



## Ethernet: A Smart Carrier Move

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Ethernet is one of the outstanding success stories of recent networking history. Famously starting out in the local area network (LAN) - according to Nokia Siemens Networks (NSN) the protocol now accounts for 99% of LAN technology in use - Ethernet has progressively shifted into MAN and WAN markets and has been punted at applications as disparate as the local loop, home networking, telematics and computer backplanes. In parallel the speed of Ethernet is being ramped up - hard on the heels of 10 Gbits/s are plans for, and in some cases demos of, both 40 Gbits/s and 100 Gbits/s - and the protocol now finds itself being run over thick and thin coax, telephone pairs, cable TV networks, power line, optical fibres and wireless bearers.

One of the fastest growing sectors of the overall Ethernet business is Carrier Ethernet. As noted by an IDC 'Product Flash' accompanying the launch of Extreme Networks' Black Diamond 20808 purpose-built Metro Ethernet transport switch in September, applications for Carrier Ethernet platforms initially were for delivering business services, but have grown to meet rising residential service demands as well as mobile backhaul infrastructure needs.

At the end of 2007, IDC reported that the value of the Carrier Ethernet routing and switching market reached US\$4.2 billion. The analyst company says 2008 so far looks to be on target to reach US\$5.15 billion which is a 20.5% year over year increase. By 2012 IDC expects the value of this market to reach well over US\$7.6 billion with a 5-year compound annual growth rate (CAGR) of 17.5%. Meantime, according to Ovum-RHK, the global Carrier Ethernet business services market is expected to reach US\$31 billion by 2012 fuelled by demand for high-capacity Layer 2 Virtual Private Networks, video, business continuity and disaster recovery, cloud computing and other diverse applications. Carrier Ethernet it is, Carrier peanuts it ain't.

### **Bandwidth on the run**

NSN, which in September launched its A-series 2200 Carrier Ethernet switch boasting a maximum switching capacity of 24 Gbits/s, is one of a growing number of vendors that are convinced the future lies with Carrier Ethernet. "Basically NSN has decided to massively invest in Ethernet transport as the next generation transport for telcos to get all their data transported over the new technology and do the shift from historic PDH and SDH, and now from SDH and ATM towards Ethernet," states NSN EMEA sales director for Carrier Ethernet Transport Françoise Tournesac. "From an NSN point of view access is becoming Ethernet for wireline and wireless. It is driven mainly by the access. Basically the access is driving the core." Tournesac was speaking at the recent NetEvents European Press Summit in Portugal.

NSN offers an almost apocalyptic view of the future of networking and the challenges faced by network operators and service providers. This view takes in a major expansion of subscribers and required bandwidth. "We believe that 5 billion people will be connected online by 2015," explains NSN head of IP Transport Bernd Schumacher, the keynote presenter at the aforementioned NetEvents gathering. "This is a massive uptake on the subscriber side and a massive uptake in bandwidth."

According to one high-end NSN calculation something like a 100 Mbits/s connection per household will be needed by the year 2010, and even if this somewhat over-eggs the bandwidth

requirement, Schumacher points out that if you have 5 billion people always on, always connected, we are not in any case talking bandwidth chickenfeed. Driven in part by a surge in the residential use of video and the growth of user generated content (UGC), and by multiplying advanced enterprise applications, Schumacher is predicting that we could soon witness total global consumption in the range of 100,000 Petabits per month.

"There are significant challenges around this bandwidth growth and tremendous opportunities for industry because we have to manage this bandwidth growth in an extremely cost efficient way," avers Schumacher. And, although to the forefront of the equation, it's not just cost-effectiveness that has to be delivered in next generation networks. NSN also includes reliability, high availability, resilience, protection, scalability, QoS, manageability, fast activation and provisioning of new services, integration with legacy systems and, in the case of enterprise products, SLAs. And there's a premium on simplicity too.

"We have to enable the service providers to compete with new services and at the same time we have to reduce complexity and take cost out of the system," argues Schumacher. "Today's network architectures are not fully geared to solve these challenges, and we have to find a new way of addressing them."

And here step forward Carrier Ethernet - in partnership with photonic technology. "We believe that Ethernet and photonics play an absolutely fundamental role in addressing these challenges," states Schumacher. "Further optimisation of the network can only be done if we flatten the network architecture around Ethernet and optics."

NSN believes that Carrier Ethernet will pay significant dividends for both users and service providers. "On the enterprise side of the equation, for example, the value proposition is basically the increase of bandwidth in order for the enterprise to centralise servers and for the telco to play a different role than just a pipe provider. The telco also becomes a service provider, providing voice services, SANs, LAN-to-LAN and, in fact, value added services on top of higher bandwidth infrastructure," suggests Tournesac. "It (the telco) can play a more strategic role in the IT community with this transmission system. The telcos believe that the attributes of Carrier Ethernet will enable them to grab a bigger market share."

"The whole idea is to replace multiple separate networks, each of which is an overlay network that introduces a lot of complexity, with a single, converged packet network that is of lower cost and provides more capacity and improves the profitability of service providers," offers Mark Showalter, director of Service Provider Marketing at Extreme Networks, and another NetEvents participant.

### **Etherd age?**

In fact Carrier Ethernet is happening as you read this. "Ethernet WANs are happening now - it isn't just a thing of the future," offers Ian Keene, vice president and chief analyst with Gartner.

"This is not future music" agrees Schumacher.

Meantime Nan Chen, president of the Metro Ethernet Forum and yet another NetEvents participant, argues that the technology is entering the third phase of its evolution towards the definitive next generation service-level network for global business, entertainment, information and communication. In this reading of the runes Phase 1 addressed the necessary specifications and underlying architecture, and Phase 2 focused on Carrier Ethernet implementation and certification to the point where demand for global Carrier Ethernet WANs accelerated beyond US\$12 billion last year. Now, says Chen, Carrier Ethernet enters Phase 3, aimed at fully scalable worldwide operation and beginning with new specifications announced for automated management. Nan Chen also points out that the MEF - in its role at the forefront of the Carrier Ethernet development and driving all these phases - will increasingly be offering service provider

tools, beginning with the recently announced Global Services Directory followed by a basic wholesale provisioning agreement and template for local Ethernet access.

Speaking at the Carrier Ethernet World Congress (CEWC) in Berlin in September, Chen said: "So far service providers across the globe have embraced the MEF standards to deliver reliable, high quality and technically consistent services, but to deliver a truly global service there needs to be new operational solutions at the business interface between providers. Our aim is to make intercontinental Carrier Ethernet as straightforward as an intercontinental TDM phone connection. Phase 3 will bring both operational scalability and efficiency over legacy networks to take Carrier Ethernet to that next level."

A new MEF specification automates and standardises many aspects of management at the edge of the network to bring cost savings, improved quality and scalability for the service provider. The specification (MEF 20: User Network Interface Type 2) was approved at the Q3 2008 MEF quarterly meeting and covers fault management, monitoring and protection, bandwidth profile management, and so on. It is designed to bring faster response to end users changing requirements and increase service level performance visibility.

Part of the operational phase is to extend the scope of MEF's contribution to the industry beyond specifications, certification and education by delivering ready-made operational tools. According to Nan Chen the recently launched Global Services Directory - a free on-line tool on the MEF website offering the latest data on service coverage and availability across the globe - provides essential data for enterprise users and service providers planning extensive network upgrades, pinpointing which service providers are providing what Carrier Ethernet services in locations around the world. Visitors can see the types of services such as E-Line point-to-point and E-LAN multipoint and whether those services are certified to MEF standards. Other information provided includes the locations covered, contact information, and details of other business services.

Meanwhile, the newly formed MEF Wholesale Access Interconnect Group is focusing on defining a basic wholesale provisioning agreement and template for local Ethernet access - one based on globally recognised provisioning parameters and agreed service levels. As well as streamlining the ordering and provisioning of Ethernet access at the local level, this will greatly simplify the process of specifying a global WAN across multiple carriers with a variety of service offerings.

"Systems and network integrators can offer greater flexibility, faster transformation and lower total cost of delivery by using multiple carriers. Individual carriers may not have coverage in every location, or do not have sufficient population density and scale to provide a competitive service in every country," states Chen. "The most efficient wholesale solution requires multi-carrier integration, while Carrier Ethernet's very flexibility means there are more choices to be aligned between providers' services - choices such as mapping of SLA, bandwidth profiles, classifications and OAM. The world is looking to the MEF to address not just the technical but also these business issues to come up through standardised approaches and practices to provide ubiquitous, cost-effective and standardised Carrier Ethernet services worldwide. The demand is there, and service providers across the globe are signing up for MEF membership to make sure we can meet that demand."

### **E-NNI port in a storm**

Also present at the Berlin CEWC was Ovum RHK senior analyst Ian Redpath who presented an analyst view and chaired the packet optical stream at the event. According to a posting on the Ovum RHK 'Straight Talk' service the conference highlighted several developments which will spur continued growth in the Ethernet service market. Among them: external network-to-network interconnection (E-NNI) standards are progressing; Ethernet for mobile backhaul is poised for prime time; and carriers are implementing customer 'stickiness' strategies to ward off commoditisation.

So far as Ethernet E-NNI is concerned, Redpath observes that, being in a pre-standard environment, carriers can opt out of pursuing interconnection and avoid the associated effort and

cost (although their addressable market will be reduced), or they can implement bi-lateral pre-standard interconnections. However the need for E-NNI is not doubted, particularly where enterprise services are being delivered globally. "On the business side the global enterprise wants to connect around the world at the lowest cost. It wants the most bandwidth and it wants it everywhere," comments Showalter. "But not every carrier can reach all over the world. And if they want to serve global enterprises they need to connect their global islands of access networks."

And the MEF Ethernet E-NNI standards effort is apparently chugging along quite nicely. Nan Chen says this effort has two main parts: the technical, which is concerned with performance parameters, and the business, which is concerned with how you order Ethernet services between carriers. "It should really allow, on a business level, ease of ordering and provisioning from different carriers," he says of the latter. "And that's a really important part of overall deployment."

Chen is predicting the ratification of the first phase of the Ethernet E-NNI by summer 2009.

On the backhaul front, so to speak, Redpath notes that present day mobile data services can run at speeds of up to 7.2 Mbits/s, and that higher speeds are in the offing as next generation technology approaches. He reasons that if many performance-sensitive customers try to use their service at the same time, bandwidth could quickly exceed hundreds of Mbits/s per cell tower, and that traditional T1/E1 backhaul networks aren't designed to cope with this loading. He instances three factors that improve the case for using Ethernet as a backhaul solution:

- a clock synchronisation challenge was solved in part with the ratification of the IEEE1588v2 standard in April 2008
- an MEF hub-and-spoke service construct (E-Tree) has been optimised for the mobile backhaul network
- and there is a dramatic increase in the need for backhaul capacity with an aggressive cost per bit target

NSN agrees that the business case for Ethernet backhaul is getting stronger with the increase in data volumes. "I would say that in the past some operators didn't care about the mobile backhaul costs using leased lines," says Schumacher. "But this is now a very, very critical element in the business case. And the pressure to change over to a more efficient architecture is increasing."

Ovum's take on 'stickiness' is that Web-based customer portals are one method of avoiding service commoditisation. "Such portals give customers access to ongoing performance information about their services, and allow customers to monitor their service level agreements," writes Redpath. "Customers can also access quote tools to speed up purchase decisions."

And if NSN is correct in its calculations quite a lot more people are going to be making those Carrier Ethernet purchasing decisions in the future. "I do not see any other technology available today in the market that can solve the (current) challenges in combination with the bandwidth growth," concludes Schumacher.