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

draft-xie-idr-mpbgp-extension-4map6

Xing Li (Presenter)   CERNET Center/Tsinghua University
Congxiao Bao

Chongfeng Xie   China Telecom
Guozhen Dong
Guoliang Han   Indirection Network Inc.

idr@IETF 116, Yokohama

Overview

- This document defines MP-BGP extension and the procedures for IPv4 service delivery in multi-domain IPv6-only underlay networks.

- A new BGP path attribute, i.e. 4map6, is defined, it is in conjunction with the existing AFI/SAFI for transferring IPv4/IPv6 address mapping rule within and across IPv6-only domains.

Background (1)

- There are IPv6-only networks now, but IPv4/IPv6 coexistence may last long.
- The IPv4/IPv6 translation technologies are defined and used for about 10 years.
  - ➢ Data plane:
    - – Protocol translation (RFC7915)
    - – Address mapping (RFC6052)
    - – Encapsulation(RFC2473)
  - ➢ Control plan:
    - – DNS (RFC7050)
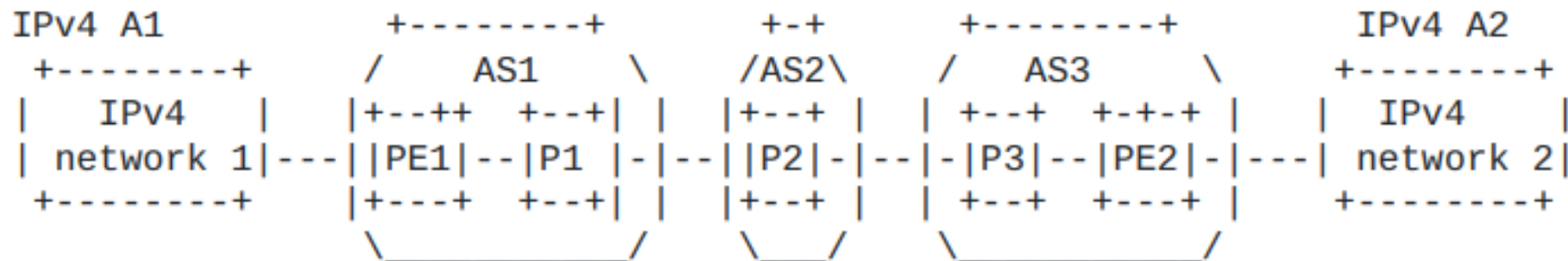   - – DHCPv6 (RFC7598)
    - – RA (RFC8781)
  - ➢ The missing part:
    - – IPv6-only core network peering without multiple IPv4/IPv6 translations.
    - – BGP

IPv4 address

| IPv6 prefix	IPv4 address

Background (2)

- The document [I-D./draft-ietf-v6ops-framework-md-ipv6only-underlay] proposes a framework, in which IPv4 packets will be stateless translated or encapsulated into IPv6 ones for transmission across multi-domain IPv6-only underlay.

- A data structure, i.e. address mapping rule, is used by the ingress to generate corresponding IPv6 source and destination addresses from its IPv4 source and destination address when its egress is the given PE, and vice versa.

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

```
IPv4 A1            +--------+        +-+       +--------+       IPv4 A2
 +--------+       /   AS1    \     /AS2\     /   AS3     \      +--------+
 |  IPv4   |      |+--++  +--+|  | |+--+ |   | +--+  +-+-+ |    |  IPv4   |
 | network 1|---||PE1|--|P1 |-|--||P2|-|--|-|P3|--|PE2|-|---| network 2|
 +--------+       |+---+  +--+|  | |+--+ |   | +--+  +---+ |    +--------+
                  _____/    \__/     _____/
```
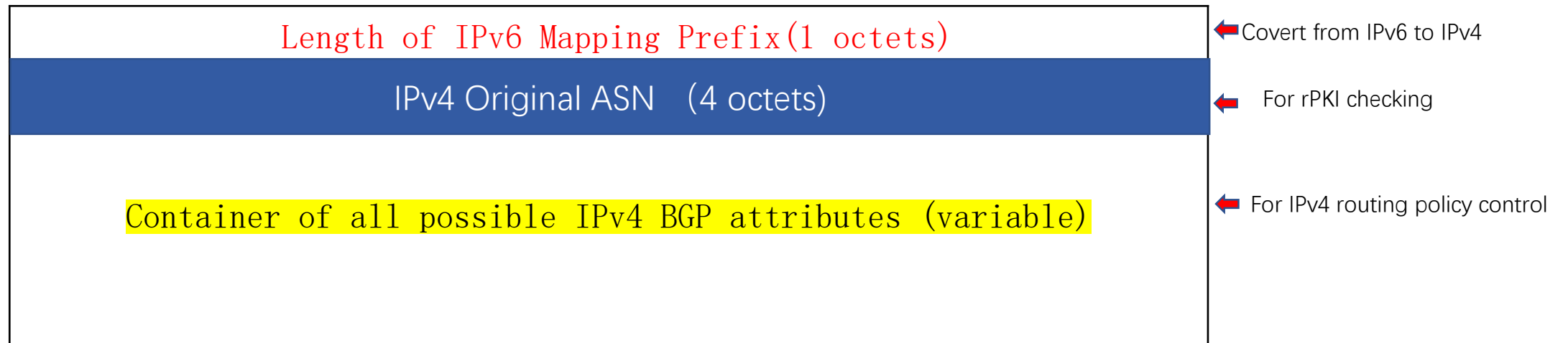
MP_REACH_NLRI

- The existing AFI/SAFI combination is used to identify the reachability of IPv4 address block in IPv6-only network.

  - AFI = 2 (IPv6)
  - SAFI = 1 (Unicast)
  - Length of Next Hop
  - Network Address of Next Hop
  - NLRI : Composite IPv6 address prefix, which is composed of a **IPv6 mapping prefix, the original IPv4 address prefix**, and all possible IPv4 BGP attributes
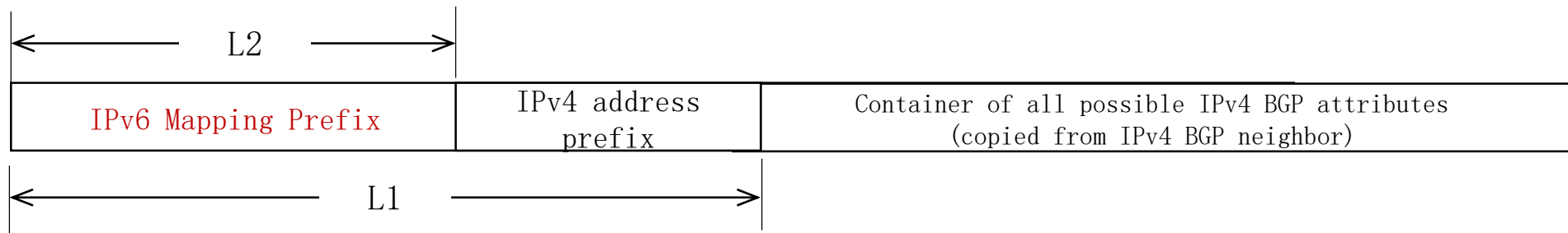
4map6 BGP path attribute

- It specifies the IPv6 mapping prefix and other additional information needed to properly transform the IPv4 packets.
- It is optional and transitive.

Length of IPv6 Mapping Prefix(1 octets)
IPv4 Original ASN　(4 octets)
Container of all possible IPv4 BGP attributes (variable)

← Covert from IPv6 to IPv4

← For rPKI checking

← For IPv4 routing policy control

The total length of this attribute is (the whole-original IPv4 attributes) + 5 (octets)

Procedures

- Advertisement of Mapping Rule Update by egress PE

- Receiving Mapping Rule advertisement by P router

- Receiving Mapping Rule Update by Ingress PE

IANA Considerations

- IANA is requested to allocate the following codes,

    - A code for 4map6 path attribute in the BGP "BGP Path Attributes" registry

    - Value xx for 4map6 in the BGP "Capability Codes" registry

Next Steps

- Further refinement is needed to improve the document

- Comments and suggestions are welcome

- Consider adopting the document as a IDR WG item?

Thank you！
Q&A