4.2.3 Dark Fiber Service (DFS) (L.34.1.4.6)

Qwest pioneered the delivery of dark fiber to the Federal Government. Our Networx DFS extends our proven capability to the wide arc of Agencies.

Qwest's Dark Fiber Service (DFS), based on our extensive engineering experience, nationwide fiber optic network and partners, results in an optimum DFS for the Networx program. Qwest's DFS provides a fully compliant and comprehensive capability that will address the widest possible set of Government dark fiber requirements.

Qwest's DFS features fully tested, dark fiber serving [redacted] cities in the continental United States (CONUS) compliant with standards as referenced in RFP Section C.2.5.3.1 and its subsections. Our Point of Presence (POP) and fiber network amplifier facilities provide the ability to access dark fibers at multiple locations. We will use our established, strong relationships with many fiber providers within CONUS to extend our reach and minimize construction. We have similar strong relationships with multiple fiber providers in Europe, Asia, the Pacific Region, and other parts of the world to design and implement robust and cost effective global fiber optic facilities for Networx.

Qwest's nationwide fiber network uses High Density PolyEthylene (HDPE) conduit construction and is predominantly located on privately owned railroad Rights-of-Way (ROWs) to provide a robust, secure network with fewer cable cuts. We have in place the engineering, network operations, and field operations that are essential to the highly available and capable fiber optic network needed to support Agencies now and in the future, including verification testing to meet performance standards. Qwest leads the industry in providing DFS to the Government today in support of extensive private

networks [redacted]

Qwest's nationwide fiber infrastructure is monitored and maintained by our Fiber Protection Center (FPC). The FPC is one [redacted] departments under our [redacted] and is vital to the successful operation of all of Qwest's service offerings. Our FPC supports Government customers along with Qwest field operations, customer care, and engineering with network management, service restoration, technical assistance, quality assurance, and fiber maintenance.

Qwest's DFS provides Federal Agencies with the capability to acquire dark fiber with the option of providing their own opto-electronics equipment or leasing opto-electronics from Qwest. As required in RFP section C.2.5.3.1.1, with Qwest DFS, Agencies that choose to provide their own opto-electronic equipment will have the flexibility of designing, owning, and managing their network infrastructure. Agencies that choose to acquire their opto-electronics equipment from Qwest will also have the flexibility of contracting equipment design, leasing, and management services from Qwest. Qwest DFS allows the Agency the unconditional right to use the fiber route whether a fiber pair or an entire fiber optic cable are selected. Qwest's DFS does not include leasing of the equipment. If the Government chooses to have Qwest light the dark fiber, the Government can do so through our [redacted]

Figure 4.2.3-1 provides an easy reference to correlate the narrative requirements to our proposal response.

Figure 4.2.3-1. Table of DFS Narrative Requirements

Req_ ID	RFP Section	RFP Requirement	Proposal Response
6331	C.2.5.3.1.4(1)(a)	The following Dark Fiber Services capabilities are mandatory unless marked optional: 1. Geographical Coverage. The contractor shall specify the coverage of its DFS, in the following regions: a. Non-domestic. The contractor, once the proper non-disclosure agreements (NDAs) are agreed upon with the Agency, shall provide and maintain a list of all the Countries/Jurisdictions where the contractor's dark fiber is available.	4.2.3.3.1
6330	C.2.5.3.1.4(1)(b)(i)(1)	The following Dark Fiber Services capabilities are mandatory unless marked optional: 1. Geographical Coverage. The contractor shall specify the coverage of its DFS, in the following regions: b. CONUS i. Inter-city connectivity. The contractor, once the proper non-disclosure agreements (NDAs) are agreed upon with the Agency, shall specify for the Government the information outlined as follows, and shall update such information as the network is modified: 1. Number of Inter-city route miles available in North America and listing of interconnected cities shall be included.	4.2.3.3.1
6329	C.2.5.3.1.4(1)(b)(i)(2)	The following Dark Fiber Services capabilities are mandatory unless marked optional: 1. Geographical Coverage. The contractor shall specify the coverage of its DFS, in the following regions: b. CONUS i. Inter-city connectivity. The contractor, once the proper non-disclosure agreements (NDAs) are agreed upon with the Agency, shall specify for the Government the information outlined as follows, and shall update such information as the network is modified: 2. Availability of regeneration locations and hut spacing shall be listed.	4.2.3.3.1
6328	C.2.5.3.1.4(1)(b)(i)(3)	The following Dark Fiber Services capabilities are mandatory unless marked optional: 1. Geographical Coverage. The contractor shall specify the coverage of its DFS, in the following regions: b. CONUS i. Inter-city connectivity. The contractor, once the proper non-disclosure agreements (NDAs) are agreed upon with the Agency, shall specify for the Government the information outlined as follows, and shall update such information as the network is modified: 3. Should amplification locations be available, type of fiber deployed and spacing between locations shall be included.	4.2.3.3.1
6327	C.2.5.3.1.4(1)(b)(ii)(1)	The following Dark Fiber Services capabilities are mandatory unless marked optional: 1. Geographical Coverage. The contractor shall specify the coverage of its DFS, in the following regions: b. CONUS ii. Intra-city connectivity. The contractor, once the proper non-disclosure agreements (NDAs) are agreed upon with the Agency, shall specify for the Government the information outlined as follows, and shall update such information as the network is modified: 1. The contractor shall list the available metro networks.	4.2.3.3.1
6326	C.2.5.3.1.4(1)(b)(ii)(2)	The following Dark Fiber Services capabilities are mandatory unless marked optional: 1. Geographical Coverage. The contractor shall specify the coverage of its DFS, in the following regions: b. CONUS ii. Intra-city connectivity. The contractor, once the proper non-disclosure agreements (NDAs) are agreed upon with the Agency, shall specify for the Government the information outlined as follows, and shall update such information as the network is modified: 2. The contractor shall include the available connection options.	4.2.3.3.1

Req_ ID	RFP Section	RFP Requirement	Proposal Response
6325	C.2.5.3.1.4(1)(b)(ii)(3)	The following Dark Fiber Services capabilities are mandatory unless marked optional: 1. Geographical Coverage. The contractor, once the proper non-disclosure agreements (NDAs) are agreed upon with the Agency, shall specify the coverage of its DFS, in the following regions: b. CONUS ii. Intra-city connectivity. The contractor shall specify for the Government the information outlined as follows, and shall update such information as the network is modified: 3. The contractor shall state its ability to upgrade to multi-conduit system.	4.2.3.3.1
6324	C.2.5.3.1.4(1)(b)(ii)(4)	The following Dark Fiber Services capabilities are mandatory unless marked optional: 1. Geographical Coverage. The contractor shall specify the coverage of its DFS, in the following regions: b. CONUS ii. Intra-city connectivity. The contractor, once the proper non-disclosure agreements (NDAs) are agreed upon with the Agency, shall specify for the Government the information outlined as follows, and shall update such information as the network is modified: 4. List of Collocation facilities provided shall be provided as part of “on-net” facilities. If collocation facilities are not provided as part of “on-net” facilities, collocation facilities contracted with third parties shall be specified	4.2.3.3.1
6322	C.2.5.3.1.4(1)(c)(i)(1)	The following Dark Fiber Services capabilities are mandatory unless marked optional: 1. Geographical Coverage. The contractor shall specify the coverage of its DFS, in the following regions: c. OCONUS . i Inter-city connectivity. The contractor shall specify for the Government the information outlined as follows, and shall update such information as the network is modified: 1. Number of Intercity route miles available in OCONUS shall be included.	4.2.3.3.1
6321	C.2.5.3.1.4(1)(c)(i)(2)	The following Dark Fiber Services capabilities are mandatory unless marked optional: 1. Geographical Coverage. The contractor shall specify the coverage of its DFS, in the following regions: c. OCONUS i. Inter-city connectivity. The contractor shall specify for the Government the information outlined as follows, and shall update such information as the network is modified: 2. Availability of regeneration locations and hut spacing shall be listed.	4.2.3.3.1
6320	C.2.5.3.1.4(1)(c)(i)(3)	The following Dark Fiber Services capabilities are mandatory unless marked optional: 1. Geographical Coverage. The contractor shall specify the coverage of its DFS, in the following regions: c. OCONUS i. Inter-city connectivity. The contractor shall specify for the Government the information outlined as follows, and shall update such information as the network is modified: 3. Should amplification locations be available, type of fiber deployed and spacing between locations shall be included.	4.2.3.3.1
6319	C.2.5.3.1.4(1)(c)(ii)(1)	The following Dark Fiber Services capabilities are mandatory unless marked optional: 1. Geographical Coverage. The contractor shall specify the coverage of its DFS, in the following regions: c. OCONUS ii. Intra-city connectivity. The contractor shall specify for the Government the information outlined as follows, and shall update such information as the network is modified: 1. The contractor shall list all available metro networks.	4.2.3.3.1

Req_ ID	RFP Section	RFP Requirement	Proposal Response
6318	C.2.5.3.1.4(1)(c)(ii)(2)	The following Dark Fiber Services capabilities are mandatory unless marked optional: 1. Geographical Coverage. The contractor shall specify the coverage of its DFS, in the following regions: c. OCONUS ii. Intra-city connectivity. The contractor shall specify for the Government the information outlined as follows, and shall update such information as the network is modified: 2. The contractor shall specified its ability to upgrade to multi-conduit system.	4.2.3.3.1
6299	C.2.5.3.1.4(5)(f)	The following Dark Fiber Services capabilities are mandatory unless marked optional: 5. Gateways. The contractor shall provide the ability to add and drop traffic via gateway locations (nodes A, B, C, and D in Figure C.2.5.3.1.4-1 through Figure C.2.5.3.1.4-3 are examples of gateways). The following requirements shall be fulfilled by the contractors and updates on improvements or expansions shall be provided throughout the life of the contract. f. The contractor shall indicate if gateway expansion is possible.	4.2.3.3.1
6298	C.2.5.3.1.4(5)(g)	The following Dark Fiber Services capabilities are mandatory unless marked optional: 5. Gateways. The contractor shall provide the ability to add and drop traffic via gateway locations (nodes A, B, C, and D in Figure C.2.5.3.1.4-1 through Figure C.2.5.3.1.4-3 are examples of gateways). The following requirements shall be fulfilled by the contractors and updates on improvements or expansions shall be provided throughout the life of the contract. g. The contractor shall indicate if gateway locations are monitored remotely.	4.2.3.3.1
6292	C.2.5.3.1.4(7)(a)	The following Dark Fiber Services capabilities are mandatory unless marked optional: 7. Fiber Deployed. The contractor shall indicate which type of fiber is deployed, if a mixed of fiber types has been deployed, and where f ber has been deployed. a. The contractor shall make available single mode and multimode f ber.	4.2.3.3.1
6291	C.2.5.3.1.4(7)(b)(i)	The following Dark Fiber Services capabilities are mandatory unless marked optional: 7. Fiber Deployed. The contractor shall indicate which type of fiber is deployed, if a mixed of fiber types has been deployed, and where f ber has been deployed. b. The contractor shall indicate which of the fiber types have been deployed and where: i. Non-zero dispersion shifted (NZDS) fiber to allow DWDM transmission	4.2.3.3.1
6289	C.2.5.3.1.4(7)(b)(ii)	The following Dark Fiber Services capabilities are mandatory unless marked optional: 7. Fiber Deployed. The contractor shall indicate which type of fiber is deployed, if a mixed of fiber types has been deployed, and where f ber has been deployed. b. The contractor shall indicate which of the fiber types have been deployed and where: ii. Corning ELEAF	4.2.3.3.1
6288	C.2.5.3.1.4(7)(b)(iii)	The following Dark Fiber Services capabilities are mandatory unless marked optional: 7. Fiber Deployed. The contractor shall indicate which type of fiber is deployed, if a mixed of fiber types has been deployed, and where f ber has been deployed. b. The contractor shall indicate which of the fiber types have been deployed and where: iii. Lucent True-Wave	4.2.3.3.1
6287	C.2.5.3.1.4(7)(b)(iv)	The following Dark Fiber Services capabilities are mandatory unless marked optional: 7. Fiber Deployed. The contractor shall indicate which type of fiber is deployed, if a mixed of fiber types has been deployed, and where f ber has been deployed. b. The contractor shall indicate which of the fiber types have been deployed and where: iv. Lucent True-Wave RS.	4.2.3.3.1

Req_ ID	RFP Section	RFP Requirement	Proposal Response
6286	C.2.5.3.1.4(7)(b)(v)	The following Dark Fiber Services capabilities are mandatory unless marked optional: 7. Fiber Deployed. The contractor shall indicate which type of fiber is deployed, if a mixed of fiber types has been deployed, and where f ber has been deployed. b. The contractor shall indicate which of the fiber types have been deployed and where: v. Lucent All-Wave	4.2.3.3.1
6285	C.2.5.3.1.4 (7)(b)(vi)	The following Dark Fiber Services capabilities are mandatory unless marked optional: 7. Fiber Deployed. The contractor shall indicate which type of fiber is deployed, if a mixed of fiber types has been deployed, and where f ber has been deployed. b. The contractor shall indicate which of the fiber types have been deployed and where: vi. SMF-28, limited to link segments below 60 km	4.2.3.3.1
6278	C.2.5.3.1.4(9)(a)(v)	The following Dark Fiber Services capabilities are mandatory unless marked optional: 9. Networx Services Verification Criteria. The contractor shall comply with the following verification requirements: a. Verification Testing shall be performed as follows: v. A written report shall be issued and delivered to the Government, for each cable and OTDR traces and other measurements shall be included for each fiber.	4.2.3.3.1
6276	C.2.5.3.1.4(10)(b)(i)	The following Dark Fiber Services capabilities are mandatory unless marked optional: 10. Service Components. DFS service components shall include the following: b. Laterals. They shall be funded by the Agency and their length may vary from a few meters to several kilometers. i. The contractor shall indicate the minimum and maximum size of the lateral in fiber strands	4.2.3.3.1
6265	C.2.5.3.3	Interface: The contractor shall identify the fiber connectors that are supported.	4.2.3.3.3

4.2.3.1 Reserved (L.34.1.4.6(a))

4.2.3.2 Reserved (L.34.1.4.6(b))

4.2.3.3 Satisfaction of DFS Requirements (L.34.1.4.6(c))

Qwest's fiber optic network has been constructed to industry standards and local regulations using best commercial practices. Our fiber infrastructure supports the fiber connectivity and interoperability needs of the DFS user, including network connections, collocation facilities, path diversity, fiber terminations, and service components. Our ring-centric fiber network architecture supports point-to-point, diverse route, star, and hybrid configurations. We have extensive experience with various Government Fiber Service Delivery Point requirements. Our fiber facilities have the infrastructure necessary to support secure and reliable gateways. Our International

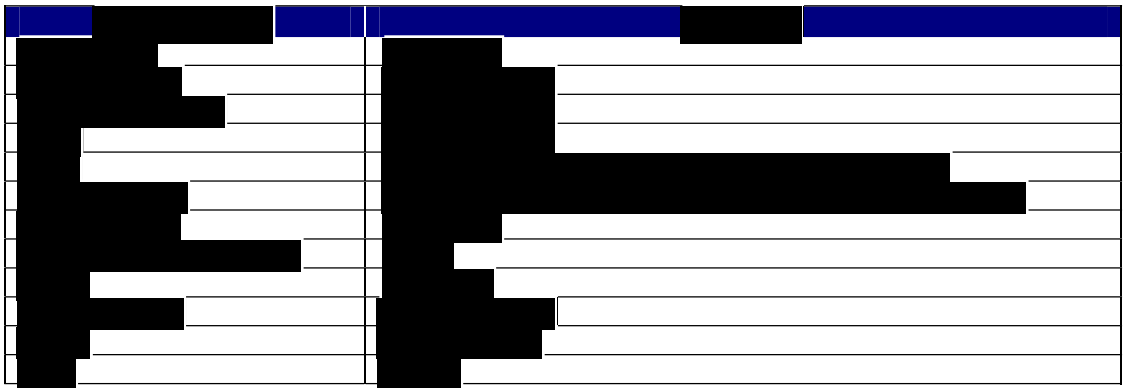
Telecommunications Union (ITU)-T G.655 and ITU-T G.652 compliant fibers have the optical characteristics for 80 Dense Wavelength Division Multiplexing (DWDM) wavelengths in the C and L bands and we verify these characteristics prior to service delivery. Our DFS supports all the amplification techniques required by the Government.

Qwest has the necessary network pre-sales engineering, planning, construction expertise, operations, and field operations capacity required to deliver DFS to the Government. Qwest has been successfully providing DFS to federal Agencies for over seven years.

4.2.3.3.1 Satisfaction of DFS Capabilities Requirements (L.34.1.4.6(c); C.2.5.3.1.4)

Qwest fully complies with all mandatory stipulated and narrative features, capabilities, and interface requirements for DFS. The following text 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.

[redacted]



[redacted]

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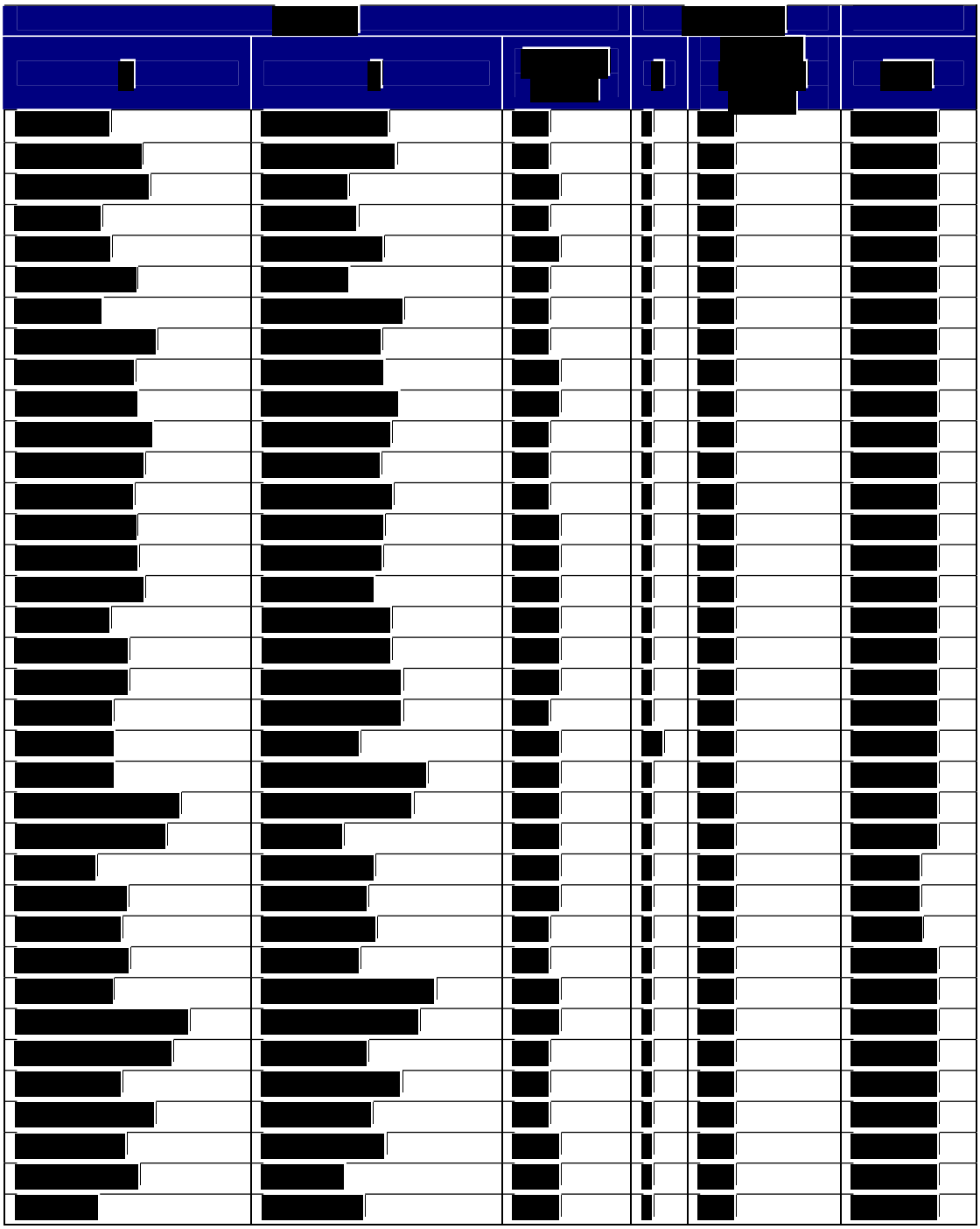

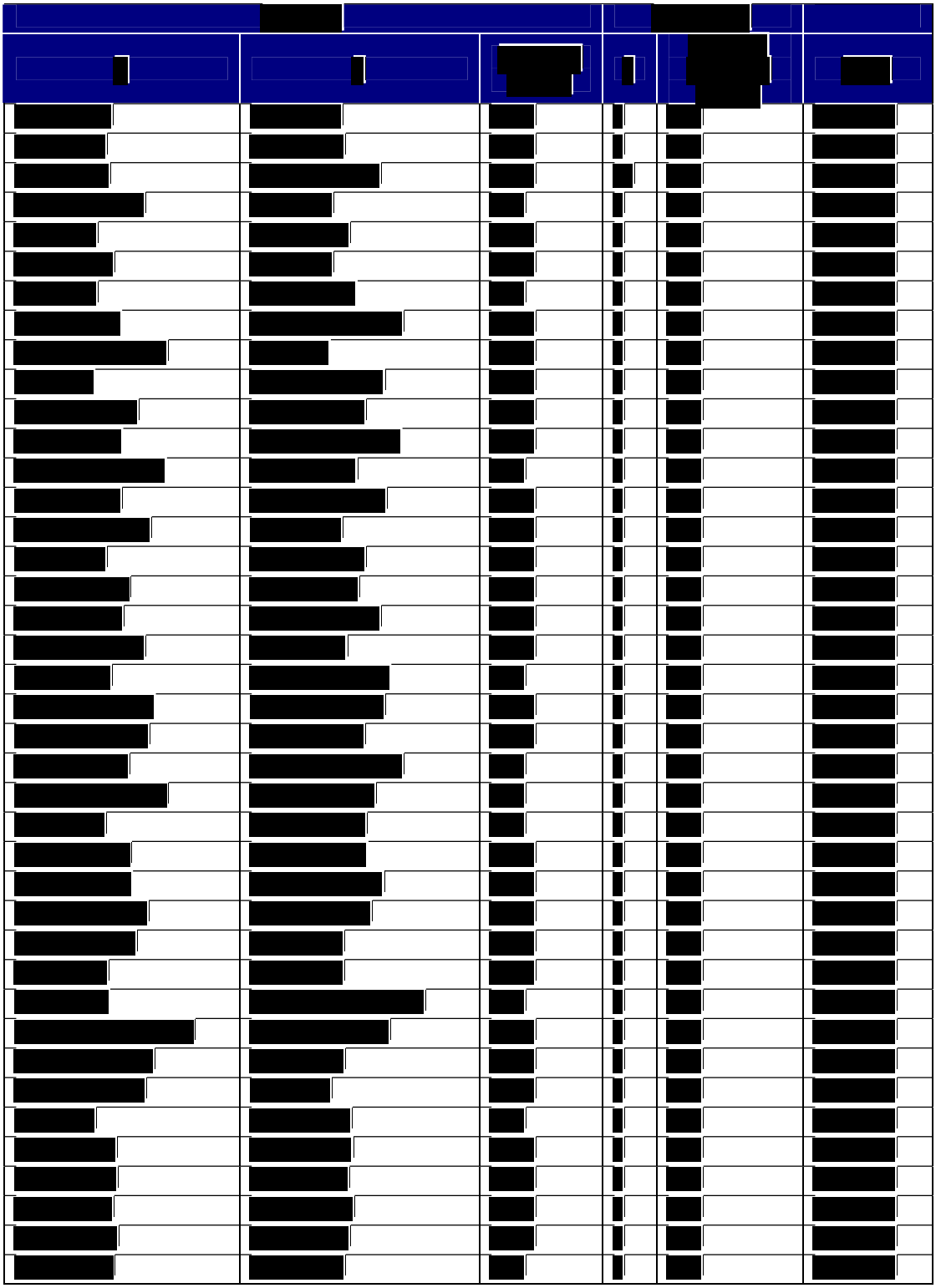

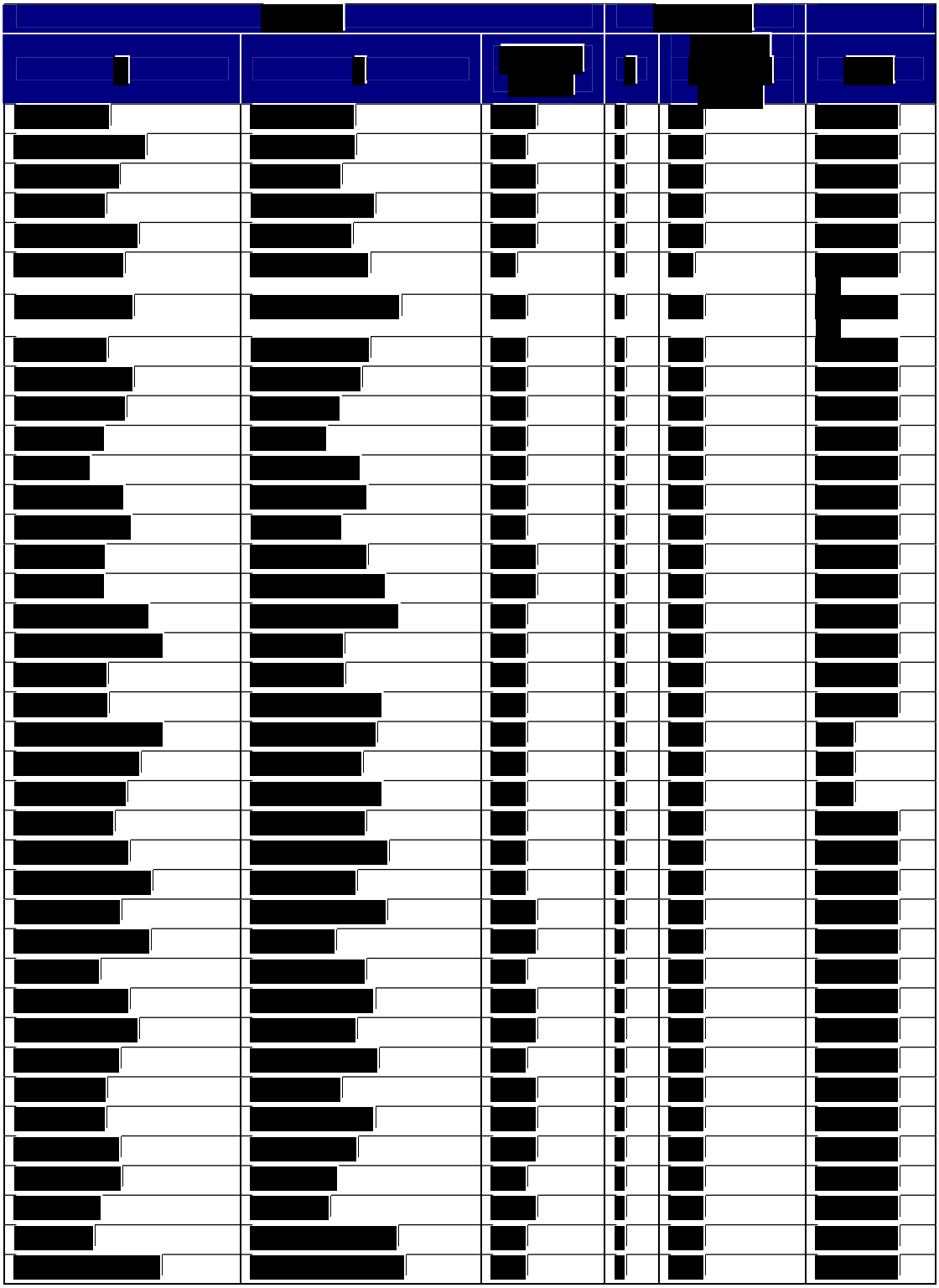

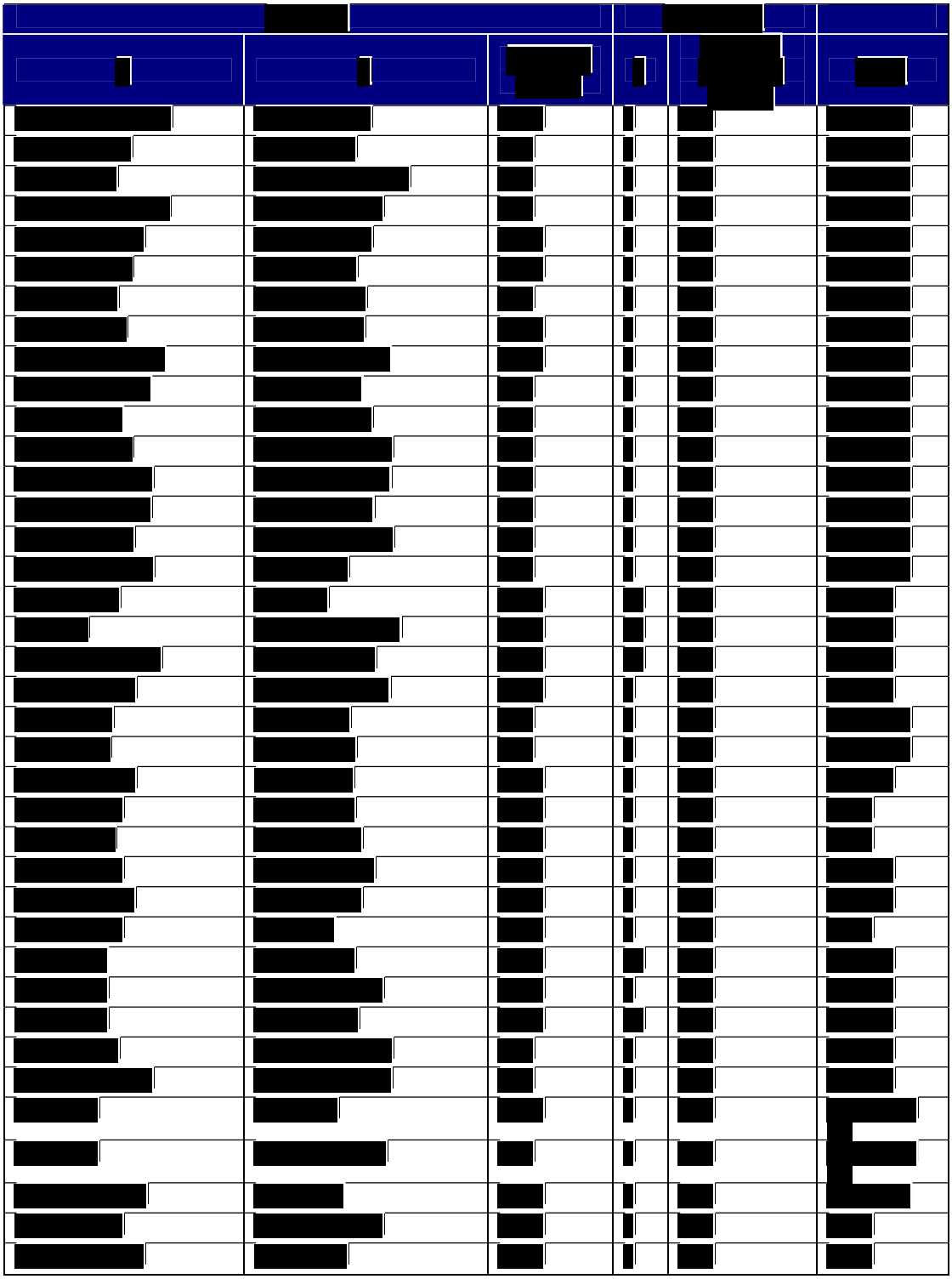

[redacted]

Qwest's TrueWave® dark fiber, has the ability to reach over 2,000 km without regeneration when appropriate optronics are applied. Qwest can provide space for regeneration equipment in any of the sites (city locations or amp sites) indicated in Figure 4.2.3-4 as well as in other sites located within the Qwest network. Qwest will provide a full list of its sites (including gateways, amps and regens, addresses, mileages, and other relevant information) to the Agency as specific projects are discussed. Qwest will update this information as the network is modified.

Amplifier Locations, Fiber, and Spacing (Req_ ID 6328; C.2.5.3.1.4(1)(b)(i)(3))

Figure 4.2.3-4 summarizes the number of amplifier locations, type of fiber deployed, and average spacing. The Qwest average hut spacing of 87 km provides the optimal balance between reach (or distance between regenerators) and the number of amplifiers to minimize costs. Qwest will provide a full list of all Qwest sites (including gateways, amps, and regens, addresses, mileages, and other relevant information) to the Agency as specific projects are discussed. Qwest will update this information as the network is modified.

Geographical Coverage CONUS Intra-city (Req_ ID 6327; C.2.5.3.1.4(1)(b)(ii)(1))

Qwest has metropolitan or intra-city fiber optic networks in numerous cities throughout the U.S. The metropolitan networks are interconnected to the Qwest backbone for access to the Qwest nationwide optical network. Qwest provides intra-city DFS across this backbone extending fiber into carrier hotel facilities, Government, and commercial buildings.

[redacted]

Connection Options (Req_ ID 6326; C.2.5.3.1.4(1)(b)(ii)(2))

Agencies may connect to dark fiber at available splice points and serving man holes, or within facilities where Qwest metro (intra-city) dark fiber terminates. Typical connection takes place in a building meet me room, vault, or via cross connects within a Qwest premise. Qwest will provide additional information regarding the available connection options as specific projects are discussed with each Agency.

Multi-Conduit Upgrade (Req_ ID 6325; C.2.5.3.1.4(1)(b)(ii)(3))

Qwest has deployed a multi-conduit system throughout most of its fiber network. Qwest can perform upgrades to conduit systems, such as adding additional conduits, inner ducts, etc., to facilitate the needs of a requesting Agency. Qwest will work with requesting Agencies to identify cost-benefit justified options to meet their needs.

Collocation facilities (Req_ ID 6324; C.2.5.3.1.4(1)(b)(ii)(4))

Qwest provides collocation facilities in connection with DFS today. Qwest actively manages our collocation facilities and will provide a list of the currently available facilities to Agencies as specific projects are discussed.

Geographical Coverage OCONUS Inter-city (Req_ ID 6322; C.2.5.3.1.4(1)(c)(i)(1))

[redacted]

OCONUS Regeneration and Hut Spacing (Req_ ID 6321; C.2.5.3.1.4(1)(c)(i)(2))

[redacted]

OCONUS Amplifier Locations (Req_ ID 6320: C.2.5.3.1.4(1)(c)(i)(3))

[redacted]

Geographical Coverage OCONUS Metro Networks (Req_ ID 6319; C.2.5.3.1.4(1)(c)(ii)(1))

[redacted]

[redacted] Qwest will provide available OCONUS metro-networks once the proper NDAs are executed.

OCONUS Upgrade to Multi-conduit System (Req_ ID 6318; C.2.5.3.1.4(1)(c)(ii)(2))

[redacted] Qwest will specify our ability to upgrade to a multi-conduit system once the proper NDAs are executed.

Gateways

Gateway Expansion (Req_ ID 6299; C.2.5.3.1.4(5)(f))

For gateway sites where the facilities are already in place, gateway expansion is possible and Qwest will work with the Government to address and support all construction-related requirements.

Gateway Monitoring (Req_ ID 6298; C.2.5.3.1.4(5)(g))

The Qwest Environmental Control Center (ECC) monitors the support functions or environmental status of sites 24/7, including gateway locations, such as mechanical, electrical, and life safety systems. These alarms are communicated through parallel telemetry circuits in the transport equipment so that remote surveillance of these vital sites is continuously maintained. All Qwest's Tenant Improvement sites and ROW sites that house terminals, regenerators, and optical amplifiers are equipped with local and remote alarming. As alarms are triggered, the ECC responds by logging tickets and working closely with Field Operations to perform on-site inspections, troubleshooting, and restoration of all environmental issues. A full array of environmental conditions is automatically monitored including:

- Security
- Fire Suppression
- Heating, Ventilating and Air Conditioning Systems

- Primary Power
- Secondary Power
- Protected AC Power Group
- Uninterruptible Power Supply (UPS) System
- Normal AC Service and Distribution Group
- Generator Indications Sub-Group
- Generator Critical

Fiber Deployed (Req_ ID 6292; C.2.5.3.1.4(7)(a))

[redacted]

NZDS Fiber Deployed (Req_ ID 6291; C.2.5.3.1.4(7)(b)(i))

Qwest has deployed Non-Zero Dispersion-Shifted (NZDS) fiber. Approximately 80 percent of the Qwest fiber backbone and dark fiber are NZDS. Figure 4.2.3-4 lists where the various fiber types are deployed. [redacted]

Corning ELEAF Fiber Deployed (Req_ ID 6289; C.2.5.3.1.4(7)(b)(ii))

[redacted]

Lucent TrueWave Fiber Deployed (Req_ ID 6288; C.2.5.3.1.4(7)(b)(iii))

Qwest's nationwide network consists of approximately [redacted] Lucent TrueWave, a non-zero dispersion shifted fiber. Figure 4.2.3-4 shows which segments of Qwest CONUS Fiber Network use Lucent TrueWave.

Lucent TrueWave RS Fiber Deployed (Req_ ID 6287; C.2.5.3.1.4(7)(b)(iv))

Figure 4.2.3-4 shows which segments of Qwest CONUS Fiber Network use Lucent TrueWave RS.

Lucent All-Wave Fiber Deployed (Req_ ID 6286; C.2.5.3.1.4(7)(b)(v))

Lucent All Wave is designed for metropolitan area network applications. Qwest has restricted deployment of Lucent All Wave to the metropolitan area networks shown in the bullet list of Geographic Intra-City Coverage above.

Single Mode Fiber Fiber Deployed (Req_ ID 6285; C.2.5.3.1.4(7)(b)(vi))

[redacted]

Networx Services Verification Criteria (Req_ ID 6278; C.2.5.3.1.4(9)(a)(v))

Prior to delivery, Qwest will perform testing as described below in Section 4.2.3.7, Verification of Dark Fiber Services, of all dark fiber delivered under the Networx program to ensure that it fully meets specifications. Qwest will submit a written report including Optical Time Domain Reflectometer (OTDR) traces and other measurements to the Government.

Service Components- Laterals (Req_ ID 6276; C.2.5.3.1.4(10)(b)(1))

Qwest will work with Agencies to engineer laterals of varying lengths as required, from a few meters to several kilometers. Qwest proposes a minimum lateral of 12-fiber cable and a maximum of 144-fiber cable. 144-fiber cable is readily available and is workable in ducts as small as 1.25 inches. Qwest does not, however, pre-determine lateral cable sizes; we engineer laterals to satisfy the requirements of customer applications and field physical conditions. Laterals may be designed and engineered to include various cable sizes depending upon the size and availability of fiber duct as well as network design objectives. Therefore, it is possible to exceed 144 fiber strands by using larger or multiple cables in existing infrastructure or new construction, where needed.

4.2.3.3.2 Satisfaction of DFS Feature Requirements (L.34.1.4.6(c); C.2.5.3.2)

Qwest fully complies with all mandatory stipulated and narrative features, capabilities, and interface requirements for DFS. The text in ***Figure 4.2.3-5*** 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.

The Qwest DFS features listed below are based on our Nationwide Fiber Network comprising many fiber rings that connect over 100 transfer POPs located on common points of intersecting rings.

Figure 4.2.3-5. Qwest Feature Compliance for DFS

ID #	Name of Feature	Qwest's Technical Approach
1	Collocation Service	[redacted]
2	Duct	
3	Dark Fiber Local Loop	
4	Diverse Route Single Drop	
5	Diverse Route Dual Drop	

ID #	Name of Feature	Qwest's Technical Approach
6	Inter-city Connectivity	[redacted]
7	Multiple Duct	
8	Off-net laterals	

4.2.3.3.3 Satisfaction of DFS Interface Requirements (L.34.1.4.6(c); C.2.5.3.3)

Qwest will terminate our DFS-provided fibers to the existing Fiber Distribution Panel (FDP) or to an Agency specified FDP using industry standard connectors for single and multi-tenant buildings.

DFS Interfaces (Req_ ID 6265; C.2.5.3.3)

Qwest supports the FC fiber connector for DFS on our side of the connection. The FC connector is widely used throughout industry. Qwest will support Agency required telco-standard connectors on the Agency side of the connection.

4.2.3.4 DFS - Quality of Service (L.34.1.4.6(d); C.2.5.3.4; C.2.5.3.4.1)

Qwest's ITU-T G.655 and G.652-compliant nationwide fiber infrastructure meets all the DFS performance metrics required by the Government. We have all the proven monitoring and measurement systems, procedures, and evaluation methods necessary to ensure that our DFS meets the Government's performance metrics. The Government's performance metrics are consistent with ITU-T G.655 and ITU-T G.652 fiber specifications. See ***Figure 4.2.3-6***.

Figure 4.2.3-6. Qwest Compliance with Government Performance Metrics

Key Performance Indicator (KPI)	Service Level	Performance Standard (Level/Threshold)	Acceptable Quality Level	Qwest Performance Standard	Measurement Method
Attenuation Coefficient SMF (1550 nm)	Routine	0.25 db/km	≤ 0.25 dB/km at all times	[redacted]	[redacted]
Attenuation Coefficient SMF (1310 nm)	Routine	0.35 db/km	≤ 0.35 dB/km at all times	[redacted]	[redacted]
Attenuation Coefficient MMF 850 nm (50/125µm)	Routine	2.35 db/km	≤ 2.35 dB/km at all times	[redacted]	[redacted]
Attenuation Coefficient MMF 1300 nm (50/125µm)	Routine	0.35 db/km	≤ 0.35 dB/km at all times	[redacted]	[redacted]
Polarization Mode Dispersion (PMD) at 1550 nm (Inter-City Networks)	Routine	0.1 ps/km^{½}	≤ 0.1 ps/km^{½} at all times	[redacted]	[redacted]
Polarization Mode Dispersion (PMD) (Intra-City Networks)	Routine	0.3 ps/km^{½}	< 0.3 ps/km^{½} at all times	[redacted]	[redacted]
Chromatic Dispersion at 1550nm	Routine	2.0 ps/km^{½}	< 2.0 ps/km^{½} at all times	[redacted]	[redacted]
Reflectance Events (all events)	Routine	Less than 40 dB	≤ 40 dB at all times	[redacted]	[redacted]
Time to Restore (TTR)	Without Dispatch	4 hours	≤ 4 hours	[redacted]	[redacted]
	With Dispatch	8 hours	≤ 8 hours	[redacted]	
Connectors					
Return Loss	Routine	Less than 50 dB	≤ 50 dB at all times	[redacted]	[redacted]
Insertion Loss	Routine	Less than 0.5 dB	≤ 0.5 dB at all times		

[redacted]

4.2.3.5 Proposed Enhancements for DFS (L.34.1.4.6(e))

Qwest expects to enhance DFS over the course of the Networx program through fiber construction, equipment, and transport media selection. [redacted]

[redacted] Pricing for such fiber builds will be on an Individual Case Basis.

Our Fiber Optic Construction Division provides a continuing capability to perform new dark fiber installation on a large scale anywhere in the country. Our regional managers have ongoing business relationships with permit agents who facilitate obtaining ROWs and other permissions pertaining to new fiber installations—allowing us to anticipate and deal with potential delays involving ROWs. We maintain continuing business relationships with companies for subcontracting trenching, boring, and other preparation activities—taking full advantage of local company knowledge of local and state construction regulations and also allowing us to undertake large-scale implementations as readily as small-scale implementations.

The key to minimizing schedule risks is in the details, such as ensuring the early identification of hard-to-find state-certified professional engineers to validate drawings as a prerequisite for ROW approval or having contract clauses allowing Qwest to direct addition of work crews to accelerate the construction process.

Qwest has performed large-scale fiber implementations for its own network, other carrier networks, and Government networks, often simultaneously, with an unblemished record of meeting fiber implementation schedules.

DFS Customer Premise Equipment Selection, Testing and Acquisition

[redacted] As part of the acquisition

process, Qwest produces a narrowed field of vendors and associated hardware to proceed to the laboratory testing stage. It is generally expected that equipment [redacted] will proceed to the laboratory testing stage where it is run through Qwest's production environment and interoperability tests. [redacted]

All new technologies deployed in the Qwest network undergo rigorous testing at the [redacted]. Laboratory testing is a key element of risk reduction for any new equipment deployment. Every new vendor chassis, card type, and software release is tested for standards compliance, compatibility with Qwest Network Operations, and interoperability with other vendor's equipment.

It is not only important to test the equipment in its operational state, [redacted]

4.2.3.6 Experience with DFS Delivery (L.34.1.4.6(f))

Qwest was one of the first carriers to offer DFS to the Federal Government and we have successfully provided extensive private DFS networks to multiple Government Agencies. These DFS networks enable high speed bandwidth and diverse physical access to multiple critical customer sites in the CONUS [redacted]

These projects include engineering and designing of the network, and submission of all necessary ROWs and construction permits, fiber optic construction, equipment installation, test and activation, network management, operations, maintenance, and program management.

Qwest has provided the Government optical transport equipment technology assessment, testing and evaluation, engineering procurement, installation, testing and activation, and support of the latest technology of long haul DWDM and optical switching.

Our broad experience has provided in-depth understanding of key success factors in the delivery of DFS. For example, Qwest provides its customers accurate diagrams with visibility down to field level information using a hard or soft copy delivery platform. With this unique support tool, our customers do not have to wait for a field survey every time they have a network planning change. This capability provides accurate transparency to Qwest's entire fiber inventory. On average, Qwest processes more than 100,000 cable-locate requests every month and dispatches its technicians to mark the route to prevent cable cuts. One of the reasons Qwest protects its cables so thoroughly is that its own services are riding within the same cable system. Qwest processes [redacted] projects related to interconnect cable builds every month. These projects vary from actual cable placements, to manhole and handhole placements, to cable relocate, to various level of FOC splicing. Our experience in this field allows us to accurately deliver the finished service to our customers in a timely manner.

[redacted]

[redacted]

4.2.3.7 Verification of DFS (L.34.1.4.6(g))

Qwest measures performance characteristics of our dark fiber inventory upon installation. We use this data as a part of the determination that DFS is immediately available on any specific route. Whether from existing inventory or from new installation, Qwest will measure KPI data prior to delivery and verify that they meet or exceed AQL compliance. Qwest measures attenuation coefficients, polarization mode dispersion, chromatic dispersion, reflectance, and return loss to ensure the AQLs provided in Figure 4.2.3-6.

4.2.3.8 Impact of DFS Delivery on the Network Architecture L.34.1.4.6(h))

Qwest is able to offer DFS to its customers without impact to our own network architecture. While constructing our nationwide fiber network, Qwest installed multiple conduits for future expansion. Our current fiber inventory, that includes dark fiber, occupies only one-fourth of the capacity of the buried conduit. As current dark fiber inventory becomes exhausted, Qwest is able to pull new fibers as needed to satisfy future network requirements for both our own network and those of our dark fiber customers.

4.2.3.9 Approach for Technological Enhancements to DFS (L.34.1.4.6(i))

Planning for the future, Qwest installed multiple conduits providing capability for future expansion in fiber count and fiber technology. The current fiber cable occupies only one-fourth of the capacity of the buried conduit.

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 (CTO), headed by Qwest CTO Pieter Poll, Qwest evaluates new products and technologies for incorporation into the Qwest network, in partnership with product management.

Figure 4.2.3-7, Qwest's [redacted] shows the role of the [redacted]) in the product and technology management process. The [redacted] determines the steps necessary to evaluate the viability of the technology by issuing vendor Requests for Information and performing integration laboratory tests. [redacted]

[redacted]

Summary

[redacted] Qwest's DFS provides a fully compliant and comprehensive capability that will address the widest possible set of Government dark fiber requirements.