

Richland County 9-1-1

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TEST PLAN

EXHIBIT 10.1 and 10.2

NG-911, Inc. Integrated Test Plan

Coordinate with Exhibit 10.2 FAS Test Plan

December 2014

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1.0 Overview

This NG-911, Inc., Integrated Test Plan has been developed to test the functionality of the Next Generation 9-1-1 network architecture being deployed by NG-911, Inc., the SSP for Richland County. The intent is to deploy an IP-Based Next Generation 9-1-1 communication system that meets NENA NG 9-1-1 standards, including the emerging NENA IP-Capable PSAP standards. The desired results will be increased functionality, redundancy, diversity, and scalability.

Each test case has been identified with a specific Test Case number, Test Case Description, the Expected successful outcome of the Test Case and the Actual outcome of the Test Case. There are some tests that do not require any traffic or call attempt results, and those can be performed any time. There is a distinction between Access Testing and Network testing of the NG9-1-1 Architecture. Access Carriers using direct facilities and trunking into the Richland County NG 9-1-1 network FEs are distinguished from Access Carriers using the Frontier Aggregation Solution, FAS. There is a complementary Test Plan agreed upon between Frontier Communications, and NG-911, Inc. for the calls going through the FAS solution. Refer to Exhibit 10.2, FAS Test Plan.

Network Test calls will be made prior to live activation of the 9-1-1 service and Access Test calls to validate end to end performance. Some Tests are designed to demonstrate performance of the Network.

Section 3 first describes the results of tests performed with the Illinois Institute of Technology, (IIT), which determined that key components of the network design functioned in a resilient and secure fashion, and performed well under a simulated load. Section 3 describes the tests to be performed and documented.

Section 4.0 describes the testing performed with various vendors of the FEs, taking advantage of tools and automated procedures used during installation validation.

Appendix A provides a Standards Trouble Reporting and Resolution Template

Appendix B provides a General Trouble Reporting and Resolution Template

Appendix C provides an End to End Testing Template

Appendix D provides a County Carrier Test Numbers for NPA NXXs Template

2.0 Next Generation 9-1-1 System Requirements Test Cases

The following sections provide a brief description of the various functions related to the ESI-net and i3 specifications as well as test cases and expected responses for each function. The test cases have also been ordered such that they build on data that is produced by a previous test case. The test areas are listed below.

1. Network and Carrier Configuration Test Scenarios
2. PSAP Configuration Test Scenarios
3. Future PSAP Configuration Test Scenarios
4. TDD/TTY Configuration Test Scenarios
5. Logging and Instant Recall Recorders Test Scenarios
6. Management Information Systems Test Scenarios
7. System Administration Test Scenarios
8. System Performance Test Scenarios
9. System Monitoring Test Scenarios
10. Administrative Reports Test Scenarios

Note on adherence to applicable standards:

It should be noted that the test cases performed below serve also as test cases for the NENA standards that comprise the Next Generation 9-1-1 system functional elements and protocols. In particular, this test plan will validate the following list of NENA standards as they apply to this project. For terminology definitions refer to the NENA Standards.

- Flexible Call routing via Emergency Services Routing Protocol (ESRP)
- Database queries
- Origination using legacy signaling through the Legacy Network Gateway (LNG)
- SIP Origination using SIP Protocol, through the Border Control Function (BCF)

2.1 Network and Carrier Configuration Test Scenarios

The following test cases support various Network and Access Carrier Configurations. The test cases that are relevant to a particular type of Access Carrier facility can be tested as those particular facilities are activated. If feasible, the Test Cases that represents a facility type for which there is multiple Access Carriers and will be repeated for each Carrier.

Note: Test Cases that will be used for Access Carriers connected Directly to the NG9-1-1 network on an end to end basis are noted with a single asterisk (*). Test Cases that will be used for Access Carriers connected indirectly through the FAS solution are included with a double asterisk (**). Test Cases that will be used in both Access Carrier scenarios are shown with both indicators. Refer to the Exhibit 10 Network Diagram for the Direct and Indirect Access Carriers by name.

The Templates will be used to track the results that are required to be tested end to end and by Carrier.

Test Case #	Test Description	Expected Test Outcome Notes	Results/Date
NG-NC-001* **	Demonstrate the ability to support multiple types of inbound and outbound analog or digital Central Office or End Office provisioning, such as SS7, PRI/ISDN,	Received SIP calls from Clearwave. Received SIP calls from FAS.	SIP from Clearwave 5/6/13 Tested MF/SS7 Signaling through FAS, and SIP signaling. SIP from FAS ESRPs August 2014
NG-NC-002* **	Demonstrate the ability to provide a local termination/demarcation point for carriers while maintaining overall call routing configuration.	FAS Test calls route through Metro E to Switch and SBC in each Data Center. Clearwave Test numbers route to POI	Clearwave testing Successful 5/16/13 Frontier August 2014
NG-NC-003* **	Test that the solution is capable of receiving both 9-1-1 and administrative calls in a native SIP format upon installation.	Able to answer and talk	Received Clearwave SIP calls May 2013 Receiving calls from Frontier since August 2014
NG-NC-004* **	Test for the ability to accept automated update of Selective Routing information from MSAG processing.	LVF update process	Preliminary testing June Completed October 2014
NG-NC-005* **	Test for a situation where a primary PSAP is out of service or that all circuits to that PSAP are out of service, 9-1-1 calls can be routed to an alternate PSAP.	Testing situation where there is no connectivity / No Power or no one logged in.	Complete 10/10/14
NG-NC-006* **	Test that the system can provide the ability to test inbound call routing of all carriers on an ongoing basis.	System can route all carrier on an ongoing basis	Complete 10/10/14
NG-NC-007* **	Test for the ability to support additional one-button transfers to other entities.	Received code from INdigital	Completed 12/05/14

NG-NC-008* **	Test that transferred calls can provide original caller's ANI/ESRK rather than the PSAP's ID.	Clearwave no ALI for Wireline calls and no Wireless ESRKs received from Frontier 12/05/14	Clearwave NA Target 12/08/14
NG-NC-09* **	Test for real-time measurement of Quality of Service for network infrastructure.	Use Solacom Program; Solacom monitors QoS and displays issues and alerts	Ongoing
NG-NC-010* **	Test for applicable bandwidth requirements including between PSAPs and support facilities.	Bandwidth sufficient to support call volumes	Bandwidth tested November 2014
NG-NC-011* **	Test that System provides a native IP environment for the receipt of Voice over Internet Protocol (VoIP) 9-1-1 calls with associated data is available.	Calls Route and can be answered successfully at correct PSAP.	Clearwave calls successfully routed and answered at correct PSAP May 2013 FAS tested August and September of 2014.
Added NG-NC-012 * **	Test e2k circuit operates for Wireless Info Delivery over Intrado circuit	Caller ID is provided to the PSAP with the Call for Customers who store their info in Intrado or TCS	Date:
Added NG-NC-013 * **	Test e2k circuit operates for VoIP Info Delivery over Intrado circuit	Caller ID is provided to the PSAP with the Call from Bandwidth.com VoIP providers, and others using aggregation or direct database services	Date:
Added NG-NC-014 * **	Verify each adjacent ETSB PSAP can receive transferred calls in and out with ANI	Transfers work: Primary, Backup, Using FAS or ESINet or ESINet to ESINet connectivity	Date:
Added NG-NC-014 **	LATA 978 Only: Verify Calls route successfully from Legacy SR to Legacy SR as required – Casey to Carbondale using SS7 connectivity	Intermachine Trunk Performance for FAS only Calls.	Date:

2.2 PSAP Configuration Test Scenarios

The following test cases align with the requirements to support various PSAP Equipment configurations. The test cases that are relevant to a particular type of call origination type can be tested as those particular facilities are activated.

Test Case #	Test Description	Expected Test Outcome Notes	Results/Dates
NG-PSAP-001*	Validate that all material respects to current NENA recommendations for PSAP Equipment.	PSAP Equipment NENA Compliant	PSAP Equipment is NENA Compliant
NG-PSAP-001-1*	Validate that all material respects to current NENA recommendations for NENA 04-001, Standards for PSAP Equipment	PSAP Equipment NENA Compliant	PSAP Equipment is NENA Compliant
NG-PSAP-001-2*	Validate NENA 04-004, Standards for PSAP Intelligent Workstations	Workstations NENA Compliant	Workstations are NENA Compliant
NG-PSAP-001-3*	Validate NENA 08-002, Functional and interface Standards NG9-1-1 (i3)	FE and Interface NENA Compliant	Functional and interface Standards re NENA Compliant
NG-PSAP-001-4*	Validate NENA 08-501, Network Interface to IP capable PSAP	Network Interface NENA Compliant	Network Interface is NENA Compliant
NG-PSAP-001-5*	Validate that a back-up SIP phone that is located at each call taker position can display ANI/ALI.	SIP phone displays ANI/ALI.	ALI delivery open issue on SIP handset.
NG-PSAP-002*	Validate the backup telephone instruments are provided with handsets and function independently or in parallel with the Intelligent Work Stations.	Phone and work stations work independently and in parallel	10/10/15
NG-PSAP-003*	Validate the ability to place calls on hold for retrieval by any call taker (Call Park).	Call Park works according to Standards	9/15/14 – Tested successfully. Put on hold answered call multiple times.
NG-PSAP-004* **	Test for the delivery of Automatic Number Identification (ANI) and Automatic Location Identification (ALI) data display in a consistent format regardless of the originating carrier or routing of the call.	Receive ANI/ALI.	Tested Clearwave May 2013. Received ANI/ALI Tested with Frontier 8/28/14 – 8/29/14 – ANI received from all Jackson ESTB offices – see spreadsheet for details of call by call testing
NG-PSAP-005* **	Validate that PSAP equipment can retrieve ALI equivalent information from database system.	Eq. Can retrieve ALI information	Tested with Clearwave May 2013 8/29/14 – ALI received from all calls that had records in the

			database. Some calls were made from lines not in the ALI database for audio testing.– see spreadsheet for details of call by call testing
NG-PSAP-006* **	Validate that PSAP equipment can provide for ALI retrieval from Caller ID (Business Lines) or manually entered telephone number.	PSAP equipment can provide for ALI retrieval from Caller ID (Business Lines) or manually entered telephone number.	Manually enter number is complete July 2013 Test 8/28 and 8/29 2014 – ALI retrieved
NG-PSAP-007* **	Validate that the System can accommodate the handling and display of Wireless 9-1-1 Phase I and Phase II information.	Intrado hardware installed Murphysboro 8/28/14 and referred to Intrado for turn up. Harrisburg hardware will be installed 9/2/14 and turned over to Intrado.	Complete 10/8/14 – testing with Sprint and Frontier
NG-PSAP-008* **	Test for the ability to support access to wireless databases	See above	Complete 10/8/14 – testing with Sprint and Frontier
NG-PSAP-09*	Validate the presence of an Intelligent Workstation platform to support the installation of third-party applications.	Intelligent Workstation	Verified
NG-PSAP-010*	Test the ability to monitor the audio of call taking at another position, with or without muting.	Can monitor call – muted and not muted	Monitored calls with muting November 13, 2013 Tested again 8/28/14
NG-PSAP-011*	Test the ability to ‘barge-in’ to a call in progress by supervisory personnel.	Can barge in on a call in progress	Barged in call in progress November 13, 2013
NG-PSAP-012*	Test the ability to conference calls with outside parties.	Limited to number of lines connected.	Conferences established in transfers to Union, Perry and Franklin.
NG-PSAP-013*	Test the ability to support separate inbound call queues if circuit provisioning is deployed.	All Traffic delivered SIP	Load balance tested with call through testing on 8/28/14 - 8/29/14
NG-PSAP-014*	Test the ability to support one-button re-dialing of recent calls, including abandoned calls.	Admin Line connection required	Tested on local number – will have to build route tables for non-local re-dials
NG-PSAP-015* **	Validate the ability to capture abandoned call information for call taker use.	Capture	Captured dropped call information 8/29/14

		abandoned call information for call taker use	
NG-PSAP-016* **	Test the ability to display location information at each call taker position for calls pending.	Answer from the Map is a feature that shows location of inbound calls	
NG-PSAP-017*	Test the ability to provide system-wide status at each PSAP, reflecting system availability, calls in progress, call taker availability, and calls in queue.	Provide system-wide status at each PSAP	9/15/14 – Preliminary testing of this feature - successful
NG-PSAP-018* **	Validate the Creation of Incoming Call Queues	Create incoming call queue	System set up as Ring All – Calls sent to alternate route after 15 sec (3 rings)
NG-PSAP-019* **	Validate the Creation of Spatial Incoming Call Queues	Create spatial incoming call queue	See above

2.4 TDD/TTY Configuration Test Scenarios

The following test cases support various TDD/TTY configurations.

Test Case #	Test Description	Expected Test Outcome Notes	Results/Dates/Initials
NG-TDD-001*	Validate the ability to support Baudot-format TDD/TTY dialogue from callers at every position.	Support Baudot-format TDD/TTY dialogue from callers at every position.	Per PSAP
NG-TDD-002* **	Validate the ability to provide TDD/TTY detection and alerting at each call taker position	Provide TDD/TTY detection and alerting at each call taker position	Per PSAP

2.6 Logging and Instant Recall Recorders Test Scenarios –

The following test cases support Logging and Instant Recall Recorders..

Test Case #	Test Description	Expected Test Outcome Notes	Results/Dates/Initials
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NG-LOGIR-001* **	Test the Instant Recall Recording and playback application software at each workstation position with the ability to integrate with existing analog voice logging recorder at each PSAP.	Workstation will have IRR functionality	Tested Instant Recall Recording on all work stations March 2012
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2.7 Management Information Systems Test Scenarios –

The following test cases support Management Information Systems..

Test Case #	Test Description	Expected Test Outcome Notes	Results/Dates/Initials
NG-MIS-001* **	Validate the System Management Information System (MIS) reporting of transaction volumes and system performance for overall system as well as significant components.	Reports Produced	
NG-MIS-001-a* **	Test that the MIS and reporting application can allow access to all captured database elements.	All FEs covered in Reports	
NG-MIS-001-b* **	Test the Detail of MIS reporting to provide for both individual PSAP and system-wide transaction volumes and call handling performance.	System wide Performance Per PSAP by ETSB	
NG-MIS-001-c* **	Test that the MIS reporting can provide for time and day of week in tabular and graphical formats.	As Required	
NG-MIS-001-d* **	Test that the Reporting application can provide for selection of indexing and sorting keys by any formatted field.	As Required	
NG-MIS-001-g* **	Test that the MIS is be capable of capturing data from all circuits within the system, including inbound 9-1-1trunks, administrative lines as well as outbound calling.	As Required	

NG-MIS-002* **	Test that access to information shall be acquired remotely by permissions.	As Required	
NG-MIS-002-a* **	Test that the MIS can collect data on the Number of total calls received	As Required	
NG-MIS-002-b* **	Test that the MIS can collect data on the Number of abandoned calls	As Required	
NG-MIS-002-c* **	Test that the MIS can collect data on the Number of calls on a per trunk/per circuit basis	As Required	
NG-MIS-002-d* **	Test that the MIS can collect data on the Number of calls on a call type (wire line, wireless, VOIP, etc.) basis	As Required	
NG-MIS-002-e* **	Test that the MIS can collect data on the Number of calls conference/transferred	As Required	
NG-MIS-002-f* **	Test that the MIS can collect data on the Calls conference/transferred by destination	As Required	
NG-MIS-002-g* **	Test that the MIS can collect data on the Number of calls on a log-on or per position basis	As Required	
NG-MIS-002-h* **	Test that the MIS can collect data on the Average time to answer	As Required	
NG-MIS-002-i* **	Test that the MIS can collect data on the Average length of call and average hold time	As Required	
NG-MIS-003* **	Test that each data center is equipped with a Call Detail Record (CDR) function that provides for capture, search and retrieval, display, and printing of information regarding each 9-1-1 call. The MIS be able to process data with the following configurations.	As Required	
NG-MIS-003-a* **	Test that the MIS can collect data on the Date received	As Required	
NG-MIS-003-b* **	Test that the MIS can collect data on appearance time	As Required	
NG-MIS-003-c* **	Test that the MIS can collect data on the Caller's telephone number	As Required	
NG-MIS-003-d* *** **	Test that the MIS can collect data on the ANI, ESRK or other routing identification	As Required	

NG-MIS-003-e* **	Test that the MIS can collect data on the Answer time	As Required	
NG-MIS-003-f* **	Test that the MIS can collect data on the Answering position identification	As Required	
NG-MIS-003-g* **	Test that the MIS can collect data on the Trunk/circuit identification	As Required	
NG-MIS-003-h* **	Test that the MIS can collect data on the Time call was released	As Required	
NG-MIS-003-i* **	Test that the MIS can collect data on the Time call was transferred	As Required	
NG-MIS-003-j* **	Test that the MIS can collect data on the Transfer destination	As Required	
NG-MIS-003-k* **	Test that the MIS can collect data on the Abandoned call indicator	As Required	
NG-MIS-003-l* **	Test that the MIS can collect data on the Ringing start time	As Required	
NG-MIS-003-m* **	Test that the MIS can collect data on the Time call was placed on hold and taken off hold and by what position	As Required	
NG-MIS-003-n* **	Test that the MIS can collect data on the All ALI data, including name, address, Community, ESN, Class of Service, etc. Test data may be accessed remotely from the PSAPs with permissions.	As Required Test Complete per PSAP.	
NG-MIS-004*	Test the ability to direct MIS reports or Workstation printouts to any Local Area Network-attached printer.	As Required	
NG-MIS-005*	Test the ability to export formatted detailed records or summary report tables for analysis with third-party applications (e.g., Microsoft Office)	As Required	
NG-MIS-006*	Test the ability of the MIS reporting to be fully initialized prior to operational use of system; this includes any procedures, routines and scripts for daily, monthly and annual periodic reporting.	As Required	

2.8 System Administration Test Scenarios

The following test cases support System Administration.

Test Case #	Test Description	Expected Test Outcome Notes	Results/Dates/Initials
NG-SA-001*	Test the ability to administer call queuing and call routing parameters.	As Required	Calls Routed during call through testing with Frontier 8/28-8/29/14
NG-SA-002*	Test the ability to support centralized and administered backup and recovery policies.	As Required	9/15/14 – Backup and Recovery Procedures are centralized.
NG-SA-003*	Test the ability to support on-line centralized backup	As Required	
NG-SA-004*	Test that the system can provide real-time call volume and call status information at remote locations	As Required	Remote access to WS remotely
NG-SA-005-a*	Test that the system can provide Positions Logged On/Ready/Available	Solacom – Guardian Workstation Software	9/15/14 – Can determine “Active Operators” in real time that are Logged On/Ready/Available
NG-SA-005-b*	Test that the system can provide Positions Busy/Off Hook	Solacom – Guardian Workstation Software	9/15/14 – Can determine “Active Operators” in real time that are Busy/Off Hook
NG-SA-005-c*	Test that the system can provide Positions Not Ready/Out of Queue	Solacom – Guardian Workstation Software	9/15/14 – Can positions” in real time that are Not Ready/Out of Queue
NG-SA-005-d*	Test that the system can provide Calls in Queue/Calls Pending	Solacom – Guardian Workstation Software	9/15/14 – Can positions” in real time that are Queue/Calls Pending
NG-SA-005-e*	Test that the system can provide Calls Holding/Calls Parked	Solacom – Guardian Workstation Software	9/15/14 – Can positions” in real time that are Holding/Calls Parked
NG-SA-005-f*	Test that the system can provide PSAP Status (e.g., system OK, connectivity good)	Solacom – Guardian Workstation Software	9/15/14 – Can positions” in real time that are system OK, connectivity good

NG-SA-006*	Test that the system can provide the Ability to provide a real-time display of system availability, call taker availability & calls in progress.	Solacom – Guardian Workstation Software	9/15/14 – Can positions” in real time that are system OK, connectivity good
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2.9 System Performance Test Scenarios

The following test cases support System Performance.

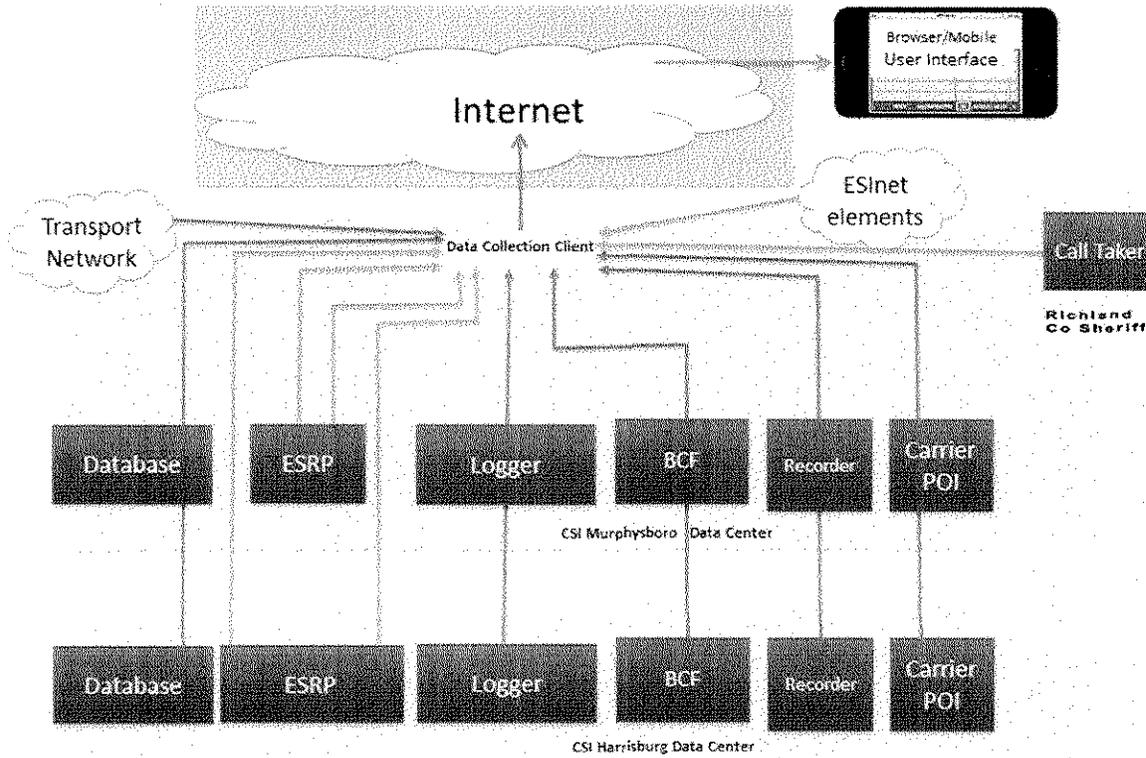
Test Case #	Test Description	Expected Test Outcome Notes	Results/Dates/Initials
NG-SP-001*	Test the ability of the system to support automated, unassisted restoration from stoppages or outages, including significant network components and application software.	As Required	Testing scheduled for 10/17/14 Tested/confirmed October/November 2014
NG-SP-002*	Test the ability of the system to provide positive/affirmative alert to each call taker position of off-line status, error conditions or conditional events.	As Required	WS will display various alerts and visual indications of various outage scenarios as related to WS connectivity.
NG-SP-003*	Test the ability of the system to support localized supervision and reporting of ANI and ALI failures, network outages, etc.	As Required	System has the ability to support localized supervision and reporting of ANI and ALI failures, network outages, etc.
NG-SP-004*	Test the ability of the system to provide in each PSAP readily visible and (selectable) audible indicators of emergency and non-emergency calls pending.	Call will ring differently for each type of call – 911 or Admin.	911 call rings like a siren and admin calls like a digital phone rings. March 2012
NG-SP-005* **	Validate that the vendor has described their recommended approach to node and link redundancy to meet Availability Performance Requirements.	Node and Links are redundant	Node and Link redundancy verified February 2012 Retested/confirmed October/November 2014
NG-SP-006* **	Validate that the vendor(s) described their system architecture as it relates to failover and fault tolerance, including the gateway into the 9-1-1 IP network, traffic paths to the network	As Required	Testing in progress 10/17/14 Tested/confirmed October/November 2014

	endpoints, and any crucial devices within the scope of the relevant network fabric.		
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2.11 System Monitoring Test Scenarios – All vendors as required

The following test cases to provide System Monitoring..

Figure 2.11 Monitoring for Testing Richland County



Test Case #	Test Description	Expected Test Outcome Notes	Results/Dates/Initials
NG-MON-001*	Test that the system can provide error logs and diagnostic information sufficient to support vendor troubleshooting.	Includes the use of the Monitoring Application to see the exceptions.	In Progress

NG-MON-002* **	Test that the system collects sufficient information to give the NG-911, Inc. and IT staff an end-to-end view of the ability of incoming calls to be completed	Includes the use of the Monitoring Application to see the exceptions.	In Progress
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3.0 Next Generation 9-1-1 Network Test Cases

NG9-1-1 Network Testing was conducted in the Illinois Institute of Technology (IIT) Real-Time Communications Lab (RTCL). IIT students and mentors had the responsibility to validate the design and configuration of the ESInet and overall NG9-1-1 Architecture based on the real-world NG9-1-1 network being deployed for use by Jackson County. IIT RTCL configured the lab to match real world conditions, and iteratively identified and tested failure mitigation strategies. IIT Testing and results were provided to Jackson County via NG-911, Inc. upon completion.

Access Carriers were not involved in the IIT RTCL Testing. NG-911, Inc. will perform these same tests before any Access Carrier enters the Network. Many of these tests can be done once, such as the SIP related tests with an Access Carrier after the basic tests are performed in a simulated fashion and not repeated with each Access Carrier

The Diagram for the IIT RTCL Test Configuration is labeled 3.0.1. The Diagram for the Field NG-911, Inc. Testing is labeled 3.0.2, with associated Tables 3.0.2.1 and 3.0.2.2 respectively.

Section 3.1 describes the results of network tests performed at the Illinois Institute of Technology, (IIT), which determined that key components of the network design functioned in a resilient and secure fashion, and performed well under a simulated load.

Section 3.2 also describes the network tests to be performed and documented by NG-911, Inc. with the Direct Carriers such as Clearwave Communications and the Indirect Carriers using Frontier FAS.

Figure 3.0.1 - Testing at IIT RTCL, Wheaton and Chicago, Illinois

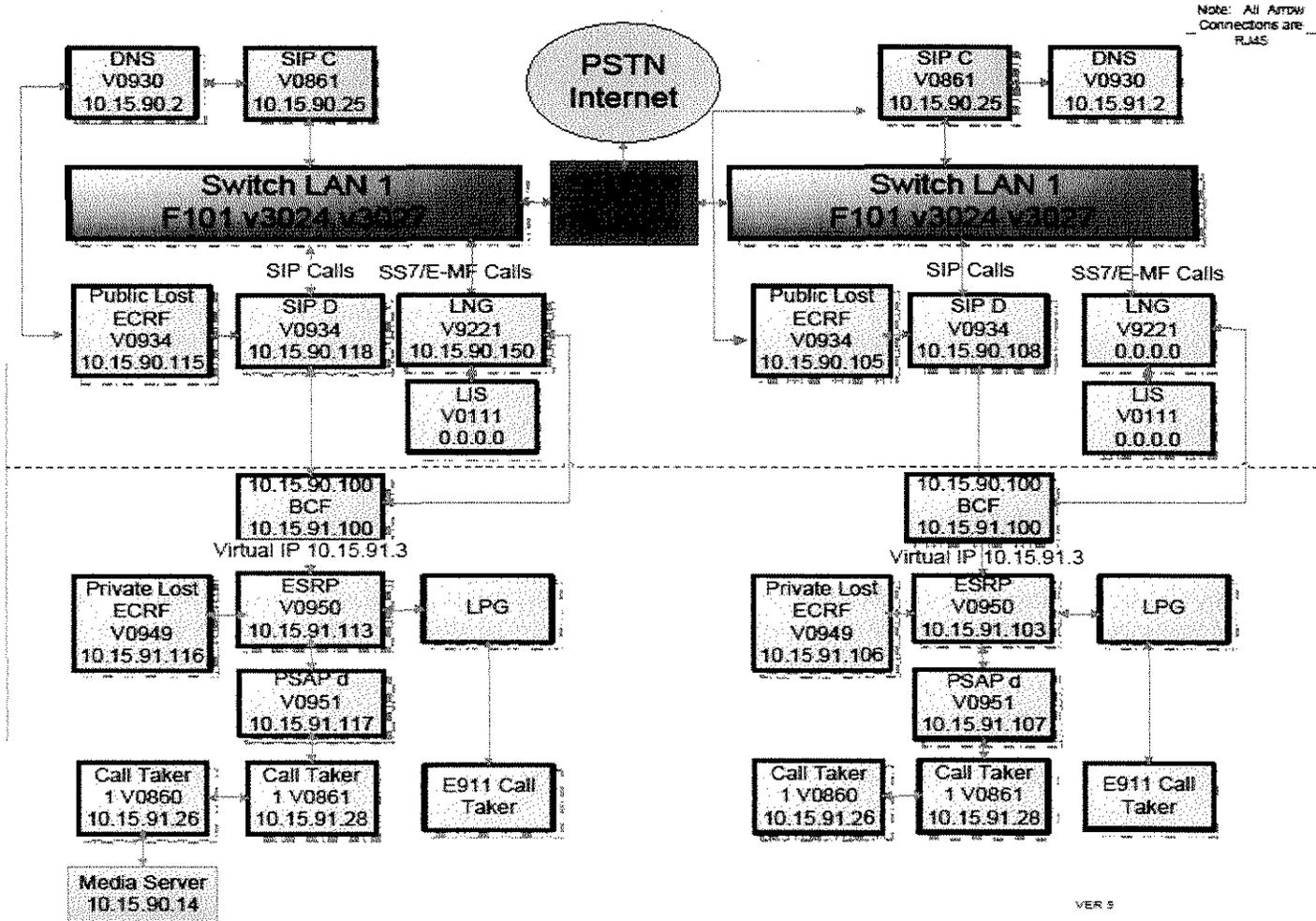


Figure 3.0.2 – NG9-1-1, Inc. Testing Configuration

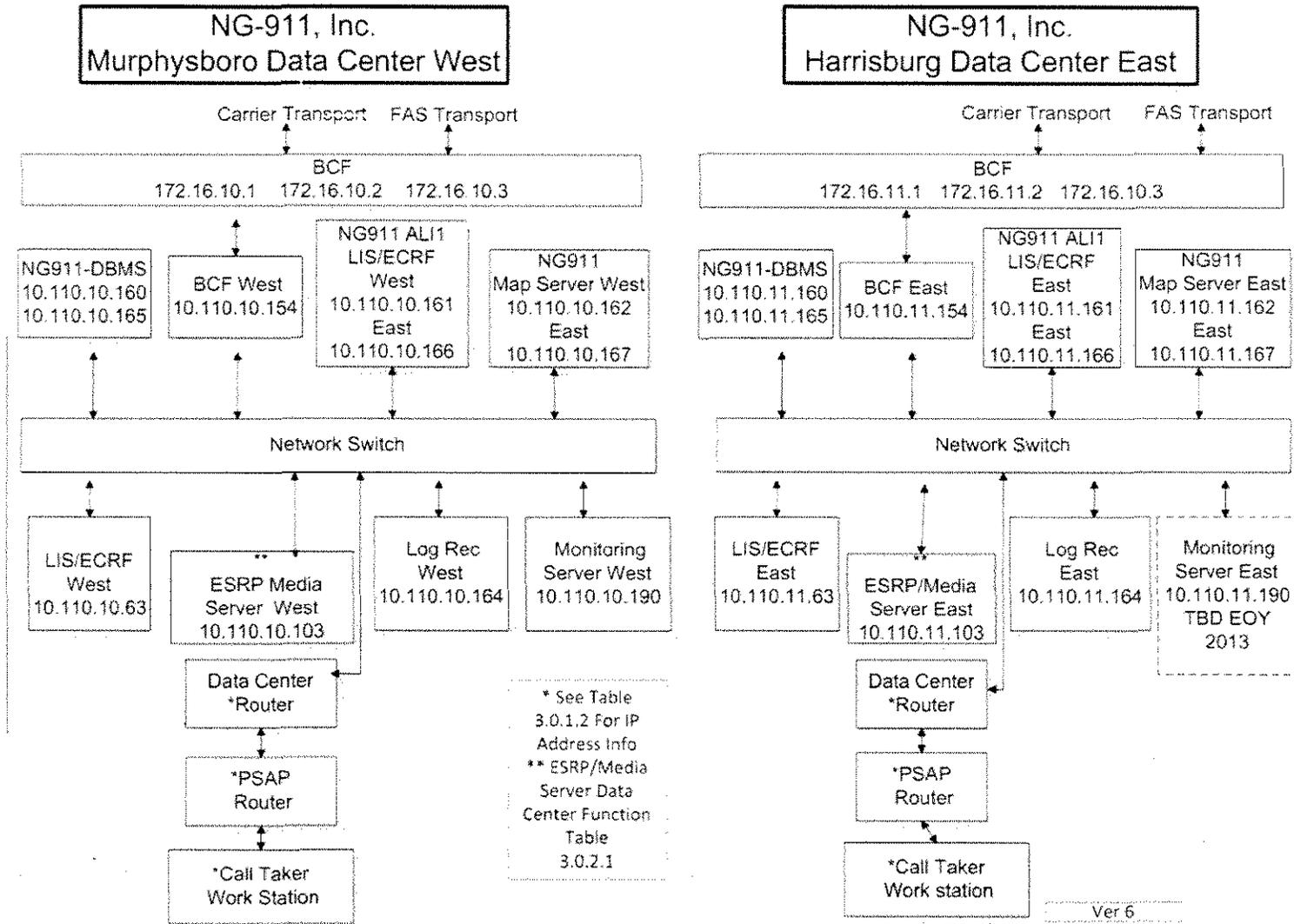


Table 3.0.2.1 - Data Center - related to Figure 3.0.2 above**

Data Center	Functions	IP Addresses
West	Legacy Network Gateway (LNG)	10.110.10.103
	SIPc	
	ESRP	
	Media Server	
	Legacy PSAP Gateway (LPG)	
Data Center	Functions	IP Addresses
East	Legacy Network Gateway (LNG)	10.110.11.103
	SIPc	
	ESRP	
	Media Server	
	Legacy PSAP Gateway (LPG)	

Table 3.0.2.2 - PSAP Information Table Supplement to Figure 3.0.2.1 above

PSAP Number County	PSAP Name	Work Stations	Work Station IP Addresses	Router /PSAP	IP Address /Router
1 Richland	Richland County Sheriff	3	10.110.40.30 10.110.40.31 10.110.40.32	1	10.110.40.254

IIT RTCL

The functions of the NG9-1-1 Network Design that were tested at the IIT RTCL Lab are:

1. Resiliency to Network Element failures, and failures of layer 1 and layer 2 transport systems.
2. Performance of the design under heavy load conditions.
3. Security of information and security from attacks that affect performance.

Network Testing: Given the agreements with the FAS Frontier INdigital solution, additional testing will be provided through FAS Network to Network. The configuration for FAS and NG 9-1-1 and ESInet Testing required is included in the Diagrams.

Access Testing: Indirect Access Carrier testing will be performed by NG-911, Inc., in cooperation with Frontier including the Indirect Access Carriers. Refer to the Exhibit 10.2 FAS Test Plan for testing of Indirect Access Carriers.

3.1.1 Resiliency Test Plan - IIT RTCL

This set of tables reflects the tests and the documented results from the IIT RTCL Testing.

Test Case #	Test Description	Expected Test Outcome	Results
IIT-001	Place 911 test call from SIP UA and remove power from the ESRP IP address 10.15.91.113 Place 2 nd test call and record both results	911 call is routed to the alternate ESRP IP address 10.15.91.103 via Virtual IP address 10.15.91.3	911 call is routed to the alternate ESRP IP address 10.15.91.103 via Virtual IP address 10.15.91.3
IIT-002	Place 911 test call from SIP UA and remove the RJ45 connection from ESRP to Switch 101 v3024 IP address 10.15.91.113 Place 2 nd test call and record both results	911 call is routed to the alternate ESRP IP address 10.15.90.103 via Virtual IP address 10.15.90.3	911 call is routed to the alternate ESRP IP address 10.15.91.103 via Virtual IP address 10.15.91.3
IIT-003	Place 911 test call from SIP UA and remove power from the PSAP IP address 10.15.91.117 Place 2 nd test call and record both results	911 call is routed to alternate PSAP IP address 10.15.90.107 via Virtual IP address 10.15.91.7	911 call is routed to alternate PSAP IP address 10.15.91.107 via Virtual IP address 10.15.91.7 Call Takers have to re-register to alternate PSAP after failover
IIT-004	Place 911 test call from SIP UA and remove the RJ45 connection from PSAP to Switch 101 v3024 IP address 10.15.91.117 and record both results	911 call is routed to alternate PSAP IP address 10.15.91.107 via Virtual IP address 10.15.9.7	911 call is routed to alternate PSAP IP address 10.15.91.107 via Virtual IP address 10.15.91.7 Call Takers have to re-register to alternate PSAP after failover
IIT-005	Place 911 test call from SIP UA and remove power from Call taker 1 IP Address 10.15.9.26 Place 2 nd test call and record both results	The 911 call is routed to the 2 nd Call Taker 10.15.91.28	The 2 nd 911 test call is received by the 2 nd call taker and the 3 rd call routes to Queue
IIT-006	Place 911 Test call from SIP UA and remove RJ 45 connection from Call taker position to Switch 101 v0324 Place 2 nd test call and record both results	911 call is routed to alternate Call Taker 10.15.91.28	The 2 nd 911 test call is received by the 2 nd call taker and the 3 rd call routes to Queue

IIT-007	Place 911 CAMA/MF test call from the 314A CAMA test set and removes power from the ESRP. Place 2 nd test call and record both results	911 Call is routed to the alternate ESInet	CAMA/MF 911 Call Routes to Alternate ESRP after power is removed from Primary ESRP
IIT-008	Place 911 CAMA/MF test call from the 314A CAMA test Set and remove the RJ45 connection from the ESRP Place 2 nd test call and record both results	911 call is routed to the Alternate ESInet	CAMA/MF 911 Call Routes to Alternate ESRP after the ESRP loses connectivity to the Network
IIT-009	Test case reserved for future testing.		
IIT-010	Test case reserved for future testing.		
IIT-011	Place 911 Test call with manual location set and remove power to the private lost server ECRF function IP address 10.15.91.116 Place 2 nd test call and record both results	911 call is routed to the alternate private lost server IP Address 10.15.91.106 via Virtual IP address 10.15.91.6 but the alternate private LOST location information will be used to forward the call instead.	911 call is routed to the alternate private lost server IP Address 10.15.91.106 via Virtual IP address 10.15.91.6 but the alternate private LOST location information will be used to forward the call instead.
IIT-012	Place 911 test call with manual location set and remove the RJ45 connection to the private lost server ECRF function IP address 10.15.91.116 Place 2 nd test call and record both results	911 call is routed to the alternate private lost server IP Address 10.15.91.106 via Virtual IP address 10.15.91.6 but alternate private LOST location information will be used to forward the call instead.	911 call is routed to the alternate private lost server IP Address 10.15.91.106 via Virtual IP address 10.15.90.6 but alternate private LOST location information will be used to forward the call instead.

3.1.2 Resiliency Test Plan – NG-911

This set of tables reflect the tests and the documented results from Field Testing

Test Case #	Test Description	Expected Test Outcome	Results/Dates/Initials
NG-001* **	Place 911 test call from SIP UA and remove power from the ESRP IP address Place 2 nd test call and record both results	911 call is routed to the alternate ESRP IP address via Virtual IP address	Testing 10/17/14 911 call is routed to the alternate ESRP
NG-002* **	Place 911 test call from SIP UA and remove the RJ45 connection from ESRP to Switch IP address	911 call is routed to the alternate ESRP IP address via IP address	Testing 10/17/14 911 call is routed to the alternate ESRP

	Place 2 nd test call and record both results		
NG-003* **	Place 911 test call from SIP UA and remove power from the PSAP IP address Place 2 nd test call and record both results	911 call is routed to alternate PSAP IP address via Virtual IP address	Testing 10/17/14 911 call is routed to alternate PSAP Call Takers have to re-register to alternate PSAP after failover
NG-004* **	Place 911 test call from SIP UA and remove the RJ45 connection from PSAP to Switch IP address and record both results	911 call is routed to alternate PSAP IP address via Virtual IP address	Testing 10/17/14 911 call is routed to alternate PSAP Call Takers have to re-register to alternate PSAP after failover
NG-005* **	Place 911 test call from SIP UA and remove power from Call taker 1 Place 2 nd test call and record both results	The 911 call is routed to the 2 nd Call Taker	Testing 10/17/14 The 2 nd 911 test call is received by the 2 nd call taker and the 3 rd call routes to Queue
NG-006* **	Place 911 Test call from SIP UA and remove RJ 45 connection from Call taker position to Switch Place 2 nd test call and record both results	911 call is routed to alternate Call Taker	Testing 10/17/14 The 2 nd 911 test call is received by the 2 nd call taker and the 3 rd call routes to Queue

3.2 Security Test Plan

Section 3.2.1 includes the IIT RTCL Security Tests and Results.

Section 3.2.2 includes the Security Tests.

3.2.1 Security - IIT RTCL

Test Case #	Test Description	Expected Test Outcome	Results
IIT-013	Access LNG using Telnet or SSH to IP Address 64.131.109.217	Access to the LNG management port is allowed for Authorized IP addresses	Access to LNG is allowed to IP address 64.131.109.217
IIT-014	Login to LNG with Root Login and Non-authorized Password	Access is denied except for users with authorized passwords	Access is Denied to users without the proper credentials

IIT-015	Login to LNG using non-authorized login and Password	Access is denied except for users with authorized logins and passwords	Access is Denied to users without The proper credentials
IIT-016	Login to LNG using authorized login and password	Access is allowed with Authorized Logins and Passwords	Access is allowed with Authorized Logins and Passwords.
IIT-017	Restrict Access to the BCF and ESInet from outside the network by denying access to other than authorized IP addresses.	Access BCF from outside the network using Non-Authorized IP Address.	An Access control list was created for Authorized IP address access. Attempts to access the BCF from non-authorized IP addresses are refused.
IIT-018	Login to BCF Management port using non-authorized logins and passwords	Access is Denied for non-authorized users	Access is not allowed when attempting to access the BCF Management port
IIT-019	Allow Authorized Access to management port of the BCF	Users with non-Authorized Logins and passwords are denied access to the BCF Management port	Non Authorized users are denied. Only users listed in the SSH file are allowed
IIT-020	Restrict user privileges in the BCF on a per user login and password basis	Authorized users are restricted to their allowed access privileges	BCF Commands are restricted by assigned user privileges.
IIT-021	Call Taker/PSAP initiates outbound SIP call	Call completes from PSAP	Call completes to an available call taker when an outbound call is initiated.
IIT-022	PSAP/ Call Takers attempt to access Internet	Call takers cannot complete to the Internet	A call taker cannot complete to the internet when access is attempted
IIT-023	Allow normal inbound SIP call traffic and block unauthorized SIP sessions	SIP traffic allowed for trusted IP addresses only	Normal inbound SIP call traffic allowed and unauthorized SIP sessions blocked

3.2.2 Security - NG-911

Test Case #	Test Description	Expected Test Outcome	Results/Dates/Initials
NG-017* **	Restrict Access to the BCF and ESInet from outside the network by denying access to other than authorized IP addresses.	Access BCF from outside the network using Non-Authorized IP Address.	BCF locked down and tested with Clearwave May 2013 Tested/confirmed October/November 2014
NG-018* **	Login to BCF Management port using non-authorized logins and passwords	Access is Denied for non-authorized users	Tested only allows authorized users to log in May 2013 Tested/confirmed October/November 2014
NG-019* **	Allow Authorized Access to management port of the BCF	Users with non-Authorized Logins and passwords are denied access to the BCF Management port	Tested only allows authorized users to log in May 2013 Tested/confirmed October/November 2014
NG-020* **	Restrict user privileges in the BCF on a per user login and password basis	Authorized users are restricted to their allowed access privileges	Tested only allows authorized access and privileges based log in May 2013 Tested/confirmed October/November 2014
NG-021* **	Call Taker/PSAP initiates outbound SIP call	Call completes from PSAP	
NG-022*	PSAP/ Call Takers attempt to access Internet	Call takers cannot complete to the Internet	Tested ability to deny call taker access to the internet and allows access for updates. May 2013
NG-023* **	Allow normal inbound SIP call traffic and block unauthorized SIP sessions	SIP traffic allowed for trusted IP addresses only	Tested October/November 2014

3.3 Performance Test Plan

3.3.1 Performance Test Plan and Results – IIT RTCL

Test Case #	Test Description	Expected Test Outcome	Results
-------------	------------------	-----------------------	---------

IIT-024	Generate multiple SIP test calls to the ESInet and observe performance.	SBC should forward all SIP Calls to the PSAP Call Takers	All Calls are sent to the available call takers
IIT-025	Generate Multiple SIP calls to the Session Boarder Controller (SBC)	SBC should forward all SIP Calls to the PSAP Call Takers	All Calls are sent to the available call takers
IIT-026	Generate Multiple test Calls to the Call taker positions until all are busy	Calls should Queue and release as positions become available	All calls Queue when available call takers are busy.
IIT-027	Verify the ability of the Call Taker to transfer a call to another PSAP	Call Taker successfully transfers A call	A call taker successfully transferred a call to a 3 rd call taker
IIT-028	Generate Multiple invite messages to the ESRP and observer performance.	The ESRP should accept all invites until limits are reached.	The ESRP accepted approx. 16000 invite messages and then reached a Q full status. Rebooted ESRP as a result of failure
IIT-029	Generate Multiple Invite messages to the SBC and ESInet to simulate a DDoS attack and then observe performance.	The SBC should accept all invite messages until failure. The SBC is not configured to prevent a DDoS attack during this test	The SBC forwarded approx. 16000 invite messages from the MU-8000 to the ESInet and then generated 503 server busy and 408 timeout messages. Rebooted BCF as a result of failure
IIT-030	Generate registrations without authorization to Call takers	The Call takers should register to PSAP.	62000 registrations were generated by the MU-8000. 40,000 passed with 22,000 errors Rebooted PSAP
IIT-031	Generate Multiple Invite messages to the SBC and ESInet to simulate a DDoS attack with the SBC configured to throttle requests	The SBC should allow multiple invite request based on the programmed parameters of the SBC	Multiple Invite messages generated to the SBC and ESInet simulates a DDoS attack with the SBC configured to throttle requests

3.3.2 Field Performance Test Plan and Results – NG-911

In the case of the NG-911, Inc. Performance Testing, if assistance is needed to generate the call volume, one choice would be to locate DDoS attack software or use IIT RTCL suggested software. Another major objective is to recognize when a DDoS or TDoS attack is taking place and to escalate, and advise others per Policy or Regulatory Requirements.

Test Case #	Test Description	Expected Test Outcome	Results/Dates/Initials
NG-024* **	Generate multiple SIP test calls to the ESInet and observe performance.	SBC should forward all SIP Calls to the PSAP Call Takers	In progress with IIT Tested October 2014 -
NG-025* **	Generate Multiple SIP calls to the Session Boarder Controller (SBC)	SBC should forward all SIP Calls to the PSAP Call Takers	In progress with IIT Tested October 2014
NG-026* **	Generate Multiple test Calls to the Call taker positions until all are busy	Calls should Queue and release as positions become available	In progress with IIT Tested October 2014 Calls placed in queue.
NG-027* **	Verify the ability of the Call Taker to transfer a call to another PSAP	Call Taker successfully transfers A call	9/8/14 – Call can be transferred but with no ANI. 12/5/14 Calls can transfer with ANI
NG-028* **	Generate Multiple invite messages to the ESRP and observe performance.	The ESRP should accept all invites until limits are reached.	9/15/14 – limit from SBC is 50 second.
NG-029* **	Generate Multiple Invite messages to the SBC and ESInet to simulate a DDoS attack and then observe performance.	The SBC should accept all invite messages until failure. The SBC is not configured to prevent a DDoS attack during this test	In progress with IIT Tested October 2014
NG-030* **	Generate registrations without authorization to Call takers	The Call takers should register to PSAP.	Clarification with IIT Tested October 2014 Rejected by SBC
NG-031* **	Generate Multiple Invite messages to the SBC and ESInet to simulate a DDoS attack with the SBC configured to throttle requests	The SBC should allow multiple invite request based on the programmed parameters of the SBC	In progress with IIT Tested October 2014

4.0 Additional Testing

The test cases ensure that, call through and field testing has been performed .

Test Case #	Test Description	Expected Test Outcome Notes	Results/Dates/Initials

V-000* **	Perform Call Through Testing for NXXs, Carrier, and PSAP combinations shown on the table below. Ensure each Class of Service is Tested in each Rate Center in each Originating Location. (see Templates in appendices)	See ETSB Test Table.	Completed: Date TBD after each ETSB Completes Tests.
V-001	Split Exchange Testing Direct	The Narrative and the ETSB Network Diagrams include Split Exchanges to be and tested for call completion to the correct PSAPs each time using Clearwave SIP Connectivity Insert as needed.	Completed: Date TBD after each ETSB Completes Tests.
V-002	Split Exchange Testing Indirect via FAS	The Narrative Plan has a table and reference to the ETSB Diagram to reflect the Split Exchanges to be tested for call completion to the correct PSAPs each time using FAS	Completed: Date TBD after each ETSB Completes Tests.

Appendix A - Standards Report Resolution Template

Standards Clarification/Resolution Request - NG-911, Inc.						
Item	Date	Trouble Ticket(s)	Vendor(s)	Compliance Clarification Request	Standard Name/ Section	Resolution Y/N
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
n						

Appendix B - General Trouble Report Resolution Template

Trouble Resolution Request - NG-911, Inc.							Commission
Item	Date Time Open	Trouble Ticket(s)	Vendor(s)	Brief Description of Trouble	Severity Level	Resolution Y/N Date Closed	Commission Report Y/N/NA and which Commission
1							Y
2							Y
3							
4							
5							
6							
7							
8							
9							
n							

1. During Pre-Cutover Testing, the Trouble Resolution timeframe will be agreed upon by all parties before the start of the testing process.
2. After Cutover to live service, the Trouble Resolution timeframe will be agreed upon based on Severity Level , Service Level Agreements (SLAs) including an Escalation Policy.
3. Trouble Report filing to the Commissions will be governed by the Commission requirements. NG 9-1-1, Inc. will follow ICC and FCC guidelines as they pertain to the 911 SSP for Trouble Reports.

Appendix C - End to End Testing Template

See Attached Excel Spread Sheet.

NG-911, Inc. FAS Plan

Coordinate with Exhibit 10.1 Integrated Test Plan

December 2014

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1.0 Test Objectives and Guidelines

1.1 Scope of document

The intent of this document is to define the test procedures for Acceptance Testing between the FRONTIER Aggregation Service (FAS) 9-1-1 Access network, components provided by INdigital, and the NG9-1-1 Functional Elements (FEs) to the NG 9-1-1 PSAPs in Richland County. All testing shall be coordinated by NG 9-1-1, Inc., the selected 9-1-1 Service Provider (SSP), in cooperation with FRONTIER Communications and INdigital.

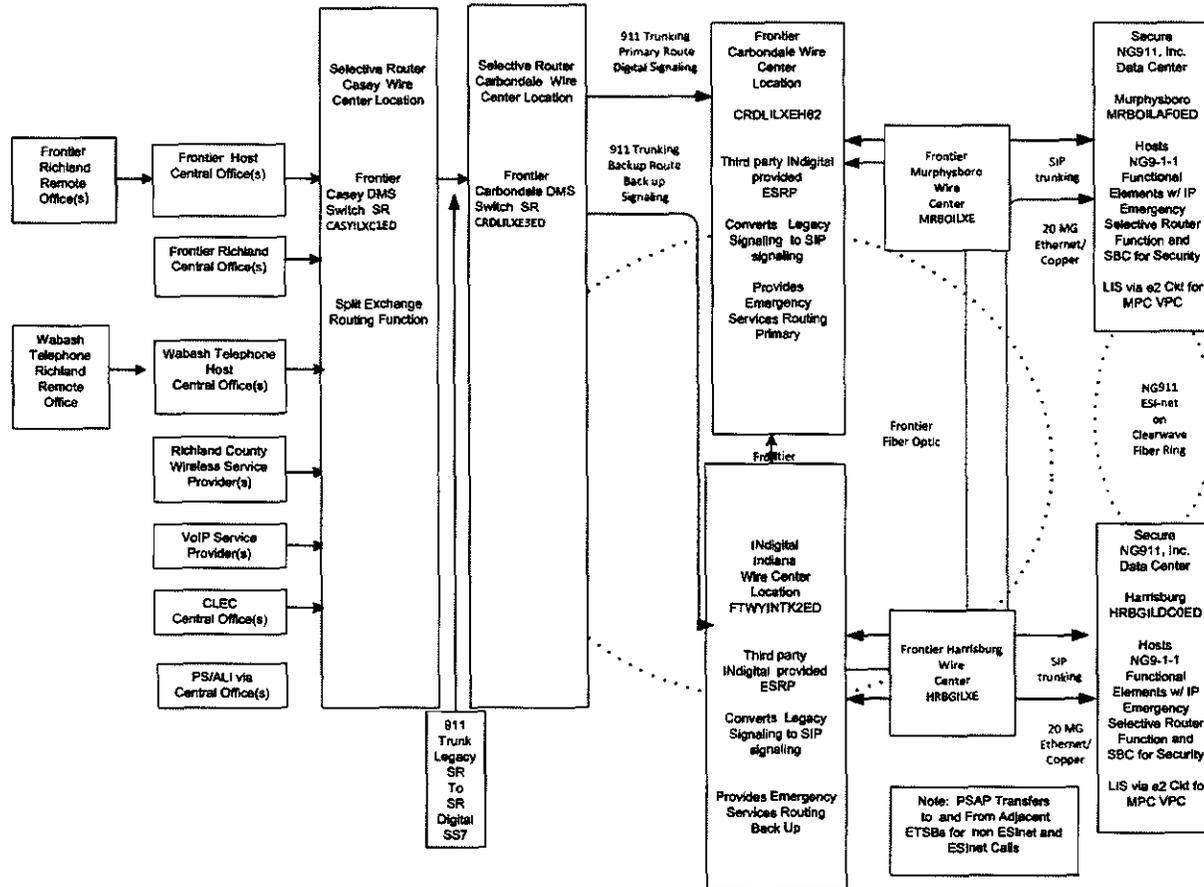
The purpose of this effort is to verify that the FAS network will deliver 9-1-1 calls using equipment located in Carbondale and Indiana, via SIP protocol to the NG9-1-1 Data Centers and the NG9-1-1 FEs to the correct PSAPs. Test calls will then be placed by FRONTIER working with the Access Carriers they represent to confirm with NG9-1-1, Inc. and the Richland County PSAP that the correct ANI and ALI are received at the correct PSAP. NG 9-1-1, Inc., FRONTIER and INdigital will work together to resolve any integration issues that arise during testing.

This FAS Test Plan will be used in conjunction with the NG-911, Inc., and Integrated Test Plan Exhibit 10.1.

Exhibit 10 Network Diagrams of the ICC filing includes an end to end Diagram. The portion of the Diagram that represents the FAS related Access Carriers through to the NG9-1-1 Data Centers, FAS is further diagramed in detail in the following Figure 1.1.1.

Figure 1.1.1 FAS Diagram

Richland County, IL – ETSB - Frontier Aggregation Solution
 Segment of NG-911, Inc. Next Generation 9-1-1 Project - 2014



1.2 Establish Connectivity

NG9-1-1, Inc. will provide appropriate personnel on-site to test at each PSAP. FRONTIER and NG9-1-1, Inc. will establish IP connectivity between FRONTIER and the NG 9-1-1, Inc. Selective Routers. FRONTIER and NG9-1-1, Inc. will configure the INdigital ESRPs and PSAP Gateways (referenced herein for ease of communications as IP Selective Routers or IP SR's to process 9-1-1 test calls from the FRONTIER network to each PSAP.

1.3 Testing

FRONTIER will provide test numbers per Access Carrier per rate center that they represent in the FAS solution to NG9-1-1, Inc. to be loaded into the Database for use during testing. NG9-1-1, Inc. is requesting the test numbers from each Access Carrier using the FAS solution. FRONTIER agreed to cooperatively assist with obtaining such numbers. Both FRONTIER and NG9-1-1, Inc. will ensure the numbers are loaded into the Frontier Databases and the NG-911, Inc. GIS Databases prior to the beginning of testing,

1.3.1 Landline Test

A 9-1-1 landline test call will be placed to each NG9-1-1, Inc. SR from the FAS RBOC, ILEC, RLEC and CLEC Carriers from each end office trunk group from the test numbers to the designated PSAP prior to any change in the network. This will establish a baseline of expectation. The network results for call completion will be documented.

- The baseline path will be made busy and the calls will be placed from the same originating central offices per rate center and test number through the FAS solution to the designated PSAP.
- The Primary INdigital path to the NG 9-1-1, Inc. SR location will be made busy and the calls will be re-originated and verified that they route to the correct PSAP.
- NG 9-1-1, Inc. will make the Primary Data Center Route Busy and the calls will be re-originated to the destined PSAP.

- Permutations and combinations will continue until all diverse paths have been tested. At a minimum a call will be made from each Class of Service from each originating Carrier originating location.
- In each case the PSAP will :
 - Verify receipt of ANI information for landline offices for voice and TTY.
 - Verify receipt of ALI information for landline offices for voice and TTY.

1.3.2 Wireless Test

A 9-1-1 Wireless Test call placed from each Wireless Carrier or their representative

- Verify receipt of Emergency Services Routing Key (ESRK) and callback number
- Verify receipt of ALI information
- FRONTIER and NG 9-1-1, Inc. will document configuration settings so effort is repeatable at other sites.

1.3.3 Voice over Internet Protocol (VoIP) Test

A 9-1-1 VoIP Test call placed from each VoIP Carrier or their representative.

- Verify receipt of ANI information.
- Verify receipt of ALI information.
- FRONTIER and NG 9-1-1, Inc. will document configuration settings so effort is repeatable at other sites.

Test Case #	Test Description	Expected Test Outcome Notes	Results

1.4 Site Information

The Access Carriers using FAS will not be re-terminating their trunking from the DMS100 Tandem routes and trunk groups into the NG9-1-1 Data Centers as planned in later FAS Phases. FAS is a Network reconfiguration and the Test calls merely represent the successful use of the new NG 9-1-1 GIS database and NG 9-1-1 FEs to route successfully to the new NG9-1-1 PSAPs as diagramed. Access trunks terminate to the same FRONTIER DMS 100 that serves as the existing FRONTIER Legacy Selective Router, only the functions of the Selective Routing are moved into the NG9-1-1 network to NG-911, Inc.'s Data Center FEs to the new NG9-1-1 PSAPs equipment.

It should be noted that Clearwave does provide complete access diversity. Any Carrier who chooses to connect to the NG9-1-1 Data Centers in a diverse fashion is welcome to do so. FAS is a convenient transition step toward NG9-1-1 for most Carriers. All Carriers with SIP Access Trunking are encouraged to use the same access methodology as Clearwave to achieve full end to end diversity.

Benefits include:

- Solution gives the Access Carriers additional time to build and test alternate trunking.
- Solution introduces Digital and SIP Trunking into the new FAS network.
- uses GIS Location Information for its Database which improves Location Accuracy
- Allows for transfer of significant information along with the 9-1-1 call when required to another PSAP or a First Responder.
- provides local Data Center Diversity
- The Session Border Controller can protect the PSAPs and network from Overload and Security Threats.

The Frontier Casey DMS 100 routes calls to Carbondale DMS100 which in turn routes to the diverse INdigital FAS in Carbondale and Indiana, all via digital trunking. Inside the INdigital FAS, the 9-1-1 calls are converted to SIP, using selected FEs of the newer NG9-1-1 architecture. Those FEs serve as a Legacy Network Gateway (LNG) and Emergency Services Routing Proxy (ESRP) to send the 9-1-1 SIP calls to the two (2) Diverse Session Border Controllers in Murphysboro and Harrisburg where the calls will be handled by the remaining FEs of the NG9-1-1 Architecture .

The information below will be completed each time a test is made. This form can be modified to suit the actual test to be made. Refer to the details in the Exhibit 10.1 NG9-1-1 Integrated Test Plan document for more specific tests to be performed.

Carrier Name	
Contract No.	
System Component Name Number CLLI	
Customer County PSAP	
Sites Addresses	
Sites Managers Names	
Sites Managers Phone Numbers	
Sites Manager Cell Phone Number	
Sites Managers Emails Addresses	
NOCs Contacts Names	
NOCs Contacts Phone Numbers	
Split Exchange Yes or No	

Signaling	
Transport and Bandwidth	
If Yes, Specify the PSAPs, Primary and Alternate, and Disaster Recovery	
Test Number in Databases	
Test Pass/Fail Details and Time	

1.5 Test System Configuration

Test 1: FRONTIER Casey SR to Carbondale SR interface.

Trunks	Quantity	Comments	
Intermachine Trunks			
STP Pair interfaces/Carrier			
T1 span Legacy SR to Legacy SR			
SS7 spans (Legacy SR to Legacy SR)			
Backup connectivity			
TOTAL SS7 LINKS			
TOTAL TRUNKS			
TOTAL SS7 LINKS			
TOTAL TRUNKS			

FRONTIER Carbondale SR to INdigital ESRP interface.

Lines/Trunks	Quantity	Comments	
E9-1-1 Trunks			
SIP 911 interface			
Database			
T1 span Legacy SR to SIPME(s)			
PSTN access for ESRP in Carbondale			
SS7 spans (Legacy SR to SIPME)			
Primary IP Network connectivity			
Backup IP connectivity			
Backup ESRP in Indiana			
TOTAL LINES/TRUNKS			

INdigital ESRP to the NG9-1-1 Inc. Data Centers via Carrier POI and then the Dual SBCs into the FEs. The testers will be able to see them each work and or fail via using NOC tools.

Lines/Trunks	Quantity	Comments	
Frontier & Access Carrier E9-1-1 Trunks			
Clearwave SIP 911 Trunks		Access Carriers w SIP	

FAS DMS 100 Tandem			
FAS Database			
FAS SS7 Network			
FAS Copper Fiber Ring			
INdigital Carbondale ESRP			
INdigital Indiana ESRP			
NG-911, Inc. Carrier POIs			
SBCs			
ECRFs			
ESRPs			
Logging and Recording			
Monitoring			
PSAPs			
Call Delivery			
ALI Deliver			
IP network			
Media Server/Transfer			
Primary PSAP			
Back up			
Back up			
Back up (applicable Perry)			

1.6 Schedule of Events

General Plan:

Agreed Day of Week:

Agreed Maintenance Window:

Agreed Test Tools:

Agreed Communications Bridges:

NOCs Ready: List and provide reach information and contacts

Event	Date
Install Begin	
Testing Begin	
Testing Complete	
Grade of Service Observed:	
3 Week Grade of Service Goal Reached	
Remove old SR to PSAP Routing	

2.0 Equipment and Software

2.1 Equipment, Software Version

---TBD---

3.0 Test Requirements

3.1 Functional Checklist

The functional test checklist is included in this section. Each item will be tested based on the availability of test circuits and interfaces.

Requirements Codes

The following codes will be used to indicate pass, fail, or not applicable for each application module feature. The designated code for each requested feature is listed in the “**Test Code**” column.

When the **TF** or **RTF** code is used, the Tester must also insert an explanation of the planned correction action in the **Comments** column.

- TP Test Passed
- TF Test Failed
- RTP Retest Passed
- RTF Retest Failed
- NA This feature is not applicable in Customer Systems

Note: In this the section, the Test teams will reference the 10.1 Test names and numbers as appropriate

Test Case #	Test Description	Expected Test Outcome Notes	Results

3.1.1 Power and Connectivity Requirements

Power Connections

Refer to the 10.1 Test Case Names and Numbers where appropriate.

Test #	Description	Test Code	Results Comments
1.	Use the power connections diagram to verify that all pre-installed power connections are still firmly plugged in.		
2.	Verify that power connections of all elements of the system are safely connected and that there is no risk of a connection to be accidentally disconnected		
3.	Verify that all elements of the solution are powered on.		
4.	Verify that the Central Equipment is connected to the building ground. Test this ground with voltmeter (should be close to 0 Volts or current building ground voltage) and measure resistance (close to 0 Ohms)		
5.	Verify performance of backup power Generator turn-up time Battery Survivability time		

3.1.2 Remote Access & Monitoring

Refer to the 10.1 Test Case Names and Numbers

Test #	Description	Test Code	Comments
--------	-------------	-----------	----------

1.	Verify that you have the proper external IP addressing and connectivity to the Internet (remote system management.		
2.	NG 911, Inc. contacts the INdigital TSG group at 1-877-469-2010. Have a member of the customer support team login to the system and verify that they are able to connect to remote systems.		
3.	NG 911, Inc., contacts the FRONTIER NOC group at 1-877-245-3511. Have a member of the NOC team login to the system and verify that they are able to connect to the devices. Note: If Frontier needs another Carrier to Participate, they will name the Carrier and either Contact them or set up the arrangement.		
4.	FRONTIER contacts the Access Carrier NOC group at 1-877-245-3511. Have a member of the NOC team login to the system and verify that they are able to connect to the devices.		
5.	NG9-1-1, contacts the CSI PSAP Manager and/or IT contact for the PSAP group at 618-534-4911. Have a member of the Data Center and/or PSAP team login to the system and verify that they are able to connect to the devices.		
6.	Confirm remote access via a Conference Bridge.		
7.	Monitoring system - verify all critical hardware software have been added to Monitoring.		
8.	Verify all Hand held or PC monitoring solutions are operational.		

9.	Critical equipment list: (LIST HARDWARE HERE)		
10.	Ensure all Reporting Capabilities are turned on for Tracking		

3.1.3 FRONTIER 911 Network Testing

Refer to the 10.1 Integrated Test Case Names and Numbers

Lines/Trunks	Test Code	Comments
Casey to Carbondale IMTs Casey to Carbondale SS7 STPs and Signaling Test Circuit continuity Audio Quality Trunk Failover		
E9-1-1 Trunks Test circuit continuity Audio Quality Trunk Failover		
SIP 911 interface Test circuit continuity Audio Quality Trunk Failover		
Database Data upload to onsite database Wireline & wireless test		

<p>T1 span Legacy SR to SIPME(s) Test circuit continuity Audio Quality Trunk Failover</p>		
<p>PRI span(s) Legacy SR to SIPME Test circuit continuity Audio Quality Trunk Failover</p>		
<p>SS7 spans (Legacy SR to SIPME) Test circuit continuity Audio quality Trunk failover</p>		
<p>Primary IP Network connectivity Test circuit continuity Ping times Bandwidth load latency</p>		
<p>Backup IP connectivity Test circuit continuity</p>		

Ping times		
Bandwidth load		
latency		
Backup ESRP in Indiana		
Failover call router		
Confirm call delivery		
Audio quality		

3.1.4 Frontier ESRP to NG-911, Inc. ESRP testing

Refer to the 10.1 Test Plan for Test Case Names and Numbers (repeat multiple times with duplex devices).

Lines/Trunks	Detail	Test code	comments
E9-1-1 Trunks			
Test circuit continuity			
Audio Quality			
Trunk Failover			
SIP 911 interface			
Test circuit continuity			
Audio Quality			

Trunk Failover			
Database (verify onsite system)			
IP network Test circuit continuity Ping times Bandwidth load Latency			
Clearwave Fiber Ring Data Center to PSAPs Fiber Network Ethernet Connectivity Test Phase Test Jitter Test Latency Bandwidth Load Ping Times Document		Note Clearwave NOC needed on end to end calls nearly all the time. Verify right tests.	
Call Delivery Audio Quality Call Routing Failover ALI information			

ALI Deliver			
Wireline			
Wireless			
IP network			
Primary and backup			

3.1.5 PSAP 911 testing

1.	Test Description	Test Code	Comments
2.	Establish/verify test numbers are inserted into data bases and are ready to be used in the Access Carrier Network.		
3.	Place wireline calls (list exchanges below)		
4.	Confirm voice delivery (list exchanges below)		Add Rows for Each Company
5.	Confirm ALI data delivery (list exchanges below)		
6.	Place wireless calls (list carriers)		Add rows for each PSAP
7.	Verify Phase 2 delivery of Wireless Call		
8.	Verify receipt of ESRK and call back number in ALI display		
9.	Place test calls from CLECs & VOIP providers from sampling (List Carriers).		
10.	Verify ALI delivery of CLEC & VOIP providers.		
11.	Verify ALI delivery of nomadic VOIP provider		
12.	Verify backup systems (fail primary delivery methods) list MOP of test		
13.	Verify call overflow methods		
14.	Verify default routing		

15.	Verify Call transfer utilizing 911 network		Validate Legacy and ESInet per Diagram and Network Status at time of Test and Cutover
16.	Verify ALI data delivery on transferred call		

4.0 Site Acceptance

We hereby certify that the present document is complete (no missing page) and that all test procedures have been executed and passed as per associated expected results or that all tests have been executed and some deviations were observed

	All test were executed and passed
	All test were executed, however there was the following deviations:

NG9-1-1, Inc. Test Representative/Witness

Name:	
Title:	
Signature:	
Date:	

Name:	
Title:	
Signature:	
Date:	

FRONTIER Test Representative /Witness

Name:	
Title:	
Signature:	
Date:	

INDigital Test Representative/Witness

Name:	
Title:	
Signature:	
Date:	

Access Carrier Test Representative/Witness