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

draft-xie-v6ops-framework-md-ipv6only-underlay

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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

<table>
<thead>
<tr>
<th>Issue</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Partial IPv6-only deployment</td>
</tr>
<tr>
<td>2</td>
<td>Unnecessary traffic winding</td>
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<tr>
<td>3</td>
<td>Invisibility of the original address</td>
</tr>
<tr>
<td>4</td>
<td>Inconsistency of data format</td>
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</tbody>
</table>
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)
......
Framework of Multi-domain IPv6-only Underlay

- **IPv4 router (R1)**
  - IPv4 routing engine
  - IPv4 packet forwarding
  - RT4

- **IPv6 router (PE1)**
  - IPv6 routing engine
  - IPv6 packet forwarding
  - MD

- **IPv6 router (PE2)**
  - IPv6 routing engine
  - IPv6 packet forwarding

- **IPv6-only network (P1)**
  - IPv6 routing engine
  - RT6

- **ADPT**
  - RM
  - RP
  - DF

- Links:
  - I1
  - I2
  - I3
  - I4
  - I5
  - I6
  - I7
  - I8
IPv4 Service Delivery over IPv6-only Underlay: A Sample Flow

Incoming IPv4 packet (Src address, dst address)

Outcoming IPv4 packet (Src address, dst address)

Route(Pref6-2) propagation

Mapping rule R2 announcement
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

Incoming IPv6 packet

Outcoming IPv4 packet (Src address, dst address)

Route(Pref6-2) propagation

Mapping rule R2 announcement