

# Requisition

Req # 00131062

PO #

Date: 04/22/08

*OK*

*Regular # 9020 4/29/08*

Bill To: x  
x

Vendor : 151521  
AT&T  
P.O. BOX 2969  
OMAHA NE 68103-2969

Ship To: INFORMATION TECHNOLOGY DEPARTMENT  
100 N. CLOSNER, 1ST FL  
EDINBURG TX 78539

Contact: EDNA KIRBY  
956-292-7010

Contract No:

Special Instructions:

QUANTITY	UOM	DESCRIPTION	UNIT PRICE	AMOUNT
8	MONTH	DO NOT DUPLICATE ORDER Basic-Transport PAK ATM DS3 ** Mbps 10 Mbps Dedicated Internet Access via ATM Asynchronous Transfer Mode (ATM) is a high-speed, fast-packet switching service that transmits Internet traffic on a single network by supporting rapidly changing bandwidth demands. It provides scalable bandwidth of a few megabits to several gigabits per second. ATM combines the performance of leased lines with the flexibility and connectivity of local area networks.	2,600.00	20,800.00
1				.00
1				.00
		Account No _____	Encumbrance	
		8-1100-415-00-200-002-0-534	20,800.00	
			Freight	.00
			Total	20,800.00
		REPORT ROAD HAZARDS 1-866-HCR-SAFE OR 1-866-427-7233		
		<i>upgrade</i> <i>replacing roadsrunner (Time Warner) DSL -&gt; AT&amp;T High Speed Connection</i>		

Authorized By: \_\_\_\_\_

## Edna Kirby

---

**From:** Renan Ramirez [renan@co.hidalgo.tx.us]  
**Sent:** Friday, April 18, 2008 2:49 PM  
**To:** 'Edna Kirby'  
**Subject:** FW: DS3 Router for Internet quote

**Attachments:** Hidalgo County DIA contract 10Mbps 3-18-08.xls



Hidalgo County DIA  
contract 10...

Edna,

Please do this... We would need \$20,800...

This is a Highspeed Internet Connection, called a "DS-3 10Mbps"  
This would replace the two T-1s, the DSL and the Roadrunner...

Thanks!

=====

Renan Ramirez

CIO

IT Department / Hidalgo County, Texas

956-292-7010 x.6011

www.co.hidalgo.tx.us

-----Original Message-----

From: PACHECO, SAUL R (ATTSWBT) [mailto:sp8437@att.com]

Sent: Thursday, March 27, 2008 10:46 AM

To: Renan Ramirez

Cc: DAVILA, JOEL (ATTSWBT); PACHECO, SAUL R (ATTSWBT)

Subject: DS3 Router for Internet quote

Renan,

Here is the quote for the equipment you need to upgrade from 3Mbps Internet to 10Mbps via ATM/DS3. I am also including the contract for the Internet upgrade. Please contact me if you have any questions.

<<Hidalgo County DS3 Router 2-18-08.xls>> <<Hidalgo County DIA contract 10Mbps 3-18-08.xls>>

Saul Pacheco

Technical Sales Consultant II

Government and Medical Accounts

721 Beech Ave

McAllen, Texas 78501

T: 956.984.4641

M: 956.279.0505

F: 956.630.8403

AT&T

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# Hidalgo County

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March 10, 2008

Mr. Renan Ramirez  
CIO  
Hidalgo County  
100 N. Closner  
Edinburg, TX 78539

Dear Mr. Ramirez:

Your constituency expects you to do more with less. With shrinking budgets and growing expectations, you are challenged to maintain public safety and improve quality of life. You need to partner with an experienced communications provider that you can trust.

The AT&T companies are ready to help Hidalgo County replace your existing data communications system with one that can better meet current and future needs.

We propose OPT-E-MAN® Service, a high-speed data solution that connects your LANs within the same metropolitan area.

OPT-E-MAN service gives you:

- **Competitive Pricing**—Priced lower than similar services, OPT-E-MAN service has higher bandwidth levels and equivalent contract terms.
- **Reduced Complexity**—OPT-E-MAN is easy to use and requires no additional training or administration.
- **Network Management**—We fully manage and administer OPT-E-MAN service from edge to edge. Our management eliminates your need for costly maintenance.

We offer an integrated solution that will enhance your telecommunications network and provide greater access to information and communications. Our solution combines OPT-E-MAN service and 10 Mbps Dedicated Internet Access via Asynchronous Transfer Mode (ATM).

These products will perfectly complement each other. Together they

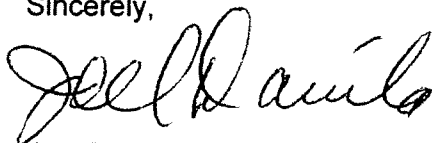
- Offer versatility by accommodating different protocols, equipment, and applications
- Support extensive record and data transfer capabilities
- Provide the higher level of telecommunications quality inherent in digital technology

When you consider the whole picture—our competitively priced solution combined with our reputation for reliability and support—you'll find we offer an excellent telecommunications value. There is no installation charge. You'll also pay a flat monthly fee of \$6,177.00 monthly for 36 months.

AT&T wants to provide Hidalgo County with a real solution to meet today's economic challenges and prepare you for tomorrow's opportunities. We know you have a choice of telecommunications providers, and we want to earn your business.

We want to provide you with the right solution for your needs. Please let me know if you have any questions after reading our proposal.

Sincerely,

A handwritten signature in black ink that reads "Joel Davila". The signature is written in a cursive style with a large, stylized initial "J".

Joel Davila  
Account Manager

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### Issues affecting Hidalgo County

From our discussions with you and the experience we've gained from working with other successful local governments, we've learned about key issues you face and specific goals you want to accomplish.

Issues surrounding connectivity regularly affect local government agencies like Hidalgo County . These issues can influence your communications decisions.

Whether it's remote access, videoconferencing, or public service portals, today's local government needs a system for staying connected.

### Goals you want to accomplish

We understand that Hidalgo County would like to replace your obsolete communications system with one that can better meet current and future needs. Specifically, you want to

- Communicate more effectively with the public
- Keep up technologically with other government agencies
- Prevent obsolete technology from interfering with your ability to serve the public

Our solution addresses your key issues and supports your long- and short-term goals. In the next section, we describe the solution, tell how it works, and define its key benefits. Then we summarize its cost.



### ▶ Current Technology

Do you want a system that can address your current and future needs?

To enhance your telecommunications network, we recommend that Hidalgo County implement a complete, integrated solution that includes OPT-E-MAN® Service and 10 Mbps Dedicated Internet Access via Asynchronous Transfer Mode. Let's look at each of your solution's components individually.

### Connect Multiple Sites in a City with OPT-E-MAN service

OPT-E-MAN® Service is a switched Ethernet service that connects your LANs within the same metropolitan area. OPT-E-MAN service provides a fully managed service that uses optical transport.

To better suit your needs, we suggest the following options with OPT-E-MAN service.

- **Silver Service**—supports applications that require minimal loss and low latency variation (jitter), such as VoIP. Silver service is a priority queue for delay sensitive traffic. The service parameters associated with it are Packet Delivery Rate (PDR), latency, and jitter. The PDR guarantee for silver service is 99.9% of total traffic. The latency guarantee is less than 18 milliseconds one way, end-to-end (50 milliseconds roundtrip), and the jitter guarantee is 12 milliseconds one way, end-to-end.

#### How does it work?

OPT-E-MAN service uses Ethernet LAN packets that run over optical fiber to the Internet or your network. The fiber transport connects to network terminating equipment at your location, and you connect to the service using a router, bridge, or switch. The service provides flexible bandwidth options from 10 Mbps to 1 Gbps.

#### What will it do for me?

You can ensure 24x7 connectivity among your sites with OPT-E-MAN service, a fiber optic solution. This Ethernet service is powerful enough to handle application access and data and video transport. It also supports dedicated Internet access, transparent LAN services, and network-based VPN. You can keep employees updated and involved with company issues without wasting time and money on travel.

To help you achieve these goals, OPT-E-MAN service gives you these features:

- **Competitive Pricing**—Priced at 15-20% lower than similar services, OPT-E-MAN service has higher bandwidth levels and equivalent contract terms.
- **Reduced Complexity**—OPT-E-MAN is easy to use and requires no additional training or administration.
- **Network Management**—We fully manage and administer OPT-E-MAN service from edge to edge. Our management eliminates your need for costly maintenance.

OPT-E-MAN® Service works seamlessly with Asynchronous Transfer Mode (ATM) to ensure the success of this integrated communications solution.

### 10 Mbps Dedicated Internet Access via ATM

Asynchronous Transfer Mode (ATM) is a high-speed, fast-packet switching service that transmits Internet traffic on a single network by supporting rapidly changing bandwidth demands. It provides scalable bandwidth of a few megabits to several gigabits per second. ATM combines the performance of leased lines with the flexibility and connectivity of local area networks.

#### How does it work?

With 10 Mbps ATM transport, you have the high bandwidth you need to quickly transmit data to the internet.

#### What will it do for me?

With ATM, you can efficiently connect to the internet, and you can do it in less time.

To help you achieve these goals, ATM gives you these features:

- **Flexibility and scalability**—Choose bandwidth options from T-1 to T-45 and from OC-3 (155 Mbps) to OC-12 (622 Mbps). And, choose incremental speeds from two to eight T-1s.
- **Performance**—Integrate your Internet traffic onto a single network to ensure optimal reliability and security.
- **Simplicity**—Easily reconfigure your network as your business expands and your technology demands increase.

**Agreement for  
AT&T PremierSERVSM Dedicated Internet Access (DIA)**

Req. 131062

This Agreement between AT&T Global Services (on behalf of AT&T Internet Services) referred to herein as "AT&T" and County of Hidalgo ("Customer"), is effective on the date of last execution. Execution of this Agreement is conditioned on AT&T's approval of Customer's credit. AT&T reserves the right to reject this Agreement or require a deposit based on Customer's credit.

Installation Site: County of Hidalgo  
100 N. Closner  
Edinburg, TX 78539

**Valid only for existing Customers adding circuits or sites/upgrading/downgrading/renewing current DIA Service. Any other use is prohibited.**

*Basic - Transport PAK*  
Contract Term: 36 Months

	Quantity	Monthly Charge	Installation Charge
<b>Basic - Transport PAK ATM DS3 ***10.0 Mbps</b>	1	2600	
<b>Domain Name Service</b>			
<b>Business Email (300Mb Complimentary)</b>			

Payment for Services	
Total Initial Charges Due	\$0.00
Total Monthly Charges Due	\$2,600.00

Estimated Service Activation Date: 6-8 Weeks from Contract Signature Date

Service Demarc to customer is : SBC Circuit Demarcation at Customer Site

Price Quote(s) contained on this page are valid until 05/11/2008

AT&T Address (for Notice Purposes): AT&T Internet Services, P.O. Box 941127, Plano, TX 75094-1127

Customer Support Telephone Number: 1-866-937-3664

Governing Law State: Texas

The AT&T PremierSERVSM Dedicated Internet Access Service Terms and Conditions (Version 4.3) are available online at [http://dedicated.sbcis.sbc.com/NDWS/sbc\\_policy/terms.jsp](http://dedicated.sbcis.sbc.com/NDWS/sbc_policy/terms.jsp) , and are incorporated herein by reference.

**CUSTOMER**  
(Signature) \_\_\_\_\_  
Name: \_\_\_\_\_  
Title: \_\_\_\_\_  
Date: \_\_\_\_\_

**AT&T INTERNET SERVICES, INC.**  
(Signature) \_\_\_\_\_  
Name: \_\_\_\_\_  
Title: \_\_\_\_\_  
Date: \_\_\_\_\_

**CONFIDENTIAL INFORMATION**

*This Agreement is for use by authorized employees of the parties hereto only and is not for general distribution within or outside their companies.*

MSOT Id: 76114-101623  
ECATS No.: null

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On the preceding pages, we described our recommendation, which includes OPT-E-MAN® Service and 10 Mbps Dedicated Internet Access via Asynchronous Transfer Mode (ATM). Together, these products provide a complete, cost-effective telecommunications solution.

For the solution to be truly valuable, it must be cost effective. You've seen the costs. Our prices are competitive with those of any brand-name provider. With our integrated solution, you'll have the latest technology and the tools to protect your investment over time. Plus, you'll receive excellent value:

- **Complete Solutions**—AT&T offers a complete range of solutions. We're certified to work with a wide variety of communication products and can assess your needs to find the best solutions. Our advantage stems from being able to understand what your government agency needs and from having the resources to deliver the right data service.
- **Data Network Strength**—AT&T understands data transport: our companies own and operate world-class wireline, wireless, and IP data networks, including one of the world's most advanced and powerful IP backbones. Our networks offer local, national, and global coverage. Because of our solid network infrastructure and our consulting expertise, we are able to take the worry out of data services, so you can focus on governance.
- **Service**—We offer you easy access to service and assistance, whether through online tools or a single phone number. As a result, you may spend less time on communication issues and have more time to focus on your business. Your government agency wants a solution-based approach to its data services. We're here to give you a complete solution that will see you through your communications challenges.



## Complete Solutions

Offering a variety of solutions to meet your needs

Let us put these assets to work for you today. If you believe that our solution will meet your needs, we're ready to negotiate all terms and conditions today.

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One thing consistently sets the AT&T companies apart from other providers—a dedicated account team. This table lists contact names and information. Call any of us whenever you have a question or problem. We'll come through for you.

Hidalgo County Account Team		
Joel Davila	Account Manager	956-984-4648
Saul Pacheco	TSC II	956-984-4641
Leticia Eads	Sales Manager	956-984-4615
Michael Johns	Communications Consultant	956-984-4633

This proposal expires in thirty (30) days.

**OPT-E-MAN® Service**

OPT-E-MAN® service is provided by Southwestern Bell Telephone, L.P. (dba AT&T Arkansas, AT&T Kansas, AT&T Missouri, AT&T Oklahoma, and/or AT&T Texas); Pacific Bell Telephone Company, dba AT&T California; The Southern New England Telephone Company, dba AT&T Connecticut; Nevada Bell Telephone Company, dba AT&T Nevada; Illinois Bell Telephone Company, dba AT&T Illinois; Indiana Bell Telephone Company, Incorporated, dba AT&T Indiana; Michigan Bell Telephone Company, dba AT&T Michigan; The Ohio Bell Telephone Company, dba AT&T Ohio; and/or Wisconsin Bell, Inc., dba AT&T Wisconsin, based upon the service address location. OPT-E-MAN service will be offered with guaranteed throughput thresholds based on the service configuration provided to the customer. There are distance limitations with OPT-E-MAN service based on the Network Terminating Equipment owned by the AT&T local phone companies to provide service to the customer. All service designs will need to be verified prior to selling and installing OPT-E-MAN service to ensure correct provisioning and maintenance. In this document, the term "AT&T" may refer to the holding company, any of its subsidiaries (including combinations of them), or the AT&T brand. © 2008 AT&T Intellectual Property. All rights reserved. AT&T, the AT&T logo and all other AT&T marks contained herein are trademarks of AT&T Intellectual Property and/or AT&T affiliated companies. All other marks contained herein are the property of their respective owners.

**Asynchronous Transfer Mode (ATM)**

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White Paper

## The Value of Subscribing to Managed Metro Ethernet Services from Service Providers with Cisco QoS Certification

By extending Ethernet beyond your office or campus to the metropolitan-area network, you can gain greater reliability, performance, and flexibility than you can with other broadband access methods, usually at lower cost. And when you subscribe to Metro Ethernet services from a service provider that has earned the Cisco® Quality of Service (QoS) Certification, you know that you are dealing with a company serious about living up to its network-performance promises.

The Cisco Powered Network QoS Certification for Metro Ethernet indicates that a managed Metro Ethernet service meets QoS requirements for delay-sensitive traffic.

### Executive Summary

This paper is written for technical staff members in enterprises that are considering deploying Metro Ethernet services.

The paper begins by describing how Ethernet has evolved from a technology exclusive to LANs to one equally at home in WANs – the “metropolitan area.” By extending Ethernet to the WAN, you can better control your communications; take advantage of converged voice, data, and video services; and save money, among numerous other benefits.

Next the paper highlights a number of important reasons why your IT department should consider out-tasking the management of its Metro Ethernet services. Cutting administrative overhead and reducing capital investment are two prime reasons, but many other compelling incentives exist as well.

The paper then explores why your company needs QoS levels for its Metro Ethernet services. In essence, these QoS levels let high-priority traffic – voice and video for instance – get through networks in sufficient time to deliver the desired quality of service. Next, the paper defines and describes how to calculate three performance parameters that can affect both your service-level agreement (SLA) and your Metro Ethernet QoS: frame delay, frame jitter, and packet loss.

The document then explains how Cisco Systems® has introduced a new Cisco Powered Network Metro Ethernet QoS Certification that can help you find a qualified service provider. In essence, this certification tells you two things: First, that the managed service provider delivers its services over a network built end to end with Cisco hardware and software. And second, that the voice and video traffic on this network meets high performance standards.

The final section of the document describes the technologies that certified service providers use to attain these performance standards.

## Ethernet Evolves Into a Valuable WAN Technology

Approximately 85 percent of the world's LAN-connected PCs and workstations use Ethernet. Easy to understand, implement, manage, and maintain, this technology was devised as a straightforward, cost-effective network protocol for office computer networks, typically with a few hundred users at most.

Ethernet was not initially intended for public networks and their expansive user bases. But that restriction applies no longer. Today, *Metro Ethernet* is linking physically distant private-network sites by extending Ethernet past buildings and into the WAN. In fact, Metro Ethernet is a rapidly maturing networking technology that broadens Ethernet to the public networks run by telecommunications companies. Consequently, these service providers can capitalize on IP-aware Ethernet switches to offer you a suite of converged voice, data, and video services such as IP telephony, video streaming, imaging, and data storage.

Low costs, reliability, ease of expansion, and interoperability with traditional broadband access technologies well suit Ethernet to a dominant role in both LANs and WANs. By extending Ethernet to the metropolitan area, you can provide your remote offices with reliable access to applications and data on your headquarters LAN.

### Benefits of Metro Ethernet

#### Reduces expenses and administration

- Spares you from having to categorize data, voice, and video applications into individual circuits, saving you time and money
- Provides a switched, high-bandwidth Layer 2 network capable of managing data, voice, and video all on the same infrastructure; this characteristic increases your bandwidth and eliminates expensive conversions to ATM and Frame Relay
- Enables you to cost-effectively connect numerous sites in the metropolitan area to each other and to the Internet

#### Integrates easily

- Connects easily to existing Ethernet LANs, reducing installation costs and time
- Coexists with other broadband access methods such as Frame Relay, ATM, and TDM, prolonging your investment in these technologies
- Offers a highly scalable alternative to traditional broadband access methods such as Frame Relay, ATM, and TDM

#### Boosts business productivity

- Enables you to **take advantage** of productivity-enhancing IP applications that are difficult to implement on TDM or Frame Relay networks. These applications include:
  - Hosted IP Communications
  - Voice over IP (VoIP)
  - Streaming and broadcast video
  - Real-time applications such as collaborative development
  - Secure Layer 2 and Layer 3 VPNs
  - Business intranets and extranets
  - Network security
  - Storage area networking and hosting
  - Disaster recovery

## Out-Tasking Metro Ethernet Service Management Can Save You Money and Improve Productivity

If you are considering designing, deploying, and managing a Metro Ethernet network, you have two choices: You can do it yourself in house, or you can contract a qualified managed service provider to do it for you. (A managed service provider delivers and manages network-based services, applications, and equipment to businesses or other service providers.) In many cases, the latter option will be your smartest decision for several reasons:

- **Increases control of your business:** You spare your IT staff from routine tasks such as daily monitoring, support, provisioning, transport, and router maintenance. Your staff is therefore free to focus on your core business and strategic initiatives such as network design and planning.
- **Reduces costs:** You can cut your capital investment and lower your operating costs. Your service provider can capitalize on its economies of scale to charge less than you would have to spend on operations, maintenance, service, equipment, and technology upgrades. Out-tasking also enables you to pay as you grow and avoid investing in upfront idle capacity to accommodate expected growth. In other words, you pay only for what you need today.
- **Makes recurring costs more predictable:** By shifting from a variable to a fixed-cost model, you will know your monthly costs in advance, and you will not have to scramble to find the budget to deal with unexpected network upgrades or outages.
- **Scales easily:** Because managed service providers offer bandwidth in small increments from 1 Mbps to 1 Gbps, you can more easily keep your network capacity in step with your traffic volume.
- **Lets you meet changing business needs:** As your business needs change, your service provider can increase or scale back bandwidth, add security services such as encryption, and adjust QoS to meet desired service levels for voice or other time-sensitive applications.
- **Simplifies network management:** Your service provider can make a change once and then apply it efficiently to all your locations.
- **Improves network availability and performance:** For most types of Metro Ethernet services, your service provider will provision, manage, and monitor your service online to ensure high availability and dependable performance.
- **Offers you expertise and support not available in house:** Service providers can fill critical resource gaps in areas such as network security, which typically requires special training and expertise.

Next, this paper describes the importance of establishing QoS levels for your Metro Ethernet service.

## Metro Ethernet QoS Levels Let You Match Network Performance to Business Needs

Ethernet was originally restricted to enterprise LANs because it did not offer the performance that service providers and their customers demand. And although early adopters of Metro Ethernet put up with inconsistent performance in exchange for increased bandwidth or lower prices, without Ethernet service-level agreements (SLAs), many prospects will stay with their traditional Frame Relay, private line, or ATM services. *To attract more enterprises to managed Metro Ethernet, service providers need to offer Metro Ethernet SLAs.*

Fortunately, technological advances now let service providers do just that. In effect, these organizations commit to providing a certain level of network performance or QoS. Typically defined in SLAs, these QoS guarantees are intended to protect your critical applications and your business, ensuring that you get the service performance and reliability you need.

QoS-based networks allow delay-sensitive data packets for such services as voice and video to bypass congested routers, just as ambulances have the right of way at crowded intersections. In other words, critical traffic gets through. For example, QoS is crucial to making voice calls over IP data networks sound just as good as conversations on the public switched telephone network (PSTN).

How do QoS and Metro Ethernet help your company? First, you can protect your most important applications. They also enable service providers to offer different classes of service that correspond to a variety of committed information rates (CIRs). You select the levels that meet your needs and your budget.

Cisco Systems, Inc.

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For instance, your service provider could offer three classes of service – bronze, silver, and gold – each characterized by successively better performance. You might put basic, noncritical data on a bronze class of service, backup traffic on a silver class, and voice traffic on a gold class. Service providers can differentiate service classes by varying network-performance characteristics, three of which are described next.

### Defining Three Metro Ethernet QoS Variables

For Ethernet services to replace older Frame Relay and private line data services, Ethernet SLAs must incorporate the following QoS performance parameters. SLAs must also include penalties and provisions to rebate customers if service providers fail to meet performance standards.

- **Frame delay**

Frame delay is the maximum delay measured for a percentage of successfully delivered CIR-conformant service frames over a time interval. The delay has three sources, the sum of which generates the overall frame delay: (1) The user-to-network-interface (UNI) at one network-access point, (2) the Metro Ethernet network itself, and (3) the UNI device at the second network-access point.

- **Frame jitter**

Also referred to as delay variation, frame delay greatly affects the performance of real-time applications such as IP telephony or IP video. To function as intended, these applications require a low and bounded frame jitter.

You can derive frame jitter statistics from the frame delay measurement. To calculate frame jitter, find the service frame with the lowest service frame delay in the population of frame delay samples used to derive the frame delay. Subtract this service frame delay from the maximum frame delay for the entire population (that is, from the frame delay value). The resulting figure is the frame jitter. Note that frame jitter applies only to CIR-conformant service frames.

- **Packet loss**

Packet loss refers to the percentage of CIR-conformant service frames that fails to be delivered between UNIs during a measurement interval.

To calculate packet loss, take the number of service frames delivered to the destination UNI and divide it by the total number of service frames sent to the destination UNI. Subtract the resulting percentage from one and then multiply by 100 to get the frame loss.

A real-time application such as voice over IP may be able to accommodate a packet loss of one percent without compromising quality. Bump that percentage up to three percent, however, and voice quality will be unacceptable. Packet loss has less effect on transmission control protocol (TCP)-based applications such as Web browsing because the TCP protocol retransmits lost packets. Nonetheless, the higher the packet loss, the lower your Metro Ethernet QoS will be.

QoS is extremely important to your managed Metro Ethernet SLA. But how do you know that your service provider can live up to its QoS commitments? One way is to ensure they have a Cisco QoS Certification, which is discussed next.

### The Cisco QoS Certification for Metro Ethernet Means Reliable Network Performance

A service-level agreement is only as good as the organization behind it. You may be compensated if your service provider fails to live up to its Metro Ethernet SLA, but you would rather avoid invoking penalties in the first place. You can lessen the likelihood of performance problems by dealing with a service provider whose Metro Ethernet service has been certified to meet the high QoS standards and best practices set by Cisco Systems.

Cisco offers a variety of Metro Ethernet service solutions, each of which enables providers to support QoS service classes to meet your needs. By applying effective QoS mechanisms, service providers can develop SLAs to align their services closely with your applications.

## Technical Requirements for Cisco QoS-Certified Networks

Metro Ethernet services with the Cisco QoS Certification must meet the following requirements:

- Maximum 150 milliseconds (ms) one-way delay for voice and video packets
- Maximum one-way packet jitter of 30 ms for voice and video traffic
- Maximum voice and video packet loss of one percent

Table 1 summarizes these requirements.

Table 1. Cisco Metro Ethernet QoS Certification Standards

QoS Metric for Voice and Video Packets	Standard
One-way, end-to-end delay	<150 ms
Variation or jitter	<30 ms
Packet loss	<1%

Service providers that use Cisco equipment exclusively and meet these performance standards are eligible to receive the Cisco QoS Certification. When you work with a Cisco QoS Certified service provider, you know you are working with an organization that treats its service commitments seriously.

## Comprehensive Certification Process Helps Ensure High Standards

Cisco follows an objective process for awarding the Cisco Powered Network QoS Certification. A third-party consultant assesses the service provider and verifies whether the company follows Cisco specifications and best practices for delivering SLAs pertaining to delay, jitter, and packet loss. The third-party assessor reviews important aspects of the service provider's operations and answers these questions:

- Does the service provider track and monitor the end-to-end network?
- Can the service provider secure its own network traffic and manage priority traffic across other networks?
- What are the minimum thresholds for network latency and availability?
- How is performance measured?
- Do procedures exist for load balancing, mirroring, caching, integrity, performance design reviews, security, backup, and recovery?
- Can the service provider's data center support enterprise requirements for physical and network security, capacity, availability, operations, and backbone connectivity?
- How quickly will the service provider respond to changing networking requirements as your business grows or changes?

This ongoing, rigorous assessment objectively validates the service provider's qualifications and the performance you can expect from its managed Metro Ethernet services. Services that display the logo in Figure 1 have passed the Cisco assessment. You can be confident that these services employ the best practices to deliver real-time voice and other critical applications over Metro Ethernet networks.

Figure 1

Cisco Powered Network Certification Logo



Cisco Systems, Inc.

## **Get the Right Service from the Right Provider**

Choosing the right service provider when out-tasking a Metro Ethernet network can be critical. Since 1997, businesses have relied on the Cisco Powered Network designation to find providers that both deliver services over a network built end to end with Cisco technology and meet Cisco standards for network and service quality. Today, the Cisco Powered Network designation is even more important because providers that offer Metro Ethernet services must pass an objective assessment. This assessment certifies that the service meets Cisco best practices and standards for QoS for the metrics in Table 1.

In the final section, the document describes the technologies that these certified service providers use to meet the Cisco QoS network-performance metrics.

## **Network Capabilities Needed To Deliver High-Quality Metro Ethernet Services**

To limit delay, jitter, and packet loss and to meet Cisco Metro Ethernet QoS standards, service providers employ a variety of technologies related to capacity, classification, prioritization, and link optimization.

### **Capacity**

Capacity refers to the actual throughput, as opposed to bandwidth, across each link. Metro Ethernet services require sufficient throughput at each link to avoid delay when your traffic peaks.

### **Classification**

To minimize delay and packet loss, the network must classify its traffic, especially voice and video, according to its performance requirements. Classifications typically include high priority, low latency, and best effort, and the classifications are made by service providers at the enterprise edge.

With a classification system in place, when the network is congested, critical traffic will advance to the front of the queue, unimpeded by noncritical traffic. Note that many networks use Layer 2 link-layer technologies, such as Frame Relay and Ethernet, in addition to Layer 3 technologies. To provide end-to-end IP QoS in these situations, Layer 2 and Layer 3 QoS classifications must match.

### **Prioritization**

Prioritization ensures that delay-sensitive voice and video payload and signaling packets are forwarded promptly. When outbound traffic is congested, higher-priority voice and video packets are forwarded before data packets, even if the data packets had arrived first.

## Link Optimization

Link optimization techniques include link fragmentation and interleaving (LFI) and traffic shaping:

- *LFI* – On access links under 768 kbps between the enterprise edge and service provider edge, large data packets can create unacceptable delays. To prevent these delays, service providers can fragment data packets at the enterprise edge.
- *Traffic shaping* – Although LFI helps ensure QoS when the network carries large packets, traffic shaping works to meet QoS standards when total traffic from all remote sites exceeds a central site's bandwidth capacity. In effect, traffic shaping accommodates mismatches between access speeds and aggregated bandwidth.

## Taking the Next Step

To confidently deliver real-time voice and video applications end to end, you need a QoS-enabled network service. But it takes expertise and investment to develop and monitor such a network. For these reasons, out-tasking QoS management to a service provider can dramatically reduce your risk and save you money as well.

Fortunately, finding a managed Metro Ethernet service to meet your requirements is now easier than ever. All you need to do is check that your service provider candidate has both a Cisco Powered Network Metro Ethernet designation and the Cisco QoS Certification. Choosing a service provider with these qualifications will go a long way toward producing the network reliability and service performance that your business relies on.

To locate a managed Metro Ethernet service that has earned Cisco Powered Network QoS Certification, visit: <http://www.cisco.com/cpn>.

To learn more about managed services, visit: <http://www.cisco.com/go/managedservices>.

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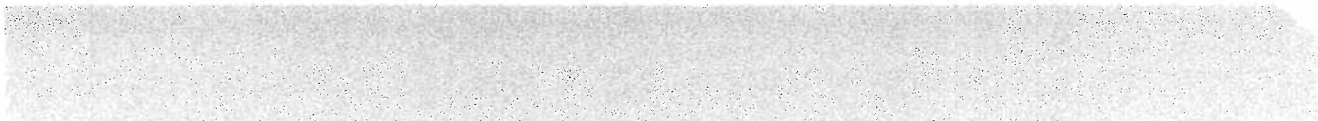
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# AT&T CUSTOMER DATA FORMAT REQUIREMENTS OPT-E-MAN<sup>®</sup> & CSME

AT&T strives to provide a reliable installation and networking experience for our customers. We will do all that we can to ensure the project is completed on time and exceeds our Customer's expectations. This document describes the specific recommendations, requirements and limitations associated with formatting the Customer data signal so that it can be transported successfully by the AT&T Network.

*Note: Additional requirements pertaining to physical room / site preparation requirements are provided in the document:*

## **OPT-E-MAN / CSME Customer Site Preparation Requirements**

1	OPT-E-MAN / CSME Network Interface	1
2	Customer Provided Equipment (CPE) Choices	1
3	Distance Limitations on Customer Premises	1
4	CPE Configuration	2
5	Virtual LAN (V-LAN) Configuration and Limitations	3
6	MAC Address Limitations When Using Bridge / Switch	3
7	Multicast and Broadcast traffic limitations	3
8	Traffic Shaping	4
9	IP Configuration and Limitations	4
10	Changes to Design / Requirements	4

## **1 OPT-E-MAN / CSME Network Interface:**

1.1. OPT-E-MAN / CSME service will be terminated according to the guidelines contained in **OPT-E-MAN / CSME Customer Site Preparation Requirements**. Service will be terminated at the demarcation point and will be either a RJ-45 patch panel for a 10/100 Base T connection or a fiber patch panel for a 1 Gbps connection. The network interface for OPT-E-MAN / CSME service is available in the following choices that need to be selected prior to firm pricing / design:

Interface	Handoff	Fiber Mode	Bandwidth Usage Limit
10/100 Base T	Copper	N/A	100 Mbps
1000 Base SX	Fiber	Multi-mode	1 Gbps
1000 Base LX/LH	Fiber	Single-mode	1 Gbps
1000 Base ZX	Fiber	Single-mode	1 Gbps

## **2 Customer Provided Equipment (CPE) Choices**

2.1. The Customer can use a switch, bridge or router to connect to OPT-E-MAN / CSME service. This equipment is a Customer responsibility and Customer can choose from many Ethernet-compatible equipment suppliers. In addition, your AT&T representative can offer a variety of equipment supplied by the AT&T family of companies.

## **3 Distance Limitations on Customer Premises**

3.1. Distance limitation – The customer may need to address signal regeneration on their premises to extend the signal beyond the AT&T interface (demarcation point).

Demarcation location will be determined by AT&T engineers based on conditions described in the OPT-E-MAN / CSME Customer Premises Requirements document. The following table describes signaling limits from the AT&T network equipment, located on the network side of the demarcation point.

Interface Speed	Cable type	Overall Limit
100 Mbps	UTP electrical (CAT5e or better)	90 M
1000-SX	50u Multi-Mode Fiber	550M

## 4 CPE Configuration

4.1. The CPE connecting to OPT-E-MAN/CSME service should be configured as follows BEFORE the service is turned over to the customer by AT&T

4.1.1. **10/100 single VC:** If the Customer is connecting to an OPT-E-MAN port that will not have multiple Ethernet Virtual Connections (EVCs) assigned to a 10/100 Mbps connection, the connecting CPE interface should be configured as follows:

- Speed set to 100 Mbps (No auto-negotiation)
- Duplex set to Full (No auto-negotiation)
- Traffic Shaping/Policing - limit output rate at or below the bandwidth usage subscribed for that connection
- If using OPT-E-MAN multipoint-to-multipoint configuration, the customer should enable controls for multicast and broadcast traffic within the customer network(s)

4.1.2. **10/100 multiple VCs:** If the customer is connecting to an OPT-E-MAN port that will support multiple EVCs assigned to a 10/100 Mbps connection, the connecting CPE interface should be configured as follows:

- VLAN tagging - Customer traffic needs to be tagged with AT&T assigned VLAN(s) provided by the Ethernet Network Operations Center (ENOC)
- Speed set to 100 Mbps (No auto-negotiation)
- Duplex set to Full (No auto-negotiation)
- Traffic Shaping/Policing - limit output rate at or below the bandwidth usage subscribed for that connection
- If using OPT-E-MAN multipoint-to-multipoint configuration, customer should enable controls for multicast and broadcast traffic within the customer network(s)

4.1.3. **1G single VC:** If the customer is connecting to an OPT-E-MAN port that will not have multiple EVCs assigned to the 1 Gbps connection, the connecting CPE interface should be configured as follows:

- Speed set to no auto-negotiation
- Duplex set to full
- Traffic Shaping/Policing - limit output rate at or below the bandwidth usage subscribed for that connection
- If using OPT-E-MAN multipoint-to-multipoint configuration, customer should enable controls for multicast and broadcast traffic within the customer network(s)

4.1.4. **1G multiple VCs:** If the customer is connecting to an OPT-E-MAN port that will have multiple EVCs assigned to the 1 Gbps connection, the connecting CPE interface should be configured as follows:

- VLAN tagging - Customer traffic needs to be tagged with AT&T assigned VLAN(s) provided by the ENOC
- Speed set to no auto-negotiation
- Traffic Shaping/Policing - limit output rate at or below the bandwidth usage purchased per connection
- If using OPT-E-MAN multipoint-to-multipoint configuration, customer should enable controls for multicast and broadcast traffic within the customer network(s)

## 5 Virtual LAN (V-LAN) Configuration and Limitations:

- 5.1. If OPT-E-MAN **Basic Plus** service has been ordered, which is a Virtual Local Area Network (VLAN) -based Ethernet Relay Service that logically segregates different Ethernet signals (also referred to as service multiplexing), AT&T WILL ASSIGN all VLAN Identifiers (IDs) to customer traffic / connections.
- 5.2. If OPT-E-MAN **Basic** service has been ordered, which is an Ethernet Wire Service (EWS) that is port-based and provided only in point-to-point configuration, no coordination of VLAN information is necessary as AT&T will pass both tagged and untagged traffic across the point-to-point connection.

## 6 MAC Address Limitations When Using Bridge / Switch

- 6.1. If the Customer elects to connect to the OPT-E-MAN/CSME network using a switch or bridge, the Customer needs to understand the limitations on Media Access Control (MAC) addresses per port
  - 6.1.1. **OPT-E-MAN:** When using a bridge or switch to connect to OPT-E-MAN, a maximum of 50 MAC addresses can be used per OPT-E-MAN port; any additional MAC addresses will be assessed an additional charge to allow a total of 100 MAC addresses per port
  - 6.1.2. **CSME:** When using a bridge or switch to connect to CSME, a maximum of 150 MAC addresses can be used per CSME port; any additional MAC addresses will be assessed an additional charge to allow a total of 200 MAC addresses per port.

## 7 Multicast and Broadcast traffic limitations

- 7.1. Customers ordering Basic Plus (multipoint-to-multipoint) OPT-E-MAN service need to be aware of the following controls regarding multicast and broadcast traffic
  - 7.1.1. **Broadcast Traffic** – refers to Ethernet frames that are forwarded to all nodes on the network using the broadcast Ethernet address
  - 7.1.2. **Multicast Traffic** – refers to Ethernet frames that are forwarded, in a point to multipoint fashion, across the network to multiple recipients that belong to groups that are identified using any of the multicast Ethernet addresses defined by the Internet Assigned Numbers Authority (IANA) as Internet Multicast.
- 7.2. Reason for Controls - Continuous and unpredicted floods of broadcast and multicast traffic can use substantial network bandwidth to the point of overloading the network's capacity. For this reason, it is necessary to place the following limits on the traffic types noted above:
  - Broadcast traffic limitation = 200 packets per second per port
  - Multicast traffic limitation = 1 Mbps per port

## 8 Traffic Shaping

- 8.1. Customer should enable Traffic Shaping on the Customer Provided Equipment (CPE) switch or router to ensure maximum throughput efficiency
- 8.2. Traffic shaping is required in order to ensure that packets are not dropped when entering the network as traffic policing is applied on the OPT-E-MAN network
- 8.3. If shaping is not enabled by customer, AT&T will randomly drop traffic if the customer signal exceeds the Committed Information Rate (CIR) that is contracted per connection
- 8.4. Most routers on the market should support traffic shaping
- 8.5. Shaping is supported in the standard Cisco IOS since it is a common IP software function
- 8.6. OPT-E-MAN can scale from 5 Mbps to 1 Gbps as long as the customer can shape their traffic; if Customers is not able to shape their traffic, they should purchase service in the 10/100/1000 Mbps speed tiers to achieve maximum use of the bandwidth; failure to comply with this recommendation could result in reduced throughput and performance

## 9 IP Configuration and Limitations:

- 9.1. AT&T WILL NOT:
  - Assign an Internet Protocol (IP) address as part of the OPT-E-MAN/CSME service
  - Enable Cisco Discovery Protocol (CDP) to or from the OPT-E-MAN/CSME service port
  - Enable UniDirectional Link Detection (UDLD)
  - Enable keep-alive
- 9.2. AT&T WILL:
  - Drop customer's Bridge Protocol Data Unit (BPDU) at User-Network Interface (UNI)

## 10 Changes to Design / Requirements

- 10.1. If the Customer makes changes to the interface types, quantities, or locations this would invalidate the network design agreed upon between AT&T and the Customer. This change could delay service turn-up as it may result in a change in the type of Network Termination Equipment (NTE) to which the customer will be connecting.

*Note: Additional requirements pertaining to physical room / site preparation requirements are provided in the document*

### ***OPT-E-MAN / CSME Customer Site Preparation Requirements***

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## **Customers and AT&T Representatives Please Note:**

AT&T and our Customers are equally interested in a smooth and on-time installation experience. AT&T will negotiate a project schedule with the Customer to enable service completion as close to Customer desired date as possible. HOWEVER, any changes to plans or any delays associated with Customer Site Preparation or Customer CPE configuration can have a corresponding impact to service delivery date. For example, if the customer CPE is not ready to be connected to the OPT-E-MAN Network, AT&T may not be able to complete the installation, leading to delays in using the service.

Prompt and clear communication between AT&T and Customer personnel has been cited by satisfied customers as the key to successful implementation.



**AT&T CUSTOMER SITE PREPARATION  
REQUIREMENTS  
OPT-E-MAN<sup>®</sup> & CSME INSTALLATION**

AT&T strives to provide a smooth and successful installation experience for our customers. We will do all that we can to ensure the project is completed on time and exceeds our Customer's expectations. Experience shows that Customer Site Preparation issues are a frequent cause of major installation delays. The important requirements detailed in this document need to be completed according to project schedule to avoid the risk that the project will be delayed. Close coordination and effective communication between the Customer and AT&T will be critical to ensuring the OPT-E-MAN / CSME service will be available when needed.

*Note: Additional requirements pertaining to Layer 2 / Layer 3 data formatting and customer equipment configurations are provided in the document:*

***OPT-E-MAN / CSME Customer Data Format Requirements***

The following is a high-level check list of the requirements in this document. Project team should use this checklist to ensure steps are completed on time.

<b>Site 1 Address:</b>			
<b>Site 1 Contact:</b>		<b>Contact Phone:</b>	
<b>Requirement</b>		<b>Scheduled Complete</b>	<b>Actual Complete</b>
1) Room Location Approved (meets environment, accessibility and security requirements)			
2) Conduit/Path from property line to equipment location available			
3) Adequate space (19" / 23" rack or wall mount) identified			
4) Rack confirmed (AT&T provided or approved customer-provided), exclusively for AT&T components)			
5) Power requirements: normally one dedicated fused/breaker, 15 amps, properly grounded, 3 prong 110V AC outlet located within 6' of the NTE			
6) Proper grounding arrangement available			
7) Cable supporting structure (cable rack or metallic EMT conduit)			
8) Contacts and restrictions			

<b>Site 2 Address:</b>			
<b>Site 2 Contact:</b>		<b>Contact Phone:</b>	
<b>Requirement</b>		<b>Scheduled Complete</b>	<b>Actual Complete</b>
1) Room Location Approved (meets environment, accessibility and security requirements)			
2) Conduit/Path from property line to equipment location available			
3) Adequate space (19" / 23" rack or wall mount) identified			
4) Rack confirmed (AT&T provided or approved customer-provided), exclusively for AT&T components)			
5) Power requirements: normally one dedicated fused/breaker, 15 amps, properly grounded, 3 prong 110V AC outlet located within 6' of the NTE			
6) Proper grounding arrangement available			
7) Cable supporting structure (cable rack or metallic EMT conduit)			
8) Contacts and restrictions			

**Note:** If project includes more than 2 sites, use additional sheet found at end of document.

# AT&T CUSTOMER SITE PREPARATION REQUIREMENTS

## OPT-E-MAN<sup>®</sup> & CSME INSTALLATION

### DETAILED GUIDELINES

#### **Section 1) Room Selection:**

OPT-E-MAN will be terminated at the existing Demarcation Point (DP) which marks the endpoint of the AT&T service via a Network Interface Device (NID). If none exists, or if the existing DP is not suitable to Optical Network Terminating Equipment (NTE), a new optical DP will be established for the property in conjunction with AT&T Engineering and applicable regulations pertaining to "Minimum Point of Entry" (MPOE), which is the place where AT&T Telco services are first terminated within the property. For OPT-E-MAN, the NID will be an RJ-45 for 10/100 Mbps connections or a fiber patch panel for 1Gbps connections. The NID will be installed at the established optical Demarcation Point (DP) at the customer's premises.

**New construction only:** If the equipment is being placed during a period of new or scheduled construction, the AT&T engineer will determine if the location is suitable during the initial site inspection. Following completion of construction and prior to placement of the NTE, a final inspection will be required to confirm site readiness.

#### **Section 2) Conduit / Path from Property Line to Demarcation Point:**

Optical Services are normally connected from the property line to the building's "Minimum Point of Entry" (MPOE) via an underground conduit facility. All conduits on the building's property are "subscriber conduit" and are the responsibility of the property owner to maintain and repair. Site installation work cannot begin until space within an acceptable conduit has been established between the property line and the DP. AT&T shall place inner duct/fiber liner within this section.

If the Optical Dmarc is not within the MPOE, the customer is responsible for providing the path between the MPOE and the proposed location. The conduit shall be a minimum 2" EMT type with a hard plastic corrugated inner duct with pull rope through which the fiber will be placed. The size of the conduit will be dependent on the future growth of the customer. Paths longer than 300' or with two or more 90 degree turns will require a pull box (12"x12"X18" minimum).

#### **Section 3) Space Requirements:**

OPT-E-MAN / CSME services include AT&T owned and operated Network Terminal Equipment (NTE) located at the customer dmarc location. Several models of NTE may be used, all of which have the same physical requirements. Adequate space, power and environment conditions must be provided by the Customer.

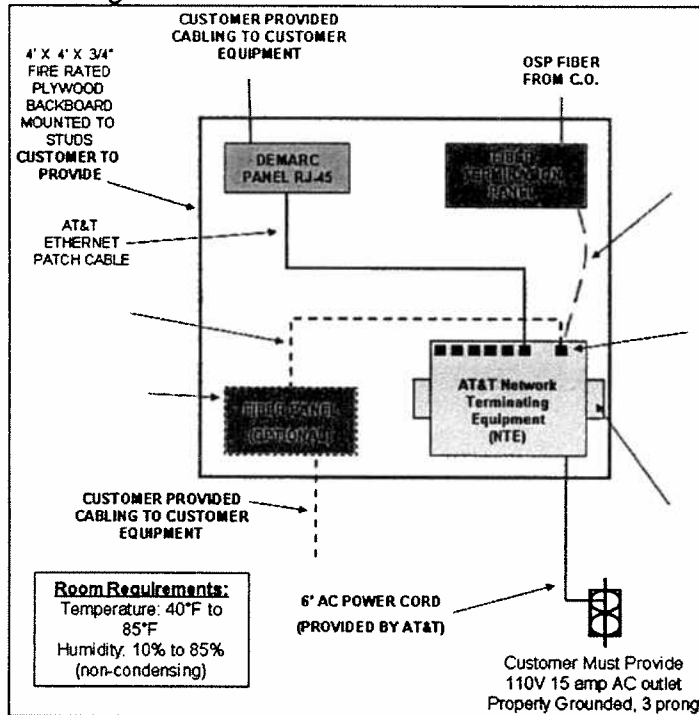
The NTE is normally provided in an AT&T furnished rack or cabinet (19" or 23") or may be mounted to the wall. Physical requirements for each type are provided below.

### Rack / Cabinet:

See section 4 for more details about rack/cabinets. OSHA requires a minimum of 36" to the front and rear of the bay/cabinet. The bay/cabinet has to be securely mounted and earthquake braced by bolting to the floor.

### Wall Mount:

See diagram.



### Section 4) Rack Information and Options:

OPT-E-MAN / CSME is normally deployed using an AT&T-furnished high-quality rack or cabinet (19" or 23") which was selected specifically for these services based on research and testing to meet AT&T stringent reliability standards. Most installations will dedicate a rack to the AT&T OPT-E-MAN or CSME equipment, but under circumstances described below, arrangements may be made to share a rack with other AT&T provided equipment. AT&T equipment cannot share a rack with the Customer's or another provider's equipment, as this creates a risk to our service reliability.

*If this project will use standard AT&T provided rack and will not be sharing the rack with other AT&T services, you do not need to read further in this section, skip to Section 5.*

### **OPT-E-MAN & CSME NTE Sharing Rack with Other AT&T Equipment**

AT&T supports the needs of our customers to maximize their floor / rack space. In cases where the customer requests to deploy equipment for different types of AT&T services within the same rack, the following steps should be taken:

**4A)** For requests to share rack between OPT-E-MAN or CSME and any AT&T service except those listed in 4B below, your AT&T representative will complete the form entitled, "Application for Non-Standard Installation: Mixed AT&T Network Services Equipment" embedded in this document. The completed application will be submitted by the AT&T representative to the OPT-E-MAN / CSME Product Manager, for review by AT&T Network personnel to ensure rack space and power conditions will allow the services to work together and forecasted growth can be supported.



Mixed Services

**4B)** For requests to share rack between OPT-E-MAN / CSME and any of these services, GigaMAN<sup>®</sup>, DecaMAN<sup>SM</sup>, FibreMAN<sup>®</sup> and / or WaveMAN<sup>SM</sup>, such requests shall be allowed (without submitting an Application for Mixed Services) with the following caveats:

Local engineer (with customer concurrence) confirms

- Power supply for each device is adequate and not in conflict
- Since the NTE is AC powered, the cord must be physically separated from all signal cabling in the relay rack
- Anticipated growth for each service will not exceed current equipment capacity, or if exceeded, will not trigger additional AT&T / customer investment that would not have been necessary had we deployed the services separately
- No power protection ("battery back-up) is required for this equipment now or in the future

This policy is not applicable for installations involving a Nortel OM5200 at customer premises.

*If this project will use standard AT&T provided rack, you do not need to read further in this section, skip to Section 5.*

### **Using Customer Provided Racks for OPT-E-MAN & CSME NTE**

As noted above, AT&T does not support requests to deploy our NTE in a rack or cabinet that also contains customer or another provider's equipment. AT&T does not charge the customer to provide a rack. If customer has other reasons for wanting to use their own rack (some customers prefer standardizing racks in their data center), such requests can be considered as described below.

The AT&T representative shall complete the "Application for Non-Standard Installation: Customer Provided Rack or Cabinet", embedded in this document. This application will be submitted by the AT&T representative to the OPT-E-MAN / CSME Product Manager, for review by AT&T Network personnel. The information on the application plus AT&T research on rack / cabinet manufacturers will be used to validate whether the rack will perform to AT&T stringent standards. If approved, the approval may include instructions for securing the rack or placing equipment in order to minimize the risk associated with the proposed rack.



Customer Provided  
Rack

### **Section 5) Power Requirements:**

OPT-E-MAN / CSME uses AC powered NTE which requires one dedicated fused/breaker, 15 amps, 110V AC outlet. This outlet shall be properly grounded (Section 6) with 3 prongs. This receptacle has to be located within 6' of the AT&T NTE equipment.

### **Section 6) Grounding Requirements:**

Relay racks/cabinets must be grounded by placing an exposed #6 or larger grounding wire to the building's ground source. This ground wire will be attached to the closest ground rod (earth ground) or building bus bar available and run to the OPT-E-MAN / CSME location in the room. In addition, the 110V, 15 amps AC outlet must be 3 prong and properly grounded.

### **Section 7) Cable Supporting Structure:**

The customer must provide a cable supporting structure that meets the National Electric Code Standards and may be either a cable rack or a metallic EMT conduit.

### **Section 8) Contacts & Restrictions:**

Customer shall provide the following information at start of project:

1. Contact name and telephone number at building where install is scheduled.
2. Building access information such as parking, unloading zones, elevators and route to work area.
3. Any noise or time restrictions.
4. Any asbestos or hazardous materials present in work area.

The customer shall provide a safe work environment and shall ensure that all customer requirements have been met or will be completed by agreed upon date. Customer will be prepared and have appropriate staff designated to test and accept service on due dates.

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*Note: Additional requirements pertaining to Layer 2 / Layer 3 data formatting and customer equipment configurations are provided in the document:*

***OPT-E-MAN / CSME Customer Data Format Requirements***

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## **Customers and AT&T Representatives Please Note:**

AT&T and Customer are equally interested in a smooth and on-time installation experience. AT&T will negotiate a project schedule with customer to enable service completion as close to customer desired date as possible. HOWEVER, any changes to plans or any delays associated with Site Preparation can have a corresponding impact to service delivery date. For example, if there is a two week delay in making conduit available, there will be at least a two week delay in the overall installation date for that site. The actual delay could be greater than 2 weeks depending on lead time associated with scheduling work.

Prompt and clear communication between AT&T and Customer personnel has been cited by satisfied customers as the key to successful implementation.

Use this sheet for projects with more than 2 sites; assign a site number to each site

<b>Site #</b> <b>Address:</b>			
<b>Site #</b> <b>Contact:</b>		<b>Contact Phone:</b>	
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