

Ethernet exchange and the future of enterprise networks

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Ethernet is recognised as the number one networking technology, from local area to the global WAN, and there is soaring demand for its wide range of available business services. Yet many enterprises still rely on ATM or Frame Relay for their intercontinental or even transnational networks, simply because there are interconnect agreements in place that make it quick and easy for providers to collaborate in extending their service footprint by linking these networks globally.

Until now, Ethernet connection has not been as simple. Global Ethernet networks are well proven, but they have mostly been created in a one-off manner, requiring considerable initial effort in establishing the interface between providers' networks to ensure consistent, reliable service.

So the MEF (MetroEthernet Forum), the industry body responsible for driving the Carrier Ethernet revolution, is working on streamlining the inter-provider connectivity process to make it just as easy to establish long distance Ethernet services as it is to establish telephone or ATM links.

This article summarises the story that was spelled out at NetEvents 2009 Asia-Pacific Press Summit. The steps being taken to achieve this aim, and the successful results already being demonstrated by Iometrix labs, delivering intercontinental performance to MEF standards across multiple carrier networks.

The role of the MEF

The MEF announced recently that Carrier Ethernet is entering the third phase of its evolution towards the definitive next generation service-level network for global business, entertainment, information and communication. He described three phases of growth. Phase 1, launched in 2002, addressed the necessary specifications and underlying architecture. Then in 2005 came Phase 2, focused on Carrier Ethernet implementation and certification, to the point where demand for global Carrier Ethernet WANs accelerated beyond \$12bn by 2008.

Now Carrier Ethernet has moved to Phase 3, aimed at fully scalable worldwide operation, in particular making it as fast and simple to roll out Ethernet WANs as it has been to provide telephone or ATM/frame relay services. According to MEF COO, Kevin Vachon: "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 global 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."

One of the first steps was the announcement of a new specification for automated management – MEF 20: User Network Interface Type 2 – that automates and standardizes many aspects of management at the edge of the network, including fault management, monitoring and protection and bandwidth profile management, to bring cost savings, improved quality and scalability to the Ethernet WAN. Then came MEF 21 addressing the Link OAM, and the very recent launch of their MEF 21 certification programme. Equipment certified to MEF 21 will reduce costs by eliminating costly truck rolls, on-site diagnostics and troubleshooting.

Meanwhile the MEF Wholesale Access Interconnect Group was created to focus on defining a basic wholesale provisioning agreement and template for local Ethernet access – one based on globally recognized 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.

As John Hoffman, Head of Ethernet Product Management - Global VPN Services at Tata Communications, explained: "Systems and network integrators can offer greater flexibility, faster transformation and lower total cost of delivery by using multiple carriers. Even Tata Communications, with the most extensive carrier Ethernet coverage, does not yet have the scale to provide a competitive service in every country. 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 standardized approaches and practices to provide ubiquitous, cost-effective and standardized Carrier Ethernet services worldwide. The demand is there, and service providers across the globe are following Tata Communications' example in signing up for MEF membership to make sure that demand can be met."

The E-NNI

Another milestone towards ubiquitous Ethernet services is the E-NNI. A Network-to-Network Interface (NNI) defines how two networks handshake and communicate. An E-NNI (External NNI) extends that to join one network with another, external network – typically one operated by a different service provider, but it might also consist of another internal network in a separate maintenance region.

Enterprise frequently need to reach service end points in regions that cross multiple service provider networks, and the E-NNI addresses this problem. Key issues for inter-carrier handoff of Ethernet services include the OAM issues addressed by MEF 20 and 21, but also such issues as Quality of Service (QoS); and service-level agreements (SLAs) to ensure that, for example, one carrier's so-called "premium business service" will not be compromised by routing through a lower quality service. E-NNI is more than just a protocol, it has become the impetus for an entirely new wholesale Ethernet market.

Taking QoS as an example: where two service provider networks meet, the E-NNI measures an Ethernet service stream via two sets of QoS parameters → bandwidth profiles of either Committed or Excess Information Rate (CIR or EIR) and performance measured by delay, loss and availability. The E-NNI then preserves this priority information across the boundary of the networks by encapsulating each Ethernet frame with an appropriate MAC header. In this way, if a stream of packets contains both high-priority traffic such as Voice over IP (VoIP) calls and low-priority traffic such as overnight server backup, the E-NNI helps ensure that the critical VoIP calls get priority.

As analyst Camille Mendler spelled out in her NetEvents debate session: Test and Measurement is the new business imperative. Thorough pre-testing of these critical network links is necessary to ensure reliable performance under real world conditions, and Spirent Communications is the world leader in this field.

According to Angus Robertson, Director Global Services Asia Sales at Spirent: "Just as channel/data service units triggered wide-scale adoption of Frame Relay services by enabling service providers to offer, monitor and test SLAs, now Ethernet services are experiencing growth with the increasing deployment of sophisticated, optimized NNI demarcation devices implementing the E-NNI and other standards-based capabilities. These increasingly smart NNI demarcation devices include physical demarcation, service aggregation, media conversion, end-to-end monitoring, testing of OAM and SLAs and other critical carrier-class functionality for Ethernet services."

The Ethernet Exchange

Another idea that is being put forward by MEF members is the third-party Ethernet exchange. Similar to a VOIP peering point or an IP exchange, this is a facility designed to specifically address the connectivity issue between carriers. An independent facility funded by the carriers involved, where carrier networks intersect, and where Ethernet services could be handed off from one operator to another on demand.

Rather than needing to sort out the connectivity and business issues themselves, carriers could quickly commission links to each others' networks and expand there services into new regions or across the entire globe.

From an enterprise perspective, the exciting promise of these Ethernet exchanges is that they create a marketplace in Ethernet services that would lead to lower costs. The choice between providers at the exchange creates a competitive situation and will result in price reduction and lower costs for the end user.

Does it work in practice?

Smooth provisioning of seamless Ethernet connection, and consistent SLAs, between operators is vital for Carrier Ethernet's claim to be the global connectivity solution of the future. There is still work to be done, and the MEF is spearheading the effort. But is it based on sound technology that will deliver in the real world?

The answer was provided at this year's Ethernet Expo: Europe 2009, at the ExCel Conference Centre in London, when delegates witnessed the world's first intercontinental demonstration of carrier-class Ethernet connectivity, designed and organised by Iometrix and showcased at NetEvents Singapore.

Bob Mandeville, president and founder, Iometrix, explained that there were two main demonstrations. The first was an NTL/COLT link up to create a trans-European circuit delivering broadcast quality interactive HDTV. Videoconferencing is a highly demanding interactive application because poor quality of experience would be immediately visible on the demo's massive screen. Spirent Avalanche application network layer testing equipment was used to generate video traffic for the demo while Spirent TestCenter VQA flawlessly assessed more than one hundred metrics relevant to delivering high quality video.

Using COLT's embedded performance monitoring capabilities end to end, the 100Mbps Ethernet service from London to Frankfurt demonstrated round trip delay (send and return) of merely 14.1ms and jitter (frame delay variation) less than 0.01ms.

The second demonstration was provided by TATA Communications, using its extensive global coverage to stitch together a network running from London to Los Angeles to Singapore to Chennai in India and back to London. According to John Hoffman "attendees were highly impressed by the real time performance statistics shown on-screen throughout the demonstration".

The essential question was this: if an enterprise creates a global network by linking the best available MEF14-certified service offerings, will the resulting combined network still meet MEF 14 standards? The performance and management statistics on show provided visible proof that these services can indeed be chained to create a global interconnected service that performs reliably to MEF14 standards.

Following the success of this demonstration, Bob Mandeville announced at NetEvents that the demo will be recreated on an even larger scale in November, at the New York Ethernet Expo.

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