EVN6: Mapping of Ethernet Virtual Network to IPv6 Underlay for Transmission draft-xls-Intarea-evn6-02

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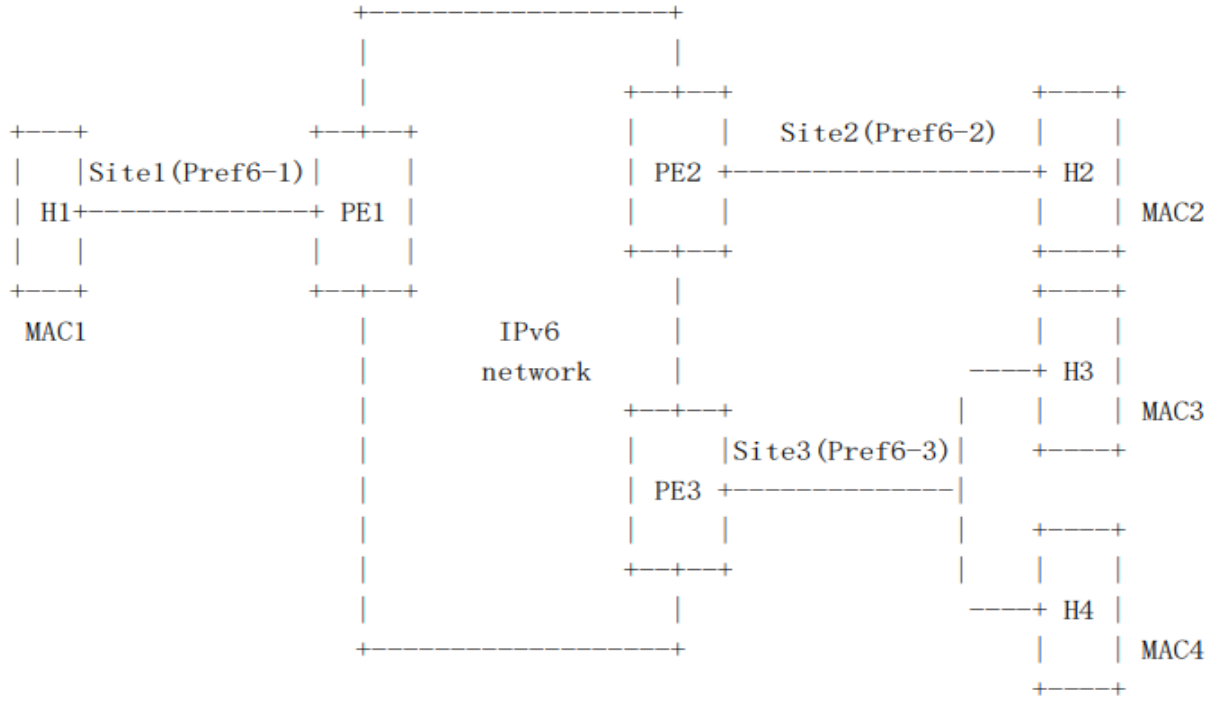
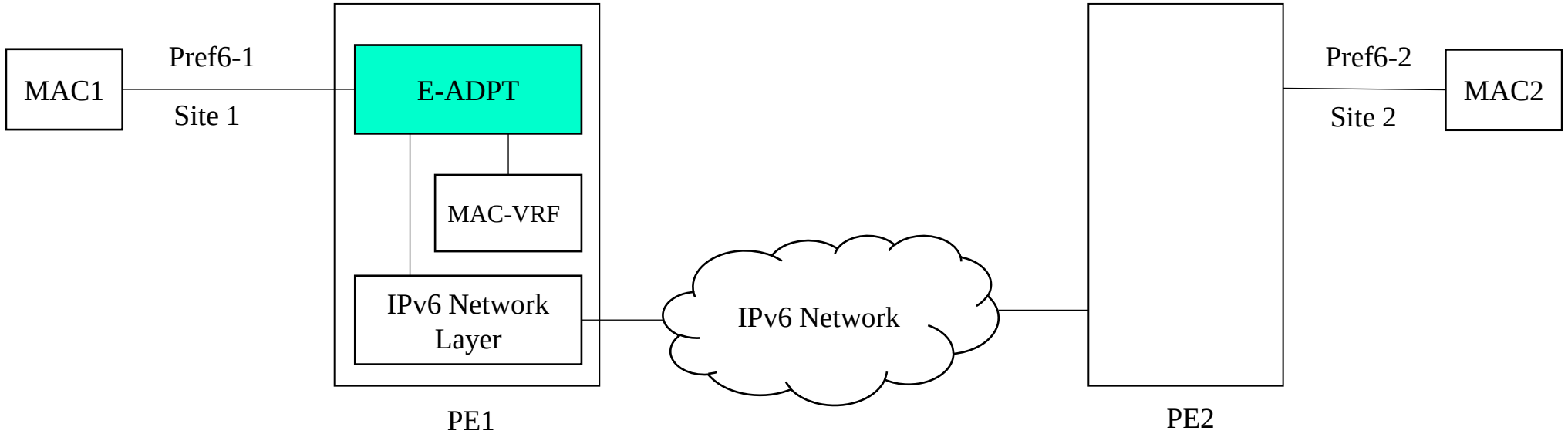
Overview

- EVN6 is Layer-2 network model built on top of the IPv6 underlay to provide connectivity between dispersed customer sites.
  - Ethernet frame is directly copied in the payload of IPv6 packet with encapsulation.
  - Stateless mapping is used to generate IPv6 addresses from the MAC addresses, Virtual Network Identifier and site prefixes.
- It was first proposed in October 2023 to 6man WG, has been discussed in 6MAN, V6OPS and INTAREA WGs several rounds.



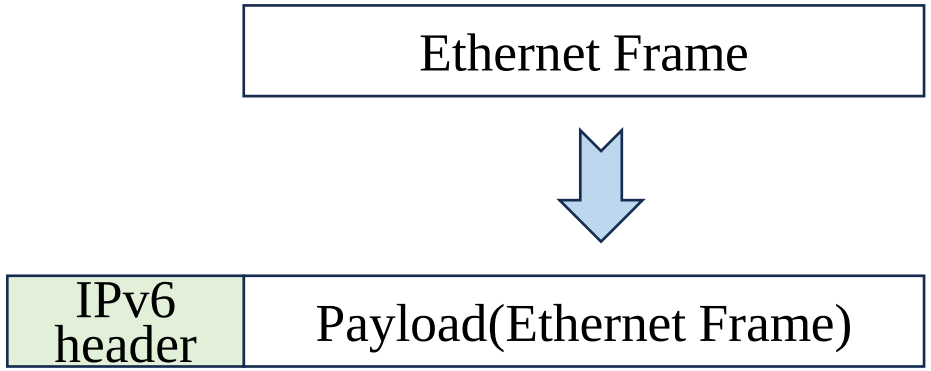
Overall Architecture



VEI	32-bits Virtual Ethernet Identifier
Pref6	Site Prefix/ IPv6 Mapping Prefix
MAC-VRF	A Virtual Routing and Forwarding table for MAC, it stores IPv6 site prefix, VEI of the Ethernet Virtual Network, MAC address, host ID of each host. The exchange of MAC/Pref6 mapping can be implemented at the existing control layer.

Encapsulation of Ethernet Frame into IPv6 Packet

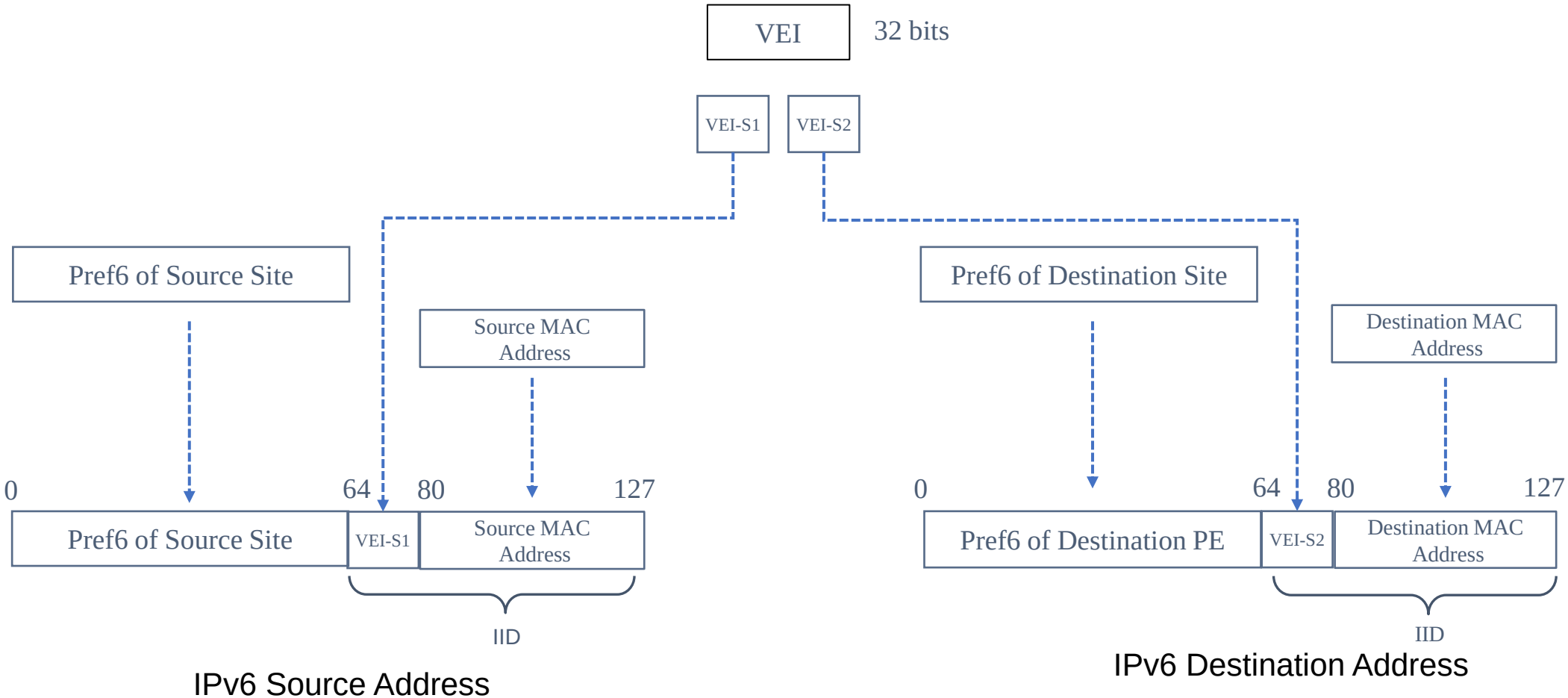
- The Ethernet frame is directly placed in the payload of IPv6 packet by the E-ADPT of ingress PE.
- The field of ‘Next header’ in IPv6 header is set as 143, to indicate that the payload is Ethernet frame.



Revisions

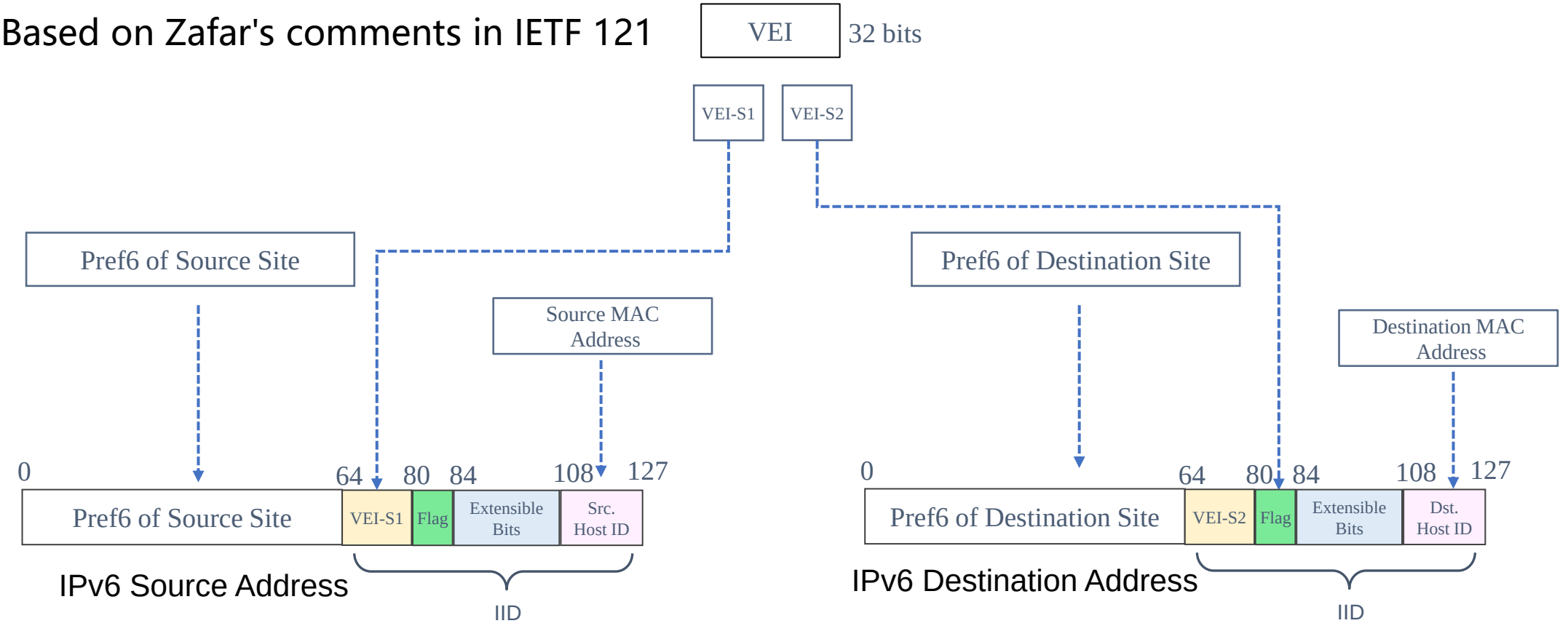
- Title is changed to “EVN: Mapping of Ethernet Virtual Network to IPv6 Underlay for Transmission”
- The term of ‘Pref6’ is added in section 2, based on the comment of Bob Hindon
  - Pref6: Site prefix, Pref6 is a 64 bits subnet prefix (Section 2.5 of [RFC4291]) to identify one site of a given EVN6 instance
- The following sentence is removed from section 5.2, based on the comment of Bob Hindon
  - Link layer broadcast is often used for IPv4 ARP and IPv6 neighbor discovery with ICMPv6 packet of type NS (type 135) [RFC4861].

Old Scheme of Stateless IPv6 Address Generation



Revised Scheme IPv6 Address Generation

Based on Zafar's comments in IETF 121



Flag:	4-bits, it is an identification field in the format of GRRR.
Extensible Bits:	If the G bit is 1, the 24-bits Extensible Bits field is assigned to the Group Policy ID; If the G flag is 0, then all the 24 bits are set to zero.
Host ID:	20-bits, it is for identifying each host within the site.

Justification and Benefits Analysis

- Forward efficiency
  - L2 frame is encapsulated into IPv6 packet without extra encapsulation headers, encapsulation and processing cost can be reduced.
- Delivery flexibility
  - Service can be provisioned as long as access to lPv6 Internet is available.
  - There is no specific requirement for the interworking between ISPs, it can be easily deployed in multi-operator environment
- Secure
  - As there is no pre-configured static tunnel endpoint address, the risk of DDOS attack can be reduced.
- Traffic load-balancing(ECMP)
  - Load balancing can be implemented based on the source IPv6 addresses, different host within the same site has different IPv6 addresses.

Next Steps

- Authors would like to ask for WG adoption of this document.
- Comments and suggestions are welcome!

Thank you!
Q&A