SRv6 and MPLS interworking for VPN service

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Abstract

This document describes a method to achieve an inter-domain connection for a VPN (Virtual Private Network) service.

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1.  Introduction

[I-D.agrawal-spring-srv6-mpls-interworking] describes SRv6 and MPLS/
SR-MPLS interworking and co-existence procedures. The document
leverages the function defined in
[I-D.ietf-spring-srv6-network-programming] to give guidance to the
forwarding in routers.

[RFC4364] describes a method by which a Service Provider may use an
IP backbone to provide IP Virtual Private Networks (VPNs) for its
customers. When SRv6 and SR-MPLS are co-existed in the backbone,
controller or a control plane, for example, using BGP, should be used
to instantiate the VPN service as described in
[I-D.agrawal-spring-srv6-mpls-interworking].

In case of option B inter-domain interconnection [RFC4364], only ASBR
needs to do the stitching work between two ASes. Thus PEs in SRv6
and SR-MPLS domains do not have to support both SRv6 and SR-MPLS
functions. This document discusses the use of BGP for achieving VPN
service through option B defined in [RFC4364] across a backbone that
includes SRv6 and SR-MPLS domains.

2.  Specification

2.1.  SRv6 to SR-MPLS domain signaling

[I-D.dawra-bess-srv6-services] defines the new TLVs for the BGP
Prefix-SID Attribute that can be used to signaling of SRv6 SID for L3
and L2 services. In this document, we use L3 case as the example,
the procedures for L2 are the same as in L3 scenario.
For example, CE1 and CE2 are connected through a backbone that includes AS1 and AS2. AS1 supports SRv6 only, and AS2 supports SR-MPLS only. ASBR1 supports both SRv6 and SR-MPLS capabilities, but ASBR2 supports SR-MPLS capability only.

For a prefix advertised by CE1 to PE1, PE1 assigns SID with End.DT4 (or End.DT6) defined in [I-D.ietf-spring-srv6-network-programming] section 4 (e.g., End.DT4 is used while the prefix is IPv4 prefix, End.DT6 is used while the prefix is IPv6 prefix), and advertises it to ASBR1. Because ASBR2 supports SR-MPLS function only, the SRv6 SID advertised by ASBR1 cannot be executed by ASBR2 because ASBR2 cannot recognize it.

ASBR1 uses specific execution function that is different from the function used in a single SRv6 domain or a single SR-MPLS domain. In this situation, ASBR1 assigns an MPLS label for the prefix received from PE1 and advertises it to ASBR2. The MPLS label has local significance that indicates this packet is associated with an SRv6 SID list which leads the packet from ASBR1 to PE1. The advertisement is the same as the format in [I-D.ietf-idr-bgp-prefix-sid].

When a data flow packet which has the destination to CE1 is received by ASBR1, ASBR1 recognizes the MPLS label, removes the label and adds an SRH to the packet, then forwards it to PE1.

2.2. SR-MPLS to SRv6 domain signaling

In the same example, PE2 advertises a prefix received from CE2 with assigned SID to ASBR2 according to [I-D.ietf-idr-bgp-prefix-sid], ASBR2 assigns SID for this prefix and advertises it to ASBR1. When ASBR1 advertises this prefix to PE1, ASBR1 should assign an SRv6 SID for it. The SID indicates the new execution function (e.g., END.RM, it indicates that MPLS should replace the SRH) for exchanging the packet header from SRH to MPLS list. The new function format is like the definition in [I-D.ietf-spring-srv6-network-programming] section 4.
When a data flow packet, which has the destination to CE2, is received by ASBR1, ASBR1 recognizes the SRv6 SID, removes the SRH and adds a or a list of MPLS label in the packet, and forwards it to PE2.

3. IANA Considerations

There is no IANA consideration.

4. Security Considerations

This document introduces no new security consideration beyond those already specified in [RFC4364], [I-D.ietf-idr-bgp-prefix-sid], [I-D.ietf-spring-srv6-network-programming], [I-D.dawra-bess-srv6-services] and [I-D.agrawal-spring-srv6-mpls-interworking].

5. References

5.1. Normative References

[I-D.dawra-bess-srv6-services]

[I-D.ietf-idr-bgp-prefix-sid]

[I-D.ietf-spring-srv6-network-programming]

5.2. Informative References

[I-D.agrawal-spring-srv6-mpls-interworking]

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