Best Practices for using Logical Router in Multilayer Service Network

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Agenda

- Multi-Layer Service Network (MLSN) architecture
- JUNOS Logical Router
- Case study – SINET3
- JUNOScript 2.0 for MLSN Provisioning
- Multi-Layer Resource Control
- Summary
What is Multi-Layer Service Network?

- **Optical path cut through control by GMPLS**
  - Dynamic Layer1 path setup in GMPLS based Multi Layer Network

- **Multilayer correlation**
  - Correlation for GMPLS optical path layer and MPLS packet path layer provisioning

- **Multiple networks accommodation**
  - Multiple services (L1VPN, L2VPN, L3VPN, Internet, IPv6, etc) in a Multilayer Service Network.
**JUNOS Logical Router (LR)**

- Introduced in JUNOS 6.0 (Q3 2003).
- Isolates routing protocols and interfaces. Provides great hardware reuse with shared uplinks and efficient inter-LR forwarding (lt-tunnel).
- Deployed by our customers for service separation, additional security, managed service, substitute for physical router.
- Most protocol features can be configured on every LR.
  - IPv4, IPv6, Multicast, VPLS, L2VPN, L3VPN, 6PE, 6VPN, DiffServ TE, P2MP TE, etc
- GMPLS signaled by LR master.
Drivers for Multilayer Service Network with Logical Router

- **Save CAPEX and OPEX:**
  - Share expensive forwarding plane.
  - Converge separate services into shared backbone.
  - Collapse multiple routers in a POP into a single physical router.

- **Separate services:**
  - Dedicated routing process per Logical router (LR).
  - Security between services (public IP vs. private IP).
  - Fault isolation between services.
  - Different service and core groups need to manage the same physical router (MR: Master/main router).
Network Consolidation model

- **Vertical consolidation:**
  Combine logical routers and collapse interconnected router functions into a single router
  - Vertical Edge consolidation
  - Interconnect between different services, e.g. VPLS<->L3VPN, etc
  - Vertical POP consolidation
  - Managed CPE service in IDC

- **Horizontal consolidation:**
  Combine unconnected logical router functions into a single router
  - Horizontal consolidation for different networks
  - Isolating different services
  - Multi-Layer Service Network

(LR: Logical Router, MR: Main/Master Router)
Logical Router in Multi-Layer Service Network

Key features:
- Service domain virtualization using Logical Router
- Multi Layer TE (Each TE is managed by each Logical Router)
- Each service operator manages each Logical Router
- Pseudo I/F for converged forwarding plane
- Each Layer1 path is managed by MR with GMPLS

MR: Master Router
LR: Logical Router
MLSN Provisioning

- **Concern**
  - Operation & Provisioning complexity

- **Solutions**
  - Adopting more Plug&Play protocols
    - BGP based VPNs (L3VPN, VPLS/RFC4761, L2VPN-kompera, NG-MVPN)
    - MPLS auto mesh
    - IPv6 link local address
    - IPv4 Unnumbered TELink
    - GMPLS
    - etc
  - JUNOScript2.0
    - Auto-configuration for each service
    - Customized command for easy operation
    - Event-driven/Time-driven operation
JUNOScript for plug & play provisioning

JUNOScript2.0
- Commit Script
- OP Script
- Event Script

IPv4/IPv6 Internet Service
L3VPN, 6vpn NG-MVPN
L2VPN P2P service
VPLS MP service

GMPLS control plane

Shared Physical IF
Container(Pseudo) Interface
Ideal of multi-layer resource control

- Control plane
  - (G)MPLS, resource control to each layer (IP, Ethernet, SDH, OTN, etc)
  - Inter-Layer PCE, etc
  - Virtual Network Topology management
  - Further study…….
Summary

- **Benefit of MultiLayer Service Network**
  - Save CAPEX & OPEX by sharing platform & network
  - Keep dedicated routing policy for each service network layer

- **JUNOS Logical Router design for MultiLayer Service Network**
  - Horizontal consolidation
  - Converged forwarding plane
  - Dedicated routing process for each LR(network service)

- **JUNOScript2.0**
  - JUNOS automation for safe operation, provisioning and maintenance for backbone network, and to reduce OPEX.

- **Multi-Layer Resource Control**
  - GMPLS helps multi-layer resource control to automate restoration and assists with connection provisioning for both packet and Optical layers.
Thank you!

Juniper your Net.

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