Inter-domain Multicast using BIERv6

draft-geng-bier-ipv6-inter-domain-00

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IETF105  2019-07-24  Montreal
Scenario: Hierarchial Multicast

BR = Border Router
SRC = Multicast Source
RCV = Multicast Receiver

Figure 1: Inter-Domain Hierarchical Multicast
Solution: Static-bift for BIERv6

bier sub-domain 6 ipv6-underlay  ##configuration for BR1
bfr-prefix 2001:DB8::B1:AB37
bfr-id 0
encapsulation ipv6 bsl 256 max-si 2
static-bift
    nexthop 2001:DB8::B2:AB37 bfr-id 1 to 256   ##Note1
    nexthop 2001:DB8::B3:AB37 bfr-id 257 to 512  ##Note1

bier sub-domain 6 ipv6-underlay  ##configuration for PE1x
bfr-prefix 2001:DB8::E1:AB37
bfr-id 0
encapsulation ipv6 bsl 256 max-si 2
static-bift
    nexthop 2001:DB8::B1:AB37 bfr-id 1 to 512  ##Note1

•Note1: Use the BSL-SD-SI BIFT-id encoding method described in [I-D.ietf-bier-non-mpls-bift-encoding] as auto-generation method.
Scenario: Peering Multicast

AD = Administrative Domain (independent autonomous system)
BR = Border Router
SRC = Multicast Source
RCV = Multicast Receiver

Figure 2: Inter-Domain Peering Multicast
Solution: auto-IR to each domain

• # PE1x routing underlay layer configuration
  bier sub-domain 6 ipv6-underlay
  bfr-prefix 2001:DB8::E1:AB37
  bfr-id 1
  encapsulation ipv6 bsl 256 max-si 1
  color 1 protocol isis
  color 2 static-bift
   next-hop 2001:DB8::B2:AB37 bfr-id 1 to 512
  color 3 static-bift
   next-hop 2001:DB8::B3:AB37 bfr-id 1 to 256

• The following lists the BIFTs that will be constructed on PE1x:
  BIFT corresponding to SD<6>/BSL<256>/SI<0> for color 1 ;;Ref1
  BIFT corresponding to SD<6>/BSL<256>/SI<0> for color 2 ;;Ref2
  BIFT corresponding to SD<6>/BSL<256>/SI<1> for color 2 ;;Ref3
  BIFT corresponding to SD<6>/BSL<256>/SI<0> for color 3 ;;Ref4
Solution: auto-IR to each domain

- Overlay Multicast Flow steering to (Color, SD/BSL/SI, BitString) tuple on Ingress PE
  
  \((VRF<X>, S<S1>, G<G1>)\)
  
  \((\text{Color}<1>, \text{SD}<6>, \text{BSL}<256>, \text{SI}<0>, \text{BitString}<0001>) \text{;;Ref1}\)
  
  \((\text{Color}<2>, \text{SD}<6>, \text{BSL}<256>, \text{SI}<0>, \text{BitString}<0001>) \text{;;Ref2}\)
  
  \((\text{Color}<2>, \text{SD}<6>, \text{BSL}<256>, \text{SI}<1>, \text{BitString}<0001>) \text{;;Ref3}\)
  
  \((\text{Color}<3>, \text{SD}<6>, \text{BSL}<256>, \text{SI}<0>, \text{BitString}<0001>) \text{;;Ref4}\)

- Color Extended Community carried in Leaf-AD route from Egress PE.

Leaf A-D route:

- NLRI: RD, S, G, OrigIP, LeafIP
- PMSI: Sub-domain, bfr-prefix, bfr-id
- Color Extended Community: Color=1/2/3 (PE1y/PE2x/PE3x carry Color 1/2/3 resp.)
Comments on the list (1)

• For the “peering multicast”, how many BIER sub-domain do you have?
  • haven't evaluate that so far.
  • I initiate this idea when I found a recent rfc8313 and thought of the tenant spanning multiple DCs.
  • Also I assume the multicast as a service draft for this case.
  • The document assume a single BIER sub-domain (through multiple AS) for multicast deployment.
Comments on the list (2)

• What’s the real difference between “hierarchical multicast” and “peering multicast”, once you take away the color and MVPN aspects that I believe are orthogonal here?
  
  • the hierarchical one is a P2MP case like IPTV in service provider.
  • The peering one is an MP2MP case where the multicast source may be more unpredictable.
  • From BIER point of view, there is still some difference.
  • In current BIER Architecture, BIFT is constructed per the tuple of <SD/BSL/SI>.
  • In the above Color case, BIFT is constructed per the tuple of <Color/SD/BSL/SI>.
  • There may be some consideration of supporting multiple encapsulation in one <SD/BSL>, then the BIFT may be constructed per the tuple of <SD/BSL/Encap/SI>.
  • Note the multicast overlay need to steering a flow to <Color/SD/BSL/SI> instead of <SD/BSL/SI>. 
What’s the significance of “inter-domain” here, that requires this new draft?

- static-configuration is not desired in intra-domain case since there is so automated IGP deployment.

- For Inter-domain case (mainly about inter-AS case as this document examples), static-configuration can be used, and I am used to understand things clearly by using static-configuration first.

- I will try to learn and understand how the dynamic protocol as proposed on the WG can be used for inter-domain.
Comments on the list

• What’s the uniqueness of IPv6 here?
  • I found it difficult to construct the inter-domain BIFTs since the BIER-MPLS label is dynamic.
  • SRGB is a thing I could thought of to use for static-configuration.
  • Use of a static SRGB label as BIER-MPLS of a BR(border router) is wasteful, while use the SRGB for the entire domain seems not welcome in ietf102.
  • This document assume the 'SD-BSL-SI' auto-generation of BIFT-ID is used consistently in all BFRs, makes inter-domain BIERv6 deployment easy.
  • (1) inter-domain BIERv6 configuration is easy
  • (2) inter-domain BIERv6 can skip non-BFRs completely.
  • (3) inter-domain BFRs use only the BIERv6 encapsulation without any addition.
Request for

- Comments/questions/discussions

Thank you!