



# Still the next big idea

A BIG MONEY-MAKER TECHNOLOGY FOR OVER A DECADE, MPLS IS EVOLVING TO MEET THE CHANGING NEEDS OF CARRIERS. **CAROLINE CHAPPELL** REPORTS ON HOW IT IS DEVELOPING

**MPLS** is universally hailed as a wonder technology by the world's large carriers, some of whom have now clocked up as many as 12 years' experience with it. "We find MPLS remarkably useful – our operational guys love it and customers increasingly associate MPLS with service predictability," says Matthew Finnie, CTO at Interoute. "MPLS is a big money maker for large carriers, with MPLS VPNs generating tens of billions of dollars of revenues for service providers," points out Andrew Malis, director of packet network architecture at Verizon Communications. "MPLS traffic engineering has done a great deal to help manage and scale our network infrastructure, especially given the rate of growth of internet traffic."

"MPLS is both a mature technology

and rapidly developing one," explains Tori Downes, principal technologist, network technologies division at Metaswitch Networks. And the reason MPLS is still developing where many network technologies run out of steam or succumb to the next big idea after 10 years is the fact that its "fundamental mechanism works so well", Downes adds. "There continues to be a steady accumulation of features because the mechanism is so flexible and attractive."

## THE LONG VIEW

Malis has been active in MPLS standardisation bodies at chairman level for many years and has the long view of the technology's evolution. MPLS was originally developed to implement traffic

engineering and VPNs in IP networks. However, MPLS forwarding, control signalling and OAM mechanisms were soon recognised as applicable to other network technologies, too. "It was noted that connection signalling in MPLS is actually a general mechanism that could be used to control TDM connections, Ethernet and even lamdas," Malis says. "So Generalised MPLS (GMPLS) was born." GMPLS provides the control plane for the ITU-T Optical Transport Network (OTN) standard: together they enable carriers to treat diverse optical transport technologies including Sonet, SDH, WDM, DWDM and the various sizes of DWDM wavelengths as a single network for signalling purposes. GMPLS/OTN simplifies the management of heterogeneous fibre-optic networks as the

legacy Sonet/SDH migration to next-generation DWDM networks plays out.

The latest evolution of the standard, MPLS Transport Profile (MPLS-TP), pushed MPLS much further into the transport layer and “is the result of the observation that the things that make MPLS successful at traffic switching could work on fibre-optics, optimising fibre networks for packets as well as circuits”,

Malis adds. It is inefficient to transport today’s packets across a circuit-based fibre-optic network, so MPLS-TP will support native packet switching in the transport network, as well as connection set-up and the OAM functions that will allow service providers to monitor the health of individual fibres and wavelengths. MPLS-TP is designed for use in both long-haul and metro transport networks. The

architecture and requirement documents for the new profile are complete and the protocol specifications are underway: network equipment companies such as Metaswitch are closely monitoring them and expect to support MPLS-TP “in the near term”, according to Downes.

“Verizon is very interested in deploying MPLS-TP because it will greatly decrease our capex and opex costs through



## THE INTERCONNECTION ISSUE

**The endorsement** of MPLS may not be quite as universal as the Tier 1 and 2, technology-savvy carriers like to think. One of the surprises of *Capacity's* Latam conference in March this year was the number of small, regional carriers railing against implementing MPLS in their networks. They became quite heated in their focus on MPLS' negative qualities, which mainly centred around the difficulty of achieving native MPLS interconnects, according to Richard Munday, VP international business development at Keytech, the holding company for a number of operators across the Caribbean. Munday wants to see the smaller carriers in his region adopting MPLS but first, they need to appreciate the benefits.

Munday would like to dispel the myth that to run an MPLS network an operator needs to interconnect with partners at Layer 3. He agrees that MPLS interconnects are cumbersome at this layer since different carrier quality of service (QoS) and class of service (CoS) definitions mean that it is hard, if not impossible, to map between MPLS networks. “In reality, where there are native MPLS interconnects, the small provider takes the large provider's CoS definitions,” Munday admits. This can make it difficult for the smaller provider to differentiate itself at a retail level in competition with the larger provider if both share a domestic market, for example.

Although there are packet control advantages to a native MPLS interconnect, even the big players shun Layer 3 interconnects. Finnie points out: “No one has ever successfully done an intelligent interconnect. We connect at Layer 2 and use our partner network as dumb infrastructure, going straight across it and managing the MPLS QoS/CoS down to the customer premise equipment (CPE). Interconnects are very simple today for a reason – the idea that you exchange labels with another carrier and trust them to do the right things with those labels doesn't work in practice. It's a big security issue. Layer 2 interconnects are working well for us – we're running MPLS to 72 countries and in large areas of the world, such as the Americas and the Pacific Rim, we're dealing with partner carriers.”

Munday agrees: “Most carriers in our region don't realise how easy MPLS interconnects are at Layer 2. All you do then is to layer MPLS on top of the partner network. The only heavy lifting piece becomes the care and control you have of the customer router. The fact that people are trying to make MPLS interconnects sound difficult is holding back MPLS adoption in the Caribbean.”

And that means less service reach for Keytech's customers, although Keytech's potential partners are losing out as well, Munday feels. “Having MPLS in the core brings a number of benefits,” he explains. The “wonder” technology not only supports a wide range of services over the same network infrastructure but makes the network more scalable, gives operators more network control and drives down cost, especially in the area of geo-redundancy – an important factor in the fragmented and earthquake-prone territory of the Caribbean. “Operators don't have to have large redundancy pipes because MPLS will provide automatic failover across multiple cable systems,” Munday points out. “There is evidence that wider adoption of MPLS would create greater cost-efficiencies across the entire industry. Smaller providers would benefit especially since they wouldn't have to invest so much in optical equipment.”

Verizon's Malis points out that if Tier 2 or 3 operators are only concerned with providing internet access, MPLS may be overkill for them. “But if an operator wants to provide advanced business services or to scale up their infrastructure, MPLS is essential,” he comments. In the meantime, Finnie warns that Ethernet is the next target for over-complicated interconnects. “I would caution against any carrier getting into a sophisticated interconnect model,” Finnie says. “We're really about selling simple native or managed transport services and the more you mess with the service, the harder it is to manage it.” ■

## “We expect MPLS-TP to increase efficiency at fibre level so we’ll get more bandwidth out of our network”

**ANDREW MALIS**

DIRECTOR OF PACKET NETWORK ARCHITECTURE, VERIZON



efficiency gains,” Malis comments. “Since MPLS-TP combines all routing and transport function in the same system, we won’t need to co-locate transport switches and routers in our central offices – we’ll only need to co-locate them in the core. We also expect MPLS-TP to increase the efficiency of what happens at fibre level so we’ll get more bandwidth out of our fibre network and increase its longevity.”

### THE ACCESS NETWORK

MPLS-TP isn’t the only game in town, however. Just as MPLS is helping to unify technologies in the transport network, it is also being positioned to play a similar role in the access network where carriers also need to manage multiple legacy and next-generation technologies. MPLS’ success means that it is being pushed “further out of the core where it is being deployed or experimented with in broadband access and mobile backhaul networks,” says Peter Atanasovski, product manager, carrier Ethernet and MPLS at Ixia. MPLS is a key ingredient in Interoute’s new Unified Connectivity service, for example, which gives enterprises a simple, managed connection into Interoute’s services cloud regardless of their access topography. “MPLS has allowed us to encapsulate the connection to the customer site so we don’t care what the access is – whether it’s DSL, Ethernet or a leased line – we just run the service straight across it,” Finnie explains. “MPLS greatly simplifies how we deliver services so we can be far more flexible and responsive to customers. Their

only limiting factor becomes how much access capacity they can buy to our network.”

Unified Connectivity appears to be an early implementation of a concept called seamless MPLS, which, according to Malis, first surfaced in an MPLS conference in October 2009, expounded by Deutsche Telekom. “It’s a very interesting proposal to extend MPLS out of the core and into the access network and the IETF is beginning a standardisation effort here,” Malis comments. However, Atanasovski points to a new MPLS in Mobile Backhaul (MMBI) standard being developed by the Broadband Forum (which absorbed the former MPLS Forum), which he anticipates will lead to a raft of new edge devices that implement MPLS coming onto the market. “We’re now seeing customers implementing MPLS on their DSLAMs and in cell site gateways as network equipment vendors begin to drive the concept of seamless MPLS. They like the idea that if they push MPLS to the edge, service providers get one big MPLS network which is easier to provision from the access to the core, without worrying about managing disparate technologies and protocols,” Atanasovski points out.

### MULTICAST VIDEO DISTRIBUTION

MPLS is also being considered as a means of tackling the emerging problem of scaling multicast video distribution (point-to-multipoint [P2MP] delivery) in IP networks as operators increasingly roll out IPTV and

move into broadcast content delivery. Existing IP multicast architectures and protocols are creaking under the strain as volumes and customer numbers grow, Atanasovski points out. “There are large scalability problems with Protocol Independent Multicast (PIM) and BGP multicast protocols, so we are beginning to see interest in removing and replacing them with MPLS,” he suggests. “P2MP support is one of the features we’re building into MPLS so that we can do video distribution at the transport layer,” Malis agrees.

Currently, MPLS is a point-to-point delivery technology, so again, the standardisation bodies are looking at its evolution to support P2MP. However, Downes says this is a “field in flux”: “We’ve been working with customers on their requirements and we have been expecting to invest in P2MP but it is taking the standards bodies time to determine what to do,” he reports. “For carriers to use P2MP MPLS, it needs to be scalable to millions of endpoints”, and Metaswitch has yet to see credible proposals it can begin to implement. Atanasovski believes the provision of multicast VPNs are, in any case, “a very advanced application” that few providers are ready to engage with yet.

P2P MPLS is not the only development for the future as the technology’s star continues to rise. On the horizon, according to Downes, is the IETF’s standardisation of Path Computation Element (PCE) which will be responsible for carrying out the calculation of LSPs across complex, multi-domain MPLS networks, separating resource-intensive route calculations from the signalling of those paths. PCE is likely to be contentious if applied to inter-carrier networks (see *box p28*) but may introduce better routing visibility and efficiency within MPLS networks over time. ■

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### COMPANY PROFILE

MTS Ukraine is one of the leading mobile operators in Ukraine and a wholly owned subsidiary of Mobile Telesystems OJSC (NYSE: MBT). It is licensed to provide mobile services using the GSM 900/1800 and CDMA 450 standards, as well as fixed-line services. The company provides services to more than 17 million subscribers.

### CONTACT

Anna Podvysotskaya  
Head of Carrier Relations Department  
T: +380 50 110 73 40  
E: apodvysotskaya@mts.com.ua / iplc@umc.com.ua