1.4.18 Dark Fiber Services (DFS) [C.2.5.3]

Agencies can control and manage their own network by the deployment of Dark Fiber Services (DFS) that connect Agency locations together, Agency service delivery point (SDP) to the contractor's point-of-presence (PoP), or the longhaul or metro carrier of choice. Through the use of unrivaled fiber footprint and unique, private rights-of-way, Agencies can gain control, security, and management required to activate and operate a fiberoptic infrastructure.

1.4.18.a Reserved

1.4.18.b Reserved

1.4.18.b.1 Reserved

Through

1.4.18.b.25 Reserved

Pages 703 through 713 have been deleted in conformance with Amendment 5 revisions.

1.4.18.c Service Description [L.34.1.4.6.c]

(c) A technical description of how the service requirements (e.g., capabilities, features, interfaces) are satisfied for all proposed optional services.

Dark fiber provides physical strands of fiber plant between Agency SDPs. The dark fiber will terminate into the Agency SDP or into an AT&T collocation facility as shown in **Figure 1.4.18.c-1**. The Agency will install and maintain the necessary electronics to provide transport on the fiber strands. This allows the Agency the benefit of designing its own optical network as well as owning and managing the network so that the infrastructure can be modified to match unique mission requirements.

Figure 1.4.18.c-1: Dark Fiber Service. *Typical architecture supported by a dark fiber infrastructure. Fiber span extend between Fiber Distribution Panels in either a PoP or a hut. Agencies lit the dark fiber by connecting optical equipment to the fiber distribution panels. Metro dark fiber can be used to connect the Agency SDP to the AT&T PoP.*

Table 1.4.18.c-1 summarizes how the AT&T meets the technical capability requirements listed in the RFP.

SERVICE REQUIREMENTS	TECHNICAL DESCRIPTION	BENEFIT TO AGENCY
Geographical Coverage	The AT&T has an extensive network reach with our local and longhaul CONUS coverage as well international. The following details each area of coverage: • CONUS Longhaul – Approximately [redacted] route miles [redacted] that contains fiber [redacted] • CONUS Metro – Approximately [redacted] route miles [redacted]. • International – International fiber is provided [redacted]	Through AT&T's extensive network reach, Agencies benefit through the ability to create global dark fiber networks. [redacted]
Configuration Options	The AT&T will custom design the dark fiber network to match the requirements of the RFP at the request of the Agency	Agencies benefit from a variety of network configurations to enhance network reliability in order to deliver high quality services.
Fiber Service Delivery Point (FSDP)	The AT&T will support the Dark Fiber Service Delivery Point at either the fiber patch panel demarc at the SDP or at the collocation facility where the Agency has installed it's equipment	Agencies benefit from an interface to interconnect to other optical networks.

SERVICE REQUIREMENTS	TECHNICAL DESCRIPTION	BENEFIT TO AGENCY
Channel Count	Fiber deployed in the AT&T's CONUS and International networks supports [redacted]	Agencies will be able to use the latest in current and future technologies in Optical transmission equipment. This helps to ensure the lowest possible total cost of ownership.
Gateways	Gateway locations will be provided for the Agency's [redacted]	Agencies benefit from the ability to add optical equipment to add or drop network interfaces, increasing the flexibility of their network.
Amplification	Fiber in the AT&T's networks supports the amplification equipment supplied by the Agency	Agencies benefit from the ability to select from a variety of wave division multiplexing systems. This provides the opportunity to lower the overall total cost of ownership.
Fiber Deployed	The AT&T's Non-Zero Dispersion Shifted dark fiber inventory includes: [redacted]	Agencies have the flexibility to efficiently use either the current generation of optical transmission equipment or upgrade to future versions of equipment without upgrading the fiber infrastructure. This keeps the total cost of ownership down.
Required Optical Characteristics	The fiber deployed in the AT&T's network will comply with the required optical characteristics. The performance compliance is covered in more detail in Section 1.4.18.d in this response	Agencies are provided with the fiber infrastructure is compliant with industry standard optical characteristics, enabling full interoperability with commercially available optical transmission equipment.
Networx Services Verification Criteria	Fiber verification testing procedures comply with the requirements listed in the RFP. Details of the verification testing can be found in Section 1.4.8.g in this response.	Agencies are provided delivery of high quality fiber infrastructure for their networking needs.
Service Components	AT&T's dark fiber service offering consists of: Trunks – Cables that contain up to several hundred fiber spans Laterals – Fiber spans from the Agency SDP to the closest splice point in the AT&T dark fiber network Building entrances – Connectivity from the lateral to the fiber distribution panel at the SDP. Fiber may enter through a manhole(s) or may traverse the building through a riser.	Agencies are provided a complete, turnkey solution in the delivery of dark fiber infrastructure. AT&T serves as a full service provider for all of the Agencies' dark fiber needs.

Table 1.4.18.c-1:AT&T Measures for Technical Compliance. *The dark fiber infrastructure is fully compliant with all technical requirements.*

Table 1.4.18.c-2 summarizes how the AT&T meets the feature requirements listed in the RFP.

SERVICE REQUIREMENTS	TECHNICAL DESCRIPTION	BENEFIT TO AGENCY
Colocation Service	AT&T will provide collocation space in the POPs, repeater, and regenerator huts along the fiber route. The Agency is responsible to provide all the optical amplifier (OA) equipment, when required, in the repeater huts along the dark fiber route.	Agencies benefit from the ability to regenerate or amplify their optical network signals, fully managing the reliability of their network. This provides the opportunity to lower the overall total cost of ownership.

SERVICE REQUIREMENTS	TECHNICAL DESCRIPTION	BENEFIT TO AGENCY
Duct	The AT&T will make available conduit, or ducts, to the Agency as required.	Agencies benefit from the ability to expand their network as traffic demands require.
Dark Fiber Loop	The AT&T will provide a dark fiber local loop between the Agency SDP and either the CONUS longhaul regen hut or the AT&T POP as required by the Agency.	Expanded connectivity options are made available to SDPs to enable an end-to-end, self managed network for an opportunity to have a lower total cost of ownership for network operations.
Diverse Route Single Drop	The AT&T will custom engineer and deploy the dark fiber loop configured as a diverse route single drop as required by the Agency.	Provides the Agency with a highly available, redundant network in order to increase service KPIs. Interfaces will be available at a single access point.
Diverse Route Dual Drop	The AT&T will custom engineer and deploy the dark fiber loop configured as a diverse route dual drop as required by the Agency.	Provides the Agency with a highly available, redundant network in order to increase service KPIs. Enhanced reliability is available because interfaces will be available at two separate access points.
Inter-city Connectivity	The AT&T will custom design a dark fiber network that will connect Agency locations within CONUS as well as outside CONUS on an individual case basis.	Agencies benefit from enhance geographic reach to enable globally available service.
Multiple Duct	The AT&T will make available multiple ducts as required by the Agency. If network expansion is required, it will be negotiated on an Individual Case Basis.	Agencies benefit from the ability to expand their network as traffic demands require.
Off-net Laterals	The AT&T will custom-build Agency funded off-net lateral per the Agency's specifications.	Expanded connectivity options are made available to Agency SDPs for an end-to-end, self managed network.

Table 1.4.18.c-2: AT&T DFS Deployment Services. With *the availability of these features, the Agency has several options for provisioning service over the Dark fiber infrastructure.*

[redacted] inter-city fiber route connects [redacted] metropolitan areas with [redacted] miles of [redacted] fiber.

[redacted] AT&T will provide Agencies the following:

- Space for racks or cabinets
- Installation of Fiber Cross-connects (collocated equipment to POI)
- Power – both DC and AC. Grounding
- Heating, ventilation, and air Conditioning (HVAC), and security

- Engineering and Materials for install of rack, power, cross-connects
- Interconnection to customer dark fiber or AT&T services

[redacted] local fiber in [redacted] Metropolitan Statistical Areas and [redacted]

[redacted]

To ensure reliability and optimum performance of both the existing and newly constructed fiber cables, AT&T will employ established and tested operations and maintenance standards, methods and procedures for system monitoring, routine maintenance, right-of-way maintenance, plant protection, planned cable intrusion management, and emergency cable repairs. Management and execution of day-to-day operations and maintenance requirements for the cable and AT&T's huts and central offices will be the responsibility of AT&T's [redacted]

[redacted]

AT&T supports all key performance indicators in the Performance Metrics for Dark Fiber Services.

1.4.18.d Service Quality and Performance [L.34.1.4.6.d]

(d) A description of the quality of the services with respect to the performance metrics specified in Section C.2 Technical Requirements for each proposed optional service, and other performance metrics used by the offeror.

AT&T has a standard fiber testing process for all fiber segments delivered to its customers. This process is made part of every contract and the AT&T is willing to negotiate to be in compliance for each and every segment. **Table 1.4.18.d-1** summarizes compliance to the performance metrics listed in the RFP.

KEY PERFORMANCE INDICATOR (KPI)	SERVICE LEVEL	PERFORMANCE STANDARD (THRESHOLD)	PROPOSED SERVICE QUALITY LEVEL
Attenuation Coefficient SMF (1550 nm)	Routine	0.25 dB/km	[redacted]
Attenuation Coefficient SMF (1310 nm)	Routine	0.35 dB/km	[redacted]
Attenuation Coefficient MMF (850 nm)	Routine	2.35 dB/km	[redacted]
Attenuation Coefficient MMF (1300 nm)	Routine	0.35 dB/km	[redacted]
Polarization Mode Dispersion (PMD) at 1550 nm (Intercity Networks)	Routine	0.1 ps/km 1/2	[redacted]
Polarization Mode Dispersion (PMD) (Intracity Networks)	Routine	0.3 ps/km 1/2	[redacted]
Chromatic Dispersion at 1550 nm	Routine	2.0 ps/km nm	[redacted]
Time To Restore (TTR)	Without Dispatch	4 hr	[redacted]
	With Dispatch	8 hr	
Return Loss	Routine	Less than 50 dB	[redacted]
Insertion Loss	Routine	Less than 0.5 dB	[redacted]

Table 1.4.18.d-1: Compliance with dark fiber performance metrics. [redacted]

Testing results are part of every Fiber Delivery Acceptance package and the Agency must sign-off on the Acceptance package before AT&T begins billing for the use of the fiber segments.

All testing metrics – attenuation, polarization, chromatic dispersion and reflectance – are components of the Optical Time Domain Reflectometer (OTDR) testing that will be part of any dark fiber segment delivery to an Agency. Bi-directional OTDR () testing of individual splices is performed. To ensure acceptable splices prior to closing and sealing the splice case, AT&T uses the OTDR to monitor all splicing activity as it is performed.

1.4.18.e Attributes and Values of Service Enhancements [L.34.1.4.6.e]

(e) If the offeror proposes to exceed the specified service requirements (e.g., capabilities, features, interfaces), a description of the attributes and value of the proposed service enhancements.

Many Agencies may require the reliable, scalable, and secure solution that dark fiber offers but are discouraged by the need to make the large initial investment. [redacted] **Table 1.4.18.e-1** [redacted]

PROPOSED SERVICE REQUIREMENT	TECHNICAL DESCRIPTION	BENEFITS
[redacted]	[redacted]	[redacted]

Table 1.4.18.e-1: [redacted] **solution.** [redacted]

The Agency also has the choice of converting to traditional dark fiber pricing at any time, presenting a truly all around advantageous solution for any Agency with flexible capacity needs.

1.4.18.f Service Delivery Experience [L.34.1.4.6.f]

(f) A description of the offeror's experience (including major subcontractors) with delivering each proposed optional service.

AT&T has a record of being responsive to customer requirements .The following projects reflect our management approach, teaming philosophies, technical focus, and emphasis on customer satisfaction. These projects are summarized in **Tables 1.4.18.f-1 to 1.4.18.f-3**.

[redacted]

CLIENT NEED	SOLUTION	CREATED VALUE
[redacted]	[redacted]	[redacted]

Table 1.4.18.f-1: Dark Fiber Experience [redacted] *AT&T provided an* [redacted] *cable network to enhance* [redacted]

[redacted]

CLIENT NEED	SOLUTION	CREATED VALUE
[redacted]	[redacted]	[redacted]

Table 1.4.18.f-2: Dark Fiber [redacted] *Fiber paths* [redacted] *provided diverse* [redacted]

[redacted]

CLIENT NEED	SOLUTION	CREATED VALUE
[redacted]	[redacted]	[redacted]

Table 1.4.18.f-3: Dark Fiber Experience [redacted] *AT&Ts overall experience in the deployment of fiber networks* [redacted]

[redacted]

1.4.18.g Approach to Perform Service Verification [L.34.1.4.6.g]

(g) A description of the offeror's approach to perform verification of individual services delivered under the contract, in particular the testing procedures to verify acceptable performance and Key Performance Indicator (KPI)/Acceptable Quality Level (AQL) compliance.

AT&T places the highest priority on Agency satisfaction. No project is considered complete until thorough tests are conducted and approved by the Agency.

Table 1.4.18.g-1 summarizes the verification approach and testing procedures used to verify the KPI required in the RFP.

KPI	VERIFICATION APPROACH	TESTING PROCEDURES
• Return Loss • Insertion Loss	**Splice Testing** bi-directional OTDR (Optical Time Domain Reflectometer) testing of individual splices are performed	[redacted]
• Reflectance Events	**Fiber Optic Cable Testing** Various tests on spliced and terminated fiber optic cable spans are performed to ensure fiber optic cables are working according to cable manufacturers specifications.	[redacted]

KPI	VERIFICATION APPROACH	TESTING PROCEDURES
• Attenuation Coefficient		[redacted]
• Chromatic Dispersion		
• Polarization Mode Dispersion		

Table 1.4.18.g-1: Approach and testing procedure summaries for KPI Verification for DFS. *To ensure Agency satisfaction, fiber spans are thoroughly tested to verify performance.*

1.4.18.h Optional Services Network Impact [L.34.1.4.6.h]

(h) A description of how the delivery of any optional services would impact the network architecture (e.g., security, quality and reliability, performance).

Dark fiber networks are dedicated – Agencies share no system capacity with other customers, which provide an inherent security factor. AT&T's dark fiber networks consist of the highest quality fiber optic technology and are consistently surveyed, upgraded, and groomed for quality. Since Agency dark fiber are dedicated networks, there will be no impact to the AT&T network architecture in the deployment of these Agency custom networks.

1.4.18.i Approach to Incorporating Optional Services, Enhancements, or Improvements [L.34.1.4.6.i]

(i) A description of the approach for incorporating into the proposed optional services, technological enhancements and improvements that the offeror believes are likely to become commercially available in the timeframe covered by this acquisition, including a discussion of potential problems and solutions.

[redacted]

Table 1.4.18.i-1 [redacted]

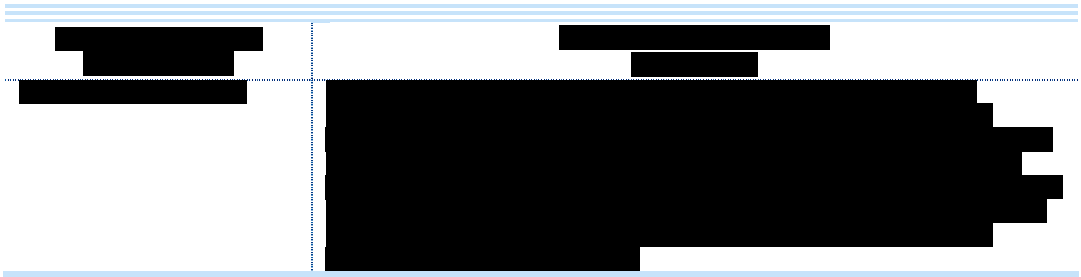

Table 1.4.18.i-1: Technology

Table 1.4.18.i-2 summarizes those risks and the mitigation of those risks.

POTENTIAL TECHNOLOGY ENHANCEMENTS	POTENTIAL RISKS	RISK MITIGATION

Table 1.4.18.i-2: in

1.4.18.1 Narrative Requirements [L.34.1.4.6.b]

(b) Narrative responses to the requirements in Table J.9.1.1.3 (b) Technical Narrative Requirements for Optional Services.

AT&T's experience and knowledge in planning, constructing, testing, activating, and maintaining DFS is evidenced AT&T embarked on a major fiber network modernization program.

This experience will be leveraged in the deployment of local fiber in and cities. AT&T completes approximately

[redacted] annually, including those for DFS. [redacted] This volume of construction is made possible by a highly skilled implementation team with in-depth experience in right-of-way selection and acquisition, permitting, environmental assessment, route engineering, physical construction, and overall end-to-end project management.

1.4.18.1.1 Geographical Coverage – Non-domestic [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. [Optional] Non-domestic. The contractor shall provide and maintain a list of all the Countries/Jurisdictions where the contractor's dark fiber is available.

Table 1.4.18.1-1 summarizes the non-domestic locations where dark fiber will be made available. Both metro and long-haul fiber connectivity between the jurisdictions listed in Table 1.4.18.1-1 are available for Agencies to order.

Non-domestic Availability

Country	Jurisdiction
[redacted]	[redacted]

Table 1.4.18.1-1: Non-Domestic Dark Fiber Availability. *Agencies can obtain dark fiber from AT&T in these non-domestic areas.*

1.4.18.1.2 Geographical Coverage – CONUS [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 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.

AT&T has approximately [redacted] route miles of intercity fiber available for lease. Interconnected cities are included in **Table 1.4.18.1-2**.

INTERCONNECTED CITIES

[redacted]					

INTERCONNECTED CITIES					
[redacted]					

Table 1.4.18.1-2: AT&T CONUS Interconnected Cities. *AT&T's [redacted] route miles of intercity fiber connect these cities.*

1.4.18.1.3 Geographical Coverage – CONUS – Inter-city [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 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.

AT&T's huts are spaced at approximately [redacted] AT&T's [redacted] network has a maximum average fiber attenuation of [redacted] AT&T's facilities (e.g., POPs and huts) will provide adequate space; grounding; heating, ventilation, air conditioning (HVAC); and commercial/backup/redundant power to support new amplification and regeneration equipment. AT&T's facility design requirements for space, HVAC, and power take into consideration [redacted]

1.4.18.1.4 Geographical Coverage – CONUS -Inter-city [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 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.

AT&T's huts are spaced at approximately [redacted] intervals. The typical loss between amplifier locations [redacted] is less than [redacted] has a maximum average fiber attenuation of [redacted] AT&T has deployed [redacted]

1.4.18.1.5 Geographical Coverage – CONUS – Intra-city [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 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.

Metro dark fiber provides Agencies with the ability to interconnect multiple sites with high capacity communications facilities. Agencies can obtain metro dark fiber from AT&T in select cities. **Table 1.4.18.1-3** lists the cities where metro dark fiber is available.

STATE	CITY	STATE	CITY
[redacted]			

STATE	CITY	STATE	CITY
[redacted]	[redacted]	[redacted]	[redacted]

Table 1.4.18.1-3: Metro Dark Fiber Availability. *Agencies can obtain dark fiber from AT&T in these domestic cities.*

1.4.18.1.6 Geographical Coverage – CONUS – Intra-city [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 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.

Agencies will be able to connect to the dark fiber network at either a collocation facility or through a custom build from the Agency SDP to the AT&T PoP. These access options are detailed in **Table 1.4.18.1-4.**

CONNECTION OPTION	DESCRIPTION
Collocation Facilities	Agencies can connect to the network on common carrier neutral hotels.
Custom Build	AT&T will arrange to extend dark fiber network to the desired Agency SDP.

Table 1.4.18.1-4: Connection Options. *Agencies can choose between two options for connectivity to the AT&T dark fiber network.*

1.4.18.1.7 Geographical Coverage – CONUS – Intra-city [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 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.

AT&T will arrange for an upgrade to a multi-conduit system to suit the needs of the Agency. This will be done on an individual case basis, per the Agency's specifications.

1.4.18.1.8 Geographical Coverage – CONUS – Intra-city [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 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

The list of on-net collocation facilities is provided in Appendix E, Dark Fiber CONUS Collocation Facilitates.

1.4.18.1.9 Geographical Coverage – OCONUS – Intercity [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.

AT&T will provide outside contiguous United States (OCONUS) intercity routes for Agencies [redacted] to match the Agencies' opportunities. **Table 1.14.19.b-5** lists OCONUS dark fiber availability of the AT&T dark fiber offer.

OCONUS INTERCITY ROUTE MILES	
Alaska and Hawaii	[redacted]
Other OCONUS locations	[redacted]

Table 1.4.18.1-5: OCONUS Availability. [redacted]

1.4.18.1.10 Geographical Coverage – OCONUS – Intercity [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.

[redacted]

[redacted]

1.4.18.1.11 Geographical Coverage – OCONUS – Intercity [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.

[redacted]

[redacted]

1.4.18.1.12 Geographical Coverage – OCONUS – Intra-city [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, 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 all available metro networks.

[redacted]

[redacted]

1.4.18.1.13 Geographical Coverage – OCONUS – Intra-city [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, 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 specified its ability to upgrade to multi-conduit system

[redacted]

[redacted]

1.4.18.1.14 Gateways – Expansion [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.

[redacted]

[redacted]

1.4.18.1.15 Gateways – Monitoring [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.

[redacted]

[redacted]

[redacted]

1.4.18.1.16 Fiber Deployed [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 fiber has been deployed.
a. The contractor shall make available single mode and multimode fiber.

[redacted]

[redacted]

[redacted]

1.4.18.1.17 Fiber Deployed – NZDS [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 fiber 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

[redacted]

1.4.18.1.18 Fiber Deployed – Corning ELEAF [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 fiber has been deployed.
b. The contractor shall indicate which of the fiber types have been deployed and where:
ii. Corning ELEAF

[redacted]

1.4.18.1.19 Fiber Deployed – True-Wave [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 fiber has been deployed.
b. The contractor shall indicate which of the fiber types have been deployed and where:
iii. Lucent True-Wave

[redacted]

1.4.18.1.20 Fiber Deployed – True-Wave RS [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 fiber has been deployed.
b. The contractor shall indicate which of the fiber types have been deployed and where:
iv. Lucent True-Wave RS

[redacted]

1.4.18.1.21 Fiber Deployed – All-Wave [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 fiber has been deployed.
b. The contractor shall indicate which of the fiber types have been deployed and where:
v. Lucent All-Wave

[redacted]

1.4.18.1.22 Fiber Deployed – SMF-28 [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 fiber 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

[redacted]

1.4.18.1.23 Verification Testing [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.

AT&T will prepare a written report for the Agency on each fiber for the OTDR traces and other measurements. Fiber test measurements will be taken using the following methods as detailed in **Table 1.4.18.1-6**:

TEST MEASUREMENT	DESCRIPTION
End-to-End Attenuation SMF	[redacted]
End-to-End Attenuation MMF	[redacted]
Optical Loss	[redacted]
Optical Time Domain Reflectometer (OTDR)	[redacted]
Polarization Mode Dispersion (PMD)	[redacted]
Chromatic Dispersion (CD)	[redacted]

Table 1.4.18.1-6: Types of Fiber Test Measurements. *Five major types of fiber test measurement are performed to demonstrate fiber quality.*

[redacted] **Figure 1.4.18.1-1**.

Figure 1.4.18.1-1: Attenuation Test Set Up. [redacted]

[redacted] **Figure 1.4.18.1-2**.

[redacted]

Figure 1.4.18.1-2: OTDR Test Set Up: [redacted]

[redacted] Figure 1.4.18.1-3. [redacted]

Figure 1.4.18.1-3: PMD Test Set Up. [redacted]

[redacted] Figures 1.4.18.1-4.

Figure 1.4.18.1-4: Chromatic Dispersion Test Set Up. [redacted]

1.4.18.1.24 Service Components – Laterals [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

Typical lateral fiber cable sizes range from [redacted] fibers. However, the size of the cable can be accommodated to the Agency's present and future growth requirements.

1.4.18.1.25 Interface [C.2.5.3.3]

The contractor shall identify the fiber connectors that are supported.

In accordance with the RFP, DFS is compatible with or supports the interfaces that are the fiber terminations at the FSDP fiber distribution panel (FDP). **Table 1.4.18.1-7** shows the standard connectors available. [redacted]

CONNECTOR TYPE	SUPPLIED
SC	✓
LC	✓
ST	✓
FC	✓

Table 1.4.18.1-7: Connector types supported. *SC connectors, which AT&T uses as the standard connector, use a push-pull latching mechanism to connect to the interface. LC, ST and FC connectors can be used at the Agencies' request.*

[redacted]

1.4.18.2 Stipulated Deviations [L.34.1.4.6.a]

(a) Stipulated responses to the requirements in Table J.9.1.1.2 (b) Technical Stipulated Requirements for Optional Services.

AT&T takes neither deviation nor exception to the stipulated requirements.