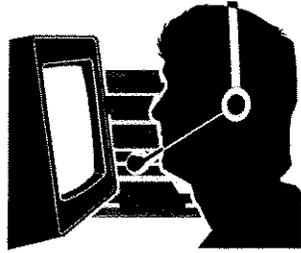


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**PLAN NARRATIVE  
FOR  
PULASKI COUNTY**

**Pulaski County Modified Plan for  
Docket Number \_\_\_\_\_  
October 2014**

# Plan Narrative

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**Pulaski County Modified Plan for  
Docket Number -----  
October 2014**

**Confidential and Proprietary – Not for Disclosure**

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**1.0 Executive Overview**

Pulaski County plans to implement a Next Generation 9-1-1 System county-wide with the primary objective to provide the citizens of Pulaski County Illinois with a high quality of 9-1-1 services. NG-911, Inc. is the 9-1-1 System Provider ("SSP").

The Pulaski County PSAP will collectively answer, process and direct all calls placed to 9-1-1 within it's jurisdictional boundaries. Pulaski County has one (1) Public Safety Answering Point (PSAP) with two (2) positions providing emergency services. Pulaski County will leave their existing PSAP in operation in its present location using the same trained, qualified, and experienced personnel.

PSAP	Backup
Pulaski County 9-1-1	Union County 9-1-1

There are two (2) geographically diverse, fully redundant NG-911, Inc. operated Data Centers (Data Centers will be used as Term of Art) which house the NG9-1-1 network Functional Elements (FEs), one at the Jackson County Sheriff's Office in Murphysboro and the second at the Saline County Sheriff's Office in Harrisburg.

Pulaski County has entered into an agreement with other Illinois Public Safety Agencies known as The Counties of Southern Illinois, hereafter called CSI. CSI refers to sixteen (16) Emergency Telephone System Boards (ETSBs) with Public Safety responsibilities in (15) Counties: Alexander, Clay, Gallatin, Jackson, Johnson, Marion, Massac, Perry, Pulaski, Richland, Saline, Union, Wabash, White, Williamson and one (1) city, the City of Marion. Pulaski County and the other CSI ETSBs formed a 501(c) 3 not for profit corporation to plan, fund and cooperate in a National Emergency Number Association (NENA) standards-based regional Next Generation 9-1-1 (NG9-1-1) solution.

The Service Provider Agreement is severally binding upon CSI and each of the members of CSI that signed the contract, including Pulaski County. (See, Exhibit 11, first paragraph and paragraph 28 (confidential)) Consequently, there is a direct contract between NG-911, Inc. and Pulaski County independent of the agreement between NG-911, Inc. and CSI and/or the other CSI members.

The Next Generation 9-1-1 system will increase functionality, redundancy, diversity, and scalability. The system will have automatic failover capability between the two Data Centers. Having two Data Centers to serve the PSAPs in the Emergency Services Internet Protocol Network (ESInet) will increase reliability 100%. The new NG9-1-1 system by design has redundancy built in at every point practical to eliminate all Single Points of Failure (SPOF.)

The NG9-1-1 system will handle calls from all Carriers that are answered today. The NG9-1-1 ESInet will enable a wide spectrum of users to utilize emergency support services, such as hearing impaired, deaf, speech impaired, and non-English speaking callers. The new system will also incorporate the TTY technology that serves hearing and speech impaired end users.

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The NG9-1-1 system fully integrates with a local ALI database management system as well as an integrated Mapped-ALI display. The ALI database management system (ALI DBMS) is Internet Protocol (IP)-based and for traditional wireline calls operates exactly as the existing ALI.

Pulaski County is currently handling Phase II wireless calls and this system will be as accurate in locating wireless callers as the current system.

**Radio / Telecommunications**

All emergency services within Pulaski County, Illinois have the capability to be linked either by radio or telephonically. Details on both primary and secondary communication procedures are contained in the Call Handling Intergovernmental Agreements

**Dispatch to Participating and Adjacent Agencies**

Details of the elaborate dispatch system utilized by the primary PSAP is detailed in the Call Handling Intergovernmental Agreements. Details in said Agreements also cover the three (3) counties adjacent to Pulaski County being:

- Alexander County
- Massac County
- Union County

**Territory Covered by the 9-1-1 System:**

The Pulaski County enhanced 9-1-1 system provides all residents of the geographic area covered by Pulaski County with enhanced services, either directly or indirectly through direct dispatch, call transfer, or call relay.

**Telephone Companies Providing Service to Pulaski County and Their Exchanges:**

**Frontier:**

Karnak	634
Villa Ridge	342
Ullin	845

**AT & T:**

Mounds	745
Mound City	748
Olmsted	742

**Intergovernmental Agreements:**

The Pulaski County ETSB has entered into 19 separate intergovernmental agreements for call handling and system procedures with emergency service providers within Pulaski County and 31 separate agreements with the 4 adjacent counties to Pulaski County. The agreements form the basis for linkage, cooperation, and communication between both inter-county and intra-county agencies. The Pulaski County ETSB has been extremely fortunate in building a strong relationship with the area emergency services providers. Numerous informational meetings have been held and a strong spirit of mutual cooperation and problem solving has emerged. Copies of all agreements are contained and attached to this modification as exhibits under the heading Exhibit 8 & 9.

**Financial Matters:**

The cost of the system and how it will be paid for is outlined in a detailed budget attached to this modification as exhibit 7. The budget reflects the revenue and expenditures of the Pulaski County ETSB.

**Public Information:**

The Pulaski County ETSB continues to provide public awareness and information by means of several local media outlets, public presentations and school programs. The Pulaski County ETSB plans on increased publicity once the Modification is approved.

**Training:**

Per Intergovernmental Agreement with Alexander County 911, Pulaski County and Pulaski County Sheriff's Dept, (see Exhibit 13- pg. 3 & 4 item 9e) training will be provided to all personnel staffing the PSAP. The initial PSAP operators will be existing employees of the communication center where the PSAP is located and all have had previous training in emergency call handling and dispatch. The major equipment and software vendor, NG-911, Inc. will provide extensive training on all aspects of the equipment.

**Database Matters:**

The Pulaski County ETSB has designed and purchased ( per Intergovernmental Agreement with Pulaski County and Pulaski County Sheriff's Dept. (see attached agreement – pg. 3 – item 9c) a comprehensive i3 standards system that is highly sophisticated. The system will provide automatic location identification (ALI), automatic number identification (ANI), and selective routing to the PSAP. In addition, the system will feature geospatial, policy based functionality that will deliver superior service and response to the emergency needs of the citizens of Pulaski County. Every structure in Pulaski County has been identified and every residence has a street number with a street and road name. Additionally, geo-spatial numbering has been designed with address points to identify the residence where the 9-1-1 request is made. All database elements comply with NENA Data Formats for ALI, MSAG and GIS.

**Miscellaneous Information:**

The PSAP in the Pulaski County 9-1-1 System meets the following requirements:

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- A. Twenty-four hour a day operation, three hundred sixty-five days a year.
- B. A call logging recorder capable of recording, and date and time stamping of all 9-1-1 position / calls, and radio frequencies which are used to dispatch the assignments
- C. .An alternate power source, generator, capable of sustaining full operation of the PSAP, including communications, should commercial power outage occur. Each PSAP also has battery backup to allow continued operation during switch over from commercial power to alternate power.
- D. A TDD device is available at each PSAP to allow the hearing impaired citizen the same availability to 9-1-1 as all other citizens.
- E. Each PSAP will maintain a log of its calls for at least two years.
- F. The Pulaski County ETSB has adopted a complete set of Standard Operation Procedures. These include, but not limited to, trouble reporting, call tracing, emergency restoration procedures etc. These procedures are followed by the Pulaski PSAP when handling calls from the Pulaski ETSB area.

**2.0 Part 725, Section 725.205 (f)**

**2.1 Identify the 9-1-1 system providers. If multiple providers are being used, provide a detailed description of each provider's role;**

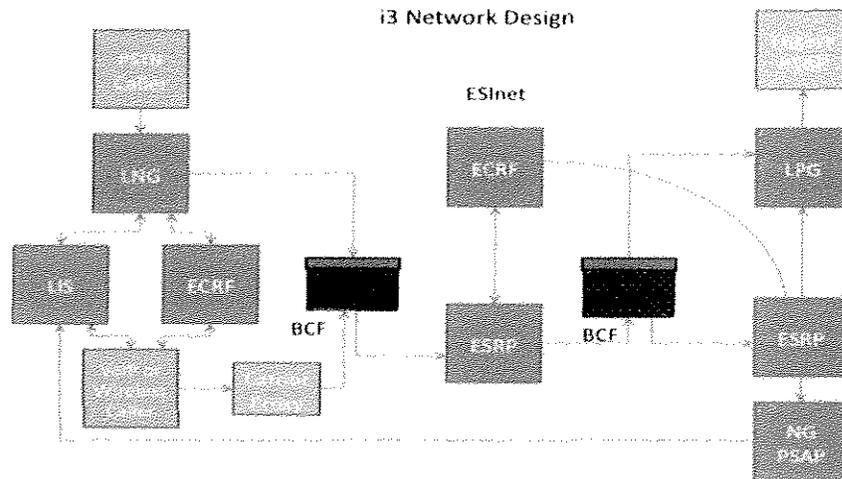
NG-911, Inc. is the sole 9-1-1 System Provider.

**2.2 Explain the new system configuration and technological architecture (i.e., network and routing);**

The NG9-1-1 architecture is comprised of an Emergency Services Internet Protocol Network (ESInet) to connect the PSAPs using IP signaling and aggregation points of interface (POIs). Indirect Access Carriers connect at the Carbondale Wire Center and Direct Access Carriers connect to the Data Centers. Each Carrier will choose from Legacy and newer protocols for trunk signaling.

The ESInet incorporates two fully duplicated Data Centers. A Session Border Controller (SBC) function provides a Firewall for protection from unwarranted Cyber Attacks, Denial of Service Attacks and/or focused Network Overloads. The design is in accordance with the NENA i3 Standards; the Data Centers are the destination points for all inbound emergency 9-1-1 traffic in the areas served. The two Data Centers are also the exit points for all traffic outbound from the ESInet such as outbound calls from one of the PSAPs serving the area to an adjacent PSAP, both on and off an ESInet.

**NG9-1-1 Call Flow**



**Figure 1 - Call Flow Diagram**

Reference Figure 1 above. The Network has the same Functional Elements (FEs) in both Data Centers for redundancy. The acronyms are explained in the text below. The blue boxes represent additional FEs with the i3 NENA Standard architecture and design. The FEs are repeated for ease in following the diagram

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(Figure 1) to show the call flow. There is only a single Emergency Call Routing Function (ECRF) and a single SBC, and a single Emergency Services Routing Proxy (ESRP) for example in each of the Data Centers.

The following text describes the Call Flow for the NG 9-1-1 architecture.

**Emergency Services IP Network (ESInet)** is an IP (Internet Protocol) network. The ESInet is a private, managed IP network, not on the open Internet. The key to network reliability is redundancy. The FEs listed below are redundant in the NG9-1-1 Design.

**LIS – the Location Information Server** stores information against a key. Keys are IP addresses, Media Access Control (MAC) addresses or telephone numbers, for legacy wireline customers. The LIS uses DHCP (Dynamic Host Configuration Protocol), the protocol that provides the IP address or HELD (a protocol identified by the Internet Engineering Task Force (IETF) to deliver HTTP (Hypertext Translation Protocol) based location protocol. The LIS is queried. The LIS returns a PIDF (Presence Information Data Format,) the new form of location. A PIDF can contain a civic (street) address or geo (X Y) coordinates. Location may be obtained by value or by reference. Location by value means the actual location is sent in the signaling. Location by reference supplies a URI (Uniform Resource Identifier) with a SIP or HELD protocol.

**ECRF – the Emergency Call Routing Function** (a.k.a. IP Selective Router database instructions for call routing) is the heart of the NG9-1-1 routing database used for ALL calls. It is queried using the LoST (Location to Server Translation) protocol. It sends location (PIDF) in, plus a service URN (Uniform Resource Name) and gets a URI, typically a SIP URI of where to send the call. Conceptually the ECRF geocodes a civic address to a geo, and uses a point-in-polygon algorithm against a set of service boundary polygons that represent the area served by a PSAP. ECRF replaces the MSAG (Master Street Address Guide) and ESN (Emergency Service Number) codes. The External ECRF (sometimes called the Public LoST server) routes to the correct ESInet and the originating ESRP (Emergency Services Routing Proxy) within it. Inside the ESInet, the Internal ECRF (sometimes called the Private LoST server) routes calls to the correct PSAP.

**ESRP – the Emergency Services Routing Proxy** (a.k.a. IP Selective Routing). The ESRP is the call routing engine. The ESRP uses the ECRF to choose a nominal next hop in routing. It then applies the route policy of the next nominal hop to determine the next actual hop. Route policy can take into account the state of the PSAPs, congestion, media server, source of the call and suspicion level provided by the border control function and more. Route decisions can include the next ESRP, a nominal PSAP, diversion PSAP, IMR (Interactive Media Response System) or Busy.

**PRF – the Policy Routing Function** evaluates the PSAP (Agency) controlled rules about how calls are routed in the ESRP. Inputs include the PSAP (System) state, congestion state, security posture, call suspicion, call state (SIP headers and added data) and more. The output is a routing decision. The ESRP queries the ECRF with location for the nominal next hop". That entity's policy is obtained from a policy store and interpreted. For example, rules are in the form of IF "this is true," THEN do "that." "This" is the input conditions expressed with and/or statements. "That" is the route, the actual PSAP, diversion PSAP, IMR, or Busy. Policy is dynamic which means the capability to change it at any time to new calls route with new rules. Policy rules have a standardized format.

**BCF – the Border Control Function** provides the External security border for the ESInet and the internal isolation border for the PSAP. It has both firewall and Session Border Controller (SBC) (SIP specific) parts. It marks calls with suspicion levels and has functions to block specific call sources. The ESInet BCF will withstand the largest feasible attack, currently known to be in the range of 10 Gigabits.

**NG PSAP - the Next Generation PSAP** gets all calls from the ESInet via SIP protocols with Location routed by the ECRFs. The PSAP will use the ECRF/ESRP function to route to queues of call takers.

**LNG and LPG – Legacy Network Gateways and Legacy PSAP Gateways**

There are entry and exit points to and from the ESInet which will exist as long as there are non IP communications devices in the network. They are called Legacy Network Gateways (LNG) and Legacy PSAP Gateways (LPG). Inside the ESInet the architecture uses IP protocol based communications.

**LNG - the Legacy Network Gateway** serves as the bridge between the existing originating networks and the ESInet. One means of interface to the LNG for transition purposes is the existing Selective Router interface to the LNGs. This is an initial step to bring the CAMA/MF, SS7 and ISDN PRI (Legacy Signaling protocols) interfaces to the ESInet. The LNG is always outside the ESInet. It will reside in each of the dual Data Centers housing the redundant ESInet FEs in Harrisburg and Murphysboro. The LNG routes via the ECRF, always coming through the BCFs. Specifically the LNG uses the ESRP to route the calls. The LNG interworks location protocols and formats between the legacy network and the ESInet. The E2 interface (wireless) or internal LIS (replaces ALI Data for wireline) faces toward the legacy network. The LNG either supplies location-by-value in the SIP signaling, or may supply a location reference that resolves to itself using SIP or HELD protocol towards the ESInet. This will be part of the architecture as long as legacy networks are deployed. The LNG is on the Access side of the network architecture.

**LPG – the Legacy PSAP Gateway** allows existing non-upgraded PSAPs to connect to the ESInet.

**LVF – the Location Validation Function (LVF)** is used by the LIS Operator to validate location before loading it into the LIS. Similar to MSAG validation, the LVF verifies that the location matches a known address within the 9-1-1 Authority's service area. It is like the ECRF, using the same protocols and same data. The LVF can validate to the street address, not just address range. It can also validate to the building, floor, and unit (apartment, suite, etc.) and room. The LVF introduces a few new address elements, for example, the prefix for a street type. Addresses inside the NG9-1-1 standard systems are conformant to the new FGDC (Federal Geographic Data Committee) standards.

**Additional Data**

**Call data** is supplied by service providers in the path and possibly the device itself, signaled with the call, by value or by reference. Call data contains Access Carrier Contact data, Subscriber data, Service data (Class of Service equivalent), and device-specific data such as sensors, telematics, etc.

**Caller data** is specific to the caller (home, work or cell provide the same data) and can be signaled with the call or queried from a database. It contains Contact Data, Emergency Contact Data, Medical Data, etc.

**Location data** is specific to the location of the call; two calls from the same location will have the same location data. An ECRF query with a special service URN yields a URI to the data. Location data contains

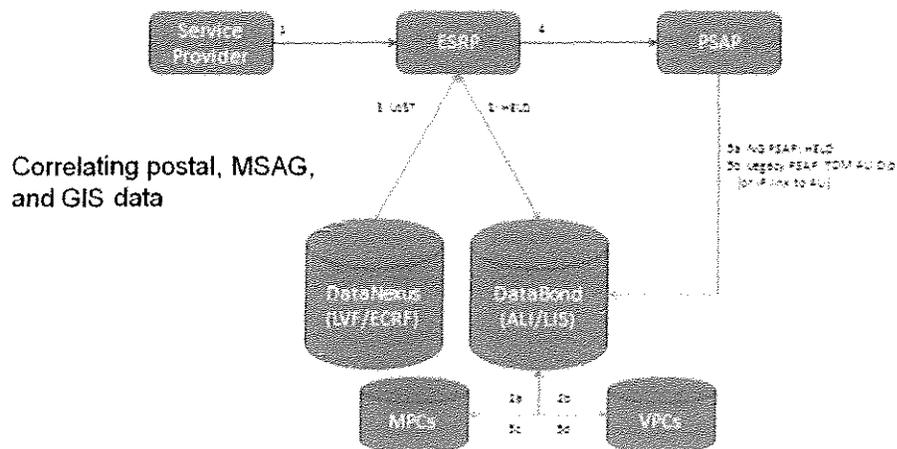
Building Owner/Tenant Contact information, Floor Plans, Alarm and Sensor data, Control Panel data and more.

**Database Flow**

Reference Figure 2.

Database flow starts with a LIS, a Location Information Services function. A LIS or its equivalent is required to support interactive validation functions, and is especially crucial to support over the top IP based originating services. The LIS is the equivalent of the ALI Database in the new NENA i3 environment only it is much more.

When a call comes from an Access Carrier (or Service Provider) as shown below, it goes to the ESRP Emergency Services Routing Proxy via the SBC, Session Border Controller not shown below. The ESRP queries the pre-populated LIS Database and, if needed, goes to the MPC, Mobile Positioning Center/ Gateway Mobile Location Center System, or the VPC, the VoIP Positioning Center System to rebid and see if there is better location information. The ESRP queries the Server going into the ECRF the Emergency Services routing Proxy to determine which PSAP should handle the call. The ESInet gathers all relevant information sending the call with the data to the PSAP for answering. In the ESInet architecture, the PSAP equipment does not do the data dip to the database.



**Figure 2 - Database Flow**

NG-911, Inc. is responsible for all functional aspects of database operations and will coordinate with the Access Providers to receive updates and maintain the database(s).

**Frontier Aggregation Service – (FAS)**

Access Traffic will be delivered for Pulaski County through what has been called the Frontier Aggregation Service (FAS). NG-911, Inc. has contracted with Frontier to aggregate Access Carrier traffic from Frontier and other Access Carrier offices and deliver it to the NG-911, Inc. Data Centers in Murphysboro and Harrisburg.

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The Frontier Fiber/Copper Ring provides diversity from both Carbondale, Illinois and Indiana Wire Centers into the Frontier Murphysboro and Harrisburg Wire Centers. From there, 20 megabits of Ethernet traffic is extended into the two (2) NG-911, Inc. Data Centers. Traffic will be converted through the FAS ESRP to SIP Ethernet over Copper. Calls will be routed by the NG-911, Inc. FEs in the 2 Data Centers onto the Clearwave fiber and routed to the proper PSAPs.

The Frontier Aggregation process converts the legacy protocols to SIP before delivering them to the two (2) Data Centers on new diverse facilities. The size of the routes from FAS to the Data Centers reflects the total demand of the 9-1-1 trunking in the network architecture for voice. This will carry the full load should one Data Center or transport route completely fail.

All Access Carriers except Clearwave are connecting through the Frontier FAS. The network diagram shows Clearwave connecting to the ESInet. Any changes in the connection of Access Carriers in the future will require Pulaski County to request Commission approval before those changes can be made. As of this filing Clearwave has reserved the NXXs but has no customers served the Pulaski ETSB area for 911.

Carriers do not have to order or arrange to use the FAS service. Pulaski Wireless Carriers are already connected to Frontier for access in Pulaski County. For this Pulaski County filing, there is no change. The FAS service is an agreement between Frontier and NG-911, Inc.

### **Clearwave Service Access**

Access traffic from the Clearwave Central Office in Marion, Illinois carries calls originating [primarily through the use of Local Number Portability (LNP)] in Pulaski County served by the Clearwave MetaSwitch Softswitch. The Clearwave MetaSwitch will route the calls over the Clearwave Fiber network into the two (2) Data Centers at Murphysboro and Harrisburg. There will be two (2) Clearwave trunks providing 32 paths each as shown on Exhibit 10. Translations in the Clearwave Meta Switch send the calls primary and alternate to the two (2) Data Centers for completion to the designated PSAPs based on the location of the caller.

Frontier Aggregation and Clearwave calls will all use SIP trunking before the calls get access to the ESInet.

Access Carriers have the option to complete 9-1-1 calls via FAS, Clearwave fiber or direct connect.

### **Transfer Calls Out of the Network**

In this document, NG9-1-1 PSAPS are called on-net PSAPs (and will be functioning on an ESInet) and Legacy PSAPs are called off-net PSAPs. If a call is received for a PSAP adjacent to Pulaski County that is an off-net Legacy PSAP, Pulaski County will transfer 9-1-1 calls to a 10-digit administrative line. However, if the FAS transfer solution becomes fully operational, Pulaski will begin utilizing the FAS solution to transfer calls to off-net PSAPs with ANI instead of transferring to a 10 digit number without ANI.

If a call is received for a PSAP adjacent to Pulaski County that is an on-net PSAP or becomes a part of the NG9-1-1 ESInet at a later date, those transfers will be done using the ESInet protocols and functional elements.

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### Transfers out of Pulaski County:

Transfer Originates from County/ETSB	Transfer to County/ETSB	Transfer Process Primary	Transfer Process - Alternate	Effective Date
Pulaski	Union	10 Digit Number/FAS Solution with ANI or via the ESInet	LEADS	ICC Plan approval/completed testing *
	Johnson	10 Digit Number/FAS Solution with ANI or via the ESInet	LEADS	ICC Plan approval/completed testing *
	Massac	10 Digit Number/FAS Solution with ANI	LEADS	ICC Plan approval/completed testing *

\*Note: Union and Johnson Counties are currently considered off-net PSAPs, however they have filed their NG9-1-1 Plans with the ICC in dockets 14-0484 and 14-0578. Once Union and Johnson begin operating on the NG9-1-1 ESInet and are considered on-net PSAPs, Pulaski County will begin transferring 9-1-1 calls to Union and Johnson via the ESInet as stated above.

### Transfer Calls into the ESInet

There are some cases where calls may be required to be transferred into the NG9-1-1 ESInet to Pulaski County from a neighboring Legacy off-net PSAP. Currently, the off-net PSAP will transfer 9-1-1 calls to a 10 digit number at Pulaski County. However if the FAS transfer solution becomes fully operational the off-net PSAPs can begin utilizing the FAS solution to transfer calls to Pulaski on the ESInet with ANI instead of to the 10 digit number without ANI.

### Transfers to Pulaski County:

Transfer Originates from County/ETSB	Transfer to County/ETSB	Transfer Process Primary	Transfer Process - Alternate	Effective Date
Union	Pulaski	10 Digit Number/ FAS Solution with ANI or via the ESInet	LEADS	ICC Plan approval/completed testing *
Johnson		10 Digit Number or FAS Solution with ANI or via the ESInet	LEADS	ICC Plan approval/completed testing *
Massac		10 Digit Number or FAS Solution with ANI	LEADS	ICC Plan approval/completed testing *

\*Note: Union and Johnson Counties are currently considered off-net PSAPs, however they have filed their NG9-1-1 Plan with the ICC in dockets 14-0484 and 14-0578. Once Union and Johnson begin operating on the NG9-1-1 ESInet and are considered on-net PSAPs, they will begin transferring 9-1-1 calls to Pulaski County via the ESInet as stated above.

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### **2.3 Explain what national standards, protocols, and/or operating measures will be followed;**

NG-911, Inc. has assembled the best FEs available from the vendors who comply with the NENA NG9-11 i3 standards. NG9-1-1 is an integrated standard based IP NENA solution. The Pulaski County NG9-1-1 network Design Plan conforms to the NENA Standards.

For a complete list of standards, please see the i3 standards references on the [www.nena.org](http://www.nena.org) website.

The internal ESInet operates on SIP protocols. Access Carriers may retain their legacy access protocols they have in place today. The LNG will convert older existing protocols to SIP. In the case of the initial deployment of FAS, the FAS INdigital Functional Elements in Carbondale and Fort Wayne, Indiana will do the conversion to SIP before the calls are sent to the NG9-1-1 Data Centers.

### **2.4 Explain what measures have been taken to create a robust, reliable and diverse/redundant network;**

The Design is based on building redundant systems to avoid any single point of failure (SPOF) in the ESInet. The NG9-1-1 system will provide flexibility in the routing of calls. The ESInet being deployed has all PSAPs connected and can route calls based on not only location, but also by availability. Currently, if a PSAP has only two (2) trunks from a legacy Selective Router, the third caller gets a busy signal. In a Next Generation solution, that caller will be answered through intelligent routing. Additionally, there will be more available positions to answer calls because all connected PSAPs will be technically able to answer the call and will be able to dispatch or transfer the call to another PSAP. In the case of FAS, the legacy Selective Router is still in the call flow. Direct Carriers operate as described in the standards.

The hardware and software is expandable by installing additional components, such as servers, gateways and workstations as needed. The hardware is comprised of off the shelf servers and NENA compliant software. The Workstations used by the Call Takers are Dell computers, so there is not a barrier to replacing equipment if hardware fails.

In the event that 9-1-1 calls are unable to be answered by the primary PSAP (for whatever reason), calls will be routed to the Backup PSAP designated in the 9-1-1 Plan. Pulaski County will utilize the existing backup plans for the 1st layer of backup. The IP network allows flexibility to deliver overflow or re-routed calls to pre-determined Backup PSAPs. Calls can be routed to the Backup location through the software.

### **2.5 Explain what functional elements and external interfaces will be needed for the NG9-1-1 system to supply data and assistance in processing an emergency call;**

#### Security -Session Border Control

The SBC will act as a sophisticated firewall to protect the NG9-1-1 system from Denial of Service Attacks, malicious or accidental attempts that could cause ESInet network overload, and other intrusive security breach attempts. The SBC satisfies critical security, service assurance, and regulatory requirements and supports multiple protocols including SIP, H.323, MGCP/NCS, H.248 and RTSP and multiple border points.

A Session Border Controller (SBC) firewall is being installed in each of the Data Centers. The same system has been installed and tested extensively at the Illinois Institute of Technology Real Time Communications Laboratory (IIT RTCL) simulating loads well beyond what can be developed in the field.

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### Database Management Software

The software will enable NG-911, Inc. to manage the ALI database. The software fully integrates with the other FEs of the NG9-1-1 system and performs data validation, request/response software, managing data quality and providing real-time communication tools.

### Map

The IP-based mapping system fully integrates with all the other components of the NG9-1-1 system.

### IP Selective Router / Switch

The IP Selective Router equipment and software being deployed meets the redundancy and resiliency that is required by the NG-911, Inc.

### Recorder

This function includes call recording, data integration and reporting tools.

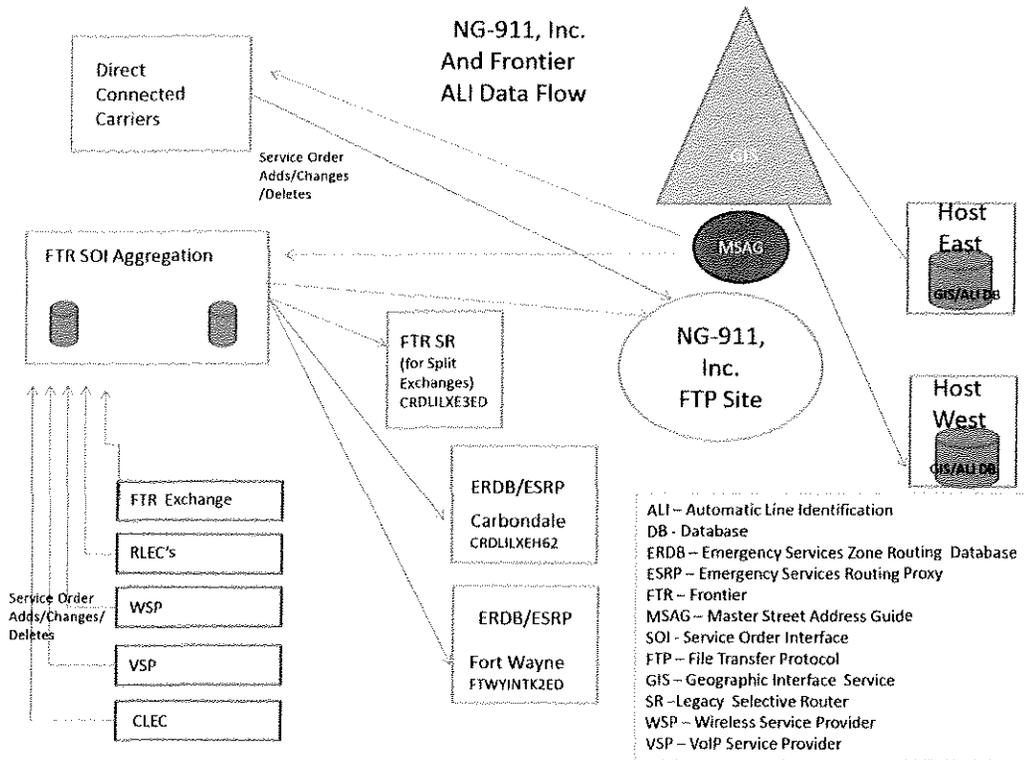
### Monitoring

The Monitoring solution captures call completion and other data in real time from relevant general-purpose and NG9-1-1 platforms from a wide variety of vendors and telecommunications equipment manufacturers. Algorithms sort through the data to capture and rapidly analyze only the information that applies to situations in which emergency calls are at risk of not being delivered. The rigorous analysis identifies emergency services call trouble areas, and rapidly identifies network failures and congestion points that may be interfering with these calls.

### **2.6 Explain how the existing 9-1-1 traditional legacy wireline and wireless databases will interface and/or be transitioned into the NG9-1-1 system;**

NG-911, Inc. will ensure the Database records are received from the Access Carriers reviewed as they are today for location accuracy, accepted, validated and integrated into the active working records.

Customer Records come from the Service Order Process of the Access Carriers. The Access Carriers that use the FAS will transmit the database updates to Frontier who will provide accurate ALI records to NG-911, Inc. NG-911, Inc. will work closely with Frontier on Database updates. For FAS carriers, the Initial Service Order information will continue going to Frontier who will load it into the Frontier split exchange database for split exchange call handling and pass these Service Order updates to NG-911, Inc. for updating the NG-911, Inc. Functional Elements. Service Order updates to the NG9-1-1 ALI records will be accomplished using database management software to process updates from all Access Carriers FAS and Direct Carriers. See Figure 3.



**Figure 3 Database Management for Direct and FAS Access Carrier Records**

Direct connect carriers will provide ALI updates to NG-911, Inc. via a FTP site.

PS/ALI will work in the same manner as the standard service order updates. If the PS/ALI customer is connected to the FAS, updates to PS/ALI records will be included with other service order updates from Frontier. There are no direct connected PS/ALI customers at the time of filing. The Next Generation System will accept ISDN, PRI and SIP trunking directly from the PS/ALI customers' switch. If there are direct connected PS/ALI customers in the future, updates will be sent via the same FTP site as direct connect carriers.

The ALI Database is hosted onsite in the two (2) Data Centers in the Database FEs. They are duplicated and they reflect information that has been accepted, validated and aggregated and is ready to use in the 9-1-1 actual call flow.

GIS coding will be added to all Service Order records that update the ALI.

NG-911, Inc. will maintain the database in a manner that ensures that customer personnel cannot alter the data. All aspects of the ALI database process will meet NENA database standards.

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The Service Order updates that will be managed by NG-911, Inc. daily, will utilize multiple logic checks that guard against invalid ALI updates and increase the reliability of data. These invalid updates would include, but are not limited to, ensuring that the address conforms to public record including GIS ECRF data (MSAG) and that the ALI record telephone number is in a valid format. The database system supports direct service order entry, manual update as well as the import and export of NENA format.

### Steps to Test Database:

1. The 9-1-1 SSP obtains the Pulaski County ETSB ALI image copy from each Legacy 9-1-1 Carrier two weeks prior to live traffic being delivered to the NG9-1-1 System. This image copy is taken after the workweeks' updates have been processed to make the database as current as possible.
2. Updates will be sent daily (work day) from each Access Carrier directly to NG-911, Inc., as prescribed by the Commission, to update the database with the information sent from the Access Carriers.
3. Records that fail the database edits for syntax or formatting errors will be returned to the submitting Access Carrier for correction. Error records sent to Access Carriers will be tracked for resolution and completion.
4. After 10 days of running concurrent updates of the Legacy 9-1-1 Carriers' databases with the identical updates processed into the Pulaski County database, the Legacy 9-1-1 provider will provide a current (updated) version of the ALI database that will be compared against the Pulaski County database that has been updated in parallel.
5. Discrepancies will be researched and resolved, depending on the situation, with the Legacy 9-1-1 SSP or the individual Carrier that controls the records with the discrepancies.
6. Test results will be determined by reviewing the differences in the database on a record by record basis, based on update activity
7. When these tests are successful, NG-911, Inc. will continue to process the Pulaski County updates sent from the 9-1-1 Access Carrier until live traffic is successfully cut, beginning within days of successful database testing.
8. Once live traffic is cut the respective Access Carriers' updates will be processed by to NG-911, Inc. daily.

**2.7 Explain how these databases will be maintained and how address errors will be corrected and updated on a continuing basis. In addition, explain who will be responsible for updating and maintaining the data at a minimum on a daily basis Monday-Friday;**

The updates from the Carriers will be received via the Frontier FAS service or FTP site where the adds, changes and deletes will be processed and the database updated by NG-911, Inc. Any errors will be researched and returned for correction of records and resubmission of the update

**2.8 Explain what quality of service standards will be followed to ensure the same level of quality for voice, 9-1-1 call setup time and ALI delivery for the proposed 9-1-1 system as compared to the 9-1-1 traditional legacy service;**

NG-911, Inc. and Pulaski County will utilize the Commissions' service standards for call blocking and will provide the required P.01 level of service at a minimum. Call set up will remain the same or improve with the use of SIP signaling. Since the NG9-1-1 Architecture doesn't rely on copper lines, inbound traffic is not limited by physical trunks. The NG9-1-1 Architecture will allow more calls to be answered once they are sent from the Access Carriers offices and through the initial stage of FAS.

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ALI delivery will occur in milliseconds as the ALI database is located inside the ESInet within the duplicated Data Centers.

### **2.9 Explain how new technology in the 9-1-1 system will co-exist with the 9-1-1 traditional legacy service;**

Working with NG-911, Inc., Frontier, has developed an Aggregation Service (FAS) for their end offices and other wireline ILECs', Wireless and VoIP carriers. Individual Carriers can choose to leave their facilities terminated to the Frontier network and Frontier will aggregate and transport the traffic to the two NG-911, Inc. Data Centers. The FAS process uses the Frontier Legacy DMS 100 Selective Router Switch for Split Exchange Routing.

NG-911, Inc. has purchased transport facilities using the Frontier Fiber/Copper Ring to the two (2) NG911, Inc. Data Centers for call completion for Carriers using FAS. See Exhibit 10 Diagrams for details.

#### **Frontier Aggregation Services (FAS)**

Frontier will be providing a service using their existing network and adding hardware to aggregate, route and deliver calls to NG-911, Inc.

As the 9-1-1 Service Provider (SSP), NG911 Inc. will be responsible for "selectively routing" 9-1-1 calls for Pulaski County to the appropriate Public Safety Answering Point (PSAP) within Pulaski or to the back up PSAP.

Frontier will establish 9-1-1 Trunks using Session Initiation Protocol (SIP) signaling, via high bandwidth Ethernet facilities to each of NG-911 Inc.'s "Selective Routers" (SRs') which will be located at the dual NG-911, Inc. Data Centers located in Murphysboro and Harrisburg, Illinois.

To enable the service delivery, Frontier will deploy an Emergency Service Routing Proxy (ESRP) in the Frontier Carbondale Central Office to interconnect the SIP trunks to the NG-911, Inc. dual Data Centers.

The FAS will utilize digital trunking to the Carbondale ESRP. The upgrade to digital trunking will provide a service improvement of call setup time over legacy Centralized Automatic Message Accounting (CAMA) trunking. A mated ESRP, located in Indiana, will be utilized via a high capacity data circuit for redundancy. Frontier will load balance the traffic to the NG9-1-1 Data Centers.

Frontier will continue to selectively route 9-1-1 calls for split exchanges to the appropriate PSAPs for any county and/or jurisdiction, other than Pulaski County, that uses Frontier as their 9-1-1 SSP. Frontier may also need to selectively route remote exchanges where the host switch does not exclusively serve the county, unless alternate arrangements are available. *Refer to the Split Exchange details for Pulaski County below.*

Frontier will provide to NG-911 Inc., a download of the Frontier 911 ALI database that pertains to Pulaski County records. The database copy will be stored in the NG -911, Inc. Next Generation 9-1-1 Functional Elements (FEs) which include ALI and GIS data. NG-911, Inc. will receive daily updates from Frontier and will be responsible for maintaining the ALI records for Pulaski County. The service order records from the FAS Access Carriers (including Frontier) and any directly connected Access Carriers will be reviewed, geo-coded and loaded into the NG9-1-1 GIS database Functional Elements daily (Monday – Friday). NG911, Inc., as the 911 SSP, manages all data in the two (2) redundant Data Centers in Murphysboro and

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Harrisburg. Pulaski County 9-1-1 calls will be processed and the routes selected to the PSAPs using the new GIS database.

Frontier will route and deliver 9-1-1 traffic from the FAS for any ILECs, CLECs, VOIP, and wireless Carriers that are currently connected to the Frontier Carbondale SR to the NG9-1-1, Inc. Selective Routers, with the exception of any carrier(s) that choose to directly connect to the NG-911, Inc. Selective Routers.

### Split Exchanges – Pulaski County

Split exchanges in Telephone Company Central Offices are supported in the NG9-1-1 network architecture. Clearwave as a direct connected carrier does not require the FAS solution to resolve Split exchange issues. Clearwave will perform 10-digit screening in their Softswitch. This will allow Clearwave on a customer-specific basis to send the calls to the correct 9-1-1 Provider.

During the preliminary testing between NG-911, Inc. and Clearwave through the ESInet, ANI/ALI information was available from Clearwave's switch.

Because of the FAS agreement, there are processes in place to resolve split exchanges for access carriers using FAS. Frontier and NG-911, Inc. will designate the exchanges that are split; Frontier will use their own database first to determine where to send the calls, either to their E9-1-1 PSAPs or to the FAS architecture for delivery to the NG-911, Inc. Data Centers for selective routing to the Pulaski County PSAP.

In Pulaski County, the split exchanges are managed in two places in a consistent fashion: the Frontier Carbondale DMS 100 and the NG9-1-1 Database.

1. The FAS retains the DMS 100 Tandem to route the legacy 9-1-1 calls for callers outside the Pulaski County footprint to the legacy PSAPs in neighboring Union, Johnson and Massac PSAPs, while forwarding the Pulaski County 911 calls from those same split exchanges to the new NG9-1-1 network for completion to the Pulaski County PSAPs.
2. The NG-911, Inc. GIS Databases accept the Pulaski County 9-1-1 calls and route them through the NG9-1-1 network architecture via the Data Center FEs to the Pulaski County PSAP.
3. The Pulaski County included split exchanges:

Pulaski County Access Carrier	Split Exchanges in this application	618 NPA NXXs	Split with
Frontier	Dongola DONGILXERS0	827	Union
Frontier	Cypress CYPRILXERS0	657	Johnson
Frontier	Karnak KRNKILXERS0	634	Johnson Massac
Frontier	Joppa JOPPILXERS2	543	Massac

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### Pulaski County Split Exchanges that are Opted In:

Pulaski County Access Carrier	Split Exchanges Opted In FAS DMS 100 Routed to other ETSBs	618 NPA NXXs	From ETSB
AT & T	Ullin ULLNILXERS2	845	Alexander County

- 2.10 Explain what security measures will be placed on the IP 9-1-1 network and equipment to safeguard it from malicious attacks or threats to the system operation and what level of confidentiality will be placed on the system in order to keep unauthorized individuals from accessing it;**

Security for IP based NG 9-1-1 is comprised of physical and logical layers. The locations of each data center have physical security layers, which include but not limited to: Secure entry, limited access entry and video/audio recordings.

All calls and network users are authenticated for security reasons. Calls are routed based on location. Being IP-based, the system can route calls based on network and/or PSAP access conditions, under database rules set and controllable.

The software components of the system have logical security i.e., Login and Password. Passwords will be controlled by the Data Center administrators and limited to IT staff. All employees that work with the equipment will have their own passwords and the log-ins will be recorded at time of log-in and log-off.

All employees, including IT staff, employees and custodial employees, are required to carry departmental identification and are fingerprinted as well.

The role of the Session Border Controller (SBC) or sometimes called the Border Control Function (BCF) was described earlier in this document. All 9-1-1 calls will pass through the SBCs located in both Data Centers to avoid overload and malicious attacks. See below Figure 4 for the FAS Security configuration and Figure 5 for Direct Connect Security Configuration.

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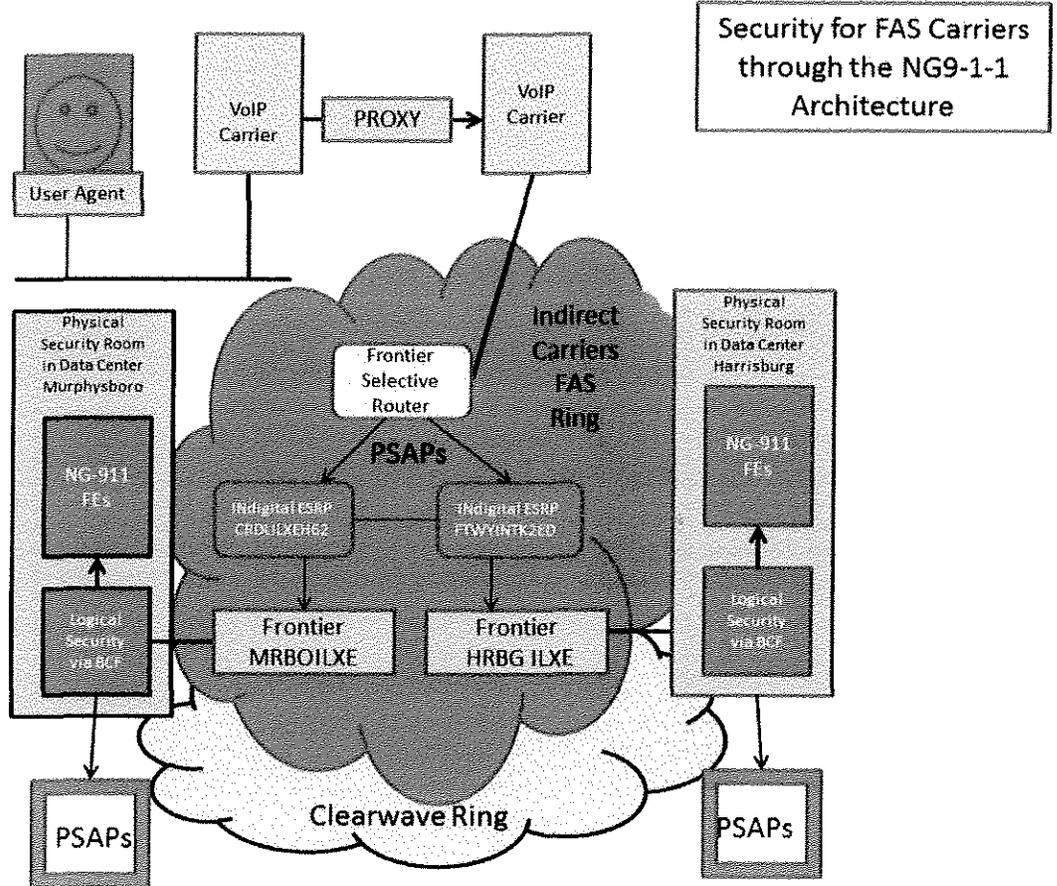


Figure 4 – Security FAS

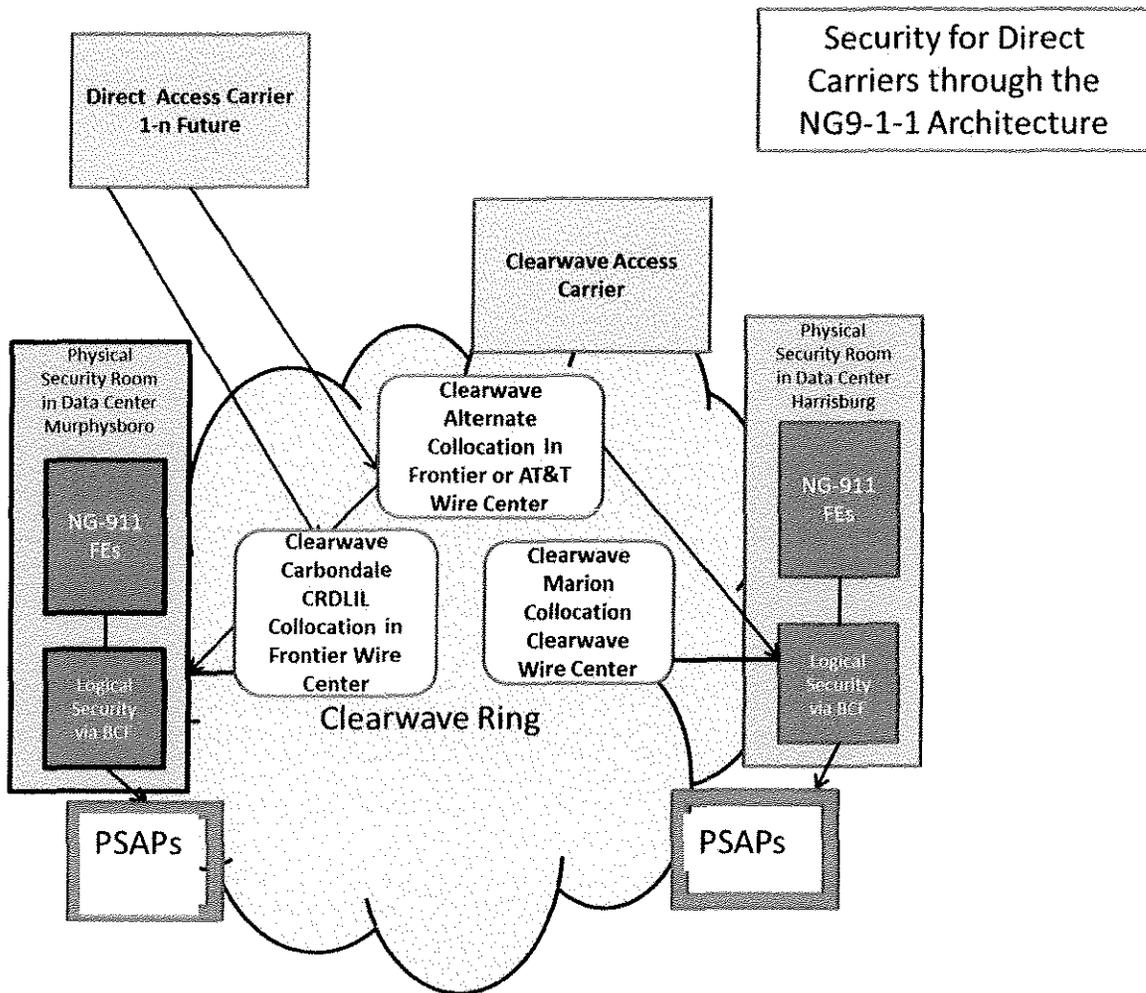


Figure 5 Security Direct

**2.11 Provide a detailed transition plan for the newly designed system;**

Initial Cutover Strategy will be cooperative with Carriers including the Frontier Aggregation Carrier.

The Cutover Plan will validate the translations in the network are operational for primary, alternate and disaster situations to ensure the proper response gets to the PSAP even if the network is overloaded.

Cutover will occur Carrier-by-Carrier in the mutually agreeable Carrier and PSAP maintenance window for 9-1-1 services. The process includes:

- Optimization of physical and logical routes
- Circuit ordering process outlined and confirmed
- Field Testing resulting in Cutover Ready Transition
- Agreement on Primary and Alternate Routing Rules

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- Translations for Load Balance and Routing in the Carrier Network
- Sharing of Carrier Test Numbers
- Addition of Carrier Test Numbers into the NG9-1-1 Database Records
- Selective Router trunking to Data Centers
- Originating Rate Center (NPA-NXX) to PSAP
- Verify PSAP before and after Dispatch
- Make Access Trunks Busy and Verify Load Balance
- Log off workstations and verify Primary / Alternate PSAP

Traffic will be live after all steps are complete.

Dual network access will be available for 14 days after successful cutover of the ESInet. Pulaski County ETSB plans to cut to live service after successful field testing.

All Access Carriers that have not direct connected to the Data Centers will be delivered using the Frontier Aggregation Service. IP trunking connectivity will be utilized where ever practical. Once the new trunking is installed, field testing will commence. The transfer of the 9-1-1 traffic load will occur after all field tests of the ESInet, the appropriate PSAP or PSAPs required to accept the traffic have been equipped with the new IP work station equipment and have passed both lab and field testing. A deployment schedule will be developed to coordinate these activities. Refer to the Access Carrier Test Plan, Exhibit 10.2, and the Integrated Test Plan, Exhibit 10.1

When all tests are successful, the first access traffic load will be delivered to the appropriate PSAP/PSAPs in accordance with the deployment schedule. Subsequent migration will occur as specified in the deployment schedule.

### **2.12 Provide a disaster recovery plan for system failures and outages;**

The NG9-1-1 ESInet is by Design a reliable network. The factors that make it a good network during national security and emergency preparedness situations include:

1. The dual Data Centers in Murphysboro and Harrisburg are more than 50 miles apart.
2. Duplicated capabilities of the FEs within each Data Center.
3. Having a balanced load on the Data Centers with dual access requested of the Access Carriers makes this a good plan in Disaster Recovery scenarios. Manual switchover to a Disaster Recovery PSAP often requires staffing and physical switching over to a configuration that is only tested once in a while.

Access Carriers will connect in a way that supports Disaster Recovery principles.

1. Direct Dual Trunking
2. Alternate Facilities Routes
3. SLAs for service quality problem identification and resolution.
4. Monitoring tools to see problems that are simplex in nature and get them rapidly corrected before they become service affecting for customers trying to reach 9-1-1.

Business Processes are Critical to Disaster Recovery Principles.

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1. Planning for Disasters in the ongoing design, engineering and during growth of the network.
2. The need for good records exchange with Carriers, Methods of Procedures for work activities signed off and communicated ahead of a planned event.
3. Use of Maintenance Windows that are strict before any change is made to the network.
4. Proper staffing and coverage and a call out plan for emergencies.
5. Training on the FEs and on processes and procedures.
6. Communications capabilities using the IP PBX.
7. Use of Conference Bridges and other means of communications during cutovers, planned major activities and during major outages or emergencies. Radios etc.
8. Documented Disaster Plans in case of natural disasters such as earthquakes, floods, tornadoes, electrical grid problems, prison breaks, plane crashes, bomb threats and physical and cyberattacks on the Data Centers and more.
9. Testing of Scenarios planned and unplanned, exercises involving staged incidents.
10. Offers to participate with Access Carriers, during their annual Disaster Recovery exercises.
11. Use of Best Practices in password protection and physical and logical security protection. Note: FCC provides industry Best Practices. FCC CSRIC includes NG9-1-1. [www.fcc.gov](http://www.fcc.gov).
12. Session Border Controllers (SBCs) to prevent, thwart and alert for unwarranted attacks on the network.
13. Facility diversity where possible and uninterrupted power supply (UPS) and generators to ensure the system can run indefinitely. In event of commercial power failure, UPS systems and generators will be utilized until electrical service is restored.
14. Grounding of the Data Centers to industry requirements.
15. Pulaski County will comply with NENA standards and sound Information Technology policy.
16. Standard procedures to maintain telephony and computer equipment will be utilized, including HVAC and other environmental controls to ensure optimum conditions for the ongoing function of the hardware.

If PSAPs must abandon a physical site, the calls can be rerouted to other PSAPs in real time through changes in software and tables.

Pulaski County's system is resilient and fault tolerant. The failure of individual components, such as Local Exchange End Offices, will not bring the NG9-1-1 system down because the components utilized in the NG9-1-1 system are geographically diverse and the network is designed for redundancy and resiliency.

### **2.13 Provide a contingency plan in the event that the new system fails or the 9-1-1 system provider does not fulfill its obligation;**

Because of the diverse and duplicated nature of the ESInet and its components, the system is designed not to fail. Following NENA guidelines, the plan supports 99.999% reliability. The total system will be tested prior to deployment. It is important to distinguish the nature of the "Next Generation" services (NG91-1) from the legacy 9-1-1 systems. NG9-1-1 is far different from the current (legacy) system, in which wireline, wireless and TTY/TDD calls are directed to PSAPs via selective routers owned and operated by telephone Carriers.

The transition to a new 911 SSP will not require significant additional capital expenditure for Pulaski County. Pulaski County has a long-term lease on the equipment and software. Pulaski County has obtained the network (e.g., fiber) from Clearwave. Clearwave is the underlying network provider (Carrier) and Pulaski

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County either owns the equipment or leases the equipment on a long term basis. The network utilized by Pulaski County could be replaced, or Pulaski County could elect to continue using the same network.

The ESInet uses standards based open architecture standards. The NG9-1-1 equipment, software and services are in compliance with NENA standards, including the requirement for open architecture systems for call delivery, mapping, CAD and other components. The Emergency Services IP Network (ESInet) delivers voice, video, text and data to the PSAP using SIP or IP Multimedia Subsystem (IMS), which incorporates SIP. NENA standards prescribe SIP and IMS architectures to maximize interoperability and flexibility. Several manufacturers offer IP Selective Routers, Gateways and other equipment and software that utilize open architecture. Recording, mapping and CAD systems are available from numerous vendors.

Pulaski County has contracted with NG-911, Inc. to serve as the 911 SSP to provide and maintain the Database and assume the attendant Regulatory responsibilities. In the event NG-911, Inc. does not fulfill its obligation, Pulaski County will contract with another SSP (the Next SSP).

If NG-911, Inc. ceases doing business as a 911 SSP, the Next SSP will need to provide Database management. Database management is a service offered by multiple vendors. Software, including the software utilized by Pulaski County is available if the database is managed internally. The 911 SSP will maintain the Database using NENA standards, so the format should be universal. The "next provider" will also be responsible for updating the ECRF; several companies presently solicit for that business.

NG-911, Inc. does not anticipate being out of business; however, if, for any reason NG-911, Inc. was unable to continue in business, the Database and all other files would be provided to the Next SSP in an orderly and professional manner to avoid any possibility of service interruption.

The ESInet is not a single system. Failure of a path or a portion of a path does not constitute total system failure. As stated earlier, all ESInet and PSAP components are based on standards and are duplicated and readily available from current vendors or other vendors.

### **2.14 Describe the financial and technical resources that the 9-1-1 authority needs in order to sustain such a system; and**

Pulaski County as part of CSI has shared the cost of the common functional elements, described as the FEs throughout the document. The CSI members, including Pulaski County paid a portion of the cost of purchasing the next-generation equipment for the Data Centers and the network. The \$600,000 Department of Justice COPS program grant and the \$100,000 Delta Regional Authority grants were used to purchase the new PSAP equipment. The Clearwave BTOP grant was used to provide fiber for the ESInet and the hardware and software for the Data Centers. Under terms of the grant, they are providing low-cost fiber connections to the PSAPs. CSI has already provided the local match for these grants of \$450,000.

CSI has already paid for GIS services through Southern Illinois University and has prepaid the first three years of maintenance on the system.

The Pulaski County ETSB has been operating an enhanced 9-1-1 system since 1999. Most of those functions will not change, so the annual budget will have very little change. Old maintenance contracts on legacy 9-1-1 equipment and software will end. Pulaski County's current operating expenses for personnel, office operations, road signs, education, training, radio, CAD and recording systems, etc. will remain the same.

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The ETSB Members are appointed by the county boards. If the ETSBs' ever fall short on funds, the County government must pay for the service. They have the taxing authority to raise additional funds if needed.

Pulaski County and the other CSI members have already shared the costs of the investment in the NG9-11 network. There are two diverse Data Centers which house the majority of the NG9-1-1 network Functional Elements (FEs). The Pulaski County PSAP and Union County as backup will have less onsite equipment than they currently have to own, operate, upgrade and manage today.

With a reliable and diverse network, the Pulaski County will be able to support itself in new and unique ways, leveraging the language skills in one center for example, and supporting each other during peak loads or in times of major trauma in a local area.

Pulaski County will leave it's existing PSAP in operation using the same trained, qualified, and experienced personnel and the Inter-Governmental Agreements for backup PSAPs that exist today will be honored. New Agreements will be created as required to accommodate the new capabilities of the NG9-1-1 system.

**2.15 If migrating to a new technology, file a test plan that may vary from the existing testing requirements addressed in Section 725.500(a) given the technical differences in the service offering. The test plan must thoroughly explain how the operation of the network, routing and database accuracy will be verified. Since this is a migration to new technology as outlined in 725.205 (f) (15), testing procedures will vary from what has been done historically with existing Basic 911 and E-911 systems.**

Written test plans are in Exhibits 10.1 and 10.2 to this filing. The test plan thoroughly explains how the operation of the network, routing and database accuracy will be verified. NG-911, Inc. and Pulaski County will oversee all aspects of testing the NG9-1-1 System and will be directly involved with Exhibit 10.1, Integrated Test Plan, Sections 2.2 through Section 2.12.

As discussed previously, the ALI database will be transferred from Frontier to NG-911, Inc. which will ensure that subsequent adds, deletes and changes will be processed daily. It is presumed that the ALI database maintained by Frontier meets the Commission standards set forth in Part 725.500(c), adopted from ETSA Section 15.4(d), of a 1% or less error ratio. NG-911, Inc. will verify that the ALI Database being deployed will also meet the 1% or less error ratio. Because of these methods and procedures, field testing of 40% of the wireline access lines would not add any value to testing the accuracy of the ALI Database.

Pulaski County will coordinate call through testing for each wireline end office. NG-911, Inc. will obtain from the Access Carriers, test numbers per wire center, per rate exchange, per class of service as appropriate. Testing with Carriers is described in additional detail in the Exhibit 10.1 and 10.2 Test Plans.

Pulaski County will work with NG-911, Inc. to conduct coordinated testing with the telecommunications carriers when any of the following occur:

- New central office switching installations that affect the directly connected carrier(s) and/or the FAS
- Network router, Selective Router or functional equivalent installations, upgrades or rehomes;
- NPA (Numbering Plan Area) additions
- Any other event that affects 9-1-1

Pulaski County will perform coordinated testing with private residential or business switch operators who request such testing.

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Pulaski County, in conjunction with the wireline telecommunications carriers, will test all call boxes at wireline end offices once a year and keep a running log of the testing.

In addition to all the testing described in this filing and to further ensure a smooth transition to the new system, the Pulaski County ETSB and NG-911, Inc. agrees to the following:

- Submit weekly test reports to the ICC Staff prior to cutting live to the new system
- Hold and conduct weekly implementation conference calls with all parties (9-1-1 Director NG-911, Frontier, involved access providers, involved 9-1-1 system providers, and ICC Staff)
- Submit to ICC Staff a schedule of the phased-in cut-over to the new system by exchange,
- Submit to ICC Staff traffic studies/call completion reports for 3 months after cut-over to the new system
- Submit to ICC Staff other trouble reporting if deemed necessary.