BGP Classful Transport Planes


IETF 108

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Problem

• A domain has intra-AS tunnels with varying TE characteristics (gold, silver, bronze).

• There could be multiple tunnels to the same destination. And different tunneling protocols creating those tunnels.

• These tunnels may need to be extended inter-domain, while preserving their TE characteristics end-to-end.

• Different Service routes want to resolve (put traffic) over intra/inter-domain tunnels of a certain TE characteristic, with an option to fallback on tunnels belonging to a different TE characteristic.

• How to extend BGP to signal these pieces of information, and get the job done.
How? the constructs of BGP CT

• A domain has intra-AS tunnels with varying TE characteristics (Transport Class: gold, silver)

• Use “Transport Class Route Target” to signal transport class in BGP.

• There could be multiple tunnels to the same destination. Use “Route Distinguisher” to advertise them without path-hiding, and allow identifying originating PE.

• The tunnel may need to be extended inter-domain, while preserving the same Transport class end-to-end. Resolve BGP NH using tunnels belonging to the same Transport class. And follow RFC-4364 option-C style procedures, to create swap-routes on domain boundaries.

• New BGP transport layer address-family (SAFI: 76, “Classful Transport”) that follow RFC-4364 procedures.

• Service routes want to resolve using a Resolution scheme (viz. use tunnels of a certain Transport class, with an option to fallback on other Transport classes).

• Desired Resolution scheme is signaled via “Mapping community” which can be a function of transport-class.
BGP CT – pcap sneak peak

Nov 10 22:00:51.708561 BGP SEND 13.21.0.13+65494 -> 13.21.0.21+179
Nov 10 22:00:51.708563 BGP SEND message type 2 (Update) length 98
Nov 10 22:00:51.708572 BGP SEND Update PDU length 98
Nov 10 22:00:51.708574 BGP SEND flags 0x40 code Origin(1): IGP
Nov 10 22:00:51.708580 BGP SEND flags 0x40 code ASPath(2) length 6: 1
Nov 10 22:00:51.708581 BGP SEND flags 0x80 code MultiExitDisc(4): 30
Nov 10 22:00:51.708596 BGP SEND flags 0xc0 code Extended Communities(16): transport-target:0:100
Nov 10 22:00:51.708605 BGP SEND flags 0x90 code MP_reach(14): AFI/SAFI 1/76
Nov 10 22:00:51.708611 BGP SEND nhop 13.21.0.13 len 12
Nov 10 22:00:51.708631 BGP SEND 1.1.1.3:9:1.1.1.1/32 (label 299952)

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Advantages

• Keep the heterogenous tunneling-domains (RSVP, SRTE, FlexAlgo, etc) loosely coupled and still preserve Transport-class end to end.

• Natural extension to BGP-LU RFC-4364 option-C deployments.

• Reuse of proven BGP-VPN technology at Transport layer.
  • RD:TunnelEndpoint takes care of path-hiding.
  • Transport class RouteTarget treats “Color” as an attribute (adjective), rather than part of NLRI (noun). Which is more appropriate.

• On-demand-NH comes for free, with RTC (RFC-4684) mechanisms for BGP-CT family

• New Route-target type avoids collision with existing service-routes RT namespace.

• Opens up new possibilities by extending applicability of time-tested RFC-4364 mechanisms at a new (transport) layer.
Why new address-family?

Why not re-use/hack existing families like LU, SRTE or L3VPN?

• Carrying ‘Color’ as attribute (RT) makes more sense, instead of in the NLRI.

• RD is the right distinguisher, end-to-end. Add-path-ID is per-session scope. Both are required, either one is not enough by itself.

• Use of RT allows for RTC like mechanisms, and the ODN. If we didn’t use well-known RT ext-comm for route-leaking, this is not possible.

• Further overloading L3VPN (service family) with transport-routes is not good. As route-propagation path is different for service vs transport routes.

• Thus, new SAFI 76. A Transport family that can signal transport classes.