# 4.2.10 INTERNET PROTOCOL TELEPHONY SERVICE (IPTELS)
(L.34.1.4.6, M.6, C.2.7.10)

> ***Qwest has deployed IP telephony services that satisfy Networx requirements; we deliver Networx IPTelS using this proven network platform.***

Qwest's Internet Protocol Telephony Service (IPTelS) provides a network-based telephone service over Qwest IP-based network services, such as Internet Protocol Service (IPS) and Network Based Internet Protocol Virtual Private Network Services (NBIP-VPNS), using the Voice over Internet Protocol (VoIP) and providing all of the required features. Fully integrated into the Public Switched Telephone Network (PSTN), Qwest's IPTelS allows Agencies to be reached by direct dialing.

Qwest IPTelS offers a new fully hosted service that replaces the need for a premises-based phone system and the multiple vendors required to provide popular applications, such as voice mail and integrated messaging. The features and applications are delivered to an Agency's handset via a single Internet Protocol (IP) network connection. These features can be individually customized by the user through the Qwest Control Networx Portal. The solution provides centralized management and control, supporting Moves, Adds, Changes, and Disconnects (MACDs) from an Internet connection.

Our IPTelS solution is hosted on Qwest's OC-192, IP/Multi-Protocol Label Switching (MPLS) backbone network. The low packet loss rate and low jitter of the Qwest IP network that supports the Qwest IPTelS service ensures that Agencies will experience the same voice quality to which they are
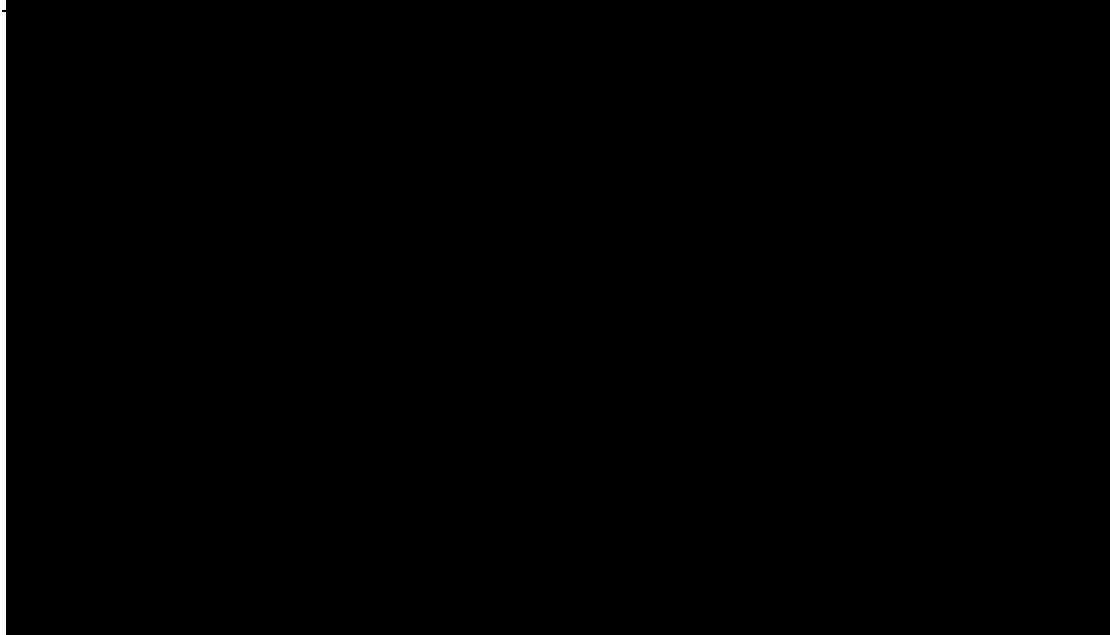
accustomed with their existing PBX and the PSTN. A representation of a typical implementation of Qwest IPTelS solution is shown in ████████

Figure 4.2.10-2 provides an easy reference to correlate the narrative requirements to our proposal response.

Figure 4.2.10-2. Table of IPTelS Narrative Requirements

Req_ ID	RFP Section	Proposal Response
32235	C.2.7.10.1.4 (2)(e)	4.2.10.3.1
32239	C.2.7.10.1.4 (3)	4.2.10.3.1
32244	C.2.7.10.1.4 (5)	4.2.10.3.1
32246	C.2.7.10.1.4 (6)	4.2.10.3.1
32249	C.2.7.10.1.4 (8)	4.2.10.3.1
32252	C.2.7.10.1.4 (11)	4.2.10.3.1
32253	C.2.7.10.1.4 (11)	4.2.10.3.1
32254	C.2.7.10.1.4 (11)(a)	4.2.10.3.1
32255	C.2.7.10.1.4 (11)(b)	4.2.10.3.1
32256	C.2.7.10.1.4 (11)(c)	4.2.10.3.1
32328	C.2.7.10.3.2 (1)	4.2.10.3.3

4.2.10.1 Reserved (L.34.1.4.6 (a))

4.2.10.2 Reserved (L.34.1.4.6 (b))

4.2.10.3. Satisfaction of IPTelS Requirements (L.34.1.4.6(c))

The following three sections describe how Qwest will satisfy the capability, feature, and interface requirements of the RFP.

4.2.10.3.1 Satisfaction of IPTelS Capability Requirements (L.34.1.4.3(a), C.2.7.10.1.4)

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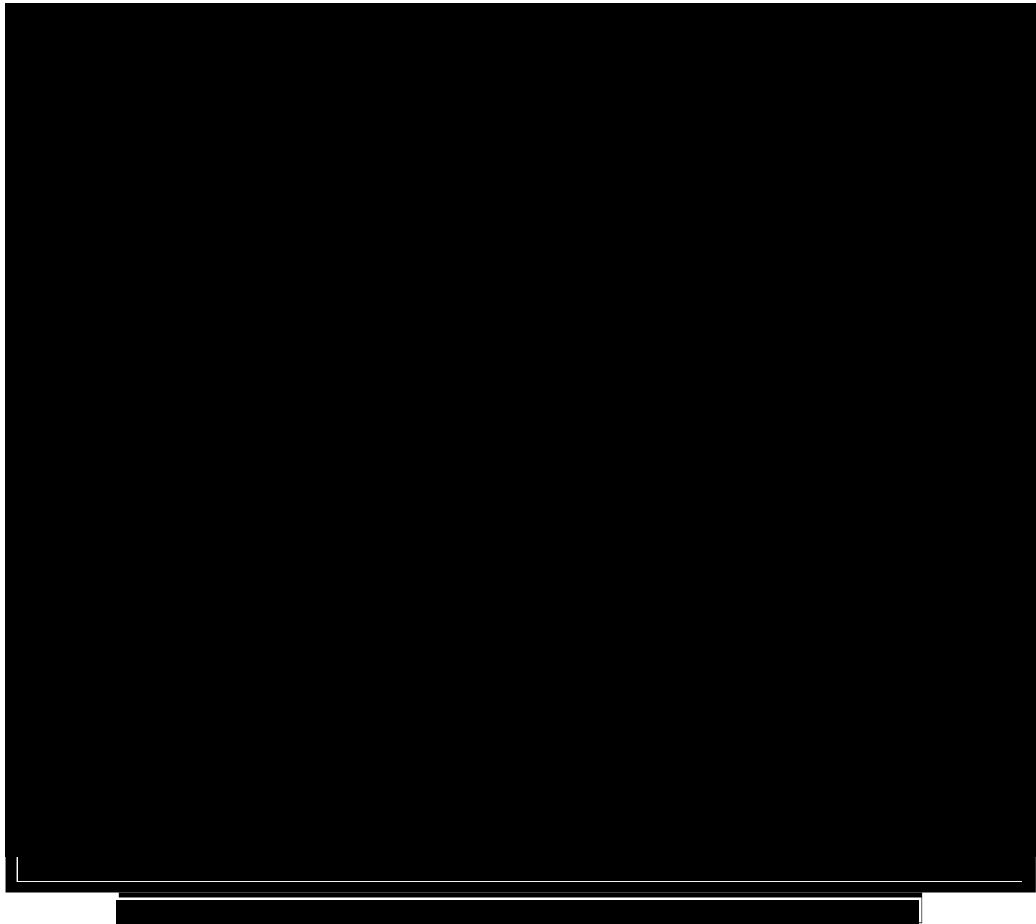
Figure 4.2.10-3 below summarizes Qwest's technical approach to delivering the IPTelS capabilities in RFP C.2.7.10.1.4. Qwest fully complies with all mandatory stipulated and narrative capabilities requirements for IPTelS. The text in Figure 4.2.10-3 provides the technical description required per L.34.1.4.3(a) and does not limit or caveat Qwest's compliance in any way.

Figure 4.2.10-3. Qwest's Technical Approach to IPTelS Capabilities

ID #	Name of Capability	███████████
1	Originate and Terminate on-net and PSTN calls	████████████████
2	Minimum	████████████████

ID #	Name of Capability	███████████
	Capabilities	███████████
3	Gateways	███████████
4.	Alternate Routing	███████████
5	Routing Prioritization	███████████
6	Station Mobility	███████████
7	911 and E911	███████████
8	Traverse Agency Firewalls	███████████
9	Minimum Quality Level	███████████
10	Local Number Portability	███████████
11	Security Practices and Safeguards	███████████

ID #	Name of Capability	███████████
12	Call Routing between PSTN and IP	
13	Secure Website for Subscribers	
14	Basic Phone Service Features	

An Agency site will connect to the Qwest IP network via the access options available with IPS and NBIP-VPNS. Once connected to a Qwest IP-based network service, Qwest uses ███████ feature servers to provide PBX-like functionality and call control. Off-net originating and terminating calls are routed through one of several ███████ VoIP gateways to connect to the PSTN. The PSTN destination of the traffic, having been determined by the called number, is forwarded by ISDN PRI to the appropriate local voice network or via a Feature Group D connection to long-distance and wireless networks.

████████████████ shows call flow for on-net calling. This call flow applies for on-net IPTelS calls as well as calls to Qwest-provided CIPS. Specifically, once the call is determined to be another IPTelS or CIPS customer (by signaling to the ████████ feature server), the VoIP connection is made between the end equipment VoIP phone sets.

Interoperability with Agency-specific 700 numbers (Req_ID 32235; C.2.7.10.1.4(2)(e))

The contractor shall provide the following minimum capabilities: e. The contractor's IPTelS shall interoperate with non-commercial, Agency-specific 700 numbers.

The IPTelS dial plan supports routing of Agency-specific 700 numbers.
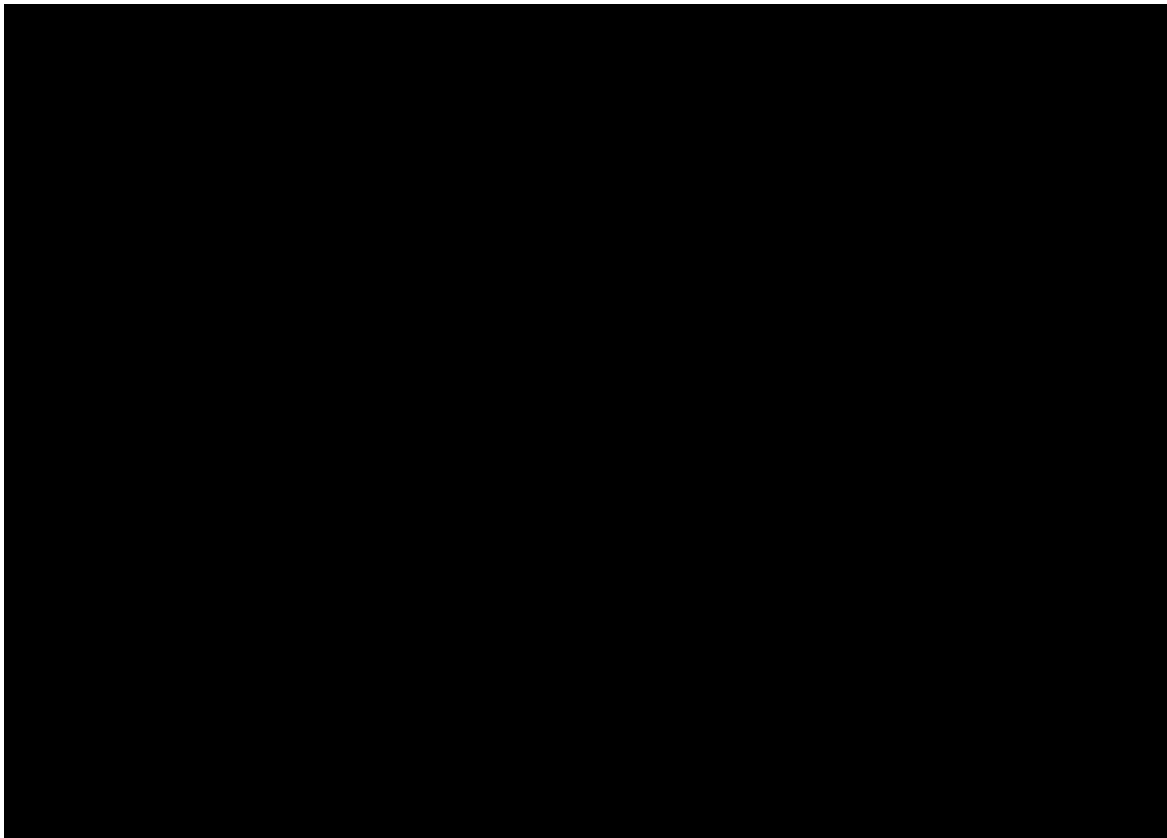
The 710 NPA is currently implemented in the Qwest network. Qwest will implement other 7XX NPAs as needed. The ████████ RMS is a fully functional route management server that allows us the capability to build and assign flexible dial plans and routing on an Agency basis, allowing for necessary customization to support Agency-specific 700 numbers.

Interoperability with PSTN and Agency UNIs (Req_ID 32239; C.2.7.10.1.4(3))

The contractor shall provide gateway's for interoperability with IPTelS and the PSTN, or with Agency UNIs.

IPTelS supports interoperability for non-IP telephone devices. ████████ ██ ██ IPTelS will provide transparent access to, and interwork with, the domestic and non-domestic PSTNs. IPTelS supports interoperability with any 10-digit telephone number, whether the number is part of the PSTN or part of the VoIP platform. ██ gateways work in concert to provide seamless interoperability and access to the PSTN network.

Routing Prioritization/Class of Service (Req_ID 32244; C.2.7.10.1.4(5))

The contractor shall provide a routing prioritization scheme or class of service.

To enable the convergence of customer applications, such as the use of private real-time applications including VoIP and IP-based videoconferencing or access to Qwest's VoIP and video conferencing services, ██

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████████████████████████████████████ Qwest will work with Agencies to engineer their CoS design to ensure that the service meets application requirements.

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████████████████████ Agencies may select any of the queuing implementations on a per-port basis, restricted only by what options are available on the applicable access type for the port.

All queuing methods described are applied at the network egress router port (traffic leaving the Qwest network Provider Edge (PE) on the

access line toward the Agency Customer Edge (CE) router). Therefore, the queuing prioritizes one or more types of Agency traffic over other types of traffic. Because it is applied at the port level, these mechanisms are not prioritizing Agency traffic over another customer's traffic and vice versa. All traffic that exceeds the speed of the Agency's port is buffered or discarded at the egress point in the network.

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Station Mobility (Req_ID 32246; C.2.7.10.1.4(6))

Station mobility and portability is supported via DHCP at the service location. After the local DHCP resource assigns an IP address, the station will re-register with the IPTelS system. Mobility outside of the physical location is supported through the same mechanism. The mobility is provided by the functionality of Qwest's VoIP Services Portal and can be used at any Internet location. For example, if a phone has been moved to another location on the network, the Portal can be accessed to update location information for E911 purposes.

A change of physical location requires notification to Qwest so that E911 databases can be kept current.

Agency Firewall Compatibility (Req_ID 32249; C.2.7.10.1.4(8))

Qwest's Voice Implementation will work with the Agency at the time of Agency turn-up to ensure that the Agency firewall is configured to interoperate with the Qwest IPTelS. If any issues are detected by the Qwest voice implementation team, Qwest will work with the Agency to isolate and guide the Agency to the appropriate configuration.

Security Practices and Safeguards (Req_ID 32252; C.2.7.10.1.4(11))

IPTelS complies with all industry security best practices and safeguards to minimize susceptibility to security issues and prevent unauthorized access. ███████████████████████████████

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██ The SBCs ███████████

████ perform many security functions. One function is anchoring the media and signaling to protect Agency and network external IP addresses from being exposed. DDoS protection, rogue calls, Call Admission Control, and other mechanisms are analyzed and enforced as well. A Routing Engine coordinates traffic between the SBCs and multiple feature and media servers.

Qwest implements industry-standard security to ensure data assurance, integrity, and confidentiality of customer and company information in support of our telecommunications services. These practices include implementing controls specifically in the areas of personnel, systems, and facility security. Qwest has also implemented comprehensive business continuity and disaster recovery measures and controls to ensure the availability of customer and corporate networks.

To ensure that the security architecture stays current with best practices, Qwest takes a lead role in developing standards, working with vendors, and implementing new, innovative approaches to improve our products, including security services. Qwest maintains relationships with key network equipment vendors to provide a bi-directional dialog on best security practices and new feature development, along with our membership and participation in a variety of industry and standards forums, ████████

Additionally, we provide a dedicated representative at the National

Communications System's (NCS's) National Coordinating Center (NCC) for Telecommunications.

Qwest will provide safeguards to prevent hackers, worms, or viruses from denying legitimate IPTelS users and subscribers from accessing IPTelS. Qwest also uses a combination of physical security, operational procedures, and logical separation of services to ensure the integrity of IPTelS and prevent hackers, worms, or viruses from penetrating or spreading across Network Elements (NEs) and degrading IPTelS.

Specific protections against cyber attacks include:

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Security Updates and Audit (Req_ID 32253; C.2.7.10.1.4(11))

Qwest will ensure that security practices and policies are updated and audited regularly. Qwest performs ongoing audit scans on production NEs. We have a mature auditing process ██████████████████████████ ███ ███ ██████████████████

Qwest implements industry-standard security to ensure data assurance, integrity, and confidentiality of customer and company information in support of our telecommunications services. These practices include implementing controls specifically in the areas of personnel, systems, and facility security. Qwest has also implemented comprehensive business continuity and disaster recovery measures and controls to ensure the availability of customer and corporate networks

To ensure the security architecture stays current with best practices, Qwest takes a lead role in developing standards, working with vendors, and implementing new, innovative approaches to improve our products, including security services. Qwest maintains relationships with key network equipment

vendors to provide a bi-directional dialog on best security practices and new feature development, along with our membership and participation in a variety of industry and standards forums, ████████ ██████ ██████ ██████ ██ ███ ███████████████████████ Additionally, we provide a dedicated representative at the NCS's NCC for Telecommunications.

Denial of Service (Req_ID 32254; C.2.7.10.1.4(11)(a))

Multiple safeguards are in place to protect the IPTelS network from hackers, worms, and viruses. Primarily, SBCs screen all traffic into and out of the IPTelS network. In addition, the following protective measures are used:

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Qwest will provide safeguards to prevent hackers, worms, or viruses from denying legitimate IPTelS users and subscribers from accessing IPTelS. The above section, Security Practices and Safeguards (Req_ID 32252), provides further information on practices and safeguards.

Intrusion/Illegitimate Use of IPTelS (Req_ID 32255; C.2.7.10.1.4(11)(b))

Only registered subscribers of the IPTelS or CIPS can access the network. Numerous safeguards, from gateway router access control to verification of IP telephone MAC address, prevent unauthorized users from illegitimately using the system.

Invasion of Privacy (Req_ID 32256;C.2.7.10.1.4(11)(c))

The combination of physical security, operational procedures, and logical separation of services ensures the privacy of IPTelS traffic. Qwest

ensures the privacy of customer IPTelS traffic through security built into the design of the network and operational procedures that provide ongoing security. The network is physically and logically protected. Qwest facilities ensure physical security with the use of controlled access equipment rooms.

With Qwest on-net service, traffic traverses the Qwest trusted network over a private backbone infrastructure that inherently prevents third-party attempts to intercept VoIP and data communications. Qwest analyzes, assesses, designs, and implements security solutions designed to review security and improve security policy and infrastructure. Qwest will ensure that the IPTelS cannot be intercepted and that unauthorized third parties cannot eavesdrop on the packet payloads ███████████████████████ ███████████████

Only registered subscribers of Qwest's IPTelS or CIPS can access the network. ██ ██ ███████████████████████████ ███████████████████████████████████ ██ ██ ██ ██ ██ ████████████████████

4.2.10.3.2 Satisfaction of IPTelS Feature Requirements (L.34.1.4.3(a); C.2.7.10.2)

Figure 4.2.10-5 summarizes our technical approach to satisfying all IPTelS features required for the Networx program. All of the enumerated features are provided ██████████████████████ Qwest fully complies with all mandatory stipulated and narrative feature requirements for IPTelS.

The text in Figure 4.2.10-5 provides the technical description required per L.34.1.4.3(a) and does not limit or caveat Qwest's compliance in any way.
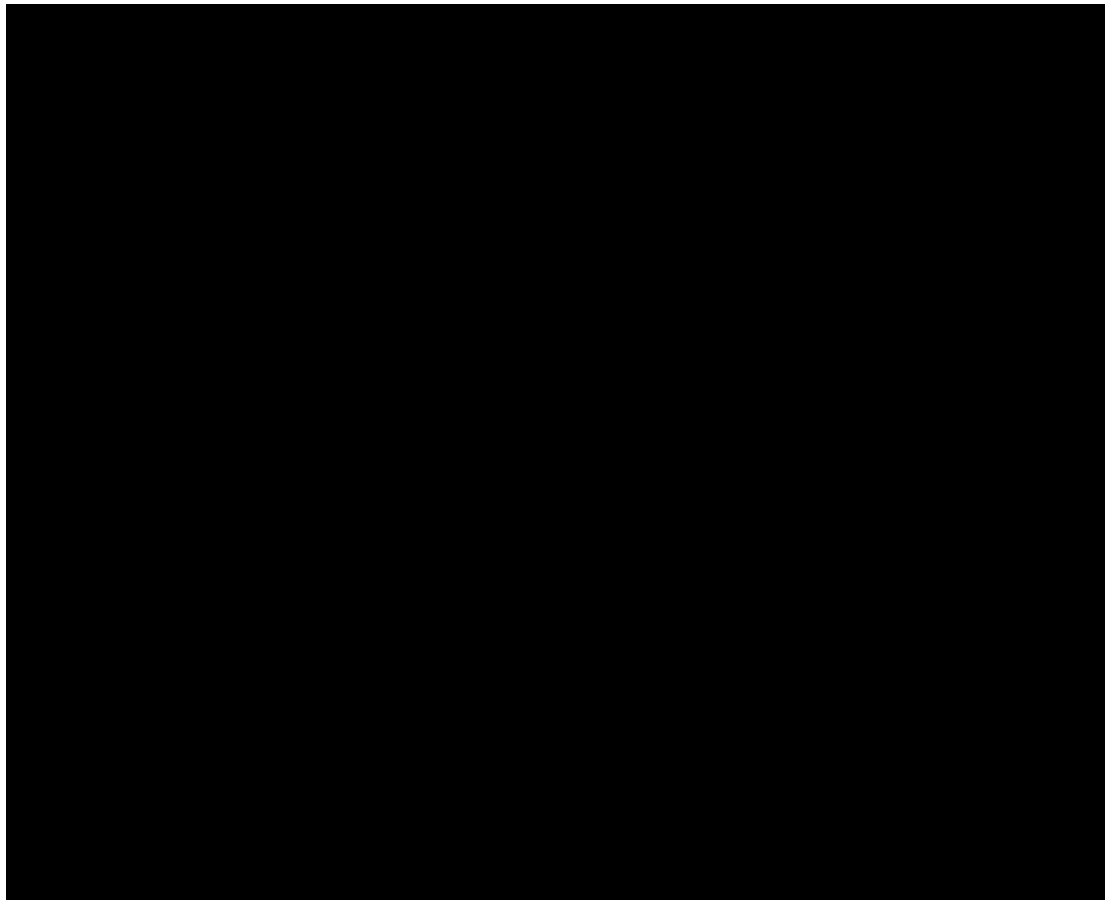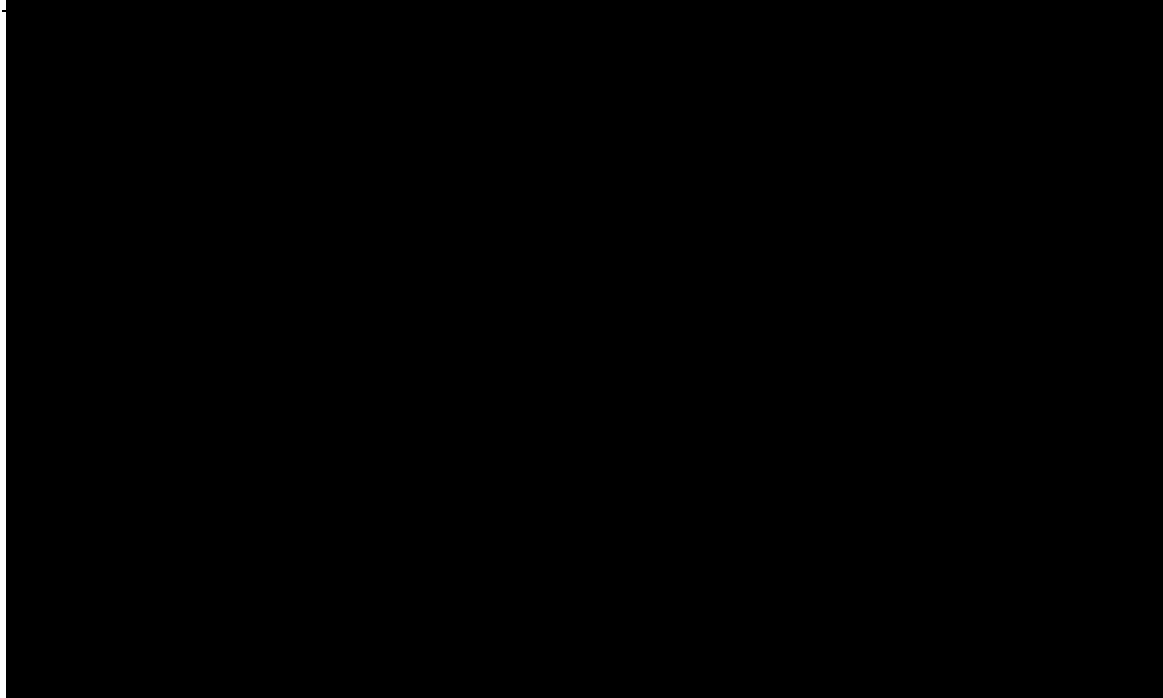
Figure 4.2.10-5. Summary of Technical Approach to Meeting IPTeIS Feature Requirements
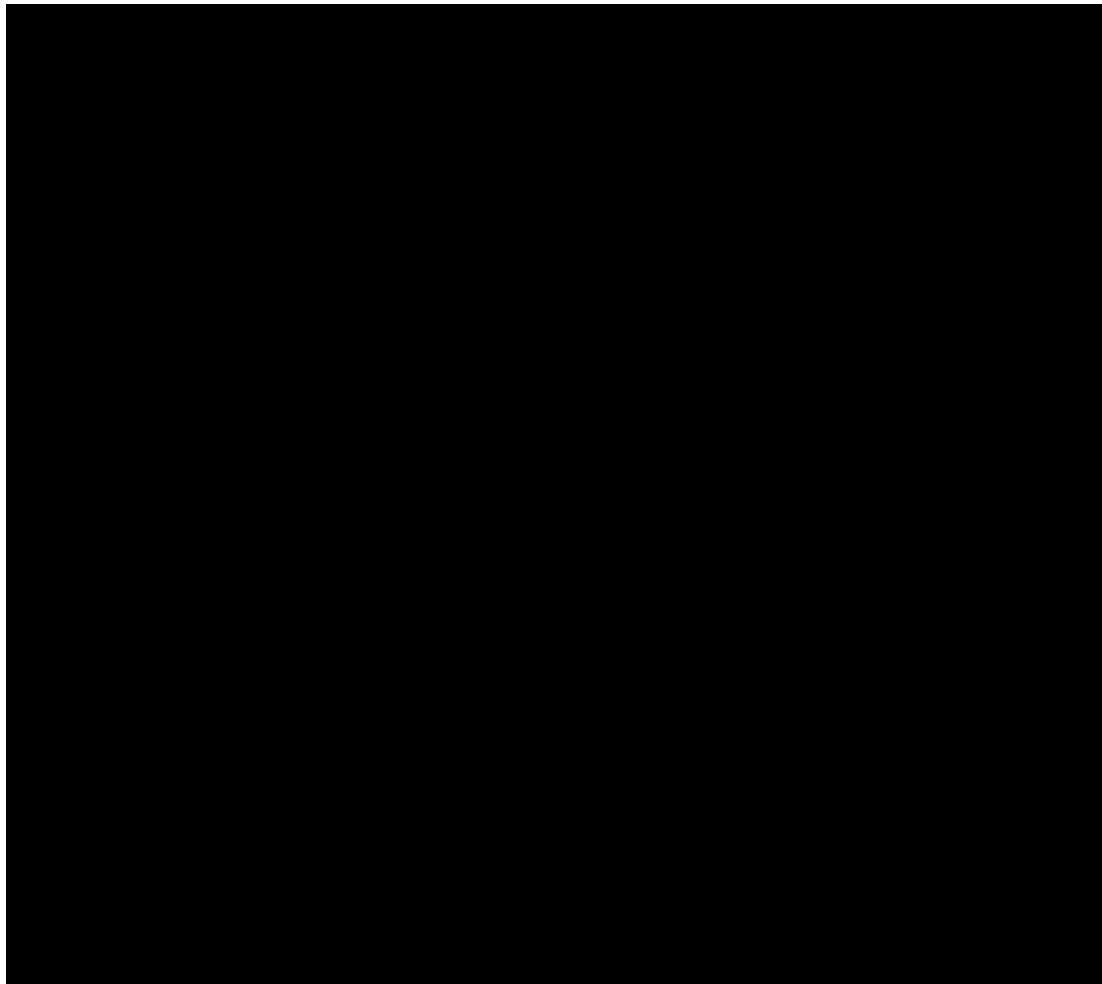
ID Number	Name of Feature	
1	Find Me, Follow Me Routing	
2	IP Telephony Manager (Subscriber)	
3	IP Telephony Manager (Administrator)	
4	Voice Mail Box	
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4.2.10.3.3 Satisfaction of IPTelS Interface Requirements (L.34.1.4.3(a); C.2.7.10.3)

Figure 4.2.10-9 summarizes our support of IPTelS interfaces, including the SED that we intend to use to deliver the services. Qwest may substitute for the assigned SED device over the course of the program with SEDs of similar functional and performance attributes. Qwest fully complies with all mandatory stipulated and narrative interface requirements for IPTelS. The text in Figure 4.2.10-9 provides the technical description required per L.34.1.4.3(a) and does not limit or caveat Qwest's compliance in any way.

Figure 4.2.10-9 Qwest's Provided IPTelS Interfaces at the SDP

UNI Type	Interface Type and Standard	Payload Data Rate or Bandwidth	Signaling or Protocol	████████████████
1	Router or LAN Ethernet port: RJ-45 (Std: IEEE 802.3)	Up to 100 Mbps	SIP, H.323, MGCP, or SCCP (Optional), where commercially available	██████████
2	Analog Line: Two-Wire (Std: Telcordia SR TSV-002275)	4 kHz Bandwidth	Line - Loop Signaling	████████
3 [Optional]	Digital line: ISDN BRI S and T Reference Point (Std: ANSI T1.607 and 610)	Up to 128 Kbps (2x64 kbps)	ITU-TSS Q.931	████████

IP Telephony Interfaces UNI Type 1 (Req_ID 32328; C.2.7.10.3.2(1))

Qwest will meet this requirement ████████████████████████ with a 10/100 LAN interface at the Agency site.

4.2.10.4 IPTelS Quality of Service (L.34.1.4.6(d))

As shown in *Figure 4.2.10-10*, Qwest meets the thresholds for all Acceptable Quality Levels (AQLs) with our IPTelS solution. Qwest's performance measurement methodology is fully compliant with the Government's requirement. Qwest leverages the robustness of our OC-192 IP network and the redundancy of our Core High-Speed Backbone POPs (TeraPOPs) to provide high availability and high performance service. Each TeraPOP has multiple fiber links interconnecting it to other TeraPOPs, ensuring no single point of failure in the IP network backbone. Full-node redundancy and network symmetry allow for element or patch failure, as dynamic routing logic keeps track of the active systems and application routes. The Qwest VoIP network is currently deployed in geographically diverse locations to ensure fault tolerance and high availability. Qwest also assumes responsibility for the local loop (POP – SDP) circuit in measuring performance. Note that for requirements with a service level marked "critical,"

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Qwest requires that all access loops be fully redundant and protected in order to meet the performance level.

Figure 4.2.10-10 Qwest Compliance with Government IPTeIS Performance Metrics

Key Performance Indicator (KPI)	Service Level	Performance Standard (Threshold)	Acceptable Quality Level (AQL)	
Latency	Routine	200 ms	≤ 200 ms	████
Grade of Service (Packet Loss)	Routine	0.4%	≤ 0.4%	███
Availability	Routine	99.6%	≥ 99.6%	███
	Critical [Optional]	99.9%	≥ 99.9%	███
Jitter	Routine	10 ms	≤ 10 ms	███
Time to Restore	Without Dispatch	4 hours	≤ 4 hours	███
	With Dispatch	8 hours	≤ 8 hours	███

Qwest understands latency to be the average round-trip time for a packet to travel between source and destination SDPs (CONUS only). ███████████████████████████████████ Qwest's industry-leading OC-192 IP/MPLS backbone and IP services network ensures ██████████████████████████

Qwest understands availability to be the percentage of the total reporting interval time that the IPTeIS is operationally available to an Agency. Qwest's underlying IP/MPLS-based transport network ████████████ ██████████████████████████ ███████ Network availability is measured by network downtime, which exists when a particular port is unable to transmit or receive data, ██████ ███████████████████ on auto-generated trouble tickets.

Qwest's IPTeIS is provided on multiple server and gateway platforms in geographically diverse Data Centers and Qwest POPs.

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Qwest understands jitter to be the variation in the delay between received packets of an IP data stream from SDP-to-SDP (CONUS only). Jitter is typically the result of network overload. ████████████████████ ████████████████████████████████████ Jitter is the measurement of inter-packet delay variance and is measured by generating synthetic UDP traffic.

4.2.10.5 IPTelS Performance Improvements (L.34.1.4.6(e))

In the event that an Agency has a specific business need or application problem, Qwest is willing to discuss service enhancements. Qwest will operate in good faith to engineer an IPTelS solution to serve unique Agency needs. Qwest is able to leverage our vast IPTelS product portfolio, which includes a variety of SED providers and specific IPTelS solutions. Through a special combination of vendor solutions and talented engineering capabilities, Qwest will be able to serve an Agency's business needs.

4.2.10.6 Experience with IPTelS Delivery (L.34.1.4.6(f))

Qwest has years of experience in VoIP technology and has performed numerous trials and implementations of commercialized Hosted VoIP services within the manufacturing, legal, retail, and financial services industries. Qwest

has been carrying large portions of our classic long-distance traffic over IP This has enabled Qwest to provide more cost-effective and reliable long-distance service.

Qwest is a proven player in the IP and VoIP market. Qwest seamlessly sends four billion minutes of VoIP traffic per month across our IP network.

Qwest has long been a leader in IP network technology. Our robust, fiber-based OC-192 network provides IP and MPLS services to a number of Government customers. Qwest's experience enables us to offer various solutions to begin the migration of existing TDM equipment utilizing the Qwest IPTelS solution.

Qwest's IP services solutions have supported Federal, commercial, and educational enterprises for more than including our past experience as US West.

Qwest provides IP transport services on a nationwide and global basis to a majority of the Fortune 500 U.S.-based businesses and continues to exceed industry performance measurements for service, features, and availability. Qwest presently supports dedicated IP access connections originating from Qwest's OC-192 IP/MPLS network.

4.2.10.7 Characteristics and Performance of Access Arrangements (L.34.1.4.6(g))

Convergence of edge technologies is progressing rapidly as customers strive to handle many applications over a single facility type. Qwest is focused

on providing access facilities that meet this need, enabling customers to converge their traffic. Qwest does this today for services such as IPS and NBIP-VPNS.

To be effective, a multi-application access facility must meet a number of requirements. QoS is critical for this environment. Data, voice, email, video, and other applications all have different QoS requirements. Adherence to QoS metrics will ensure that these applications can be used across a common facility effectively. In the case of IPTelS, QoS implemented in the Juniper edge routers ensures that VoIP traffic is given priority over other IP traffic. In addition to QoS, the network must recognize individual applications within the IP stream. ██ ████████

Qwest further provides access to traditional telephony applications through a multi-service connection. Qwest's IPTelS and TDM networks are interconnected through distributed ███████ gateways across the United States. IPTelS has access to these gateways and their services through the IPS or NBIP-VPNS connection. Section 3.2 provides more information on Qwest's proposed access arrangements for Networx, including wireline access arrangements and broadband access arrangements.

Qwest will provide IPTelS access to the Qwest backbone with the assistance of ILEC and CLEC suppliers as required. Each supplier will use methods for service delivery that are common for that service area. Ordering, repair, and all other mandatory requirements of the RFP are met using Qwest ███████████████████████████ personnel, who will be a single point of contact for all Government requests and work directly with our suppliers. ███████████ ██ ██ ███████████

4.2.10.8 Approach for Monitoring and Measuring IPTelS KPIs and AQLs (L.34.1.4.6(h))

Qwest monitors and measures the KPIs and AQLs SDP-to-SDP using automated processes that pull data from the root source, summarize it, and display it using Web tools. These Web tools display actual results and provide a color-coded visual, indicating whether performance goals have been achieved. Our approach is to completely automate the Web display of results from data collection. This ensures that the focus is on responding to performance issues, rather than on performance report generation. The automated reporting process eliminates any question of manipulating the performance data.

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Measuring SDP-to-SDP Latency, Packet Loss and Jitter, and the Role of SEDs

All of Qwest's IP-based services are provided over the same IP services infrastructure. ██████████████████████████

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████████████████████████████ In summary, Qwest will adhere to all Special Performance Requirements as stated in Section C.2.1.6.2 of the RFP.

Use of Statistical Sampling in lieu of Direct KPI Measurements

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4.2.10.9 IPTelS Support of Time-Sensitive Traffic (L.34.1.4.6(i))

Qwest's IPTelS solution ensures the quality of time-sensitive traffic through the combination of our network access architecture and our CoS attributes. Our network access architecture and CoS capabilities (with four classes of service) provide converged IP services that include data, video, and voice. The Qwest SEDs for IPTelS are also CoS-aware to ensure the proper prioritization of traffic entering the Qwest network.

Qwest ensures that time sensitive IP packets are assigned a strictly higher priority than other traffic. This is accomplished by the proper selection and configuration of SEDs as well as the proper configuration of CoS templates for the Qwest IP ports associated with IPTelS. Qwest sales engineering will work with an Agency to design a CoS plan that meets application requirements.

4.2.10.10 IPTelS Support for Integrated Access (L.34.1.4.6(j))

Qwest's national network and its associated NEs for electrical and optical transport, Metro Optical Ethernet (MOE), ATM, Frame Relay access, IP, and data and VoIP services provide integrated access capability. Qwest service offerings such as IPS, NBIP-VPNS, IPTelS, CIPS, TFS, VS, ATMS, and FRS can be used on any of these access methods.

Qwest access services provide a wide variety of narrowband and broadband options and access speeds for the Agency, such as switched 56, fractional T-1, T-3, STS-1, and MOE in bandwidth increments of 100 Mbps to 1000 Mbps, and optical access up to OC-192.

All Qwest NEs in our Central Offices and Points of Presence are traceable to a Stratum 1 Primary Timing Source. Cesium, GPS, and CDMA are used as the Primary Reference Source. We employ Synchronization Status Messaging (SSM) for ring synchronization, and it is available on all National network BITS clocks. The wireless synch-services are compatible with our wireless service providers.

Qwest access services enable the Agency to integrate their DID/DOD Voice services, long distance, toll-free service, CENTREX, VoIP, data, video, multi-media, IP Internet, IP Intranet, ATM, and Frame Relay into a single access facility. Access and network diversity is available and highly recommended for redundancy and network survivability. Qwest can work with our suppliers to facilitate alterative providers for access and network diversity where network survivability of high availability locations is critical.

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Qwest complies with IETF, ITU, Telcordia, ANSI, and all applicable industry, national, and international standards. Qwest is actively working with the standards bodies and holds the Technology and Operations chair position in ATIS, an ANSI-accredited standards organization. Qwest's network is built on standards-based technologies, enables a building-block approach to evolution, and supports the access methods required by the Government. Qwest's timing and synchronization architecture is compliant with all applicable standards, including:

- Telecordia GR-253, SONET Transport Systems, Common Generic

- Telecordia GR-436, Digital Network Synchronization Plan

Qwest's converged access solutions provide unparalleled support in the marketplace and to the Government customer. Agencies can be assured of an integrated access solution that will provide a reliable, virtually error-free data transport highway, no matter what telephony, IP, or data services are used.

4.2.10.11 Infrastructure Enhancements and Emerging Services (L.34.1.4.6(k))

Best-of-class vendors, extensive interoperability testing, and strategic innovative design form the basis for adopting emerging technology into the Qwest IPTelS network. Qwest will continue to leverage our deployed IP/MPLS network, in addition to our VoIP infrastructure, to enhance the IPTelS offering. As the industry evolves and standards are adopted, Qwest will continue to evolve our IP/MPLS network in addition to our VoIP infrastructure to facilitate support of emerging services. Convergence will drive additional applications and services, and the Qwest platforms are well positioned to facilitate the incorporation of new services while interoperating with existing services.

Qwest's technical team embraces a charter to ensure that Qwest is a leader in industry trends, is versed in emerging technologies, and can anticipate customer needs. The Qwest technical team establishes a path by which emerging technologies are incorporated into our platform and associated services are made available to customers.

4.2.10.12 Approach for Network Convergence (L.34.1.4.6(l))

In order to support services such as IPTelS, Qwest is committed to the elimination of single-purpose, stovepipe networks that create planning, operations, and interoperability issues for Agencies.

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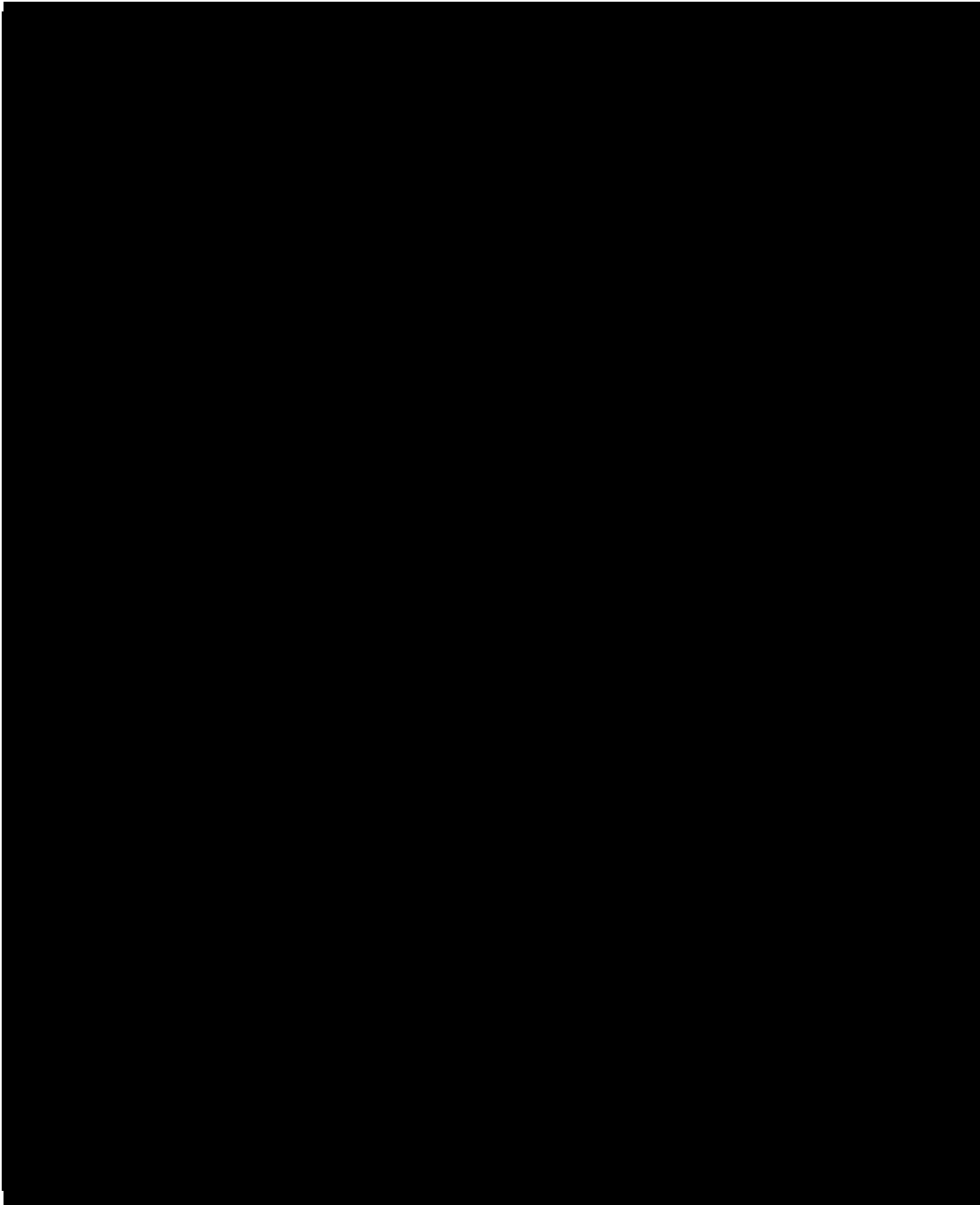
4.2.10.13 IP-PSTN Interoperability (L.34.1.4.6(m))

A description of the approach to support and ensure interoperability between Internet Protocol (IP) networks and the Public Switched Telephone Network (PSTN), including the approach to map between IP and PSTN addresses.

An Agency site will connect to the Qwest IP network via the access options available with IPS and NBIP-VPN. Once connected to a Qwest IP-based network service, Qwest uses ▮▮▮▮▮▮ feature servers to provide PBX-like functionality and call control. Off-net originating and terminating calls are routed through one of several ▮▮▮▮▮▮ VoIP gateways to connect to the PSTN. The PSTN destination of the traffic, having been determined by the called number, is forwarded by Integrated Services Digital Network (ISDN) Primary Rate Interface (PRI) to the appropriate Local Voice Network or via a Feature Group D connection to Long Distance and Wireless Networks.

███████████████ shows call flow for on-net calling. This call flow applies for on-net IPTelS calls as well as calls to Qwest-provided Converged IP Services (CIPS). Specifically, once the call is determined to be another IPTelS or CIPS customer (by signaling to the ████████ feature server), the VoIP connection is made between the end equipment VoIP phone sets.
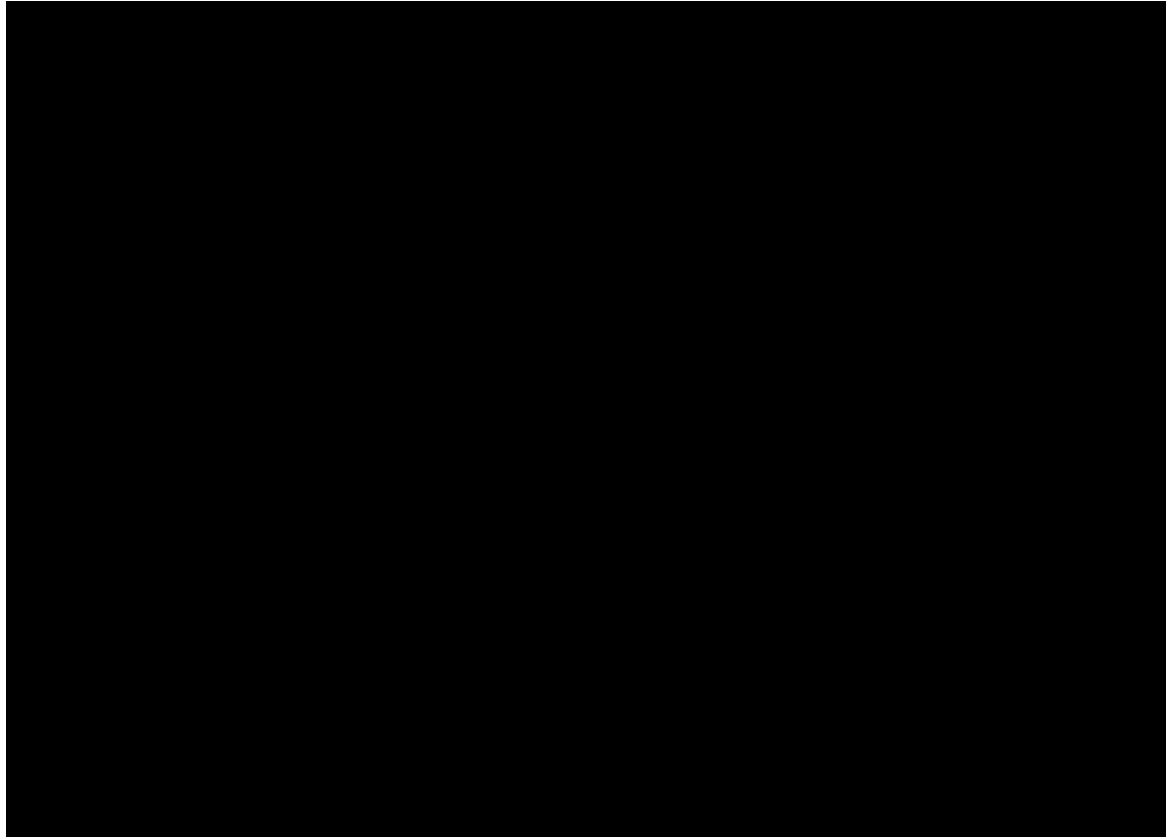
███████████████ shows the call flow for IPTelS calls that terminate on the PSTN. The Qwest Feature server handles standard NPA/NXX calls as well as special calls, specifically E911 and 411.
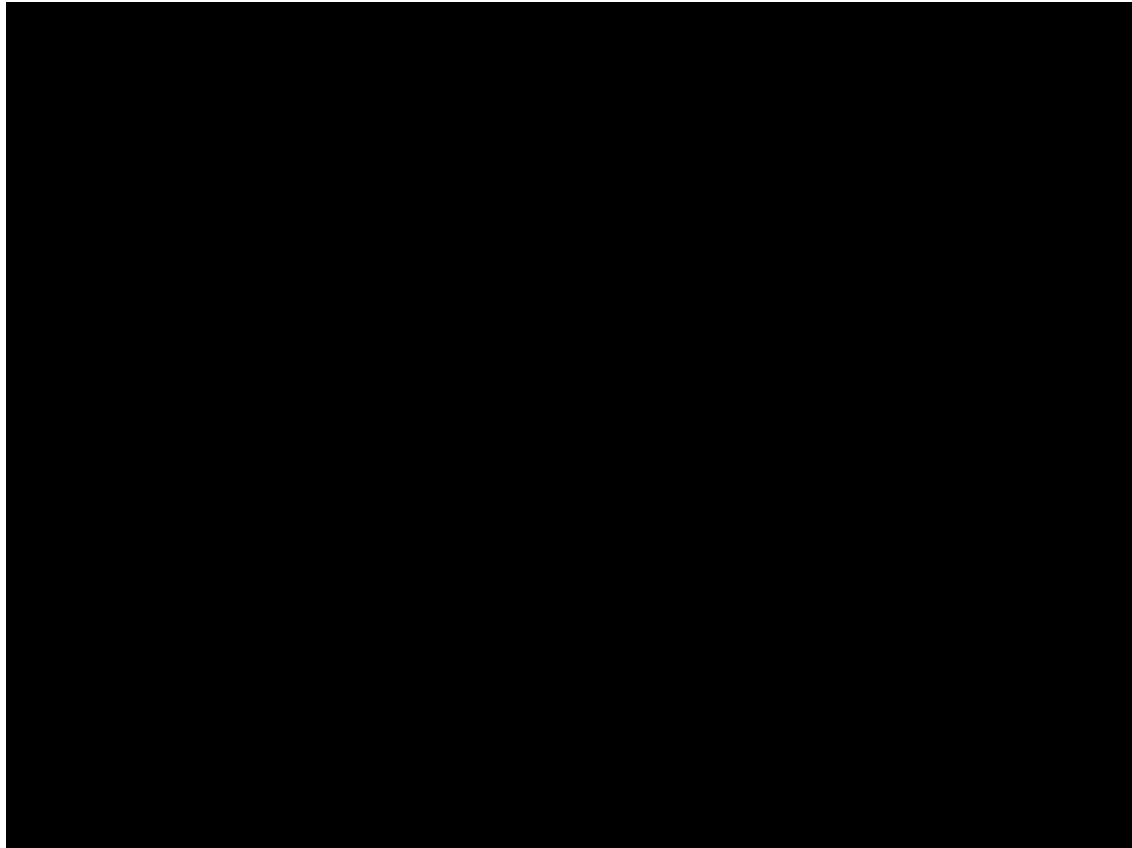
The Qwest IPTeIS service enables subscribers to originate and terminate telephone calls to and from the PSTN. This interoperability is provided by the Qwest ██████ VoIP gateways that connect our IP network to the PSTN. The IPTeIS also uses the ████████ Feature servers and Agency VoIP handsets to support:

- The real-time transport of voice, facsimile, and TTY (TDD device) communications
- Caller ID ANI information and logging, when available, from the sender (and provide the correct caller ID information on originating calls)
- The North American Dialing plan, Direct Inbound Dialing, and international access

Private dial plans, which can be created, and station-to-station direct calling is supported:

- Agency-specific 700 numbers
- Provision of directory assistance (411) and operations assistance
- Provision of call return
- Provision of multi-point conferencing

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The Qwest IPTelS fully complies with all 911 and E911 Government requirements. Mobility must be carefully coordinated to ensure proper E911 operation as required by the FCC. Qwest also complies with all FCC regulations regarding local number portability and other requirements.

Qwest is a proven provider for both voice and data/IP services and has long been a leader in IP network technology. Our robust fiber-based OC-192 network provides IP and MPLS services to a number of Agencies. Qwest's IP/MPLS network rides a fully-meshed OC-192 backbone, employs Fast Re-Route technology for redundancy, and is private edge MPLS Frame Relay-enabled.

In addition to the Qwest IP/MPLS network strategy to support convergence, Qwest brings proven experience in the Voice space. ███████████
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███████████████████████████████████████ This network leverages ██ to offer services. Qwest's experience with TDM-based networks, in addition to our expertise in data/IP networks, has uniquely positioned us to offer VoIP-based services to our customers. Qwest has added key NEs, our network architecture, with the goal of providing and enabling IP-based Voice solutions

as part of a converged solution set. Qwest's VoIP solution includes call routing, call features, IP-enabled features/functionalities, and IP-enabled messaging capabilities.

Utilizing the Qwest IP/MPLS network in addition to our Voice infrastructure, Qwest has been carrying large portions of our long-distance traffic using IP transport since ████. This has enabled Qwest to demonstrate the interoperability of our IP/MPLS network with the PSTN and to provide cheaper, more reliable long-distance service to the customer for the last four years.

4.2.10.14 Approach for IPv4 to IPv6 Migration (L.34.1.4.6(n))

Qwest is well positioned to migrate our network from IPv4 to IPv6.

███████████████ shows how IPv6 signaling is fully incorporated into a native IPv6 core network. Qwest's MPLS core architecture enables us to provide multiple services at the same time, including IPv4 and IPv6 for public and private IP services.

4.2.10.15 Satisfaction of NS/EP Requirements (L.34.1.4.6(o))

Qwest uses a structured multi-layered approach to supporting National Security and Emergency Preparedness (NS/EP) that is designed to address each required function. Qwest has organizationally and strategically integrated risk management and security to encompass information technology and physical security. Our priorities are to protect our customers

from the physical layer up through the entire OSI stack, including all facets of cyber security.
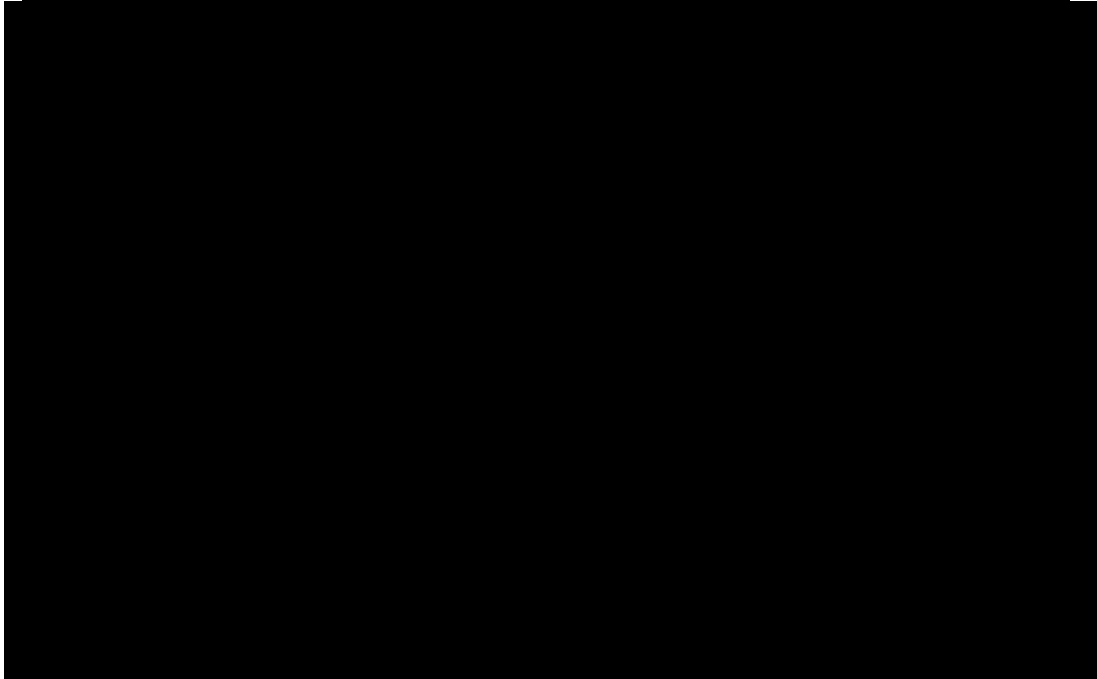
Our approach ensures that Qwest complies with and provides priority for the Government's telecommunications requirements for NS/EP survivability, interoperability, and operational effectiveness during an emergency threat, whether caused by natural hazards, man-made disasters, infrastructure failures, or cyber events. Our approach consists of multiple levels of NS/EP support, including the assignment of a full-time dedicated liaison, established TSP policies and procedures, implementation of the basic NS/EP telecommunications functional requirements, and our robust redundant network architecture in the National Capital Region (NCR).

Specifically, in accordance with RFP Section C.5.2.2.1, *NS/EP Basic Functional Requirements Matrix for Networx Services*, Qwest supports the following basic functional requirements for IPTelS:

- Enhanced Priority Treatment (C.5.2.1(1)) – IPTelS supporting NS/EP missions are provided preferential treatment over all other traffic.

- Secure Networks (C.5.2.1(2)) – IPTelS supporting NS/EP missions have protection against corruption of, or unauthorized access to, traffic and control, including expanded encryption techniques and user authentication, as appropriate.

- Non-Traceability (C.5.2.1(3)) – IPTelS users are able to use NS/EP services without risk of usage being traced (that is, without risk of user or location being identified).

- Restorability (C.5.2.1(4)) – Should a service disruption occur, IPTelS-supporting NS/EP missions are capable of being re-provisioned, repaired, or restored to required service levels on a priority basis.

- International Connectivity (C.5.2.1(5)) – IPTelS supporting NS/EP missions are provided access to and egress from international carriers.

- Interoperability (C.5.2.1(6)) – IPTelS will interconnect and interoperate with other Government or private facilities, systems, and networks, which will be identified after contract award.

- Mobility (C.5.2.1(7)) – The IPTelS infrastructure supports transportable, re-deployable, or fully mobile voice and data communications (i.e., Personal Communications Service, cellular, satellite, and high frequency radio).

- Nationwide Coverage (C.5.2.1.(8)) – IPTelS is readily available to support the National Security leadership and inter- and intra-Agency emergency operations, wherever they are located.

- Survivability/Endurability (C.5.2.1(9)) – IPTelS is robust to support surviving users under a broad range of circumstances, from the widespread damage of a natural or man-made disaster up to and including nuclear war.

- Voice Band Service (C.5.2.1(10)) – According to RFP Section C.5.2.2.1, this requirement is not applicable to IPTelS.

- Broadband Service (C.5.2.1(11)) – According to RFP Section C.5.2.2.1, this requirement is not applicable to IPTelS.

- Scaleable Bandwidth (C.5.2.1(12)) – According to RFP Section C.5.2.2.1, this requirement is not applicable to IPTelS.

- Affordability (C.5.2.1(13)) – IPTelS leverages network capabilities to minimize cost (for example, use of existing infrastructure, commercial off-the-shelf technologies, and services).

- Reliability/Availability (C.5.2.1(14)) – IPTel Services perform consistently and precisely according to their design requirements and specifications and are usable with high confidence.

Details of how Qwest supports all 14 basic functional requirements listed in RFP Section C.5.2.2.1 are provided in Section 3.5.1, *Approach to Satisfy NS/EP Functional Requirements*, in this Technical Volume.

4.2.10.16 Support for Signaling and Command Links (L.34.1.4.6(p))

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4.2.10.17 Service Assurance in the National Capital Region (NCR) (L.34.1.4.6(q))

As discussed in Section 3.2, *Approach to Ensure Service Quality and Reliability*, Qwest provides network services in the NCR with a robust network architecture designed and engineered to ensure continuity for IPTelS and other services in the event of significant facility failures or catastrophic impact. Qwest will continue to engineer critical services to meet each Agency's requirements to eliminate potential single points of failure or overload conditions that may impact their network service performance.

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███ ████████ ██████████ Qwest also provides functionality that enables Government Emergency Telecommunications Service priority calling mechanisms. Qwest has a full-time NCS representative. His dedication to the program enables Qwest to provide full coordination with the Government's requirements in times of emergency.

Qwest will provide full NS/EP Functional Requirements Implementation Plan (FRIP) documentation upon contract award when requested to proceed with plan delivery. Qwest will update plans, including Part B, addressing our strategy for supporting Agency NCR requirements in accordance with RFP Section C.7.16.

Qwest understands the Government's requirement to assure performance of network services in and around the NCR. Qwest has POP diversity in the NCR ████████████████████████████████████ ████████████████████████ these gateways provides complete redundancy to access Qwest nationwide and international network capabilities, as well as regional voice and data services, including IPTelS. ████████████████

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████████████████ shows the logical configuration of the major transport facilities, as well as the services provided at each POP.
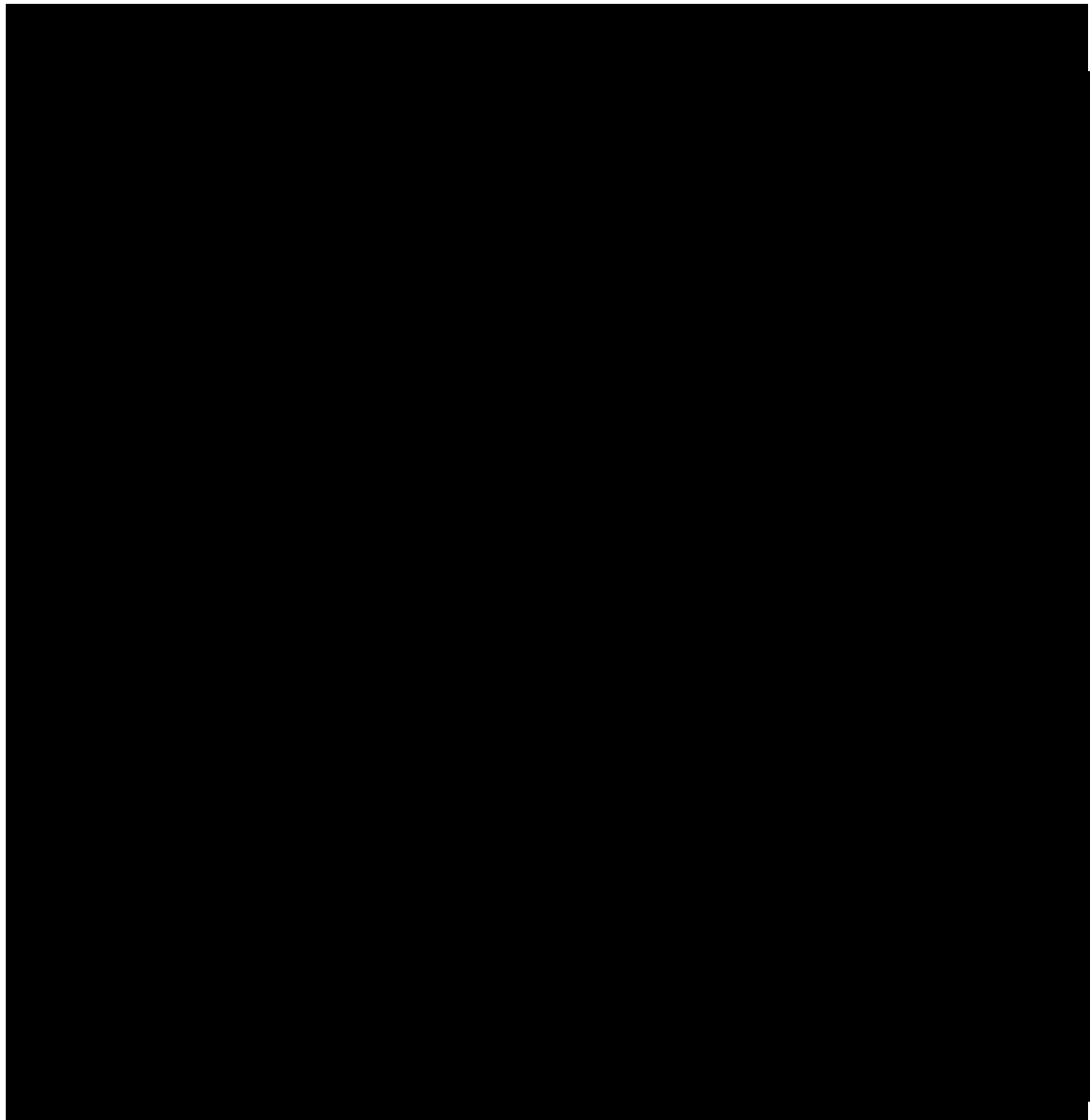
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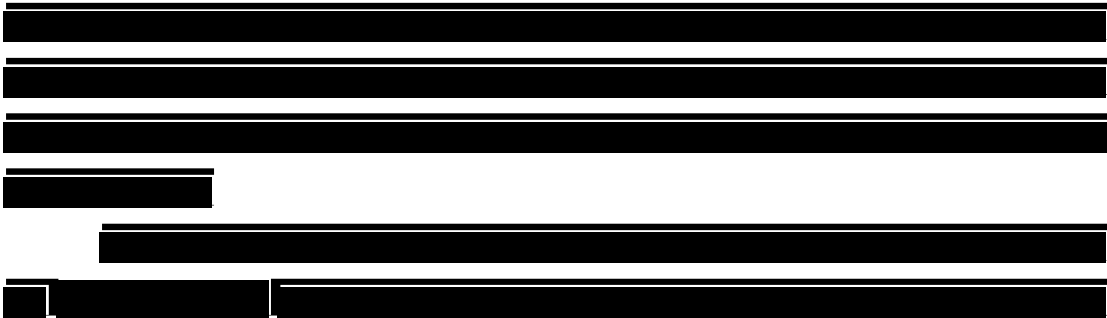
████████████████████████████████████ This configuration enables these ████████████ to participate in the routing of access and backbone traffic, providing significant load balancing and reconfiguration options in the event of a switch, router, or even a complete POP failure. Qwest has recently acquired OnFiber, a metro SONET and Ethernet provider with yet another diverse network in the NCR. This gives Qwest at least ████████████ fiber optic networks to use to ensure redundancy and survivability in the greater Washington D.C. area. In effect, this means Qwest can circumvent Washington, D.C. to continue providing services in an emergency.

Qwest operates seven other major SONET rings and an extensive fiber infrastructure in the NCR to connect NCR customers. Qwest pre-subscribed this infrastructure from an ILEC and numerous CLECs. As presented in Section 3.2.2, *Arrangements with Other Service Providers for Carrying and Exchanging Traffic*, Qwest connects to several major ILEC POP locations through SONET-ring protected networks to ensure multiple access paths to ILECs services, including voice termination and fiber access. The use of CLECs, which provide infrastructure that is generally separate from the ILECs, gives another level of resiliency to the architecture because these services would not be affected by an ILEC facility failure.

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██████████████████████████████████ This ensures that Qwest can hand off traffic to at least one access tandem in the event of a complete Qwest POP failure. Qwest supports dual-homing arrangements for call overflow or load balancing between two or more diverse voice switch locations. Using Qwest diverse-access infrastructure affords the maximum protection for an Agency in the event of the loss of a switch or transport system failure. In Section 3.2.3*, Congestion Flow Strategies, Control, and*

Redundancy, Qwest demonstrates how network planning examines all failure modes and determines network capacity and switch or router redundancy placement to ensure performance during failures.

The route-diverse SONET backbone and access networks that service the NCR enable the transport of services to any Qwest POP nationwide. ▮▮

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▮▮▮▮ Qwest peers with the largest ISPs at ▮▮▮ private peering locations geographically distributed through the United States, and the loss of a single peering point has virtually no effect on our ability to provide high-quality access to the Internet. Qwest also peers directly in Asia and Europe to improve international peering performance. In total, Qwest can dual-home critical customer connections with complete route diversity to all of Qwest's data networking services to have complete resiliency from facility failures in the NCR.

To ensure 50 to 100 millisecond range service restoration in the event of a catastrophic backbone circuit or router failure, Qwest's IP-based MPLS fast-forwarding core design uses Fast Re-Route, which provides pre-provisioned multi-path healing for all Qwest IP services.

Qwest will address the strategy, technical systems and administration, and management and operation requirements for the NCR in part B of our NS/EP FRIP (a draft appears as Appendix 2 to the Technical Volume).

4.2.10.18 Approach to Satisfying Section 508 Requirements (L.34.1.4.6(r))

Qwest's approach to meeting Section 508 criteria includes a range of activities to ensure that *all* users are able to access all services offered through the Networx contract vehicle.

Qwest achieves compliance by performing the same rigorous testing and evaluation processes that all products and services go through before they are made available to the public. To ensure products and services are 508 compliant, Qwest continues tests and evaluations with industry and specific Assistive Technology (AT) vendors to assess interoperability with TTY and AT devices.

Qwest has enlisted a single toll-free number for 24x7x365 access, 1-866-GSA-NETWorx(1-866-472-6389), that will provide Agencies with direct access to our Customer Support Office, which will also be 508 compliant, enabling accesses by email, fax, TTY, TDD, text messaging, or other methods as required. Qwest Customer Service support will be accessible around the clock for all Agency users, wherever they may be located. To ensure this, the Qwest Control Networx Portal, the gateway to Qwest Networx support systems, will also be 508 compliant. This Portal will serve as the primary conduit for daily status pertaining to ongoing projects and other service delivery activities for Agencies.

As part of Qwest's Networx deliverables,   lists the Voluntary Product Accessibility Templates (VPATs) developed for each offered product and service applicable for Networx services as required. The VPATs, including the relevant provisions of Subparts B, C, and D listed in Figure 4.2.10-20, are included in the Technical Volume Appendices.

1194.21 Software Applications and Operating Systems

1194.22 Web-based Internet Information and Applications

1194.23 Telecommunications Products

1194.31 Functional Performance Criteria

1194.41 Information, Documentation, and Support

The following steps describe Qwest's approach for maintaining compliance with Section 508. Our approach for 508 compliance starts at lifecycle initiation and flows through transition, testing, and operations.

Step 1 – Discovery and Scoping

Step 2 – Publish Design Guidelines

Step 3 – Ensure Future Releases are Compliant

More information about how Qwest will maintain 508 compliance is located in Section 3.5.4, *Approach for Meeting Section 508 Provisions*, of this Technical Volume.
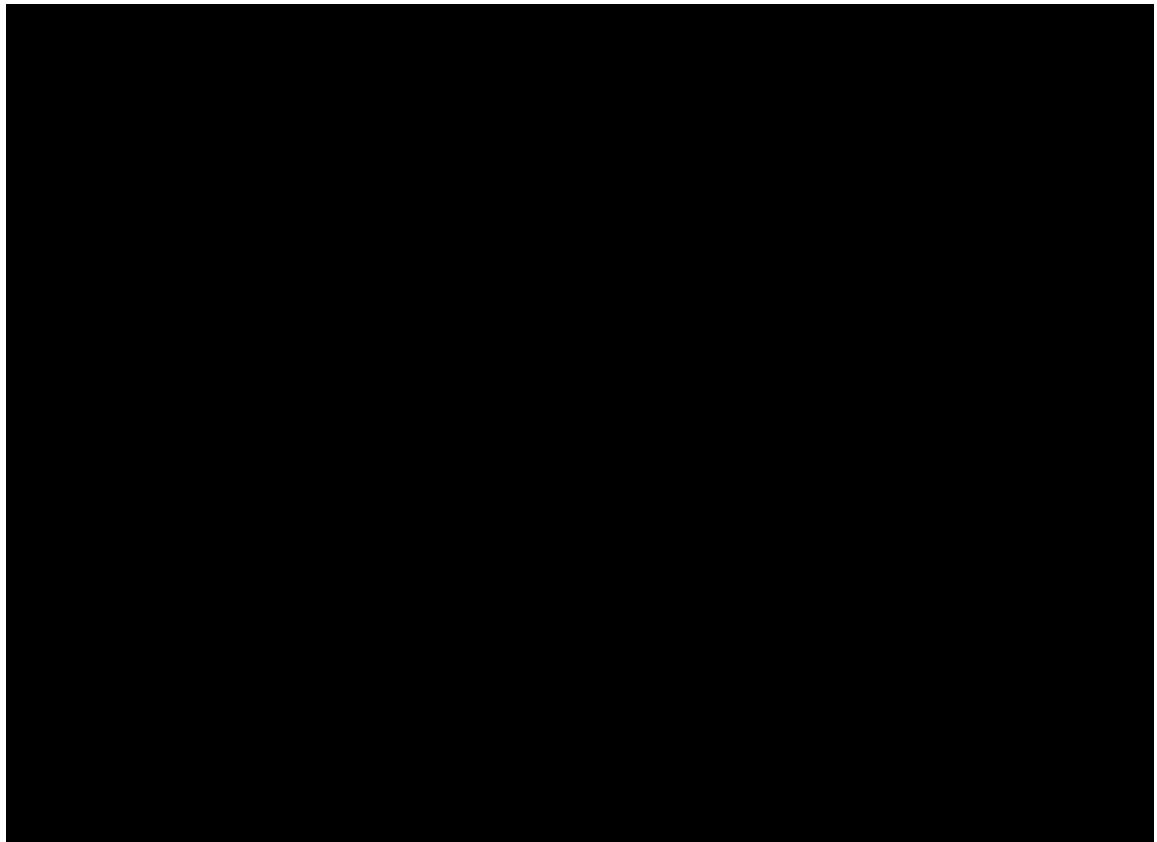
4.2.10.19 IPTelS Impact on Network Architecture (L.34.1.4.6(s))

We do not expect any impact to our network architecture stemming from the delivery of IPTelS. The Qwest infrastructure that supports IPTelS is modular, consisting of discrete components to provide the Feature Server, SBC, Gateway, and Unified Messaging services. Each one of these modules will be expanded or supplemented as required. ████████████████████████

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██████████████████████████ As later year requirements increase, we will add network components as required to meet the demand.

4.2.10.20 Optimizing the Engineering of IPTelS (L.34.1.4.6(t))

Planning and Engineering of IPTelS centers around a multi-set design process. Planning produces monthly reports for the IPTelS system that specify current and forecast utilization. ████████████████

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█████████████████████ In addition to monthly reporting, large Agency orders will also trigger this process to ensure that capacity is available.

Once this trigger is met, a number of activities result. First, the planning team builds a proposal for the capacity augmentation. This proposal identifies scenarios for how much new capacity will be built, how much that capacity will cost, and a list of project milestones. The growth proposal is built using existing models and configurations that have been certified for field use ████████████████████████ This method ensures that capacity will be available for Qwest customers and that new service will not be delayed. Use of certified models and configurations mitigates risk of

network deployment through standardized deployments and software configurations that are the result of detailed testing.

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4.2.10.21 Vision for Service Internetworking (L.34.1.4.6(u))

Qwest is committed to the elimination of single-purpose, stovepipe networks that create planning, operations, and interoperability issues for our customers.

Qwest's service delivery model supports multiple types of customer requirements. Qwest's approach for network architecture evolution guides our

investments and provides the overall direction for our technology evolution and services convergence. Qwest's service delivery model also allows us to assess the interoperability impacts of changes in the technical elements in each network area (e.g., access, service control, edge, core, MPLS, and optical).
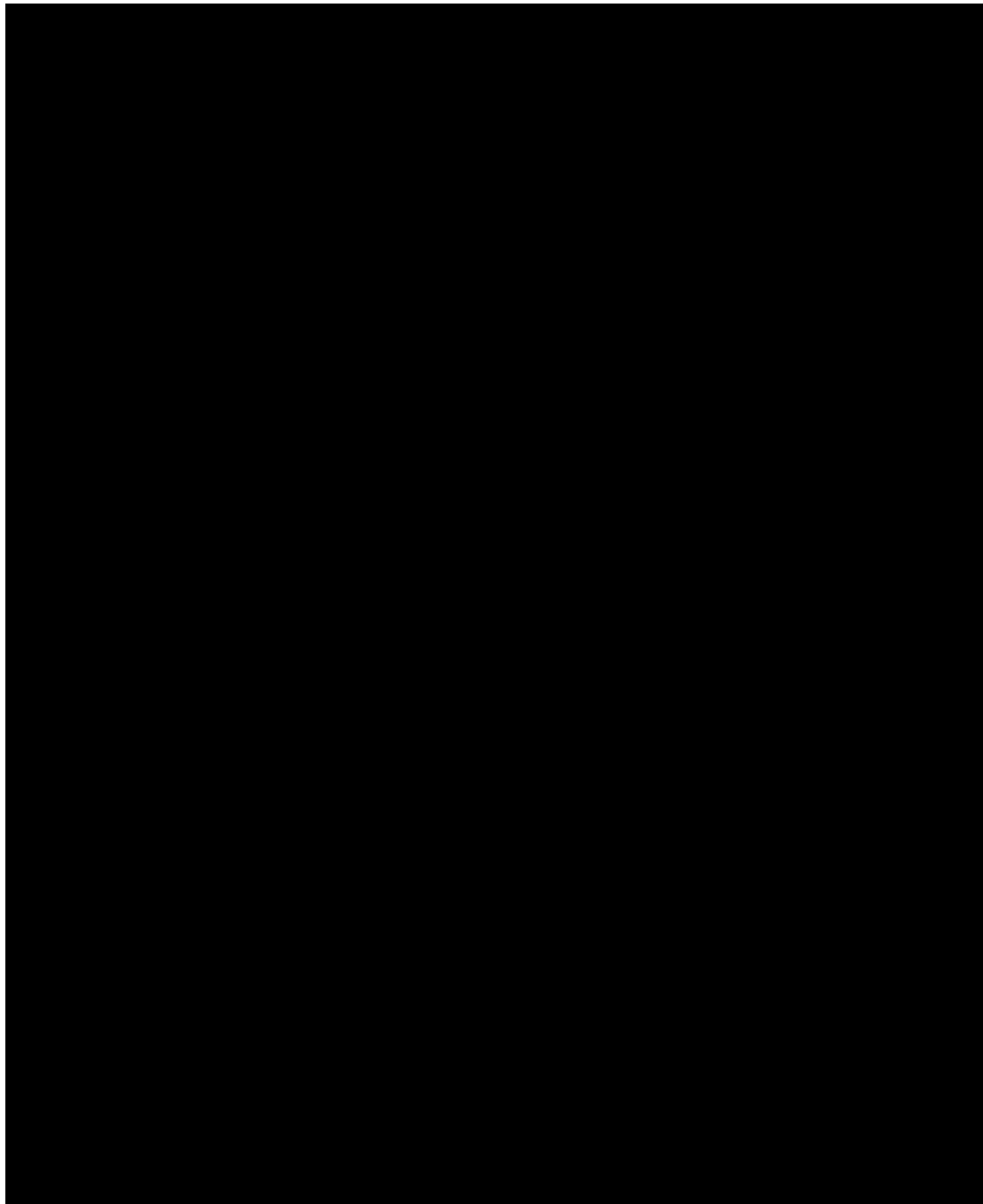
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In summary, the Qwest backbone has been transformed from primarily serving Internet traffic to a general-purpose packet transport network with

TDM-like quality characteristics, capable of serving multiple kinds of application traffic, including Internet, Layer 3 VPNs, Layer 2 VPNs, VoIP, Video over IP, Storage over IP, and other traffic.

4.2.10.22 Support for Government IPTelS Traffic (L.34.1.4.6(v))

The Government traffic model requirements are modest in the early years, adding only about 1,000 clients a year through year 3. In year 4, the demand begins to increase, culminating in a total of approximately 190,000 subscribers (telephone numbers) by year 10.

The Qwest infrastructure that supports IPTelS is modular, consisting of discrete components to provide the Feature Server, SBC, Gateway, and Unified Messaging services. Each one of these modules can be expanded or supplemented as required. ████████████████████████████

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4.2.10-23 ICB CLIN Specific Agency Services and Case Numbers

Table 4.2.10.23-1 Table of ICB CLINs and Case Numbers

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