3.2 APPROACH TO ENSURE SERVICE QUALITY AND RELIABILITY (L.34.1.3.2)(M.2.1.1 (c))(C.2.1.5)(C.2.1.6)(C.2.16)

Connecting the backbone network to an Agency and ensuring that end-to-end quality meets the Agency's needs requires a flexible approach for access, the right networking technology, and strict network planning and engineering rules. Qwest brings Agencies all of this on a proven converged platform that also enables service continuity.

Qwest has envisioned, designed, engineered, deployed, and operated highly-reliable network services for several decades. To accomplish our performance goals, Qwest uses a comprehensive quality assurance plan, quality control techniques, best practices for network design and operations, and industry standard proven technologies to ensure high service quality, reliability and highly competitive pricing.

Many service providers design, purchase and piece together different technologies, building hybrid networks consisting of disconnected architectures, and miscellaneous equipment. This practice results in user services that are not fully integrated, controlled or managed, which in turn compromises service continuity, quality and reliability.

Qwest's unified network architecture exponentially increases service quality and reliability because it is built on self-healing Synchronous Optical Network (SONET) rings, transported on fiber buried four feet below ground in protective conduits along railroad right of ways. Our fiber network facilities are built to exacting standards for environmental and power redundancy. Additionally, our architecture provides multiple levels of redundancy including switched redundancy at each Point of Presence (POP), plus connectivity to at least three other POPs to ensure service continuity in the event of a switch or path failure. Within 100 milliseconds of a failure, traffic is automatically routed around the failure, undetected by users.

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Qwest recognizes the Government's concern about access arrangements' quality and reliability, both between Service Delivery Points (SDP)s, and from SDPs to POPs, because even though our backbone services are reliable, the key measure of an Agency's experience is total service satisfaction from end-to-end. Qwest also ensures that our connections with other service providers including Incumbent Local Exchange Carriers (ILECs), Competitive LECs (CLECs), Inter-Exchange Carriers (IXCs), and wireless access providers meet our requirements for quality and reliability.

To fulfill our requirements for quality and reliability, Qwest has developed a technical approach that combines Commitment, Implementation, Surveillance and Reporting to achieve the results shown in ***Figure 3.2-1*.**

Figure 3.2-1. Qwest's Technical Approach Ensures the Delivery of the Highest Quality and Reliable Services to Agencies

COMMITMENT	IMPLEMENTATION	SURVEILLANCE AND REPORTING	RESULTS
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
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Section 3.2.1 describes Qwest's access arrangements, characteristics, performance, and technical capabilities. Section 3.2.2 describes Qwest's arrangements for exchanging traffic with other providers, and how we maintain service quality during failures. To provide access services, Qwest has a broad variety of agreements with local carriers to ensure flexibility, responsiveness, quality, and reliability. Qwest has strict quality standards guiding how we connect with other carriers to maintain this high level of performance. Qwest continually

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monitors its services 24x7x365 to ensure that we maintain the highest quality of services and optimize reliability for Agency users. Surveillance monitoring and reporting includes performance measurements, and capacity utilization, as well as fault and trouble analysis. Section 3.2.3 describes the methods that Qwest uses to test our services against our engineering design, as well as to probe and continually monitor our services to ensure that we meet the Acceptable Quality Levels (AQLs) and Key Performance Indicators (KPIs). Each of Qwest's backbone data networking services provides the capability of ensuring the delivery of time-sensitive data. Section 3.2.4 explains the technologies that Qwest uses to provide high quality, real-time services.

Figure 3.2-2 provides an easy reference to correlate Verification Test Plan narrative requirements to our proposal response.

Figure 3.2-2. Responses to Narrative Mandatory Service Requirements

Req_ID	RFP Section	Proposal Response
34603	E 2 2	3.2.3
34604	E 2 2	3.2.3
34605	E 2 2	3.2.3
34608	E 2 2	3.2.3

Figure 3.2-3 provides additional reference to other required narrative responses for Access Arrangements.

Figure 3.2-3 Additional Responses to Narrative Mandatory Service Requirements

Req_ID	RFP Section	Proposal Response
35036	C 2.16 2 2.1.4.1	3 2.1 & 3.2.1.2.6.1 & 3 2.1.2.6.2
35037	C 2.16 2 2.1.4.2	Optional and Qwest is not proposing.
34444	C 2.16 2.4.1.4 (2)	3 2.1.2.8.1

3.2.1 Characteristics and Performance of Access Arrangements to the Qwest Network (L.34.1.3.2(a); Req_ID 35036; C.2.16)

Qwest is providing Switched and Dedicated Access Arrangements as illustrated in [redacted], which depicts three SDP/POP configurations.

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[redacted]

Qwest's access arrangements provide for 1) Connectivity of the SDP to the Qwest POP and 2) connectivity where the SDP is located in a Qwest POP. Qwest is offering the two major categories of access: Circuit-Switched and Dedicated Access Arrangements.

Circuit Switched Access Arrangements

Qwest offers Circuit-Switched Access Arrangements from the local Central Office (CO) servicing the SDP. Qwest pre-subscribes IXC service to support Qwest's Voice Service (VS). Qwest offers a full-range of developed, implemented and managed traditional domestic and non-domestic switched access.

Qwest owns and operates one of the largest dial-up access networks in the nation. With coverage of over 80 percent of all the Continental U.S. (CONUS) local calling areas and a total of over one million ports for both analog and Integrated Services Digital Network (ISDN), Qwest is a leading wholesale provider of this service to major Internet Service Providers (ISPs) as well as Government Agencies [redacted].

Qwest continually monitors our dial access network to ensure there are enough ports in each location to ensure low call blocking percentages as well as identifying issues that require trouble management.

Dedicated Access Arrangements

Qwest uses our own and leased access facilities to connect Agency locations to Qwest network services. Qwest uses a variety of technologies – from dark fiber to emerging standards like Worldwide Interoperability for Microwave

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Access (WiMAX). In each case, Qwest performs network engineering and planning ensuring that the access from our backbone to the Agency's location meets our strict standards for high quality, reliable services.

1. Wireline Access (WLNAA) – Qwest is offering a full range of Wireline Access speeds: Analog, DS-0 through OC-192c, ISDN Primary Rate Interface (PRI), Dial Access Line, E-1, E-3 (non-domestic), and Dark Fiber Strands.

2. Broadband Access (BBAA) - Qwest will provide Digital Subscriber Line (DSL) services up to 6 Mbps at all mandatory servicing wire centers. Qwest will provide Ethernet services ranging in speeds up to 1 Gbps at select POPs.

3. Satellite Access Arrangement (SatAA) - Qwest is offering Satellite Access Arrangements at speeds [redacted] to support Agency performance metrics for availability and disaster recovery. In compliance with NS/EP requirements, the command and control link is encrypted.

[redacted] This combination enables Qwest to leverage our own capabilities as an ILEC in 14 states in the western U.S. and to the other ILECs and CLECs—to provide robust access solutions that meet Agencies' needs.

To ensure the service quality and reliability of these access services that connect to our backbone, Qwest uses the same discipline and approach that are used to maintain our own facilities-based portions of the service.

[redacted]

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[redacted]

3.2.1.1 Circuit Switched Access Arrangements (C.2.16.1)

3.2.1.1.1 Voice Service (VS)

Qwest offers switched access arrangements to support VS from the local CO servicing the SDP. Qwest pre-subscribes IXC service to Qwest VS. Qwest is offering a full-range of developed, implemented and managed traditional domestic and non-domestic switched access to comply with the following applicable standards: American National Standards Institute (ANSI) T1.101, ANSI ISDN, International Telecommunications Union (ITU)-TE.164, ANSI Signaling System 7 (SS7) and LSSR FR-64, at a minimum.

Approach for Monitoring and Measuring VS KPIs and AQLs

[redacted]

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
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[redacted]

Qwest's Switch Management Center performs daily fault management for Signaling and Voice Operations. This center, [redacted] is fully staffed 24x7x365. In the event of a catastrophic center failure, [redacted] can be made fully operational [redacted]. We perform quarterly failover exercises to ensure proper operations and support functions are maintained.

Switch Management uses various Network Management Systems (NMSs) to deliver an alert/log status for operator review and action. [redacted] They correct and document actions taken to mitigate the alarm condition. They also coordinate additional

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resources needed for repair and restoration with Field Operations and advanced Technical Support.

3.2.1.1.2 Circuit Switched Data Service (CSDS)

[redacted]

3.2.1.1.3 Toll-Free Service (TFS)

Qwest offers switched access arrangements to support TFS from the local CO servicing the SDP. Qwest pre-subscribes IXC service to the Qwest TFS. Qwest is offering a full-range of developed, implemented and managed traditional domestic switched access service to comply with the following applicable standards: ANSI T1.101, ANSI ISDN, ITU-TE.164, ANSI SS7 and LSSR FR-64, at a minimum.

Approach for Monitoring and Measuring TFS KPIs and AQLs

[redacted]

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
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Qwest maintains a central data repository for key network performance information. These performance indicators are generated by a combination of system specific statistics (e.g., call attempts generated by the SSP, monitoring tools

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and call detail collection). Logs and traps are generated by the SSPs, STPs and SCPs and sent to the Network Monitoring team for instant responses. Data is analyzed, formatted and sent to operations, engineering and planning for proactive network enhancement and capacity planning.

[redacted]

The Switch Management Center described above in Section 3.2.1.1.1 VS also supports TFS Signaling and Voice Operations.

3.2.1.1.4 Combined Service (CS)

[redacted]

3.2.1.2 Dedicated Access Arrangements (C.2.16.2, C.2.16.2-1)

Qwest is offering three types of access arrangements to support the various transport services required for Networx. [redacted]

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[redacted]

3.2.1.2.1 Wireline Access Arrangement (WLNAA) (C.2.16.2.1, C.2.16.2.1.1)

Qwest is offering a full range of traditional domestic and non-domestic wireline access with the following speeds: Analog, DS-0 through OC-192c, ISDN PRI, Dial Access Line, E-1, E-3, and Dark Fiber Strands. [redacted]

Table 3.2.1.2.1-1 provides a list of ICB CLIN and Case Numbers.

[redacted]

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[redacted]

Table 3.2.1.2.1-1 Table of ICB CLINs and Case Numbers

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3.2.1.2.1.2 Custom Access Arrangements

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3.2.1.2.2 WLNAA Characteristics and Performance (C.2.16.2.1.1.2)

Qwest's developed, implemented and managed wireline service access arrangements comply with the following applicable standards to the service being offered, at a minimum:

1. ANSI T1.102/107/403/503/510 for T1

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2. ANSI T1.607/610 for ISDN PRI
3. Telcordia PUB GR-499-CORE for T3
4. ANSI T1.105 and 106 for SONET
5. Telcordia PUB GR-253-CORE for SONET
6. ITU-TSS G.702 and related recommendations for E1 and E3
7. Frequencies grid and physical layer parameters for Optical Wavelength:
   a. DWDM: ITU G.692 and G.694 as mandatory and G.709 and G.872 as optional
   b. WDM: ITUG.694.2 and Telcordia GR 253
8. Applicable Telcordia for DWDM systems including: GR-1073, GR-1312, GR-2918, GR-2979 and GR-3009
9. EIA/TIA-559, Single Mode Fiber Optic System Transmission Design
10. Telcordia GR-20-CORE for Generic Requirements for Optical Fiber and Optical Fiber Cable GR-253 (SONET), and GR-326 (Connector)
11. Qwest will comply with all new versions, amendments and modifications to the above documents and standards when offered commercially. We have a proven lab testing process to certify interoperability with vendor equipment before any new standards are put into our production environment.

Qwest's established policies and procedures ensure WLNAA service will provide required performance characteristics as follows:

- Qwest serves every Local Access and Transport Area (LATA) in every state with dedicated access
- [redacted]
- [redacted]

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- [redacted]
- [redacted]
- Bit error rate acceptable standards
  - [redacted]
  - [redacted]
  - [redacted]

Approach for Monitoring and Measuring WLNAA KPIs and AQLs

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3.2.1.2.3 Satisfaction of WLNAA Capability Requirements (C.2.16.2.1.1.4)

Qwest fully complies with all mandatory stipulated and narrative features, capabilities, and interface requirements for WLNAA. [redacted]

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Figure 3.2.1-5. Qwest's WLNAA Technical Capabilities

ID #	Name of Capability	Qwest's Approach
1. a.	Integrated access of different services (e.g., VS, PS, and CS) over pre-allocated channels for channelized transmission service (e g. Channelized T1)	[redacted]
1 b.	Integrated access of different services (e.g., VS, PS, and CS) over the same channel (e.g., Unchannelized T3, SONET OC-3c) of P packets for Converged IP Services	[redacted]
1 c.	Integrated access of different services (e.g., VS, PS, and CS) over the same access circuits for both VS and TFS	[redacted]
2.	Transparent to all bit sequences transmitted by the Generic Framing Procedure (GFP)	[redacted]
3.	Network-derived clocking	[redacted]
4.	The following categories of WLNAA shall be supported:	[redacted]
4 a.	**T1**. This category of WLNAA access arrangement shall support a line rate of 1 544 Mbps, which may be used to provide channelized or unchannelized T1 access arrangement as follows:	[redacted]

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ID #	Name of Capability	Qwest's Approach
		[redacted]
4.a. (1)	Channelized T1. In this mode, 24 separate DS0 clear channels of 56/64 kb/s shall be supported.	[redacted]
4.a. (2)	Unchannelized T1. In this mode, a single 1 536 Mbps information payload shall be supported.	[redacted]
4 b.	**Fractional T1**. This category of WLNAA access arrangement shall support 2, 4, 6, 8, or 12 adjacent DS0 clear channels over an interface of T1 with a line rate of 1.544 Mbps.	[redacted]
4 c.	**ISDN PRI**. This category of WLNAA shall support 23 separate DS0 clear channels of 56/64 kbps over an interface of ISDN PRI (23B+D) with a line rate of 1 544 Mbps (Optional).	[redacted]
4 d.	**T3**. This category of WLNAA shall support a line rate of 44.736 Mbps, which may be used to provide channelized or unchannelized T3 access arrangement as follows:	[redacted]
4.d. (1)	Channelized T3. In this mode, 28 separate DS1 channels of 1 536 Mbps information payload rate shall be supported.	[redacted]
4.d. (2)	Unchannelized T3. In this mode, a single 43.008 Mbps payload shall be supported.	[redacted]
4 e.	**Fractional T3**. This category of WLNAA shall support three, four, five, or seven adjacent DS1 clear-channels.	[redacted]
4.f.	**E1** (Non-domestic). This category of WLNAA shall support a line rate of 2 048 Mbps, which may be used to provide channelized or unchannelized E1 service as follows:	[redacted]
4.f. (1)	Channelized E1. In this mode, 30 separate DS0 clear channels shall be supported.	[redacted]
4.f. (2)	Unchannelized E1. In this mode, a single 1 92 Mbps information payload shall be supported.	[redacted]
4 g.	**E3** (Non-domestic). This category of WLNAA shall support a line rate of 34.368 Mbps, which may be used to provide channelized or unchannelized E3 service as follows:	[redacted]

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ID #	Name of Capability	Qwest's Approach
		[redacted]
4.g. (1)	Channelized E3. In this mode, 16 separate E1 channels shall be supported.	[redacted]
4.g. (2)	Unchannelized E3. In this mode, a single 30.72 Mbps information payload shall be supported.	[redacted]
4 h.	**SONET OC-3. (Optional)** This category of WLNAA shall support a line rate of 155.520 Mbps, which may be used to provide channelized OC-3 or concatenated OC-3c access arrangement as follows:	[redacted]
4.h. (1)	Channelized OC-3. In this mode, three separate OC-1 channels, each with an information payload data rate of 49.536 Mbps, shall be supported.	[redacted]
4.h. (2)	Concatenated OC-3c. In this mode, a single channel equivalent to information payload data rate of 148 608 Mbps shall be supported.	[redacted]
4 i.	**SONET OC-12** (Optional). This category of WLNAA shall support a line rate of 622.080 Mbps, which may be used to provide channelized OC-12 or concatenated OC-12c access arrangement as follows.	[redacted]
4.i. (1)	Channelized OC-12. In this mode, four separate OC-3 channels, each with an information payload data rate of 148 608 Mbps, shall be supported.	[redacted]
4.i. (2)	Concatenated OC-12c. In this mode, a single channel equivalent to an information payload data rate of 594.432 Mbps shall be supported.	[redacted]
4 j.	**SONET OC-48** (Optional). This category of WLNAA shall support a line rate of 2.488 Gbps, which may be used to provide channelized OC-48 or concatenated OC-48c service as follows:	[redacted]
4.j. (1)	Channelized OC-48. In this mode, four separate OC-12 channels, each with an information payload data rate of 594.432 Mbps, shall be supported.	[redacted]
4.j. (2)	Concatenated OC-48c. In this mode, a single channel equivalent to an information payload data rate of 2 377728 Gbps shall be supported.	[redacted]
4 k.	**SONET OC-192** (Optional**)**. This category of WLNAA shall support a line rate of 10 Gbps, which may be used to provide channelized OC-192 or concatenated OC-192c service as follows:	[redacted]
4.k. (1)	Channelized OC-192. In this mode, four separate OC-48 channels, each with an information payload data rate of 2.488 Gbps, shall be supported.	[redacted]

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ID #	Name of Capability	Qwest's Approach
4.k. (2)	Concatenated OC-192c. In this mode, a single channel equivalent to an information payload data rate of 9 510912 Gbps shall be supported.	[redacted]
4 l.	**Dial Access Line**. (Optional) This category of WLNAA shall support two wire analog lines and trunks without access integration for voice service (VS)	[redacted]
4 m.	**DS0.** This category of WLNAA shall support information payload data rates of 56 kbps and 64 kbps.	[redacted]
4 n.	**Subrate DS0**. (Optional)This category of WLNAA shall support Subrate DS0 at information payload data rates of 4 8, 9 6, and 19.2 kbps.	[redacted]
4 o.	**Optical Wavelength. (Optional)** Bi-directional wavelengths (WDM and ASTN) connections to an optical network for the following speeds: 1. OC-48 2. OC-192 3. OC-768 (Optional)	[redacted]
4 p.	**Dark Fiber** (Optional). Dark Fiber shall support the following capabilities:	[redacted]
4.p. (1)	Deployed fiber shall support both single-mode and multimode fibers	[redacted]
4.p. (2)	Deployed fibers shall be capable of supporting a minimum of 80 DWDM wavelengths or user data with spacing as specified in ITU-T G 694.1	[redacted]
4.p. (3)	Deployed fibers shall be capable of operating in the "C" and "L" bands. Support for the "S" band will also be required when commercially available.	[redacted]

3.2.1.2.4 Satisfaction of WLNAA Feature Requirements (C.2.16.2.1.2)

Figure 3.2.1-6 presents Qwest's approach to the Government's requirements for WLNAA technical features.

Figure 3.2.1-6. Qwest's WLNAA Features

ID #	Feature	Qwest Technical Approach
1	Access Route or Path Diversity	[redacted]

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ID #	Feature	Qwest Technical Approach
		[redacted]
2	Access Route or Path Avoidance	[redacted]

3.2.1.2.5 WLNAA Interfaces (C.2.16.2.1.3)

Qwest supports the following User-to-Network Interfaces (UNIs) shown in ***Figure 3.2.1-7*** at the SDP by deploying CLEC/ILEC services terminating in a SED. Representative service supporting SEDs are detailed in a section-by-section fashion in this technical volume for each service.

Figure 3.2.1-7. WLNAA Methods Ensure Compliance with UNI Interface Standards

UNI Type	Interface Type and Standard
1	[redacted]
2	[redacted]
3	[redacted]
4	[redacted]
5	[redacted]
6 [Optional]	[redacted]
7	[redacted]
8 [Optional]	[redacted]
9 [Optional]	[redacted]
10 [Optional]	[redacted]
11 [Optional]	[redacted]
12 [Optional]	[redacted]
13 [Optional]	[redacted]
14 [Optional]	[redacted]
15 [Optional]	[redacted]

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UNI Type	Interface Type and Standard
16 [Optional]	[redacted]
17 [Optional]	[redacted]

3.2.1.2.6 Broadband Access Arrangements (BBAA) (C.2.16.2.2)

[redacted] Qwest will provide DSL and Ethernet access services that are designed to interoperate with services delivered to Agency specified locations/equipment and to the Qwest POPs. Both BBAA service types provide for Ethernet handoffs that interface with Qwest's Provider Edge (PE) routers/switches and support the telecommunications service offerings as designated in the service/access matrix shown in Figure 3.2.1-3.

Qwest is not proposing Cable High-Speed service or Fiber-to-the-Premises (FTTP) service.

3.2.1.2.6.1 BBAA Characteristics and Performance (Req_ID 35036; C.2.16.2.2.1.1, C.2.16.2.2.1.2, C.2.16.2.2.1.3, C.2.16.2.2.1.4)

Qwest offers Agencies the low cost of DSL access with nationwide coverage. Qwest's Ethernet offers Agencies the best of Ethernet local access conforming to IEEE 802.3 and supporting multiple media types for LANs, WANs and MANs.

3.2.1.2.6.1.1 DSL

DSL access is rapidly becoming a cost-effective alternative to traditional dedicated access circuits. [redacted] comply with the following applicable standards, at a minimum, to the service being offered:

1. Asymmetric and Symmetric Digital Subscriber Line (ADSL and SDSL):
   a. ADSL and DSL Forums

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b. ITU-TSS Recommendation G.992 for ADSL (interoperable DSL modem and DSLAM line card)

c. ANSI T1.413 (compatible DSL modem and DSLAM line card from the same manufacturer)

2. ISDN Digital Subscriber Line (IDSL)

a. ISDN Forum

[redacted]

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3.2.1.2.6.2 Ethernet Local Access (ELA) (Req_ID 35036)

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Figure 3.2.1-10. BBAA Methods Ensure Compliance with UNI Interface Standards

UNI Type	Interface Type and Standard	Payload Data Rate or Bandwidth	Protocol Type

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UNI Type	Interface Type and Standard	Payload Data Rate or Bandwidth	Protocol Type
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
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CLIN	Case Number	Country/Jurisdiction ID	Case Description
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3.2.1.2.7 Wireless Access Arrangement (WLSAA) [Optional] (C.2.16.2.3)

[redacted]

3.2.1.2.8 Satellite Access Arrangement (SatAA) [Optional] (C.2.16.2.4)

Qwest is offering SatAA with our partner [redacted] to provide speeds of [redacted] to support Agency performance metrics for availability and

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disaster recovery. In compliance with NSEP requirements, the command and control link is encrypted. SatAA service has been developed, implemented, and managed supporting the following frequencies

a. C-Band. Uplink: 5.9 to 6.4 GHz; Downlink: 3.7 to 4.2 GHz; Bandwidth: 500 MHz
b. Ku-Band. Uplink: 14 to 14.5 GHz; Downlink: 11.7 to 12.2 GHz; Bandwidth: 500 MHz
c. Ka-band. Uplink: 30 to 31 GHz; Downlink: 20 to 21 GHz; Bandwidth: 500 MHz (when available commercially)

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3.2.1.2.8.1 Satellite Access Arrangement (SatAA) Characteristics and Performance

Qwest is offering the following satellite transponders' bands frequency allocations and channel bandwidth (FCC) as applicable:

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Frequency:

- C-Band. Uplink: 5.9 to 6.4 GHz; Downlink: 3.7 to 4.2 GHz; Bandwidth: 500 MHz
- Ku-Band. Uplink: 14 to 14.5 GHz; Downlink: 11.7 to 12.2 GHz; Bandwidth: 500 MHz
- Ka-band. Uplink: 30 to 31 GHz; Downlink: 20 to 21 GHz; Bandwidth: 500 MHz

Standards:

- Transmission Control Protocol-Internet Protocol Performance Enhancement Proxy (PEP) for Satellite transmission (IETF RFC 3135)
- TIA-1008 [also known as IP over Satellite (IPoS)]
- Transmission Performance and GFP Interfaces
  - ANSI T1.102/107/403/503/510 for T1 data rate
  - Telcordia PUB GR-499-CORE for T3 data rate
  - ITU-TSS G.702 and related recommendations for E1
  - ANSI T1.105 and 106 for SONET
  - USB 2.0 (USB Implementers' Forum)
  - IEEE 802.3, including 10 Base-T/TX/FX and 100 Base-TX/FX

Interfaces: Qwest fully complies with all mandatory stipulated and narrative features, capabilities, and interface requirements for SatAA. The content in ***Figure 3.2.1-10b*** is intended to provide the technical description required and does not limit or caveat Qwest's compliance in any way.

Figure 3.2.1-10b. Interfaces

UNI Type	Interface Type and Standard	Payload Data Rate or Bandwidth	Signaling Type
1	ITU-TSS V.35	Up to 1 92 Mbps	Transparent
2	EIA RS-449	Up to 1 92 Mbps	Transparent
3	EIA RS-232	Up to 19.2 Kbps	Transparent
4	EIA RS-530	Up to 1 92 Mbps	Transparent
5	T1 [Std: Telcordia SR-TSV-002275; ANSI T1.403]	Up to 1 536 Mbps	Transparent
6	T3 [Std: Telcordia GR400-CORE]	Up to 43.008 Mbps	Transparent
7	E1 (Std: ITU-TSS G.702) (Nondomestic)	Up to 1 92 Mbps	Transparent
8	USB 2.0 (high speed) (Optional)	Up to 43 Mbps (Note maximum serial bus speed is limited to 480 Mbps)	Transparent
9	Air link interface (C-band, Ku-band, and Ka-band earth station)	Up to 43.008 Mbps	Transparent

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SatAA Coverage Maps (Req_ID 34444, C.2.16.2.4.1.4(2))

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3.2.2 Arrangements with Other Service Providers for Carrying and Exchanging Traffic (L.34.1.3.2(b))

Carrier Arrangements for Traffic Exchange

Qwest has carrier agreements and interconnections with [redacted] carriers. Qwest requires that connectivity with CLECs and ILECs be through SONET ring-protected networks using dual entrance into our POPs to eliminate the impact of fiber cuts. In particular, any carrier with whom Qwest enters into an interconnect arrangement is required to meet Qwest's stringent quality and reliability requirements. For all maintenance, installation, cross-connect, addition, upgrade, modification or other alteration within the facility, Qwest and other service providers comply with all manufacturers' specifications and meet all industry quality assurance standards (for example, Network Equipment Building Standards (NEBS), IEEE, and Telcordia).

Qwest has comprehensive Master Services Agreements for bandwidth services and voice call origination and termination, as shown in [redacted]

Inter-Exchange Carrier (IXC)	
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

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Inter-Exchange Carrier (IXC)	
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	

Qwest's IXC Carrier Management organization is responsible for establishing, developing, and managing relationships with other IXCs to enable Qwest to deliver the highest quality off-network long-distance switched and private line long-haul services at the best possible rates. The team works aggressively to obtain the lowest cost for all services through contract negotiations with current vendors and by establishing new vendor relationships with other IXC service providers.

IXC Carrier Management also develops vendor performance management tools and reports, which enables Qwest to manage IXC service providers to the same aggressive service levels that Qwest has committed to our customers.

In addition, we have [redacted] agreements over and above the necessary connections with the ILECs, as shown in [redacted] Please note as of Thursday, August 31, 2006, Qwest's acquisition of OnFiber was completed.

[redacted]

CLEC and Number of Buildings		CLEC and Number of Buildings	
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]

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As with IXC Carrier Management, our CLEC management team is responsible for establishing, developing, and managing relationships with CLEC vendors that enable the best possible rates and service reach. The team works aggressively to obtain the lowest cost for all services through contract negotiations with current vendors and by establishing new vendor relationships with other CLEC service providers.

Carrier management continually reviews our carrier partners' technical and operational performance. Each agreement ensures the proper optimization of the relationship to cover the lifecycle of a service request – from technical issues for provisioning to provisioning timeframes, billing, monitoring, and trouble management.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

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[redacted]

3.2.3 Approach to Performing Verification of Individual Services (L.34.1.3.2(c))

Qwest continually undertakes activities designed to keep our products, services and network operating capabilities at par or better than targeted performance levels. These activities include testing new transport methodologies to enhance our customers' voice services. Our network supports VS, TFS, Voice over Internet Protocol (VoIP) Services and IP Telephony Services. Qwest uses traffic modeling and forecasting based on actual traffic and predicted traffic. This modeling is used to determine when to augment network equipment and how to route customer traffic.

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By managing Agency traffic patterns, and engineering backbone capacity proactively, Qwest provides a high level of service performance to Agencies. Qwest measures MOU (minutes of usage), switch/port capacity and utilization, and capacity transport (owned and leased) quarterly. Based on this data, Qwest develops feasibility studies, forecasts needs, and executes business case evaluation for network expansion.

Qwest network provisions additional bandwidth when a switch reaches 50 percent capacity. Capacity is measured daily; switches are monitored and alarmed continuously. When traffic warrants, Qwest provisions additional network routes and/or upgrades the transmission speed of existing routes. We add backbone capacity proactively, based on projected demand and actual orders in process.

Qwest engages in continuous dialogue with our strategic customers to identify potential service enhancements. These collected requirements, in addition to those captured as an element of competitive analysis and proactive service planning, are assessed by Qwest Network Engineering and Product Management. Our planners and engineers apply a proven, requirements-based, standard engineering methodology for functional analysis, function placement (e.g., platform identification), cost/benefit analysis, and development/deployment for all services, including TFS. Platform and integration level test cases are directly derivative of the original functions required. Integral to this process is strictly controlled vendor management and associated laboratory testing to validate platform interoperation. The scope of these engineering activities may vary widely based upon demand, from relatively minor augmentation of existing services, to deployment of entire new service layers, but the fundamental requirements-driven engineering approach is consistent.

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

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- Providing designs, technical guidance and alternatives for hardware and network opportunities to ensure Agencies receive services built to meet their requirements
- Providing consultative services on voice, data, and video applications
- Assisting in strategic and disaster recovery planning, and solution implementation to give Agencies the best possible solution to meet Continuity of Operations capabilities
- These resources will ensure that VS On-Net or Off-Net configurations are working correctly, announcement applications are implemented as required, Authorization Code and Calling Card arrangements are meeting expectations as well as achieving the Agencies desired results

Standard Test Procedures (Req_ID 34603)

Qwest will deliver the Networx Services Verification Test Plan which will detail the standard test procedures that will be used by Qwest to verify, at a minimum, that the services delivered under the contract meet the KPI/AQL thresholds for the ordered service as specified in Section C.2 prior to delivering the ordered service to the Agency.

Qwest has developed a customized Networx Services Verification Test Plan that will be presented within the 60-days of Notice to Proceed.

Process and Procedures for Individual Services (Req_ID 34604)

The Networx Services Verification Test Plan will contain the individual service test plans that Qwest uses on a regular basis, as well as team member-provided services. As new services are requested by the Government, these individual Service Test Plans will be incorporated into the Networx Services Verification Test Plan. The individual test plans will be reviewed with the Government prior to adding any new service to the Networx Program. The Government may comment and suggest changes or improvements to the service test plan to be considered for incorporation into the plan.

Testing at Time of Initial Service Delivery (Req_ID 34608)

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Each time a new service is delivered to an Agency for the first time, the individual service test plan will be executed. Qwest will provide a copy of the service test as part of the acceptance process each time a service is delivered to the Government.

Service-Specific Test Plan Attachments (Req_ID 34605)

As new services are requested by the Government, Qwest will provide the associated Service Test Plans and they will be incorporated into the Networx Services Test Plan. The individual service test plans will be reviewed with the Government prior to adding any new service to the Networx Program. The Government may comment and suggest changes or improvements for the service test plan to be considered for incorporation into the plan.

[redacted]

[redacted]

[redacted]

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[redacted]

[redacted]

[redacted]

[redacted]

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	Private Line	Optical WL over WDM	Ethernet	Dark Fiber

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[redacted]

- [redacted]
- [redacted]
- [redacted]

[redacted]

For DFS, we measure the attenuation coefficient to verify that it is within specifications before accepting turn-up of the service to the Agency. [redacted]

For the data (FR/ATM; IP/Multi-protocol Label Switching (MPLS) networks), [redacted] they are assessed on an individual site or site-pair basis where applicable. This data is used to ensure all Agency data network SLAs are systematically being supported by the network. Additionally, key network infrastructure interfaces (aggregation ports/network-to-network interfaces and ATM trunk ports) are monitored for packet/cell loss (including errors and discards) and availability, ensuring that no Agency SLA issues are traceable to key network infrastructure ports.

[redacted]

	Frame Relay	ATM	Premised Based IP VPN	Network Based VPN	Converged IP	Internet Protocol	Layer 3 VPN
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]			[redacted]	[redacted]	[redacted]	X	[redacted]

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[redacted]

For VPN services, Qwest provides Customer Edge (CE) based performance measures, including [redacted] to each POP that has PE routers and measurements are taken from the probes to Agency CE devices. This service requires access from the probes to the Agency CE devices. It is therefore not enabled unless specifically ordered by the Agency.

The Qwest ATM/frame network [redacted]

Individual voice services leverage multiple NEs to provide a single service to the Agency. Because of this integration, voice test and certification require these same elements, as well as interconnectivity and interaction in a lab environment.

Qwest certifies all voice services and products across [redacted] This includes all voice, combined, toll-free services, VoIP and IP telephony services. Qwest maintains a reproduction of the field environment in the lab to test and certify these services. [redacted] lists some of the major NEs contained in the test facilities.

Figure 3.2.3-3. Qwest Network Elements in Test Facilities

Switch	SCP	STP	Service Node
[redacted]	[redacted]	[redacted]	[redacted]

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[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]

The test facilities incorporate all major elements of the VS. We develop test strategies and plans based on product and Agency requirements and execute those plans to determine the conformance and quality of the product prior to live network implementation. [redacted] Where KPI and AQL compliance are identified, Qwest [redacted]

	Voice	Toll-Free	VoIP Transport	IP Telephony
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]			[redacted]	[redacted]
[redacted]			[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

In addition to the KPIs listed above, we collect performance indicators including:

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

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[redacted]

[redacted] Qwest maintains a test environment based on the live network architecture for VoIP and IP telephony. [redacted]

[redacted] Qwest is able to provide proactive management alerts to our network management centers when problems are identified—and provide passive management techniques—to quickly identify and perform issue isolation to support prompt resolution. This combined approach enables Qwest to reduce increased mean time between failures, effectively supporting our world-class network operation.

3.2.4 Approach to Ensure the Quality of Time-Sensitive Traffic (L.34.1.3.2(d))

All of Qwest's data 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. Qwest uses [redacted]

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[redacted]

[redacted]

[redacted]

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

[redacted]

[redacted] With the network acting as a nearly perfect channel for these service classes, IP packet delivery for VoIP or video conferencing (for example, H.323) is correspondingly very high (packet loss is less than 0.05 percent). Since the traffic contract is obeyed end-to-end, no other traffic on the network can interfere with the minimum data rate in the virtual circuit's traffic contract parameters. Combined with the capacity planning described in Section 3.2.3, even failures of core ATM switches or backbone circuits will not reduce the network capacity to a point where it impacts Agencies' minimum traffic contract parameters.

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Traditional IP networks have evolved around “best effort” service and typically have not provided guarantees for key performance criteria. The need to support real-time services on IP networks has driven the development of IP prioritization and queuing mechanisms as well as MPLS technology. The Qwest network is engineered to enable QoS to prioritize certain types of traffic over other types of traffic if there is congestion in the network.

As described in Section 3.2.3, [redacted] This means that the VoIP traffic has a higher priority than VPN or Internet traffic. [redacted] as shown below, highlights the quality of service enabled by Qwest’s converged IP MPLS.

Qwest’s IP MPLS network employs standards-based MPLS and IP-based QoS mechanisms to enable high quality voice, video, and data over an IP backbone. The process of applying QoS in a network, as previously shown in Figure 3.2.4-1, consists of multiple actions, defined as follows:

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[redacted]

- [redacted]
- [redacted]
- [redacted]
- [redacted]

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[redacted] With strict priority queuing, the scheduler is more interested in serving traffic in the [redacted] maybe even at the expense of the other queues (that is, it is not “fair”). [redacted]

With strict priority queuing on the ATM or Frame Relay access method, the scheduler can starve out other queues by exclusively serving the [redacted] describes how Agencies can segment and prioritize traffic.

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[redacted]

In addition to the two different queuing methods—high priority queuing and strict priority queuing—[redacted] shows a typical MPLS-based VPN providing support for video and other applications. If all the sites are connected via T-1s, then without QoS, the video IP packets in general will be dropped as often as other packets if the traffic flow into the destination site in the figure exceeds the capacity of the T-1. This causes significant degradation of the video quality. To ensure that each application gets its required bandwidth, Qwest will implement the following processes which are currently supported on our network:

- Each CE router would prioritize the traffic that enters the Qwest IP network. This ensures that congestion at the Agency location does not

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interfere with the transfer of time-sensitive traffic. In particular, strict queuing with a bandwidth guarantee for [redacted] traffic would be implemented.

- The Qwest IP network maintains the priority through the core network as well as protection of our MPLS, VPN and VoIP traffic against impacts from other networks.
- The Agency selects a prioritization template that is enforced on the Qwest egress (MPLS PE) so that packets marked [redacted] are forwarded first, and that sufficient bandwidth is allocated to meet the application's requirements.

These QoS actions ensure that low latency, real-time applications, such as voice, can share the same access lines and core with non real-time data applications. Our convergence approach means that Qwest data services will migrate to a common IP/MPLS network, so we can easily plan and identify any QoS issues. Qwest's conservative and aggressive backbone and access bandwidth planning methodology ensures that there is sufficient bandwidth to meet Agencies' full port-limited capability, even in the event of core router failure or an access router or backbone trunk failure.

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