

VOLUME 1, SECTION 3.9: OPTICAL WAVELENGTH SERVICES



3.9 OPTICAL WAVELENGTH SERVICES [C.2.5.4, M.6.1]

This section of our proposal addresses the Level 3 Team's offering to provide Optical Wavelength Service (OWS) over [REDACTED] [REDACTED] to Government agency customers through the Networkx program. Our service meets or exceeds the requirements for OWS [REDACTED] [REDACTED] as defined in Section C.2.5.4.1 of the RFP.

A description of our OWS offering is provided below, followed by responses to the requirements in RFP Section L.34.1.4.6 as they apply to this service.

The Level 3 OWS [REDACTED] offering that will provide Government agencies the capability to interconnect their offices with [REDACTED]

[REDACTED]
[REDACTED]

Our metro optical wavelength service provides [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]
[REDACTED]

[Redacted content]

3.9.1 Stipulated Responses to Table J.9.1.1.2 (b)

In accordance with Networx Enterprise RFP Amendment 0005, Level 3’s responses to the requirements in Table J.9.1.1.2 (b) Technical Stipulated Requirements for Optional IP-Based Services have been submitted to GSA via the Networx Hosting Center.

3.9.2 Narrative Responses to Table J.9.1.1.3 (b)

In accordance with Networx Enterprise RFP Amendment 0005, Level 3’s responses to the requirements in Table J.9.1.1.3 (b) Technical Narrative Requirements for Optional IP-Based Services have been submitted to GSA via the Networx Hosting Center.

3.9.3 Technical Description of OWS

The Level 3 Optical Wavelength Service offering fulfills the mandatory service requirements for OWS contained in RFP Section C.2.5.4.1. This section demonstrates our capabilities in the following areas:

- Standards
- Connectivity
- Technical Capabilities
- Features
- Interfaces

3.9.3.1 STANDARDS [C.2.5.4.1.1.2]

The Level 3 OWS complies with the required standards as delineated in RFP Section C.2.5.4.1.1.2. Level 3 is an active member of a variety of industry forums and working groups and is committed to implementing future standards as technologies are developed and standards are defined and become commercially available

3.9.3.2 CONNECTIVITY [C.2.5.4.1.1.3]

[REDACTED]

Since Level 3 adheres to GSA-stipulated and industry standards for commercial OWS, our service provides seamless operation between our metro and intercity networks and is fully [REDACTED]

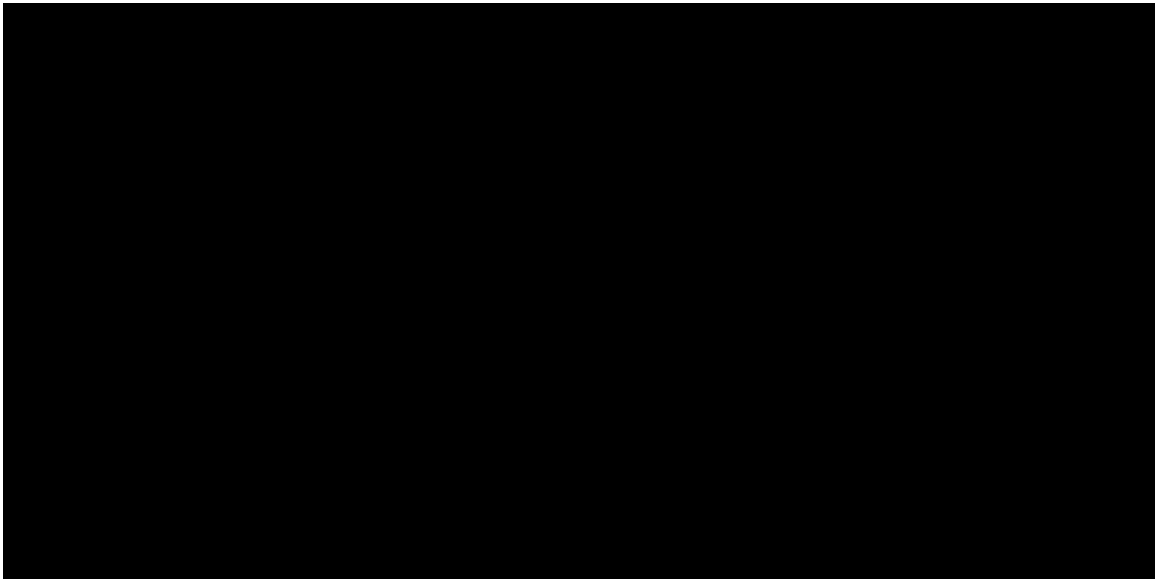
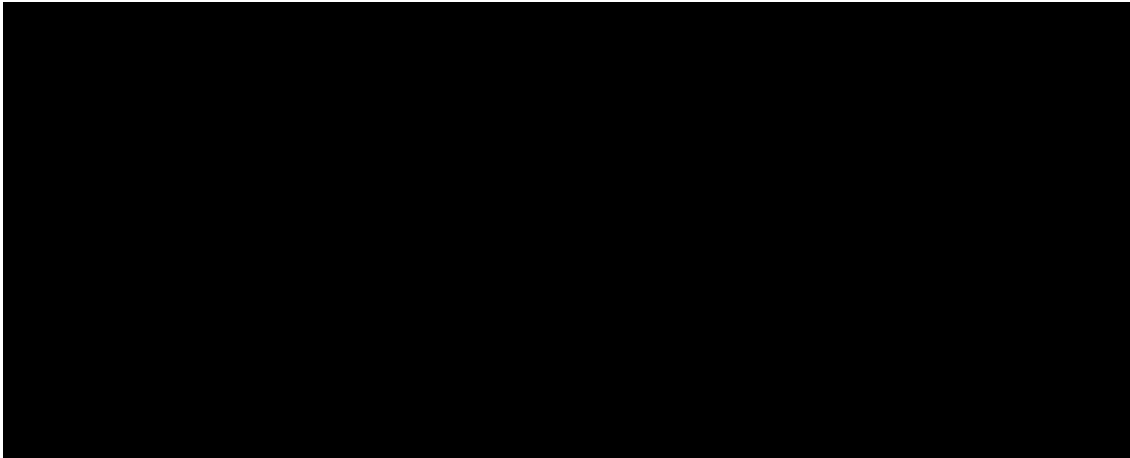
[REDACTED]

3.9.3.3 TECHNICAL CAPABILITIES [C.2.5.4.1.1.4]

Our OWS [REDACTED] solution complies with the mandatory requirements listed in RFP Section C.2.5.4.1.1.4. The discussion below provides details on the more salient requirements. Additional detail is provided in the Narrative Requirements tables.

3.9.3.3.1 End to End Wavelength Termination

[REDACTED]



3.9.3.3.2 Transmission Rates, Transparency, Channelization, and Concatenation





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[Redacted text block]

[Redacted text block]

3.9.3.3 Access

[Redacted text block]



[Redacted text block]

3.9.3.3.4 Customer Premises Equipment (CPE)

Level 3 is prepared to meet the full needs of the Government as it relates to customer provided equipment and the required interconnection methodologies used to ensure connectivity. Level 3 will support the Government's needs for short reach or very short reach optical interfaces. Level 3's network allows for the appropriate optical interfaces to support these needs today. [Redacted text]

Level 3 provides construction services [REDACTED] to interconnect systems, can utilize it's existing metro networks and on net building connections to connect systems, and will utilize partners where appropriate to always ensure that the Government service is interconnected from end to end in the most timely manner possible. [REDACTED]

[REDACTED]

3.9.3.4 FEATURES [C.2.5.4.1.2.1]

The discussion below addresses the requirements for OWS over WDM, as described in RFP Section C.2.5.4.1.2. Level 3 is not proposing to offer the optional services listed.

3.9.3.4.1 Equipment Protection

[REDACTED]

3.9.3.4.2 Geographic Diversity

Full geographic diversity is maintained [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Please see Section 3.9.3.3 and Appendix A of this proposal volume for more detail.

3.9.3.5 INTERFACES [C.2.5.4.1.3.1]

The Level 3 OWS [REDACTED] offering will support the required interfaces listed in RFP Section C.2.5.4.1.3.

3.9.4 Required Performance Metrics [C.2.5.4.1.4]

This section responds to the additional performance requirements specified in Amendment 0005 of the Networx RFP as well as the specific performance metrics in RFP Section C.2.5.4.1.4.1.

3.9.4.1 FRAMED WAVELENGTH PERFORMANCE [C.2.5.4.1.4(1)]

Level 3 uses standards-compliant equipment which complies with C.2.5.2.1.4 (7a). Level 3 complies with C.2.5.2.1.4 (7) b(i) and C.2.5.2.1.4 (7) b(ii) for protected OWS.

The exact parameters cited in C.2.5.2.1.4 (7) b(iii) and C.2.5.2.1.4 (7) b(iv) are equipment dependent and are [REDACTED]
[REDACTED] Wherever the equipment supports the cited feature sets, Level 3 will comply with the requested standards. However, if the equipment deployed does not support the desired OWS feature sets, Level 3 will not be able to

comply and will make the agency aware of this at the time of quote. The agency will have the option to accept the feature sets supported by the current OWS equipment, request a specific type of OWS equipment in which the requesting agency would be charged accordingly, or select another provider for OWS services over the segment or segments that are not within the stipulated compliance levels.

[REDACTED]

[REDACTED]

3.9.4.2 TRANSPARENT WAVELENGTH PERFORMANCE [C.2.5.4.1.4(2)]

[REDACTED]

3.9.4.3 IN-SERVICE MONITORING (ISM) [C.2.5.4.1.4(3)]

Level 3's OWS are monitored at the transport layer, not at higher layers, as described above. Level 3 complies with this requirement.

3.9.4.4 OWS OVER WDM PERFORMANCE METRICS [C.2.5.4.1.4.1]

[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]

3.9.5 Proposed Service Enhancements

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

3.9.6 Experience Delivering OWS

Level 3's has delivered OWS for [REDACTED] years in CONUS. We are the premiere provider of [REDACTED] wavelengths, having turned up over [REDACTED] [REDACTED] supporting various vendors' [REDACTED] Standard SONETS [REDACTED] have used OWS. Customers are Internet Service Providers, major service providers, wireless phone companies, large corporate enterprises and the [REDACTED] Level 3 believes (other carriers don't provide data to enable an absolute statement of fact) it has the largest installed base of OWS in the world.

3.9.7 Access Arrangements

The access method is the means by which the customer connects to the Level 3 wavelength network. [REDACTED] [REDACTED] whether the agency is on- or off-net, and desired bandwidth capability, among other factors. The ideal solution for a specific agency will likely use a combination of access methods based on the location of each of their points on the network.

Wavelengths can be terminated [REDACTED] [REDACTED] Additionally, Level 3's open interconnection policies allow the Government to interconnect to other carriers that reside in Level 3's facilities.

A brief discussion of each access method is follows. These include:

- [REDACTED]
- [REDACTED]
- [REDACTED]

[REDACTED]

[REDACTED]

An overview of our procedure for determining access for off-net Government buildings is also provided.

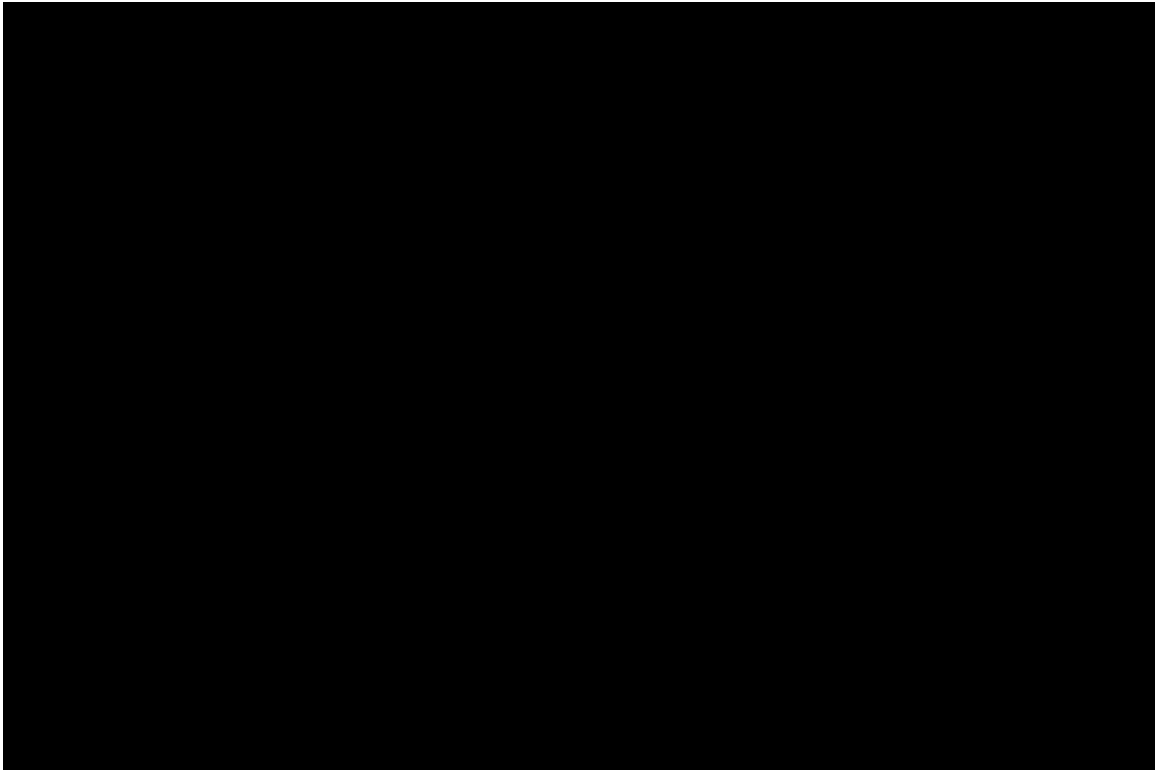
3.9.7.1 TERMINATION IN A LEVEL 3 GATEWAY/SYNERGY SITE

If the Government is collocated in Level 3 Gateway facilities, then Level 3 OWS is just a cross connect away. Level 3 collocation can provide the Government with a mission critical data center facility, with easy access to OWS on the Level 3 Network, and on other carriers' networks as well since most major carriers have fiber connections to Level 3 Gateways.

[REDACTED]

[REDACTED]

[REDACTED]



3.9.7.2 CUSTOMER PROVIDED FIBER (CPF) ACCESS

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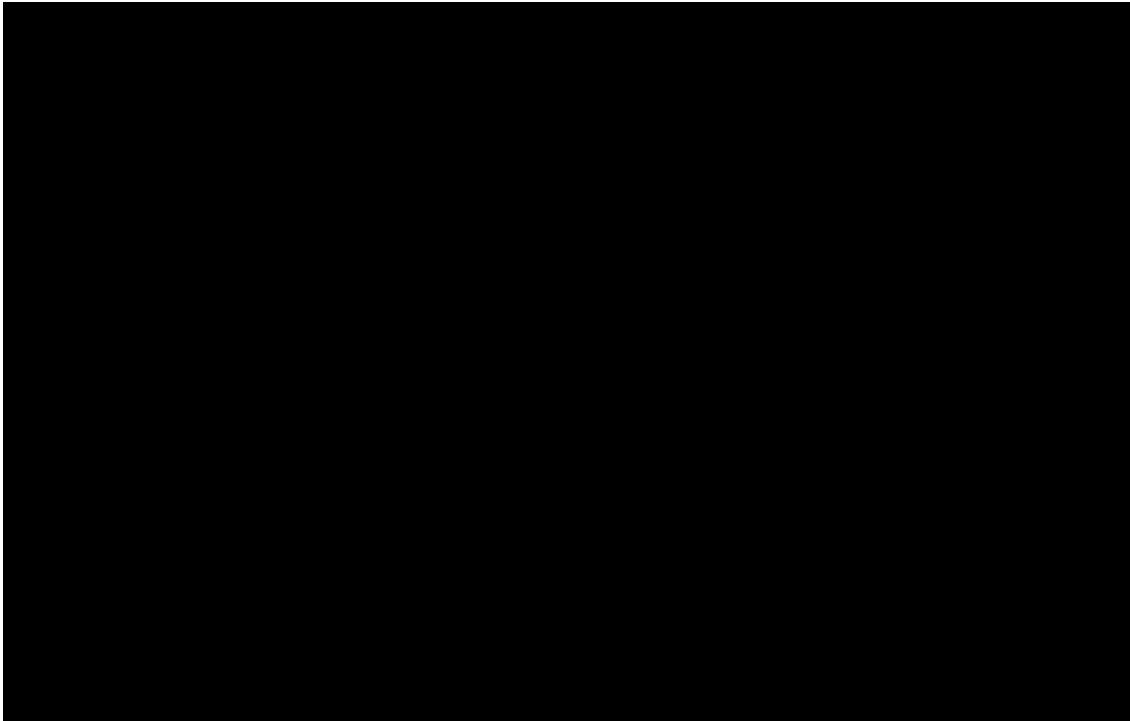
[Redacted]

3.9.7.3 LEASE TRANSPORT VENDORS

[Redacted]

3.9.7.4 FIBER EXTENSIONS

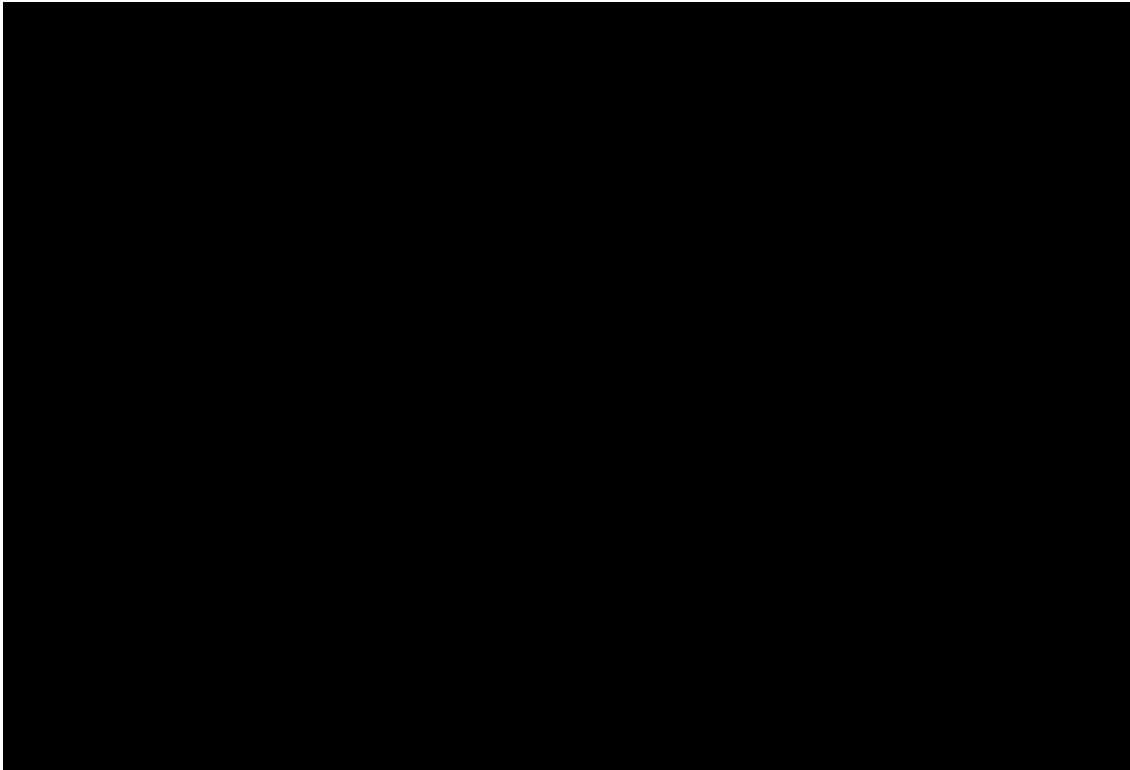
Government agencies can reach the Level 3 OWS through fiber extensions. Level 3's facilities-based metro networks can be utilized to extend Wavelengths as an alternative access method for agencies that are not located in our collocation facilities. In its simplest variation, customers that are physically connected to the Level 3 fiber network can establish an [Redacted] between the agencies' equipment and Level 3. Details are shown in Figure 3.9-4.



3.9.7.5 LEVEL 3-PROVIDED ACCESS



To reach the Government customer who may exceed recommended distances or require protection in a metro area, Level 3 can provision a wavelength, from our remote collocation facility over Level 3 fiber facilities or use [REDACTED] to reach the premise. Level 3 would then place [REDACTED]





3.9.7.6 DETERMINING ACCESS FOR OFF NET GOVERNMENT BUILDINGS



 Level 3 will conduct preliminary engineering analysis and cost estimating for these buildings, per agency request. After receiving further guidance from the agency, Level 3 will further refine the available options. As standard process, Level 3 investigates multiple options 



[Redacted text block]

[Redacted text block]

[Redacted text block]

Whether the fiber access is Level 3 or [Redacted], the AQL and KPI for OWS will be met. Industry best practices are followed (and often exceeded) by Level 3. The same level of support will be required of any third party vendors that supply fiber. In either case, the equipment supporting the OWS will be owned and managed by Level 3 to maintain the highest standards of service.

3.9.8 Verification of Individual Services

[Redacted text block]

[REDACTED]

3.9.9 Handling Time-Sensitive Traffic

When working with wavelengths, factors such as service availability and latency should be researched to ensure that the transport medium appropriately supports the delivery of voice, video, and data in a timely manner. In addition to ensuring that the service provides a timely delivery mechanism, it's important to note that wavelength service is a clear channel service [REDACTED]

[REDACTED]

[REDACTED] OWS is a means of ensuring that bandwidth exists to transport critical voice and data services from one point to another. However, it is up to the Government engineers purchasing OWS to provide the guarantees in this requirement since Level 3 has no visibility whatsoever into the loading factors on the OWS, or into the services being supported on the OWS.

3.9.10 Integrated Access for Different Performance Requirements

This section describes the approach for providing integrated access to locations that support customer applications with different performance requirements.

Level 3 wavelength service is medium for transporting multiple traffic types such as voice, data, and video. Thus we presume the Government has

integrated multiple services and purchased OWS to transport them to the appropriate location. [REDACTED]

[REDACTED]

Section 2.3.1 of this proposal describes Level 3's ability to handle multiple traffic types in detail. Sections 3.9.3 and 3.9.7 provide a general discussion of our access standard access arrangements.

3.9.11 Infrastructure Enhancements and Emerging Services

A detailed response to this requirement is provided in Section 3.4.11 of this proposal.

3.9.12 Network Convergence

Using Level 3's OWS will allow the Government the bandwidth necessary to converge multiple technologies onto one platform, allowing for true network convergence. [REDACTED]

3.9.13 IS and PSTN Interoperability

IP and PSTN Interoperability is not applicable to our OWS offering.

3.9.14 Approach for IPv4-to-IPv6 migration

IPv4-to-IPv6 migration is not applicable to our OWS offering.

3.9.15 NS/EP Functional Requirements

See the detailed response in Section 2.5 of this proposal.

3.9.16 Protection of SS7 Signaling

Section C.5.2.5 of the RFP with respect to protection of SS7 signaling systems is not relevant to Level 3's OWS offering.

Security of our network and data is significant to both Level 3 and our customers. Section 2.5.3 of this proposal discusses protection of SS7 signaling systems in detail.

3.9.17 National Capital Region Service

Section 2.5.2 of this proposal demonstrates Level 3's compliance with the Government's requirements for service in the National Capital Region.

3.9.18 Meeting Section 508 Provisions

Meeting Section 508 Provisions as specified in Section C.6.4 of the RFP is not applicable to Level 3's OWS offering.

3.9.19 Optional Service Impact on Network Architecture

OWS is a standard feature of Level 3's standard commercial offerings. There is no impact on the network architecture when implementing OWS. Our network planning team monitors the wavelength growth to ensure adequate capacity is available for new orders.

3.9.20 Optimizing Engineering

Section 3.1.5.1 of this proposal discusses in detail Level 3's approach for optimizing the engineering of IP-based and optical services. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

3.9.21 Service Internetworking

Level 3's vision for implementing service internetworking over a common infrastructure is not relevant to OWS. This topic is discussed in Section 3.1.5.4 of this proposal.

3.9.22 Traffic Model

This section discusses Level 3's current network capacity and utilization in support of Government requirements specified in the Network traffic model. Additional detail addressing this topic can be found in Section 3.1.4.1 of this proposal.

The Level 3 Network has [REDACTED] on every intercity link in its network, and is currently [REDACTED] expanding the network capacity through deployment of the [REDACTED]. This platform uses [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]