

Advisory Report:

Ethernet Services Telebriefing: Global Market Drivers and Winning Portfolios

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Market:

Business Network Services - U.S., Business Telecom Services - Europe, Telecom Services - Asia

Standard View

Summary

Issue

Current Analysis gave a Global Ethernet Services Telebriefing during June 2009 ([Listen to the replay](#)). This advisory captures the salient points in a service area that continues to experience strong market growth, propelled by unabated demand for bandwidth, and the need for enterprises to grow their bandwidth flexibly and cost-effectively. Examples of the main areas discussed include: market leading portfolios; overall market trends and regional differences; the scalability of Ethernet VPLS and the benefits of hybrid L2/L3 data WANs; the evolution of Ethernet access evolving; typical applications of Ethernet services; and the progress and importance of robust and consistent Ethernet network-to-network Interfaces (E-NNIs).

Perspective

Current Perspective

The global carrier Ethernet services market continues to grow positively, as enterprise clients seek to replace legacy TDM leased line, ATM and frame relay platforms with Ethernet access and end-to-end circuits. Several carriers report double-digit percentage growth year-over-year largely due to legacy migrations. However, actual Ethernet circuit penetration is relatively low compared with other data WAN technologies with Current Analysis estimating approximately 10% to 15%, and of this estimate, metro Ethernet circuits prevail in the breakdown at about 75% with long-haul circuits slightly more than 25% of the total Ethernet circuits deployed. The market traction of Ethernet services tends to vary country-by-country and region-by-region, with some domestic markets showing considerable maturity for point-to-point and metro Ethernet options. For example, we estimate that in the U.S. some 200,000 Ethernet circuits were in place by 2008, and the growth of Ethernet remains robust. Meanwhile in certain countries and regions, any-to-any and Ethernet VPN services are in the early-maturity phases, with for example, the UK, North American and Japanese markets giving ample choice for established E-LAN and Ethernet VPLS products, whereas in Italy and Spain the focus tends to be more on L3 IP VPN for large-scale national data WAN deployments. A number of factors are impacting the take-up of Ethernet services at the domestic level, such as whether market regulation is in place, whether there is robust competition for wider choice, and on the status of legacy network transformation to packet-based NGN. However, cross-border Ethernet services are still emerging and Ethernet VPLS (any-to-any) services in particular are still immature on a global scale. A main driver for Ethernet deployments is that of businesses seeking more flexible and powerful applications over a simplified and more cost-effective infrastructure. Examples of applications that are well suited to Ethernet include: data centre interconnection, Software as a Service and cloud computing, remote back-up and storage, disaster recovery and financial transactions.

Ethernet Versus IP

L2 Ethernet and L3 IP VPN are seen to be complementing one another. Certainly carriers that are able to offer both in an integrated concept, such as ntl:Telewest Business (UK) and KPN International, are delivering the most competitive products. For example customers might require a 1 Gig-E circuit between data centre, and EVPL for various sites in the metro, but then use IP VPN for connectivity with several outlying offices. Service providers should avoid trying to force customers into one solution, but remain open and willing to understand the customer's business productivity needs to come up with the most sensible platform. Several large incumbent

carriers, such as BT, France Telecom and Telecom Italia, continue to place more emphasis on L3 IP/MPLS VPNs due to existing investments. A broad entry into L2 Ethernet services, including Ethernet access as well as the full range of Ethernet data WAN flavors, namely EPL, EVPL and E-LAN, is likely to have repercussions in terms of cannibalizing existing revenue streams. Therefore such operators are focusing more on the Ethernet access side of the story, to lay a foundation for a future wholesale move into a more aggressive full suite of Ethernet services. Typically such activity for a large-scale incumbent will depend on whether they are being forced to do so by alternative service provider activities, in other words, competition as well as carrier NGN strategies for group efficiencies. Finally, MPLS continues to contain some superb attributes, such as multiple levels of fine-grained QoS combined with traffic-shaping, as well as the ability to scale to hundreds of sites, which is currently more challenging for L2 Ethernet services to match. There are ample practical technical work-arounds to address these areas in the Ethernet world, but standards are still emerging and there remains a raging debate in the industry on whether, for example, Ethernet VPLS can effectively scale in large networks.

Virtual Private LAN Services (VPLS) – The Next Best Thing Since Sliced Bread?

VPLS run over an MPLS pseudo-wire mesh, thereby giving operators that have significant MPLS deployments the opportunity to capitalize on previous investments, and offer attractive multi-site WANs to prospects. Customers are interested in Ethernet VPLS services since the solution scales any-to-any carrier Ethernet services beyond the metro and lowers premises equipment costs. Since the technology relies on MPLS, there are additional positive attributes such as traffic management and solid SLAs. This area is one that is bearing witness to carrier initiatives as providers seek to differentiate based on VPLS capabilities; examples include AT&T, KPN, Exponential-e and Tata Communications. There were several announcements by service providers in H1 2009:

(see ["Global Crossing Continues Positive Momentum with Expanded EtherExtend Flex Reach and Plans for VPLS towards the Back-end of 2009,"](#) January 30, 2009)

(see ["Reliance Globalcom Combines Assets of the Former Flag, Yipes and Vanco to Extend Ethernet VPLS to 17 Countries Worldwide"](#) May 15, 2009)

(see ["AT&T Begins Offering Ethernet VPLS Internationally Including Four Countries in Asia"](#) December 3, 2008)

However, challenges to VPLS implementation abound. For example, while the most explicit customer demand for VPLS is coming from large enterprise customers that, for security or operational reasons, refuse to turn over control of IP routing to an external service provider, there are differing views concerning how well VPLS can scale in large customer networks. The prevailing view among providers is an upper limit of around 50 fully interconnected sites, due to restrictions posed by customer routing protocols such as OSPF. There is a minority view which holds that Ethernet VPLS can scale to hundreds of sites or more. For example, Verizon Business has proposed hierarchical VPLS as scalable to 1,000 sites. Another challenge is the potential explosion of customer MAC addresses. It is generally agreed that switches are cheaper than routers, and some customers may naturally wish to use Ethernet switches in place of IP routers, but the double-whammy is a MAC address explosion and an unstable network. Carriers are responding by placing a ceiling on the number of allowed MAC addresses per node or per network, while others charge for extra address blocks. Furthermore, in multi-cast or broadcast platforms, there remain valid concerns over performance degradation due to excessive broadcast or multicast traffic flooding the network. Despite all these inhibitors, carriers striving to differentiate their offerings by adding an Ethernet VPLS offer in response to demand for any-to-any connectivity at Layer 2.

Examples of Service Providers Offering Ethernet VPLS

- U.S. – AT&T, Level 3, Qwest, Masergy, Reliance, tw telecom, Verizon Business; Global Crossing (by Q4 2009)
- EMEA – KPN International, COLT (VPLS instance over SDH), Tinet, Exponential-e, ntl:Telewest Business
- Asia Pacific – SingTel, HGC, Reliance

Ethernet Network-to-Network Interfaces (E-NNIs) an Area of Focus

Establishing solid E-NNI agreements with third parties is an essential process to remain competitive in deploying widely reaching Ethernet services by leveraging partner networks. However, the necessary industry standards

have been long in coming, but there is hope that Metro Ethernet Forum (MEF) framework specifications will finally be available by Q4 2009, with E-NNI certification to follow. In the meantime, operators have established E-NNIs based on MEF draft specifications as demonstrated in an interconnection demo at the Ethernet Expo London in May 2009 (see "[Ethernet Expo 2009: Industry Experts Gather to Tackle Hot Topics and Showcase Capabilities](#)," January 30, 2009). Carriers with strong Ethernet interconnection capability, include COLT that reports having 100+ partners; Reliance Globalcom that reports 21 E-NNI partners; and Verizon Business that has a three-level approach to supporting E-NNIs, whereby Tier 1 partners offer transparency in the off-net portion of the network for consistent SLAs and for extending network performance monitoring to the carrier's technical teams. In some cases Verizon Business will agree to interconnect with a third party should the customer insist on a particular in-country provider, but Verizon will not extend its guarantees to this part of the network. One thing is clear – carriers that have robust E-NNI strategies in place can offer a strengthened service portfolio based on expanded reach and SLA consistency providing suitable partners are in place.

The Evolution of Ethernet Access

A number of European service providers are aggressively pursuing Ethernet-over-copper (EoCu) and Ethernet First Mile (EFM) to extend cost-effective low to mid-band access. For example, COLT offers EFM in 12 countries in Europe, based on products from Actelis. BT reports that it is able to reach 54% of UK businesses with EoCu offerings using the Hatteras platform. BT Wholesale is working on a wholesale EoCu offering in relation with UK vendors, and as this rolls out it will considerably impact the UK Ethernet market making services far more widely available. However, at some point above 8 Mbps many carriers report the desire to deploy fibre optic cable for commercial reasons. Thus for capacities in the order of 100 Mbps and above, optical Ethernet over fibre rules the roost, and carrier NGN plans are driving rocket-powered technology into the market. KPN has an aggressive domestic fibre rollout plan reporting that Dutch businesses are eager to embrace more hosted applications and SaaS, and KPN seeks sponsorship in laying fibre to business parks giving end-users motivation to participate by offering long-term discounts once the infrastructure is in place.

The vast majority of U.S. Ethernet services are fiber-based, which is fine for businesses located in downtown areas where most buildings have fiber from one or more providers, and in larger cities there are carrier hotels where customers can connect to their service provider of choice. But outside of urban centers and in the suburbs, fiber availability is inconsistent and can vary widely from one location to another. Consequently Ethernet availability and pricing can vary widely from one address to another.

In response, carriers, and their vendors, have developed ways to utilize the vast installed base of copper wires and legacy TDM private line services to supply Ethernet to their customers. To begin with, a number of telcos offer Ethernet over bonded T1 or DS3s, sometimes known as serial links, by placing a managed device at the customer premises and another at the central office. The advantage of running Ethernet over leased lines is that such legacy infrastructure is usually available in places where Ethernet-over-fiber is not an option. Level 3, Masergy, tw telecom and Verizon support Ethernet over various types of fixed circuits ranging from T1 or DS3 up to as high as OC12, using equipment from Anda, Overture and Nortel (Tasman) networks.

Other carriers support low speed Ethernet over bonded copper pairs, which can achieve up to 10 Mbps or 20 Mbps in most cases, depending on the distance from the CO and the number of available pairs. This technology is naturally popular with local exchange carriers that own the copper wire infrastructure, such as AT&T, Equant and Qwest, and also with some CLECs including Cavalier, XO and others that lease the copper lines from the incumbent telcos. Popular Ethernet over bonded copper equipment vendors include Actelis, Adtran, Aktino and Hatteras. In addition to providing business access, the various Ethernet over copper technologies are finding a place in the mobile backhaul market as well.

Not to be left out, the cable (TV) network operators have, as recently as 2008, begun to deploy Ethernet over hybrid fiber coax (EoHFC) networks. Cox and Time Warner Cable-Business Class have rolled out EoHFC in a number of metros at speeds up to 5 Mbps in the case of Cox, and 2 Mbps in the case of TWCBC. Low speed Ethernet over HFC allows the cable companies to target the massive installed base of T1 and frame relay customers of the telcos, but are somewhat limited when compared to what has been achieved using telco EoCu technology as noted above.

Industry Vertical and Applications

A number of industry verticals have proven to be prime targets for Ethernet services, with the positive attributes of L2 Ethernet presenting a very practical and attractive platform. Four typical verticals are commonly cited, namely GEMS – or in other words, government, education, medical and services (financial). For government and municipal authorities, the high-speed performance and simple Ethernet interface provides a good concept. In education interconnecting sites for sharing knowledge and data is also attractive for the lower-cost base. Meanwhile the transfer of heavy medical imaging has driven take-up of Ethernet, and finally financial services are particularly interested in keeping control of IP routing tables and the ultra-low latency – in cases sub-1ms (metro-level) – for real-time trading. In terms of segmentation and applications, typically large enterprises and multinationals are purchasing high-speed circuits from 100 Mbps up to 1 Gig-E and even 10 Gig-E circuits are gaining momentum. Such prospects are eager to embrace hybrid and integrated L2 Ethernet/L3 IP VPNs for reduced data WAN complexity and lower costs on equipment interfaces. Finally large customers might harness Ethernet to run IP video, SaaS, DR, intranets/extranets, for dedicated Internet access and data replication. For example BT reports that its Etherflow offer is a point-to-point service that its customers can then customize for a unique IP VPN need, such as one with specific encryption required, or for IP multicasting. The SME segment is more attracted to Ethernet for a low-cost network, and one that is simplified, in other words the multi-protocol solution is used to converge voice, data and video onto a single pipe. The technology is well-suited to interconnected small numbers of office locations, as well as for leveraging more hosted services, such as VoIP and UC. The final application we are seeing is more related to the wholesale market, whereby mobile backhaul is increasingly being achieved over cost-effective Ethernet core transport.

Competitive Landscape Round-up: Who are the Market Leaders?

Current Analysis publishes four product assessment classes covering the markets of North America; pan-Europe, the UK and Asia-Pacific, with main buying criteria identified for competitive position of service provider portfolios. Buying Criteria include network reach (metros, PoPs, nodes, etc), service types, bandwidth range and increments, multiple QoS, real time SLA metrics and customer network management. A competitive portfolio has the following attributes:

- Extensive on-net coverage and strong E-NNI partnerships for extending service reach to multiple metros, states, regions & countries.
- Ample choice in the range: namely point to point, point to multipoint, or multipoint to multipoint –EPL, EVPL and ELAN or VPLS. Ethernet over DWDM wavelengths at the high end.
- Broad feature list: such as low, mid, and high bandwidths and flexible increments, fully-managed or non-managed, QoS, client-side and proactive monitoring, and competitive SLAs. Access via copper facilities to supplement fiber optic networks.

North America

- U.S. Leaders: AT&T & Verizon – both players have broad choice and regional/national/international coverage.
- AT&T offers EPL, ELAN and VPLS metro, regional and national; Verizon offers full portfolio of metro, national EPL, EVPL, ELAN, VPLS; Verizon CPA provides consistent Ethernet access across markets; Verizon launched VPLS in 2007, VPWS in 2006; Int'l VPLS is planned for 2009; AT&T launched national and international VPLS in 2008; AT&T offers Ethernet over bonded copper, Verizon supports EoPDH.
- tw telecom national CLEC with fiber to about 10,000 buildings in 75 markets; Supports EoDS1/DS3; VPLS since 2003
- Cox, TWC-BC strong regional cable operators, + Optimum Lightpath in NY. Extensive regional fiber and HFC networks, but lack national long haul networks; Rolling out Ethernet over HFC at 2 – 5 Mbps
- Contenders: Level 3, Global Crossing, Qwest, Masergy, Reliance (Yipes)

Pan-European

- COLT pioneer, 32 MAN/13 country footprint, unmatched EoCu capabilities, experienced E-NNI negotiator.

- KPN is aggressive early-mover with VPLS in 22 countries.
- Orange Business Services – IEL is a solid product backed by classical operational strength.
- Verizon Business aggressive CPA rollout and solid EPL in Europe.
- BT has the global element and proven applications-specific expertise (e.g., Radianz for financial trading) but needs to bring-to-market 'Global Etherflow'.
- Other SPs: Interoute, Global Crossing, Cable & Wireless, Tata Comms and Tinet all have unique strengths in various sweet spots.

UK

- Ntl:Telewest Business has a well-rounded portfolio of services, is one of only two vendors (the other is COLT) with MEF 9 & 14 certifications, and has the extensive national network capillarity and reach to challenge BT on the incumbent's network reach strength.
- Despite being a slow-mover compared to aggressive alternative providers, BT closed the gap with the launch of Etherflow during Q3 2008. Etherflow is one of the first services to run on 21CN and has all the markings of a modern L2 Ethernet point-to-point offering that is backed by BT's massive infrastructural assets. However work must be done to add additional products, such multiple CoS, any-to-any options, and Ethernet VPLS.
- COLT, Cable & Wireless, Global Crossing are all very competitive Ethernet providers in the UK, with robust portfolios, and specific strengths in metro areas and business parks where they have rolled out optical fiber.
- Exponential-e is the innovative younger player, with a compelling NGN message and aggressive Ethernet VPLS offerings. The carrier is expanding its MPLS PoP reach and is succeeding to carve out market share against far larger rivals. However the company remains relatively small compared to for example ntl:Telewest Business and BT.

Asia-Pacific

- SingTel and Tata Communications are leading with good regional coverage and a broad range of services. SingTel offers E-Line (dedicated point-to-point), E-VPN (any-to-any VPLS) and metro Ethernet in Singapore. Tata offers a variety of features on 3 platforms - Priority Ethernet (CoS) and Dedicated Ethernet (any-to-any, 10GigE) and Priority Stretch (usage-based billing).
- Global carriers are strengthening their Ethernet capabilities in APAC and they offer Ethernet access in most countries within the region. These carriers have PoPs in major cities across the region and they work with local partners for extensive in-country coverage. In terms of L2 Ethernet services, these global carriers typically start with key markets such as Japan, Australia, Singapore and Hong Kong. AT&T launched VPLS in 2008 starting with four cities; Orange Business Services offers its International Ethernet Link in six markets; and Verizon Business offers EVPL in eight markets with plans to introduce VPLS in these markets in H2 2009.
- Other strong contenders in the APAC region include Telstra International, NTT Com, Reliance, PCCW Global and HGC. These carriers offer competitive Ethernet offerings and some have already deployed E-LAN services including VPLS.

Recommended Actions

Vendor Actions

- Carriers eyeing the global Ethernet market need to continue their coverage expansion to match the coverage of other WAN services such as ATM, frame relay and IP VPN. Besides deploying Ethernet-enabled PoPs in major cities globally, these carriers need to have a partnership strategy for Ethernet access and/or NNI to gain deeper in-country coverage outside their home markets. Carriers should monitor closely the development of the MEF NNI specifications and to adopt a standardized approach for NNIs.

- While E-Line services are showing healthy growth, carriers should evaluate any-to-any Ethernet services, particularly VPLS which is becoming more common for international connectivity and to support Layer 2 VPN. With increasing bandwidth demand especially for data centre and cloud-based services, carriers will also need to consider supporting 10Gig-E in the medium term.
- To gain service differentiation, carriers need to consider providing bandwidth on-demand through a customer network management portal, consistent SLAs as well as online tools for service provisioning and performance reporting. Carriers should also look at EoCu in their home markets where they operate their access infrastructure, and in other countries either through local subsidiaries (as is the case with COLT) or third parties. While fibre-based access is ideal for bandwidth intensive applications, there are also demand for smaller bandwidth Ethernet connectivity for example an SME or branch offices that do not require a huge pipe, particularly if fibre is not readily available.
- BT Global Services needs to close the gap with rivals by coming to market with its Global Etherflow proposal on a global scale. While the carrier has introduced Etherflow in the UK and some services in Europe, it has no firm plans to roll out Layer 2 Ethernet services in Asia and North America. The carrier needs to review its stance on Layer 2 Ethernet services in view of the growing demand and to respond to the market; as well as point out that it does support Ethernet access for its IP VPN in many countries globally.
- COLT can position itself as one of the real Ethernet service pioneers in Europe, with a number of unique selling points, such as MEF accreditation, online monitoring as part of its Managed CPE offer, E-LAN capabilities, and EFM in 12 countries in Europe. The company's recent NGN announcement lays to rest any concerns that its platforms will rely on older legacy technologies, with new multiservice equipment (Nokia Siemens Networks and Sonus Networks) currently being deployed.
- Verizon Business and AT&T need to make market announcements in the very near future concerning Ethernet service rollouts in Europe and Asia Pacific. Both companies were active earlier in 2008 concerning expansion plans, with Verizon Business talking about CPA rollouts, and AT&T announcing investments in OPT-E-WAN; but no updates have since been forthcoming, raising concerns over whether new service capabilities will actually come into play before the year ends in the approaching final quarter.

User Actions

- Customers looking for L2 Ethernet services should remember that there are a wide variety of vendors available, and the best choice depends on the business need. Clients looking for high capacity over major routes interconnecting large cities can consider a multi-vendor approach taking the best price and SLA from a long list of potential suppliers. In each region, there are a few very competitive carriers for example AT&T and Verizon Business in North America, Interoute and COLT in Europe, several UK operators to choose from for UK-only services, and SingTel and Telstra in Asia Pacific.
- Besides coverage and pricing, customers should also evaluate the features offered by a service provider including fully managed services, burstable bandwidth/bandwidth on-demand, classes of service and VLAN support. Customers should also check the SLAs offered especially for international Ethernet services as they tend to differ depending on a carrier's submarine cable assets and partnerships in each market.
- Multinationals looking for a more managed data WAN service might prefer to go with larger global operators, such as Tata Communications, Reliance Globalcom, Orange Business Services and Verizon Business, as such players have the resources and depth to offer several aspects of a total network and IT solution. AT&T is also making progress extending its national U.S. OPT-E-WAN offer to multiple Asian and European locations.
- In terms of a well-rounded Ethernet portfolio, customers can ask providers whether their Ethernet offerings are MEF-certified and include services beyond basic EPL point-to-point. Several carriers have developed strong capabilities to offer any-to-any E-LAN services between multiple cities for example, KPN and COLT in Europe as well as AT&T, Reliance Globalcom and Tata Communications on a global scale.
- Clients should seek out offers that are supported with strong on-net reach, online monitoring tools and a comprehensive E-NNI strategy. In terms of last-mile access for multiple sites and a wide geographical spread, COLT is a leader in the area of EoCu.

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