Framework of Multi-domain IPv6-only Underlay Network and IPv4 as a Service
draft-xie-v6ops-framework-md-ipv6only-underlay

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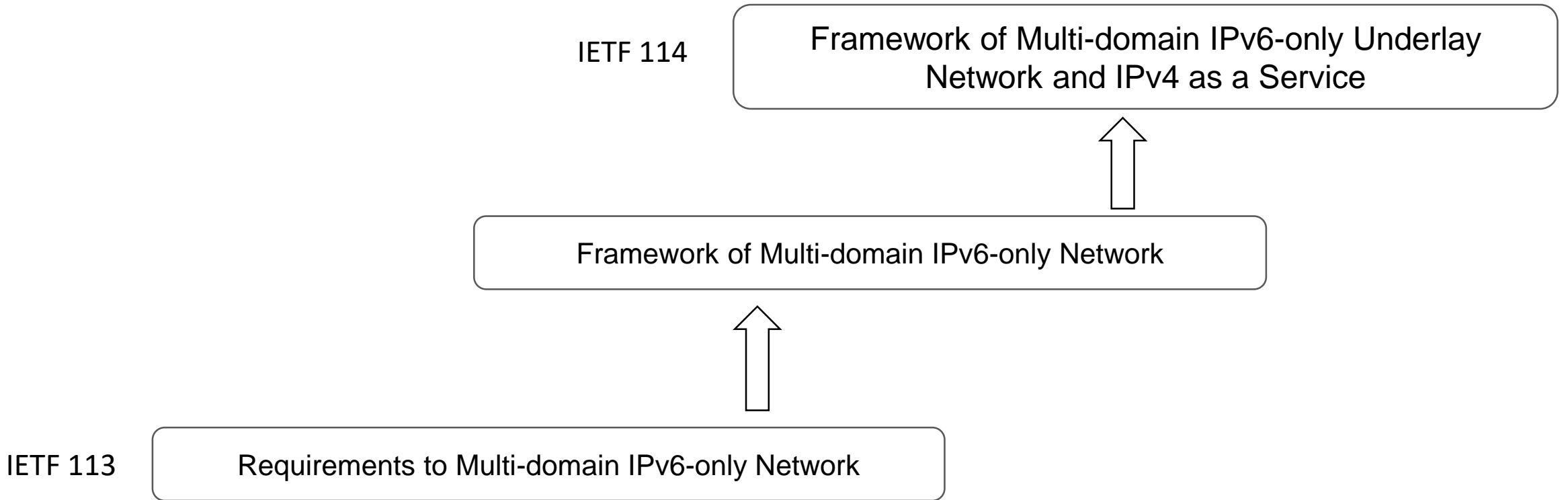
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One Draft, Multiple Titles!

IETF 114

Framework of Multi-domain IPv6-only Underlay Network and IPv4 as a Service

Framework of Multi-domain IPv6-only Network

IETF 113

Requirements to Multi-domain IPv6-only Network

Comments Received So Far

- Comments were received from Brian E. Carpenter, Xipeng Xiao, Fred Baker, Bob Harold, Giuseppe Fioccola, etc.

- All are appreciated!

Changes Since IETF#113

- Revisions based on the comments and received suggestions:
  - The title is changed by adding "underlay" and "IPv4 As A Service"
  - Document architecture is adjusted to make the logic clear, for instance, the section about scenarios has been merged with another section
  - Some requirement items have been deleted
  - Illustration how the new framework reduces v4-v6 conversions compared to other solutions has been added
  - An many other edits

Some Problems Encountered in Network Operation
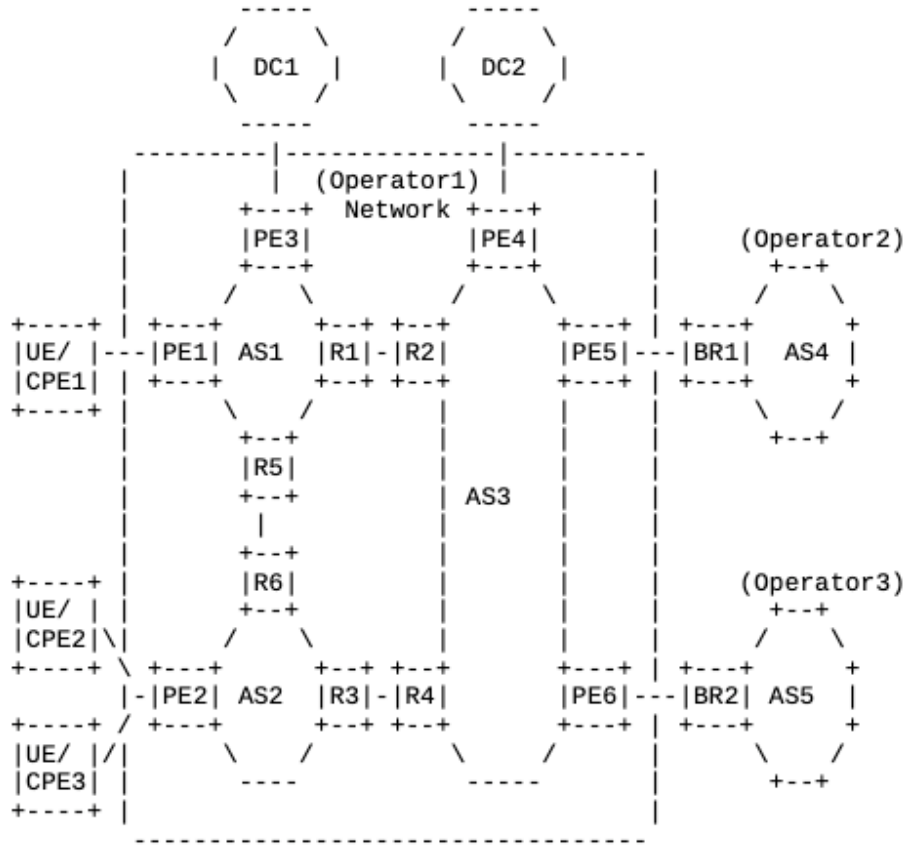
	Issue	description
1	Partial IPv6-only deployment	Not end-to-end, some domains are IPv6-only, others are not.
2	Unnecessary traffic winding	When PLAT deployed at the edge of the backbone, the data-path likely become less optimal compared with legacy IPv4 network.
3	Invisibility of the original address	When SRv6 BE is used to encapsulate IPv4 packet in IPv6-only network, the outer IPv6 header contains no original IPv4 address information.
4	Inconsistency of data format	Some domains adopt translation, and others adopt encapsulation, which leads to excessive conversion gateways and complexity.

A Framework is Required for Multi-domain IPv6-only Underlay

- Requirement 1: Beneficial to wider IPv6 adoption

- Requirement 2: Support IPv4-as-a-Service

- Requirement 3: Optimized end-to-end

- Requirement 4: Support of translation and encapsulation

- Requirement 5: User stateless at the border gateway

- Requirement 6: high scalability

- Requirement 7: SRv6 applicable (nice to have)

- Requirement 8: Incremental deployment

- Requirement 9: No additional security compromise
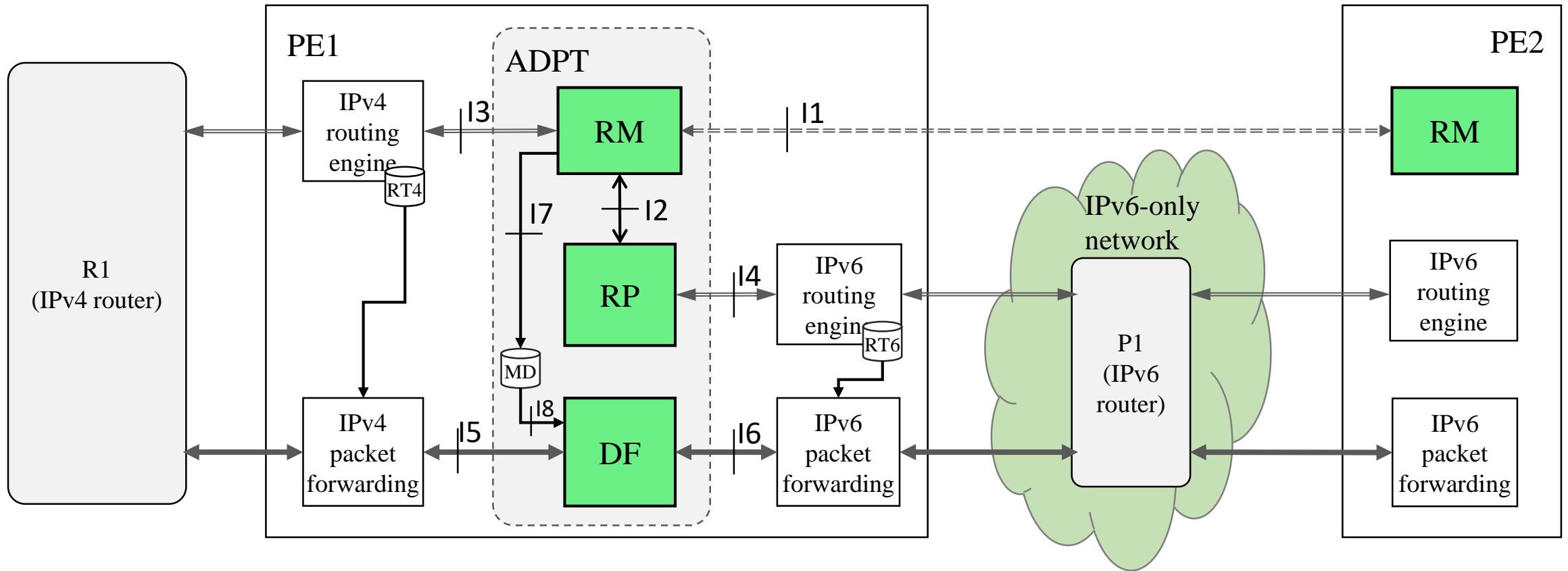
IPv4/IPv6 Address Mapping Rules
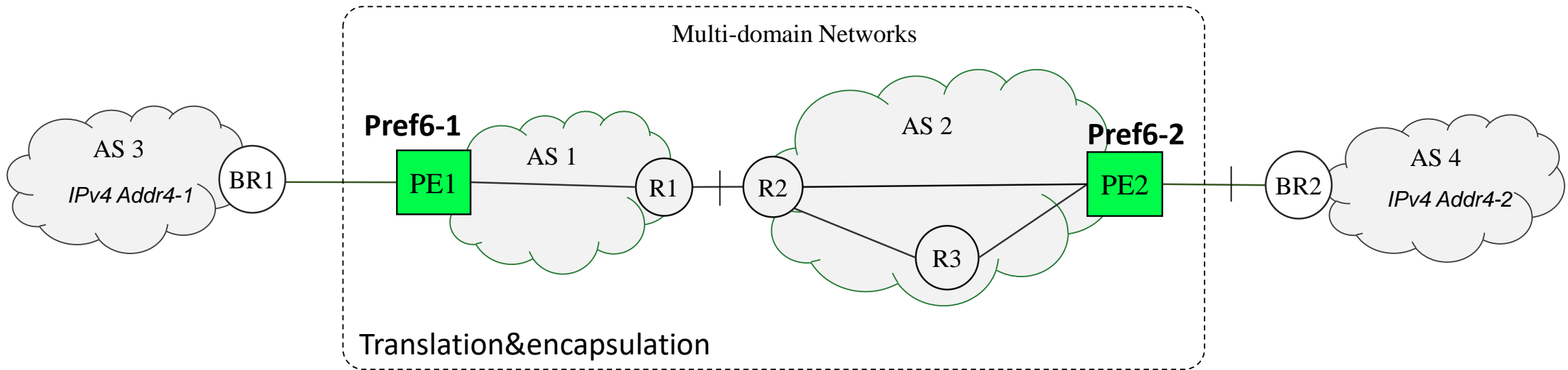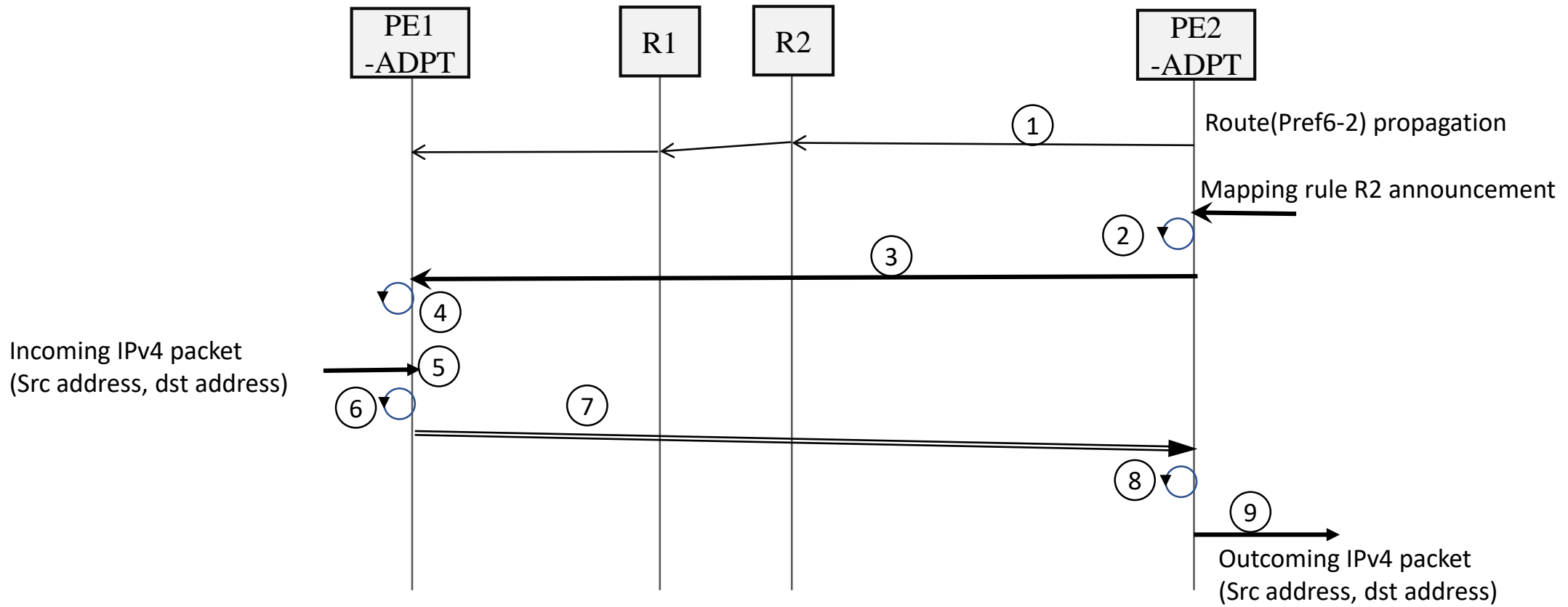

Mapping rules:
  (Addr4-1:Pref6-1)
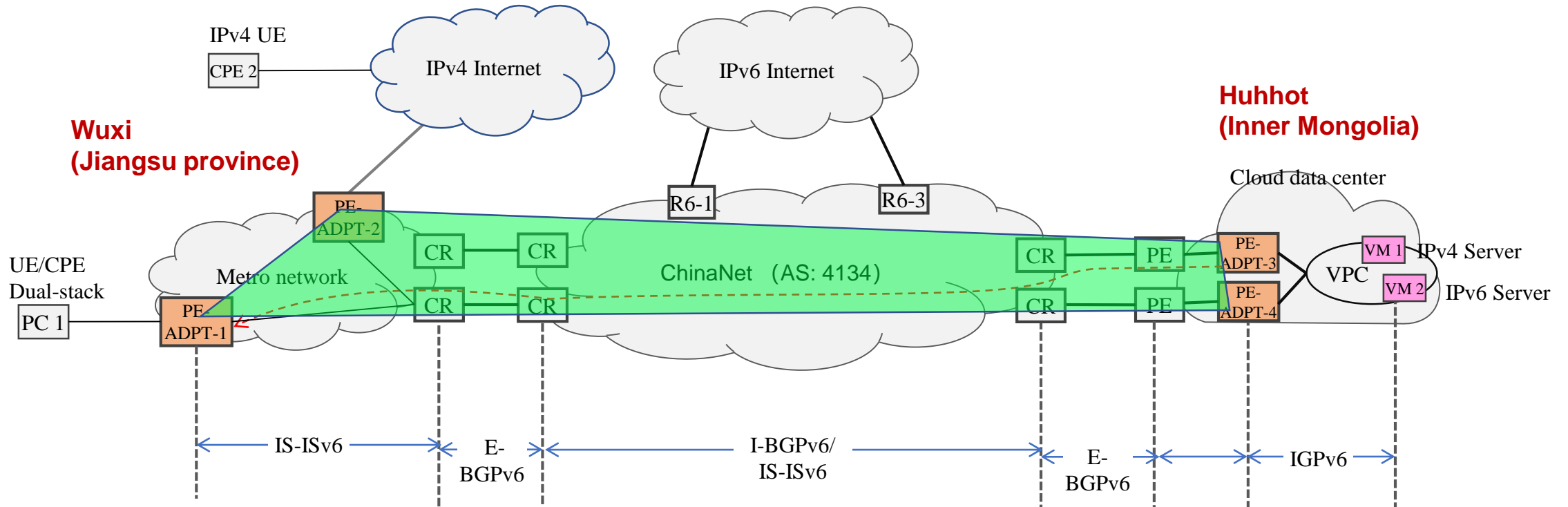 **(Addr4-2:Pref6-2)**
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Framework of Multi-domain IPv6-only Underlay

IPv4 Service Delivery over IPv6-only Underlay: A Sample Flow

Field Trial of IPv6-only Across Three Domains

Communication modes tested

- IPv4-only users access IPv4-only services
- IPv4-only users access IPv6 and IPv4 cloud servers
- External IPv4 user accesses IPv6 and IPv4 cloud servers
- IPv6 user accesses IPv6 and IPv4 cloud servers

Next Steps

- Further refinement of the document will be made to
    - Consolidate the requirements
    - Further stabilize the text that describes the framework

- Comments and suggestions are welcome, as usual

- Consider adopting the document as a v6ops WG item?

Thank you !
Q&A

IPv6-only from UE/CPE to Egress PE

UE/
CPE

PE1
-ADPT

R1

R2

PE2
-ADPT

Route(Pref6-2) propagation

(1)

Mapping rule R2 announcement

(2)

(3)

(4)

Incoming IPv6 packet

(5)

(6)

(7)

(8)

(9)

Outcoming IPv4 packet
(Src address, dst address)