

MP-BGP Extension and Procedures for IPv4/IPv6 Mapping Advertisement

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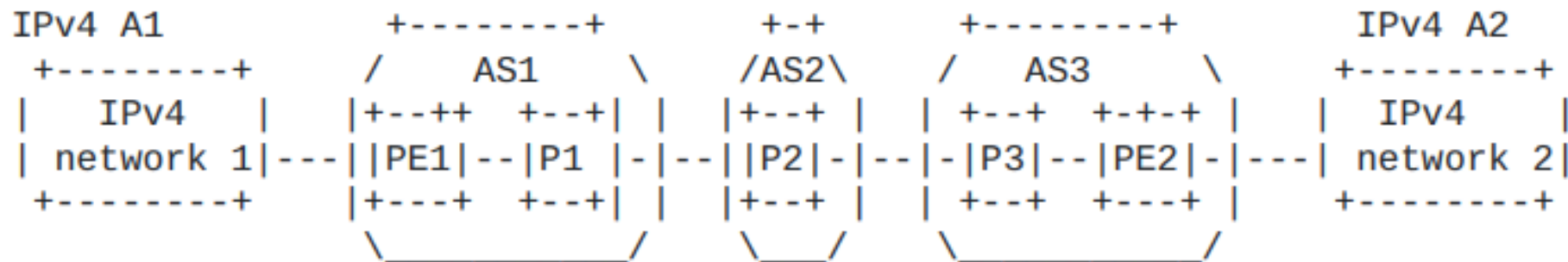
idr@IETF 119, March 2024

Overview

- This document defines MP-BGP extension, i.e. 4map6, and the procedures for IPv4 service delivery in multi-domain IPv6-only underlay network.
- It defines a new TLV in BGP tunnel Attribute, which is in conjunction with the new SAFI value(AFI=2) for transferring IPv4/IPv6 address mapping rule within and across IPv6-only domains.
- It was proposed in Jan. 2023, firstly presented in IETF 116, adopted after IETF 118.
- Multiple revisions have been made based on the discussions led by Jeff Haas since IETF 118.

Background: Multi-domain IPv6-only Network

- There are increasing IPv6-only network deployment now, IPv4-as-a-Service is a basic requirement to guarantee service continuity and stability.
- [I-D.draft-ietf-v6ops-framework-md-ipv6only-underlay] proposes a framework, in which IPv4 packets will be statelessly translated or encapsulated into IPv6 ones for transmission across multi-domain IPv6-only underlay.
- Address mapping rule is used by the ingress PE to generate IPv6 source and destination addresses from the IPv4 source and destination address when its egress is the given PE, and vice versa.



“draft-ietf-v6ops-framework-md-ipv6only-underlay”

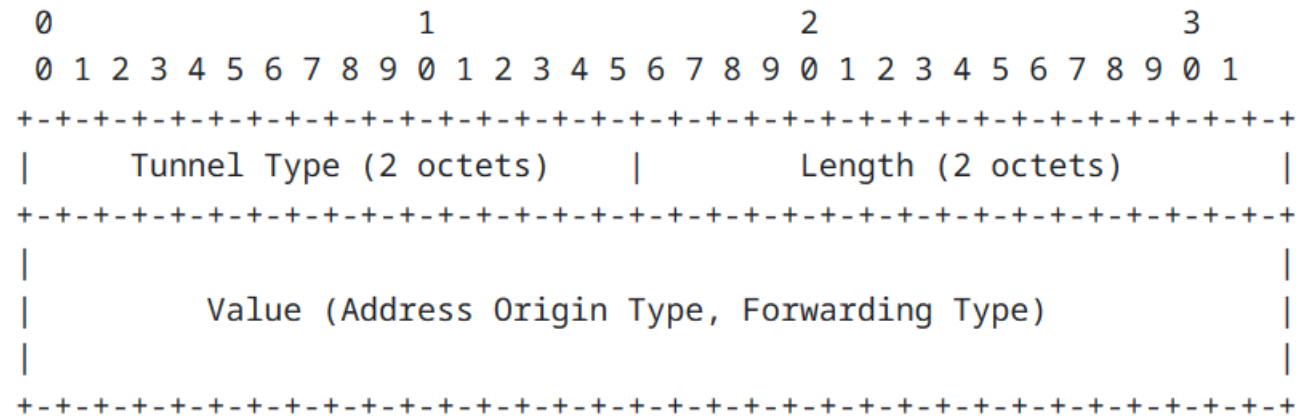
Revisions made since IETF 118(1/4)

- New SAFI is used to identify new 4map6 extension,
 - AFI = 2 (IPv6)
 - SAFI = xxx (4map6)
- The new SAFI's NLRI is encoded as:

```
+-----+
|      NLRI Length (1 octet)      |
+-----+
|      IPv6 mapping prefix length (1 octet)      |
+-----+
|      IPv6 mapping prefix (0 ... 16 octets)      |
+-----+
|      IPv4 address prefix length (1 octet)      |
+-----+
|      IPv4 address prefix (0 ... 4 octets)      |
+-----+
```

Revisions made since IETF 118(2/4)

- The fields of “Forwarding Type(1 octet)” and “Address Origin Type(1 octet)” are encoded as new TLV in BGP tunnel attribute.



- ATTR_SET attribute is used to transfer the routing information of the IPv4 network.
- The original 4map6 BGP path attribute is deleted.

Revisions made since IETF 118(3/4)

- In section 1, the following sentence is added to show that the approach in the draft mainly focuses on controlled environment,
 - "It should be noted that the approach in this document focuses on is controlled environment, for instance, one network of single network operator or small network of cooperating network operators. One effect of using this approach is that the IPv4 address prefix in it will be given one IPv6 mapping prefix and advertised in a IPv6 mapping route."
- In section 2, the term of 'Distance metric' has been removed, the structure of the mapping database in PE is changed accordingly.
- Since 'Distance metric' is removed, P router does not need to do route selection, procedures in section 4.2 and 4.3 is revised accordingly.
- In section 3.2, the value of Address Origin Type's field is illustrated.
- Section 3.3 has been deleted.

Revisions made since IETF 118(4/4)

- Section 7 of “Deployment and operation considerations” is added,
 - It mainly analyses the issues of scalability and route distribution control. In particular, it discusses IPv6 mapping prefix allocation in multi-operator environment. Moreover, proposal is provided to prevent IPv6 mapping routes from leaving the IPv6-only network and entering the IPv6 Internet, the possible effect of this to IPv6 Internet is also mentioned when this does happens.
- In section 7.1, mapping prefix configurations for different types of PE are illustrated.
- Section 8 of "Security considerations" is revised by adding the authenticity of 4map6 information.
- Some editorial changes have been made.

Acknowledgement

- Sincere thanks to Jeffrey Haas for careful review of this draft and help in significantly improving it.

Next Steps

- Comments and suggestions are welcome, and make further refinement to improve the document.

Thank you !
Q&A