4.2 TRANSPORT/IP/OPTICAL SERVICES OPTIONAL SERVICES (L.34.1.4.6, M.2.1.2)

This section presents Qwest's proposed optional services for the Networx program. In our selection of optional services we applied two criteria:

- Does the Qwest Team have a market leadership position in the delivery of the optional service?
- Does the Qwest Team currently deliver the optional service to Federal Agencies?

The optional services Qwest proposes qualify for one or both of these criteria and offer the Networx Enterprise program a depth of capability that will facilitate transition and service convergence.

4.2.1 Voice Services (VS) (L.34.1.4.6, C.2.2.1-C.2.2.1.1.3))

Flexible, reliable and scalable, Qwest's Voice Services (VS) are provided to Agencies through the Advanced Intelligent Network (AIN) features, Class III/IV/V switches, and Qwest's Macro Capacity® fiber network.

Voice calls are carried over Qwest's network and the Public Switched Telephone Network (PSTN). Qwest's network is built on multi-vendor, standards-based technologies that enable a building-block approach to evolution.

Qwest's suite of Voice Services (VS) provides the Government with global connectivity to [redacted] Qwest International Direct Dial, a high quality, managed outbound voice solution, provides international direct dial capability [redacted] We interconnect with domestic and international carriers through dedicated access lines, [redacted]

4.2.1.1 Reserved (L.34.1.4.6 (a))

4.2.1.2 Reserved (L.34.1.4.6 (b))

4.2.1.3 Satisfaction of VS Requirements (L.34.1.4.6 (c))

Qwest's VS approach meets all service requirements of the Networx program. The following sections provide the technical descriptions of how Qwest will satisfy the capabilities, features, and interface requirements of VS.

4.2.1.3.1 Satisfaction of VS Capabilities Requirements (L.34.1.4.6 (c), C.2.2.1.1.4)

Figure 4.2.1-1 summarizes Qwest's technical approach to delivering the VS capabilities in RFP C.2.2.1.1.4.

Qwest fully complies with all mandatory stipulated and narrative capability requirements for VS. The text in Figure 4.2.1-1 is intended to provide the technical description required per L.34.1.4.6(c) and does not limit or caveat Qwest's compliance in any way.

Figure 4.2.1-1 Qwest's Technical Approach to VS Capabilities

ID #	Capability	[redacted]
1	Uniform Numbering Plan	[redacted]
	a. Unique Directory Number	
	b. PSTN	
	c. Agency-specific 700 Numbers [Optional]	

ID #	Capability	[redacted]
	c. i. Transparency and Interconnectivity with Other Networks [Optional]	
	c. ii. Originating and Terminating On-Net Calls [Optional]	
	d. Private Numbers	
2	Network Intercept	
	a. Number Disconnected	
	b. Time-out during Dialing	
	c. Network congestion	
	d. Denial of access to off-net and non-U.S. calls	
	e. Denial of access to features	
3	Signaling via Integrated Services Digital Network (ISDN) D-Channel [Optional]	
4	Voice Quality	

Qwest's VS includes:

Qwest Domestic and International Outbound Long Distance

Qwest's service delivery approach provides Agencies with connectivity domestically and allows calls to originate from domestic locations and terminate in required non-domestic locations. Qwest maintains a national inter-exchange voice network infrastructure that combines the use of a traditional circuit-switched platform (Nortel DMS-250) and next-generation voice services platform (Sonus Networks Open Services Platform Architecture). The Qwest IXC network connects to serving areas in the United States primarily through SS7 Feature Group D trunks, and through in-band Feature Group D trunks where necessary. [redacted]

Qwest's VS network includes an Advanced Intelligent Network (AIN) service model. [redacted]

International Direct Dial (IDD)

IDD meets a wide range of needs, from small Federal offices requiring only national and IDD calling, to departmental enterprises requiring

connectivity and full VS functionality to many countries. Qwest has ongoing relations with a variety of international and domestic carriers for terminating international traffic. Agencies can use Qwest as a "one stop shop" because Qwest manages the relationship with the international carriers to provide international direct dial services. Qwest engineers work closely with other carriers to ensure the services are appropriately designed to interoperate across the networks.

Voice Virtual Private Network (VPN)

Qwest's VPN is an enhanced capability that provides the convenience, cost savings, and control achievable only with a virtual network. [redacted]

Qwest Networx Calling Card

Calling cards provided by Qwest offer a cost-effective, convenient calling card designed especially for business travelers. [redacted]

[redacted]

Operator Services

Qwest allows domestic and non-domestic users to reach an English or Spanish-speaking operator for a wide range of assistance calls. [redacted]

4.2.1.3.2 Satisfaction of VS Features Requirements (L.34.1.4.6 (c), C.2.2.1.2-C.2.2.1.2.1)

[redacted]

Figure 4.2.1-2 summarizes our support for the VS feature requirements.

Qwest fully complies with all mandatory stipulated and narrative feature requirements for VS. The text in Figure 4.2.1-2 is intended to provide the technical description required per L.34.1.4.6(c) and does not limit or caveat Qwest's compliance in any way.

Figure 4.2.1-2 Qwest's Technical Approach to VS Features

ID #	Name of Feature	Qwest's Services/Features
1	Agency-Recorded Message Announcements [Optional]	Qwest's Web Contact Center (QWCC) and Network Agent Routing (NAR) products provide the Government the capability to record announcements. [redacted]
2	Authorization Codes/Calling Cards	
3	Caller Identification (ID)	
4	Call Screening for Users [Optional]	
5	Customized Network Announcement Intercept Scripts [Optional]	[redacted]
6	Internal Agency Accounting Code [Optional]	[redacted]
7	Off-Net Information Calls	[redacted]
8	Operator Services	Qwest provides Operator Services that allows Agencies to reach an English or Spanish speaking operator for domestic and non-domestic assistance calls. Agency users will be able to receive operator assistance via Qwest's SS&B platform. [redacted]

ID #	Name of Feature	Qwest's Services/Features
9	Support for Government Travel Cards [Optional]	[redacted]
10	Suppression of Calling Number Delivery	[redacted]

4.2.1.3.3 Satisfaction of VS Interfaces Requirements (L.34.1.4.6 (c), C.2.2.1.3-C.2.2.1.3.1)

Qwest provides standards-based VS interfaces as required for Networx services. ***Figure 4.2.1-3*** summarizes our support for required VS interfaces, including the proposed SEDs. The Qwest voice network interoperates with interface equipment specified by the Government, such as single-line telephones, Secure Telephone Unit (STU) III, multi-line key telephone systems, conference room audio equipment, PBX, Centrex, T-1 multiplexer, modem, fax, and video teleconferencing systems.

[redacted]

Figure 4.2.1-3. Qwest Provided VS Interfaces at the SDP

UNI Type	Interface Type and Standard	Payload Data Rate or Bandwidth	Signaling	[redacted]
1	Analog Line: Two-Wire (Std: Telcordia SR TSV-002275)	4 kHz Bandwidth	Line-Loop Signaling	[redacted]
2	Analog Line: Four-Wire (Std: Telcordia SR-TS V-002275)	4 kHz Bandwidth	Line-Loop Signaling	[redacted]
3	Analog Trunk: Two-Wire (Std: Telcordia SR-TS V-002275)	4 kHz Bandwidth	Trunk-Loop Signaling (loop and ground start)	[redacted]
4	Analog Trunk: Four-Wire (Std: Telcordia SR-TSV-002275)	4 kHz Bandwidth	Trunk–Wink Start Signaling	[redacted]
5	Analog Trunk: Four-Wire (Std: Telcordia SR-TSV-002275)	4 kHz Bandwidth	Trunk-E&M Signaling	[redacted]
6	Digital Trunk: T-1 TSV-002275 and ANSI T1.102/1 07/403)	(Std: Telcordia SRSignaling Up to 1.536 Mbps	T-1 Robbed-Bit	[redacted]

UNI Type	Interface Type and Standard	Payload Data Rate or Bandwidth	Signaling	[redacted]
7	Digital Trunk: ISDN PRI T Reference Point (Std: ANSI T1.607 and 610)	Up to 1.536 Mbps	ITU-TSS Q.931	
8	Digital: T3 Channelized (Std: Telcordia GR-499 CORE)	Up to 43.008 Mbps	SS7, T-1 Robbed-Bit Signaling	
9 (Non-U.S.)	Digital Trunk: E1 Channelized (Std: ITU-TSS G.702)	Up to 1.92 Mbps	SS7, E1 Signaling	
10 [Optional]	Electrical: Synchronous Optical Network (SONET) Optical Carrier Level (OC)-1 (Std: ANSI T1.105 and 106)	49.536 Mbps	SS7	
11 [Optional]	Electrical: SONET STS-1 (Std: ANSI T1.105 and 106)	49.536 Mbps	SS7	
12 (Non-U.S.)	Digital: E3 Channelized (Std: ITU-TSS G.702)	Up to 30.72 Mbps	SS7, E1 Signaling	
13	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	

[redacted]

A dedicated circuit (local loop) is supplied from a Local Exchange Carrier (LEC), Competitive Local Exchange Carrier (CLEC), or Competitive Access Provider (CAP) directly to Qwest from the Agency premises. The actual bandwidth and speed of the circuit will vary depending on Agency.

4.2.1.4 VS Quality of Service (L.34.1.4.6 (d), C.2.2.1.4-C.2.2.1.4.1)

[redacted] Qwest's standard objective for availability for the voice network is fully supportive of Networx performance requirements. We will meet requirements as indicated by the KPI information shown in ***Figure 4.2.1-4***.

Figure 4.2.1-4. Qwest Compliance with Government VS Performance Metrics

Key Performance Indicator (KPI)	Service Level	Performance Standard (Threshold)	Acceptable Quality Level (AQL)	[redacted]
Availability (POP-to-POP)	Routine	99.95%	≥ 99.95%	
Availability (SDP-to-SDP)	Routine	99.5%	≥ 99.5%	
	Critical [Optional]	99.95%	≥ 99.95%	
Time to Restore	With Dispatch	8 hours	≤ 8 Hours	
	Without Dispatch	4 hours	≤ 4 hours	
Grade of Service (Call Blockage)	Routine	0.07 (SDP-to-SDP)	≤.07	
		0.01 (POP-to-POP)	≤.01	
	Critical [Optional]	0.01 (SDP-to-SDP & POP-to-POP)	≤.01	

Qwest KPI definitions for VS comply with the Networx RFP definitions as follows:

- **Availability:** Calculated as a percentage of the total reporting interval time that the voice service is operationally available to the Government.

- **Time to Restore (TTR):** From the creation of a trouble ticket to the time service is restored, minus approved stopped time while we are waiting on the Government (such as no access).
- **Grade of Service (GOS) (Call Blockage):** The proportion of calls that cannot be completed during the busy hour because of limits in the call handling capacity of one or more network elements.

4.2.1.5 Qwest's VS Exceeds Service Requirements (L.34.1.4.6 (e))

[redacted]

4.2.1.6 Experience with VS Delivery (L.34.1.4.6 (f))

Qwest provides long-distance services and broadband data, as well as global voice and video communications. Qwest sells its products and services to large and small businesses, Government Agencies, and public and private educational institutions.

Qwest has a rich tradition with more than 100 years of providing local, long-distance, and operator services. Qwest has served Agencies for more than 40 years and has a comprehensive understanding of their unique requirements, processes, and applications. [redacted]

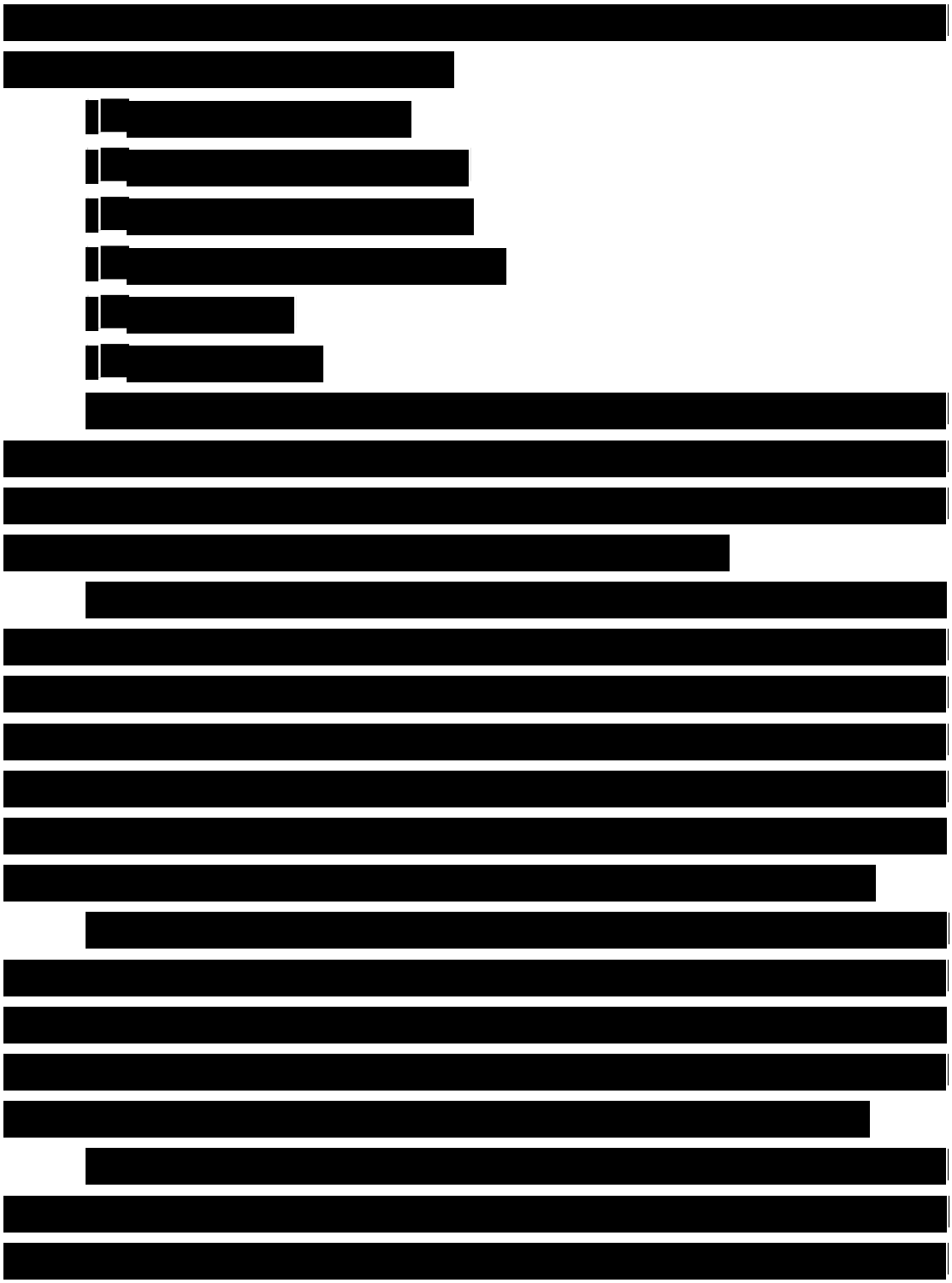
[redacted]

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

To provide access services, Qwest has a broad variety of agreements with local carriers to ensure flexibility, quality, and reliability. Qwest has strict quality standards for how we connect with other carriers to maintain this high level of performance. Section 3.2.1 of this Technical Volume provides information regarding our approach to access arrangements, including wireline access arrangements and broadband access arrangements.

4.2.1.8 Approach for Monitoring and Measuring VS KPIs and AQLs (L34.1.4.6 (h))

[redacted]



[redacted]

4.2.1.9 VS Support of Time-Sensitive Traffic (L.34.1.4.6 (i))

Qwest's Voice networking solutions provide proven, industry standard methods to ensure the quality of time-sensitive traffic. Our network engineering and capacity planning ensure our ability to meet the challenge of voice transport. VS calls are carried over best-in-class Service Switching Platforms (SSP) providing Class III, IV, and V functionality. [redacted]

Qwest utilizes industry-standard methods to ensure accurate synchronization within its transport network. VS traffic utilizing IP transport rides Qwest's best-in-class MPLS network.

Section 3.2.4 provides further elaboration on our approach to supporting time-sensitive traffic.

Section 4.1.1.1.4 provides details of Qwest's synchronization network architecture that supports time-sensitive traffic.

4.2.1.10 VS Support for Integrated Access (L.34.1.4.6 (j))

Qwest's network architecture and data services approach directly enables a complete menu of integrated access options to virtually all of Qwest's services. [redacted]

[redacted] Section 3.3.1 of this Technical Volume provides more detail regarding Qwest's access strategy and capabilities.

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

Qwest has mature processes that enable us to envision, research, evaluate, engineer, deploy, and operate new or emerging services. Driven initially by the Chief Technology Office, headed by Qwest's Chief Technology Officer (CTO), Qwest evaluates new products and technologies for incorporation into the Qwest network, in partnership with Qwest Product Management.

[redacted]

[redacted]

Qwest's vision for convergence will drive future capabilities developed for Agencies. Partnerships will become more pervasive and will be required to complete the converged value chain. Qwest's business processes, people, and technical infrastructure are capable of extending the value chain to flexibly handle a wide array of partnering arrangements in delivering a seamless Agency experience. Qwest aligns service, network and systems projects, and initiatives, all with an eye toward delivery of converged capabilities. We develop and manage the road map that results in the successful delivery of fully integrated capabilities and infrastructure.

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

Qwest already has a clear approach and has made significant progress in deploying a network that enables convergence as detailed in Section 3.3.3. [redacted]

[redacted]

4.2.1.13 IP-PSTN Interoperability (L.34.1.6.1 (m), C.2.1.10)

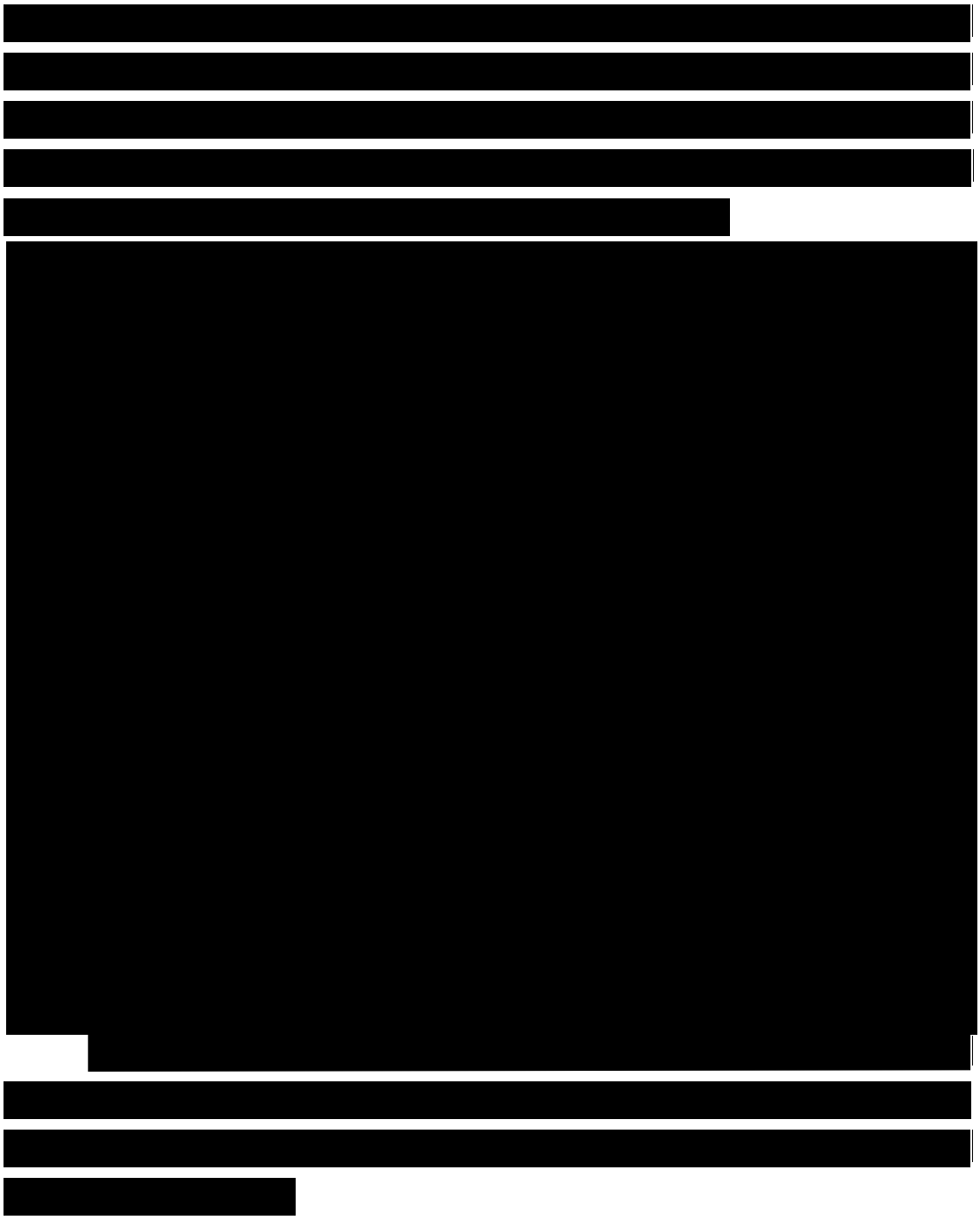
[redacted]

[redacted]

[redacted]

4.2.1.14 Approach for IPv4 to IPv6 Migration (L.34.1.4.6 (n), C.2.1.12)

[redacted]



4.2.1.15 Satisfaction of NS/EP Requirements (L.34.1.4.6 (o), C.5)

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 integrated risk management and security organizationally and strategically to encompass information technology and physical security. Our priority is to protect Agencies 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.

[redacted]

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 VS.

- **Enhanced Priority Treatment** (C.5.2.1(1)) - VS supporting NS/EP missions are provided preferential treatment over all other traffic.
- **Secure Networks** (C.5.2.1(2)) - VS 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)) - VS 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, VS-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)) – VS will provide access to and egress from international carriers.
- **Interoperability** (C.5.2.1(6)) - VS 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 VS infrastructure supports transportable, re-deployable, or fully mobile voice and data communications, i.e., Personal Communications Service (PCS), cellular, satellite, and high frequency (HF) radio.

- **Nationwide Coverage** (C.5.2.1.(8)) - VS 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)) - VS 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)) – VS will provide voice band service in support of presidential communications.
- **Broadband Service** (C.5.2.1(11)) **–** According to RFP section C.5.2.2.1, this requirement is not applicable to VS**.**
- **Scaleable Bandwidth** (C.5.2.1(12)) **–** According to RFP section C.5.2.2.1, this requirement is not applicable to VS.
- **Affordability** (C.5.2.1(13)) - VS leverages network capabilities to minimize cost (for example, through use of existing infrastructure, commercial off-the-shelf (COTS) technologies, and services).
- **Reliability/Availability** (C.5.2.1(14)) – VS 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.

4.2.1.16 Support for Signaling and Satellite Commands (L.34.1.4.6 (p), C.5.2.5)

[redacted]

To further prevent attacks to our SS7 network, Qwest is compliant with Network Reliability and Interoperability Council (NRIC) SS7 recommendations relating to network reliability and survivability where technically possible. Qwest makes every effort to be compliant with industry availability standards.

[redacted]

4.2.1.17 Service Assurance in the National Capital Region (L.34.1.4.6 (q), C.5.2.7)

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 service continuity 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.

Qwest has an active, compliant NS/EP plan. [redacted] Qwest also provides functionality that enables GETS priority calling mechanisms.

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. [redacted]

[redacted] Qwest pre-subscribed this infrastructure from an incumbent local provider (ILEC) and numerous competitive local providers (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 [redacted] 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.

[redacted] Using Qwest's diverse access infrastructure, this arrangement 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.

[redacted]

[redacted]

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

4.2.1.18 Approach to Satisfying Section 508 Requirements (L.34.1.4.6 (r), C.6)

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 (CSO), which will also be 508 compliant — enabling accesses by email, fax, text telephones (TTY), telecommunications display devices (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, [redacted] 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 4.2.1-10, 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 life-cycle 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 of this Technical Volume.

4.2.1.19 VS Impact on Network Architecture (L.34.1.4.6 (s))

The delivery of VS under the Networx Enterprise program has no substantial impact on Qwest's network architecture, as the service is well-established as a core commercial Qwest service. [redacted]

This network configuration permits shortening of the Agency access loops, which lowers latency and provides higher availability. Portions of the backhauled access loops are replaced by the redundant and diverse high-speed uplinks. As traffic increases, Qwest adds more uplinks and backbone links to the network. Qwest evaluates when higher bandwidth links are needed to replace multiple lower bandwidth links, or installs a local switching mechanism to support previously backhauled traffic.

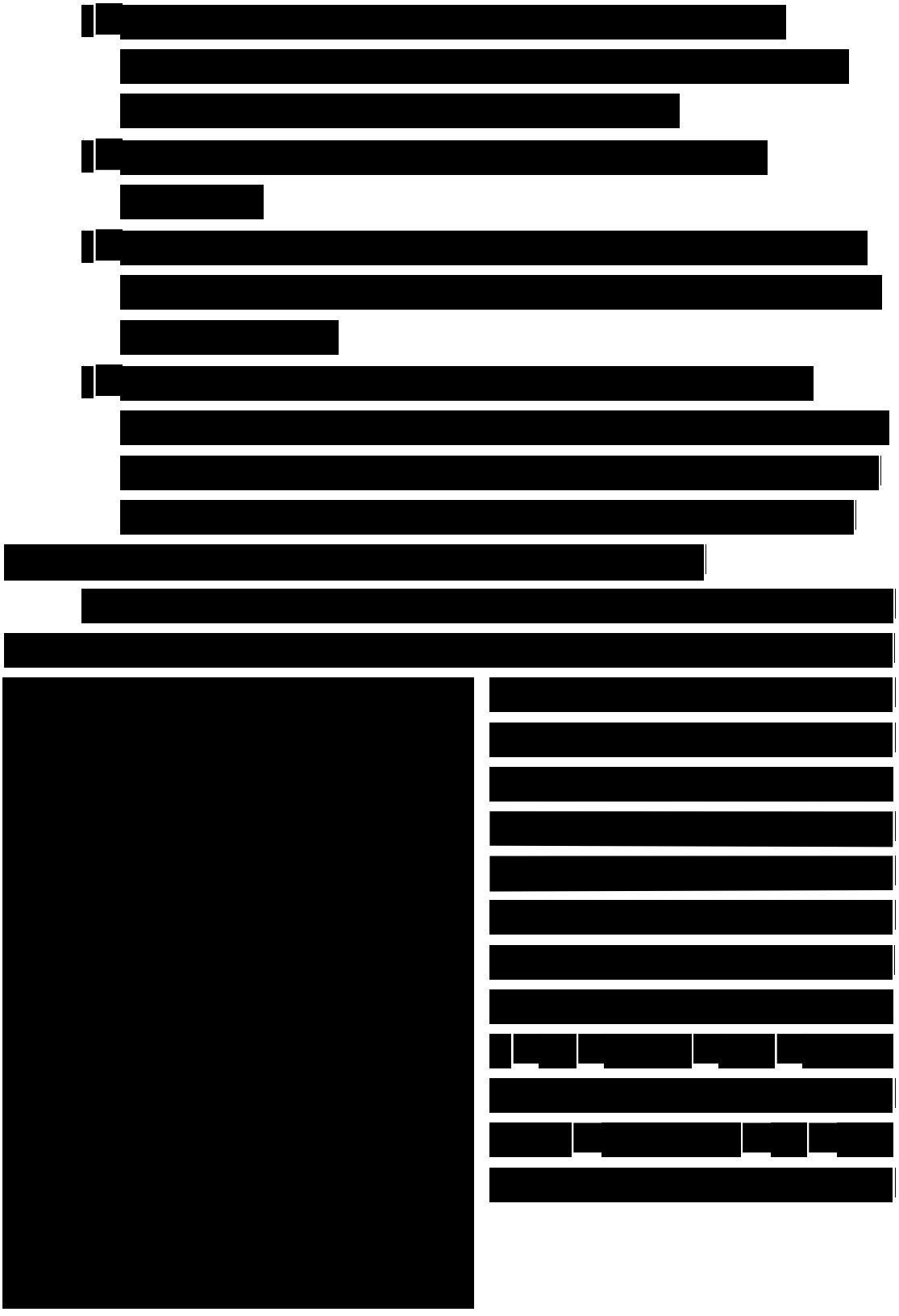
4.2.1.20 Optimizing the Engineering of VS (L.34.1.4.6 (t))

Qwest continually undertakes activities designed to keep our products, services and network operating capabilities at par or better than targeted performance levels. [redacted]

By managing Agency traffic patterns and engineering backbone capacity proactively, Qwest provides a high level of service performance to

Agencies. [redacted]

In addition to ensuring that all recommended solutions meet or exceed requirements, Qwest's systems engineers are responsible for:



[redacted]

[redacted]

4.2.1.22 Support for Government VS Traffic (L.34.1.4.6 (v))

[redacted]

Qwest continually monitors the network for traffic patterns and capacity. [redacted]