



# Request for Information (RFI) On Carrier Ethernet

***RSVP Deadline: October 20th, 2006*** e-mailed by 5 p.m. (ET)

***RFI Deadline: November 10th, 2006*** e-mailed by 5 p.m. (ET)

***Vendor Questionnaire Deadline: November 10<sup>th</sup>, 2006***

***Publication Date: March, 2007***

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## Introduction

This RFI (Request for Information) is proprietary to Network Computing and CMP Media, LLC. It is drafted and disseminated for the sole purpose of generating information on Carrier Ethernet for publication in Network Computing in March, 2007. Participating vendors must meet the minimum requirements for participation and agree that any information returned to Network Computing in response to this RFI may be published in print and electronic form on our Web site, [www.networkcomputing.com](http://www.networkcomputing.com).

## Instructions

The following minimum requirements are essential to participate in the Carrier Ethernet review.

- \_\_\_ WAN services proposed must be available in all listed locations (through partnerships is OK).
- \_\_\_ Carrier Ethernet services must comprise at least part of the proposal.

**If you do not meet the preceding criteria, your service does not meet the minimum qualifications for this review. Please RSVP by October 20th to Mike Fratto  
Thank you for your consideration.**

If you respond to the RFI, please note the dates in Section I.C to complete the RFI on time for inclusion in our March issue. We suggest you read through the entire RFI before answering questions. You can reference answers to other questions in the RFI using the section and question number. Please do not reference materials outside the RFI; incorporate them into your answers. This RFI will be the **only** source used to compare the participating services.

**Essay-type questions include word-count limits. Any submission beyond the limit may be ignored.**

Please answer all the questions in light of Sections II through V. These sections lay the foundation on which to base your answers, which will determine the winning bid and our Editor's Choice Award. If you have questions, please contact Mike Fratto

## *Effective Dates*

**RFI Issue Date:** October 11, 2006

**RSVP Deadline:** October 20<sup>th</sup>, 2006 e-mailed by 5 p.m. (ET)

**RFI Submission Deadline:** November 10<sup>th</sup>, 2006 e-mailed by 5 p.m. (ET)

**Vendor Questionnaire Deadline: November 10<sup>th</sup>, 2006 (access at <http://www.surveymonkey.com/s.asp?u=581312705708>)**

**Network Computing Publication Date: March 2007**

## Business Overview

TacDoh Corp., worldwide purveyors of deep-fried delights sold through major retail outlets, has an aging Frame Relay network linking its seven sites. Employee productivity is a critical TacDoh competitive advantage and is fueled by a well-connected network and application infrastructure.

In the past the current hub-and-spoke Frame Relay network served TacDoh's data needs well, but now an increasing rate of change and the need to leverage network dollars mandate a complete network redesign. TacDoh is searching for a new network strategy and design and is very interested in the flexibility and much-heralded cost savings of Carrier Ethernet.

Change and growth are key elements the new network will have to support. Maintaining site connectivity and application support are crucial; in addition, the winning RFI will support the increasing changes forced onto the TacDoh network.

The network supports voice, video, SAP transactions and Lotus Notes. Voice includes IP trunking as well as telephony for call processing. Voice and Video conferencing is accomplished using Polycom units at each location and occasional video streaming for companywide broadcast events. SAP transactions are high-priority traffic, requiring reliable and consistent processing, while the Lotus Notes collaboration uses store-and-forward messaging and background replication. TacDoh's customer facing web application, located in Manhasset with a secondary site in San Mateo, updates a database in Manhasset. Transactions are replicated in real-time with the secondary application server in San Mateo. Additionally, TacDoh runs its own instant messaging server and supports employee access to the Internet. Internet traffic, however, is regionally filtered and monitored, in accordance with corporate policy.

Service levels are applied to two areas: network performance and service delivery. Network performance is defined as metrics like availability, jitter, error rate and throughput. Service delivery is focused on guarantees associated with the time it takes to install new sites, dispatches to customer premises, escalation of out-of-service conditions and so on. The winning service provider will explain in detail the types of service levels available and any associated quantifications, like percentage of uptime.

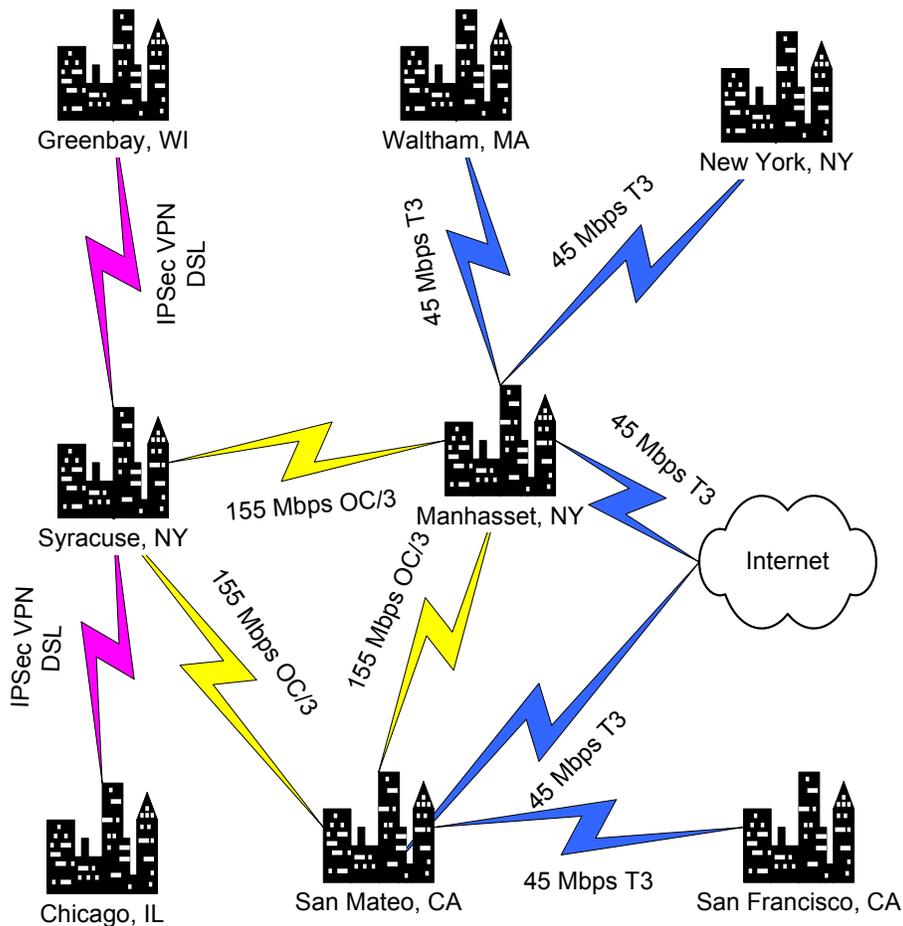
In addition to supporting and improving the service delivery and provisioning cost of its existing applications, TacDoh is seeking other ways to improve costs and service. To this end TacDoh is interested in other services available from each provider that may not be specified in this RFI, or considered part of TacDoh's initial conversion, but are recommended as a future network enhancements. Vision to outsource IT infrastructure services, cost-appropriate connectivity, redundancy, management, security and even extending network services to TacDoh customers are possible suggestions for fulfilling this partnership vision. Anything that better leverages TacDoh's network investment or core business will help the company choose a provider with which to partner.

TacDoh is growing into new areas and requires a geographical coverage explanation from each service provider. The granularity should list world regions that are part of the service provider's native coverage and regions that will be covered using partners. In the case that more than a single partner relationship exists please list all available.

Finally, because TacDoh's network connectivity and services are so critical to the success of its enterprise, the financial health and technical infrastructure of each service provider is important. The most favored responses will demonstrate all of these areas, providing sales, customer references, financials and Carrier Ethernet network connectivity in core and access network tiers.

## ***Current Network***

TacDoh currently has 8 sites, all within the continental U.S. The top of this hierarchal network has 3 regional offices (Syracuse, NY, Manhasset, NY, San Mateo, CA), connected to branch offices ( New York city, Waltham, San Francisco). Each regional is meshed with the other two, requiring two 155 Mbps connections for each. Each regional office also has one or two downstream branch offices, each connected at 44.7 Mbps. Two remote sites (Greenbay and Chicago) are connected to the Syracuse, NY location via IPsec VPN over DSL to a local ISP.



**Figure 1: Current WAN map**

As the traffic flows towards the data center it is aggregated.

- Applications supported on all circuits
  - Voice
    - IP Trunking
    - IP Telephony
  - Periodic Video Conferencing
  - Periodic Video Broadcasts
  - IBM Notes - including mail and database replication
  - SAP – Important real-time online transactions
  - Batch off hour data backup
  - Web based customer order/entry system
  - Remote desktop support for internal users
- Service Level Requirements
  - Regional Headquarters
    - 99.99% Uptime
  - Branch offices

- 99.95 Uptime
- Internet Access
  - Outbound
    - Routed through either Manhasset or San Mateo
    - Firewalls are in place between the Internet and the internal network
    - Outbound access is filtered
    - Outbound Internet access is considered best effort
  - Inbound
    - Public facing web sites and services are hosted off-site
    - Customer facing web applications are mission critical
    - Customer facing web applications (order/entry, catalogs, live support) are hosted internally
      - Primary web application is in Manhasset
      - Secondary site located on San Mateo
      - Web application updates the local databases. The local databases replicate changes in real-time with the secondary.

## **Objectives**

Our initial goal is to replace our WAN infrastructure with a more flexible and cost effective solution. We have chosen Carrier Ethernet because it seems to offer better price performance and flexibility. We are actively expanding our operations and seeking new markets. We estimate that we will be establishing more locations within the US in the next 1-2 years and internationally in the next 2 years. We want our WAN solution to grow with us.

We are looking to prospective service providers to assist us in designing the interconnections between sites and to recommend sizing, class of service, and other performance goals. We are interested in how the WAN is architected by the service provider so that we can make an assessment about whether the SLA's can be met, but the critical feature is for the WAN/LAN facility to be conform to IEEE Ethernet 802 family of standards.

- Targets
  - Initial deployment date is March 1st, 2007
    - Facilities installed at our premises
    - Establishment of VLAN and Class of Service parameters
    - Interfacing billing and support with internal systems
    - 2 weeks network testing and troubleshooting
    - Employee training if needed
  - Live on March 17<sup>th</sup>, 2007.
  - We estimate the following requirements by Q4, 2007
    - Temporary bandwidth increases for new marketing campaigns
    - Adding 4 new sites pending acquisition
- Service Features
  - Billing must interface electronically to TacDoh accounting systems
  - Provide 24/7/365 support for troubleshooting of circuit connectivity
  - Provide network backup using public (Internet) and private options
  - Provide self provisioning if available
  - Portal access to network monitoring and problem resolution
- SOHO and Remote Access not part of this proposal

The actual network design is left up to the service provider and the following list defines the critical traffic flows between locations and applications. What is critical is that the hand-off between the service provider network and our network is Ethernet.

- VoIP phones at each location must be able to communicate to each other.

- Syracuse, Manhasset, and San Mateo locations contain IP PBX's that support gateways to the PSTN. Each location has a small office PBX. SIP trunking occurs between the offices.
- Our SAP system is located in Manhasset. Each office must be able to connect to it.
- Internet traffic passes through Manhasset or San Mateo.
- The primary web application server is located in Manhasset as well as the primary order processing system (transaction processing, RDBMS, billing, etc). The secondary site is located in San Mateo. Transaction updates must occur between those two sites.
- The IBM Notes servers are located in Manhasset, San Mateo, and Syracuse. The notes servers replicate between themselves.
  - Greenbay and Chicago office connect to Syracuse Notes.
  - New York and Waltham offices connect to Manhasset Notes
  - San Francisco connects to San Mateo Notes
  - Manhasset Notes is the primary Internet email gateway. San Mateo is the secondary.
- Instant messaging gateways are located at Manhasset, San Mateo, Syracuse.
  - Manhasset and San Mateo have an internal to external IM gateway.
  - Greenbay and Chicago office connect to Syracuse IM.
  - New York and Waltham offices connect to Manhasset IM
  - San Francisco connects to San Mateo IM
- Bulk traffic can be routed.
- Streaming video is pushed from the Manhasset office.

The following table expresses our traffic priorities. Time Critical indicates latency and jitter must be minimized. Business Critical indicates level of importance to running our company.

<b>Application</b>	<b>Time Critical</b>	<b>Business Critical</b>
VoIP	High	High
SAP	High	High
Database Transactions	High	High
Inbound Internet	low	High
Outbound Internet	Low	Low
Video	High	low
IBM Notes	Low	High
Bulk traffic	Low	Medium
Instant Messaging	Medium	Medium

### ***Selection Criteria***

During our analysis period, we will be reviewing all the RFI's looking for the best solutions that fit our needs. We will most likely have additional clarifying questions that will need to be answered. We will be using the following list of items (in alphabetical order) to perform our assessment.

- Additional Service Costs
- Advanced Service Offerings
- Backbone Architecture
- CE Deployment Time/Costs
- Class of Service
- Contingency Services
- Geographical Coverage
- Global Network Strategy
- PoPs

- Price
- Summary of Carrier Ethernet services
- Support for non-IP protocols
- Topology Service Offerings
- Traffic Classification

## Carrier Ethernet Vendors Questions

The following questions explicitly address Carrier Ethernet service offerings.

### **Carrier Ethernet Service Offerings**

*Please provide a high-level description of your current Carrier Ethernet service offering, including details of the technology and use of any strategic partners to deliver services, breadth of geographic coverage and how off-network sites are interconnected. An explanation of the lowest bandwidth, maximum bandwidth, and the increments available.*

#### **Answer Guidance**

##### **Reason For Question**

Understanding of the provider's Carrier Ethernet service offering outlining the major features, functions or areas of support that differentiate the provider's service offering from competitors' offerings.

##### **Mandatory Response Format:**

**Word count:** Summary **not exceeding two pages** with executive overview and technical description.

#### **Qwest Response:**

Qwest proposes to implement an Ethernet based Virtual Private LAN Service (VPLS) to meet and exceed TacDoh Corporation's wide area networking requirements. Qwest delivers VPLS through Qwest iQ Networking® MPLS Private IP Core Network and the service would be ordered as Qwest iQ Networking Enhanced Ethernet Port. The Qwest Enhanced Ethernet Port service approach combines diverse user-to-network interfaces, multiple access types, Ethernet access provider arrangements, and MPLS-enabled transport services to deliver a flexible and fully functional VPLS solution. Qwest's VPLS provides four Class of Service categories based on service priority (e.g. time critical, business critical, standard application). Qwest also recommends that TacDoh select Qwest Integrated Management services to provide comprehensive CPE and network management services for proactive configuration and monitoring needs throughout the term of service. Qwest VPLS service is available throughout Continental U.S. and in select International markets.

Qwest Enhanced Ethernet Port Services can include:

- Multiple local access options: Native Ethernet, Ethernet Encapsulation over Frame Relay or ATM
- Tiered Enhanced Ethernet Port service from 1 Mbps to 10 Mbps at 1 Mbps increments
- Tiered Enhanced Ethernet Port 10 Mbps to 100 Mbps at 10 Mbps increments
- Tiered Enhanced Ethernet Port 100 Mbps to 1Gbps at 100 Mbps increments.
- Integrated CPE designed for Ethernet Presentation with comprehensive Qwest Integrated Management Services
- Value-added managed security services designed for network and premises defense
- 24x7x365 Network Management and Monitoring Services
- Q.Control® Customer Web Management Portal

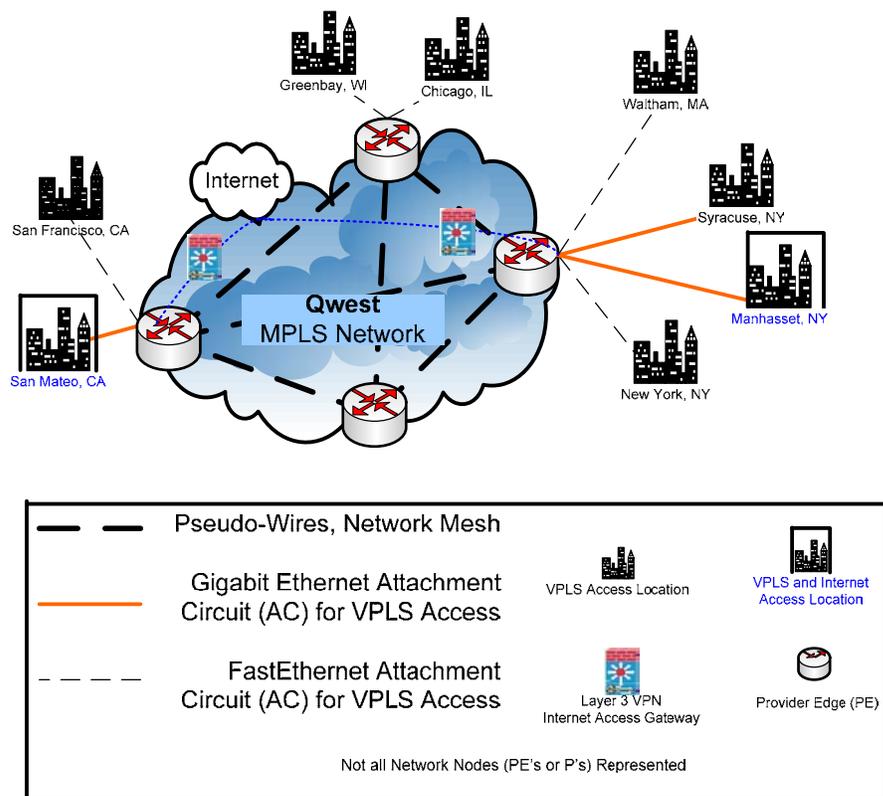
#### **TacDoh Solution**

At the three headquarter offices (Syracuse, NY, Manhasset, NY, San Mateo, CA), Qwest will provide a Qwest iQ Networking® Enhanced Gigabit Ethernet Port connection to enable secure access to the Qwest iQ Networking platform between sites, and these same links would provide Internet Access at those sites requiring it. The specific bandwidth needed for the site to site connectivity or the Internet access would be dynamically allocated as needed, with TacDoh having the ability to prioritize business critical or delay sensitive traffic. Qwest also will provide

Cisco® Catalyst 3750G-24T CPE with Qwest Integrated Management Services for each headquarters locations. For the other locations, Qwest will provide the following solutions:

- Waltham, MA - Qwest iQ Networking® Enhanced Ethernet Port will deliver Fast Ethernet Port on 100baseT or Fiber, priced for Tiered or Burstable 50 Mbps to 60 Mbps. Integrated Cisco Catalyst 3750-24TS CPE with Qwest Integrated Management Services.
- New York, NY - Qwest iQ Networking Enhanced Ethernet Port will deliver Fast Ethernet Port on 100baseT or Fiber, priced for Tiered or Burstable 50 Mbps to 60 Mbps. Integrated Cisco Catalyst 3750-24TS CPE with Qwest Integrated Management Services.
- San Francisco, CA - Qwest iQ Networking Enhanced Ethernet Port will deliver Fast Ethernet Port on 100baseT or Fiber, priced for Tiered or Burstable 50 Mbps to 60 Mbps. Integrated Cisco Catalyst 3750-24TS CPE with Qwest Integrated Management Services.
- Green Bay, WI - Qwest iQ Networking Enhanced Ethernet Port will deliver Fast Ethernet Port on 100baseT or Fiber, priced for Tiered or Burstable 30 Mbps to 40 Mbps. Integrated Cisco Catalyst 3750-24TS CPE with Qwest Integrated Management Services.
- Chicago, IL - Qwest iQ Networking Enhanced Ethernet Port will deliver Fast Ethernet Port on 100baseT or Fiber, priced for Tiered or Burstable 50 Mbps to 60 Mbps. Integrated Cisco Catalyst 3750-24TS CPE with Qwest Integrated Management Services.

Figure 1 –Qwest iQ Networking Enhanced Ethernet Port Solution for TacDoh Corporation



As TacDoh adds on new locations and experiences increased traffic demands; Qwest will design, engineer and deploy additional remote VPLS PE Routers to Tier 1 and Tier 2 metro markets closest to the TacDoh's locations to provide L2/L3 services locally. Qwest may aggregate the customer traffic and backhaul it to larger Qwest TeraPOPs in the area in order to provide long-haul networking reach domestically and internationally. Each of those remote access POPs will have at least two high-speed aggregation connections to two separate TeraPOPs.

## **Qwest VPLS Background**

Qwest VPLS, as it relates to the VPLS standard and MPLS, is a recent offering in the telecommunications industry that builds upon the breadth of Qwest experience in legacy L2 services like ATM and Frame Relay and our knowledge of L3VPN services. We leveraged our six plus years of engineering, management and operational expertise to service our customers with our Qwest iQ Networking® Enhanced Ethernet Port service.

Qwest was an early adopter of MPLS technology to provide high-quality Layer 3 VPNs (i.e. Qwest iQ Networking®) with the same security profile as traditional Layer 2 methods such as ATM and Frame Relay. In early 2006, Qwest established Qwest's Private IP Core MPLS architecture by modifying the MPLS L3 VPN Private PE routers to form a private VPN Security Domain, which is not connected to the Internet, and is inaccessible from PE routers managing Qwest's dedicated Internet customer traffic. These Private PE routers are exclusively serving VPN customers on L2 and L3 VPN platforms, which Qwest believes is absolutely necessary for commercial, government and wholesale customers to expect from their Carrier when selecting an Ethernet based WAN solution.

## **Carrier Ethernet Architecture**

Please provide a high-level description of overall Carrier Ethernet architecture covering the following topics in addition to other topics deemed necessary by the provider.

- Last mile options (fiber, copper, wireless, etc)
- Provider (P), Provider Edge (PE), Customer Edge (CE) technology
- Handling 802.1Q and 802.1P tagged frames
- Handling Ethernet Broadcast frames
- Provider CE offering ( Managed CE, non-managed CE or both)
- Identify and certification of any infrastructure
- Description of shared resource management and oversubscription practices on shared resources.

### **Answer Guidance**

**Reason For Question:** Understanding of the provider's Carrier Ethernet architecture, outlining the functional areas (e.g., access plane, control plane and data forwarding plane) and how these differentiate the provider's backbone architecture from competitors. To, gain comprehensive perspective on how the provider network architecture can effectively meet their service requirement as relates to routing/communication across the provider WAN backbone.

### **Mandatory Response Format:**

**Word count:** Summary **not exceeding three pages** describing vendor's network base Carrier Ethernet architecture.

### **Qwest Response:**

Qwest's VPLS Provider Edge platform is based on a shared architecture that unifies telecommunications technologies under a common services platform. Within that architecture is a hierarchy of core, edge and premises service elements. Qwest designs all service elements with resiliency and growth in mind. The MPLS infrastructure is based on a combination of Juniper and Cisco® PE's, with Juniper® Core Routers. These VPLS PE devices are constructed in a redundant physical and logical topology with a minimum of two OC-12 links to each Qwest core device. Qwest administers iQ Networking® Enhanced Ethernet Port VLANs to be 802.1Q compliant. Qwest supports Q-in-Q, in which the ELA provider places their own VLAN tag on top of customer applied Tag, Qwest forwards the data using the ELA tag until it reaches the PE, we place the data into an LSP, and then reapply our Tag at egress PE to send onto customer edge.

Qwest VPLS may be accessed through a variety of access methods including Ethernet as a native mode Local Area Network (LAN) interface, and dedicated Ethernet over Sonet. Ethernet access is offered over a range of speeds, from 1Mbps to 1Gbps, and selection of media types (including, but not limited to copper, 10BaseT, and fiber, 1000Base LX, etc.). ATM and FR attachment circuits are also supported for those locations that will be migrating to a VPLS service or where native Ethernet is unavailable. This alternative allows TacDoh to leverage local loop options from our suite of Frame Relay and ATM, using RFC's 2684 (obsoletes 1483) and 2427 (obsoletes 1490), which provide bridging Ethernet over Frame Relay and ATM respectively.

Qwest will provide the iQ Networking® Enhanced Ethernet Port (i.e. VPLS) services using vendor implementations that comply with all necessary IETF and IEEE standards or draft standards. We do not employ proprietary methods for providing VPLS and are currently supporting the Martini Ethernet Encapsulation draft method of pseudo-wire transmission. Qwest's ongoing participation in many standards and technology forums, such as the Internet Engineering Task Force (IETF), Institute of Electrical and Electronic Engineers (IEEE) Standards Committees and Working Groups, and the Metro Ethernet Forum (MEF), ensures our awareness and compliance with evolving industry standards.

Domestically, Qwest owns and operates national and local networks, including leveraging the recent acquisition of OnFiber, a Metro Ethernet Access Solution provider, as well as other nationwide Ethernet access provider relationships. Internationally, Qwest interconnects with International partners to reach markets globally via Inter-AS MPLS Networking solution and has established local presence in critical markets, continuing to review markets and opportunities to improve network reach.

## Your Carrier Ethernet Point of Presence

Please provide details about your POP geographical coverage across North America. Ensure you distinguish between “active” and “non active/planned”. Please also distinguish E-NNI peering coverage.

### Answer Guidance

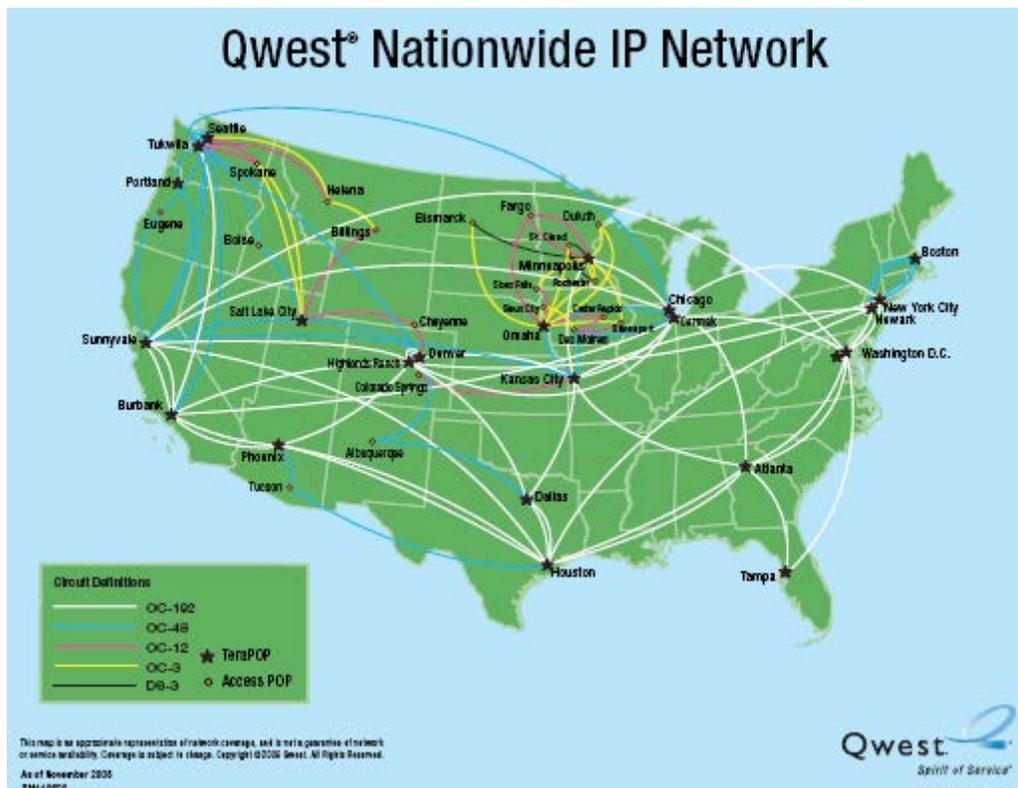
**Reason For Question:** Understanding of Provider’s Carrier Ethernet reach-ability, point of presence and access connectivity types to TACDOH locations. Also, identify where the provider’s backhaul paths might impact availability and service quality.

**Mandatory Response Format:** A list identifying the access type connectivity, the city or region of the Carrier Ethernet ready POPs and any future Carrier Ethernet POP site. Include proposed access types (e.g., fiber, copper, wireless, etc) to customer premises (from PE to CE). A map may augment the response.

### Qwest Response:

Qwest’s iQ Networking® Enhanced Ethernet Port services are offered nationwide and available in select international locations. Our customers are served from our extensive IP Network and are able to reach customers headquarters, branch offices, and campus locations through our Ethernet Local Access methods.

Figure 2 – Qwest’s iQ Networking IP Network



Qwest’s Ethernet Local Access (ELA) services provide the last mile attachment circuit to the Qwest VPLS POP. At the Qwest POP, VPLS Private Edge (PE) devices aggregate ELA for multiple VPLS instances. An emulated LAN will be formed, amongst all the TacDoh Enhanced

Ethernet Port provisioned at Qwest POP. This private, secure customer network is called a Virtual Switch Instance (VSI). ELA provides the UNI functionality as part of the service.

ELA is provided in two forms, either Dedicated Ethernet over SONET (EoS) or Native ELA. The default access method will be Native Ethernet Access; EoS will be provided as an optional access method on an individual case basis. Both ELA methods provide a set of user-to-network interfaces (UNI) types which match L2VPN/VPLS interface requirements, and Qwest will augment ELA to meet the evolution of TacDoh Corp networking needs.

- Native ELA is a type of Local Loop provided via a shared metro optical Ethernet network at speeds ranging from 10 Mbps to 1000 Mbps. Access is delivered to the Qwest VPLS backbone via trunk ports at key aggregation points. Native ELA uses IEEE 802.1p CoS prioritization mechanisms within the switched infrastructure to provide packet delivery and capacity controls. The Ethernet Customer Interface is provided on an Ethernet switch placed by Qwest or an ELA Provider. Qwest's ELA Partner networks provide point to point Ethernet connection over a shared Ethernet switched aggregation network back to a Qwest switch which aggregates ELA at the Qwest POP. At the Qwest POP, the ELA Aggregation switch connects to the Qwest PE router.
- Dedicated EoS is provisioned as an Ethernet interface over a SONET network. By its nature, this is a dedicated connection, so each port on the transport network is dedicated to the customer. ELA using EoS will be provisioned using either Qwest's on-net Ethernet Private Line network or ILEC/CLEC provider access arrangements. The Ethernet CE is provided on a SONET multiplexer (mux) placed by Qwest at the TacDoh Corp premises. The Ethernet traffic is then mapped onto a SONET circuit back to the Qwest POP. Another SONET mux at that POP hands the traffic to the Qwest PE router as Ethernet.

Qwest also supports ATM or Frame Relay access into the VPLS network. The customer equipment (CE) connecting into the CE will be required to support RFC2684 (Bridged Ethernet over ATM) or 2427 (Bridged Ethernet over FR), and will encapsulate Ethernet frames over ATM/FR for transport to the PE router, where these Ethernet frames are then un-encapsulated for forwarding into the VPLS network.

The TacDoh Corp CPE equipment in this case will bridge Ethernet onto the ATM circuit. Ethernet frames are encapsulated onto ATM cells for transport across a point to point ATM PVC. This PVC is then handed off to the Qwest PE at the Qwest POP, where the PE will take the Ethernet frames back out of the ATM PVC, and forward them onto the VPLS instance. This requires the TacDoh Corp CPE equipment router or switch to support RFC2684 "Multi-protocol Encapsulation over ATM Adaptation Layer 5" specifically for bridging Ethernet over ATM.

Or the CE can provide a FR circuit delivered into the TacDoh Corp premises. The TacDoh Corp CPE equipment in this case bridges Ethernet onto the Frame circuit. Ethernet frames encapsulated onto FR packets are transported across a point to point FR PVC. This PVC is then handed off to the Qwest PE at the Qwest POP, where the PE will take the Ethernet frames back out of the FR PVC, and forward them onto the VPLS instance. This requires the TacDoh Corp CPE equipment router or switch to support RFC 2427 "Multi-protocol Interconnect over Frame Relay," specifically for bridging Ethernet over frame relay.

## **Carrier Ethernet Contingency/Backup Solution**

*Please provide details of your Carrier Ethernet contingency solutions to ensure both service continuity and high availability.*

### **Answer Guidance**

**Reason For Question:** Understanding of provider's Carrier Ethernet contingency solution for TACDOH business continuity and high availability service. The different high availability option should aid TACDOH in determining a cost effective solution for service availability at different locations (e.g., Business critical site would require a higher degree of contingency than a non critical site).

- Access Link Redundancy
- Component Redundancy
- Central Office (CO) diversity

### **Mandatory Response Format:**

**Word count:** Summary **not exceeding two pages** of provider's network base Carrier Ethernet contingency solution.

### **Qwest Response:**

Qwest's VPLS service can provide an assortment of customized solutions designed to varying degrees of redundancy, resiliency and fail-over protection. Qwest provides the following high availability options:

- 1) Fault-tolerance – VPLS CPE Customer Edge (CE) routers can be augmented with redundant power supplies.
- 2) Load sharing – VPLS CPE CE can be configured using the 802.3ad standard. Link Aggregation Control Protocol (LACP) allows bundling of several physical ports to form a single logical channel. Two provisioned ports may have traffic dynamically shared between them. If CPE selected is a router, the CPE can perform load sharing using IP routing and ARP features.
- 3) Fail-over protection – Several possible options including:
  - VPLS CE configured using 802.3ad standard. Two ports operate in pairs where the failure of one diverts all traffic to the remaining working port.
  - Native Ethernet Access (which is the preferred method for supporting Ethernet Access) is protected through the use of the Spanning Tree Protocol on LEC-based Ethernet switched networks.
  - Where Dedicated Ethernet access is required, Ethernet over SONET (EoS) through Automatic Protective Switching (APS) can be applied. EoS access uses comparable failover techniques as used with standard TDM SONET APS solutions. An EoS port is mapped to SONET transport that is protected through automatic alternate path routing in case of circuit failure.
- 4) Diverse PoP access – Qwest provides Ethernet Local Access (ELA) mapped to diverse Qwest VPLS PoP, or through the use of different ELA Qwest LEC partners.

Qwest's network engineering practices are designed to provide robustness in the access and backbone networks, to ensure resiliency, and to plan for growth. These practices include application of network design rules, network capacity modeling for failure scenarios, and circuit route checks to ensure redundant and diverse routing. In addition, the design of our network unifies technologies under a common service platform, where all network elements are designed with resiliency and growth in mind.

## Class of Service Offering

Please provide details of your class of service offerings that would enable TACDOH to differentiate services by category. TACDOH is interested in the following functional areas:

- Number of class of services provided throughout the provider network.
- Recommended or restricted applications characteristics for each class
- Service level parameters related to each class covering:
  - Packet Loss
  - Delay (round trip or one way)
  - Jitter
- Do you offer the Committed Data Rate – CDR (contracted bandwidth) per circuit or per class of service?
  - If the CDR per circuit; please specify:
    - The minimum and maximum bandwidth CDR percentage limitation/allowed per circuit
    - If there is cost associated with the CDR per circuit
  - If the CDR per class of service; please specify:
    - The recommended CDR. percentage per class of service (if any)
    - The minimum and maximum bandwidth CDR percentage limitation/allowed per each class; ; please clarify if the technical reasons (if any)
    - If there is different cost associated with the CDRs per class.
- Bursting capabilities for each class (if any)

Class of Service. Fill out the table (add more rows if necessary) for each class of service. Be sure to indicate the time unit (millisecond, microsecond, etc).

	Delivery	Latency	Jitter
Class 1			
Class 2			
Class 3			
Class 4			

### Answer Guidance

**Reason For Question:** Understanding of the provider's class of service (CoS) offering for TACDOH service differentiation categories. These classes will have some form of QoS/service level parameter that TACDOH will use to guarantee end-to-end quality of experience for its users. Also, TACDOH will utilize the contracted bandwidth allocation and bursting capability of each class for better capacity planning.

### Mandatory Response Format:

**Word count:** Summary **not exceeding two pages**, outlining provider's network base Carrier Ethernet service offerings. If you have predefined classes of service, please use a chart below to show the component breakdown for features like delivery, delay, jitter, and availability.

### Qwest Response:

Qwest supports four queue CoS capability on customer access loops to allow customers to prioritize their traffic should customer traffic flows ever exceed any local loop limitation during bursty events in their traffic. CoS is embedded as part of the Qwest iQ Networking® service offer at no additional costs. For customers, there never are bandwidth limitations applied to the separate traffic classes – customer has 100% use of that port at their discretion. This eliminates many bottlenecks or discard-eligible limits traditionally associated with legacy wide area networks. The CoS transport features of Qwest iQ Networking Enhanced Ethernet Port are not constrained in the network due to our no-congestion backbone design engineering solution.

TacDoh will benefit from Qwest's engineering expertise to offer a robust core network to manage all of the applications and CoS rules needed to support the network.

Qwest VPLS service has the following Class of Service traffic classes, which supports TacDoh Corp's application types used across the wide area network:

- Priority 1 (P1) class – used for time sensitive-voice applications and network-critical traffic such as Routing Information Protocol and Open Shortest Path First table updates
- Priority 2 (P2) class – used for delay-sensitive applications such as interactive video and voice
- Priority 3 (P3) class – used for streaming multimedia and business-critical traffic down to "loss eligible" traffic
- Priority 4 (P4) class – represents best-effort default, invoked automatically when no other value has been set.

<b>TacDoh Application</b>	<b>Qwest Class of Service Assignment</b>
VoIP	P1 (if Voice and Video are present, Voice retains P1)
SAP	P2
Database Transactions	P3
Inbound Internet	P4
Outbound Internet	P4
Video	P2 (if Voice and Video are present, Voice retains P1)
IBM Notes	P3
Bulk traffic	P4
Instant Messaging	P4

TacDoh Corp has full control to apply CoS levels to the specified applications, as well as, full flexibility to modify CoS levels via the Q.Control® portal customer web management portal.

## Traffic Classification

Please provide details of how traffic is categorized and provides preference to TACDOH different service types. TACDOH is specifically interested in the following (but not limited to) functional areas:

- Traffic Classification/marketing mapping techniques at the CE edge
- Honoring of customer LAN classification/marketing (CoS marking IEEE Layer 2 802.1Q/P and Differentiated Service Code Point – DSCP, etc.) to provide End-to-End QoS.
- Traffic prioritization techniques for different traffic types. For example, real time, non-real time, etc.
- Traffic congestion avoidance techniques for different protocol type (TCP, UDP, SNA, etc.)
- Ability to add, modify, or remove mappings.

### Answer Guidance

**Reason For Question:** Understanding categorization; the provider may honor or re-mark TACDOH traffic categories with same level of precedence/prioritization as TACDOH application requires. Also, in time of traffic congestion at CE device, TACDOH needs to understand the congestion management/avoidance mechanism utilized by the provider to assure highest quality of user experience.

### **Mandatory Response Format:**

**Word count:** Summary **not exceeding two pages**, outlining provider's network base Carrier Ethernet class traffic classification.

### Qwest Response:

The behavior of traffic streams governed by Qwest's Enhanced Ethernet Port CoS mechanisms can be summarized by the following steps:

- 1) Customer Ethernet frames enters Qwest VPLS network via the origination office through ELA.
- 2) Based upon configuration guidance from the customer, VPLS Origination UNI/CPE tags Ethernet frames with appropriate priority.
- 3) Origination CPE/UNI, queues Ethernet frames for sequenced delivered based upon priority.
- 4) ELA maintains priority tag and delivers frames in prioritized sequence from origination UNI/CPE to origination Qwest POP VPLS Edge device connected to Qwest's nationwide MPLS private core network architecture.
- 5) 802.1p tagging is mapped to appropriate MPLS priority tagging element at the origination VPLS Provider Edge. Qwest VPLS Origination Provider Edge delivers Ethernet frames to the Destination VPLS Provider Edge maintaining priority tagging.
- 6) At the destination Qwest POP, VPLS Provider Edge queues frames based on CoS class and delivers in prioritized sequence to destination UNI/CPE via ELA.
- 7) At the Destination UNI/CPE, Ethernet frames are queued and delivered in prioritized sequence to the customer's destination office.
- 8) CoS process is identical in reverse direction.

The CoS capability is only applicable on customer access loops to allow customers to prioritize their traffic should customer traffic flows ever exceed any local loop limitation during bursty events in their traffic. Packets received at the ingress PE receive what one could call premium status, and are guaranteed to be delivered at the egress PE. The 802.1p CoS Classification the customer applied at the CE will be forwarded across the Qwest backbone network and used for prioritization on the access loop at the egress PE. The Differentiated Service Code Point (DSCP) values are carried unaltered through the Qwest backbone network, which acts as a transparent transport for the customer defined DSCP values, carrying all received packets at the ingress PE

to the egress PE. As for other behavior, the Qwest Enhanced Ethernet Port solution adapts the network interface to behave like a virtual switch, so for example, TacDoh's network sending broadcast packets would be forwarded transparently to all the participating interfaces and/or VLANs. Qwest Integrated Management provides full customer support to administer move, add, change, delete to facilitate CE CoS configurations.

## Service Level Agreement

Provide details of your service level agreement strategy including but not limited to:

- How SLA's are defined
- How conformance to SLA's are measured and monitored
- How SLA measurements are calculated.
- Provider support monitor and management portal showing traffic statistics
- Remuneration for SLA violation.
- Describe escalation procedures for SLA violations.

### Answer Guidance

**Reason For Question:** Understanding how the service provider defines, monitors, tracks, and responds to service level agreement violations is critical for TacDoh to assess how well the promised service will perform. If your organization has an example portal page available, please provide the URL and any credentials.

### Mandatory Response Format:

**Word count:** Summary **not exceeding two pages**, outlining provider Carrier Ethernet SLA service offering, including but not limited to the functional areas. Please fill out the charts below. Fill on only the non-shaded cells for each chart.

## Frame Delivery

Indicate then percentage of successfully delivered frames end-to-end to meet the SLA.

	Chicago	Greenbay	Manhasset	New York	San Francisco	San Mateo	Syracuse	Waltham
Chicago								
Greenbay								
Manhasset								
New York								
San Francisco								
San Mateo								
Syracuse								
Waltham								

Describe or define the time windows used for delivery measurements, ie, N% frames delivered within a time period.

## Latency

Indicate in **milliseconds** the maximum latency end-to-end. Describe or define the time window used for latency measurements.

	Chicago	Greenbay	Manhasset	New York	San Francisco	San Mateo	Syracuse	Waltham
Chicago								
Greenbay								
Manhasset								
New York								
San Francisco								
San Mateo								
Syracuse								
Waltham								

Describe or define the time windows used for latency measurements, ie, N% latency within a time period.

## Jitter

Indicate in **milliseconds** the maximum jitter end-to-end. Define or describe the time window used for jitter measurements.

	Chicago	Greenbay	Manhasset	New York	San Francisco	San Mateo	Syracuse	Waltham
Chicago								
Greenbay								
Manhasset								
New York								
San Francisco								
San Mateo								
Syracuse								
Waltham								

Describe or define the time windows used for latency measurements, ie, N% jitter within a time period.

### Qwest Response:

The Qwest iQ Networking® Enhanced Ethernet Port solution is designed as part of a geographically distributed and redundant topology. Network Latency and Jitter are controlled and minimized by strategically placed core and edge network elements within the network. PE devices have high-speed MPLS tunnels to all other PEs, creating primary and secondary paths in the case of failure. VPLS hardware and software components are configured redundantly to further increase overall availability. The resulting improved packet performance—as measured by availability, latency, jitter, packet delivery and TTR—results in a general improvement in grade of service (GoS). Qwest will provide performance measurements during the initial provisioning circuit acceptance to determine if service is within Qwest’s Goal Measurements.

Qwest iQ Networking Enhanced Ethernet Port Service Level Agreement consists of the following metrics:

Metric	Goal Measurement	Remedy	Service Notes
Network Availability	100%	Each cumulative hour of network outage results in a credit of one day’s charges prorated from the MRC.	Qwest included local and long-haul network components.
Latency	< 100 ms	Incremental 10% - 25% credit of MRC discount adjusted for aggregate PoP to PoP Monthly Measurement failing to meet Goal Measurement	Qwest included PoP to PoP and local access components.
Jitter	≤ 10ms	Incremental 10% - 25% credit of MRC discount adjusted for aggregate PoP to PoP Monthly Measurement failing to meet Goal Measurement	Qwest included PoP to PoP and local access components.
Frame Delivery	≥ 99.9%	Incremental 10% - 25% credit of MRC discount adjusted for aggregate PoP to PoP Monthly Measurement failing to meet Goal Measurement	Qwest included PoP to PoP and local access components.
Trouble Reporting	Customer notification within 10 minutes of trouble alert.	Each failure to meet goal results in a credit of one day’s charges prorated from the	Qwest provides proactive notification of

		MRC.	trouble alerts.
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Note: Additionally, key network infrastructure interfaces (aggregation ports/network-to-network interfaces, Ethernet trunk ports) are monitored for packet/cell loss (including errors and discards) and availability, in order to ensure that network infrastructure ports never cause customer performance issues.

Qwest monitors and measures the Qwest iQ Networking® Enhanced Ethernet Port network performance and customer circuit performance using automated processes that pull data from the root source, summarize it, and display it using Web tools. These Web tools display actual results and provide a color-coded visual indicating whether performance goals have been achieved. Our approach is to completely automate the Web display of results from data collection. This ensures that the focus is on responding to performance issues, rather than on performance report generation. The automated reporting process eliminates any question of manipulating the performance data.

Qwest maintains internal network Key Performance Indicators (KPIs) through a proprietary statistical analysis system that displays the Qwest Network Reliability Scorecard. This includes the KPIs, the objectives, and clear graphical representation of objectives met or missed for each reporting period. The scorecard is our tool to show both upper management and network management the current health of the network. The scorecard is reviewed daily at the executive level to ensure the proper attention and focus, and by our network management teams to ensure Service Level Agreements are consistently met.

For Qwest iQ Networking Enhanced Ethernet Port trouble ticketing, Qwest offers our customers the use of a customized trouble ticketing system via a customer management portal interface known as Q.Control®. From this system, we collect many useful metrics that we use internally to evaluate and improve our processes including Time to Restore (TTR).

For Qwest iQ Networking Enhanced Ethernet Port, Qwest currently uses commercial software tools to capture data to calculate edge-based availability, customer premises equipment (CPE)-based availability, latency, jitter, and packet delivery rate. We also use a commercial off-the-shelf tool, to determine interface-level utilization statistics, as well as QoS statistics such as transmit/receive bytes, average utilization, average peak utilization, discard rate and error rate.

Qwest iQ Networking® service mark is owned by Qwest. All other marks on this page are the property of their respective owners

## Proposed Topology

Provide the details about the propose topology. Include any customer premise equipment provided or required. The table below lists our bandwidth requirements. Please provide a solution based on our goal outline in the Objectives section.

**Qwest Response: Responses provided directly to Proposed Topology table.**

Location	Installation Cost	Local loop type	Band Width	Max Band width	Provider
600 Community Drive, Manhasset, NY, 11030	Voice = 50Mbps Video = 10Mbps SAP = 20Mbps Notes = 20Mbps Other = 25Mbps Internet = 45Mbps	Ethernet	200 Mbps	200 Mbps	Qwest iQ Networking® Enhanced Ethernet Port
2800 Campus Drive, San Mateo, CA, 94403	Voice = 50Mbps Video = 10Mbps SAP = 20Mbps Notes = 20Mbps Other = 25Mbps Internet = 20Mbps	Ethernet	Tiered 150 Mbps	200 Mbps	Qwest iQ Networking Enhanced Ethernet Port
206 Hinds Hall, Syracuse University, Syracuse, NY, 13244	Voice = 50Mbps Video = 10Mbps SAP = 20Mbps Notes = 20Mbps Other = 25Mbps	Ethernet	Tiered 125 Mbps	200 Mbps	Qwest iQ Networking Enhanced Ethernet Port
890 Winter St, Waltham, MA, 02451	Voice = 12Mbps Video = 3 Mbps SAP = 5 Mbps Notes = 12Mbps Other = 12Mbps	Ethernet	Tiered 50 Mbps	100 Mbps	Qwest iQ Networking Enhanced Ethernet Port
11 W 19 <sup>th</sup> St, New York, NY, 11001	Voice = 12Mbps Video = 3 Mbps SAP = 5 Mbps Notes = 12Mbps Other = 12Mbps	Ethernet	Tiered 50 Mbps	100 Mbps	Qwest iQ Networking Enhanced Ethernet Port
600 Harrison St., San Francisco, CA, 94107	Voice = 12Mbps Video = 3 Mbps SAP = 5 Mbps Notes = 12Mbps Other = 12Mbps	Ethernet	Tiered 50 Mbps	100 Mbps	Qwest iQ Networking Enhanced Ethernet Port
1270 Main St., Greenbay, WI, 54302	Voice = 7Mbps Video = 3 Mbps SAP = 5 Mbps Notes = 3Mbps Other = 3Mbps	Ethernet	Tiered 30 Mbps	100 Mbps	Qwest iQ Networking Enhanced Ethernet Port

111 East Whacker Dr., Chicago, IL, 60601	Voice = 7Mbps Video = 3 Mbps SAP = 5 Mbps Notes = 3Mbps Other = 3Mbps	Ethernet	Tiered 50 Mbps	100 Mbps	Qwest iQ Networking Enhanced Ethernet Port
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**Answer Guidance**

**Reason for Question:** Understanding how the provider will install the provision the service for initial needs and future expansion.

**Mandatory Response Format:**

**Word count:** Summary **not exceeding two pages**, outlining provider Carrier Ethernet topology service offering, including but not limited to the functional areas. A network map is optional.

**Qwest Response:**

The proposed solution for TacDoh will be based on Ethernet connectivity from the customer premises to the Qwest VPLS Network. We are confident this infrastructure will lay the foundation addressing TacDoh's critical businesses circumstances and drivers, including the need for flexibility, scalability and security.

## **CE Deployment Time**

Please provide details of how vendor would approach an Carrier Ethernet for an organization the size of TACDOH. TACDOH is interested in the following (but not limited to) status areas:

- Change Bandwidth (CDR) associated for specific Class of Service
- Change the status of classes of services (e.g., upgrade from one class to three classes)
- Change the status of an application in class of service; Add a new application to a class of service or remove it from particular class of service (e.g., in case of additional marking required on the CE device)

### **Answer Guidance**

**Reason For Question:** Understanding of cost component and business downtime associated with change order request for Carrier Ethernet service offering.

### **Mandatory Response Format:**

**Word Count:** Summary **not exceeding two pages** describing the implementation duration, service upgrade/downgrade (if any) and the cost associated to provide these services per CE.

### **Qwest Response:**

Qwest strives to provide service installation within a 90 day timeframe from order to circuit turn-up. Qwest applies a proven project management approach to support our customers and are dedicated to provide quality solutions that meet our customer needs. A majority of post-implementation service modifications are available for our customers to self-administer via our Qwest Control® Web Management Portal.

The Qwest Control® portal is a powerful Web-based tool enabling you to manage your network effectively and efficiently. TacDoh can adjust security, CoS, and bandwidth settings, manage remote access users and view network configurations and performance—24 hours a day. The Qwest Control® portal provides a comprehensive set of communications management tools, including:

- eBilling Manager – Centralize local and national billing information across your Qwest service offerings
- Repair Manager – Create and track status of trouble tickets
- Inventory Manager – View inventory and make configuration changes
- Statistics Manager – View historical and real-time network statistics and create detailed reports
- Status Manager – Stay informed of your network status and performance
- Administration Manager – Create and manage secure profiles for your enterprise users

Qwest Control® portal is a Qwest proprietary Web-based application that provides our customers with complete management control over their billing, network and trouble management. There is no cost to use the Qwest Control® portal.

Customers are able to make CoS changes on a as-needed basis and if required Qwest will provide networking expertise to assist with those changes on the CE and overall network design. TacDoh would log into the Qwest Control® portal and complete a web-based change order form that provides Qwest with an electronic authorized approval via a dynamic order form that directs Qwest provisioning to administer the MACD (i.e. move/add/change/delete).

The Qwest iQ Networking® Enhanced Ethernet Port service delivery model enables you to receive quick and accurate network implementations, regardless of the chosen technology or network size. Provisioning and implementation teams are empowered to effectively coordinate

and manage the end-to-end implementation process, bringing a personal touch to the delivery experience.

Our innovative networking solutions and operational excellence are all delivered with a human touch. Qwest iQ Networking® Enhanced Ethernet Port offers a unique, single-point-of-contact design that proactively addresses customer support from accountable professionals. From advanced frontline support teams that stay with you from start to finish, to escalation contacts that ensure meaningful and frequent communication, Qwest is with you every step of the way. And our technical assistance center is staffed by advanced technicians with technical expertise to resolve more complex issues.

## Price Model

Please provide details of cost components for Carrier Ethernet service offerings. Please include details such as costs for changes to the service or service offerings. Indicate list any items that are required but not under this RFI such as customer equipment, local loop charges, etc.

### Answer Guidance

**Reason For Question:** Understanding of cost component associated Carrier Ethernet service offerings. TACDOH will utilize this as an initial guide to do a cost/benefit analysis to determine the feasibility Carrier Ethernet services instead of keeping their existing service (voice, video etc.).

### Mandatory Response Format:

Word Count: Summary **not exceeding three pages**, outlining provider pricing model for additional Carrier Ethernet service offering with supporting executive spreadsheets (if required).

#### A. Monthly Cost and Geographical Coverage (assume a 3 yr contract)

Location	Installation Cost	Monthly Cost
600 Community Drive, Manhasset, NY, 11030		
2800 Campus Drive, San Mateo, CA, 94403		
206 Hinds Hall, Syracuse University, Syracuse, NY, 13244		
890 Winter St, Waltham, MA, 02451		
11 W 19 <sup>th</sup> St, New York, NY, 11001		
600 Harrison St., San Francisco, CA, 94107		
1270 Main St., Greenbay, WI, 54302		
111 East Whacker Dr., Chicago, IL, 60601		

### Qwest Response:

The proposed Qwest iQ Networking® Enhanced Ethernet Port solution for TacDoh on a 3 year minimum term contract will be:

**Installation Non-Recurring Cost Total = \$8000<sup>1</sup>**

**Monthly Recurring Cost for 36 Month Term = \$142, 000<sup>2</sup>**

**Qwest Total Advantage® (QTA) Discount Applied<sup>3</sup>**

### Note:

<sup>1</sup>Qwest will waive all Non-Recurring Costs for minimum 36 month contract terms. If there are Special Construction Costs required to service TacDoh locations, Qwest will apply a separate Non-Recurring Charge.

<sup>2</sup> The monthly recurring cost includes:

- Multiple local access options: Native Ethernet, Frame Relay or ATM Encapsulation
- Tiered Enhanced Ethernet Port service from 1 Mbps to 10 Mbps at 1 Mbps increments
- Tiered Enhanced Ethernet Port 10 Mbps to 100 Mbps at 10 Mbps increments
- Tiered Enhanced Ethernet Port 100 Mbps to 1Gbps at 100 Mbps increments
- Enhanced Ethernet Port Class of Service Prioritization and Administration
- Integrated Cisco® Catalyst 3750, multi-port, Gigabit and Fast Ethernet CPE designed for Ethernet Presentation with comprehensive Qwest Integrated Management Services
- 24x7x365 Network Management and Monitoring Services
- Q.Control® Customer Web Management Portal with unlimited customer change control.

<sup>3</sup> QTA Discounts applied require TacDoh to maintain minimum revenue commitment during the contract term.

## **Global Network Strategy**

TACDOH is interested in how the vendor can deliver global Carrier Ethernet service. Please address the following functional areas:

- *Carrier Ethernet using own network; full cloud visibility with class of service.*
- *Inter-providers connectivity (e.g., DiffServ Gateway); partial cloud connectivity with class of service mapping.*

### **Answer Guidance**

**Reason For Question:** Understanding of the provider's peering capability with another provider and how TACDOH can utilize this functionality to save on internal peering cost and connectivity to extranet partner between different providers Carrier Ethernet service. This will allow TACDOH to understand the global connectivity reach and how the selected providers will honor TACDOH class of service marking and prioritization across two separate providers' management plane/domain.

### **Mandatory Response Format:**

**Word count:** Summary **not exceeding two pages**, outlining provider's network base Carrier Ethernet global strategy.

### **Qwest Response:**

With a strong national presence and a nationwide network, Qwest meets the telecommunications and information technology needs of businesses throughout the world. Working with vendor partners, Qwest provides full-service solutions encompassing WANs, applications and local-area networking, plus communications services to tie together locations and link customers to the global economy. Qwest is a one-stop provider and has the ability to outsource information infrastructures at a price that delivers the best possible value.

Qwest is committed to the elimination of single-purpose, stovepipe networks that create planning, operations, and interoperability issues for our customers. Qwest's service delivery model supports multiple types of customer requirements. Qwest's approach for network architecture evolution guides our investments and provides the overall direction for our technology evolution and services convergence. The service delivery model allows us to assess interoperability impacts of service layer changes. At the core of Qwest's IP-centric approach are the optical transport and IP/MPLS networks. The service delivery model gives Qwest a guide of how to layer from the core resources to edge services, integrated services control layers, and access all the way to service delivery point at the TacDoh Corporation location. It is this layered approach that enables users to request both network resources, such as bandwidth, and application resources such as call control, security services, messaging and conferencing.

## **Future Services Offerings**

Please provide details of your service offerings for future services. TACDOH is interested in the following (but not limited to) functional areas:

- *Broadband Access Service (e.g., connectivity for TACDOH small locations Remote Access Users*
- *Traffic encryption between all or selective TACDOH locations; please outline the technology used.*
- *Provider's future plan to add additional class of service to the current service offering (if any).*
- *Providers future plan for bandwidth on demand*

### **Answer Guidance**

**Reason For Question:** Understanding of provider's Carrier Ethernet advanced service offerings. Additional service offerings by the provider may need to be examined by TACDOH for strategic and cost effective plan/architecture to accommodate voice network, video network, streaming applications, disseminate corporate communication, remote user access, Internet accesses, etc.

### **Mandatory Response Format:**

**Word count:** Summary **not exceeding three pages**, outlining provider network base Carrier Ethernet advance service offering, including but not limited to the advance services listed below. Diagrams identifying how you support these advance service on your Carrier Ethernet network should accompany the vendor summary.

### **Qwest Response:**

In addition to the proposed iQ Networking® Enhanced Ethernet Port VPLS solution for TacDoh Corporation, Qwest provides a robust portfolio of metro and long-haul Ethernet networking services to our commercial, government, and wholesale customers.

Our future strategy is to continue focus on solutions that allow our customers an ease of doing business with their partners, vendors, and customers. Qwest is embarking on a mission to deliver these types of nimble solutions on a global scale in a return on investment proven approach. Qwest strives to allow customers to make decisions based on the solution required rather than lead with a technology pre-requisite.

Qwest has designed engineered and deployed MPLS-capable multi-service edge switch routers with high-port density to provide a full suite of services for diverse customer applications. These MPLS-capable multi-service edges are connected directly to the core routers via multiple high-speed uplinks for diversity and redundancy. These intelligent edge routers allow Qwest to create new differentiated service offerings, continue support for existing services, and optimize the network infrastructure. We have applied this intelligent edge approach to support our enterprise base customers and are continuing to service the small and medium sized businesses.

With these MPLS-capable multi-service edges, the network has less equipment, fewer layers and less complexity to operate and manage. Qwest will no longer have to add older IP routers and older Layer 2 switches that were built with limited services and port density. When older equipment at the POPs are decommissioned, they are removed after traffic has been migrated over to the new multi-service edges.

Qwest provides a common set of IP services, including Private MPLS VPNs, Dedicated Internet Services and Layer 2 VPN services (i.e. VPLS) via unified platform architecture. Given that the access to Qwest iQ Networking Enhanced Ethernet Port is transported via ELA, it is feasible for Qwest to provide multiple distinct services through a single PE. The Virtual LAN (VLAN)

capabilities of Ethernet provide the mechanism to securely deliver both Network-based and L2VPN/VPLS services. By statistically sharing the Ethernet capacity among services, TacDoh Corporation will streamline access, with increased cost-efficiency.

Lastly, Qwest believes TacDoh needs to partner with a telecommunications network services provider who has built for the future. Qwest prides itself on our forward looking strategy and current abilities to meet and exceed TacDoh Corporation's wide area networking Ethernet-based needs.

For more information, TacDoh can review our third quarter 2006 earnings report and review other important information.

[Qwest Third Quarter 2006 Earnings Report](#)

**URL:** [http://www.qwest.com/about/media/pressroom/1,1281,1996\\_archive,00.html](http://www.qwest.com/about/media/pressroom/1,1281,1996_archive,00.html)

[Qwest Large Business Solutions](#)

**URL:** <http://www.qwest.com/largebusiness/enterprisesolutions/index.html>

[Qwest Ethernet Solutions](#)

**URL:** <http://www.qwest.com/largebusiness/enterprisesolutions/products/ethernet.html>

[Qwest Completes Acquisition of OnFiber Communications Inc.](#)

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