Applications of MPLS Guaranteed Bandwidth Services

Voice Trunking over MPLS Virtual Leased Lines
Target Applications

- **Voice Trunking**
  - Solution 1: Toll Bypass with Voice Network
  - Solution 2: Toll Bypass with Voice/Data Converged Network
  - Solution 3: Toll Bypass with VoIP Network

- **Virtual Leased Lines**
  - Solution 4: Virtual Leased Lines – Serial Links
  - Solution 5: Virtual Leased Lines – Frame Relay
  - Solution 6: Virtual Leased Lines – ATM
Solution 1: Toll Bypass with Voice Network

Solution Requirements

- QoS on PE Router
- Mapping Traffic to Tunnels
- QoS on Core Routers

DiffServ-Aware Traffic Engineering
Solution 2: Toll Bypass with Voice/Data Converged Network

- PBX with Circuit Emulation Interface
- Enterprise LAN
- Enterprise LAN
- Toll Bypass
- GB Tunnel
- PE
- PE
- QoS on CE Router
- QoS on PE Router
- Mapping Traffic to Tunnels
- QoS on Core Routers
- DiffServ-Aware Traffic Engineering

Solution Requirements

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Solution 3: Toll Bypass with VoIP Network

- PSTN - Traditional TDM Network
- Class 5 legacy switches
- Multi-Service Switch
- IP Phone
- Enterprise LAN
- Multi-Service Switch
- IP Phone
- Enterprise LAN
- Multi-Service Switch
- IP Phone
- Enterprise LAN

Solution Requirements:
- QoS on CE Router
- QoS on PE Router
- Mapping Traffic to Tunnels
- QoS on Core Routers
- DiffServ-Aware Traffic Engineering
Voice Trunking Summary

- Voice Trunking
  - Traditional Telephony
  - Central Office
  - VoIP Gateway
  - Toll Bypass
  - MPLS Network

- Internet Service
  - PSTN - Traditional TDM Network
  - Class 5 legacy switches

- VPN Service
  - GB Tunnel
  - GB-TE Tunnel
  - Regular TE Tunnel
  - Physical Link

Legend:
- GB-TE Tunnel
- Regular TE Tunnel
- Physical Link
Solution 4: Virtual Leased Lines – Serial Links

- Virtual Leased Line (DS-TE + QoS)
- Serial IP or PPP or HDLC over MPLS
- MPLS Backbone
- PEDS-TE Tunnel
- Serial Link
- CE
- PE
- Serial Link
Solution 5: Virtual Leased Lines – FR Networks

Frame Relay

Virtual Leased Line (DS-TE + QoS)

DS-TE Tunnel

Any Transport over MPLS (AToM) Tunnel

CPE Router, FRAD

Frame Relay

Frame Relay DLCI
Solution 6: Virtual Leased Lines – ATM Networks

Virtual Leased Line (DS-TE + QoS) - ATM Virtual Circuits

Any Transport over MPLS (AToM) Tunnel
Virtual Leased Lines Summary

PE

MPLS

Backbone

Any Transport over MPLS (AToM) Tunnel

Virtual Leased Line (DS-TE + QoS)

DS-TE Tunnel

CPE Router or FRAD

ATM Virtual Circuits

ATM

CPE Router

Ethernet

Remote CE

CE

Serial Link

Serial IP or PPP or HDLC over MPLS

Frame Relay DLCI

Frame Relay

CPE Router or FRAD
The Road to a QoS-Optimized Backbone
Road to a QoS-Optimized Backbone – Step 1

- MPLS Labeled Switch Path (LSP)
- DiffServ over IP on Access Links
- PE
- CE
- Constrained
- Unconstrained
- Best-Effort o MPLS
- DiffServ o IP
- DiffServ o IP
Road to a QoS-Optimized Backbone – Step 2

- **DiffServ over MPLS**: “color” the traffic
- **DiffServ over IP on Access Links**

**Legend**:
- Green: Priority - Voice Traffic
- Orange: Priority - Data Traffic
- Red: Regular Traffic

**Constrained**

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Road to a QoS-Optimized Backbone – Step 3

DiffServ over IP on Access Links

MPLS Backbone

DiffServ-Aware TE

CE

PE

DiffServ over IP on Access Links

DiffServ o IP

DS-TE + QoS = GB-TE

Constrained

Optimized

Constrained

Legend

- Green: Priority - Voice Traffic
- Orange: Priority - Data Traffic
- Red: Regular Traffic