IP/MPLS Forum Update

Andrew G. Malis
Chair and President, IP/MPLS Forum
andrew.g.malis@verizon.com

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IP/MPLS Forum Introduction

- **Originally three Forums:**
  - **Frame Relay Forum, founded in Spring 1991**
  - **ATM Forum, founded in Fall 1991**
  - **MPLS Forum, founded in Spring 2000**
- **FRF and MPLSF merged in April 2003 to form the MPLS & Frame Relay Alliance**
- **MFA Forum formed in July 2005 by merging the ATM Forum and the MPLS & FR Alliance**
- **Changed name to IP/MPLS Forum in Sept. 2007 to reflect current scope of activities**

The Converged Network Vision

Backbone

Metro/POP

Multi-Service Edge

IP, ATM, Frame Relay,
Ethernet, Voice, TDM,
VPLS, etc.

Access

Dial up, Copper, xDSL,
Fiber, Cable,
Fixed wireless
Mobile wireless
Free space optics etc

MPLS

MPLS

GMPLS
Optical core

GMPLS
Optical core

PSTN

ISP

IP/MPLS FORUM

Our Mission
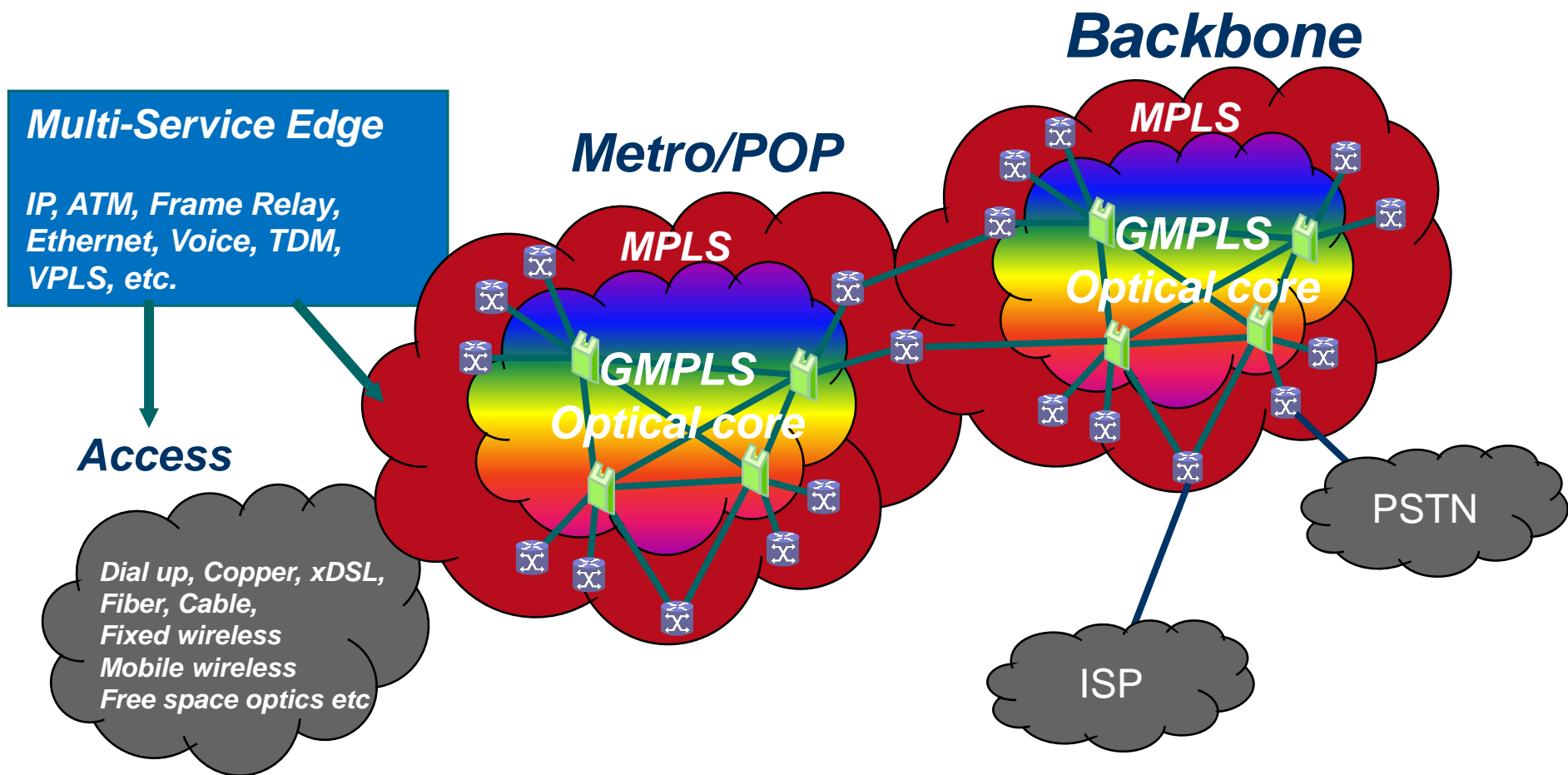
The IP/MPLS Forum is an international, non-profit association of service providers, equipment vendors, testing centers and enterprise users. The Forum's mission is to drive the global success of IP/MPLS-based technology, networks, and services while focusing on application and deployment solutions.

Members as of March 2008

Forum Objectives

Unify service providers, suppliers and end users on common vision of IP/MPLS based solutions.

Awareness

- Promote global awareness of the benefits of IP/MPLS

- Empower the telecom industry to migrate from legacy technologies to IP/MPLS based next generation networking.

Migration

- Guide the telecom end user to make the leap from legacy technologies to IP/MPLS based services

Systems-Level Solutions

- Drive implementation of standards for IP/MPLS based solutions

- Validate implementations and advance interoperability of standardized IP/MPLS based solutions.

Board of Directors

Andrew Malis, Verizon, Chairman and President

David Sinicrope, Ericsson, Vice Chairman and Secretary

Rick Wilder, Alcatel-Lucent, VP of Technology

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Ed Sierecki, AT&T, Board Member

Amy Mitchell, Cisco, Board Member

Doug O'Leary, Verizon, Treasurer and Ex-officio Board Member

Leadership Positions

- **Technical Committee**
  - **Rao Cherukuri, Juniper, Chair**
  - **David Sinicrope, Redback Networks, Applications and Deployment Working Group Chair**
  - **Matthew Bocci, Alcatel-Lucent, Interworking and Frame Relay Working Group Chair**
  - **Drew Rexrode, Verizon, Certification Working Group Chair**
- **Marketing Awareness and Education Committee**
  - **Dave Parks, Ciena, Chair**
  - **David Christophe, Alcatel-Lucent, Education Working Group Chair**

Service Provider Council

- **Service Provider Council**
  - **Chaired by Doug O'Leary, Verizon**
  - **Only carrier members are invited to participate**
  - **Open discussion for carrier requirements without vendors in the room**
  - **SPC is currently working on the requirements for the next phases of the MPLS Inter-Carrier Interface Requirements (MPLS-ICI)**
  - **SPC endorsed and helped specify the MPLS Certification Program**

Technical Committee

- **Seventeen published specifications to date, most recently concentrating on multi-service interworking of pseudowires (ATM-FR, ATM-Ethernet, FR-Ethernet) and PNNI/MPLS signaling interworking (not including FRF and ATM Forum specifications)**

- **MPLS work builds upon and conforms to IETF and ITU-T specifications**
  - **Fills in "missing pieces" and/or provides source material via liaisons**
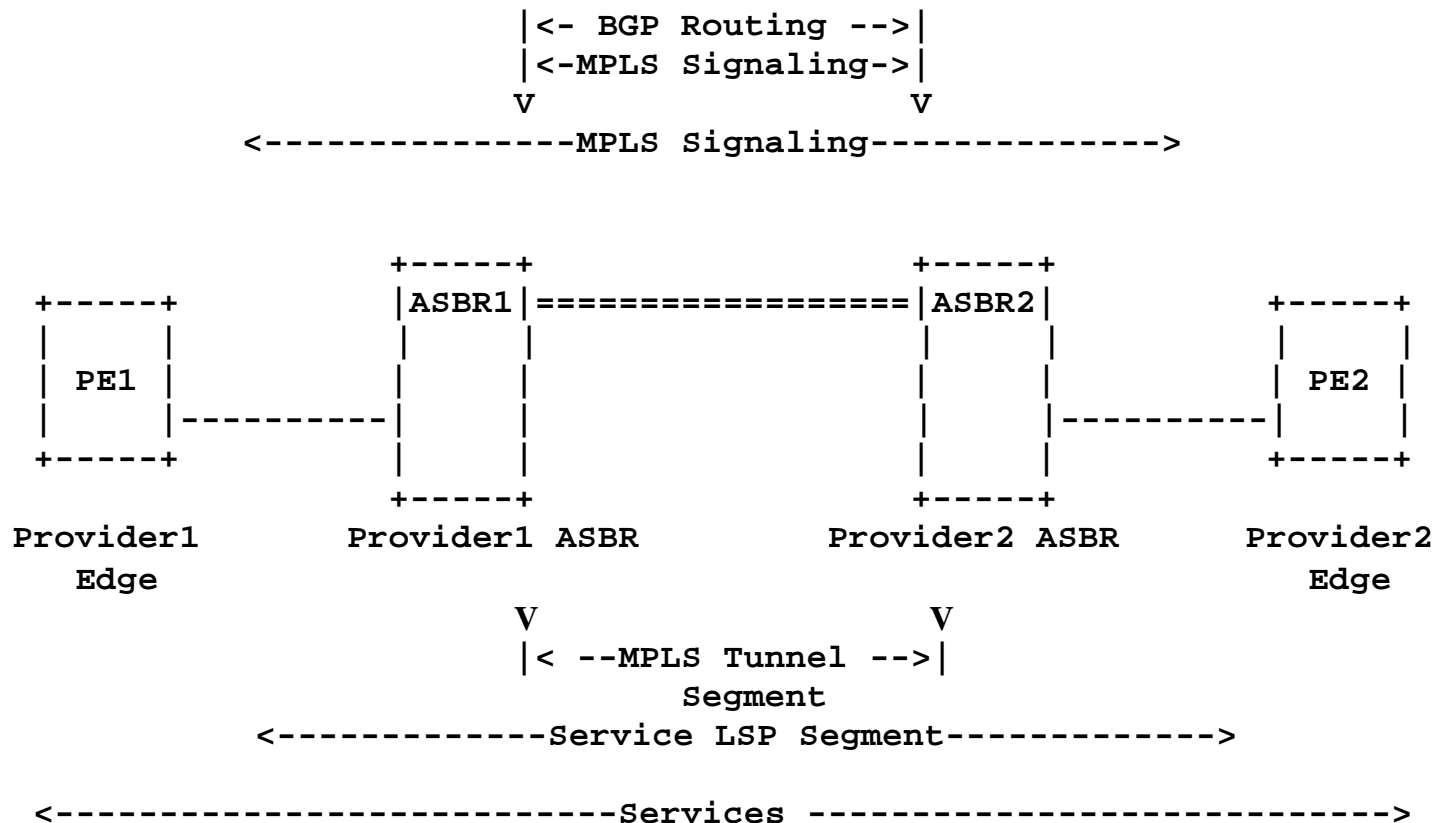 - **New work in areas not covered by the IETF and ITU-T**

Current Work Item Highlights (1)

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- **MPLS-based Wireless Backhaul**
    - **Reference architecture; Include 2G, 2.5G, 3G, 3GPP, 3GPP2, etc. to allow for a migratory path**
    - **Topology variations -- include aggregation of base station traffic, e.g. using TDM, ATM. Ethernet, CES**
    - **QoS and availability guarantees**
    - **Scalability to a large number of cell sites**
    - **Multiple underlying technologies (TDM, ATM, Ethernet, IP)**
    - **Include interaction of the backhaul network with IMS**
    - **Include method for clock distribution to base stations**
    - **Network time synchronization**
    - **Allow for converged network supporting wireless and wireline traffic**

Current Work Item Highlights (2)

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- **MPLS Inter-Carrier Interconnect Phase 1**
  - **IETF work on static multi-hop LSPs and pseudowires and RFC 4364 multi-AS options are the starting points**
  - **Service class definitions, EXP mappings, and service class differentiation**
  - **Resiliency, failure detection and notification, ECMP**
  - **Path MTU**
  - **Admission control**
  - **Control plane security (authentication, DOS protection, routing failures)**
  - **Data plane security (DOS protection)**
  - **Inter-provider OAM**
  - **Currently entering final ballot phase**

Current Work Item Highlights (3)

- **Packet-Based GMPLS Client to Network Interconnect**
    - **Dynamically establish switched and provisioned traffic-engineered end-to-end LSPs with RSVP-TE signaling**
    - **Capable of supporting user requests regarding bandwidth, traffic and delay/jitter characteristics for the LSP**
    - **Client can be CPE or other network elements in an IP/MPLS network**
- **Generic Connection Admission Control (GCAC) for IP/MPLS networks**
- **Certification abstract test suites**
- **MPLS over Aggregated Interfaces (Ethernet Link Aggregation, Multilink PPP, etc.)**

MPLS-ICI Objectives

- **MPLS Layer Requirements for Inter-Carrier Interconnection**

- **Requirements for establishing MPLS interconnects between two service providers**
  - **Reference Model and Use cases**
  - **Methods for LSP establishment**
  - **Protocols**
  - **Resilience**
  - **Traffic management, Service Class and QoS**
  - **OAM functions**
  - **Data path processing**
  - **Security**

MPLS ICI - Reference Model

```
                          |<- BGP Routing -->|
                          |<-MPLS Signaling->|
                          V                  V
              <--------------MPLS Signaling-------------->


                      +-----+              +-----+
       +-----+        |ASBR1|==============|ASBR2|        +-----+
       |     |        |     |              |     |        |     |
       | PE1 |        |     |              |     |        | PE2 |
       |     |--------|     |              |     |--------|     |
       +-----+        |     |              |     |        +-----+
                      +-----+              +-----+

     Provider1        Provider1 ASBR     Provider2 ASBR     Provider2
     Edge                                                   Edge

                          V                  V
                          |< --MPLS Tunnel -->|
                                  Segment
              <-------------Service LSP Segment------------->

       <--------------------------Services ------------------------------>
```

MPLS ICI - Use Cases

- **BGP/MPLS IPVPN: Extension of IPVPN services to out of franchise territories**

- **MPLS PWs: Extension of L2 VPNs and L2/L1 circuits over MPLS PWs to out of franchise territories**

- **Data trunks-TE tunnels: Efficient Long-haul packet transport**

- **VoIP and the new PSTN : Inter-provider VoIP services**

Market Awareness & Education

- **Tutorials**
    - **Introduction to MPLS**   **full and ½ day**
    - **MPLS VPNs and VPLS**   **full and ½ day**
    - **MPLS Traffic Engineering**   **½ day**
    - **Introduction to GMPLS**   **½ day**
    - **Voice over MPLS**   **½ day**
    - **Legacy Services Migration to MPLS** **½ day** **(FR, ATM, Ethernet, SONET/SDH)**
    - **MPLS OAM**   **½ day**
    - **Multi-service Interworking over MPLS** **½ day**
    - **Introduction to MPLS L2/L3 VPNs** **½ day**
    - **MPLS VPN Security**   **½ day**
    - **Multicast in MPLS & VPLS Networks** **½ day**
    - **MPLS in Mobile Networks**   **½ day**
- **Conferences and exhibitions**
    - **Almost every MPLS conference globally has a Forum speaker**

Public Interoperability Events

- **SUPERCOMM (Atlanta), June 2002**
  - MPLS traffic engineering, Layer 2 and 3 Virtual Private Networks (VPNs)
- **Next Generation Networks (Boston), October 2002**
  - Generalized MPLS (GMPLS)
- **MPLS World Congress (Paris), February 2003**
  - BGP/VPN Scalability, MPLS Fast Reroute (FRR)
- **SUPERCOMM (Atlanta), June 2003**
  - Frame Relay, ATM, Ethernet/VLAN over MPLS, Virtual Private LAN Services (VPLS), MPLS Fast Reroute (FRR)
- **MPLS World Congress (Paris) February 2004**
  - MPLS enabling service guarantees
- **SUPERCOMM (Chicago), June 2004**
  - Metro Services and Enhanced Applications, including VoIP, over MPLS
- **MPLS World Congress (Paris), February 2005**
  - Hierarchical VPLS, LSP ping and traceroute
- **MPLS World Congress (Paris), February 2006**
  - Converged MPLS Services
- **MPLS World Congress (Paris), February 2007**
  - Inter-carrier connectivity solutions, Multicast VPN services, and Multi-vendor service provisioning and fault management
- **MPLS World Congress (Paris), February 2008**
  - Mobile backhaul transport

2008 Events and Tutorials

- **MPLS World Congress: Mobile Backhaul Interoperability Demonstration, two Forum tutorials on Feb. 5 in Paris**
- **Carriers World Asia: 'Mobile backhaul: Challenges and opportunities for carriers and mobile operators' on March 12 in Hong Kong**
- **CTIA Wireless: Panel on 'Ensuring Video Quality in Backhaul Networks' on April 2, in Las Vegas, Nevada, third stop of the Interoperability demonstration**
- **Future-Net: Four tutorials presented on April 14 in Boston**
- **IIR's Transport Networks for Mobile Operators: Technical Tutorial covering 'IP/MPLS in the mobile radio access network (RAN)', May 9 in Amsterdam, Netherlands**
- **IP Network Transformation: 'The Evolution of IP/MPLS and Understanding How Ethernet Fits in the IP Backbone Context' on June 11 in London**
- **The trade shows our booth will be at and other special events are:**
  - **MPLS World Congress, Paris: February 4-7, 2008**
  - **Future-Net, Boston: April 14-17, 2008**
  - **Day-long Tutorial, Beijing, China: September 22, 2008**
  - **MPLS 2008, Washington DC: October 19 - 22, 2008**

New White Papers!

IP/MPLS FORUM

WHITE PAPER

USE OF MPLS TECHNOLOGY IN MOBILE BACKHAUL NETWORKS

WHITE PAPER

ADDRESSING INTER PROVIDER CONNECTIONS WITH MPLS-ICI

Copies available at our booth or download from www.ipmplsforum.org

Conformance, Interoperability, and Certification Testing

- **Starting a new certification program**
  - **First certification testing is planned for MFA 12 – Multiservice Interworking for Ethernet over MPLS**
  - **Led by Drew Rexrode, Verizon**
    - **Currently working on abstract test suite**
    - **Will be piloting program in coming months**
- **Conformance test plans**
  - **LDP**
  - **RSVP-TE**
- **Interoperability test plans**
  - **LDP**
  - **RSVP-TE**
  - **DiffServ Traffic Engineering**
  - **Layer 3 (BGP/MPLS) VPNs**
  - **Layer 2 pseudowires and VPNs over MPLS (Martini/PWE3)**
  - **Virtual Private LAN Service (VPLS)**
  - **Fast Reroute (FRR)**
  - **LSP Ping and Traceroute**
  - **Graceful Restart (OSPF, ISIS, LDP, RSVP, BGP VPN)**

Relationships with Other Bodies

- **IETF**
  - **Formal liaison relationship**
  - **Strong common participation between IETF and IP/MPLS Forum**
  - **Specifications based on IETF RFCs, no duplication of work**
- **ITU-T**
  - **A4 and A5 liaison status with ITU-T**
  - **Communicating with Study Groups 11, 13, 15, and 17 regarding such topics as T-MPLS, NGN, MPLS OAM, MPLS/PNNI signaling interworking, VoMPLS carriage and signaling**
- **Also have liaison relations with:**
  - **MultiService Forum (MSF)**
  - **Metro Ethernet Forum (MEF)**
  - **Optical Internetworking Forum (OIF)**

Planned in 2008

- **Phase 2 of the MPLS ICI Specification**
    - **Additional use cases**
    - **Incorporate multi-hop LSP and PW signaling from IETF**
    - **IPv6**
    - **BFD for OAM across the ICI**
    - **Multicast**
- **Continuing MPLS-based wireless backhaul**
- **Continued liaising with ITU-T SGs 13 and 15 on T-MPLS definition and OAM**
- **Interworking MPLS-TE with PBB-TE signaling (if not already covered by the IETF)**
- **Certification testing**

Thank You!

For more information, please visit us at Future-Net Booth #14 or at www.ipmplsforum.org