The Power of Ethernet Solutions
As contemporary networks have become highly complex, requiring connections to multiple corporate LANS, data hubs and remote sites, with consistent speed and flexibility, Ethernet solutions should be considered as a way to simplify delivery of voice, video and data traffic across your distributed infrastructure.

Without question, an Ethernet-based Virtual Private LAN service (VPLS), which is a network-based Virtual Private Network (VPN), is one of the most developed Wide Area Network Solutions available.

However, if your business has been comfortable with using non-Ethernet WAN services, how do you determine if it will be beneficial to deploy an Ethernet solution for your organization?

This White Paper will examine the selection of Ethernet as a Wide Area Network solution and the way that it can provide greater performance for your enterprise via higher speeds and lower latency, simplified network management and reduced operational costs.

Differentiating WAN Technologies

First things first… As Enterprise Wide Area Networks (WANs) are highly critical to the core business and daily operations of the organization and the decision as to which technology solution should be deployed within the infrastructure to support the business operations is equally important, let’s discuss the WAN technologies available from which to choose.

For many WANs, the technology in use has included TDM Private Line, Frame Relay and Asynchronous Transfer Mode (ATM).

However, Ethernet has long been considered a standard service offering to Enterprise and Business users, since around the 1980s. It is a service which is commonly offered to customers via a physical interface; yet, once beyond the attachment point, the Ethernet service may operate over other transport services, like Multi-Protocol Label Switching (MPLS).

Also, MPLS-based IP-VPNs and Ethernet-based VPLS allow for the convergence of Internet, voice, video and data, while enabling maintenance of low end-to-end latency across the company-wide network. In addition, both of these technologies have the ability to reduce the number of leased lines required in the infrastructure; thereby decreasing circuit costs.

None of these capabilities are available with the previous technologies mentioned earlier.

Therefore, the performance and cost efficiencies achieved with both MPLS-based IP-VPNs and Ethernet-based VPLS offerings have made them the technologies of choice.

This leaves us to discuss the two more popular WAN connectivity options: MPLS-based IP VPN and Ethernet-based VPLS.

MPLS Technology

Usually referred to as Layer 3 MPLS VPN services, MPLS-based IP VPN is an IP-based option for transporting data across high-capacity networks. Its primary difference from an Ethernet solution is that it routes traffic across the network based upon the IP address.

The employment of an MPLS network to route traffic can be seen as complicating the process and increasing the level of overhead on the network. This is because the router will temporarily assign a “label” (or “shim”) to the packet prior to sending it off to the predetermined destination.

Once it arrives at the final destination router on the other end, the label is removed and the packet is delivered utilizing normal IP routing.
Differentiating WAN Technologies

The issue with this is that generally, a Layer 3 network is built to run on top of a Layer 2 network. MPLS-based IP VPNs connect through routers at the Layer 3 (Network Layer) of the Open System Interconnection (OSI) Model, which is usually slower than Ethernet; a Layer 2 (Data Link) layer of the OSI model.

Ethernet Technology

Ethernet has consistently been a comparatively less expensive and faster technology for the past few decades and has become the most widely deployed network technology world-wide.

With Ethernet-based VPLS services, traffic is routed based on its associated media access control address (MAC address); connecting through network equipment beyond routers, such as hubs, bridges and switches at the lower data layer (layer 2) of the OSI model.

In contrast with MPLS-based IP VPN services, Layer 2 traffic does not require that an organization outsource their network routing tables to a third-party. This can become extremely important when the company is an industry which requires that they protect privacy data; such as healthcare or finance.

An Ethernet solution is easily the preferred WAN design for specific circumstances, since US public Ethernet revenues grew from $3.9 billion in 2011 to a projected $4.6 billion in 2012, and are projected to more than double to over $13.4 billion 2018, at a compounded growth rate of 19 percent.¹

Benefits of an Ethernet Solution

As the demand increases for higher bandwidths due to the necessity to transport larger data files faster, as well as the convergence of voice, video and data onto a single network, a traditional WAN connection can become extremely taxed. While benefits of Ethernet within the LAN are quickly known, the technology has evolved; providing these same benefits for reducing network congestion and increasing network data transfer speeds throughout the enterprise WAN. Additional benefits include simplicity, increased performance and decreased costs.

Simplicity

Ethernet can greatly benefit a distributed organization, whether in a single town or spanning the country or the world, as if the locations were right next door to each other.

An Ethernet-based VPLS service accepts multiple protocols; therefore, the need for complex protocol conversions is eliminated. Also, it gives the business’ IT Department the ability to retain routing control and to prioritize traffic between various domains, applications or departments, irrespective of where the users are physically located on the network.

Increased Performance

With high-speed Ethernet rates in the multiple gigabits per second range and increasing, one of the greatest benefits to an Ethernet solution is its ability to provide for higher-speed, lower-latency end-to-end communications; while Ethernet protocols and interfaces support the technology with standard-compliant devices which can be easily deployed without the need to frequently upgrade speeds in small increments.

Decreased Costs

Another great benefit to employing an Ethernet solution is that it is much less expensive than traditional circuit costs on an Mbps basis. It is possible to save as much as half the cost of a DS3 connection, SONET OCx service or traditional T1 lines.
Benefits of an Ethernet Solution

With its extensive geographical coverage and multiservice access (services employing the same interface) an Ethernet solution decreases both equipment and power requirements and increases cost efficiencies. In addition, as the business grows, the scalability of the solution will allow for increases to bandwidth without requiring expensive capital purchases.

As an organization continues to increase its requirement for more media-intensive traffic across the network, an Ethernet solution is a reliable option to satisfy those demands and is an ideal technology for the converged network. Ethernet is generally simpler and less costly to deploy due to the reality that it does not require as many connections or equipment as an MPLS-based network, nor does it depend upon specialized IT training or resources.

Decision Criteria for Ethernet

Many times, an organization will make a decision based on the technology and then attempt to force the application to fit the decision. Perhaps, this may not be the best approach. It is much more likely that the outcome will be successful if one begins with the issue at hand and then makes a determination as to which technology best resolves it.

Ethernet –based VPLS is a great choice for those enterprises which currently employ an MPLS-based network and desire to deploy Ethernet at particular locations in order to augment its overall WAN design. Additionally, an Ethernet solution is best for those organizations needing connectivity for high-traffic, bandwidth-intensive applications, such as VoIP, video transfer or offsite data backup and storage.

Connectivity to sites requiring higher bandwidth needs may include:

- Mission-critical data centers
- Distance learning and corporate training
- Media centers

- Medical imaging
- Secure data and file transfer
- Transparent LAN services
- Storage Area Networks (SANs)

When deciding whether or not deploying an Ethernet solution within your enterprise is the right decision for your organization, there are a few things to consider; such as, examining the business needs, availability of resources within the network and researching service offerings within your region.

And finally, coverage is important when implementing an Ethernet Solution. Previously, it was imperative that there was an availability of fiber optics in order to deliver high-speed connectivity; however, in circumstances of limited optical, Ethernet can provide for higher speed connectivity to a multiple number of sites, as well as increasing circuit diversity via various access capabilities to include fiber, copper, coax and wireless.
When Private Line, Frame Relay and ATM were the dominating WAN technologies in the late 1990s, there weren’t many who were able to envision the power that Ethernet solutions would unleash for the enterprise today. In the decades following its introduction, Ethernet has obtained the leading position as the transport technology of choice due to its ability to simplify service management and provide higher speeds, scalability and flexibility, while allowing organizations to realize decreased network implementation and operational costs as compared to other options currently available.

About Frontier Business Edge

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