VOLUME 1, SECTION 3.12:

VOICE SERVICES

3.12 VOICE SERVICES [C.2.2.1, M.6.1]

Level 3 is a proven voice services provider, with the capabilities and application heritage needed to deliver best-in class service to Government customers.

Level 3 provides a full suite of voice services that cover a range of capabilities including: ISDN-PRI, Digital Trunks for TDM PBX, IP Trunking for seamless IP-PBX access, and Long-Distance. Additionally, we are experienced in all aspects of the voice application – the customer's environment and the voice infrastructure. Level 3 has delivered voice services for a variety of Government and commercial enterprise customer implementations and we have built a world class voice backbone.

We blend these assets to design solutions that suit any point on the spectrum of TDM-to-VoIP migration and fully support network convergence.

Unlike many voice service providers, our solutions are powered by a vast voice network and facilities-based local access, which optimizes service quality, reliability and price-performance. The depth of our PSTN connectivity allows us to receive and terminate calls closer to customers' origination and end points, respectively. This reach increases our span of control over service delivery and improves quality.

3.12.1 TECHNICAL DESCRIPTION OF VOICE SERVICES (C.2.2.1.1)

Level 3's Voice Service offering fulfills the service requirements for Voice Services contained in RFP Section C.2.2.1.1. This section demonstrates our capabilities in the following areas:

- Standards
- Connectivity
- Technical Capabilities

- Features

The Level 3 voice services switching network was constructed to provide superlative interexchange carrier (IXC) services and features in support of incumbent local exchange carriers (ILEC) – in essence a carrier's carrier. Therefore, Level 3 concentrated on providing extraordinary redundancy, diversity, and backbone capacity in the voice services network and switching platforms, building a reputation for high quality, availability and reliability.

The following diagram depicts the positioning of the Level 3 voice services network relative to customers and other carriers:

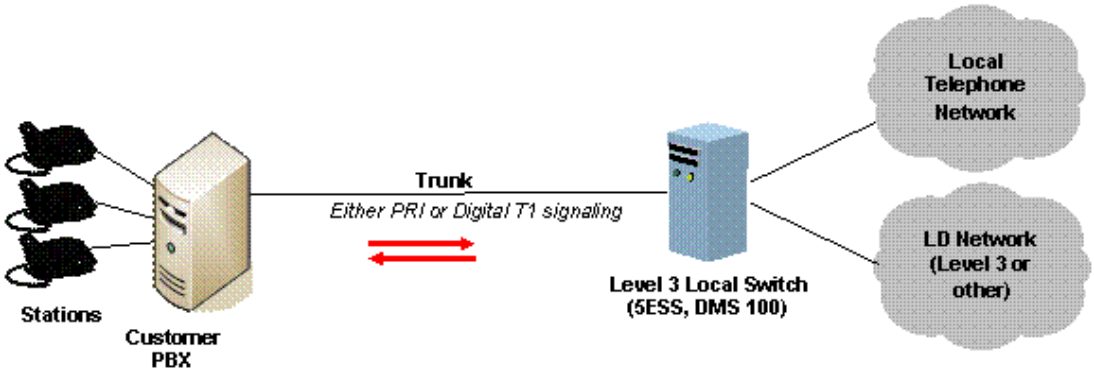

Figure 3.12-1 Level 3 delivers a quality voice service structure.

To deliver the carrier of carrier's service, Level 3 found it expedient to establish connectivity into most carriers' voice switching networks, with the result that Level 3 is now extremely well established with local carriers and local network resources.

Concurrent with deployment of the Level 3 voice switching network, Level 3 built a world-class optical data infrastructure to support voice and data. The following diagram shows the architectural foundation provided by the Level 3 optical infrastructure:

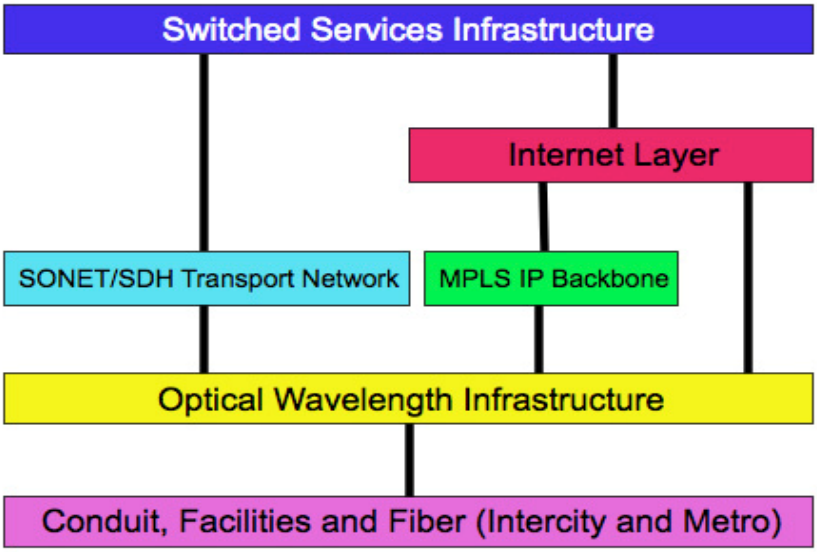

Figure 3.12-2 illustrates the Level 3 architecture for the delivery of voice services.

The result is a converged optical voice and data network of exceptional scope, performance and reliability, with carrier-class support for legacy switching services, as well as a best-in-class IP/MPLS network.

3.12.1.1 Standards (C.2.2.1.1.2)

Level 3 Voice Services comply with the following standards, as applicable to the particular services and functions being delivered. After award, Level 3 may propose alternatives at no additional cost to the Government that meet or exceed the provisions of the standards listed below.

1. ANSI T1.101
2. ANSI ISDN
3. ANSI SS7 standards
4. Telcordia Notes on the Networks, Issue 4, October 2000
5. All applicable Telcordia, ANSI, and ITU Standards

6. ITU-T E.164 as interpreted by the Industry Number Committee of ATIS
7. Level 3 is actively involved in developing, certifying and validating new versions, amendments, and modifications to the above documents and standards before they are offered commercially.

3.12.1.2 Connectivity (C.2.2.1.1.3)

Level 3 is one of the nation's largest CLECs, allowing for the most comprehensive voice termination portfolio. As such, Level 3 maintains effective, high-performance connectivity with all major LECs and most minor LECs as well.

Level 3 Voice Services support connectivity to and interoperate with:

- Government specified terminations (such as single-line telephones, Secure Telephone Unit (STU) III, multiline key telephone systems, conference-room audio equipment, PBX, Centrex, T1 MUX, modem, FAX, and video teleconferencing systems)
- Public Switched Telephone Network (PSTN), including both wireline and wireless networks, in domestic and non-domestic locations
- All other Networx Universal and Networx Enterprise VS Contractors' networks
- Inmarsat (terminal types A, B, M, Mini-M, and Aeronautical) for calls terminating to Inmarsat

3.12.1.3 Technical Capabilities (C.2.2.1.1.4)

3.12.1.3.1 Uniform Numbering Plan

Level 3 VS offer a uniform numbering plan for the following calling situations:

a. Unique directory number for all on-net Government locations, including support for existing FTS2001 numbers
b. PSTN (including both wireline and wireless networks) numbers and any future changes to PSTN numbers
c. Level 3 network-specific private numbers, including access to Level 3 operators, trouble reporting, or other special applications

3.12.1.3.2 Network Intercept

Level 3 provides network intercept services to a recorded announcement as an inherent network capability when a call cannot be completed. Such announcements are provided for the following conditions:

a. Number disconnected (disconnected number shall not be reassigned for at least 90 days for those situations where the contractor controls number assignment)
b. Time out during dialing
c. Network congestion
d. Denial of access to off-net and non-US calls
e. Denial of access to features

3.12.1.3.3 User-to-User Signaling

Level 3 ISDN Primary Rate Interface (PRI) services support user-to-user signaling, in accordance with ITU-TSS Q.931 standards, via the ISDN D-channel during a call.

3.12.1.3.4 Voice Quality

Voice quality on Level 3 Voice Services networks is at least equal to 64 Kbps PCM (standard ITU G.711).

3.12.1.4 Features (C.2.2.1.2.1)

3.12.1.4.1 Caller ID

Calling numbers on incoming calls are delivered to the called party for each call.

3.12.1.4.2 Off-Net Information Calls

Level 3 network users may access off-net directory assistance by dialing NPA-555-1212 or any other valid off-net directory assistance number. NPA also includes service access codes, e.g., 800, for this feature.

3.12.1.4.3 Operator Services

Operator support services are available 24 hours a day, 7 days a week.

3.12.1.4.4 Suppression of Calling Number Delivery

Level 3 permits suppression of calling number delivery by either the originating or terminating on-net customer. Suppression of calling number delivery is performed by the originating or terminating switch and Level 3 will not modify the SS7 data related to the caller.

3.12.1.5 Interfaces (C.2.2.1.3)

Level 3 offers the User-to-Network interfaces (UNIs) at the SDP as described in the table below as standard service features:

Voice Services Interfaces (C.2.2.1.3.1)			
UNI Type	**Interface Type and Standard**	**Payload Data Rate or Bandwidth**	**Signaling Type**

Voice Services Interfaces (C.2.2.1.3.1)			
UNI Type	**Interface Type and Standard**	**Payload Data Rate or Bandwidth**	**Signaling Type**
6	Digital Trunk: T1 (Std: Telcordia SRTSV-002275 and ANSI T1.102/107/403)	Up to 1.536 Mbps	T1 Robbed-Bit Signaling
7	Digital Trunk: ISDN PRI T Reference Point (Std: ANSI T1.607 and 610)	Up to 1.536 Mbps	ITU-TSS Q.931
8	Digital: T3 Channelized (Std: Telcordia GR-499-CORE)	Up to 43.008 Mbps	SS7, T1 Robbed-Bit Signaling
10	Optical: SONET OC-1 (Std: ANSI T1.105and 106) (Optional)	49.536 Mbps	SS7
11	Electrical: SONET STS-1 (Std: ANSI T1.105 and 106) (Optional)	49.536 Mbps	SS7
Table 3.12-1 Details the Level 3 Voice Services interfaces.			

3.12.2 REQUIRED PERFORMANCE METRICS (C.2.2.1.4.1)

In accordance with RFP Section C.2.2.1.4.1, Level 3 will provide the performance metrics (as clarified in Section 3.12.6 of this proposal) shown in the table below, for our Voice Services offering:

Voice Service Performance Metrics			
Key Performance Indicator (KPI)	**Service Level**	**Performance Standard (Threshold)**	**Acceptable Quality Level (AQL)**
Availability (POP-to POP)	Routine	99.95%	≥ 99.95%

Voice Service Performance Metrics			
Key Performance Indicator (KPI)	**Service Level**	**Performance Standard (Threshold)**	**Acceptable Quality Level (AQL)**
Availability (SDP-to-SDP)	Routine	99.5%	≥ 99.5%
	Critical (Optional)	99.95%	≥ 99.95%
Time to Restore	With Dispatch	8 hours	≤ 8 hours
	Without Dispatch	4 hours	≤ 4 hours
Grade of Service (Call Blockage)	Routine	0.07 (SDP-to-SDP)	≤ 0.07
		0.01 (POP-to-POP)	≤ 0.01
	Critical (Optional)	0.01 (SDP-to-SDP & POP-to-POP)	≤ 0.01
Table 3.12-2 details the Level 3 Voice Services performance metrics.			

3.12.3 PROPOSED SERVICE ENHANCEMENTS

Level 3 does not intend to exceed the AQLs in the KPIs at this time but would like to reserve the ability to do so with performance improvements that may be attained through the introduction of new technology. Level 3 believes in continuous improvement and will always strive to deliver the highest quality services.

3.12.4 EXPERIENCE DELIVERING VOICE SERVICES

Networx customers will benefit from having the Level (3) Enterprise team as their partner for VS in the same way many of the top companies in the US and Europe have benefited from their choice of Level 3 as their partner:

- CLEC status in all 50 states
- Network and telephone numbers in rate centers covering over 85% of U.S. households
- Over 1.7 million voice-capable trunks connect Level 3 to the PSTN
- Connectivity to every long distance tandem office in the United States

- Carry over 6 billion minutes of U.S. and international traffic every month
- 100% On-net Feature Group D (FGD) origination and termination capability
- First internationally deployed Softswitch for voice to VoIP conversion
- FCC-compliant E911 VoIP solution (3,517 rate centers; 5,463 PSAPs)

In sum, Level 3 is a world-class voice services provider, an innovator in delivery of voice services via IP, and Level 3 provides the inter-exchange underpinning for most U.S. ILEC's. Therefore, Level 3 should be the Government's choice to deliver high performance, high reliability, and low cost voice services.

3.12.5 ACCESS ARRANGEMENTS

As a competitive local exchange carrier (CLEC) in all 50 states, Level 3 has been very active in bringing our largest customers on-net. That is, building fiber optic access into our customer's facilities, to provide diversity, redundancy and lower cost services. Therefore, Level 3 will evaluate each site individually to determine the best business case to satisfy the customer and deliver the finest service possible.

If the site is already on-net, optical fiber will be in place connecting to a Level 3 POP, with appropriate termination equipment at each end. If the site is off-net, Level 3 will investigate the feasibility and cost involved to bring the site on-net versus the alternative access methods available. In consultation with the respective customer, a business case may be developed and the most appropriate access plan may be implemented.

To build access between the Government customer site and The Level 3 Network, we will investigate constructing new fiber routes, purchasing third party dark fiber, or leasing off-net connectivity from another service provider. In those cases where third party fiber is employed, industry-standard KPIs/AQLs will be required from the supplier so that industry best practices are supported.

Where fiber connectivity is not a viable option, Level 3 will, on the customer's behalf, lease services from another service provider.

The following diagram provides a high-level overview of the variety of access arrangements Level 3 has implemented for our customers:

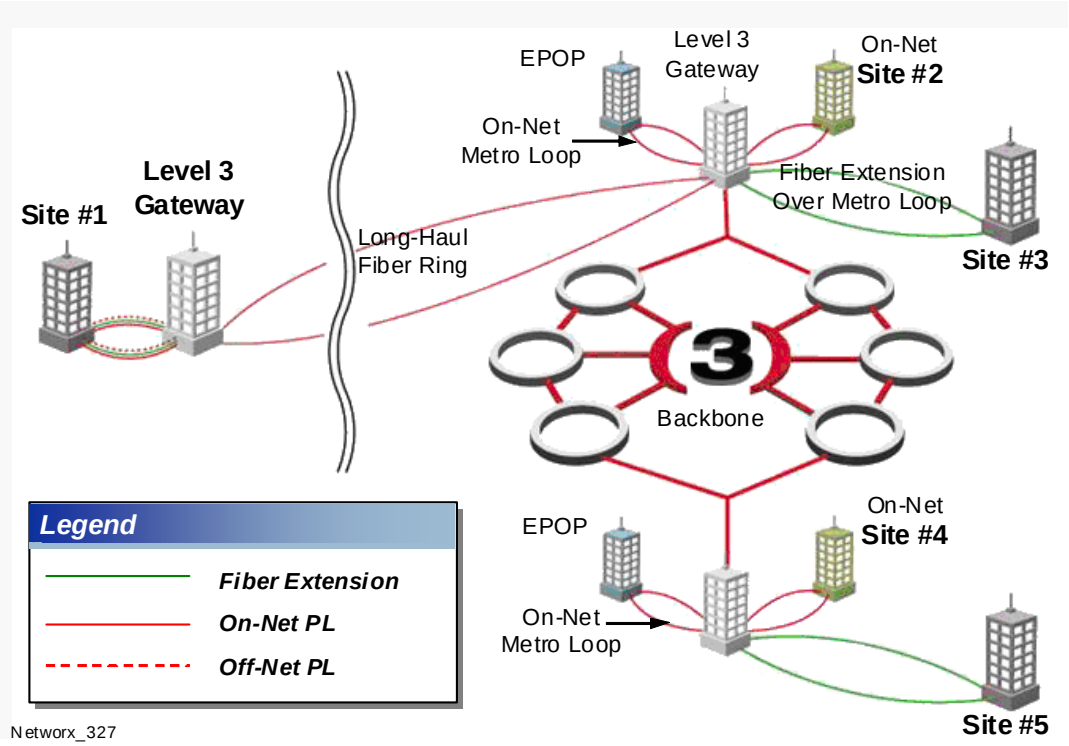

Figure 3.12-3 Level 3 access arrangements are very flexible numerous sites can be connected in numerous ways

3.12.6 MONITORING AND MEASURING KPIS AND AQLS

This section describes the Level 3 approach to ensuring compliance with the Government-specified Key Performance Indicators (KPIs) and Acceptable Quality Levels (AQLs) for Voice Services (VS) as defined in Table C.2.2.1.4.1, Voice Services Performance Metrics. In addition to collecting performance data, Level 3 will demonstrate to the Government that we are, in fact, performing within the specified KPIs/AQLs.

For the initial turn up of the circuit, a bit error rate (BER) test is performed end-to-end. If the test results are satisfactory, then the circuit is turned over to the Government. The KPIs for VS are measured over time in service of the circuit: availability and time to repair (TTR).

The Level 3 Transport Management Infrastructure and Operations Team is responsible for monitoring and managing our VS offering. Below is a summary of the specific tools used by our network management staff for comprehensive visibility of numerous network elements associated with VS and the ability to accurately measure AQLs for the applicable KPIs.

Clarify: Trouble ticketing system. All relevant alarm data including diagnostic network information is included in the body of the trouble ticket. The trouble ticket data is updated throughout the lifecycle of the event by the Level 3 Service Management Staff. Trouble ticket details, including all alarms and staff notes, are available for view on-line via our Enterprise Portal.

TrailBlazer: The Level 3 user interface for service activation and for troubleshooting transport services.

Ops Automation (OA): A custom built application developed and used by Level 3 to automate network monitoring and management. The system monitors and manages all alarms received across the network through the

Network Topology Viewer database (NTV). The Operations Automation engineering staff evaluates the alarms and correlates them to a customer's service using the object models created and maintained in TrailBlazer.

Network Topological Viewer (NTV): NTV is the single interface where all transport faults are aggregated and correlated to customer services. NTV shares information with our network configuration (TrailBlazer), Trouble-Ticketing (Clarify) and Operations Automation systems.

The KPIs measured for VS are described below.

- **Availability:** The percentage of minutes a customer's physical access port is able to send and/or receive traffic in a given month. Availability is determined in the following manner:
  - $Av = RI(HR) - \frac{COT\ (HR)}{RI(HR)} \times 100$
- **Unavailability**: Is calculated by the total number of minutes an access port is unable to send and/or receive traffic over the course of a month. Unavailable minutes are determined via trouble tickets submitted by the customer.
- **Time to Restore:** Level 3 measures the Time to Restore (TTR) as the customer-facing time to restore a problem. Our metric represents the gross internal performance of our service management teams. Specifically, the duration of an unexcused outage on a service port would be measured from the time a trouble ticket is opened to the time that service is restored.

Level 3 provides the Government an insight into the performance of Level 3's proposed VS using web-based tools.

3.12.7 HANDLING TIME-SENSITIVE TRAFFIC

Level 3 maintains Stratum-1 timing on all time division multiplexed (TDM) transport facilities to assure end-to-end timing is maintained across the facilities. Timing continuity is then monitored and verified by network operations staff in our network operations centers.

Our network operations and engineering teams maintain sufficient excess capacity to assure that even at the busy hour, network availability, call completion and blocking levels are well within desired levels. As traffic levels grow, additional resources are brought on-line to address the traffic.

3.12.8 INTEGRATED ACCESS FOR DIFFERENT PERFORMANCE REQUIREMENTS

Our approach for providing integrated access to locations that support customer applications with different performance requirements is described below.

Level 3 prefers to provide VS access over dedicated fiber links. Additional services can be provided over the fibers with additional equipment. Add-drop multiplexers (ADMs) with appropriate interfaces for the different services required by the Government will be deployed as necessary for the services ordered. Typically, different services will use different, distinct fiber strands, or different wavelengths on the same fibers, going to the site. Thus applications requiring different service and performance levels will not interfere with the high quality required for Level 3 voice services.

3.12.9 INFRASTRUCTURE ENHANCEMENTS AND EMERGING SERVICES

This section describes the approach for incorporating infrastructure enhancements and emerging services that Level 3 believes are likely to become commercially available in the timeframe covered by this acquisition, including a discussion of potential problems and solutions.

Level 3 is committed to providing all customers with access to the latest technology developments and enhancements for both hardware and software. As customer requirements change, Level 3 will recommend modifications, or upgrades to existing facilities. After a thorough cost/benefit analysis, in consultation with the customer, Level 3 will develop a revised network design and transition plan. Only with the approval of the customer, will Level 3 make a network design change that could potentially impact the service level the customer is receiving.

The Level 3 account team is constantly reviewing the available technology and evaluating it's feasibility within the customer network. They will periodically provide the customer with training on emerging technologies and explain how those technologies might improve the operational environment for the customer.

For example, when voice services customers are ready to consider migrating to the world-class Level 3 voice over IP (VoIP) services, their Level 3 account team will be prepared to assist them. Then a practical plan will be developed to assure a smooth transition, on the customer's timetable.

Changes to the Level 3 backbone network infrastructure are being made all of the time. While these changes are not entered into lightly, they are generally required to maintain Level 3's prominence in the telecommunications transport market – and to maintain the highest levels of performance and low cost that our customers have come to expect.

Permanently established architecture teams (Optical Transport, Data and IP, Voice) are constantly evaluating new hardware, software, and network designs for innovative features and economic advantage. Once something new demonstrates the potential for significant beneficial capabilities,

performance improvements or major cost reductions, it is tested in our evaluation laboratory.

Level 3 has established an elaborate test facility at our corporate headquarters in Colorado for just this purpose. Only upon successful completion of evaluation and testing, and development and testing of implementation and transition plans, are changes to the infrastructure scheduled. Backbone network service events are scheduled for low volume periods, to avoid any chance that customer operations might be affected by the service event.

3.12.10 NETWORK CONVERGENCE

Level 3 is committed to provide customers networks with the highest performance and reliability possible. To deliver on this commitment Level 3 has constructed a thoroughly converged network.

During the design process, Level 3 Engineers evaluate transport solution requirements to deliver the highest reliability and performance service to the customer, employing network resources that will deliver the best cost/performance appropriate to the specific requirement. Where service over a converged network will provide the customer with improved service, lower cost, and/or improved flexibility, the Level 3 Engineer will specify those services.

As a general rule, lower bandwidth network transport requirements are better served over a converged infrastructure, while higher bandwidth requirements benefit from lower network complexity. However, Level 3 depends on the high quality of our customer focused engineering resources to make the ultimate determination, based on the best interests of the specific customer.

3.12.11 IP AND PSTN INTEROPERABILITY

IP and PSTN Interoperability is not applicable to our Voice Services (VS) offering.

3.12.12 IPV4-TO-IPV6 MIGRATION

IPv4-to-IPv6 migration is not applicable to our Voice Services (VS) offering.

3.12.13 NS/EP FUNCTIONAL REQUIREMENTS

Level 3's approach to satisfying the NS/EP basic functional requirements listed in RFP Section C.5.2.2.1.1 is described in detail in Section 2.5 of the original Networx Enterprise proposal.

3.12.14 PROTECTION OF SS7 SIGNALING

Section C.5.2.4 of the Networx RFP with respect to protection of SS7 signaling systems is addressed in detail in Section 2.1.2 of Level 3's original Networx proposal.

Security of our network, particularly the management and control infrastructure represented by the SS7 components, is of the utmost importance to Level 3 and is a constant focus of Level 3's network management and security organizations.

3.12.15 NATIONAL CAPITAL REGION SERVICE

Level 3's ability to provide service to Government customers during emergencies, such as national security and natural disaster events, is discussed in detail in Section 2.5 of our Networx original proposal submission. Protection of our signaling systems and assurance of coverage in The National Capital Region is addressed in detail therein.

3.12.16 MEETING SECTION 508 PROVISIONS

Meeting Section 508 Provisions as specified in Section C.6.4 of the Networx RFP is addressed in detail in Section 2.5 of Level 3's original Networx proposal.

3.12.17 OPTIONAL SERVICES IMPACT ON NETWORK ARCHITECTURE

Voice Services are part of Level 3's standard commercial offerings. Providing VS to the Government under Networx will have no adverse impacts on network architecture or performance.

3.12.18 OPTIMIZING ENGINEERING

Section 3.1.5.1 of Level 3's original Networx proposal discusses in detail the Level 3 approach for optimizing the engineering of IP-based and optical services.

3.12.19 SERVICE INTERNETWORKING

Level 3's vision for implementing service internetworking over a common infrastructure is not relevant to Voice Services. However, this topic is discussed in Volume 1, Section 3.1.5.4 of Level 3's original Networx proposal.

3.12.20 TRAFFIC MODEL

All Level 3 services use a common network. Therefore, traffic on Level 3's network considers all our proposed services. Traffic related to the Government traffic model and Level 3 is discussed in detail in Volume 1, Section 3.1.4.1 of Level 3's original Networx proposal.