

1.4.17 Layer 2 Virtual Private Network Services (L2VPNS) [C.2.7.12]

Agencies can easily interconnect their sites across metropolitan areas or around the globe using Layer 2 Virtual Private Network Services (L2VPNS). L2VPNS offers a wide range of connectivity options and features, including point-to-point, point-to-multipoint, Classes of Service (CoS), interworking with Ethernet, frame relay, asynchronous transfer mode (ATM), and Internet protocol (IP) networks.

1.4.17.a Reserved [L.34.1.4.6.a]

1.4.17.b Reserved [L.34.1.4.6.b]

1.4.17.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. [L.34.1.4.6.c]

Currently, AT&T offers metropolitan L2VPN VPLS service in 41 markets within 13 states. Branded as "OPT-E-MAN", this service is fiber-based switched L2VPN VPLS service. OPT-E-MAN transparently interconnects multiple customer LANs within the same LATA. Under Networkx contract, AT&T will provide L2VPN VPLS service on May 31, 2007 for Government Agencies to order.

AT&T will integrate its existing metropolitan L2VPN service with domestic L2VPN service to provide an integrated metro and domestic L2VPN service offering. The integration of the metro, domestic service will benefit Agencies by allowing them to obtain L2VPN service from SDP-to-SDP over a single network. For Agency locations outside of the 13 states, AT&T will establish interworking agreements with other metropolitan L2VPN service providers to enable the L2VPN service to reach the Service Delivery Point (SDP).

AT&T uses Martini as the encapsulation method for the VPLS service.

As shown in **Figure 1.4.17.1-1**, AT&T will provide the Government a L2VPNS VPLS that is fully compliant with the VPLS requirements in the RFP and provides Agencies multipoint-to-multipoint services over a common IP/MPLS backbone as shown between Agency Locations 3, 4, 5 (Logical LAN A), or Agency Locations 4, 5, 6 (Logical LAN B).

AT&T’s approach to service delivery is based on four key principles. These principles are summarized in **Table 1.4.17.c-1**.

SERVICE DELIVERY APPROACH	DESCRIPTION
Wholly owned and operated global infrastructure	L2VPNS is offered on AT&T’s wholly owned and operated IP/Multi-protocol label switching (MPLS)-based infrastructure, as shown in Figure 1.4.17.1-1 . <ul style="list-style-type: none"> • AT&T fully controls the design and operation parameters • End-to-end visibility into the entire network • AT&T does not rely on third parties, network-to-network interface (NNI), or bilateral agreements to extend its backbone reach.
Suite of services (no service islands)	L2VPNS is a member of AT&T’s extensive IP VPN portfolio. This portfolio is a comprehensive suite of network services designed to meet the advanced application needs of Government Agencies and commercial organizations <ul style="list-style-type: none"> • A range of interoperable network-based, premises-based, and integrated (a combination of network- and premises-based solutions) IP VPN implementations is offered <div style="background-color: black; height: 40px; width: 100%;"></div> <ul style="list-style-type: none"> • The management continuum ranges from individual customer-managed elements to fully managed services by experienced personnel. • AT&T enhances the value of IP VPNs by tackling the increasing complexity of integration on behalf of the Agencies. Services are refined into solutions as opposed to stand-alone offers • Procurement and management of customer premises equipment (CPE) are options for the Agencies • AT&T’s strength is in its ability to seamlessly interwork the widest variety of IP VPN implementations.
Complementary value-added services	Agencies that deploy L2VPNS will be able to easily subscribe to a range of additional services, including: <ul style="list-style-type: none"> • Internet • Security • Hosting • Storage • Content Delivery
Offering a full-featured service	A full set of features and capabilities are offered, as shown in Figure 1.4.17.1-1 , including: <ul style="list-style-type: none"> • VPLS (Virtual Private LAN Service) as shown between Agency Locations 1,2,3 (LAN A), or 2,3,4 (LAN B) • Classes of Service • Routing Support and Transparency

Table 1.4.17.c-1: AT&T’s Approach to Service Delivery. A full suite of complementary services offered on a seamless global network enables Agencies to reliably interconnect their geographically dispersed networks across town and around the globe.



AT&T's approach to service delivery will allow Agencies to interconnect their geographically dispersed networks across town and around the globe.

Current Analysis

"AT&T's IP VPN services, under the banner of AT&T IP VPN Solutions, are threatening to competitors because the carrier combines the reach and reliability of the AT&T Global Network with a vast portfolio of Services."

November 2004.

Figure 1.4.17.c-1: L2VPNS. Agencies can interconnect their LANs and Layer 2 networks using scalable, high-performance, and secure solutions provided by AT&T's Layer 2 VPN Service.

Agencies will be able to leverage the ubiquity, simplicity, and flexibility of Ethernet to interconnect their geographically dispersed local area networks (LANs) and Layer 2 networks using L2VPNS.

AT&T will offer a wide range of capabilities, features, and interfaces to meet and exceed Agencies' requirements for Layer 2 VPN services.

1.4.17.c.1 Capabilities

AT&T will fully satisfy the Government's requested capabilities for layer 2 VPN VPLS services:

- Full meshed connectivity for Agencies' Ethernet LANs, as shown in **Figure 1.4.17.c-2**. VPLS provides Agencies with a scalable, cost-effective means of creating a fully meshed network in which all devices appear to be on the same LAN segment, using the Ethernet standard.

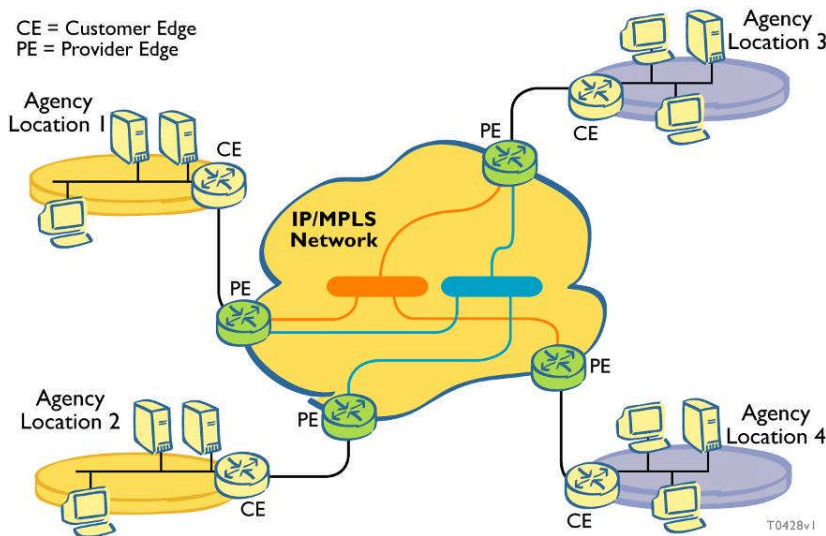


Figure 1.4.17.c-2: Virtual Private LAN Service. Fully meshed interconnection of Agency locations provides scalable, any-to-any connectivity to Agencies.

L2VPNS provides connectivity on a Layer 2 basis. Therefore, Agencies do not have to share routing information with AT&T, providing additional convenience, flexibility, and security.

The capabilities offered by L2VPNS are summarized in **Table 1.4.17.3-1**.

CAPABILITIES	DESCRIPTION	BENEFIT TO AGENCIES
Access and connectivity features	<ol style="list-style-type: none"> 1. Service Types <ul style="list-style-type: none"> • VPLS – Fully meshed connectivity 2. Connectivity Options <ul style="list-style-type: none"> • Connectivity across MAN (Metro Area Network), and WAN (Wide Area Network) • Intra-Agency Connectivity: Connection of LANs in same Agency • Inter-Agency Connectivity: Connection of LANs from different Agencies • Internet Connectivity: Connection to Internet from same access line that Agency uses for L2VPNS, [REDACTED] 3. Full Port and VLAN Access <ul style="list-style-type: none"> • Full Port Ethernet Access: Entire bandwidth available on given port on AT&T's provider edge (PE) router is available to Agency site. • VLAN Ethernet Access: Several customer connections are aggregated onto single physical port. Each individual Agency site or VPN is provided on separate VLAN. 4. Supported Speeds: <ul style="list-style-type: none"> • L2VPNS supports port and VLAN speeds from 1 Mbps to 10 Gbps (Table 1.4.17.3.A.3-1) 	<ul style="list-style-type: none"> • Flexibility to meet diverse Agency requirements in connectivity speeds • Scalability to allow Agencies to grow their networks over time, consistent with traffic demand from their users • Convenient connection to Internet from same access line reduces Agency access costs
Routing support, transparency, encapsulation, Network interworking	<ul style="list-style-type: none"> • L2VPNS is Layer 2 service, and supports any Layer 3 routing protocol, including open shortest path first (OSPF), enhanced interior gateway protocol (EIGRP), routing information protocol (RIP), and border gateway protocol (BGP) • Agencies have full control over their routing schemes, and do not have to share those with AT&T [REDACTED] • Martini encapsulation scheme used • User data is not terminated or "touched" • Support for IPv4, and IPv6 	<ul style="list-style-type: none"> • All Agency routing protocols are supported, providing service continuity and backward compatibility • Agencies do not have to share routing information with AT&T, providing additional flexibility and security • Addressing simplification, and scalability
Performance and reliability features	<p>L2VPNS is supported by many performance and reliability features, including:</p> <p>[REDACTED]</p>	<p>High quality and reliable service enables Agencies to fulfill their mission goals efficiently and largely without service interruption.</p>
Geographic coverage	<p>[REDACTED]</p>	<p>Enables Agencies to interconnect within metro area and/or around globe with same ease.</p>

Table 1.4.17.c-2: L2VPNS Capabilities. Agencies will benefit from a full-featured service suite offering simplicity, performance, reliability, and wide geographic coverage.

These capabilities will offer Agencies a full featured service suite that offers simplicity, performance, reliability, and wide geographic coverage.

1.4.17.c.2 Features

AT&T will satisfy all the service features requested by the Government for Layer 2 VPN VPLS. These features and their associated benefits are summarized in **Table 1.4.17.3-2**.

FEATURES	DESCRIPTION	BENEFIT TO AGENCIES
Classes of Service (CoS)	[REDACTED]	<ul style="list-style-type: none"> Agencies are offered wide flexibility to prioritize their traffic, based on tolerance to delay, jitter, and packet loss Real-time voice and video do not compete for network resources with noncritical data (e.g., email), resulting in enhanced performance for voice and video, resulting a higher quality service
High Availability Features	[REDACTED]	Highly available, high quality service protects Agencies against risks associated with productivity losses which can potentially result from service interruptions

Table 1.4.17.c-3: L2VPNS Features. AT&T will satisfy all the features requested by the government for Layer 2 VPN services.

Agencies can prioritize their traffic [REDACTED] as listed in **Table 1.4.17.3-3**. Classes of Service are available on a per VLAN basis. Each VLAN on a customer access link can have a different CoS profile.

CoS PACKAGE	CLASSES AVAILABLE	PROFILES AVAILABLE	PROFILE NUMBER	BANDWIDTH ALLOCATION					
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

CoS PACKAGE	CLASSES AVAILABLE	PROFILES AVAILABLE	PROFILE NUMBER	BANDWIDTH ALLOCATION				

Table 1.4.17.c-4: L2VNS Classes of Service.

1.4.17.c.3 Interfaces and Speeds

L2VPNS supports a wide range of optical and electrical interfaces supporting speeds from 1 Mbps to 10 Gbps as listed in **Table 1.4.17.3-4**.

PORT SPEEDS	ACCESS SPEEDS AVAILABLE PER VLAN
10 Gigabit Ethernet (10,000 Mbps)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 20, 30, 40, 50, 60, 80, 90, 100, 150, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 2000, 3000, 4000, 5000, 6000, 7000, 8000, 9000, 10000 Mbps
Gigabit Ethernet (1000 Mbps)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 20, 30, 40, 50, 60, 80, 90, 100, 150, 200, 300, 400, 500, 600, 700, 800, 900, 1000 Mbps
Fast Ethernet (100 Mbps)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100 Mbps
Ethernet (10 Mbps)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10 Mbps

The speeds in the above table are available on a per VLAN basis, allowing

Table 1.4.17.c-5: L2VPNS Supported Speeds. Agencies will benefit from a scalable solution that provides port and VLAN speeds from 1 Mbps to 10Gbps.

the Agencies great flexibility and scalability in ordering the bandwidth that is most suited to their application, with an option of upgrading quickly and cost effectively when their traffic needs grow.

1.4.17.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. [L.34.1.4.6.d] AT&T will comply with and meet or exceed the L2VPNS quality performance metrics specified in Section C.2.7.12.4.1, as illustrated in **Table 1.4.17.2-1**.

KEY PERFORMANCE INDICATOR (KPI)	SERVICE LEVEL	PERFORMANCE STANDARD (THRESHOLD)	PROPOSED SERVICE QUALITY LEVEL
Availability	Routine	99.8%	
	Critical (Optional)	99.999%	
Latency(CONUS)	Routine	100 ms	
Latency(OCONUS)	Routine	400 ms	

KEY PERFORMANCE INDICATOR (KPI)	SERVICE LEVEL	PERFORMANCE STANDARD (THRESHOLD)	PROPOSED SERVICE QUALITY LEVEL
Time to Restore (TTR)	Without Dispatch	4 hr	
	With Dispatch	8 hr	
Jitter(Packet)	Routine	10 ms	
Grade of Service (Data Delivery Rate)	Routine	99.9%	
	Critical (Optional)	99.95%	

Table 1.4.17.d-1: L2VPNS Key Performance Indicators. AT&T meets or exceeds GSA networks requirements in service performance.

Focusing on an Agency’s service experience produces a high-quality solution, and service experience must be measured quantitatively through the KPIs. However, high quality is not necessarily attained through exceptional performance of a single KPI. For example, an inferior response to the Agencies’ maintenance and support needs can quickly erase the benefits of exceptional network latency performance. Agencies will receive high-quality service through the combination of the six network and service attributes that ultimately directly affect the quality delivered to the end user: scale, global footprint, high availability and data delivery, low-packet latencies and jitter, and quick-service restoration.

1.4.17.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. [L.34.1.4.6.e]

[REDACTED]

1.4.17.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. [L.34.1.4.6.f]

“AT&T leads the \$2.2 billion U.S. IP VPN market, with more than double the market share of its closest competitor. This is the second consecutive year that AT&T has taken the top spot, making it the first provider to get back-to-back #1 rankings”

--IDC

September 2004

AT&T has a proven track record of providing high quality, and cost effective VPN solutions to a large number of Government and commercial organizations. Two typical examples are summarized in **Table 1.4.17.3-5**.

<i>Client Need</i>	<i>Solution</i>	<i>Created Value</i>
[REDACTED]	[REDACTED]	[REDACTED]
<i>Client Need</i>	<i>Solution</i>	<i>Created Value</i>
[REDACTED]	[REDACTED]	[REDACTED]

Table 1.4.17.f-1: Experience Delivering IP VPN Services. Success is measured by the ability to deliver solutions to Agencies that create value to their business.

AT&T’s experience, along with established methods and procedures in providing IP VPN solutions to a large number of Government and commercial organizations, will provide Agencies a proven means of deploying layer 2 VPN services.

1.4.17.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. [L.34.1.4.6.g]

The first time the service is provided through the Networkx contract, the service performance must be verified; KPIs will be monitored to certify that

the service performance complies with the AQL. **Table 1.4.17.g-1** summarizes the verification and testing procedures for the Ethernet KPIs.

KEY PERFORMANCE INDICATOR (KPI)	APPROACH TO MONITORING AND MEASURING
Availability	[REDACTED]
Latency – CONUS	[REDACTED]
Latency – OCONUS	[REDACTED]
Jitter (Packet)	[REDACTED]
Grade of Service (Data Delivery Rate)	[REDACTED]
Time to Restore (TTR)	[REDACTED]

Table 1.4.17.g-1: Monitoring and Measuring KPIs. Agencies can easily manage EthS with easy-to-access and use data delivered through the AT&T **BusinessDirect** web portal.

To simplify the verification process, AT&T has automated the process. The common testing platform provides an integrated system to perform service verification testing and present the results either on AT&T **BusinessDirect** or by written report. The service verification process is presented in greater detail in Section 1.3.2.d, Approach to Perform Service Delivery Verification.

Through a comprehensive verification process, Agencies and the GSA will receive concrete data that demonstrates the readiness of the L2VPN services. AT&T follows detailed procedures to verify L2VPN service, by comparing the KPI data against the stated AQLs, as described in the Verification Test Plan.

1.4.17.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). [L.34.1.4.6.h]



[REDACTED]

1.4.17.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. [L.34.1.4.6.i]

The approach for incorporating into the proposed optional services, technological enhancements, and improvements is described in Section 1.3.3.d.

1.4.17.1 Reserved

1.4.17.1.a Reserved

1.4.17.1.b Reserved

1.4.17.1.c Reserved

1.4.17.1.d Reserved

1.4.17.2 Reserved

1.4.17.2.a Reserved

1.4.17.2.b Reserved

1.4.17.2.c Reserved

1.4.17.2.d Reserved

1.4.17.3 Reserved

1.4.17.3.a Reserved

1.4.17.3.a.1 Reserved

1.4.17.3.a.2 Reserved



- 1.4.17.3.a.3 Reserved**
- 1.4.17.3.b Reserved**
- 1.4.17.3.c Reserved**
- 1.4.17.3.d Reserved**
- 1.4.17.4 Reserved**
- 1.4.17.4.a Reserved**
- 1.4.17.4.b Reserved**
- 1.4.17.4.b.1 Reserved**
- 1.4.17.4.b.2 Reserved**
- 1.4.17.5 Reserved**
- 1.4.17.5.a Reserved**
- 1.4.17.5.b Reserved**
- 1.4.17.5.c Reserved**
- 1.4.17.5.d Reserved**

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1.4.17.6 Stipulated Deviations [L.34.1.4.6.a]

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

1.4.17.6.1 Reserved**1.4.17.6.2 Reserved****1.4.17.7 Narrative Requirements [L.34.1.4.6.b]****1.4.17.7.1 Encapsulation Protocols [C.2.7.12.1.4 (8)]**

Encapsulation Methods - The contractor shall indicate what encapsulation schemes are supported by its networks in order to support L2VPNS; i.e., Martini encapsulation, Q-tag stacking (Q-i-Q), MAC Address Stacking (MAS) and MAC in MAC (MIM).

