MFA (MPLS, Frame Relay, and ATM) Forum Update

Future-Net Expo
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http://www.mfaforum.org

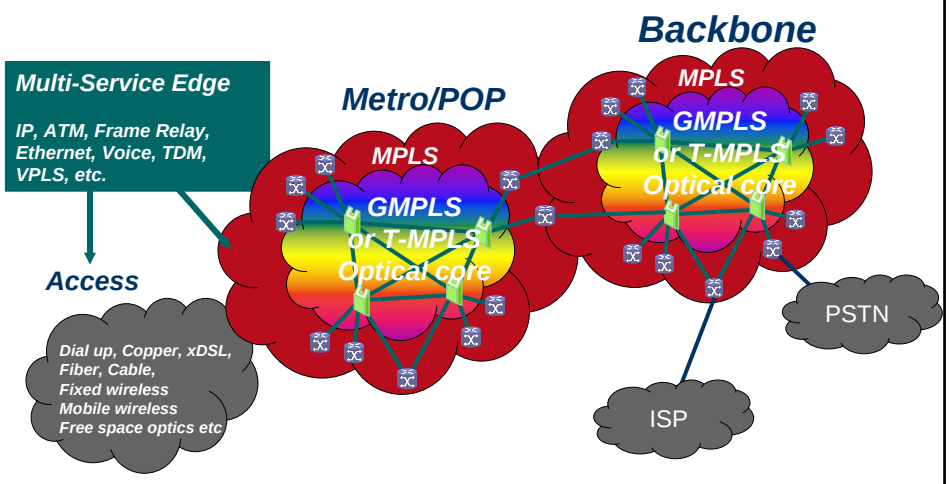
MFA Forum Introduction

- **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**
- **The merger:**
  - ✓ **consolidates the three forums in order to optimize the strengths of each in addressing next generation multi-protocol networks and their interworking**
  - ✓ **leverages the combined resources of the combined organizations to advance the recognition, acceptance, and implementation of packet technologies in the global networking communications industry**
  - ✓ **Provides the industry with one point of contact for MPLS, FR, and ATM technologies**
  - ✓ **Maintains the body of specifications from the parent organizations**

Mission Statement

The MFA Forum's mission is to enable users, enterprise customers, and carriers to make the leap from legacy technologies to next generation networking by defining & promoting the interfaces and capabilities for enterprise and carrier IP/MPLS networks and services, including core networks, access technologies, security and privacy, visibility and reporting, and QoS (Quality of Service).

The Converged Network Vision



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Agilent Technologies
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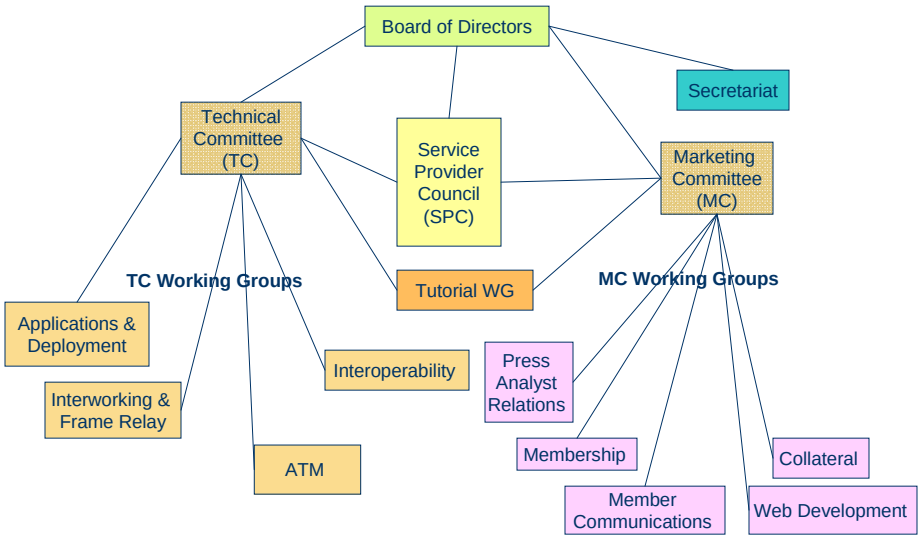
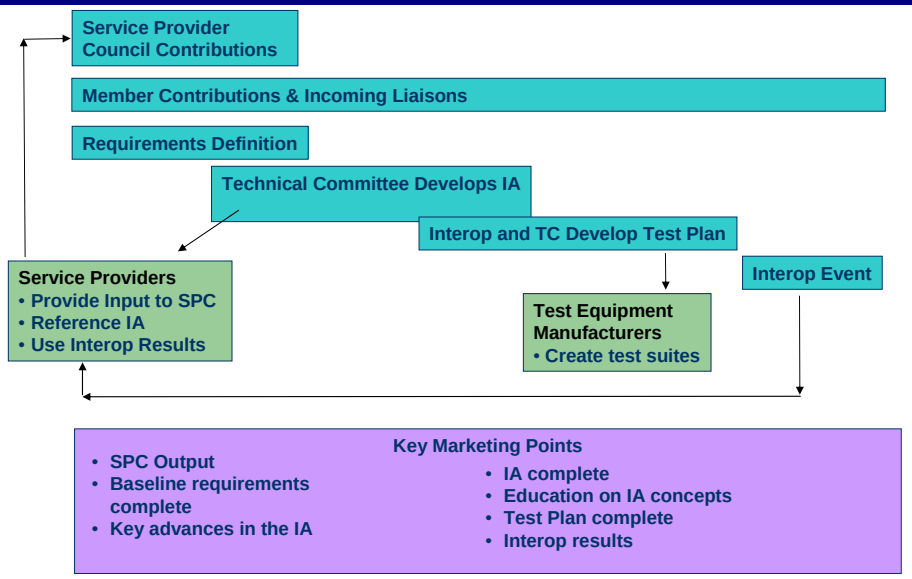
Verizon Communications
VSNL India
World Wide Packets
ZTE Corporation

Total Membership = 39

MFA Forum Organizational Chart



MFA Forum Work Cycle



MFAF Board of Directors

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MFAF Leadership Positions

- Technical Committee
  - ✓ Rao Cherukuri, Juniper, Chair
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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 (FR, ATM, Ethernet, SONET/SDH) — ½ day
  - ✓ 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
- Conferences and exhibitions
  - ✓ Almost every MPLS conference globally has an MFA Forum speaker

Conformance, Interoperability, and Certification Testing

- 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)
- Starting a new certification program
  - ✓ First certification testing is planned for MFA 12 – Multiservice Interworking for Ethernet over MPLS
  - ✓ In the process of generating a test lab RFP and an abstract test suite

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

Service Provider Council

- Service Provider Council
  - ✓ Chaired by Doug O'Leary, Verizon
  - ✓ Carriers only are invited to participate
  - ✓ Open discussion for carrier requirements without vendors in the room
  - ✓ First major work item: MPLS Inter-Carrier Interface Requirements (MPLS-ICI)
    - Used as requirements for work in the Technical Committee
  - ✓ SPC is working jointly with the TC to refine the requirements and use them to develop a technical specification for the NNI

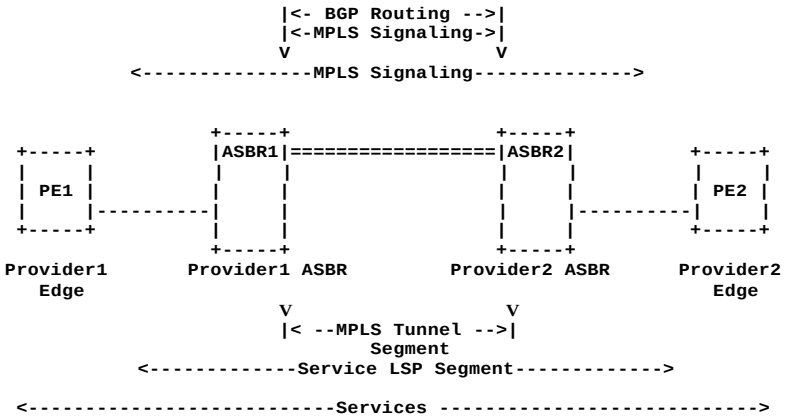
MPLS-ICI Scope

- MPLS Layer Requirements for Inter-Carrier Interconnection
- Assumes 2 different service providers (SPs), but a subset of these requirements apply to 2 Autonomous Systems (ASes) operated by the same SP
- Does not preclude end-end label-switched path provided by more than 2 SPs. An inter-carrier interconnection is, by definition, between 2 ASs.

Objectives

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

Reference Model



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

Technical Committee

- Sixteen 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
- Work items on Frame Relay and ATM also continue
  - ✓ Recently completed an update to FR/ATM Service Interworking specification
  - ✓ New ATM signaling extensions

Current Work Item Highlights (1)

- 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)

- MPLS Inter-Carrier Interconnect
  - ✓ IETF work on 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

Current Work Item Highlights (3)

- **Layer 2 Mediation**
  - ✓ Interworking between ATM Soft Permanent Virtual Circuits and MPLS pseudowires
  - ✓ Extending existing ATM networks to MPLS-connected endpoints via pseudowires
- **AAL1 and AAL2 TDM and Voice Trunking over MPLS**
  - ✓ Allows for graceful migration from ATM-based to MPLS-based voice and private line services
  - ✓ Efficient carriage of AAL1 and AAL2 in new PW types (more efficient than ATM cell transport)
- **Generic Connection Admission Control (GCAC) for IP/MPLS networks**
- **Certification abstract test suites**

Current Work Item Highlights (4)

- **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
- **ATM and Frame Relay to MPLS Control Plane interworking**
  - ✓ Signaling interworking between MPLS and PNNI, ATM UNI, etc.
  - ✓ Collaboration with ITU-T SG 11 and SG 13
    - Draft new ITU-T Recommendation Y.mplstcpi, Use of Virtual Trunks for ATM/MPLS Client/Server Control Plane Interworking
    - Draft new ITU-T Recommendation Y.mplsccpi, ATM and Frame Relay / MPLS control plane interworking: Client-Server

Relationships with Other Bodies

- IETF
  - ✓ Formal liaison relationship
  - ✓ Strong common participation between IETF and MFA Forum
- 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)

Key Points

- FR and ATM continue to produce tens of billions in annual service provider revenues
- MPLS is coming up strong behind them
  - ✓ MPLS in wide use for Layer 3 VPNs and traffic engineering, generating over $5B US annually in service provider revenues
  - ✓ New applications (L2 VPNs, VPLS, enhanced QoS, multimedia, wireless backhaul) are undergoing development and deployment
- MPLS standardization continues to be very active – many innovative ideas from both service providers and vendors
- MFAF, IETF, and ITU-T need to continue to work hard to stay in sync and not duplicate work or contradict each other's specifications
- Interoperability, conformance, and certification testing continue to be crucial as new applications are standardized
- Next Meeting: July 17-19, San Jose, CA
- The MFAF welcomes your active involvement!!!

Questions? Comments? Ideas?

We want to hear from you!

www.mfaforum.org

Contact us:

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MFA Forum Chairman and President: Andrew G. Malis, andrew.g.malis@verizon.com