SEAMLESS SR

draft-hegde-spring-mpls-seamless-sr

IETF 108

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Agenda

- Introduction
- Use cases
- Proposed Solution
- Examples
  - Data Sovereignty
Introduction to Seamless SR

- Based on Seamless MPLS architecture
- Accommodates heterogeneous networks
- Extends Seamless MPLS
  - Support for End-to-End Slicing
  - Native MPLS for IPv6 networks
  - Interworking with IPv6 Technologies
    - MPLSoUDP, MPLSoGRE, SRm6, SRv6
5G Transport Networks

- Massive bandwidth
  - (N*10GE, 25GE, 100GE, 400GE)
- Timing and E2E Latency
  - (Stringent Timing and latency requirements due to distributed/virtualized network functions)
- Operational Simplicity
  - (Fewer protocols, stateless/programmable)
- High availability
  - (Node/Link/Path protection)
- High scalability
  - (100xNode scale)
- E2E Service Differentiation
  - (Differentiated services with varied service mapping)
- Application aware routing
Large Scale Service Provider networks

- Large number of nodes in the order of 100k
- Multiple domains with single ownership
- End-to-end SLO
- Low latency routing
LARGE SCALE WAN NETWORKS

- Smaller IGP domains
- Reduce overall state on the device
- Smaller fault domain
- E2E TE constraints
- Data Sovereignty
Data Center Interconnect

- E2E Path Diversity
- Low latency Paths
- Avoid service routes on ABRs
Seamless SR with BGP-Classful Transport

End to End Colored transport satisfying SLAs

- Transport class
- Transport RIB
- BGP-CT
- Route Distinguisher
- Route Target
- Mapping Community
Seamless SR with BGP-Classful Transport

Prefix: PE5
RD: 5.5.5.5
RT: red
Label: L5
Nexthop: ASBR1

Prefix: PE5
RD: 5.5.5.5
RT: red
Label: L4
Nexthop: ASBR3

Prefix: PE5
RD: 5.5.5.5
RT: red
Label: L3
Nexthop: ASBR5

Prefix: PE5
RD: 5.5.5.5
RT: red
Label: L2
Nexthop: ASBR7

Prefix: PE5
RD: 5.5.5.5
RT: red
Label: L1
Nexthop: PE5

VPN prefix: v1
RD: X
RT: Y
Ext color comm: Red
Label: Lv1
Data sovereignty Use case

- Multiple AS
- Each AS represents a continent
- Data sovereignty
  - Avoid node A and C
- This “avoid node A & C” constraint is not applicable in AS1 and AS2
Data sovereignty Use case

- Red LSP created on ASBR4
- Since ASBR5 is connected to A & C, Red LSP isn’t created
- Red transport class created on all border nodes
- Resolution
  - AS3: Strict resolution
  - AS1 & AS2: Resolve on Red fallback on best
Solution with BGP-CT

AS1 and AS2 do not need to create Red Transport Tunnel. BGP-CT will use best effort paths in AS1 and AS2.
Next steps

- Request review and comments
Thank you
Seamless MPLS

- SR-TE Domain
- IGP-SR
- LDP

IBGP-LU/BGP Prefix-SID

Intra domain TE Controller

Core

Access

Agg

Metro 1

PE1

PE2

PE4

PE3

Metro 2

SR-MPLS (v4)

SR-MPLS (v4)

SR-MPLS (v4)

End to End Services: EVPN, IPVPN, IP

Juniper Business Use Only
Shortcomings of BGP-LU

- Single path to remote loopback
- BGP best path selection applied to choose the path
- Possible options
  - Multiple loopbacks
  - BGP-LU with add-path

Both options are operationally very cumbersome. For large networks, BGP based E2E TE solution needed
Solution Concepts

- **Transport Class**: Set of paths satisfying certain constraints
- **Transport RIB**: Collection of tunnels belonging to same Transport Class
- **BGP Classful Transport**: New NLRI for carrying E2E SLA paths
- **Route Distinguisher**: Used to distinguish multiple paths to same loopback
- **Route Target**: Carries the Transport class of the BGP-CT advertisement
- **Mapping Community**: Extended community as defined in RFC 4360 used for service mapping