MFA FORUM

April 2006 UPDATE

Andrew G. Malis
Chairman and President

Chief Technologist, Tellabs
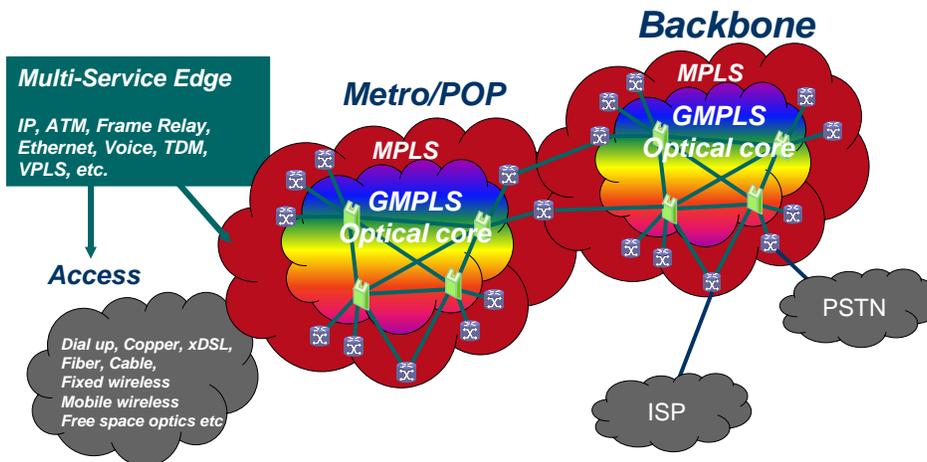**Andy.Malis@tellabs.com**

Mission Statement

The MFA Forum is an international, industry-wide, nonprofit association of telecommunications, networking, and other companies focused on advancing the deployment of multi-vendor, multi-service packet-based networks, associated applications, and interworking solutions.

The Converged Network Vision

MFA FORUM

Backbone

Multi-Service Edge

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

Metro/POP

MPLS

MPLS

GMPLS
Optical core

GMPLS
Optical core

Access

PSTN

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

ISP

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MFA Forum Introduction

MFA FORUM

- **Formed in July 2005 by merging the ATM Forum and the MPLS & FR Alliance**
  - ✓ New name: MFA Forum
  - ✓ New logo
  - ✓ Combined technical and marketing activities
- **The merger:**
  - ✓ consolidates the ATM Forum and the MPLS & FR Alliance 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

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Current Membership

Agilent Technologies	Isocore
Alcatel	Ixia
Analog Devices	Juniper Networks
AT&T (including SBC)	LG-Nortel
Axerra Networks	Lucent Technologies
BellSouth	MCI
BT Infonet	Native Networks
Calix Networks	Nexagent
China Unicom	RAD Data Communications
CIENA Corporation	Riverstone Networks
Cisco Systems	RTCOMM
Department of Defense (DoD)	SAGEM SA
DETECON	Siemens
Deutsche Telekom	Sprint-Nextel
EANTC	Telcordia Technologies
ECI Telecom Ltd	Tellabs
Ericsson (including Marconi)	Tollgrade
Hammerhead Systems	UNH IOL
	Verizon
	World Wide Packets
	ZTE Corporation

MFAF Board of Directors

- **Andrew Malis, Tellabs, Chairman and President**
- **Tom Walsh, Lucent Technologies, Vice Chairman**
- **David Sinicrope, Ericsson, Secretary**
- **Doug O'Leary, Verizon, Treasurer**
- **Gary Leonard, Riverstone Networks, VP of Marketing**
- **Rick Wilder, Alcatel, VP of Technology**
- **Michael Buttrey, Sprint-Nextel, Board Member**
- **Lily Lu, Cisco Systems, Board Member**
- **Ex officio: David Drury, President Emeritus**

MFAF Leadership Positions

- **Technical Committee**
  - ✓ Rao Cherukuri, Juniper, Chair
  - ✓ John Kenney, Tellabs, Vice-Chair
  - ✓ David Sinicrope, Ericsson, Applications and Deployment Working Group Chair
  - ✓ Matthew Bocci, Alcatel, Interworking and Frame Relay Working Group Chair
  - ✓ Carsten Rossenhoevel, EANTC, Interoperability Working Group Chair
  - ✓ John Rutemiller, Ericsson, ATM Architecture WG Chair
  - ✓ Mickey Spiegel, Cisco, ATM Signaling WG Chair
  - ✓ Nikhil Shah, Lucent Technologies, A&D WG Vice Chair
- **Marketing Awareness and Education Committee**
  - ✓ Lily Lu, Cisco, Chair
  - ✓ Chuck Sullivan, Ciena, Vice Chair
  - ✓ Jean Jones, Lucent Technologies, Vice Chair
  - ✓ David Christophe, Lucent Technologies, Education Working Group Chair

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
  - ✓ MPLS VPN Security   ½ day
- **Conferences and exhibitions**
  - ✓ Almost every MPLS conference globally has an MFA Forum speaker

Interoperability Working Group

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- **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)
- **Investigating a certification program**

Public Interoperability Events

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- **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

World Congress 2006
Interoperability Test Areas

- **Ethernet, ATM and TDM Pseudowires**

- **Hierarchical VPLS Provider Edge Devices**

- **Hierarchical VPLS Multi-Tenant Units**

- **L3 VPN Services**

- **Access / Multi-Segment Pseudowires**

- **Basic Multicast over VPLS**

Participating Vendors

Live Network
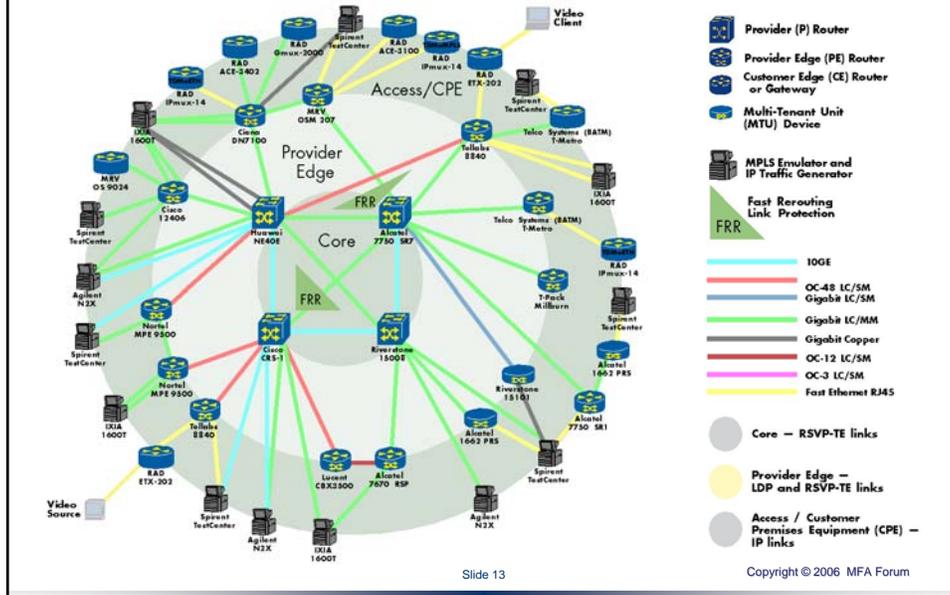
Service Provider Council

- **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.**
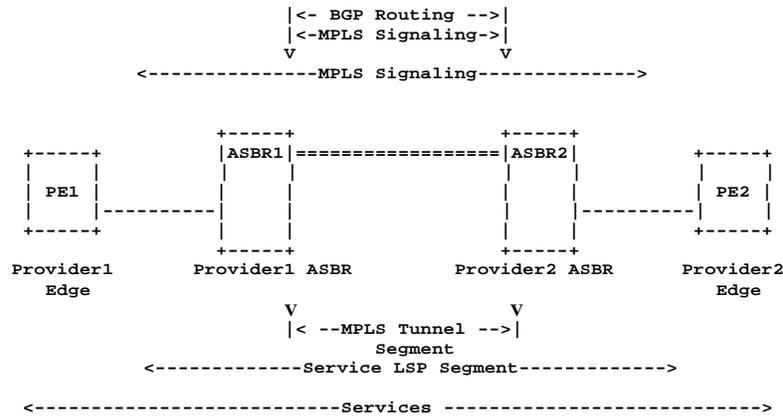

Objectives

- **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

```
                              |<- 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 -------------------------->
```

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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**

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Technical Committee

- **Most recent meeting: Berlin, April 4-6 2006**
- **Next meeting: Vancouver, June 27-29 2006**
- **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

Technical Committee Major Work Items

- **MPLS Inter-Carrier Interface**
  - ✓ Technical Specification based on requirements from the SPC
- **Packet-Based GMPLS Client to Network Interconnect (CNI)**
  - ✓ 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 (in Final Ballot)**
  - ✓ 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

Technical Committee Major Work Items (con't)

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- **Fault Management Interworking (in Final Ballot)**
  - ✓ **Includes ATM to MPLS OAM interworking, FR status notification, etc.**
- **ATM, Ethernet, and Frame Relay Interworking over MPLS (in Final Ballot)**
  - ✓ **Allows these protocols to be tunneled over MPLS with heterogeneous endpoints (FR – Ethernet, ATM – FR, ATM – Ethernet)**
- **Performance Monitoring Across Multiservice Networks (in Straw Ballot)**
  - ✓ **Procedures, monitoring points, and OAM interworking for performance measurement in MPLS and multiservice networks**

Technical Committee Major Work Items (con't)

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- **Layer 2 Service Mediation**
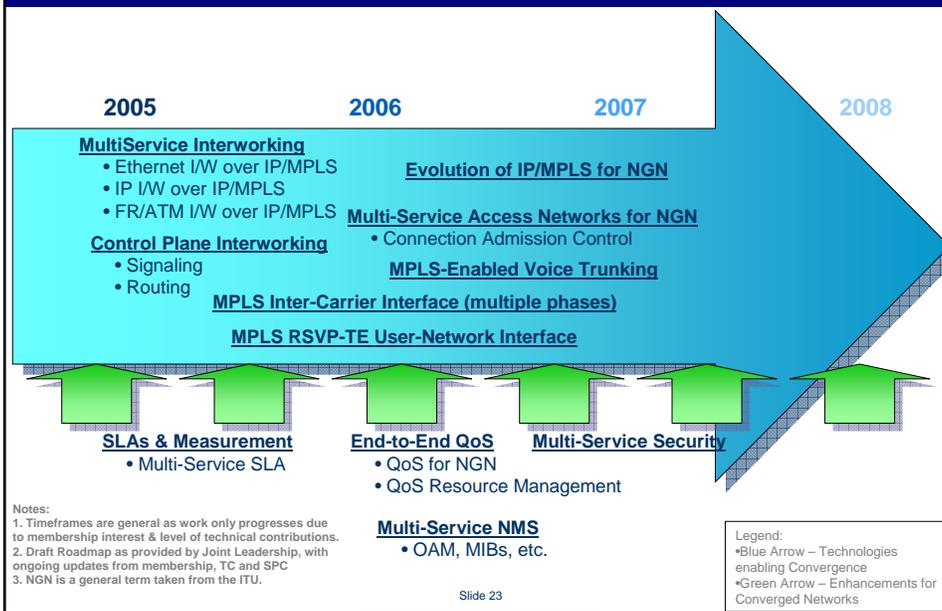 - ✓ **Allows connections between ATM, FR, and Ethernet endpoints on MPLS networks with those on native ATM, FR, and Ethernet networks**
- **AAL1 and AAL2 Voice Trunking over MPLS**
  - ✓ **Allows for graceful migration from ATM-based to MPLS-based voice and private line services**
  - ✓ **Efficient carriage of AAL1 and AAL2 in new PW types (more efficient than ATM cell transport)**

Roadmap

2005   **2006**   **2007**   **2008**

MultiService Interworking
- Ethernet I/W over IP/MPLS
- IP I/W over IP/MPLS
- FR/ATM I/W over IP/MPLS

Evolution of IP/MPLS for NGN

Multi-Service Access Networks for NGN
- Connection Admission Control

Control Plane Interworking
- Signaling
- Routing

MPLS-Enabled Voice Trunking

MPLS Inter-Carrier Interface (multiple phases)

MPLS RSVP-TE User-Network Interface

SLAs & Measurement
- Multi-Service SLA

End-to-End QoS
- QoS for NGN
- QoS Resource Management

Multi-Service Security

Notes:
1. Timeframes are general as work only progresses due to membership interest & level of technical contributions.
2. Draft Roadmap as provided by Joint Leadership, with ongoing updates from membership, TC and SPC
3. NGN is a general term taken from the ITU.

Multi-Service NMS
- OAM, MIBs, etc.

Legend:
- Blue Arrow – Technologies enabling Convergence
- Green Arrow – Enhancements for Converged Networks

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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 NGN, MPLS OAM, MPLS/PNNI signaling interworking, VoMPLS carriage and signaling**
- **MultiService Forum (MSF)**
  - ✓ **Formal liaison relationship**
  - ✓ **Meet jointly twice a year**
- **Metro Ethernet Forum (MEF)**
  - ✓ **Formal liaison relationship**
  - ✓ **Working in concert on FR/ATM/Ethernet interworking**
- **Optical Internetworking Forum (OIF)**
  - ✓ **Formal liaison relationship**

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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
  - ✓ SP revenues also in the billions, growing at 40%/year
  - ✓ New applications (L2 VPNs, VPLS, enhanced QoS, multimedia) are undergoing development and deployment
- **MPLS standardization continues to be very active – many innovative ideas from both service providers and vendors**
- **Interoperability and conformance testing continue to be crucial as new applications are standardized**
- **The MFAF is working to expand our international presence and participation**
- **We welcome your membership and participation**

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THANK YOU!

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