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2010, the year of the Ethernet ENNI

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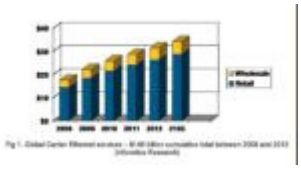
Expect a new growth wave in global enterprise networks


Kevin Vachon, MEF COO

Ethernet services continue their growth, with global sales of $30.4 billion expected by 2013, according to Infonetics Research (Fig 1.), and they show little sign of being set back by the recent economic turbulence. Although other areas of technology spending have suffered cutbacks, Carrier Ethernet offers a combination of lower operating costs, greater flexibility and new business potential that has even greater appeal when times are tough.
When it comes to linking sites across towns or regions, Carrier Ethernet is the number one choice, with its ability to tailor bandwidth and services to meet demand, rather than impose major upgrade decisions such as installing an additional leased line. Service providers are moving to all-packet metropolitan networks and Ethernet transport is increasingly used even for non-Ethernet service delivery.
The world is being tiled with islands of Ethernet. These islands are growing as providers extend their footprints and offer ever growing reach, but in bridging them, they still rely largely on legacy networks.



So the MEF (Metro Ethernet Forum), the industry body responsible for driving the Carrier Ethernet revolution, has been focusing on ways to streamline the inter-provider connectivty process to make it just as easy to establish long distance Ethernet services as it is to establish TDM links that span two or more service providers and operators.

The role of the MEF
Carrier Ethernet has seen 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.
Phase 3, announced in 2009, aims at fully scalable worldwide operation. The MEF describe this as ”Global Interconnect – the interconnection of autonomous Carrier Ethernet networks to enable standardized and streamlined delivery of MEF-certified Carrier Ethernet services with end-to-end Class of Service, management and protection”.
One of the first moves 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 Global 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 greatly simplifies the process of specifying a global WAN across multiple providers with a variety of service offerings.
The reality is that systems and network integrators can offer greater flexibility, faster transformation and lower total cost of delivery by using multiple providers – no provider has the footprint to provide a fully competitive service in every country across the globe. So the most efficient wholesale solution requires multi-provider integration.
However, 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 ENNI
January 2010 marked another significant advance, as the MEF announced the ratification of the its eagerly awaited MEF 26 Specification - defining Phase I of the ENNI, or "External Network to Network Interface".
As MEF COO, Kevin Vachon explained: "So far service providers across the globe have embraced the MEF standards to deliver reliable, high quality and technically consistent services. The ratification of MEF 26 will significantly accelerate the current lengthy, costly and complex process of spanning these services across one ore more service providers' Ethernet networks".
A Network-to-Network Interface (NNI) defines how two networks interface and communicate. An ENNI (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.
Key issues for inter-operator handoff of Ethernet services include the OAM issues addressed by MEF 20 and 21, but also such issues as Class of Service (CoS); 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. ENNI is more than just a specification, it has become the impetus for an entirely new wholesale Ethernet market.
Taking CoS as an example: where two service provider networks meet, the ENNI measures an Ethernet service stream via two sets of CoS parameters –¬ bandwidth profiles of either Committed or Excess Information Rate (CIR or EIR) and performance measured by delay, loss and availability. The ENNI 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 ENNI helps ensure that the critical VoIP calls get priority.
Ethernet Expo: Europe 2009, saw the world's first intercontinental demonstration of carrier-class Ethernet connectivity in two main demonstrations. The first was 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. 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 featured a network running from London to Los Angeles to Singapore to Chennai in India and back to London, with impressive 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.
The demonstration showed clearly what was possible, but work was still necessary to take it from the possible to the practical. In practice, features and functionality are often mismatched, making it difficult to know which Carrier Ethernet networks are available to reach a specific area. Proprietary and customized features developed locally become maintenance and integration nightmares when applied to other Service Provider networks. Negotiations between Operators to verify each other's Carrier Ethernet functionality and operational capabilities are usually cumbersome and awkward, with operators reluctant to reveal too much network information to competitors.
So the MEF's solution must necessarily address more than just technological issues.

The MEF Global Interconnect Program
The benefits of MEF's Global Interconnect Program include:

1) Reduced operating costs through the aggregation and inter-operability of multiple Carrier Ethernet services over a single standards-based physical connection called the NNI.

2) Lower capital costs through use of logical connections, instead of more capital intensive physical assets such as POPs, circuits, wavelengths, and optical interfaces.
3) Extending a service provider's footprint via interconnection to increase capacity and reach new markets and applications.

4) ReducingEthernet business services deplyoment and costs via a standardized ENNI.
5) Increasing business efficiencies by presenting proven inter-operable processes like ordering, implementation, and billing.

To achieve this, the MEF is defining specifications for service and equipment, covering, in addition to the ENNI and its management mechanisms: Class of Service alignments, OAM for fault and performance information, and the NID or Network Interface Device.
Testing & Certification is another key enabler. Certification has been an important part of the MEF's work since 2005, and test suites and certification programs developed by the MEF will ensure that ENNI equipment and services perform correctly.
Thirdly, the MEF is providing tools for service providers. The Global Services Directory is a database of Ethernet service providers that helps facilitate communication and coordination among service providers. The MEF also provides other tools to assist with interconnect like the Interconnect Questionnaire. This is a spreadsheet with the full set of Ethernet parameters that should be considered to offer an end-to-end SLA.
Finally, the program helps service providers to end-to-end Ethernet services. Ethernet's flexibility means that there are many posibilities needing to be aligned for a consistent service. These include:

• The Physical Interface – copper, fiber, and speed.
• Path protection, port, card or chassis protection.
• Ethernet Frames – size, types, fields.
• The many parameters for CoS and SLAs.
• Service Limitations – how is rate limiting implemented both at ingress and egress?
• Network Management – how is link, path and service OAM maintained?
• Performance Reporting – how do you measure the SLA?
• Connection Admission Control Rules for adding customers to the network.

Put all of this together, and service providers can use these standard definitions, specifications and certifications to create and guarantee Ethernet SLAs, even when the service doesn't originate or terminate on their network.

Conclusion
The potential for global Ethernet service interconnection is enormous. As MEF Chairman Nan Chen predicted back in 2008, the world will soon have just one universal business language – not English, not Mandarin, but Ethernet.
The announcement of the ENNI is something that the service providers have been eagerly awaiting. It amounts to an unleashing of the true global potential for Carrier Ethernet Services.

2010 looks like being another exciting year for Carrier Ethernet…