



## VPLS – The Future of Wide Area Networking

White Paper

### Abstract

*This backgrounder examines what Virtual Private LAN Services are, what they do and the benefits they deliver. A comparison between VPLS and other technologies that do a similar job is also included.*

This document was prepared by and reproduced with kind permission of Exponential-e – the UK's thought leader in Ethernet-based WAN solutions.

In addition to supplying TeleWare with its networking solutions, Exponential-e is a TeleWare Accredited Sales Partner.



## Contents:

1. What is VPLS?
2. What does VPLS do?
3. How can VPLS help you do better business with your customers?
4. What makes VPLS easy to use and install?
5. What makes VPLS stand out from other technologies that do a similar job?
6. A VPLS-enabled Next Generation Network from Exponential-e

## VPLS: The Future of Wide Area Networking

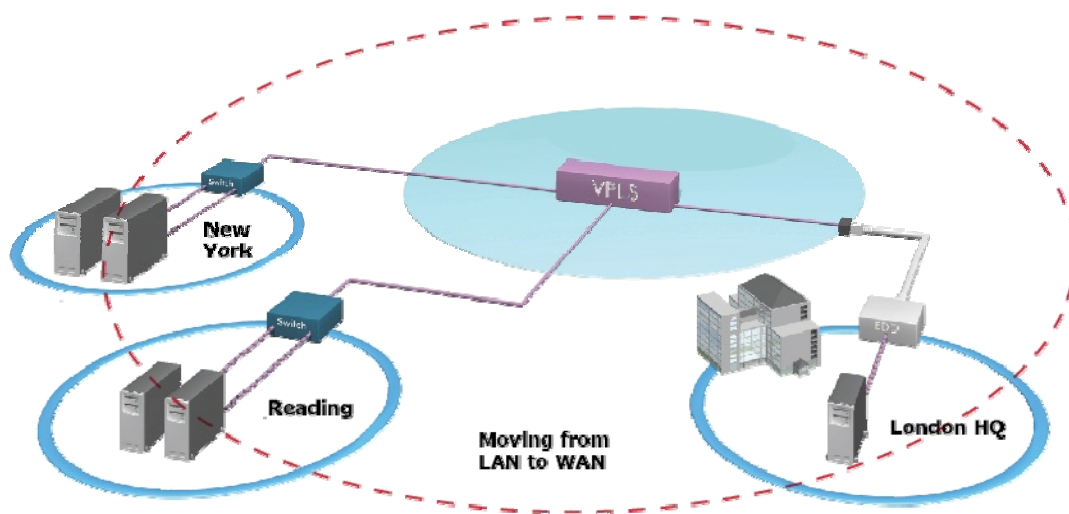
### 1. What is VPLS?

VPLS (virtual private LAN services) is a significant standard supported by the Metro Ethernet Forum. It extends the plug-and-play functionality we are used to in the LAN across the wide area by facilitating the creation of a completely private Layer 2 virtual cloud to which you can connect all of your offices in order to gain any-to-any connectivity. Across this cloud we are able to create numerous virtual private networks (VPNs), meaning that we can layer value-added services over the network and, importantly for security, keep these services separate from each other.

### 2. What does VPLS do?

A VPLS-enabled Next Generation Network (NGN) enables the provision of Ethernet based multipoint-to-multipoint communication over IP/MPLS networks. It makes it possible for geographically dispersed sites to share an Ethernet broadcast domain by connecting multiple sites through pseudo wires to a central bridge, as shown on the diagram overleaf.

**Figure 1:** VPLS enables geographically dispersed sites to share an Ethernet broadcast domain:



Combining the cost-effectiveness of Ethernet with the service delivery, traffic engineering, scalability and reliability of MPLS, VPLS has proven to be an effective and inexpensive way to provide multipoint Layer 2 Ethernet business services. As such, VPLS opens the gateway to creative cost-saving business solutions such as centralised DMZ distribution to multiple sites. In addition, for the first time, it enables the provision of multiple services such as video, VoIP, storage and hosting over one pipe, commonly known as convergence. This allows users to consolidate their telecommunications requirements and benefit from resulting cost savings.

### 3. How can VPLS help you do better business with your customers?

VPLS can positively impact how you do business in a number of ways:

i) **Improved agility** - In the current climate of rapid change and advancement, companies which are set up to respond the most quickly to market shifts will be the ones that retain a competitive advantage. A VPLS solution assists companies to this end. VPLS uses MAC addresses with Layer 2 switching as opposed to Layer 3 MPLS solutions which use IP addresses and Layer 3 routing. The over-riding advantage of this is that you are

in control of your own IP routing. Therefore, your IT department can be much more agile in responding to varying levels of customer demand.

You can conduct rapid reconfigurations yourselves without having to contact your service provider and wait for the provider to act upon the request. Even if you do require a service provider change, the typical time to make network changes is only a fraction of that for Layer 3 MPLS networks because the network planning is much simpler, which could be crucial for some businesses. Another feature which aids agility is the ease of adding new sites. With our VPLS-enabled NGN, a new site can be added by simply changing the network router that connects the site to the VPLS network. With Layer 3 MPLS solutions, however, it is a much more complex process as all of the service provider's routers need to be changed which typically takes 10 times as long.

**ii) Improved efficiency** - Companies with a VPLS-enabled NGN will be more smooth-running and thus should be able to provide a better level of service to their customers. This is down to the fact that with VPLS the company has access to its own network information so faults in a network can be isolated much faster and the IT department can trouble-shoot to fix an urgent crisis rather than having to go through a number of support engineers to get the information required. Less network down-time means higher corporate efficiency and productivity. Another aspect of our VPLS solutions is that they offer 5 levels of Quality of Service (QoS) and allow you to define your own priority levels either through labeling your traffic or using the service aware QoS feature on the core network. This maximises efficient network usage according to your business needs, so you can rest assured that mission-critical data such as CRM, ERP and SCM are allocated enough bandwidth, alongside key services such as video conferencing and telephony, even during peak usage and without costly over provisioning of network capacity.

**iii) Lower costs** - Companies that use VPLS solutions will find they have lower costs for a number of reasons. Firstly, VPLS enables convergence of services such as VoIP, video etc. so that all traffic can be delivered over a single Ethernet interface, eliminating multiple leased lines and resulting in economies of scale. Secondly, working with VPLS uses the same skills sets that LAN specialists have, so you would not need to provide additional training on WAN skills or hire WAN specialists. In addition, VPLS requires a lower cost of CPE as it requires smaller and fewer routers than MPLS solutions.

**iv) Lower latencies** – As a switched, Layer 2 solution it is zero-hop in the core of the network, so extremely low round-trip latencies can be achieved. For example sub 1millisecond within London and 67milliseconds round-trip from London to New York. This improves the productivity of the workforce as information is available faster. It also saves retail customers using EPOS systems time dialling up to make credit/debit card payments, improving their customers' sales experience.

#### **4. What makes VPLS easy to use and install?**

A VPLS-enabled NGN is a switched solution. This has a number of implications for ease of installation and ease of usage. As a switched solution it does not depend on routing tables, which means specific routing information is not required from the customer which is a huge advantage as such information can be of a confidential nature. Routed MPLS solutions require complex network design work to be completed and the resulting design affects the way that customers must configure their gateway router equipment. By way of contrast, with a PLS solution, only the network router to which the site connects needs to be configured. Once this is done, the customer can connect their site up without any special configuration. In addition, there is usually no need to purchase new hardware in the form of routers, as is often the case for MPLS solutions, because the company can use ordinary LAN equipment already at the site. As a Layer 2 service there is a clear separation of control between service provider and customer, as such, faults can be identified and rectified faster, what's more, servers can be moved without the need for changing IP addresses. The ability to rapidly change the VLANs with just a few key strokes, swinging them to different sites or connecting different sites and services together makes the network easily adapted to a customer's changing needs.

#### **5. What makes VPLS stand out from other technologies that do a similar job?**

Layer 3 IP VPNs provide a similar solution to a Layer 2 VPLS, however there are several key points of difference between the two solutions, each of which results in important advantages:

**i) Protocol** - Layer 3 solutions are limited to IP protocol so some applications will require special handling to bring them onto the network. VPLS on the other hand is a protocol-agnostic Ethernet solution which can support both IP and non-IP applications.

In other words, if an application can run on a company's LAN it can run on their WAN. This feature saves our customers time and money from reduced administration.

**ii) Architecture** - The simplicity of the network as a switched solution means the addition of a new site can be done quickly and inexpensively via a VLAN, whereas with the routed MPLS solution, routing tables need to be reconfigured, which takes longer. This means we can respond to our customers' changing needs faster than our competitors. In addition, it means customers only see the routers of their own network i.e. it is a transparent WAN to the customer.

**iii) Quality of service** - The quality of service (QoS) of Layer 2 VPLS compared to that using a Layer 3 MPLS VPN is far superior. With our Ethernet network, our customers have the ability to measure very precise end-to-end service levels in terms of latency, packet loss and jitter in line with the 802.3ah. This has not been available in the UK before and remedies one of the main criticisms of wide area Ethernet networks - the inability to manage the first mile. The key feature that improves QoS over typical Layer 3 MPLS solutions is our 'service aware' capability which basically enables higher priority traffic to automatically take precedence over non-critical traffic. While many competitor networks have had the ability to put inter-site traffic into different priority queues for some time, it was always necessary for the traffic to be pre-identified by the customer. Exponential-e's 'service aware' feature removes the need for the customer to 'tag' traffic as it can identify different traffic flows and automatically prioritise data according to the customer's definition of those priorities. The feature is so sensitive that even where HTTP protocols are more commonly used for Internet surfing, mission critical applications traffic can now be identified and given a higher priority.

**iv) Security** - The security of a VPLS network is second to none as it is run in the Layer 2 environment which is not hackable unlike MPLS solutions that exist in Layer 3. Furthermore, different VLANs can be presented to the customer as separate cables allowing, for example, the "clean" office network traffic to be separated from "dirty" public Internet traffic, enabling the customer to minimise the possibility of security breach.

**v) Scalable bandwidth** - Bandwidth changes on VLANs are made through simple software changes. This means that our customers are not restricted to buying bandwidth in large steps but can buy exactly as their usage requirements dictate up to the limit of their physical access circuit's capacity.

**vi) Pricing** - Low cost CPE, lower cost management systems, less support manpower required by the service provider and a generally more efficient network mean that we can offer the technology at very competitive prices to our customers.

**vii) Future-proof** – VPLS is fully scalable and, being protocol agnostic, it is suitable for all types of traffic negating any need to rip out existing infrastructure should our customers need to upgrade again.

## **6. A VPLS-enabled Next Generation Network from Exponential-e**

Exponential-e was pioneering in the UK with its roll-out of a VPLS enabled network. Aware of the shortcomings of traditional MPLS access, such as its complexity and the fact that it led to a loss of customer control of IP routing, Exponential-e sought to develop an innovative solution that addressed these limitations. It was this desire to improve existing networking that led to the use of VPLS within our network design. Today many of the leading ISPs are announcing plans for VPLS deployment in the future, but the fact remains that our service is available right now, and has been for over two years. Our cutting edge VPLS network design has a meshed, Layer 2, MPLS switched Ethernet core and sets a new standard for connectivity. This advanced network allows the customer the flexibility to create multiple VLANs over their WAN, this gives them the security and separation they would usually expect to see on the LAN. It also allows multiple physical connections to be consolidated on to a single connection while maintaining the separation of the circuits by means of VLANs, a feature unavailable from other MPLS providers. In essence things that were previously only possible within a company's office can now be carried out over a geographically dispersed area.

What stands out about our VPLS solution is that it is a site-to-cloud VPLS service, a Layer 2 VPN option that most competitors, who generally only carry a switched Ethernet

a Pure Ethernet, switched, Layer 2, 10 gig backbone so security, speed and consistency of data flow and quality of service are all maximised.

VPLS gives us a service-oriented architecture from which our customers can plug and play with a range of voice; data; DR and virtualization services. We are delivering simplicity and operational efficiencies for IT heads as they focus on getting more value from every ICT pound spent.

In a commercial sense, what makes the technology so revolutionary, in comparison with competitors' offerings, is that it simultaneously cuts costs, improves quality of service, improves efficiency and gives control back to you, the customer.

*"The fact that Exponential-e offers a national E-LAN any-to-any service based on VPLS is a potential point of differentiation that should be worked to the full."*

Joel Stradling, [Current Analysis](#) January 2008

For more information about Exponential-e VPLS-enabled NGN solutions, please call them on [0845 230 5001](tel:08452305001), email [enquiries@exponential-e.com](mailto:enquiries@exponential-e.com) or visit [www.exponential-e.com/vpls](http://www.exponential-e.com/vpls)

Headquarters/Registered Office  
**TeleWare plc**  
TeleWare House, York Road, Thirsk,  
North Yorkshire, YO7 3BX, UK  
T: +44 (0) 1845 526830 F: +44 (0) 1845 522165

Asia Pacific Regional Sales Office  
**TeleWare NZ Ltd**  
Level 8, TeRenCo Finance House, 86 Victoria Street,  
Wellington, PO Box 1956, New Zealand  
T/F: +64 (9) 360 6881

Registered in England No 4756742

E: [enquiry@teleware.com](mailto:enquiry@teleware.com)

W: [www.teleware.com](http://www.teleware.com)