



9-1-1 Managed Services Technical Review

FINAL REPORT

**SUBMITTED JUNE 2014 TO:
STATE OF ARIZONA 9-1-1 PROGRAM**



MissionCriticalPartners

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EXECUTIVE SUMMARY

Mission Critical Partners, Inc. (MCP) is pleased to provide the State of Arizona 9-1-1 Program (Program) with a Managed Services Technical Review report. The Program contracted with MCP to review all of the technical documentation associated with the Arizona solution and provide a written report outlining its strengths and vulnerabilities.

The 9-1-1 industry is experiencing significant change driven by advances in technology and our public safety professionals' steadfast dedication to serving their communities. Today's 9-1-1 network is outdated and is unable to keep up with the technology that is in the hands of end users. Additionally, 9-1-1 funding models are slow and difficult to change, which compounds the challenges that face public safety answering points (PSAPs) across the United States. As a result, the legacy 9-1-1 network and its operating model must change.

The State of Arizona (State) is taking a proactive approach to addressing the funding and technology challenges by considering a Managed 9-1-1 Services model. The Managed Services model offering is presented by CenturyLink, the long-time 9-1-1 service provider in the state. CenturyLink has partnered with the industry's leading solutions providers, Cassidian and Intrado, to offer a bundled services offering that will enable PSAPs across the state to upgrade their legacy call handling systems and migrate to an Emergency Services Internet Protocol (IP) Network (ESInet).

The proposed solution includes all of the major Next Generation 9-1-1 (NG9-1-1) services available to PSAPs today, including a redundant IP network, call routing, location data management, call handling equipment, text to 9-1-1, geographic information system (GIS) data management tools, and supplemental data. All of these services will be maintained to National Emergency Number Association (NENA) i3 standards and at the most recent software releases for the duration of the contract. The Managed Services offering provides PSAPs with the option to choose between two industry-leading customer premise equipment (CPE) systems; either the Intrado VIPER or the Cassidian VESTA. The majority of the hardware for the solution will be located in CenturyLink data centers and the maintenance of all hardware, including that which is located at the PSAPs will be the responsibility of CenturyLink. All of the services are provided by CenturyLink as the single point of contact for the solution, so that the Arizona 9-1-1 Program and the Arizona PSAPs will have only a single vendor to manage and a single bill to pay for 9-1-1 service.

As this is a bundled, service-based model, PSAPs will have a monthly recurring fee covering all NG9-1-1 services. Today, 9-1-1 call routing and data management services are monthly recurring fees, while the CPE requires the outlay of significant capital expenditures, typically on a five-year cycle. Ownership costs for CPE can vary with spikes in capital expenditures, as servers and other hardware require replacement due to obsolescence, normal wear and tear, or failure. In the procurement of the Managed Services, PSAPs will migrate to an operating expense model that is predictable and enables the PSAP to always have the latest technology. Meanwhile, the service will be provided by a solution



provider that leads the industry in NG9-1-1 call volume and has the longest track record in migrating PSAPs to a NG9-1-1 call-processing environment.

The vulnerabilities of the solution may be summarized as “the unknown.” A review of the CenturyLink/Intrado April 2014 outage in the state of Washington indicated that the source of the issue resided in a process that was unknown to the State and its PSAPs. MCP recommends that the Program complete a review of Intrado’s corrective actions and CenturyLink/Intrado joint follow-up actions stated in CenturyLink’s April 24, 2014, Major Outage Report to the Washington Utilities & Transportation Commission. Such prudence should serve Arizona with assurances that risk has been mitigated for the State as it and its PSAPs consider the procurement of NG9-1-1 services from CenturyLink in the future.

The CenturyLink documentation did not raise major concerns with the solution design and service offering. However, there are several areas where MCP recommends that additional documentation be detailed in a consolidated Services Agreement that is supported by significant service level agreements (SLAs). This will provide the State with definitive services and assurances that CenturyLink is committed to maintaining the services. Ultimately, as proposed, the solution appears feasible and would provide many beneficial services to the State’s PSAPs and its constituents in a service-based model that enables an efficient and predictable operating expense model.



1. BACKGROUND

The Program initially provided nine documents for MCP to review for the Managed Services Technical Review. MCP's task assignment was to review all of the technical documentation associated with the Managed 9-1-1 Services offering and provide a written report outlining the solution's strengths and vulnerabilities, as well as recommendations on how the vulnerabilities may be overcome. The review was to consider the requirements checklist and add additional requirements to ensure a thorough review of the Managed Services solution.

During the review period, MCP requested additional documentation be provided by the Program to address several Project Checklist Requirements. The Program did not have the documentation and requested that CenturyLink provide the information. CenturyLink delivered a set of documents in response to the Program's request within four business days. Table 1 provides a listing of the documents received and reviewed by MCP.

Table 1 – Technical Documents Reviewed

Document Name	Description	Date Received
A9-1-1 Great Migration Plan for AZ	June 2012 proposal for bundled, managed NG9-1-1 services offering	Monday, May 5, 2014
AZ NG9-1-1 Technical Review 4-14-14	CenturyLink Next Gen 9-1-1 and Managed 9-1-1 CPE Technical Overview for Arizona Solution	Monday, May 5, 2014
Clearview reports - A911	Guide for using Clearview reporting tool	Monday, May 5, 2014
Managed 911 - Service Level Goals - 6-11-2013	Description of CenturyLink Service Level Goals for 9-1-1 Routing and ALI Management Services	Monday, May 5, 2014
MapSAG	Intrado marketing sheet for MapSAG product	Monday, May 5, 2014
MPLS SLAs 6-11-2013	CenturyLink MPLS VPN Service Level Agreement	Monday, May 5, 2014
NG911 Managed Services - Arizona Network	Detailed network diagram	Monday, May 5, 2014
PAD MOP CenturyLink Work and Testing Instructions 102313CH Final	Work instructions document for PSAP Abandonment Device (PAD)	Monday, May 5, 2014
PowerProbe6000AndPowerProbe500_CCW-20472-0_DS_NM_0	PowerProbe marketing booklet for PowerProbe 6000 and PowerProbe 500 devices	Monday, May 5, 2014
Denver dn1	CenturyLink marketing sheet for Denver 1 data center	Tuesday, May 20, 2014
Denver dn2	CenturyLink marketing sheet for Denver 2 data center	Tuesday, May 20, 2014
Denver dn3	CenturyLink marketing sheet for Denver 3 data center	Tuesday, May 20, 2014



Document Name	Description	Date Received
MCP Responses Set 1 sed	CenturyLink responses to MCP's request for additional documentation	Tuesday, May 20, 2014
PBN-2013-Third Party IP-Recording Kit	Intrado's IP recording product bulletin	Tuesday, May 20, 2014

2. REQUIREMENTS CHECKLIST

The following requirements checklist was provided by the Arizona 9-1-1 Program. MCP added two additional requirements that may be viewed at the bottom of the checklist. The checklist was used to review the documentation provided against the system requirements.

Table 2 – Requirements Checklist

Status	Requirement	Reference
<input checked="" type="checkbox"/>	Feasibility of proposed technical solution	Page 33
<input checked="" type="checkbox"/>	Single Point of Contact Solution	Page 34
<input checked="" type="checkbox"/>	Ubiquitous (eliminates or has the ability to eliminate communication boundaries such as but not limited to service provider, LATA and state boundaries)	Page 6
<input checked="" type="checkbox"/>	NENA i3 compliant (current and future requirements)	Pages 7-10
<input checked="" type="checkbox"/>	End-to-end IP signaling from VoIP endpoint to IP-enabled PSAP	Pages 10-11
<input checked="" type="checkbox"/>	Geo-diverse	Pages 11-12
<input checked="" type="checkbox"/>	Redundant (Identify any single points of failure)	Pages 12-13
<input checked="" type="checkbox"/>	The agreement ensures the use of the latest technologies, versions and industry standards for CenturyLink Provided Equipment: <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Software <input checked="" type="checkbox"/> Hardware <input checked="" type="checkbox"/> Firmware <input checked="" type="checkbox"/> Network <input checked="" type="checkbox"/> Maintenance 	Pages 34-39
<input checked="" type="checkbox"/>	Sufficient connectivity with legacy network to allow for transparent communication between networks: <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Proper gateways for service providers <input checked="" type="checkbox"/> PSAP to PSAP communications 	Pages 13-14



Status	Requirement	Reference
☑	Meets or exceeds industry standards regarding: <ul style="list-style-type: none"> ☑ Network capabilities (to include last mile) ☑ NG911 Core Services ☑ Sufficiently handle call load without degrading quality of service 	Pages 14-15
☑	Emergency call routing to the correct PSAP based on caller location; callback number and caller location are delivered to the PSAP with the call	Page 15
☑	Supports call originations from legacy wireline/wireless originating networks, as well as from VoIP callers and text messaging applications	Page 16
☑	Supports call originations from many different devices and services (e.g. SMS, IM, video PDSs, telematics, TTY/TDD, etc.)	Page 17
☑	IP-Enabled Equipment	Page 18
☑	Support (network and PSAP)	Pages 48-49
☑	Logging capabilities	Page 19
☑	Review of metrics and data provided by the ClearView Reporting tool	Pages 49-50
☑	Review of overall metrics as being necessary and sufficient to support the State's objective	Page 50
☑	Administrative line demarcation (New Checklist Requirement)	Pages 18-19
☑	Security of Managed Services (New Checklist Requirement) – Physical, Administrative, and Network Security including but not limited to NENA 75-001 (NG-SEC)	Pages 20-23

3. SOLUTION DESIGN

The CenturyLink Managed Services offering provides the Program with a geo-diverse, nationally hosted NG9-1-1 call routing and call handling solution. It includes several applications and services that will enable Arizona PSAPs to migrate to new technology in an operating expense model. The following table addresses beneficial features, vulnerabilities and recommendations for improving the solution design or its associated documentation.



Table 3 – Solution Design Review

Topic Area	Commentary	Reference
Ubiquitous – (eliminates or has the ability to eliminate communication boundaries, such as but not limited to service provider, LATA and state boundaries)		
NENA Network-of-Networks Vision	<p>Meets requirements.</p> <p>The Managed Services offering may be viewed as a cloud-hosted, Software-as-a-Service (SaaS) model where the ESInet is a combination of hosted services in regional and national data centers, with interconnection of PSAPs over private, leased Multi-Protocol Label Switching (MPLS) networks. Participating PSAPs would be part of a nationwide CenturyLink/Intrado ESInet enabling ubiquitous call transfers of voice and data to any other PSAP on the CenturyLink/Intrado ESInet, regardless of local access and transport area (LATA) and state boundaries.</p> <p>Based on the referenced figure, it appears that the solution aligns with NENA’s “network-of-networks” vision by providing interconnection with other i3 networks via the CenturyLink/Intrado-provided Border Control Function (BCF).</p>	A9-1-1 Great Migration Plan for AZ, Appendix A, Figure 1, pg. 18
i3 Call Transfers	<p>Unable to determine whether the solution meets requirements.</p> <p>Figure 1 from the referenced document indicates interoperability with other i3 networks. However, CenturyLink’s documentation does not describe interconnection and interoperability with other networks.</p> <p>MCP recommends that the Program request additional documentation from CenturyLink that describes how the Managed Services solution will interconnect with other i3 networks, either in-state regional networks or neighboring state networks. The services description should identify transfer services that will be supported, which should include but are not limited to voice, text to 9-1-1, location data, supplemental data, call types, the i3 interface(s) and protocols that will be used, physical points of interconnect, and whether additional fees may apply for said interoperability.</p>	A9-1-1 Great Migration Plan for AZ, Appendix A, Figure 1, pg. 18
Legacy Selective Router Transfers	<p>Unable to determine whether the solution meets requirements.</p> <p>The referenced documentation states that the Managed Services offering should include legacy selective router call transfers and that CenturyLink will</p>	AZ NG9-1-1 Technical Review 4-14-14, Section 7.2 & 7.3



Topic Area	Commentary	Reference
	<p>work with alternative service providers to establish connectivity to other selective routers and automatic location identification (ALI) systems. However, the documentation does not definitively describe whether call transfers to/from PSAPs served by legacy selective routers (LSRs) will provide ALI data.</p> <p>MCP recommends that the Program request that CenturyLink provide additional language in Section 7.3 that describes the specific interfaces on calls, both in to and out of the system. The documentation should describe if ALI will be provided in call transfers to and from LSRs and switches, including those from alternative service providers. Any limitations to LSR call transfers, such as ALI only being available for certain call types, should be included in this section. The potential exists where alternative service providers may not be willing to connect to the LSRs or LNGs in Phoenix and Tucson, requiring CenturyLink to pick up their traffic at the alternative service provider’s switch(es). As such, the Program should request that CenturyLink describe whether there are any additional costs associated with the connectivity and services described in Section 7.3.</p>	
NENA i3 Compliant (current and future requirements)		
NENA i3 – General	<p>Meets requirements.</p> <p>The Managed Services offering describes migrating PSAPs to i3 services and references all of the i3 functional elements, including i3 protocols and interfaces.</p> <p>MCP recommends that the Program obtain additional documentation on the specific services and features of the i3 Managed Services offering. MCP recommends that the Program obtain more details on the PSAPs’ i3 migration process, the timing with making the move from legacy systems to i3, and any limitations of the service. Specific recommendations follow in the next six topic areas.</p>	<p>A9-1-1 Great Migration Plan for AZ – references throughout the document</p> <p>AZ NG9-1-1 Technical Review 4-14-14, Section 12</p> <p>MCP Responses Set 1 sed</p>
Emergency Call Routing Function (ECRF) and Location Validation Function (LVF)	<p>Meets requirements.</p> <p>The ECRF and LVF descriptions provide information on the functions they serve at a high level. Additional information would be helpful in understanding the</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 12.1.1</p> <p>A9-1-1 Great Migration Plan for AZ,</p>



Topic Area	Commentary	Reference
	<p>provisioning of these critical systems.</p> <p>MCP recommends that the Program obtain additional documentation from CenturyLink on what these components will provide to the PSAPs. At a minimum, the additional documentation should describe: the features that these systems will provide; how validations will be made; the interface to the Communication Service Providers (CSPs); how updates to the ECRF are performed; how the GIS data is managed/coalesced between all GIS data providers; how conflicts are managed between GIS data sources; what happens when a CSP's record cannot be validated; and the Internet Engineering Task Force (IETF) Request For Comments (RFC) for those functions that are in compliance.</p>	<p>Appendix A</p> <p>MCP Responses Set 1 sed</p>
<p>Emergency Services Routing Proxy (ESRP) and Policy Routing Function (PRF)</p>	<p>Meets requirements.</p> <p>The ESRP description provides insight to the general function of the element and its ability to route calls utilizing latitude/longitude, civic location or routing keys. The PRF description details the policies and processes that PSAPs will use for making updates to their routing policies. The description highlights features that exceed i3 functionality with alternative fallback routing methodologies that could be beneficial to the PSAPs.</p> <p>A topic that is not discussed in the referenced documentation, yet a key element of the ESRP, is queue management functionality. Basically, the ESRP and PRF work together to manage call queues from which terminating ESRPs (CPE in legacy terms) will pull calls from the queues to which PSAP(s) are subscribed.</p> <p>MCP recommends that the Program obtain additional documentation from CenturyLink on these components. At a minimum, the additional documentation should describe the interfaces that the ESRP will support, its queue management capabilities with the proposed call handling systems, and the IETF RFCs for those functions that are in compliance.</p>	<p>MCP Responses Set 1 sed</p>
<p>Location Information Server (LIS) and Call Information Database (CIDB)</p>	<p>Meets requirements.</p>	<p>MCP Responses Set 1 sed</p>



Topic Area	Commentary	Reference
	<p>The LIS and CIDB descriptions provide a logical solution to the issue of carriers not providing LIS and CIDB systems, which is an industry issue for the foreseeable future. The CenturyLink/Intrado solution solves a challenge that is not addressed in i3 and exceeds the requirements set forth in the standard.</p>	
Event Logging Service	<p>Meets requirements.</p> <p>The referenced documentation describes the i3 Event Logging Service at a high level.</p> <p>MCP recommends that the Program obtain additional documentation from CenturyLink on the event logging interface, call event log details, and the system's reporting capabilities.</p>	MCP Responses Set 1 sed
Forest Guide	<p>Unable to determine whether the solution meets requirements.</p> <p>The i3 Forest Guide service is not described in the CenturyLink documentation. The Forest Guide feature enables interoperability between i3 systems. MCP recommends that the Program obtain additional documentation from CenturyLink on the Managed Services' support for Forest Guide routing. At a minimum, the additional documentation should describe how the service will interface with a state-level and/or national Forest Guide and what IETF RFCs the system will support pertaining to Forest Guide.</p>	Not applicable
i3 Guarantee	<p>Meets requirements.</p> <p>The referenced documentation describes the Managed Services providing a guarantee to support "all functions and protocols specified in the NENA i3 reference architecture."</p> <p>The documentation speaks to a guarantee, but no remedies are described in the Intrado proposal. This provides two concerns: 1) the guarantee does not provide for remedies if the Managed Services do not support all i3 functions and protocols; and 2) the guarantee is made in Intrado's proposal document, not CenturyLink's.</p> <p>MCP recommends that the Program ask CenturyLink to define the remedies if</p>	A9-1-1 Great Migration Plan for AZ, page 1, 2 and 4



Topic Area	Commentary	Reference
	<p>the Managed Services do not support all i3 functions and protocols, i.e., what is the process for raising concerns regarding i3 compliance after Managed Services go live? MCP also recommends that the Program have the i3 Guarantee detailed in the appropriate CenturyLink document, such as the CenturyLink Services Agreement.</p> <p>Unable to determine whether the solution meets requirements.</p> <p>The Great Migration Plan describes the i3 Guarantee in the context of Advanced 9-1-1 (A9-1-1) VIPER services, but it does not mention whether it applies to the Cassidian VESTA call handling solution.</p> <p>MCP recommends that the Program seek clarification from CenturyLink on whether the i3 Guarantee applies to the Cassidian VESTA call handling solution and its associated applications, such as Aurora, Data Sync, and Vela.</p>	<p>A9-1-1 Great Migration Plan for AZ, page 1 and 7</p>
End-to-end IP signaling from VoIP endpoint to IP-enabled PSAP		
<p>PSAP Gateway Manager (PGM) Terminal Server</p>	<p>Does not meet requirements.</p> <p>The referenced documentation indicates that the Managed Services will not provide for end-to-end IP signaling from VoIP endpoint to IP-enabled PSAP, at least initially. It states that PSAP gateway managers (PGMs) will convert IP traffic to centralized automatic message accounting (CAMA) signaling before delivering the call to the host call handling equipment.</p> <p>PGMs are required when interfacing with legacy CPE that is not IP capable. Both the VESTA and VIPER call handling systems are IP capable and have been deployed with the Request For Assistance Interface (RFAI), which provides IP call delivery in an Emergency Services Number (ESN)-based routing solution. Additionally, both systems have the ability to provide a NENA i3-compliant, IP interface.</p> <p>Other reasons to eliminate PGMs in the call flow include:</p> <ul style="list-style-type: none"> • IP-to-Time Division Multiplexing (TDM) conversions increase the risk of echo • The use of PGMs adds latency to call setup 	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 5.0, third bullet</p> <p>NG911 Managed Services - Arizona Network Diagram</p>



Topic Area	Commentary	Reference
	<ul style="list-style-type: none"> • PGMs represent another potential point of failure in the call path • A system process for accommodating PGMs was the critical factor in the CenturyLink outage in Washington State on April 9-10, 2014 <p>Based on the information above, MCP recommends that the Program require that CenturyLink remove PGMs from the hosted CPE solution design. This recommendation is made on the assumption that all PSAPs on the CenturyLink ESInet will have purchased the complete Great Migration solution. PGMs may be required for interfacing to other CPE systems on the ESInet and exceptions may be appropriate for PSAPs that do not use the bundled VIPER or VESTA solutions.</p>	
Network Design		
Geo-diverse	<p>Meets requirements.</p> <p>One of the strengths of the Managed Services offering is that it provides for geo-diversity throughout the solution design. Originating 9-1-1 traffic is delivered to two geographically diverse legacy network gateways (LNG) located in Phoenix and Tucson, Arizona.</p> <p>Meanwhile, the core intelligence and database elements of the solution are hosted in geographically diverse data centers in Englewood, Colorado, and Miami, Florida. This extreme geo-diversity provides improved survivability of the solution by assuring that a localized catastrophic weather or man-made event cannot take down both nodes.</p> <p>The geo-diverse design includes the host call handling systems. The VIPER hosts are located in the same Englewood and Miami data centers, while the VESTA hosts are located in Highlands Ranch, Colorado and Phoenix, Arizona.</p> <p>CenturyLink’s solution design incorporates geo-diversity into the design of the local access for each of the aforementioned critical network elements, with each element having diverse local points of presence (POP) for accessing CenturyLink’s nationwide MPLS network. Once the packets are “on net” the inherent quality of MPLS is that there are dozens of route combinations</p>	NG911 Managed Services - Arizona Network Diagram



Topic Area	Commentary	Reference
	available to deliver each packet from point A to point Z.	
Redundant	<p>Unable to determine whether the solution meets requirements.</p> <p>The Managed Services solution design provides redundant call path components throughout the design.</p> <ul style="list-style-type: none"> • Originating traffic at each of the LSRs is redundantly connected to two LNGs • LNGs are redundant with locations in Phoenix and Tucson • Each LNG location has redundant IP routers connecting to redundant MPLS POPs • The MPLS network interconnects all network nodes with redundant virtual private networks (VPNs) • MPLS bandwidth is redundant to provide for 100 percent capacity in case of failure to one of the connections • Core databases and routing elements are redundant in Englewood and Miami • Redundant IP routers are provided at each core node • VIPER hosts are redundant in Englewood and Miami • VESTA hosts are redundant in Highlands Ranch and Phoenix • Redundant IP routers are provided at each VESTA host site • Redundant IP routers are provided at each PSAP location <p>The documentation does not provide details as to the redundancy of critical support components such as the network operations center (NOC), monitoring systems, provisioning systems, backup systems, and data archive systems. Additionally, the referenced network diagram does not show redundant Layer 2 connectivity between the VESTA cores.</p> <p>MCP recommends that the Program request that CenturyLink provide details regarding the redundancy of support systems and the VESTA Layer 2 connectivity.</p>	<p>NG911 Managed Services - Arizona Network Diagram</p>
	<p>Unable to determine whether the solution meets requirements.</p> <p>The referenced document states “CenturyLink will provide dual, redundant, and</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 6.1</p>



Topic Area	Commentary	Reference
	<p>diverse IP connectivity via the CenturyLink provided iQ MPLS private port from the ECMC to the PSAP as available.”</p> <p>MCP recommends that the Program request that CenturyLink provide details where redundant and diverse IP is not available to the PSAP.</p> <p>MCP recommends that the Program request detailed network mapping down to the card level to ensure that there is no single point of failure.</p>	
<p>Sufficient connectivity with legacy network to allow for transparent communication between networks - Proper gateways for service providers</p>	<p>Meets requirements.</p> <p>Similar to today’s LSRs, the Managed Services offering provides for two redundant, geographically diverse LNGs located in Phoenix and Tucson. These gateways provide proper interconnection to the ESInet for legacy TDM traffic. CenturyLink’s recommendation for the ingress network to the gateways calls for a ratio of 1.3 trunks for every LSR-to-PSAP trunk, with the caveat that they will monitor traffic volumes and adjust the ratio up/down accordingly. This recommendation is the industry norm and appropriate for the Arizona deployment.</p> <p>A topic that was not addressed in the CenturyLink documentation is the ability for the solution to accept calls from CSPs via native Session Initiation Protocol (SIP). The standard for the SIP call delivery to an ESInet is under development, which is likely the reason that this topic was not discussed. However, during the course of the next five years, it is anticipated that the standard will be ratified and carriers will be ready to deliver their calls via SIP. Therefore, MCP recommends that the Program request that CenturyLink provide a service description in the consolidated Services Agreement detailing the points of interconnect (POI) for SIP call delivery and the process for migrating carrier traffic from the gateways to the SIP POI.</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 11.0</p> <p>“As a PSAP is migrated to a NG PSAP, CenturyLink will replace the existing EM trunks from the Legacy Selective Router (LSR) to the PSAP with SR trunks from the LSR to the LNG Gateways. CenturyLink’s recommended design will be a ratio of (1.3) ES trunks for every (1) legacy EM trunk. During the migration of PSAPs from the legacy network to the ESInet, CenturyLink will monitor the traffic volumes and may adjust this ratio up or down as needed. Additionally, trunks from the LNG to the LSR are needed to support call transfers from NG PSAPs to Legacy PSAPs or vice versa, which may also impact the required ratio.”</p>
<p>Sufficient connectivity with legacy network to allow for transparent communication between networks – PSAP-to-PSAP communications</p>	<p>Meets requirements.</p> <p>The referenced documentation describes the requirement for LNG-to-LSR trunks for the purposes of call transfers between legacy and NG9-1-1 PSAPs. As one-directional TDM trunks, the minimum capacity that could be installed is</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 11.0</p> <p>“Additionally, trunks from the LNG to the LSR are needed to support call</p>



Topic Area	Commentary	Reference
	<p>a Digital Signal 1 (DS1) circuit, which would provide for up to 24 simultaneous call transfers, i.e., 24 calls may be transferred via a DS1 from the LSR to the LNG and 24 calls may be transferred via a DS1 from the LNG to the LSR at any single given point in time. Similar to the commitment to monitoring CenturyLink’s ingress network trunk capacity, MCP recommends that the Program request that CenturyLink add a commitment to the consolidated Services Agreement for monitoring the call transfer volumes and adjusting capacity accordingly.</p>	<p>transfers from NG PSAPs to Legacy PSAPs or vice versa, which may also impact the required ratio.”</p>
<p>Meets or exceeds industry standards - Network capabilities (to include last mile)</p>	<p>Unable to determine whether the solution meets requirements.</p> <p>The Managed Services offering meets industry standards for network capabilities by providing redundant and diverse MPLS connectivity to each network element, including PSAPs where feasible. Each network node has redundant edge routers terminating the IP connectivity. The network is advertised as using leading network protocols for management of IP traffic and providing fast convergence of the networks should an issue be experienced with one of the network paths. Redundant and diverse VPNs provide for isolation of traffic. The network is proactively monitored and alarms are sent to the CenturyLink NOC for investigation and troubleshooting. The network supports Quality of Service (QoS) for packet prioritization and security is implemented on the network.</p> <p>However, in response to MCP’s request for last mile diagrams, CenturyLink stated that “CenturyLink network maps are proprietary and due to competitive and security issues, CenturyLink will not provide last mile diagrams of the last mile facilities. However, upon request, CenturyLink will allow MCP to view these maps at a CenturyLink facility. No photos, notes, or drawings will be allowed.” The Task Order timeline did not provide for the opportunity for MCP to travel to a CenturyLink facility to review their available maps. As such, MCP recommends that the Program take CenturyLink up on the offer to view last mile network maps and take note of which POPs, data centers, and PSAPs have last mile network diversity challenges. This information will be valuable in understanding limitations of the network. With this information, the Program will be enabled to work with vendors to develop network diversity to locations, as feasible and appropriate.</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Sections 5.0, 6.0, 8.0, 13.6, 13.7</p> <p>MCP Responses Set 1 sed, Answer 3</p>



Topic Area	Commentary	Reference
<p>Meets or exceeds industry standards - NG911 core services</p>	<p>Meets requirements.</p> <p>The referenced documentation describes all of the core i3 functional elements, their feature functionality, and the protocols/interfaces required of those systems. The referenced materials describe these functions for the core services and for the VIPER solution. These descriptions, as well as the i3 Guarantee (if backed up with significant remedies), provide the Program with assurance that the Managed Services offering will meet industry standards for NG9-1-1 core services.</p> <p>MCP recommends that the Program request that CenturyLink consolidate all of the NG9-1-1 service descriptions into a single section within the consolidated Services Agreement. Additionally, MCP recommends that the Program request documentation and commitment from CenturyLink regarding the Cassidian VESTA's support for NENA i3 protocols and interfaces. This should be addressed in the updated i3 Guarantee SLA.</p>	<p>A9-1-1 Great Migration Plan for AZ, pg. 4 and Appendix A</p> <p>MCP Responses Set 1 sed, Answer 1</p>
<p>Meets or exceeds industry standards - Sufficiently handle call load without degrading quality of service</p>	<p>Meets requirements.</p> <p>The referenced sentence commits to the MPLS network providing the industry standard P.01 grade of service, which correlates to no more than one blocked call out of 100 in busy hour traffic. This commitment, combined with the use of the <i>de facto</i> industry standard 1.3 ratio for ingress trunks to the ESInet and the monitoring of ingress traffic, leaves MCP to believe that the network meets industry standards and that it is designed to sufficiently handle call load without degrading quality of service.</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 6.2</p> <p>“The CenturyLink provided iQ MPLS private port will meet the industry standard P.01 grade of service. P.01 will be applied from CenturyLink sites to the PSAP over the CenturyLink supplied network.”</p>
<p>Emergency call routing to the correct PSAP based on caller location; callback number and caller location are delivered to the PSAP with the call</p>	<p>Unable to determine whether the solution meets requirement.</p> <p>The Managed Services offering provides for emergency calls to be routed to the correct PSAP based on the caller's location, either through a legacy selective routing feature or through an i3 geospatial routing feature. However, not all situations will provide for the call back number and caller location to be delivered with the call. This is not due to a limitation of the solution design, but rather a reality of today's limitations in the delivery of location with the call from the originating networks, limitations in the wireless location acquisition technology, and standards-based call processing models.</p>	<p>Not Applicable</p>



Topic Area	Commentary	Reference
	<p>i3 call delivery includes the callback number in the SIP INVITE and provides for the ability to deliver caller location with the call. However, in Location-by-Reference (LbR) scenarios such as wireless calls, the call may be dereferenced prior to call delivery, but in most cases, the location may be that of the cell site and call routing will have to be performed on the cell site or cell sector's centroid location. In some cases, a location universal resource identifier (URI) may be provided to the CPE and it may have to be dereferenced after the call is delivered. In both cases, a "rebid" by the CPE will send a Hypertext Transfer Protocol (HTTP)-Enabled Location Determination (HELD) dereference query to attempt to obtain a more accurate Phase II location for the caller. In some cases, Phase I location may only be available. However, in these i3 LbR calls, the CPE may be able to automatically perform the HELD query to obtain location data in parallel to the call setup process with the remote PSAP workstation. It is anticipated that the callback number and caller location (minimum Phase I) will be delivered with the call to the workstation in a vast majority of calls.</p> <p>Calls delivered via RFAI will not provide caller location on call delivery to the host CPE, as the call setup is based on ESN-based routing with a subsequent ALI query to retrieve location information. However, in these RFAI calls, the CPE will query ALI and should obtain ALI data in parallel to the call setup process with the remote PSAP workstation. It is anticipated that the callback number and caller location (minimum Phase I) will be delivered with the call to the workstation in a vast majority of calls.</p> <p>MCP recommends that the Program confirm the standards-based assumptions above and how much of the location retrieval function will take place before the call is presented to the PSAP, as these details were not provided in the documentation for this assessment.</p>	
<p>Supports call originations from legacy wireline/wireless originating networks, as well as from VoIP callers and text messaging applications</p>	<p>Meets requirements.</p> <p>The Managed Services offering supports call originations from legacy wireline, wireless, voice over IP (VoIP) and text messaging applications; specifically short message service (SMS) text.</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 7.1</p> <p>"Next Gen 9-1-1 Routing allows for specialized management of wireline,</p>



Topic Area	Commentary	Reference
	<p>In April 2013, the Alliance for Telecommunications Industry Solution (ATIS) and the Telecommunications Industry Association (TIA) released J-STD-110 Joint ATIS/TIA Native SMS to 9-1-1 Requirements and Architecture Specification. This industry standard “defines capabilities necessary to support SMS to 9-1-1, including standardized interfaces from the originating network to the PSAP, obtaining coarse location for routing, handling bounce-back messages, and managing the text message dialog between the originator and PSAP.”</p> <p>The Intrado solution advertises its abilities to provide an i3 interface with its call handling application, Power 911. Additionally, the solution provides a Web-browser for text delivery to the CPE that is not text enabled.</p> <p>Cassidian stated that it plans “to support text messaging when these standards are determined and approved by NENA. Once this is approved and offered by Cassidian, CenturyLink will make this optional feature available to the PSAP.”</p> <p>MCP understands that NENA views J-STD-110 as the industry standard defining emergency SMS delivery via Message Session Relay Protocol (MSRP) to PSAP CPE. The NENA i3 standard states that call handling equipment must support MSRP.</p> <p>MCP recommends that the Program require that the Cassidian solution provide text delivery directly to the call handling user interface (UI). This will enable call takers to process text messages in the call taking UI without the need for a separate window. This should also provide for consolidated voice and SMS management information systems (MIS) reporting.</p>	<p>wireless, and VoIP call types. Call types are determined based on the incoming call source facility (e.g. MSC, End office), as well as, the information provided within call signaling.”</p> <p>A9-1-1 Great Migration Plan for AZ, pg. 8</p> <ul style="list-style-type: none"> ▪ “Converts SMS messages incoming from the wireless carrier/SMS aggregator to the SIP dialogue” <p>MCP Responses Set 1 sed, Answer 4</p> <p>http://www.atis.org/PRESS/pressreleases2013/040213.asp</p>
<p>Supports call originations from many different devices and services (e.g., SMS, IM, video PDSs, telematics, TTY/TDD, etc.)</p>	<p>Meets requirements.</p> <p>The referenced documentation advertises the capability of the Managed Services offering for supporting many different sources of systems such as SMS, multimedia service (MMS), hazardous materials data, floor plan, and gunshot detection data; the system also supports legacy teletypewriter/telecommunications device for the deaf (TTY/TDD).</p>	<p>A9-1-1 Great Migration Plan for AZ, page 9 and 15</p>



Topic Area	Commentary	Reference
	<p>Additional Data is an area that is under standards development with NENA i3 v2, which is anticipated to be released sometime in 2014 with more standards development work that will carry into the standard's future versions.</p> <p>The Program should expect that call origination from sources other than the Great Migration bundled services of voice, SMS, MMS and TTY/TDD may incur additional fees for the services. However, the i3 Guarantee (with suggested remedy revisions) provides the Program with assurance that the system will comply with all current and future i3 systems, interfaces, and protocols for processing all i3 call/data types.</p>	
IP-Enabled Equipment	<p>Meets requirements.</p> <p>The VIPER and VESTA systems are industry leading IP-enabled call handling systems with the two platforms providing a majority of the call processing across the United States. These systems are able to process native SIP call delivery, eliminating TDM transport once the call reaches the ESInet.</p>	<p>http://www.cassidiancommunications.com/pdf/PB_Vesta_Sentinel4.pdf</p> <p>A9-1-1 Great Migration Plan for AZ, page 7</p>
Administrative Line Demarcation (New Checklist Requirement)	<p>Meets requirements.</p> <p>The referenced documentation is the first mention of the demarcation for administrative (admin) lines to the hosted call handling systems. In the industry, Foreign Exchange Office (FXO), Foreign Exchange Subscriber (FXS), and T1 gateways provide for the integration of admin lines with the PSAP CPE. Therefore, MCP deciphers the description of "Gateways (FXO, FXS, and T1)" to indicate that the PSAP's admin lines will be terminated locally at each PSAP.</p> <p>Termination of admin lines at the remote PSAP provides benefits and limitations to the features of a host/remote solution. As described with having admin lines terminating at the remote PSAP, the solution provides a secondary level of survivability in that if the MPLS network connectivity to the system is lost, then NG9-1-1 routing rules may be capable of being provisioned to send the 9-1-1 calls to a public switched telephone network (PSTN) number, e.g., the locally terminated PSAP admin lines.</p> <p>A potential limitation of the admin line design is that it may provide for the</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Sections 15.4 and 7.1</p>



Topic Area	Commentary	Reference
	<p>capability to send admin lines to multiple physical locations, which is a beneficial feature when a PSAP would like to spread its call takers over multiple locations. However, this feature would be enabled if the solution is designed to have the capability to backhaul the admin lines back to the core host sites and then deliver the calls to other destinations. MCP recommends, given this speculation of benefits and features, that the Program request a list of features and limitations of the admin line solution design.</p>	
Logging Capabilities	<p>Meets requirements.</p> <p>The referenced documentation describes analog output of position audio for recording of all position-based audio, e.g., 9-1-1 calls, administrative calls, and radio transmissions for both the VIPER and VESTA call handling solutions. The referenced documentation identifies an IP recording solution for the Intrado VIPER solution, which requires IP taps at each VIPER node. Based on the Third-Party IP-Recording Kit description, it appears that the logging device would have to be collocated with the VIPER nodes. This leaves questions about the ability to host third party loggers; to access log files; and to correlate them with admin line and radio traffic, as well as the maintenance and service of those systems. These questions may be offset with the option for having a cloud-hosted logging recorder solution that is briefly described in the referenced documentation. The documentation should also clearly delineate whether the Managed Services will also provide functionality for instant recall recording (IRR) of communications media. IRR provides limited instant playback of phone, radio and other media traffic, and is typically accessible at every PSAP operational position. Lastly, CenturyLink identifies that the NENA i3 specifications for logging are still under development and that the Intrado solution will support the future i3 specification. In summary, CenturyLink has presented the following logging capabilities:</p> <ol style="list-style-type: none"> 1. VIPER – Analog, position-side recording of radio, administrative line and 9-1-1 traffic 2. VIPER – IP packet recording at each VIPER node. Radio and admin lines would be recorded separate of the 9-1-1 calls by the logging recorder; as a result, correlation between 9-1-1 and radio transmissions would have to be performed independently. It is unclear whether the 	<p>MCP Responses Set 1 sed, Answer 6</p> <p>PBN-2013-Third Party IP-Recording Kit</p>



Topic Area	Commentary	Reference
	<p>Managed Services will support this solution due to the VIPER nodes being hosted at Intrado data centers</p> <ol style="list-style-type: none"> 3. VIPER – cloud-hosted, multi-vendor logging recorder options available 4. VIPER – future i3 logging interface <p>VESTA – Analog, position-side recording of radio, admin line and 9-1-1 traffic</p> <p>The position-side, analog recording option provides for a ubiquitous logging solution across both call handling solutions. With the NENA i3 logging specifications standing undefined, MCP recommends that Arizona PSAPs utilize the analog, position-side recording option until an i3 logging solution becomes available. Additionally, MCP recommends that the Program require CenturyLink to provide details on the cloud-hosted logging recorder options, the features that they provide, and the associated costs so that PSAPs may consider those options when considering the Managed Services offering. MCP recommends that the Program request that research be conducted prior to implementing a cloud-hosted logging solution, to assure continued compliance with all State and local laws regarding retention, access and storage of communications records.</p>	
<p>Security of Managed Services (New Checklist Requirement)</p>	<p>Meets requirements.</p> <p>As Arizona PSAPs make the move to NG9-1-1, the importance of security of the 9-1-1 system drastically increases. The legacy network is a closed system with controlled access through defined entry points. While much of this holds true for the ingress network, the ESInet is inherently an IP network consisting of a multitude of logical access points. With this in mind, NENA has developed the Security for Next-Generation 9-1-1 Standard (NG-SEC, NENA 75-001). While not all NG-SEC requirements may apply to the Managed Services offering, it provides a baseline set of requirements for consideration in defending the PSAP's 9-1-1 services from security threats.</p> <p>The referenced documentation provides great insight to the approach to the security of the Managed Services offering. The layering tactic of a defense-in-depth security strategy is used by the world's top information security offices and it appears that the CenturyLink solution provided by Intrado has a strategy</p>	<p>MCP Responses Set 1 sed, Answer 7</p>



Topic Area	Commentary	Reference
	<p>that is well built to defend the ESInet from malicious attacks. It is encouraging that the solutions provider is an active participant in Network Reliability and Interoperability Council (NRIC) 7 focus group 2B Cyber-Security and that its cybersecurity policies, standards, and guidelines are compliant with industry best practices as defined by International Organization for Standardization and Control Objectives for Information and related Technology (COBIT). Highlights of the security for the solution include:</p> <ul style="list-style-type: none">• Multi-layer Security Strategy• Physical Security<ul style="list-style-type: none">○ Logical access○ Physical access○ System power○ Geographic separation of core systems○ Background checks• Network Security<ul style="list-style-type: none">○ Intrusion prevention/detection systems○ Data/network segmentation○ Role-based access○ Access control lists○ Stateful packet inspection firewalls○ Session border controllers○ Encryption○ Two-factor authentication access○ Vulnerability scans○ Monitoring• Data security<ul style="list-style-type: none">○ Role-based access○ Separate provisioning/production datasets○ Two-factor authentication access○ Separate development environment from production○ Anti-virus/Anti-malware○ Patch management○ Server hardening	



Topic Area	Commentary	Reference
	<p>MCP recommends that the Program request that CenturyLink provide a report on the Managed Services offering’s compliance with NG-SEC NENA 75-001. As stated previously, there may be areas that are not applicable to the solution. MCP recommends that the report detail what alternative preventative measures are in place to address the intent of the NG-SEC requirement for any areas where the solution is not compliant with NENA 75-001. In many cases, the solution may exceed the requirements of NG-SEC.</p> <p>Operationally, industry best practices provide for separation of security and network operations. MCP recommends that the Program request that CenturyLink describe whether there is a Security Operations Center (SOC), or a functional equivalent, that carries out the tasks above. The description should detail the hours of operation of the SOC, the metrics and reports that are monitored, and whether those reports may be made available to the Program and PSAPs.</p>	
	<p>Unable to determine whether the solution meets requirements.</p> <p>MCP recommends that the Program request that CenturyLink provide details in the consolidated Services Agreement defining “appropriate levels of security,” “industry standard security procedures,” and “security measures.” This may be a reference to new content describing the security of the solution as provided in the follow-up documentation received on May 20, 2014.</p> <p>MCP recommends that the Program require that CenturyLink add security levels, with specific reporting and timeframes, to the SLA. Lastly, MCP recommends that the Program require that CenturyLink perform background checks on all staff that have access to the system, including sub-contractors.</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 6.2</p> <p>Bold formatting applied by MCP to highlight the statements referenced:</p> <p>“The iQ MPLS private port will have the appropriate levels of security in place both at the physical and application layers.”</p> <p>“The CenturyLink provided iQ MPLS private port will have the appropriate levels of security in place both at the physical and application layers, as determined within IPP. CenturyLink will secure the CenturyLink-provided iQ MPLS private port using industry standard security procedures against security attacks from other</p>



Topic Area	Commentary	Reference
		<p>networks or the public Internet.</p> <p>“CenturyLink will employ security measures where a PSAP may have dual-homed CPE (connected to both the CenturyLink solution and another service provider’s network).”</p>
PAD	<p>Meets requirements.</p> <p>The referenced material discusses the installation and testing procedures for the PSAP abandonment device (PAD). The solution appears to add value and provide an important service to PSAPs, as it provides PSAP personnel with the ability to self-initiate the abandonment process without having to engage technical support. The device will provide a lamp indicator showing that the PSAP is abandoned, which provides the PSAP’s leadership with comfort in knowing their PSAP abandonment status without having to call the NOC.</p> <p>The Technical Review document does not discuss the PAD. MCP recommends that the Program request that the PAD be described in a consolidated Service Agreement (see Service Agreement Updates section below) stating that it will be installed at all PSAPs. MCP recommends that all PSAPs contracting for the Managed Service have the PAD installed to ensure uniform service across the state.</p>	<p>PAD MOP CenturyLink Work and Testing Instructions 102313CH Final</p>
PowerProbe Servers	<p>Unable to determine whether the solution meets requirements.</p> <p>The referenced material discusses the features and benefits of the PowerProbe network metrics devices. PowerProbe provides a solution for measuring call quality in an IP network such as that which is proposed by CenturyLink. The solution design calls for centralized PowerProbe servers that reach across the ESInet to the PowerProbe 30 Responder device, which provides network performance statistics. Based on our experience in other similar deployments, MCP recommends that the PowerProbe servers be located at the network core in order to produce the most reliable call quality metrics. This will enable mean opinion score (MOS) metrics to be taken from the point where the media is</p>	<p>PowerProbe6000AndPowerProbe500_CCW-20472-0_DS_NM_0</p>



Topic Area	Commentary	Reference
	<p>anchored through the MPLS networks to the PSAP edge.</p> <p>The Technical Review document does not discuss the PowerProbe. MCP recommends that the Program request that the PowerProbe metrics be described in a consolidated Service Agreement stating the services that will be provided in the Managed Services offering. Details should include what metrics (if any) will be made available to the Program and PSAPs. Will metrics be available on an ad hoc, per call basis or in consolidated daily/weekly/monthly reports?</p>	
System Backup	<p>Unable to determine whether the solution meets requirements.</p> <p>MCP was unable to find any information in the provided documentation on how each of the systems will be backed up.</p> <p>MCP recommends that the Program require that CenturyLink provide details for system backup. These details should be provided in the consolidated Services Agreement with information on what systems are backed up; the frequency of backups; and the process for change management, backup retrieval and restoration.</p>	All documentation
<p>Local GIS data management with each of the nineteen 9-1-1 systems.</p> <p>“Confirmation is needed that the Managed Services solution provides for:</p> <ol style="list-style-type: none"> 1) Each 9-1-1 community to load their GIS locally.” 	<p>Unable to determine whether the solution meets requirements.</p> <p>The referenced documentation states that the goal of the Managed Services is to “create and maintain the authoritative GIS database for 9-1-1 purposes.” The documentation speaks to the ability of agencies to maintain their GIS data with their existing tools and loading the GIS data in to an agreed upon mechanism. The solution description does not detail the options available and how the disparate GIS datasets will be integrated with the new system.</p> <p>MCP recommends that the Program require CenturyLink to provide additional detail in the consolidated Services Agreement regarding the tools, processes and limitations related to the sharing and coalescing of 19 GIS datasets into an enterprise GIS database.</p>	<p>NG9-1-1 Core Services and mapping solutions questions from email sent by Sandra Gilstad received on May 20, 2014</p> <p>A9-1-1 Great Migration Plan for AZ, pages 6-7</p>
Local GIS data management with each of the nineteen 9-1-1 systems.	Unable to determine whether the solution meets requirements.	NG9-1-1 Core Services and mapping solutions questions from email sent by



Topic Area	Commentary	Reference
<p>“Confirmation is needed that the Managed Services solution provides for:</p> <p>2) At the level of the SIF/ECRF/LVF, that the local GIS data can be field mapped to an NG GIS data schema so that mass overhauls of local GIS data isn’t required.”</p>	<p>The State will likely have a variety of GIS data schemas due to its nineteen 9-1-1 systems in the state. The CenturyLink documentation does not describe any GIS data schema requirements and if the solution provides for field mapping of data fields to align the 19 GIS datasets into a single authoritative GIS database.</p> <p>MCP recommends that the Program require CenturyLink to provide additional detail in the consolidated Services Agreement describing the ability of the Managed Services to field map the GIS data schema so that the nineteen 9-1-1 systems may continue to manage their GIS data as they do today. The solution description should describe any limitations to unique field mapping for up to 19 data sources.</p>	<p>Sandra Gilstad received on May 20, 2014</p>
<p>“Enterprise map updates to be provided to each PSAP.”</p>	<p>Unable to determine whether the solution meets requirements.</p> <p>The referenced documentation describes single GIS servers being located at each VIPER and VESTA call handling system host site, with local GIS application servers at each remote PSAP. The documentation does not describe the process in which the call handling maps will be updated for each call handling system.</p> <p>MCP recommends that the Program require CenturyLink to provide additional detail in the consolidated Services Agreement describing the process for updating the remote GIS application servers. The Services Agreement should describe how the solution will support a state-level, enterprise map that publishes updates to multiple call handling host systems, which then feed each of the remote PSAPs’ GIS application servers. Limitations and assumptions of the Managed Services should be stated in the consolidated Services Agreement.</p>	<p>NG9-1-1 Core Services and mapping solutions questions from email sent by Sandra Gilstad received on May 20, 2014</p> <p>AZ NG9-1-1 Technical Review 4-14-14, Sections 15.3, 15.4 and 15.5</p>
Network Diagram/Description Edits		
<p>Ingress Network Design</p>	<p>Does not meet requirements.</p> <p>The referenced section suggests that each call will be selectively routed twice; once by the LSR and then again by the NG9-1-1 routing solution.</p> <p>MCP recommends that the Program request that CenturyLink incorporate a</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 11</p> <p>“As the PSAP is migrated to a NG PSAP, CenturyLink will update the routing in its LSR and based on ESN,</p>



Topic Area	Commentary	Reference
	<p>solution design that enables CSPs to direct connect to LNGs. This is the preferred method for delivering calls to the ESInet, as it eliminates a hop in the call path; it eliminates the maintenance of LSR records; and it eliminates the potential for CenturyLink to invoice for LSR services.</p>	<p>deliver the call over the EM trunks to a legacy PSAP or over the SR trunks to the LNG and then over the ESInet to a NG PSAP.”</p>
Egress Network Design	<p>Unable to determine whether the solution meets requirements.</p> <p>MCP recommends that the Program require that CenturyLink insert a statement to the effect of “Regardless of bandwidth sizing, the Managed Services fees will provide for the bandwidth required to deliver services between the host CPE sites and each PSAP.” The current language makes this assumption; it would be favorable to the PSAPs to have this commitment in the consolidated Services Agreement.</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Sections 13.7.2 & 13.7.4</p> <p>“CenturyLink and Intrado will determine the exact required bandwidth each PSAP will require after site survey and call flow meeting has been conducted. Remote PSAP bandwidth above is only for estimating Host bandwidth requirements.”</p>
Data center bandwidth and ECMC to VIPER configuration	<p>Unable to determine whether the solution meets requirements.</p> <p>The referenced material does not specify bandwidth allotment between the Intrado Emergency Call Management Complex (ECMC) data centers in Miami and Englewood. In review of the solution design, MCP sees the most resilient solution design as the one that provides either ECMC with the ability to set up calls with either VIPER host. For example, the Miami ECMC may send calls to the Englewood VIPER in situations where the Miami VIPER is down and vice versa. The referenced diagram indicates that the Miami ECMC only delivers calls to the Miami VIPER and the Englewood ECMC only delivers calls to the Englewood VIPER. If represented accurately, this configuration would be detrimental to the solution’s availability, as a failure of either VIPER or ECMC would effectively take down the availability of its collocated partner ECMC or VIPER system.</p> <p>MCP recommends that the Program request clarification from CenturyLink on the ECMC/VIPER solution design and the bandwidth requirements between the Miami and Englewood data centers. A meshed configuration between the ECMCs and VIPERs is recommended. MCP believes that it is the intent that VPNs C & D provide the meshed connection between ECMCs and VIPERs;</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 13.6</p> <p>NG911 Managed Services - Arizona Network Diagram</p>



Topic Area	Commentary	Reference
	<p>however, the VPNs between the ECMCs and VIPERs are not labeled on the referenced diagram.</p> <p>Unable to determine whether the solution meets requirements.</p> <p>Per the discussion immediately above, MCP recommends that the Program have CenturyLink update the referenced diagram to depict the iQ Private Port VPN C & D clouds connecting the two ECMCs.</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Diagram above Section 14.4</p>
VPN C & D	<p>Unable to determine whether the solution meets requirements.</p> <p>In the referenced documentation, MCP believes that VPNs C & D are not only local, but provide connectivity between data centers and POPs. MCP recommends that the Program confirm this understanding and if true, request that CenturyLink delete the word “local” in the second bullet in Section 14.4, as the VPNs provide connectivity beyond the local ECMC and VIPER node.</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 14.4</p> <p>NG911 Managed Services - Arizona Network Diagram</p>
Inter-VIPER Network	<p>Unable to determine whether the solution meets requirements.</p> <p>The referenced VIPER diagram shows a network connection between VIPER primary node and VIPER secondary node. This network connection and its associated bandwidth are not discussed in the Technical Review document, nor is it depicted in the NG911 Managed Services – Arizona Network Diagram.</p> <p>MCP recommends that the Program seek clarification from CenturyLink on whether this network connection will be provided in the Managed Services offering. If it is required, then CenturyLink should update the diagrams to reflect this connectivity and add language to the consolidated Services Agreement detailing the bandwidth required between the two systems. MCP recommends that this connectivity be on separate VPNs similar to the rest of the solution design.</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, VIPER Diagram titled “Multi-Node” above Section 15.3</p>
VIPER Configuration	<p>Unable to determine whether the solution meets requirements.</p> <p>The referenced diagram depicts the VIPERs in a primary/secondary configuration. An active-active solution design combined with a meshed configuration with the ECMCs will enable both systems to be continually active in processing calls between both ECMCs for all PSAPs. This configuration assures the Program that provisioning and network connectivity is always being</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, VIPER Diagram titled “Multi-Node” above Section 15.3</p>



Topic Area	Commentary	Reference
	<p>used and therefore tested. The Program and Arizona PSAPs do not want any system or network connection to ever sit idle, as that creates opportunities for systems to become out of synchronization and circuits to run the risk of being decommissioned due to inactivity.</p> <p>MCP recommends that the Program inquire with CenturyLink as to the VIPER configuration to ensure that either node is constantly processing calls in a balanced manner between ECMCs, and that both sites will be sized to process 100 percent of the expected calls with room for future expansion. The details of the CenturyLink response should be reflected in the consolidated Services Agreement.</p>	
VESTA Configuration	<p>Unable to determine whether the solution meets requirements.</p> <p>The referenced diagram depicts main and backup sites. Per the discussion immediately above, MCP recommends that the Program seek clarification from CenturyLink as to whether the VESTAs are configured as active-active or in a primary/secondary configuration, and that both sites will be sized to process 100 percent of the expected calls with room for future expansion. The details of the CenturyLink response should be reflected in the consolidated Services Agreement.</p>	AZ NG9-1-1 Technical Review 4-14-14, VESTA Diagram below Section 15.2
VESTA Host Site Consoles	<p>Does not meet requirements.</p> <p>The referenced diagram shows consoles at host sites. This will not be the case. MCP recommends that the Program request that CenturyLink update the diagram to accurately reflect the services/systems that will be deployed.</p>	AZ NG9-1-1 Technical Review 4-14-14, VESTA Diagram below Section 15.2
IP Routers	<p>Unable to determine whether the solution meets requirements.</p> <p>In the referenced diagram, it appears that the IP routers located in each location are logical representations and not physical representations. As such, MCP recommends that the Program request that CenturyLink confirm this interpretation and if correct, then request that CenturyLink add a note to the diagram with an explanation of logical representation of routers.</p>	NG911 Managed Services - Arizona Network Diagram
Tempe POP and VPN A	<p>Unable to determine whether the solution meets requirements.</p>	NG911 Managed Services - Arizona Network Diagram



Topic Area	Commentary	Reference
	<p>In the referenced diagram, the Tempe POP in the left, middle section of the diagram in LATA 602 shows VPN A ingress to the Tempe POP, with its egress connectivity to the iQ Private Port VPN B cloud. MCP believes that this is an error and the egress connectivity from this POP should connect to the iQ Private Port VPN A cloud.</p> <p>MCP recommends that the Program inquire with CenturyLink about this potential error and if confirmed, request that CenturyLink provide an updated diagram.</p>	
VPN E & F	<p>Unable to determine whether the solution meets requirements.</p> <p>In the referenced diagram, MCP believes that the VPN E & F notes to the right of the Englewood data center and below/right of the Phoenix VESTA host (in the upper right corner) should be updated to state “VPN E & F are part of the VESTA Host and Remote network.” It currently reads “VPN E & F are part of the VIPER Host and Remote network.”</p> <p>MCP recommends that the Program inquire with CenturyLink about this potential error and if confirmed, request that CenturyLink provide an updated diagram.</p>	NG911 Managed Services - Arizona Network Diagram
Phoenix VESTA Host Connections to VPNs E & F	<p>Unable to determine whether the solution meets requirements.</p> <p>In the referenced diagram, VPN E connects from the Phoenix VESTA host to the Tempe POP, which connects to the iQ Private Port VPN F cloud. Similarly, VPN F connects from the Phoenix VESTA host to the Phoenix POP, which connects to iQ Private Port VPN E cloud. MCP believes that the Tempe POP should connect to VPN E cloud and the Phoenix POP should connect to VPN F cloud.</p>	NG911 Managed Services - Arizona Network Diagram



Topic Area	Commentary	Reference
	<p>& H are for the Host / Remote and are not here</p> <p>This line should connect to iQ Private Port VPN E Cloud</p> <p>This line should connect to iQ Private Port VPN F Cloud</p> <p>615 N 48TH ST Floor 1, Ste 125B PHOENIX AZ 85008 IODATA DCID 772</p> <p>VESTA Host A PGM Terminal Server</p> <p>L2 1G Wave</p> <p>1G VPN D 1G VPN C 1G VPN E 1G VPN F</p> <p>TEMPAZCC 135 W Orion St Tempe AZ 85283</p> <p>LATA 602</p> <p>PHOIXAZLII 2120 N Central Ave Phoenix AZ 85003</p> <p>iQ Private Port VPN E</p> <p>iQ Private Port VPN F</p> <p>NxDS1 VPN E NxDS1 VPN F NxDS1 VPN E NxDS1 VPN F</p> <p>Remote VESTA PSAP</p> <p>Remote VESTA PSAP</p> <p>VPN C & D are part of the NG9-1-1 Network. VPN E & F are part of the VIPER Host and Remote network.</p> <p>MCP recommends that the Program inquire with CenturyLink about this potential error and if confirmed, request that CenturyLink provide an updated diagram.</p>	
VESTA Layer 2 Connection	<p>Unable to determine whether the solution meets requirements.</p> <p>Discussed in “Redundant” topic area above.</p>	<p>NG911 Managed Services - Arizona Network Diagram</p>



Topic Area	Commentary	Reference
	<p>The referenced diagram shows a single Layer 2, one gigabit per second (Gbps) connection between the two VESTA host sites.</p> <p>MCP recommends that the Program inquire with CenturyLink to determine whether the Layer 2 connection is mission critical. It is recommended that the Program ask CenturyLink for a cost/benefit analysis of providing redundant Layer 2 connectivity between the hosts given that there may be a significant cost increase to add a redundant connection. The VESTA systems may have processes in place at the host sites that provide for delayed synchronization if the Layer 2 network connection is severed. However, if the connectivity is mission critical, then it is advised that the VESTAs have redundant connectivity via diverse POPs.</p>	
Primary/Secondary VPNs	<p>Unable to determine whether the solution meets requirements.</p> <p>MCP believes that the referenced diagram indicates that there are primary and secondary VPNs between all components in the network. Active-Active path management provides the greatest level of reliability to ensure that no equipment or route path is ever sitting stagnant.</p> <p>MCP recommends that the Program request that CenturyLink explain whether the Primary/Secondary VPN configuration is accurate and if so, how the solution is configured so that load balancing is achieved across all components, VPNs, and IP routers for every PSAP, to enable a fully meshed solution where no component or path is stagnant.</p>	NG911 Managed Services - Arizona Network Diagram



Topic Area	Commentary	Reference
CenturyLink Washington Outage	<p>The CenturyLink/Intrado A9-1-1 outage that occurred on April 9-10, 2014, has raised concerns regarding the proposed solution design. Upon reading the referenced outage report, MCP recommends that the Program request an alarm audit be performed and its results be shared with the Program. Additionally, MCP recommends that the Program request a report of findings resulting from Intrado's A9-1-1 architecture review. MCP recommends that the Program request that CenturyLink share the corrective actions that are being taken to address NOC-to-NOC challenges. Lastly, MCP recommends that the Program request that CenturyLink assure the Program that lessons learned from the ingress trunking configuration in Washington be applied to the network design for Arizona, and that diagrams be updated with accompanying notes detailing what updates were made to the proposed solution design.</p>	<p>CenturyLink Major Outage Report to the Washington Utilities & Transportation Commission: http://wa-bainbridgeisland.civicplus.com/AgendaCenter/ViewFile/Item/382?fileID=1386</p>



The solution design calls for a cloud-hosted, managed services solution that incorporates the latest technology and industry standards. Proper levels of redundancy and diversity are incorporated into the network and system designs, which should provide for a fully fault-tolerant solution. MCP finds the proposed Managed Services offering feasible and that similar solutions are either live or in the deployment stages in other markets in the United States. Similar solutions that have been deployed are those that may be found in the state of Vermont, state of Hawaii, and the city of Durham, North Carolina.¹ Other mission-critical industries such as the financial industry have moved to cloud-hosted service models with great success. The State of Arizona should find comfort in understanding that it is not exploring uncharted territory with the proposed cloud-services model.

4. PROGRAM MANAGEMENT

The following section addresses program management level issues associated with the proposed Managed Services. The solution eases the Program and PSAPs' management of the services, as there is a single vendor responsible for all services. This should result in improved coordination in the delivery of services, troubleshooting problems and rolling out new feature functionality. In general, single vendor models provide for a single responsible party, which leads to less finger-pointing and a more productive working relationship. The following table outlines recommendations for enhancing service agreement documentation, improving the terms of the SLAs, and consolidating the documentation into a single Services Agreement.

¹ City of Durham - <http://www.9-1-1magazine.com/PPT-Durham-NG911-System?TopicID=521>
State of Hawaii - <http://globenewswire.com/news-release/2012/10/17/497850/10008819/en/Hawaiian-Telcom-Chooses-Intrado-for-Next-Generation-9-1-1-Services-Delivery.html>
State of Vermont - <http://www.networkworld.com/news/2011/090711-911-vermont-250601.html>



Table 4 – Program Management Review

Topic Area	Commentary	Reference
Single Point of Contact Solution		
Single Point of Contact	<p>Meets requirements.</p> <p>The referenced document provides confirmation that the proposed Managed Services solution is provided with CenturyLink as the single point of contact for the delivery of services. CenturyLink will provide a program manager for daily business needs and a NOC contact for 24 hours a day, 7 days a week (24x7) support.</p>	A9-1-1 Great Migration Plan for AZ, page 13
The agreement ensures the use of the latest technologies, versions and industry standards for CenturyLink Provided Equipment – General		
Product Lifecycle Management	<p>Does not meet requirements.</p> <p>As a service-based solution, system component refresh is required to be provided to ensure that the services purchased are delivered as specified in the contract. To achieve this, it is required that the services have definitive SLAs defining the contractual performance of the solution. These SLAs will drive the provider’s Product Lifecycle Management for the solution’s software, hardware, firmware, network and maintenance of the solution, to ensure that they are able to deliver to the agreed upon level of service.</p> <p>MCP recommends that the Program require SLAs that define the timing for refreshing the components of the solution, as related to software, hardware, firmware, and network performance.</p> <p>MCP recommends that software SLAs address feature functionality and the timing for providing software updates to the system once they become available. For example, software updates will be applied to all call handling systems within a pre-determined amount of time from their general availability.</p> <p>MCP recommends that hardware SLAs address the refresh cycle for maintaining hardware components such that the solution is never at risk due to software system requirements, manufacturer discontinued products, and failing hardware.</p>	Not Applicable



Topic Area	Commentary	Reference
	<p>MCP recommends that firmware SLAs require the provider to complete manufacturer recommended firmware updates within a pre-defined timeframe and after lab-based regression testing has been performed with new firmware.</p> <p>MCP recommends that network SLAs require a predefined set of network performance metrics, such as network availability measured in minutes of downtime per year; jitter threshold; average roundtrip delay; MOS; and packet loss.</p> <p>MCP recommends that maintenance SLAs require a predefined level of response to service-affecting outages. The SLAs would focus on response times and mean time to repair.</p> <p>MCP recommends that an i3 Guarantee SLA address when the solution will be updated to meet future i3 versions. For example, the Managed Services offering shall be current with i3 standards, with no more than 12 months passing after the ratification of each i3 version.</p> <p>MCP recommends that all SLAs have significant remedies to incent the provider to maintain the system at the agreed upon levels of service. MCP recommends that SLA metric reports be provided monthly and be independently verifiable through system reports, where available. MCP recommends that the Program seeks read-only access to the monitoring and reporting systems.</p>	
The agreement ensures the use of the latest technologies, versions and industry standards for CenturyLink Provided Equipment – Software		
i3 Guarantee and software evergreen	<p>Unable to determine whether the solution meets requirements.</p> <p>The referenced documentation clearly states that the Managed Services offering is guaranteed to provide for all functions and protocols specified in NENA i3; however, it does not address how the Managed Services will continually be updated to the most current i3 specifications. Additionally, the CenturyLink documentation does not address software updates to the VIPER, VESTA and GIS applications. Traditional call handling solutions provide for options to purchase “software evergreen,” where the latest software versions</p>	A9-1-1 Great Migration Plan for AZ, pages 1, 2 and 4



Topic Area	Commentary	Reference
	<p>will be made available for subscribers to this offering.</p> <p>MCP recommends that the Program request that CenturyLink provide contractual language as to how the core i3 functions, call handling systems and GIS applications will be maintained with the latest software versions available, based on then current industry standards, including but not limited to NENA i3 and its associated supporting industry standards. This documentation should address both the Intrado VIPER and Cassidian VESTA systems.</p>	
The agreement ensures the use of the latest technologies, versions and industry standards for CenturyLink Provided Equipment – Hardware		
End-of-Life equipment	<p>Unable to determine whether the solution meets requirements.</p> <p>The referenced diagram shows “AS5350” labeling of a gateway icon at the Phoenix and Tucson LNGs (far left boxes) with ingress to the box via multiple DS1s and direct connectivity into (Cisco) 3945 routers. This design leaves MCP with the understanding that the LNG gateways are Cisco AS5350 Universal Gateways. In our research, we found that these gateways were put on End-of-Life notice in 2006, with the last date of support being December 21, 2011. This leaves us to believe that these could possibly be Cisco AS5350XM Universal Gateways, which are also under End-of-Life notice, but with a last date of support being February 28, 2018; however, Cisco is no longer providing software maintenance support as of February 2014.</p> <p>This research elicits several areas of concern:</p> <ol style="list-style-type: none"> 1. What is the actual device providing the gateway function at the LNGs? 2. If the device is under an End-of-Life notice, then does the device have a current service contract? How long until the service contract expires? 3. What is the process for introducing new hardware, software and firmware to the solution design? 4. What is the migration plan to replace these devices prior to the expiration of the service contract? 5. What other devices not labeled in the diagram are also under an End-of-Life notice? If applicable, what do their service contracts and replacement schedules look like? 	NG911 Managed Services - Arizona Network Diagram



Topic Area	Commentary	Reference
	<p>The issues above pose a threat to the viability of the solution unless there are migration plans established within the product support expiration dates. As such, MCP recommends that the Program request that CenturyLink address the questions above. These concerns highlight the need for requiring hardware SLAs as described in the above Product Lifecycle Management topic to ensure there are significant repercussions for lapses in hardware support.</p>	
<p>The agreement ensures the use of the latest technologies, versions and industry standards for CenturyLink Provided Equipment – Firmware</p>		
Firmware SLAs	<p>Unable to determine whether the solution meets requirements.</p> <p>The following commentary is outlined above in the Product Lifecycle Management topic.</p> <p>As a service-based solution, system component refresh is required to be provided to ensure that the services purchased are delivered as specified in the contract. To achieve this, it is required that the services have definitive SLAs defining the contractual performance of the solution. These SLAs will drive the provider’s Product Lifecycle Management for the solution’s software, hardware, firmware, network and maintenance of the solution, in order to ensure that they are able to deliver to the agreed upon level of service.</p> <p>Specifically, MCP recommends that the Program require SLAs defining the timing for refreshing the components of the solution as related to software, hardware, firmware, and network performance.</p> <p>MCP recommends that firmware SLAs require the provider to complete manufacturer recommended firmware updates within a pre-defined timeframe and after lab-based regression testing has been performed with new firmware.</p>	Not Applicable
<p>The agreement ensures the use of the latest technologies, versions and industry standards for CenturyLink Provided Equipment – Network</p>		
Network Design	<p>Meets requirements.</p> <p>The proposed network design incorporates industry leading standards by incorporating multiple levels of redundancy and diversity throughout the design. Highlights of the network design include:</p> <ul style="list-style-type: none"> • Geographic diversity of LNGs 	AZ NG9-1-1 Technical Review 4-14-14, Sections 6.2, 13.5.2, 13.6.2, 13.7.5



Topic Area	Commentary	Reference
	<ul style="list-style-type: none"> • Geographic diversity of POPs • Geographic diversity of host data centers • Redundant system components • Redundant edge routers • Redundant VPNs for each application • Diverse VPN demarcation for each application • IP Bandwidth allocations for 100 percent redundancy with 100 percent capacity • Use of industry leading network protocols: <ul style="list-style-type: none"> ○ MPLS ○ Signaling System 7 (SS7) – Best solution for TDM environments ○ Virtual Router Redundancy Protocol (VRRP) ○ Hot Standby Router Protocol (HSRP) ○ Layer 2 SLA ○ Layer 3 Border Gateway Protocol (BGP) ○ Quality of Service (QoS) <p>Concerns have been addressed in other sections that include primary/secondary configurations, meshed connectivity between systems, and redundant Layer 2 connectivity between the VESTA hosts. Additionally, MCP recommends that the Program require CenturyLink to incorporate encryption via protocols such as Generic Routing Encapsulation (GRE) over IP Security (IPSec) tunnels.</p>	
The agreement ensures the use of the latest technologies, versions and industry standards for CenturyLink Provided Equipment – Maintenance		
Maintenance for Managed Services	<p>Unable to determine whether the solution meets requirements.</p> <p>As this is a service-based solution, the PSAPs and Program are not responsible for maintaining any of the hardware and software for the Managed Services offering. This provides a great benefit to the Program and its PSAPs, as it eliminates unexpected capital expenditures when equipment failures arise and when software upgrades require new hardware.</p> <p>However, the maintenance documentation provided by CenturyLink lacks detail</p>	<p>MCP Responses Set 1 sed, Answer 2, Section 1.4.3</p> <p>“Technical support and related services for incidents or service disruptions that CenturyLink determines relate to systems, equipment or network issues that are not part of the Next Gen 9-1-1</p>



Topic Area	Commentary	Reference
	<p>pertaining to response times, coordination of troubleshooting with solution partners, feet-on-the-street support, repair times, and tiered incident management support. The referenced statement presents a concern regarding a potential disconnect between the maintenance documentation provided by CenturyLink on May 20, 2014, and the Managed Services offering, as there is no demarcation point in ownership of the equipment and services, i.e., CenturyLink is responsible for all equipment related to the delivery of the 9-1-1 call from the point it reaches the ESInet all the way to the workstation headset jack. Therefore, it is believed that the demarcation reference is not applicable.</p> <p>MCP recommends that the Program require additional detail from CenturyLink of the aforementioned details that are lacking in their response and provide this in the consolidated Services Agreement. The language should align with services being provided.</p>	<p>Routing network (including those on the PSAP side of the demarcation point), or are otherwise not CenturyLink’s responsibility hereunder, will be worked jointly with the PSAP and/or PSAP.”</p> <p>Bold formatting applied by MCP to highlight the statements referenced.</p>
Service Agreement Updates		
<p>Aggregate all documentation into a single Service Agreement</p>	<p>Does not meet requirements.</p> <p>As mentioned previously in this report, MCP recommends that the Program require that CenturyLink incorporate all of the commitments, service descriptions, processes and service offering documentation into a single, consolidated CenturyLink Services Agreement. MCP envisions that the consolidated Services Agreement would incorporate all of the MCP recommendations that the Program feels are applicable and appropriate.</p> <p>This consolidated agreement would be a single resource to the Program as it would incorporate all of the Managed Services and their service descriptions, with the assurances that its contents are backed by the potential contracted provider of the services, CenturyLink. This is especially important as several of the documents provided by CenturyLink are on its manufacturers “paper”, e.g., The Great Migration Plan is an Intrado Proposal and the PowerProbe document is their own marketing brochure. In some cases, it would be appropriate for CenturyLink to refer to appendices for things such as MPLS network SLAs, but a vast majority of the document should be contained within its body.</p>	



Topic Area	Commentary	Reference
	<p>MCP recommends that the consolidated Master Services Agreement contain service guides or detailed service descriptions for the routing service, the i3 solution (LNG, ESRP, PRF, ECRF, LVF, CIDB, LIS, Spatial Information Function [SIF]), ALI management services, MapSAG[®], VIPER[®] CPE systems and applications (MIS, MapFlex 9-1-1[®], Power 911[®]), VESTA[®] CPE systems and applications (Aurora[®], Vela[®], UI, ORION[™] DataSync etc.), TXT29-1-1[®], A9-1-1[®] Address Intelligence, A9-1-1[®] Media), the ClearViewsm reporting solution, PAD, PowerProbe[®], and the software/hardware refresh program. The Services Agreement should document SLAs as recommended in the above Product Lifecycle Management topic and be customized to the Program's needs.</p> <p>The end goal of this recommendation is that all services are well documented with SLAs in a single source on the service provider's contract documents.</p>	
Out-of-Scope Requests	<p>Unable to determine whether the solution meets requirements.</p> <p>The referenced Section 16 was not included in the CenturyLink documentation. MCP recommends that the Program obtain this information from CenturyLink and have it incorporated into the consolidated Services Agreement.</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 3.1</p> <p>“The following ALI to ALI steering scenarios are not covered by this Service Exhibit (see Section 16, Out-of-Scope requests)”</p>
Plant/CML References Updated to Cassidian	<p>Does not meet requirements.</p> <p>MCP recommends updating Plant/CML to Cassidian to reflect the accurate company name.</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 5.0</p> <ul style="list-style-type: none"> • “Delivery over the iQ MPLS private port directly to the PSAP's CPE. The CPE must be capable of accepting emergency voice calls over IP and has been validated to be compatible with CenturyLink's Request for Assistance Interface (RFAI) or Plant/CML specifications.



Topic Area	Commentary	Reference
		<ul style="list-style-type: none"> As PSAPs migrate from CAMA deployments to RFAI or Plant/CML, the connectivity model will change. As part of an RFAI or Plant/CML deployment the PSAP's connectivity will go through additional network management and security devices (such as Session Border Controllers and Firewalls). This connectivity model change will not cause a change in the cost to CenturyLink and/or the PSAP."
QoS	<p>Unable to determine whether the solution meets requirements.</p> <p>MCP recommends that the Program require that CenturyLink update this language to state that QoS will be implemented across the ESInet. NENA i3 requires that IP traffic within an ESInet must implement DiffServ (RFC2475) for QoS.</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 6.2</p> <ul style="list-style-type: none"> "The CenturyLink-provided iQ MPLS private port will support QoS IP prioritization to allow the management of the prioritization of 9-1-1 voice/data/OAM network traffic"
IP Address Scheme	<p>Does not meet requirements.</p> <p>MCP recommends that the sentence be updated to include POPs, VIPER host sites, and VESTA host sites.</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 6.3</p> <p>"CenturyLink will manage the IP address scheme for Next Gen 9-1-1 Routing communications through the CenturyLink iQ MPLS private port for connectivity to ECMC sites, LNG sites and PSAPs."</p>
Next Gen 9-1-1 Routing	<p>Unable to determine whether the solution meets requirements.</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 7.1</p>



Topic Area	Commentary	Reference
	<p>MCP recommends that the Program seek clarification from CenturyLink as to the meaning of the referenced section. Specifically, what does “specialized management” entail?</p>	<p>“Next Gen 9-1-1 Routing allows for specialized management of wireline, wireless, and VoIP call types.”</p>
	<p>Unable to determine whether the solution meets requirements.</p> <p>MCP recommends that the Program seek clarification from CenturyLink as to the meaning of the referenced section. Specifically, what are CenturyLink-established preferences and needs? How would those apply to the PSAPs’ flexible routing instruction rules? Is the word “instruction” needed?</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 7.1</p> <p>“Next Gen 9-1-1 Routing will support flexible routing instruction rules, depending on CenturyLink-established preferences and needs.”</p>
Shared 3-Digit Bridge Lists	<p>Unable to determine whether the solution meets requirements.</p> <p>MCP interprets the referenced section as being a future feature. MCP recommends that the Program confirm this understanding for itself. MCP recommends that the Program request a committed timeline for the delivery of this feature.</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 7.2</p> <p>“Shared 3-Digit Bridge Lists: The ability for the call taker to use a single button on the call taker’s display and transfer unit to complete either a transfer or three-way conference. These transfers utilize pre-provisioned Star Codes (*200-*999). These Star Codes will be shared among numerous PSAPs (i.e., all PSAPs in a particular State could use the same Star Codes). In order to match the functionality that CenturyLink has deployed within its region, CenturyLink will develop this capability as part of the Product Roadmap.”</p>
Call Setup Time	<p>Does not meet requirements.</p> <p>MCP recommends that these types of commitments be backed by a SLA that has significant remedies.</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 8.2</p> <p>“Within an 8 or 10 digit CAMA deployment, the Call Setup Time</p>



Topic Area	Commentary	Reference
		duration shall not exceed 5 seconds from the time the call is received by CenturyLink LNG. Within an IP deployment (RFAI), the Call Setup Time duration shall not exceed 3 seconds.”
Alarm Monitoring	<p>Unable to determine whether the solution meets requirements.</p> <p>MCP recommends that “timely communications” be defined in terms that are appropriate for the PSAPs.</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 8.3</p> <p>“CenturyLink will provide timely communications to PSAP customer regarding any facility or service conditions that will affect the operations of Services.”</p> <p>“CenturyLink will provide timely communications to PSAP customer and STATE regarding any facility or service conditions that will affect the operations of the E9-1-1 system.”</p>
Alarm Monitoring	<p>Unable to determine whether the solution meets requirements.</p> <p>MCP recommends that CenturyLink define how testing support will be provided. For example, 24x7 or 8 a.m. – 5 p.m. Monday through Friday?</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 8.3</p> <p>“CenturyLink will provide testing support when required to evaluate CPE connectivity problems.”</p>
I to I process	<p>Unable to determine whether the solution meets requirements.</p> <p>The referenced section contains terminology that is unfamiliar to common industry knowledge. MCP recommends that the Program request clarification from CenturyLink on the “I to I process.”</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 9.9</p> <p>“Requests for additional or customized reports, query capabilities, and graphical data display should be made in accordance with the I to I process.”</p>
IP Selective Router Functional	Does not meet requirements.	AZ NG9-1-1 Technical Review 4-14-



Topic Area	Commentary	Reference
Components	<p>The components listed in this section are not IPSR components. MCP recommends that this title be updated to “i3 Functional Elements.”</p>	<p>14, Section 12.1 Title</p> <p>“IP Selective Router Functional Components”</p>
Emergency Call Routing Function (ECRF) and Location Validation Function (LVF)	<p>Does not meet requirements.</p> <p>Arizona PSAPs will migrate independently to i3 depending on their individual readiness.</p> <p>MCP recommends that this sentence be updated to “PSAPs” instead of “State of Arizona.”</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 12.1.1</p> <p>“As the State of Arizona transitions from a Tabular MSAG and ESN based routing to GIS based routing, the required ECRF and LVF elements will be available.”</p>
Border Control Function (BCF)	<p>Does not meet requirements.</p> <p>Border Control Functions require firewalls for data traffic and session border controllers (SBC) for voice traffic. Both data and voice traffic are part of the Managed Service.</p> <p>MCP recommends that “or” be struck from the referenced sentence.</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 12.1.2</p> <p>“The CenturyLink solution will include Border Control Function with Firewalls (FW) and / or Session Border Controllers (SBC).”</p>
GIS Routing	<p>Does not meet requirements.</p> <p>PSAPs must be able to migrate to geospatial routing independent of one another.</p> <p>MCP recommends updating the sentence to the following:</p> <p>“The CenturyLink solution provides all required NENA i3 functional elements to support a GIS-based routing architecture as PSAPs are ready to move to this routing architecture.”</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 12.1.4</p> <p>“The CenturyLink solution provides all required NENA components to support a GIS based routing architecture when the STATE is ready to move to this routing architecture.”</p>
LNGs	<p>Does not meet requirements.</p> <p>MCP recommends that the Program require a statement from CenturyLink be added to this section that commits to placing LNGs in two data centers within Arizona. This commitment protects the State in the case that one or both of the</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 13.1</p>



Topic Area	Commentary	Reference
	two tentative data centers become unavailable. This would commit CenturyLink to use data center(s) in the state, in order to eliminate the possibility of the solution backhauling TDM traffic to another state.	
ESRP	<p>Does not meet requirements.</p> <p>MCP recommends that the second sub-bullet be updated from “ESRT/PRF” to “ESRP/PRF.”</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 14.3</p> <ul style="list-style-type: none"> • “Functional representation of proposed solution showing core components of the ECMC including: <ul style="list-style-type: none"> ○ LVF ○ ESRT/PRF ○ ECRF ○ BCF”
PSAP Equipment	<p>Unable to determine whether the solution meets requirements.</p> <p>MCP recommends that the document be updated to clarify how many monitors will be provided and of what size/type, e.g., cathode-ray tube (CRT), flat-panel, 22-inch, touch screen, etc.</p>	AZ NG9-1-1 Technical Review 4-14-14, Section 15.5
Headset Integration	<p>Unable to determine whether the solution meets requirements.</p> <p>There is no mention of whether headset integration services will be provided with the Managed Services.</p> <p>MCP recommends that the Program request that CenturyLink clarify whether headset integration service is included with the installation of PSAP equipment and end-to-end testing.</p>	Not Applicable
Training Size	<p>Unable to determine whether the solution meets requirements.</p> <p>MCP recommends that the class size limit be specified as “number of attendees.”</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 16.2</p> <p>“CenturyLink will provide (1) Agent Train the Trainer class to each new PSAP. Train-The-Trainer classes will cover all agent topics as well as tips to train the call takers specific to the</p>



Topic Area	Commentary	Reference
Ad Hoc Training	<p>Unable to determine whether the solution meets requirements.</p> <p>MCP recommends that the Program ask CenturyLink for clarification of whether the referenced ad-hoc training is at an additional fee or is included in the Managed Services. If there is an additional fee, then what is the fee?</p> <p>Also, the sentence should be updated so that the word “bases” is changed to “basis.”</p>	<p>PSAP. Class size is limited.”</p> <p>AZ NG9-1-1 Technical Review 4-14-14, Section 16.7</p> <p>“CenturyLink will provide onsite technician support on ad-hoc bases to demonstrate features for call taker supervisors. This is not in lieu of formal training.”</p>
Service Level Goals	<p>Does not meet requirements.</p> <p>The industry norm is 99.999 percent availability.</p> <p>MCP recommends that the Program require that CenturyLink revise the Management Availability Performance Goal to be 99.999%.</p> <p>Does not meet requirements.</p> <p>MCP recommends that the Program require that CenturyLink revise the Notification Goal of the Level 1 and Level 2 SLAs to be within 30 minutes per FCC Report and Order 13-158, and include periodic updates until the system is restored. MCP recommends that the Program require that CenturyLink perform, and provide a report on, a root-cause analysis of all outages no more than 90 days after the restoration of service.</p>	<p>Managed 911 - Service Level Goals - 6-11-2013, Section 1.2</p> <p>“9-1-1 Routing and ALI Management Availability Performance Goal is 99.998%.”</p> <p>Managed 911 - Service Level Goals - 6-11-2013, Section 1.2</p> <p>https://www.fcc.gov/document/fcc-adopts-rules-improve-911-reliability Appendix B, Part 4</p> <p>The rules from FCC 13-158 were released on December 13, 2013 and require that 911 Service Providers who provide “NG911 capabilities such as call routing, automatic location information (ALI), automatic number identification (ANI), or the functional equivalent of those capabilities, directly to a public safety answering point (PSAP),”...“shall notify as soon as possible but no later than thirty minutes after discovering the outage</p>



Topic Area	Commentary	Reference
		<p>any official who has been designated by the affected 911 special facility as the provider’s contact person(s) for communications outages at that facility and convey all available information that may be useful in mitigating the effects of the outage, as well as a name, telephone number, and e-mail address at which the service provider can be reached for follow-up.</p> <p>The Covered 911 Service Provider shall communicate additional material information to the affected 911 special facility as it becomes available, but no later than two hours after the initial contact.”</p>
	<p>Does not meet requirements.</p> <p>MCP recommends that the Program request that CenturyLink delete the rolling 2/4/8 months clause from the remedy statement. As written, the rolling 2/4/8 month clause reduces the potential for CenturyLink to have to provide remedy for its service issues, which dilutes the sense of urgency and level of importance of the service to the vendor.</p>	<p>Managed 911 - Service Level Goals - 6-11-2013, Section 1.2</p> <p>“...mean time to repair is not met for a given rolling two months.”</p> <p>“...mean time to repair is not met for a given rolling four months.</p> <p>“...mean time to repair is not met over a rolling 8 month period.”</p>
	<p>Does not meet requirements.</p> <p>MCP recommends that the example for Level 1 should be amended as follows (emphasis added to indicate the updates to the existing language):</p>	<p>Managed 911 - Service Level Goals - 6-11-2013, Section 1.2, Level 1 Example</p> <p>“PSAP not receiving calls, audio is</p>



Topic Area	Commentary	Reference
	<p>“PSAP not receiving calls, audio is not working even if only on intermittent calls, End office traffic is not able to reach PSAP, not returning ALI bids, network hardware or circuit failure to data complex.”</p>	<p>working only intermittent calls, End office traffic is not able to reach PSAP, returning ALI bids, network hardware or circuit failure to data complex.”</p>
	<p>Does not meet requirements.</p> <p>MCP recommends that the example for Level 2 should be amended as follows (emphasis added to indicate the update to the existing language):</p> <p>“... system response time problems; single sided ALI function; single sided routing function.”</p>	<p>Managed 911 - Service Level Goals - 6-11-2013, Section 1.2, Level 2 Example</p> <p>“...system response time problems; single sided ALI function.”</p>
	<p>Does not meet requirements.</p> <p>MCP recommends that the Notification Goal for Level 3 should be amended as follows (emphasis added to indicate the update to the existing language):</p> <p>“as soon as possible within 1 day of the identification of the service disruption.”</p>	<p>Managed 911 - Service Level Goals - 6-11-2013, Section 1.2, Level 3 Notification</p> <p>“as soon as possible 1 day of the identification of the service disruption.”</p>
	<p>Does not meet requirements.</p> <p>MCP recommends that the Program require CenturyLink to provide a SLA for call delivery time.</p>	<p>AZ NG9-1-1 Technical Review 4-14-14, Section 5.2</p> <p>“Within an IP deployment (RFAI), the Call Setup Time duration shall not exceed 3 seconds.”</p>
	<p>Does not meet requirements.</p> <p>MCP recommends that the Program require CenturyLink to provide SLAs as revised above for other mission-critical services provided in this Managed Services offering, including but not necessarily limited to text to 9-1-1, i3 routing functions, and the Hosted Call Handling solution, and not just NG9-1-1 routing and ALI.</p>	<p>Managed 911 - Service Level Goals - 6-11-2013</p>
Support (Network and PSAP)		
Network and PSAP	Unable to determine whether the solution meets requirements.	MCP Responses Set 1 sed, Answer 2



Topic Area	Commentary	Reference
	<p>The Managed Services offering provides 24x7 monitoring and maintenance of the solution, with the NOC providing support to PSAPs around the clock. This level of support is commonplace within the industry. As part of the recommended consolidated Services Agreement effort, MCP recommends that the Program require CenturyLink to rewrite the referenced section's content to address all of the Managed Services and not just the MPLS network and/or the NG9-1-1 routing solution, as it is currently written. See the Maintenance for Managed Services topic above for additional details and concerns regarding support documentation.</p>	
Review of metrics and data provided by the ClearView Reporting Tool		
<p>ClearView Metrics</p>	<p>Does not meet requirements.</p> <p>The ClearView metrics provide PSAPs with insight to call processing within the IPSR. This represents a tremendous amount of information that the PSAPs do not have today for their LSRs. The data appear pertinent to PSAP operations and would seem to be helpful when troubleshooting issues, verifying the sufficiency of call taking capacity for shifts, and researching call transfer trends.</p> <p>The ClearView metrics only address IPSR statistics and appear to have a gap for reporting on i3 call routing functions, data validation, text messaging, and other services included in the offering.</p> <p>NENA is currently working on a standard titled "NENA Next Generation 9-1-1 Data Management Standard," which will define i3 discrepancy and performance reports. MCP has staff contributing to this standard and we anticipate that it will be finalized and published later this year.</p> <p>MCP recommends that the Program ask CenturyLink for clarification regarding whether the Managed Services offering provides reporting on i3 call processing and data validation processes. MCP recommends that the Program request that CenturyLink advise as to the time zone that will be reflected in the ClearView data and how this will correlate to the unique time zone management within the State of Arizona. Additionally, MCP recommends that the Program ask CenturyLink whether the ClearView reporting tool gives users the ability to</p>	<p>Clearview reports - A911</p>



Topic Area	Commentary	Reference
	<p>perform ad hoc reports and build their own metrics based on available data. If appropriate, MCP recommends that the Program request that CenturyLink grant access to these reports so that the Program may view state-level reports for all PSAPs using the Managed Services.</p>	
Review of overall metrics as being necessary and sufficient to support the State's objective.		
Overall Metrics	<p>Does not meet requirements.</p> <p>The Managed Services offering documentation contained only ClearView IPSR metrics. Based on several recommendations throughout the report, MCP believes that there are additional data and metrics that would be of value to the Program and Arizona PSAPs. Many of the SLAs that have been proposed should be accompanied by metrics reports proving compliance/non-compliance with each SLA.</p> <p>MCP recommends that the Program consider the following metrics, and for those that the Program feels may be of value, require CenturyLink to provide applicable monthly metrics.</p> <ul style="list-style-type: none"> • Network Performance Metrics <ul style="list-style-type: none"> ○ Jitter – average ○ MOS – low, high, average ○ Round trip delay – average ○ Packet loss – average ○ Downtime – seconds per month per system ○ Call delivery time – number of calls above 3 seconds, percent of total processed • Operational Metrics <ul style="list-style-type: none"> ○ Trouble tickets opened/closed ○ Trouble tickets – average duration • Call Processing and System Provisioning Metrics <ul style="list-style-type: none"> ○ See ClearView Metrics topic area above 	Clearview reports - A911



5. CONCLUSION

The Managed Services offering from CenturyLink presents the State of Arizona with an opportunity to upgrade its aging 9-1-1 architecture with standards-based NG9-1-1 technology that will serve its PSAPs and citizens needs now and well into the future. The solution enables PSAPs to move from an unpredictable and difficult-to-fund capital expense model to a predictable operating expense model, which is of critical importance to the State in times of limited 9-1-1 funding. The solution is viable and the technical solution design meets industry standards in terms of redundancy, diversity, and survivability. New features such as geospatial routing would foster new operational capabilities by enabling PSAPs to distribute calls more efficiently. Additionally, the solution would enable users to send requests for help via text messages, which is a service that will greatly benefit the deaf and hard-of-hearing community, as well those who may be unable to make a voice call due to service coverage issues or when making such a call will endanger them. While these end results of the deployed solution will provide great benefit to all stakeholders involved, MCP recommends additional due diligence to ensure that the Program has a clear and detailed understanding of the Managed Services model, with proper documentation of the proposed services.