BGP Flexible Color-Based Tunnel Selection

draft-shen-idr-flexible-color-tunnel-selection-00

Yimin Shen (yshen@juniper.net)
Ravi Singh (ravi.singh.ietf@gmail.com)

IETF 106, Singapore
Nov 2019
Color as Criterion in Tunnel Selection

- Payload prefix with BGP next hop $N$ and color $\text{RED} \Rightarrow \text{RED}$ tunnel to $N$
- Use cases: inter-domain TE, SR, etc.

Prefix $X$
Next hop = $N$
Color = $\text{RED}$
Color-Based Tunnel Selection

• Color provides a generic notion for network attributes:
  o TE characteristic
  o Virtual topology
  o Network slice
  o Path computation algorithm

• Color Extended Community can be signaled across AS, and from controller to routers.

• A generic service mapping mechanism based on TE, slicing, virtualization, flex-algo, etc., suitable for inter-domain and controller-driven environments.
Extended Mapping Modes and Flexible Selection Scheme

Extended mapping modes
• IP-color, with optional fallback colors
• Color-only, with optional fallback colors
• IP-any-color
• IP-only
• Converted-IPv6
• Converted-IPv6-color, with optional fallback colors
• Converted-IPv6-any-color
• Color-profile

Flexible selection scheme
• Consists of a sequence of extended mapping modes
• Falls back from one mode to next mode in the specified order

Example: payload prefix with nexthop N and color RED.

Flexible selection scheme:
(1) IP-color, fallback = {BLUE, GREEN}
   • Attempt RED tunnel to N
   • Fall back to BLUE tunnel to N
   • Fall back to GREEN tunnel to N
(2) Converted-IPv6-color, fallback = {BLUE}
   • Attempt RED tunnel to N’
   • Fall back to BLUE tunnel to N’
(3) IP-only
   • Attempt uncolored tunnel to N
Provisioning Modes of Flexible Selection Scheme

• Ingress router
  o Configure as a policy
  o Apply to payload prefixes

• Egress router
  o Signal via a new **Flexible Color Tunnel Selection** Path Attribute to ingress routers
  o Apply to payload prefixes on each ingress router

• Controller
  o Signal via a new **Flexible Color Tunnel Selection** Path Attribute to ingress routers
  o Apply to payload prefixes on each ingress router
BGP Flexible Color Tunnel Selection Path Attribute

• Carries the information of a tunnel selection scheme.
• Comprises a sequence (in the fallback order) of Extended Mapping Mode TLVs.
Relationship with Color-Only Bits of Color Extended Community

• *draft-filsfils-spring-segment-routing-policy* and *draft-previdi-idr-segment-routing-te-policy* defines two “Color-Only” bits in the Color Extended Community, and three fallback modes.

• This draft supports user-defined flexible selection schemes
  o Fully supports the fallback modes pre-defined by the CO bits

• If flexible selection scheme and the CO bits co-exist:
  o Local policy > received CO bits > received Flexible Color Tunnel Path Attribute
Next Steps

• Request review
• Welcome comments and suggestions