

1.4.7 Content Delivery Network Services (CDNS)

[C.2.4.6]

Agencies will meet their current and future needs for content caching and streaming with a high-quality, scalable, globally available, feature-rich, and nonproprietary content delivery network service (CDNS) offering. CDNS is a fully integrated, complete suite of hosting, internet, security, storage, and networking services.

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

1.4.7.1.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 have access to a flexible, network-based content delivery network service (CDNS) solution consisting of CDNS nodes (server clusters) that are geographically dispersed throughout AT&T's Internet Data Centers and Network Facilities. AT&T's CDNS will significantly improve Agencies' website capacity, reliability, and performance, while reducing total cost of ownership.

Figure 1.4.7.1-1 illustrates AT&T's approach to service delivery.

Our CDNS offers caching services to our clients. Cache servers for the service operate in the reverse proxy mode and appear as real Web servers to end-user's browsers. Cache servers pull cacheable objects from origin servers on a needed base; non-cacheable objects are bypassed and sent to origin servers directly. This service is further divided into two offers:

- **Web Acceleration** – Web Acceleration is the basic offer of caching service. For this offer, customers host content on their own origin servers. CDNS accelerates all or a portion of http/https objects for a customer's Website.

Typical objects accelerated by Web Acceleration are HTML files and image files.

- Large File Download (LFD) – LFD (or File Download or eFile Download) is a special version of caching service. Web sites identified as LFD type typically contain large size objects such as downloadable software or QuickTime files. For this offer, customers may host content on their own origin servers or use network origin servers and storage provided by CDNS.

Figure 1.4.7.1-1: Global Network for CDNS. *Providing high-performance content caching and streaming services that lower expenditures on Internet connectivity, server costs, and associated technical support costs.*

Our CDNS is delivered using our robust OC-192 IP backbone and best-in-class management tools and high-touch client servicing. These network, tools, and people are integrated with our hosting solutions. **Table 1.4.7.1-1** illustrates our service delivery approach and a description of our capabilities.



APPROACH	DESCRIPTION
Global footprint with ubiquitous service capability	<ul style="list-style-type: none"> Nodes are shared resources designed to support multiple agencies/customers.
Service quality and reliability	<ul style="list-style-type: none"> CDNS Node architecture is designed to be fault tolerant, survivable, and optimized to serve static or dynamic content.
Customer service and self-management	<ul style="list-style-type: none"> Management of service through AT&T BusinessDirect® portal, Ability to quickly provision service
Compliment of associated services	CDNS can be integrated with AT&T IP, dedicated hosting, collocated hosting and storage services.

Table 1.4.7.1-1: Approach to Service Delivery. Agencies will have access to a global CDNS network that is highly available, scalable and easy to use and manage.

Agencies have access to flexible CDNS services that will provide a better end user experience for agencies and constituents. Agencies will also be able to realize cost savings in the form of lower expenditures on Internet connectivity, server costs, and associated technical support costs.

1.4.7.1.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 (<http://www.whitehouse.gov/omb/egov/a-1-fea.html>).

AT&T’s Networkx services, in general, and CDNS services, in particular, support the Government’s vision of transformation

“AT&T is one of the most viable general purpose Internet CDN vendors”.
--Forrester, February 2004

through the use of the Federal Enterprise Architecture (FEA) by providing the technologies that contribute to the Agency’s mission objectives. **Table 1.4.7.1-2** describes each service in relation to FEA, summarizes its contribution, and/or provides an example of how it facilitates FEA implementation.

SERVICE DELIVERY APPROACH	BENEFITS	FEA FACILITATION
Global Footprint with Ubiquitous Service Capability	<ul style="list-style-type: none"> Improved end user experiences because of reduced latency. Agencies will have access to global network that can support extremely 	As a component of the TRM/Service Access and Delivery within the Access Channels subsection, Agencies can utilize CDNS services to

SERVICE DELIVERY APPROACH	BENEFITS	FEA FACILITATION
	large bursts in traffic. <ul style="list-style-type: none"> Shared environment reduces cost associated with deploying standalone system 	collaborate/communicate globally and can scale during times of need/emergency.
Service Quality and Reliability	Architecture that minimizes single points of failure and increases availability and performance of service.	As a component of the TRM/Service Access and Delivery within the Service Requirements subsection, Agencies can leverage a highly reliable delivery network to further enhance their hosting environments.
Customer Service and Self-Management	Agencies can control their CDNS in real-time through user-friendly portal.	As a component of the TRM/Component Framework within the Presentation/Interface subsection, Agencies can easily disseminate static or dynamic content based on Agency requirements.
Compliment of Associated Services	Agencies can easily develop custom CDNS services which incorporate other related services such as Dedicated/Collocated Hosting, IPS and Storages Services	As a component of the TRM/Service Access and Delivery within the Service Requirements subsection, Agencies can leverage a highly reliable delivery network to further enhance their enterprise network.

Table 1.4.7.1-2: Service Delivery Approach to Facilitating FEA Objectives. Agencies can receive products and services components that are easily integrated, commonly managed, and aligned to support FEA objectives and meet FEA guidelines.

AT&T's development of net-centric technologies supports solutions based on service-oriented architecture (SOA), which uses standardized, web-adapted components. Our approach ensures that the criteria listed below are followed:

- 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 line-of-sight linkage to mission performance and ultimate accomplishment per the Performance Reference Model (PRM)
- AT&T operates as an innovative partner through Networkx to help achieve the vision of the FEA to enhance mission performance.

In addition to the benefits and FEA facilitations cited earlier, AT&T will assist specific departments and Agencies to meet mission and business objectives through a comprehensive CDNS offering.



1.4.7.1.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 that GSA selects a service provider that has the depth and background to minimize an Agency's risk during transition. AT&T's experience has enabled us to develop proven methods, processes, and procedures to mitigate risk on the simplest or the most complex projects.

Table 1.4.7.1-3 summarizes the top six service delivery risks and our mitigation strategy. [REDACTED]

[REDACTED]

RISKS	RISK DESCRIPTION	RISK MITIGATION
Business disruption associated with poor transition planning	Ineffective transition planning that results in poor service deployments and extended outages	[REDACTED]
Requirement changes or "scope creep"	Requirements changes before and after service delivery contribute to budget overruns and missed expectations	[REDACTED]
Schedule slippage	Many issues can contribute to schedule slippage, such as inadequate resource allocation, not obtaining department sign-offs and lack of planning	[REDACTED]
Unreliable service performance	Service that does not meet the associated thresholds for	[REDACTED]

RISKS	RISK DESCRIPTION	RISK MITIGATION
	quality. Outages associated with underperforming hardware and software	[REDACTED]
Inflexible service	Services that require: <ul style="list-style-type: none"> • Provider involvement for changes and updates to service • Agencies to implement, deploy and maintain proprietary hardware and software 	[REDACTED]
Lack of monitoring and management	Inability to measure and report on the performance of the service through management reports	[REDACTED]

Table 1.4.7.1-3: AT&T Service Delivery Lessons Learned and Risk Mitigation Strategies. Agencies benefit from lessons learned and experience implementing CDNS services, which ultimately minimize service delivery risks.

AT&T has taken steps to identify risk and provided risk mitigation associated with delivering CDNS. AT&T is committed to service excellence and will work with the customer to identify and support any potential problems that occur during service delivery.

1.4.7.1.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 begin with the Federal Government's cesium-based standard signal which is distributed to a series of Global Positioning Satellites (GPS) systems. AT&T derives synchronization from those GPS systems as the primary clock source. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]

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

1.4.7.2.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.

Agencies face a risk of not being able to provide end users with consistent performance due to several factors, such as traffic surges, security threats, and geographic separation. AT&T uses AQLs to address the quality of CDNS. AT&T proposes the following AQLs, as defined in **Table 1.4.7.2-1**. AT&T will comply with and meet the Content Delivery Network Service quality performance metrics specified in RFP Section C.2.4.6.4.1, as illustrated in **Table 1.4.7.2-1**.

KPI (KEY PERFORMANCE INDICATOR)	SERVICE LEVEL	PERFORMANCE STANDARD (THRESHOLD)	PROPOSED SERVICE QUALITY LEVEL
Availability (CDNS Network)	Routine	[REDACTED]	[REDACTED]
Latency (Static content download)	Routine	[REDACTED]	[REDACTED]
GOS (Mean Time to content refresh)	Routine	[REDACTED]	[REDACTED]
Time to Restore (TTR)	Without Dispatch	[REDACTED]	[REDACTED]
	With Dispatch	[REDACTED]	[REDACTED]

Table 1.4.7.2-1: CDNS Performance Parameters. Agencies receive a high-quality CDNS, as identified by the KPI and AQL compliance referenced above.



AT&T is focused on providing Agencies with a high-quality CDNS solution through superior architecture and support. These AQLs in the table above represent the minimum level of service that AT&T intends to consistently deliver to Agencies for their CDNS solutions.

1.4.7.2.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. AT&T's distributed network architecture and i-DNS are designed to perform at the highest service level possible. To validate service performance, AT&T collects data on availability and time to repair. **Table 1.4.7.2-2** describes how availability and time to repair metrics are measured and calculated.

KPI (KEY PERFORMANCE INDICATOR)	APPROACH TO MONITORING AND MEASURING
Availability	[REDACTED]
Latency (Static content download)	[REDACTED]
GOS (mean time to content refresh) TTR (time to restore)	[REDACTED]

Table 1.4.7.2-2: Monitoring and Measuring CDNS. Agencies can easily validate the KPIs/AQLs based on tried and true methodologies for monitoring and measuring performance.

1.4.7.2.b.1 CDNS Reporting Tools

CDNS provides usage and management reports that furnish current information on web traffic patterns. [REDACTED]
[REDACTED]
[REDACTED] The available reports are described in **Table 1.4.7.2-3**.

REPORT	DESCRIPTION
[REDACTED]	[REDACTED]
<i>Web Acceleration Reports</i>	
[REDACTED]	[REDACTED]



REPORT	DESCRIPTION
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
<i>Streaming Reports</i>	
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
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[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]

REPORT	DESCRIPTION
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]

Table 1.4.7.2-3: CDNS Reporting Capabilities. Agencies have visibility into their CDNS services through a multitude of reports.

Agencies will benefit from the CDNS management reports, illustrated in **Figure 1.4.7.2-1**, by having access to these reports Agencies can validate service performance and manage their services.

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. [REDACTED]

[REDACTED]

[REDACTED] The service verification process is presented in greater detail in Section 1.3.2.d, Approach to Perform Service Delivery Verification.

AT&T's objective is to deliver quality service to every customer. Metrics will be captured and analyzed to verify acceptable performance levels are being maintained.



Figure 1.4.7.2-1: AT&T BusinessDirect. Agencies can view and assess performance statistics of their CDNS services through this AT&T web portal.

1.4.7.2.c Performance Level Improvements

(d) 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.

Achieving the AQLs defined by the Government for the Key Performance Indicators will result in superior CDNS service performance. [REDACTED]

[REDACTED]

[REDACTED]

1.4.7.2.d Rationale and Benefits for Additional Performance Metrics

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

The KPIs defined by the Government for CDNS will provide a comprehensive assessment for service verification and service performance monitoring. [REDACTED]

[REDACTED]

[REDACTED]

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

1.4.7.3.a Service Description

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

CDNS provides caching of website objects, files, and streaming of stored and live web media over the Internet and the CDNS network. The CDNS will offer Agencies a dedicated content distribution network operated and managed by AT&T. **Table 1.4.7.3-1** provides the service description for AT&T's CDNS.

SERVICE REQUIREMENT	DESCRIPTION	BENEFITS TO AGENCY
CDNS network	<p>[REDACTED]</p> <ul style="list-style-type: none"> Each node consists of up to two different kinds of servers (caching and streaming) for flexibility. Streaming servers support Microsoft Windows Media, RealNetworks Real Media, and Apple QuickTime. Note: Apple QuickTime is supported as a progressive download. <p>[REDACTED]</p>	Agencies can enhance end user experience with a global CDNS network that supports web caching and streaming
Connectivity	<p>In accordance with the RFP, the CDNS will connect and interoperate with:</p> <ul style="list-style-type: none"> Data transfer from the Agency's origin server to the CDNS on IP. CDNS locations are AT&T-managed and are located within complexes that are often collocated with AT&T IP backbone nodes. 	Flexibility to receive content and streams from any IP connection, whether it originates from an AT&T IDC or an Agency's IP connection
Intelligent DNS (i-DNS)	i-DNS servers provide routing of end-user content requests to the CDNS node that is best able to handle the request. This architecture effectively eliminates single points of failure.	Assigns traffic mathematically to the best server to provide optimal end user experience
Expansion	For growth, the CDNS nodes can easily expand by adding additional resources to nodes, rather than scattering additional devices in other networks.	Additional CDNS capacity can be added when required and without service interruption
Caching web acceleration	Agency identifies web objects and pages to be added to CDNS cache	Speeds delivery of Agency websites to end users
Caching file downloads	Agency identifies files such as, but not limited to, Adobe or Word documents to be added to CDNS cache. Allows Agencies to offload delivery of commonly requested documents.	Allows Agencies to offload delivery of commonly requested documents and reduces total cost of ownership
Streaming on-demand	Streaming of media files to be played from an Agency's website. Origin servers can be within AT&T's Internet Data Centers or from an Agency's origin server. CDNS network determines the best path for delivering the streams. [REDACTED]	Agencies can utilize CDNS to stream media files without having to make the financial investment to support that capability within the Agencies IT department, effectively

SERVICE REQUIREMENT	DESCRIPTION	BENEFITS TO AGENCY
Streaming live webcasts	For Agency events that are being captured and encoded to be distributed across the Internet at the same time the event is occurring. Distribution of the stream is handled by the CDNS network.	reducing total cost of ownership
Intelligent site management -slim mirror	As a backup for the Agency's website, CDNS network can be configured to automatically redirect end users during a failover to a backup web server front ended by CDNS cache servers. See Figure 1.4.7.3-2 .	Allows Agencies to keep backup sites small and inexpensive, with the assurance that the CDNS network will shield the backup site from heavy traffic, while the primary site is being repaired
Intelligent site management – capacity on demand	The CDNS network monitor's the Agency's origin server traffic level and shunts overflow traffic to the optimal CDNS node when and if needed. This is often referred to as Re-direction and Distribution of Service. See Figure 1.4.7.3-3 .	Provides Agencies with an overflow mechanism to handle bursts in web traffic
Secure socket layer	Supports image and static content only while delivering accelerated content of Agency's secure website.	Agencies benefit from secure object delivery
Site monitoring/ server performance measurements	AT&T continuously monitors CDNS to ensure end users are receiving expected levels of performance and QoS. AT&T monitoring tools and systems measure the following parameters: <div style="background-color: black; width: 100%; height: 100%; min-height: 100px;"></div>	Agencies have the ability to manage, monitor, and view reports on service performance

Table 1.4.7.3-1: CDNS Service Description. Agencies have several choices to develop a custom CDNS solution to fit their unique requirements.

AT&T's investment in the CDNS infrastructure provides a highly reliable and stable service. **Figure 1.4.7.3-1** shows the national footprint of AT&T's CDNS infrastructure.

AT&T provides failover services with the intelligent site management-slim mirror feature. With this feature, the CDNS network determines if the Agency's website is available by requesting a designated webpage every 60 seconds. If the request is not received from the Agency's origin server, the CDNS network will serve the content until the Agency's server is repaired.

Figure 1.4.7.3-1: CDNS Infrastructure. Agencies receive a high-quality and highly available and scalable CDNS through a distributed CDNS architecture.

Figure 1.4.7.3-2 depicts the intelligent site management-slim mirror feature.



Figure 1.4.7.3-2: Failover Feature. *During outages, Agency websites remain available to end users with the intelligent site management-slim mirror feature.*

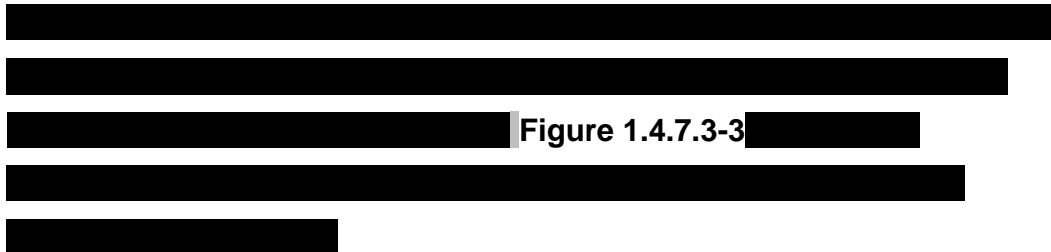


Figure 1.4.7.3-3: Intelligent Site Management-Capacity on Demand/Redirection and Distribution Feature.
Agency end users' web requests are redirected to the closest serving cache server, yielding significant performance enhancements with the redirection and distribution feature of CDNS.

1.4.7.3.a.1 CDNS Performance Measurements

AT&T uses [REDACTED]
[REDACTED] to monitor all hardware and software supporting the CDNS service. [REDACTED]
[REDACTED]
[REDACTED] for parameters such as CPU, bandwidth, and storage.

AT&T, through AT&T **BusinessDirect**, provides a management portal that provides Agencies with a valuable toolset by which they can manage their

CDNS. The management portal provides the following additional set of performance parameters:

- IP activity report
- Bandwidth usage report
- Response code report.

1.4.7.3.a.2 IP Activity Report

The IP Activity Report provides Agencies with unique IP activity for a selected timeframe. **Figure 1.4.7.3-4** is a snapshot of the tools interface that agencies use to generate their reports.

Figure 1.4.7.3-4: IP Activity Reporting Tool. Agency end users receive a unique IP activity-reporting tool as part of the standard CDNS.

1.4.7.3.a.3 Bandwidth Usage Report

The bandwidth usage report provides Agencies with bandwidth usage statistics. **Figure 1.4.7.3-5** is a snapshot of the bandwidth usage report.

Figure 1.4.7.3-5: Bandwidth Usage Report. Agency end users receive a bandwidth usage report as part of the standard CDNS.

1.4.7.3.a.4 Response Code Count Report

The Response Code Count Report (**Figure 1.4.7.3-6**) provides Agencies with several highly useful parameters (e.g., successful hits and codes) and quantifies problems, their causes, and performance in a specified timeframe.

Figure 1.4.7.3-6: Response Code Count Report. Agency end users receive a response code count report as part of the standard CDNS.

1.4.7.3.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 CDNS with additional features and capabilities. **Table 1.4.7.3-2** highlights additional service features and capabilities available with CDNS. AT&T proposes the attributes in the table below as service enhancements.

SERVICE ENHANCEMENT	DESCRIPTION	BENEFIT
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Table 1.4.7.3-2: CDNS Service Enhancements. Agencies can enhance their CDNS implementation with these service features.

AT&T offers several enhanced features, that, when coupled with AT&T standard caching and streaming services, provide Agencies with the ability to develop highly customized CDNS solutions.

1.4.7.3.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 through AT&T's ability to offer CDNS services upon contract award without modifications to the network or operational support systems.

1.4.7.3.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.

AT&T Networkx Team offers Agencies extensive experience providing managed services that create value to our customer to both in Government and commercial entities. This experience has given us the ability to engineer and deliver services. Three examples of AT&T Team's ability to deliver managed services are listed in **Table 1.4.7.3-3**.

"AT&T has provided exactly what we set out to achieve: a systems infrastructure that is stable, scalable and secure – and those are the three traits that are very fundamentally necessary to operate an online business."

*-- Michael Smith, Forbes.com
Chief Technology Officer*

AT&T EXPERIENCE		
Client Need	Solution	Created Value
[Redacted]	[Redacted]	[Redacted]
[Redacted]	[Redacted]	[Redacted]

Table 1.4.7.3-3: Experience Delivering Managed Services. Success is measured by the ability to deliver solutions to Agencies that create value to their business.



1.4.7.4 Robust Delivery of Transport/IP/Optical Services

[L.34.1.4.4]

1.4.7.4.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 buildout contemplated.

AT&T's CDNS uses AT&T's IP backbone network, which is one of the largest IP networks in terms of total IP traffic volume. [REDACTED]

[REDACTED]

AT&T's CDNS service also has a capacity-planning process; The Life Cycle Management organization monitors the service capacity with AT&T- developed trending tools. These tools produce forecasting statistics for determining in advance when additional capacity needs to be deployed to the CDNS network.

1.4.7.4.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 Labs continually evaluate network architectures and technology to increase reliability, scalability, and overall network health. **Table 1.4.7.4-1** describes AT&T's engineering practices and approaches to providing a robust, resilient, and scalable IP backbone network.

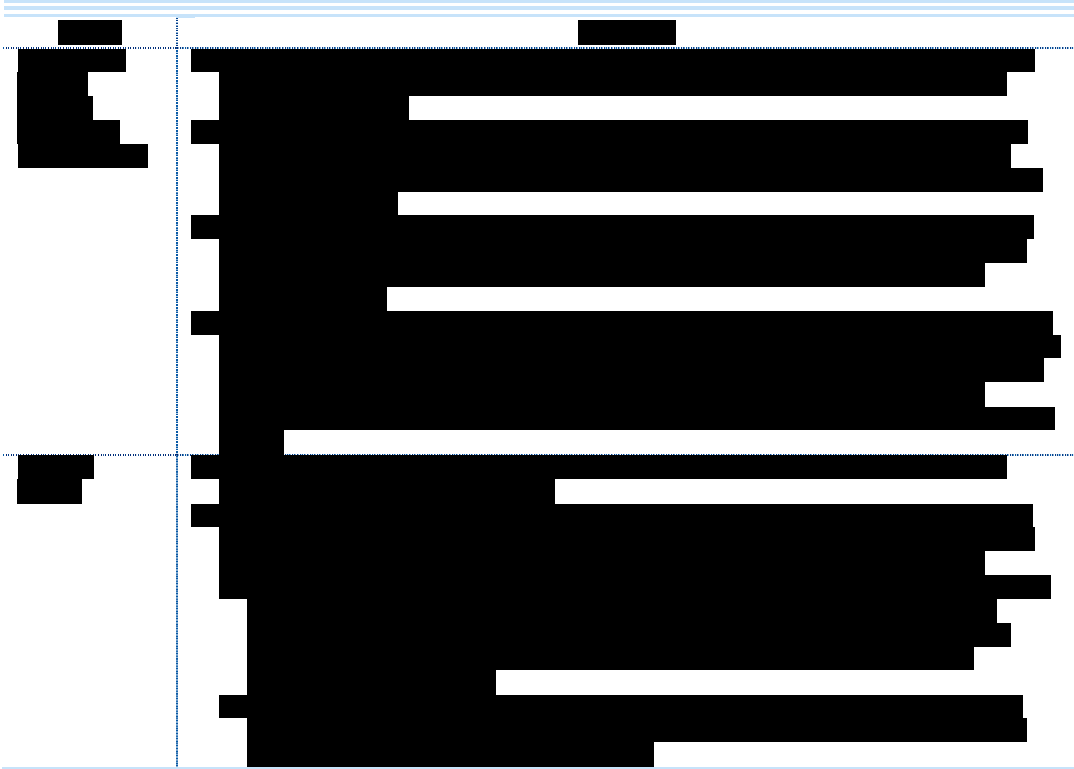
A table with multiple rows and columns, all of which are completely redacted with black boxes.

Table 1.4.7.4-1: System Robustness and Resiliency. Agencies can rely on AT&T to practice due diligence in providing a robust network and to plan for future network growth.

These two factors, along with planned network technology migrations and insertions, drive the development of AT&T's IP backbone network capacity plan. The plan is then closely monitored against measured traffic activities over time. AT&T network capacity plan is continuously adjusted for network changes to manage the IP backbone network as efficiently as possible, while maintaining the highest level of network robustness, survivability, and performance.

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

1.4.7.5.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-base and optical services is described in Section 1.3.6.2.a.

1.4.7.5.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.

1.4.7.5.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 multi-service 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.

1.4.7.5.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 interworking over a common infrastructure, including network interoperability, control plane integration, and optical infrastructure support is described in Section 1.3.6.2.d.

1.4.7.6 Stipulated Deviations

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