## 1.4.6 Internet Protocol Service (IPS) [C.2.4.1]

*Agencies will access an Internet Protocol Service (IPS) with comprehensive layered security, superior end-to-end service performance guarantees, and the industry's most recognized service-monitoring and management portal.*

## 1.4.6.1 Technical Approach to Transport/IP/Optical Service Delivery [L.34.1.4.1]

### 1.4.6.1.a Approach to Service Delivery

(a) Analyze the service requirements specified in this solicitation and describe the approaches to service delivery for each service.

Agencies use IPS to establish a wide range of connectivity options that enable end users to access the Internet, government-wide intranets, and extranets with Agency constituents. Agencies require IP services that are:

ovum

*As a provider of global IP services, AT&T seems to be doing all the right things— moving forward with its "IP everything" strategy.*

Mav 2004

- High quality, secure, reliable, and flexible

- Complete, with a rich feature set

- Enable end users to access and use IP-based services that support Agency-specific mission and objectives in line with the Federal Enterprise Architecture (FEA) and other government mandated initiatives, such as e-Government (eGov) and Telework.

- Supportive of Services Oriented Architecture (SOA) and Services over IP (SoIP).[1]

AT&T has a long and proven history of providing IP services to Government Agencies, public and private enterprises, and small businesses. ███████ ████████████████████████████████████████████████████████████████

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[1] SOA refers to a modular architecture based upon network services while SoIP refers to converging real-time and non real-time traffic onto a common infrastructure.

██████████████████████████████ An early adopter of MPLS technology as a platform for service convergence, AT&T has since gained a tremendous wealth of operational knowledge in SoIP.

**Figure 1.4.6.1-1** provides a high-level representation of AT&T's approach to using MPLS as a convergence platform for all voice, data, and video traffic streams and across all AT&T services.

**Figure 1.4.6.1-1:** ████████████████████████ *Agencies seamlessly migrate to a converged environment through an architecture designed to support voice, data, and video convergence over an IP infrastructure.*

IPS is a component of the Multi Service Edge (MSE) layer that uses the underlying service-agnostic MPLS layer. As shown in **Figure 1.4.6.1-1**, IPS provides Internet, Intranet, and extranet functionality to Agencies while MPLS provides IPS with transport and a set of ancillary services.

Associated with this architecture are three key components. First, the architecture allows separation between the services that are delivered to Agency end users and the individual technologies[2] (and their associated limitations) used to deliver those services. ████████████████████████

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[2] *Access technologies such as Frame Relay, ATM, etc.*

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████████████████████████████AT&T believes that true service convergence cannot be achieved without this fundamental key component.

The second key component of the AT&T IP/MPLS backbone architecture is the further sublayering of the MSE layer into three sublayers: an Internet sub-layer, a public Virtual Private Network (public VPN) sublayer, and a private VPN sublayer. █████████████████████████████████████

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The third key component of the IP backbone architecture is integrated network security. ████████████████████████████

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████████████████████████████████████████████By incorporating strong security measures within the IP/MPLS backbone network, Agencies are provided with enhanced flexibility in deploying a combination of network-based and premise-based customized security solutions tailored to their specific budget and security needs.

Finally, the IP/MPLS backbone architecture reflects AT&T's belief in building, operating, and maintaining one converged network.[3.] ███████████

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**Figure 1.4.6.1-2** provides a detailed illustration of all aspects of the AT&T IPS service.

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**Figure 1.4.6.1-2: AT&T IPS Service.** *IPS service requirements are satisfied and augmented with additional functionalities that empower Agency productivity, efficiencies, and cost savings.*

As **Figure 1.4.6.1-2** illustrates, Agencies receive a comprehensive IPS service that includes a number of critical elements – all provided and managed by a single full-service provider.

AT&T's approach (**Table 1.4.6.1-1**) to service delivery of IPS is based upon a number of broad factors that reflect experience providing large-scale enterprise networking solutions to large government entities and enterprises.

| SERVICE DELIVERY APPROACH | DESCRIPTION |
|---|---|
| Comprehensive access portfolio | AT&T provides access to its IP network via a wide range of:<br>• Access types (e.g., Dial, Private Line, Frame Relay, ATM, SONET, Broadband, Wireless, Satellite, and Ethernet).<br>• Interface speeds ranging from 56kbps to 2.5Gbps.<br>• End user device types such as personal computers, laptops, broadband terminal adapters, routers, etc. |
| Global geographic coverage | ███████████████████████████████████████████ |
| Flexible SDP connectivity | AT&T offers several management demarcation points. |
| Feature-rich service | AT&T supports a complete set of standard features and capabilities augmented with a comprehensive set of add-on features and capabilities. |
| High-quality service | AT&T quality performance parameters for IP services lead the industry. In addition, AT&T AQLs lead the industry not only in the actual AQL figures but also in the number of items that are covered within the AQL. Quality spans the areas of reliability, performance, and management. |
| Strong Security | ███████████████████████████████████████████ |
| Support for service convergence | The AT&T architecture was designed to readily support convergence. It contains three fundamental layers:<br>• Intelligent optical and photonics layer with rapid high-bandwidth switching and provisioning<br>• Service-agnostic MPLS layer provides for quality and class of service capabilities<br>• Multiservice edge layer provides the interfaces to the various service data types and for logical and physical separation of customer traffic. |
| Support for IPv6 | AT&T currently supports IPv6 within its IP backbone network. ██████████████████ |
| Standards-based service | The AT&T IP network and IP services are all based upon the prevalent standards emanating from common standards bodies such as the IETF, ITU, and ANSI. To avoid a closed architecture, AT&T has historically driven its vendors to supply products and services based upon these industry-wide standards. |

**Table 1.4.6.1-1: Service Approach.** *Agencies receive greater flexibility, connectivity, and productivity with high quality IP services and a comprehensive service delivery approach.*

As **Table 1.4.6.1-1** illustrates, AT&T's IPS service is designed and deployed with the goal of providing high quality, secure, flexible, and technologically

superior solutions to a diverse user base on a global basis. This approach made AT&T the industry leader in IP-based enterprise networking solutions.

## 1.4.6.1.b    Benefits to Technical Approach

(b) Describe the expected benefits of the offeror's technical approach, to include how the services offered will facilitate Federal Enterprise Architecture objectives (see http://www.whitehouse.gov/omb/egov/a-1-fea.html).

AT&T's Networx services, in general, and IP services, in particular, support the Government's vision of transformation through the use of the FEA to employ technologies that contribute to mission performance. **Table 1.4.6.1-2** describes each service-delivery approach element in relation to FEA and summarizes its contribution and/or provides an example of how it facilitates FEA implementation. AT&T is aligning its product and service components to be easily integrated, commonly manageable, and usable. This applies across Government functions, horizontally and vertically, as well as between levels of government.

| SERVICE DELIVERY APPROACH/ FEATURE | BENEFITS | FEA FACILITATION |
|---|---|---|
| Comprehensive access portfolio: broad support for access technologies, device types, and bandwidths | Agency workers, teleworkers, and mobile users all gain flexible, secure, and efficient access to Agency critical data | As a component of TRM/Service Access and Delivery/Access Channels, allows increased sharing and collaboration within and between Agencies. Significant cost savings are also realized though reduced infrastructure made possible by a larger population of teleworking employees. |
| Global reach and backbone network scale and size | Agencies have the ability to easily scale globally as demand grows for IP-based services. | As a component of TRM/Service Platform and infrastructure/hardware, allows Agencies to easily upgrade during periods of uncertainty and threats, thus maintaining citizen centric services as more citizens access Agency information sources and web sites. |
| Flexible SDP connectivity | Agencies relieved of daily device management activities | As a component of TRM/Component Framework/Data Management, allows Agencies to minimize waste and duplication by dedicating more of valuable internal resources to their core missions. |
| Feature-rich and high-quality service | Greater reliance on IP-based services and technologies | As a component of TRM/Service Access and Delivery/Access Channels, allows Agencies to increase communication and collaboration while minimizing service delivery costs. |
| Strong network integrated security | Agencies receive a highly secure IP service with continuous and real-time visibility of threats | As a component of TRM/Component Framework/Security, allows Agency e-commerce and e-business functions to remain intact in the event of major threats to the Internet. |
| Support for service convergence | Agencies may easily and reliably migrate to VoIP based services and Services over IP (SoIP) | As a component of TRM/Service Interface and Integration/Integration, allows Agencies to better share information and reduce duplication as many functions and services become available over a |

| SERVICE DELIVERY APPROACH/ FEATURE | BENEFITS | FEA FACILITATION |
|---|---|---|
| | | common and open IP-based architecture. |
| Support for IPv6 and seamless IPv4 to IPv6 migration | Increased functionality, performance, and security of IP-based applications | As a component of TRM/Service Access and Delivery/Service Transport, allows Agencies to increase productivity derived through enhanced technology and employees to work more effectively and efficiently |
| Standards-based service | Agencies are not locked into technologies and solutions that are vendor specific or inflexible | As a component of TRM/Service Access and Delivery/Access Channels, allows for more openness among Agencies and the reduction of information barriers. |
| IP services that are integrated with AT&T data hosting and data center infrastructure | Agencies realize their Continuity of Operations/ /Disaster Recovery (COOP/ DR) needs as critical applications are relocated and backed up in bandwidth-intensive and secure data centers. | As a component of TRM/Service Access and Delivery/Service Requirements, allows Agencies to protect and backup critical data in times of national emergency. |
| E-servicing | Agencies easily and efficiently procure and receive updates on provisioning and servicing requests. Agencies also have better visibility into such support systems as inventory and ticketing. | As a component of TRM/Component Framework/Data Management, data relevant to planning, prioritizing, or executing becomes readily available, allowing Agencies to meet their mission functions more effectively. |

**Table 1.4.6.1-2: Agency Benefits and FEA Facilitation.** *Agencies can receive products and services components that are easily integrated, commonly manageable, and aligned to support FEA objectives and meet FEA guidelines.*

AT&T's has developed net-centric technologies that support solutions based on service-oriented architecture (SOA) that uses standardized, web-adapted components. Our approach has the following characteristics:

- Technical Reference Model capabilities are fully met and linked to the Service Component Reference Model (SRM) and Data Reference Model (DRM).

- These links are structured to support Business Reference Model (BRM) functions and provide Performance Reference Model (PRM) line-of-sight linkage to mission performance and ultimate accomplishment.

- With AT&T as an innovative partner through Networx, Agencies are helped to achieve the vision of the FEA to enhance mission performance.

In addition to the benefits and FEA facilitations cited earlier, AT&T offers Agencies additional services that complement IPS. These include hosting, content delivery, managed security, and storage services. These

comprehensive, end-to-end enterprise networking solutions maximize Agency end-to-end service performance and security.

## 1.4.6.1.c      Major Issue to Service Delivery

(c) Describe the problems that could be encountered in meeting individual service requirements, and propose solutions to any foreseen problems.

In transitioning to any new service delivery model, whether it be task-based or fully outsourced, unforeseen issues can always arise. Therefore, it is important to minimize an Agency's risk during transition. AT&T offers GSA a service provider with the depth and background of experience in developing proven methods, processes, and procedures applicable to the simplest or the most complex projects. **Table 1.4.6.1-3** lists the top ten service delivery risks and our mitigation strategy. ██████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████████

| RISK | RISK DESCRIPTION | RISK MITIGATION |
|---|---|---|
| Business disruption | Business disruption associated with outsourcing key IT and networking functions to a managed services provider. | ███████████████████████████████████████████████████████████████████████████████ |
| Requirements changes | Requirements change before and after service delivery, contributing to budget overruns and missed expectations. | ████████████████████████████████████████ |
| IPS integration with Networx services | Offering Agencies integrated solutions such as IPS, dedicated hosting service (DHS), and managed security services on a global basis for thousands of sites. | ████████████████████████████████████████ |
| Incomplete and inaccurate location | Location information often is not accurate and site POCs are no longer valid. | ████████████████████████████ |

| RISK | RISK DESCRIPTION | RISK MITIGATION |
|---|---|---|
| information | | |
| Schedule slippage | Many issues contribute to schedule slippage. Examples include provisioning delays for local access provider access-circuit, and delays due to poor project planning. | |
| Equipment functionality problems | Premise equipment often performs below manufacturer's claims and fail to deliver functionality that customer expects. | |
| Security threats | Security threats from worms, viruses and other types emanate from the Internet and may cause severe damage to Agency critical resources. | |
| Performance compromises | Providing quality performance for IP packets during periods of severe network congestion. | |
| Migration to converged environment | Ability to transport real-time traffic over an IP network while maintaining the quality, security, and performance of an old-style TDM network. | |
| Inadequate global coverage | Risk to on-time and on-budget implementation for a large Agency with many sites scattered throughout the world. | |
| IPv4 to IPv6 Migration | Migrating Agencies from an IPv4 to an IPv6 environment to realize expanded address space, enhanced security, and additional functionality. | |

**Table 1.4.6.1-3: AT&T Service Delivery Lessons Learned and Risk Mitigation Strategies.** *Agencies benefit from AT&T's lessons learned and experience implementing IPS services, which ultimately minimize service delivery risks.*

As evidenced from **Table 1.4.6.1-3**, several program, implementation, and network risks exist that may hinder an Agency's ability to deliver high-quality and low-risk IPS services to its users. Agencies can build upon AT&T's capabilities as a full-service network provider to mitigate these risks and provide uncompromised IPS to Agency end users.

### 1.4.6.1.d    Network Architecture Synchronization

(d) Describe the synchronization network architecture to support the offeror's access and transport networks.

AT&T is a leader in the area of network synchronization, by virtue of our active role in the international and domestic standards organizations and our existing industry-unique, dedicated timing and synchronization network for distributing Stratum 1 traceable timing to our own national and international telecommunications networks.

Synchronization for access and transport networks begins with the Federal Government's cesium-based standard signal, which is distributed to a series of Global Positioning System (GPS) satellite systems. AT&T derives synchronization from those GPS systems as the primary clock source. ███████ ████████████████████████████████████████████████████████ ██████████████████████████████████████████████████████ ███████████████████████████████████████████ ██████████████████████████████████████████████████████ ████████████████████████████████████████ █████████████████████████████████████████████████ ███████████████████████████████████ A more detailed discussion on network synchronization is provided in Section 1.3.6.1, Network Architecture Synchronization.

## 1.4.6.2    Satisfaction of Transport/IP/Optical Performance Requirements [L.34.1.4.2]

### 1.4.6.2.a    Service Quality and Performance

(a) Describe the quality of the services with respect to the performance metrics specified in Section C.2 Technical Requirements for each service.

SoIP and SOA require deployment over a high-quality and high-performance underlying IP network. Agencies are able to deploy SoIP and SOA in their networks because AT&T strives to lead the industry in the quality of the IP network, as all AT&T service types converge onto a common IP/MPLS backbone network. Table 1.4.6.2-1 depicts the service performance metrics Agencies will obtain for Internet Protocol Service (IPS).

| KEY PERFORMANCE INDICATOR (KPI) | SERVICE LEVEL | PERFORMANCE STANDARD (THRESHOLD) | PROPOSED SERVICE QUALITY LEVEL |
|---|---|---|---|
| *Av (Port)* | Routine | 99.95% | ██████ |
| | Critical | 99.995% | ██████ |
| *Latency (CONUS)* | Routine | 60 ms | ███ |
| | Critical | 50 ms | ███ |
| *GOS(Data Delivery Rate)* | Routine | 99.95% | █████ |
| | Critical | 99.995% | █████ |
| *Time to Restore* | Without Dispatch | 4 hours | ████ |
| | With Dispatch | 8 hours | ████ |
| ████████████ | | ███████████████████████ | |

**Table 1.4.6.2-1: IP Network Performance Parameters.** *Agencies realize their convergence goals facilitated by a high- performance IP network.*

Agencies are provided with high-quality IPS services through AT&T's strong focus on the end-user experience. High quality is a result of a number of network and service factors that work in conjunction and that directly or indirectly reflect upon the end user's experience. As such, Agencies will receive high-quality service through the combination of the following three network and service attributes that directly affect the quality delivered to the Agency end user: scale, low packet latencies, and industry-leading AQLs.

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███████████████████████████**Figure 1.4.6.2-1** illustrates how AT&T compares with other service providers in the number of network Points of Presence (POPs) .[4] A higher number of POPs translates into improved performance levels as access lines become shorter and the access network is minimized. ████████████████████████████████ ███████████ By minimizing this access and interconnecting with the high-speed POP directly, Agencies receive much better performance levels and reliabilities.

**Figure 1.4.6.2-1: Network Reach Comparison.** *With the highest number of high speed POPs in the underlying backbone network, Agencies interconnect with the network globally and achieve much improved performance levels.*

2.      The AT&T backbone network presents the industry lowest end-to-end packet latencies. Latency is one of the most important metrics that reflect the quality of the underlying IP network. ███████████████████████ ████████████████████████████████████████████ ████████████████████████████████████████

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[4] As of mid-2005, the number of AT&T Dial POPs had increased to 8680, of which 4,424 are AT&T owned. The number of dedicated high-speed (T1 or higher) US POPs increased to 887 (including Alaska and Hawaii).

████████████████████████████ **Figure 1.4.6.2-2** illustrates how packet delay compares between several large IP networks.

**Figure 1.4.6.2-2: IP Network Latency Comparison.** *A lower latency translates to improved end-to-end quality for Agency applications and is the basis for successfully converging Agency applications onto a common IP infrastructure. Sources cited above are for each company's web site.*

3.  AT&T offers the following AQLs for performance, provisioning, and maintenance. **Table1.4.6.2-2** illustrates how the AT&T AQLs compare with competitors.

| DEDICATED INTERNET ACCESS AQLs | AT&T | CLOSEST IDENTIFIED COMPETITOR* |
|---|---|---|
| **Latency (ms)** Within Region US | ██ | ██ |
|     Within Region Asia Pacific (AP) | ██ | ██ |
|     Between Regions AP – EMEA | ██ | ██ |
| **Data Delivery** | | |
|     Within region Europe | ███ | ███ |
|     Between Regions US to Other | | |
| **Service Availability** (End-to-End) | █████ | █████ |
| **Provisioning** (Days) | ████ | ████ |
| | ███ | ███ |
| **Time to Repair** | ███ | ████ |
| | ████████████ | |

**Table 1.4.6.2-2: AT&T AQLs vs. Competition.** ███████████████████████████

## 1.4.6.2.b    Approach to Monitoring and Measuring Performance

(b) Describe the approach for monitoring and measuring the Key Performance Indicators (KPIs) and Acceptable Quality Levels (AQLs) that will ensure the services delivered are meeting the performance requirements.

Of equal importance to identifying the KPIs for a service is the method by which the KPIs are captured, measured, and monitored. Agencies will receive the most accurate assessment of the service when the KPI measurement and monitoring methodology replicates the real performance that Agency personnel experience. This approach offers a reliable predictor of performance a user's application would receive. **Table 1.4.6.2-3** outlines the methods used to measure the various IP key performance indicators.

| KPI | APPROACH TO MONITORING & MEASURING |
|-----|-----------------------------------|
| Availability | ████████████████████████████████ |
| Latency | ████████████████████████████ |
| Data Delivery (GOS) | ████████████████████████████████ |
| | ████████████████████████ |
| | ████████████████ |
| | ██████████████████████ |
| | ████████████████████████ |
| Time to Restore (TTR) | ████████████████████████████████ |
| | ████████████████████ |
| | ██████████████████████████████████ |
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**Table 1.4.6.2-3: IPS Performance Measurements.** *Agency end users experiences are truly reflected in the KPIs provided through AT&T's measurement methodology.*

The first time the service is provided through the Networx contract, the performance must be verified. The KPIs will be monitored to certify that the service performance complies with the AQL. 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 the AT&T **Business**Direct® web portal 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.

**Figures 1.4.6.2-3** and **1.4.6.2-4** illustrate how AT&T displays the network packet loss (DDR) and delay for the IP/MPLS backbone network. ████████

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**Figure 1.4.6.2-3: IP Network Health Web Page – Packet Loss (DDR***). Agencies can obtain real-time and constant updates to the packet-loss performance of the AT&T IP network.*

**Figure 1.4.6.2-4: IP Network Health Web Page – Delay***. Agencies can obtain real-time and constant updates to the delay performance of the AT&T IP network.*

## 1.4.6.2.c        Performance Level Improvements

(c) If the offeror proposes to exceed the Acceptable Quality Levels (AQLs) in the Key Performance Indicators (KPIs) required by the RFP, describe the performance level improvements.

*AT&T is really raising the bar with these SLAs. This is a comprehensive and aggressive move to challenge the industry's traditional methods of measuring performance in a way that is meaningful to customers and meeting their business objectives. It will be harder for competitors to be vague about their SLA commitments when AT&T's are out there in bold print.*

*Kate Gerwig*

Agencies will benefit from enhanced service performance when the KPI performance thresholds are exceeded. **Table 1.4.6.2-4** summarizes the proposed improvements to the KPI performance thresholds.

| KPI | NETWORX AQL THRESHOLD | AT&T PROPOSED AQL THRESHOLD | IMPROVEMENT PERCENTAGE |
|---|---|---|---|
| ██████████ | ████ | ████ | ██ |
| ██████████ | ████ | ████ | ██ |
| ██████████ | ████ | ████ | ██ |
| ████ | ████ | ████ | ██ |

**Table 1.4.6.2-4: Performance Level Improvements.** *Agency end users experience much improved performance and quality through key performance level improvements.*

## 1.4.6.2.d        Rationale and Benefits for Additional Performance Metrics

(d) Describe the benefits of, rationale for, and measurement of any additional performance metrics proposed.

AT&T proposes the additional KPIs listed in **Table 1.4.6.2-5** as enhancements to the Government's set of IPS KPIs. ████████████

| PROPOSED KPI | DESCRIPTION OF PROPOSED KPI | BENEFIT OF PROPOSED KPI |
|---|---|---|
| Provisioning Timeframe (days after order submitted) | Strict service delivery timeframe within the U.S. based upon data rate:<br>◆ 30 days for T1<br>◆ 43 days for T3<br>◆ 63 days for OC-3 | Agencies receive on-time IPS services. This is especially important as the access circuit may become a significant delay component. |
| Jitter (1ms) | Jitter KPI of 1 ms or less. | Allows Agencies to receive high quality IPS that support real-time data streams such as VoIP. |
| VoIP R-Factor (95%) | Single performance metric that captures real-time data stream quality by measuring three network performance metrics: network latency, packet loss, and jitter. | ◆ Allows Agency to ascertain real voice quality end users experience<br>• Easily translates to mean opinion score (MOS) voice quality scale |
| End-to-End Service Availability (99.999%) | Service availability measured and reported on an end-to-end basis including access and WAN. | ◆ Agency end users receive availability assurances where it really matters (end-to-end)<br>◆ Agencies minimize contribution of access failure, which accounts for approximately 70% of all outages. |

**Table 1.4.6.2-5: Additional KPIs.** *Agency end users experiences much improved performance and quality through additional key performance level metrics.*

## 1.4.6.3 Satisfaction of Transport/IP/Optical Service Specifications [L.34.1.4.3]

### 1.4.6.3.a Service Description

(a) Provide a technical description of how the service requirements (e.g., capabilities, features, interfaces) are satisfied.

AT&T will satisfy all the service requirements through the technological capabilities of the backbone IP/MPLS network, the geographic reach and access flexibility of the AT&T IP/MPLS network, and the host of network-based services and applications offered. In addition, IPS requirements will be satisfied through gateway services between the IP/MPLS network and other public networks, strong security features, complementary managed services that augment IPS, and superior support services backed by AQL guarantees.

**Table 1.4.6.3-1** provides a detailed description of the elements of the AT&T IPS service and their associated Agency benefits.

| SERVICE REQUIREMENTS | DESCRIPTION | BENEFIT TO AGENCY |
|---|---|---|
| IPS Port Rates | AT&T supports port rates from 56kbps to 2.5Gbps[5]:<br>• DS0, NxDS0, Fractional T1, T1, NxT1, E1, NxE1<br>• Fractional T3, T3, Fractional E3, E3<br>• OC-3, OC-12, OC-48<br>███████████████ | Scalability to higher data rates when needed. |
| Access Services | AT&T supports the following access services today: dial-up voice, ISDN, private line, frame relay, ATM, SONET, Wi-Fi, DSL, cable, satellite, and Ethernet. AT&T will support future access technologies such as Wi-Max. | • Access flexibility<br>• Best cost access<br>• Access in remote locations |
| Public & Private Peering | AT&T's peering architecture:<br>• Focuses on maintaining excellent performance to anywhere on the Internet (████████<br>██████████████<br>██████████████<br>██████████████<br>██████████████<br>██████████████<br>██████████████ | • Better end-user experience due to minimized hop count<br>• Routing agility at times of Internet congestion and threats<br>• First-hand visibility into the Internet (viruses, worms, etc.) |
| Address and DNS Support | Primary and secondary DNS support and IP address and domain name support | Facilitate Agency address and DNS functions. |
| BGP Support | AT&T uses BGP as a normal method for exchanging routes, enforcing policy, etc. with customer networks that require BGP support as well as for peering links. | Facilitate routing based upon Agency policy and administrative needs. |
| Backup & Redundancy | ██████ to Table 1.4.6.3-2 for backup and redundancy options supported by AT&T | • Higher reliability service.<br>• Flexible solutions in accordance with Agency backup needs and redundancy costs. |
| SDP connectivity | AT&T supports these SDP types:<br>• Access circuit only<br>• Access circuit with CSU/DSU<br>• Access circuit, CSU/DSU, and router<br>• Access circuit, CSU/DSU, firewall, and router<br>• Access circuit, CSU/DSU, firewall, router, and LAN (IP PBX, LAN switches, inside wiring) | • Relieve Agency of need to manage individual devices<br>• Higher service levels<br>• LAN and WAN end-to-end service expectations, if under management of single domain |
| Network-centric enterprise services | AT&T supports web services and web mail today in addition to DNS. ██████████████<br>██████████████ | Easy migration into network-centric enterprise services[6] |
| Gateway services | AT&T supports gateway services into the switched voice network and the Internet████████<br>████████████ | • Migration to converged network<br>• Cost savings<br>• Secure Internet access |
| Full suite of AT&T complementary managed services | • Dedicated security services<br>• VoIP/IP Telephony/ SoIP services<br>• Hosting/Storage/Content Delivery services | Integrated enterprise networking solution from one full -service vendor |

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[5] Actual port rates depend upon the access technology (ATM, private line, etc.) chosen for the site.
[6] Microsoft chairman Bill Gates has recently remarked how web-services are the holy grail of IT.

| SERVICE REQUIREMENTS | DESCRIPTION | BENEFIT TO AGENCY |
|---|---|---|
| | • VPN services | |
| AQL Guarantees | • Performance AQLs: packet delay, jitter, data delivery (packet loss), time to repair (not average time to repair), end-to-end service availability<br>• On-time installation<br>• IPS with VoIP availability<br>• IPS with VoIP quality | • Service assurance<br>• IPS and SoIP commitments<br>• Convergence |
| On-line web support through AT&T **Business**Direct® | • Ordering<br>• Provisioning<br>• Inventory<br>• Billing<br>• Ticketing<br>• Performance | • Visibility into Agency operational data<br>• Closer working relationship between AT&T and Agency facilitating higher service levels to the Agency |
| SED (CPE) support | • Full Cisco functional capability (17xx to 76xx routers)<br>• E-bonding with Cisco procurement<br>• AT&T Labs and Cisco R&D | • SED flexibility<br>• Quick, efficient, and error-free procurement<br>• Quick resolution to device-based bugs and software patches |

**Table 1.4.6.3-1: Service Requirements.** *Agency end users provided with a compliant AT&T solution for all technical, feature, and interface requirements.*

**Figure 1.4.6.3-1** represents AT&T's public and private peering in the U.S. Extensive peering allows Agency IP-based applications and users significant performance improvements as IP packets traverse the least number of intermediary networks.

**Figure 1.4.6.3-1: Peering.** *Agency IP services traverse fewer networks with AT&T's extensive public and private peering that allows improved service performance.*

**Table 1.4.6.3-2** represents AT&T's backup and redundancy options available to Agency IPS users.

| BACKUP OPTION | DESCRIPTION | PROVIDED PROTECTION |
|---|---|---|
| Analog voice dial backup | At 56 kbps | Basic backup for small sites (1-2 users) or homes |
| ISDN backup | At 64 kbps | Basic backup for small sites (1-2 users) or homes |
| ISDN backup | At 128 kbps | Basic backup for small sites or homes |
| ██████████████ | ████████████████ | ███████████████████████ |
| ██████████████ | ████████████████ | ███████████████████████ |
| ██████████████ | ████████████████ | ███████████████████████ |

**Table 1.4.6.3-2: Backup Options.** *Agency end users are provided with highly reliable IPS service through several backup options.*

With flexibility in backup, Agencies may customize their backup needs to offer maximum backup to Agency sites that require such backup while providing lesser backup to other sites that are not as critical.

One of the key industry drivers that is bound to become a disruptive technology that will change the ways Agencies interact and benefit from the network lies within the area of network-centric enterprise services. In this area, AT&T and Microsoft have recently established a global strategic partnership to develop, test, and deploy network-based application services that allow Agencies to realize significant productivity improvements, new and enhanced capabilities, and superior end-user performance improvements[7]. As a first step, the AT&T Business VoIP service will become the first service to offer end users these network-centric application enhancements. Through the lifetime of Networx, Agencies will benefit from new network-centric application services provided through the AT&T IPS service, such as communication and messaging services. These services will drive Agency mission and business efficiencies in a manner comparable to that of the personal computer (PC) revolution of the 1980s and 1990s.

### 1.4.6.3.b    Attributes and Values of Service Enhancements

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

In addition to the standard services, Agencies can enhance their IPS with additional features and capabilities for an additional fee. **Table 1.4.6.3-3** highlights additional service features and capabilities available with IPS. AT&T proposes the attributes in **Table 1.4.6.3-3** as service enhancements.

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[7] *The press release was issued on June, 6 2005. Provided is an excerpt: "AT&T will deploy Microsoft Connected Services Framework as the foundation of its Microsoft. NET-based SOA, which integrates an array of interoperable Web-based, functional capabilities in a simplified, streamlined manner. This will enable AT&T to provide a consistent service interface to its back-office systems for delivering fully managed, on-demand IP communications services. As part of the alliance, AT&T has become a founding member of Microsoft's Connected Services Framework Customer Advisory Board and will help shape the development of its road map priorities".*

| SERVICE ENHANCEMENT | DESCRIPTION | BENEFIT |
|---|---|---|
| ██████ | ████████████████ | █████████████████████████████ |
| ██████ | ████████████████ | █████████████████████████████ |
| ██████ | ███████████ | ████████████ |
| ██████ | ██████████ | ███████ |
| ██████ | ████████████ | ████████████████ |
| ██████ | ███████████ | ████████████████ |
| ██████ | █████████████ | ████████████████ |
| ██████ | ████████████ | ████████████████ |
| ██████ | ████████████ | ████████████████ |
| ██████ | ████████████ | ████████████████ |

**Table 1.4.6.3-3: Service Enhancements.** *Agency end users receive higher reliability and performance levels as well as strong transition support to a SoIP environment.*

With the service enhancements proposed, Agencies will be able to migrate more quickly and seamlessly to a converged IP-based infrastructure.

## 1.4.6.3.c    Service Delivery Network Modifications

(c) Describe any modifications required to the network for delivery of the services. Assess the risk implications of these modifications.

Agencies receive a low-risk solution by being able to use AT&T's IPS services on day one of the contract because no modifications are required to the AT&T network or systems to provide IPS services to the Government.

## 1.4.6.3.d    Transport/IP/Optical Service Experience

(d) Describe the offeror's experience with delivering the mandatory Transport/IP/ Optical Services described in Section C.2, Technical Requirements.

The AT&T Networx Team offers Agencies extensive experience providing managed services that create value to our Government and commercial

customers. This experience has given us the ability to engineer and deliver IPS services. Three examples of AT&T's ability to deliver managed services are listed in **Table 1.4.6.3-4**.

| Client Need | Solution | Created Value |
|---|---|---|
| ███████████ | ███████████ | ███████████ |

| Client Need | Solution | Created Value |
|---|---|---|
| ███████████ | ███████████ | ███████████ |

| Client Need | Solution | Created Value |
|---|---|---|
| ███████████ | ███████████ | ███████████ |

**Table 1.4.6.3-4: Experience Delivering IPS.** *Success is measured by the ability to deliver solutions to Agencies that create value to their business.*

AT&T's experience providing broad and large-scale IPS services will help Agencies meet their IPS needs, regardless of Agency size, location base, or mission requirements.

## 1.4.6.4 Robust Delivery of Transport/IP/Optical Services [L.34.1.4.4]

### 1.4.6.4.a Network Traffic Utilization

(a) Given the offeror's current network capacity and utilization, explain how the offeror will support the Government requirements specified in the traffic model. Describe the impact on capacity and utilization, as well as any infrastructure build out contemplated.

To assess the impact of the Agencies' IPS traffic on the AT&T network, the forecasted traffic in the Networx hosting model has been compared against the scale of AT&T's IP/MPLS network. As **Table 1.4.6.4-1** shows, t██████
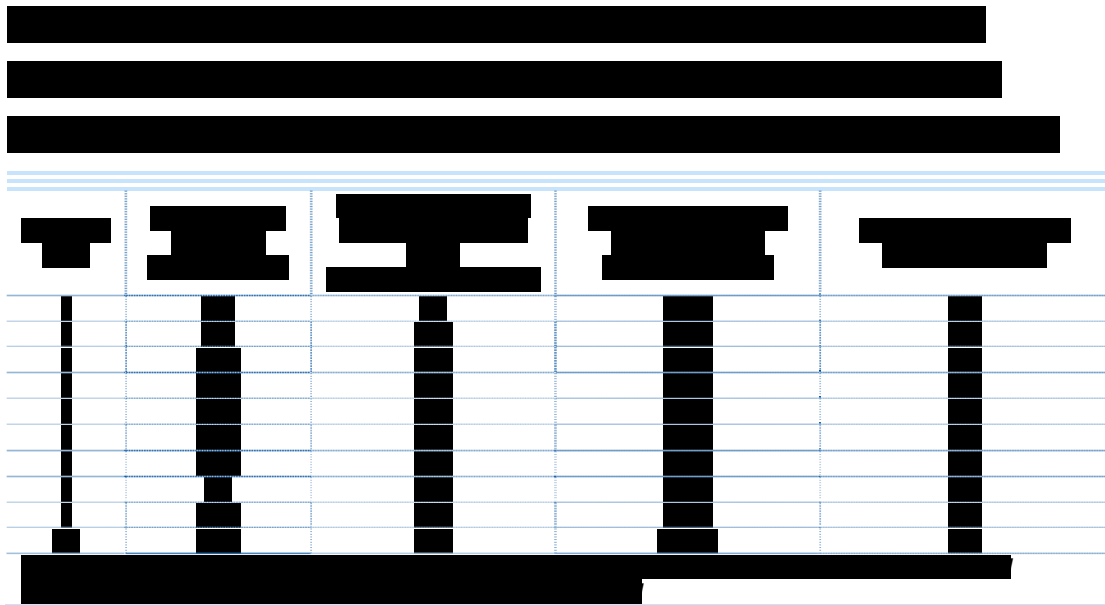
██████████████████████████████████████████████████

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██████████████████████████████████████████████████

**Table 1.4.6.4-1: Network Traffic Utilization.** ████████████████████████

Agencies will also benefit from AT&T's rigorous capacity planning process, which allows the IP/MPLS network to constantly adapt to sudden increases in traffic. AT&T's capacity planning process is outlined in Section 1.4.6.4.a.1.

## 1.4.6.4.a.1    Capacity Planning

Backbone capacity planning within the backbone IP/MPLS network is a result of three main drivers, as summarized in **Table 1.4.6.4-2**.

| MAJOR CAPACITY PLANNING DRIVER | DESCRIPTION |
|---|---|
| Forecasts | ██████████████████████████████████ |
| Planned events | ███████████████████ |
| Historic traffic growth | ██████████████████████████████ |

**Table 1.4.6.4.-2: Capacity Planning.** *Agencies benefit from a comprehensive capacity planning framework.*

The scale and size of the IP network today is testimony to the successful capacity planning process employed by AT&T.

## 1.4.6.4.b    System Robustness and Resiliency

(b) Describe the measures and engineering practices designed to provide robustness of the access and backbone networks, ensure resiliency, and plan for growth.

AT&T provides a robust and resilient IP network backbone through superb network reliability and availability measures and by adhering to a rigorous network design process. **Table 1.4.6.4-3** summarizes these two points.

| ROBUSTNESS & RESILIENCY FACTOR | DESCRIPTION |
|---|---|
| High reliability | This is facilitated through: ████████████████████████ |
| Rigorous | ████████████████████████ |

| ROBUSTNESS & RESILIENCY FACTOR | DESCRIPTION |
|---|---|
| network design process | ███████████████████████████████████ ███████████████████████████████████████████████████ ███████████████████████████████████████████████████ ███████████████████████████████████████████████████ ███████████████████████████████████ |

**Table 1.4.6.4-3 Robustness and Resilience in the AT&T Backbone.** *AT&T relies on sophisticated network design and superior operational standards to deliver IPS.*

Another key component of the AT&T backbone network and its resiliency is the fact that the MPLS core network does not contain any Internet routes (Internet-route free core). As routing tables grew in size in recent years following tremendous growth of the Internet, routers became increasingly unstable. This included core high performance routers. AT&T recognized this problem early and designed a tiered structure with the intention of having the core carry no Internet routes. This has added significantly to the stability and performance predictability of the core MPLS network.

# 1.4.6.5    Transport/IP/Optical Service Optimization and Interoperability [L.34.1.4.5]

## 1.4.6.5.a    Approach to Optimizing IP-based and Optical Services

(a) Describe the offeror's approach for optimizing the engineering of IP-Based and Optical Services.

Engineering optimization of the IP-based and optical services is described in Section 1.3.6.2.a.

## 1.4.6.5.b    Network Architecture Optimization

(b) Describe how the offeror will utilize methods such as remote concentration, switching/routing capabilities, and high bandwidth transmission facilities to optimize the network architecture.

Optimization of the network architecture through the use of remote concentration, switching/routing capabilities, and high bandwidth transmission facilities is described in Section 1.3.6.2.b.

### 1.4.6.5.c    Optimizing Engineering Techniques

(c) Describe the engineering techniques for optimizing access for improved performance or increased efficiency in areas where large concentrations of diverse customer applications exist (e.g., the use of Multiservice edge platforms).

Optimization of the access for improved performance or increased efficiency through the use of Multiservice Edge (MSE) platforms is described in Section 1.3.6.2.c.

### 1.4.6.5.d    Vision to Implement Service Internetworking

(d) Describe the offeror's vision for implementing service internetworking over a common infrastructure (e.g., IP-centric architecture). Include a view on network interoperability, control plane integration, and optical infrastructure support for IP-Based Services. Describe the benefits and rationale of the offeror's approach.

The implementation of service internetworking over a common infrastructure including network interoperability, control plane integration, and optical infrastructure support is described in Section 1.3.6.2.d.

## 1.4.6.6    Narrative Text Requirement [C.2.4.1.3.2 (1 – 12)]

As previously indicated in **Table 1.4.6.1-2** showing our overall service approach, AT&T IP services incorporate a vast array of access options. **Table 1.4.6.6-1** presents the interfaces supported. Interfaces and access types are tested and certified by AT&T Labs prior to deployment on any AT&T network to verify performance and feature capabilities. This directly benefits Agencies by providing network access through interfaces operating seamlessly and preventing performance difficulties.

| NARRATIVE TEXT REQUIREMENT REFERENCE | UNI TYPE | INTERFACE/ ACCESS TYPE | NETWORK-SIDE INTERFACE | PROTOCOL TYPE | COMPLY |
|---|---|---|---|---|---|
| [C.2.4.1.3.2(1)] | 1 | Asynchronous Transfer Mode Service | 1. T1 2. T3 3. OC-3c 4. OC-12c | IPv4/v6 over ATMS | ✔ |
| [C.2.4.1.3.2(2)] | 2 | Cable High Speed Access | 320 Kbps up to 10 Mbps | Point-to-Point Protocol, IPv4/v6 | ✔ |
| [C.2.4.1.3.2(3)] | 3 | Circuit Switched Data Service | 1. ISDN at 64 Kbps 2. ISDN at 128 Kbps 3. ISDN dial backup at 64 Kbps 4. ISDN dial backup at 128 Kbps | Point-to-Point Protocol, IPv4/v6 | ✔ |
| [C.2.4.1.3.2(4)] | 4 | Ethernet Access | 1. 1 Mbps up to 1 GbE (Gigabit Ethernet) 2. 10 GbE (Optional) | IPv4/v6 over Ethernet | ✔ |
| [C.2.4.1.3.2(5)] | 5 | Frame Relay | 1. 56 Kbps with 32 Kbps CIR 2. | IPv4/v6 over |  |

| NARRATIVE TEXT REQUIREMENT REFERENCE | UNI TYPE | INTERFACE/ ACCESS TYPE | NETWORK-SIDE INTERFACE | PROTOCOL TYPE | COMPLY |
|---|---|---|---|---|---|
| | | Service | Fractional T1 (a) 128 Kbps with 64 Kbps CIR (b) 256 Kbps with 128 Kbps CIR (c) 384 Kbps with 128 Kbps CIR (d) 512 Kbps with 256 Kbps CIR (e) 768 Kbps with 384 Kbps CIR 3. T1 (a) 1.536 Mbps with 768 Kbps CIR (b) 1.536 Mbps with 1024 Kbps CIR 4. Fractional T3 (a) 3 Mbps (b) 6 Mbps (c) 12 Mbps (d) 24 Mbps (e) 45 Mbps 5. T3 | FRS | |
| [C.2.4.1.3.2(6)] | 6 | IP over SONET | 1. 0C-3c 2. OC-12c 3. OC-48c 4. OC-192c | IP/PPP over SONET | ✔ |
| [C.2.4.1.3.2(7)] | 7 | Private Line Service | 1. DS0 2. Fractional T1 3. T1 4. Fractional T3 5. T3 6. OC-3c 7. OC-12c 8. OC-48c 9. OC-192c | IPv4/v6 over PLS | ✔ |
| [C.2.4.1.3.2(8)] | 8 | Voice Services | Analog dial-up at 56kbps | IPv4/v6 | ✔ |
| [C.2.4.1.3.2(9)] | 9 | DSL Service | xDSL access at 1.5 to 6Mbps | IPv4/v6 | ✔ |
| [C.2.4.1.3.2(10)] | 10 | Multimode/Wireless LAN Service | Per section C.2.14.3.3.1 | | ✔ |
| [C.2.4.1.3.2(11)] | 11 | Wireless Access | Per section C.2.16.2.3.3.1 | | ✔ |
| [C.2.4.1.3.2(12)] | 12 | Satellite Access | Per section C.2.16.2.4.3.1 | | ✔ |

*Note 1:* Reserved.
*Note 2:* Reserved.
*Note 3:* Reserved.

**Table 1.4.6.6-1: Access Interfaces.** *Agencies will be able to gain access to the AT&T IP MPLS network and AT&T's service portfolio through a vast array of access options.*

## 1.4.6.7 Stipulated Deviations

AT&T complies with all the Stipulated Requirements for the IPS.

### 1.4.6.7.1 Reserved

### 1.4.6.7.2 Reserved

### 1.4.6.7.3 Reserved

## 1.4.6.8     IPS with Managed Router Service

AT&T IPS with Managed Router provides managed, "end-to-end" Internet connectivity for Agencies who prefer complete vendor-provided solutions for their connectivity needs. Utilizing AT&T's Internet Service, routers are provided by AT&T, configured by AT&T, installed at the Agency's premises and monitored, managed, and maintained by AT&T. ███████████████ ███████████████████████████████████████████████████ ███████████████████████████████████████████████████ ███████████████

### 1.4.6.8.1     Service Description

Under IPS with Managed Router, AT&T provides, configures, monitors, manages and maintains the premise equipment necessary to use IPS, which generally consists of a router and a diagnostic modem. With IPS with Managed Router, service demarcation occurs at the LAN port of the router.

**Figure 1.4.6.8-1: IPS with Managed Router.** *IPS with Managed Router provides Agencies with a complete solution including monitoring, maintenance and management of the Agency premises router.*

### 1.4.6.8.2     AT&T Monitoring, Maintenance and Management

AT&T has full management and operational control (including passwords) of the AT&T routers. AT&T coordinates required software updates and configuration changes to AT&T routers. AT&T technicians work remotely with Agencies to diagnose failures and determine if AT&T routers should be replaced or repaired. For IPS Sites located in the US, AT&T provides Next

Business Day replacement support as needed for malfunctioning AT&T routers. ██████████████████████████████████

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### 1.4.6.8.3    Implementation Support

For IPS Sites located in the US, IPS with Managed Router includes on-line access to the AT&T Implementation Planner, which provides detailed information about the installation and use of IPS. AT&T will help Agencies prepare for installation and use of IPS by providing Agency Site configuration information to Agencies and by registering the Agency's network numbers, domain names and routing information. AT&T will coordinate access line connection or ordering and installation of the access line and IPS testing.

### 1.4.6.8.4    Availability and Service Interfaces

IPS with Managed Router is a fully managed service inclusive of AT&T Total Service. With Total Service, AT&T provides and coordinates the ordering of the local access and AT&T network services and supports a range of port speeds as shown in **Table 1.4.6.8-1**. Under Networx, however, access CLINs are still required to be ordered.

| SERVICE | SERVICE INTERFACES |
|---|---|
| IPS With Managed Router | 56Kbps to OC-48 (2.5Gbps) |

**Table 1.4.6.8-1: Domestic Port Speeds.** *IPS with Managed Router is available across multiple IPS port speeds.*

IPS with Managed Router service is available to Agencies located in all 50 states as well as Puerto Rico and the US Virgin Islands (USVI).

### 1.4.6.8.5    Agency Responsibilities

AT&T will provide a total "end-to-end" managed solution. As part of the IPS with Managed Router service, AT&T will provide an Agency with a managed router and CSU/DSU. Service demarcation occurs at the LAN port of the

router. Agencies have the following responsibilities in connection with IPS with Managed Router:

- Agencies with a PBX, who subscribe to IPS with Managed Router service, will require an Agency-provided adapter and associated cable to connect the Agency's PBX to the associated PBX port on the back of the CSU/DSU.
- The Agency is required to provide a Plain Old Telephone Service (POTS) line for Out-of-Band (OOB) management of the router.

### 1.4.6.8.6    Features Available for IPS with Managed Router

The following is optional and has orderable feature CLINs.

#### *Class of Service (CoS)*

CoS includes the standard four classifications that enable a network to support varied service levels and applications for many users. By selecting the appropriate classes relevant to specific corporate needs, network managers can manage bandwidth and ensure that mission-critical applications do not suffer undue delays. The four general classes are:

- **CoS 1** for Real Time (RT) for voice
- **CoS 2** for interactive and transactional applications
- **CoS 3** for web browsing applications
- **CoS 4** for sustained file transfer applications

Each of these classes can be further divided into a consistent set of 25 CoS "profiles" that can mix and match to meet specific customer needs.

████████████████████

████████████████████████ feature allows customers to ████████

████████████████████████████████████ This

option assumes availability ██████████████████

██████████████████████████

█████████████████████████

provides a ████████████

█████ configuration on the

customer's premises, as

depicted in ████████████

█████████████████      ████████████████████████

██████████████████████

██████████████

                              ██████████████████████████

                              ██████████████████████

                              ██████████████

                              ██████████████████████

                              ██████████████████████

                              ████████████ Agency

███████████████████████      routers and ████████

████████████████████         ██████████████████

███████████████████████████ AT&T IP Backbone nodes. This

option provides redundancy in: ██████████████████████████

██████████████████████████████████████████████

██████████████████████████ for the circuit, Agency Router, access

router and Backbone Node.

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██████████████████

██████████ Agency Routers

and ██████████████ ███████████████████████████

██████████████████████

███████████████████████████████████████████ circuit,

Agency Router ████████████████████ and Access Router. This option

provides redundancy in: ██████████████████████████████

████████████████████████████████████████████

██████████████████

                                              ██████████████████████████

                                              ██████████████

                                              ██████████████████

                                              circuits which terminate on

                                              █████████████████

██████████████████████████████████           █████████████████

███████████                                   █████████████████

                                              █████████████████

██████████████████████████████████████████ This option

provides a logical redundant path to help ███████████████████████

██ the circuits only.

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████████████████████████████████████ directs outbound traffic from

the ██ Agency routers over multiple links. This provides a solution to use

████████ in the case that an Agency employs the use of a firewall where the firewall acts as a ████████████████████████████████████ ██████████████ and providing efficient link utilization by ████████████ ████████████████████████████████

## 1.4.6.9    Managed Trusted Internet Protocol Service (MTIPS) Introduction [C.2.4.1.5]

**AT&T has more knowledge of the internet and its security, monitoring and reliability needs than any other organization**

- AT&T lit the nation's first coast-to-coast network over new-generation 40-Gigabit IP/MultiProtocol Label Switching (MPLS) technology (PRNewswire, 12/10/2007)
- AT&T's internet networks monitored by the Global Network Operations Center (GNOC) since 1991
- 19% of all internet traffic flows over an AT&T monitored network (IT&T News, 9/1/2005)
- AT&T network carries more than 16.0 petabytes of data daily

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