Pipeline Knowledge is Power.

Breakthroughs in Delivery: The Ethernet Access
By Michal Winkler

Over the years that Ethernet has become ubiquitous, demand for Ethernet broadband service providing 2, 4, 10 …100Mbps has constantly increased. However, a fiber "bottleneck" has caused demand for the service to outstrip its availability. It's estimated that less than 10% of business buildings are connected to fiber, and more than 80% of SMEs have no access to fiber.
This bottleneck shows few signs of being eased in the near future because it is still very difficult to get approvals to deploy fiber, and it's expensive and time-consuming to install once approvals are obtained.

Breakthroughs in Standards and Interoperability for Ethernet in the Access

The New standards

New standards have been ratified by IEEE, ANSI and ITU-T for delivering Ethernet in the First Mile (EFM). By creating a common language for providing Ethernet broadband services over copper and fiber, these standards have opened the door for mass deployment.

IEEE 802.3ah 2Base-TL standard introduced the concept of utilizing a 'bonded multi-copper pair group' performing as a single link that provides long-reach, high-bandwidth Ethernet services for fiber-deprived customers. The EFM bonding scheme proved to be superior to all other existing bonding schemes such as IMA (bonding over ATM) or the M-Pair G.shdsl. It provides better performance in all aspects – service throughput optimization, network integration, delay, noise immunity, etc. New solutions supporting these standards have been already developed and have been introduced by vendors over the past year, and have been deployed by carriers such as Qwest and others.

A special emphasis has been put on Operations, Administration, and Management (OAM) functionality as it is an essential requirement for enabling mass deployment by large carriers.
The OAM is required in order to allow full visibility into the access network, simple integration into existing carrier networks, and scalability with easy growth. It enhances the monitoring of the link operation and health as well as improves fault isolation. The IEEE 802.3ah standard specified the requirements only for a link level OAM. The IEEE 802.1ag and Metro Ethernet Forum are now in the process of completing specifications for end-to-end connectivity OAM and service-level OAM.

Standards certifications make copper-based solutions a 'safer buy'.

Certification and interoperability testing have been heavily promoted by the Metro Ethernet Forum. Sixteen vendors whose 39 products successfully passed the first

MEF certification process were announced at the 2005 Metro Ethernet World Congress in Berlin this year. The first phase of certification based on MEF-9 requirements verified vendor equipment to deliver Ethernet services properly. The second phase, announced in October 2005 would certify Ethernet services as provided by service providers.

The certification process will benefit service providers, vendors, and end users. It will expedite deployment of Ethernet services by ensuring interoperability and by reducing the time and cost of deploying new service/platforms.

Various large-scale Ethernet interoperability demonstrations by carriers have taken place as well. EANTC, a well-known European interoperability lab, recently conducted successful testing based on MEF specifications with twelve major vendors including Cisco, Siemens, Alcatel and Actelis Networks. The testing was endorsed by the Metro Ethernet Forum and T-Systems (Deutsche Telecom).

New chipsets integrate the new standards

New chipsets integrating the new Ethernet standards will become available at the end of this year and early next year, and will encourage more and more vendors to enter this market. They will rapidly accelerate the development of EFM based products and will promote the introduction of new, basic, low-end products.

Vendor RFPs are naming and claiming conformance with these standards

As proof that the demand for Ethernet-based services is growing fast, more and more carriers are issuing RFPs to extend their Ethernet service offering over copper to SMEs. The new Ethernet over copper standards as well as the interoperability activities are encouraging carriers to add EFM standard compliance as a requirement in their RFPs'. According to a 2004 Yankee Group Report, Ethernet service revenues are expected to triple by 2007.

Breakthroughs for Service Providers

Enhanced service offering for business

The new standards and technological breakthroughs enable service providers to easily extend their existing Ethernet service offerings to include Ethernet-over-Copper (EoC). It enables them to generate large revenue from very small investments by offering a straightforward, cost-effective and immediate response to customers demanding carrier class Ethernet services. Aggressive and effective marketing efforts can be launched to match the needs of any customer with a wide range of Ethernet bandwidth services from a few Mbps to tens, hundreds and Giga bits per second. Moreover, the marketing offering can be media independent because the same service can be provided with same SLAs over fiber or copper.

This new EoC service will enable the service providers to offer better service with higher value over competing wireless and cable companies. The formula of immediate service with higher (but scalable) bandwidth, more reliability and a lower price per bandwidth will be very compelling to customers.

Utilizing the existing infrastructure

Ethernet-over-copper services can help service providers turn their copper into gold again. Utilizing their existing copper-based infrastructure they can provide business customers (wherever they are) with new, highly demanded, lucrative and scalable services utilizing one or more bonded copper pairs. The new EFM standards feature lower overhead and therefore higher throughput and higher revenues in comparison to other IMA/ATM/M-pair based solutions. In addition it lowers the OPEX and simplifies management process. Even though EFM based solutions require voice-grade copper pairs, some available solutions can utilize even substandard existing copper.

Simpler network

The new EFM based platforms will smoothly integrate within a service provider's existing network, creating a seamless extension of the Metro Ethernet network. Existing EFM platforms require very low capital investments offering a pay-as-you go approach. These platforms allow gradual equipment installation in accordance with service demand as well as a cost-effective migration path from point-to-point to point-to-multi-point configurations.

The EFM solutions are carrier grade, and support SLAs and QoS features as well as simplified, non-complicated OAM. Various OAM algorithms including physical-link management, end-to-end connection management and service-level management are offered.

New backhauling alternatives

The demand to support bandwidth-hungry applications forced Cellular, Wi-Fi and residential DSLAM units to be pushed deeper into the access network requiring more and more backhauling capacity. EFM based solutions offering delivery of high bandwidth Ethernet over bonded copper pairs may be used for backhauling of these remote units. Up to 100Mbps over multiple copper pairs can be supported by EFM based platforms.

Breakthrough for the Business Customers

Ethernet services

Business customers finally have a rich service offering for Ethernet. Until now their alternatives were very limited including either a T1 or a T3 based service. The offering was not flexible in terms of bandwidth, and the prices were very high. If a T3 was desired, it usually required a long-term commitment, a long waiting period or

sometimes it was not even possible to get it at all. New Ethernet-over-copper solutions make it much easier because they provide Ethernet all the way, end-to-end, with no translation to ATM, and no T1 interfaces in between. Moreover, no special training is required since everyone is familiar with Ethernet.

These solutions are more flexible and scalable, too. Business can ask for any bandwidth with no major service gaps because 2, 3, 5, 10, 12 or even 50Mbps is possible over copper. The EoC service is a carrier class service offering various SLAs and QoS features per services type, per port allowing better utilization of the link. And most important, the service cost per bandwidth is even less in comparison to the lucrative T1 or T3 previously offered.

The painful wait for fiber is finally over because these breakthroughs are bringing Ethernet services to all businesses everywhere.