MPLS 101
Global Packet Transport Rollout

MPLS SharePoint Site: http://go.usa.gov/x3vR5

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MPLS Layer-3 VPNs (AKA Private IP)

• Virtual Private Networks
  ▪ Traffic segregation
    • Flows can be encrypted (Type III or Type I) by user
    • Typical VPN
    • MPLS VPNs are not natively encrypted

• MPLS VPN
  ▪ Layer-3 and Layer-2 (Layer-2 to be addressed later)
    • Layer-3 VPN segregate IP traffic domains
      ▪ Virtual Route Forwarding (VRF) Instances
      ▪ Label Assignment and Forwarding
    • VRF instances and LSP flows keep Layer-3 VPN traffic isolated through the provider network
Layer-2 Transport / VPN

- **Ethernet Private Line Service**
  - Point to Point Pseudowires
  - No IP routing or signaling with external network

- **Virtual Private LAN Service (VPLS)**
  - Point to Multipoint Pseudowires

- **Any Transport over MPLS (AToM)**
  - Common framework to encapsulate and transport supported Layer 2
  - ATM (AAL5), Ethernet, Frame Relay, PPP, HDLC

- **Circuit Emulation**
  - Structure Agnostic TDM over Packet (SAToP)
Transport Demand Reduction

• Dual routers decrease overall long-haul demands on transport
  ▪ Customers’ diversity requirements were driving the need to provision connections around the SDP
  ▪ Efficient and effective monitoring, planning and building of PE router bandwidth capabilities helps insure a robust and available network

  ▪ Cost savings are realized
    • Cost for bandwidth is lower on larger leases
    • Fewer leases will be required
    • Port demand is reduced for government owned transport
Increased Agility and Fewer Attack Surfaces
MPLS and the Net-Centric Vision

- **DODIN net-centricity has been IP based – Everything over IP (EoIP)**
  - Enterprise applications are IP based
  - Shared nature of IP and Internet explosive growth has required ever increasing methods to mitigate security risks

- **MPLS provides a shared medium that maintains separation from risks associated with customer IP and layer-2 traffic**
  - DISN services converging onto the Joint–Provider Edge (J-PE)
  - All IP is within Layer-3 VPN, Layer-2 transport, circuit emulation

Everything over MPLS (EoM) enables realization of the Net-Centric Vision
Multi-Protocol Label Switching is an underlying and overriding transport methodology for forwarding packet data over a network. MPLS assigns labels to data packets on ingress into the domain and forwards the data throughout the network based upon the label. Provides a simplified forwarding method for data flows across a packet network

- Label Switching versus Packet Switching
  - Label numbers is 20 bits = ~1 million labels

MPLS Header
- Label, CoS, Stack and TTL

Label Switched Paths (LSP)
- Label Edge Router (LER) and Label Switch Router (LSR)
- Signaling used in IP networks
- LDP, RSVP-TE, mBGP
J-PE Router Equipment

• **Router Features**
  • MPLS (of course)
  • Common Technology Levels
  • Multi-Terabit Backplane
  • 100 Gigabit Link Capabilities
  • High-Density Interfaces
  • Circuit Emulation

• **Port Management**
  • Limit Interface Types
  • Encourage Sub-Interface Use
  • Discourage Circuit Emulation
  • Stay Away From Vendor “features”
Multi Protocol Label Switching (MPLS) Project

Project Description/Scope

The purpose of the MPLS Technology is a highly scalable network transport carrying technique supporting both circuit switched and packet switched data across IP networks, enables a shortest path calculation route during link failures and offers a standardized platform for the deployment of Enterprise Services based on IP technology in accordance with the JIE and JRSS architectures.

Measures of Success/Status:

• Installation of MPLS-capable IP Transport routers across the DISN at all 339 DSS sites to allow VRF-based access to JRSS stacks to increase the security posture of B/P/C/S and to move the DISN closer toward predominantly IP-capable

IE Goal/Priority:

• Evolve the Joint Information Environment and Operate / Assure the Enterprise
• DISA Strategic Plan 2015-2020 Goal - Provide Global Infrastructure
• DISA Center for Operations key objectives: Optimize the design/Build and implementation of the network

Task Origin: DISN Technical Evolution Plan; accelerated by DoD CIO
Estimated Overall Project Completion Date: EST 1QFY2019 - Fully Funded
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