Use of IPREF as a tool for transitioning to IPv6

draft-augustyn-intarea-ipref-02
IETF 118 Prague 2023
Brief Overview of IPREF

• End-to-end address space traversal
  - over NAT/NAT6/filters and cross IPv4/IPv6
  - massively scalable
• IPREF Addresses

<table>
<thead>
<tr>
<th>context address</th>
<th>reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>192.0.2.123 + 3427</td>
<td></td>
</tr>
<tr>
<td>2001:DB8::123 + 2371</td>
<td></td>
</tr>
</tbody>
</table>

• IPREF Addresses publishable in DNS
Traversing Address Spaces

<table>
<thead>
<tr>
<th>Network A</th>
<th>Internet</th>
<th>Network B</th>
</tr>
</thead>
<tbody>
<tr>
<td>dst: 2001:db8::8 + 2466</td>
<td>2001:db8::8 + 2466</td>
<td>2001:db8::8 + 2466</td>
</tr>
</tbody>
</table>

| src: 172.17.1.75 | 2001:db8::9 | fdee:eeee::5951 |
| dst: 10.128.48.62 | 2001:db8::8 | 2001:db8:b::28 |

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Transitioning to IPv6, I

1. Starting point

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Transitioning to IPv6, II

3. Connecting to IPv6 Internet

4. Switching gateway traffic to IPv6
5. Dropping IPv4 Internet

Network A    |    Internet    |    Network B
IPV6          |      IPv6      |          IPv6

IPREF        ---------- IPREF
IPv4  g-way  --.       |                |  g-way       IPv4
IPv6          |      IPv6      |          IPv6

GWA                              GWB  -----------
IPv4  g-way  --.       |                |  g-way       IPv4
IPv6          |      IPv6      |          IPv6

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Transitioning to IPv6, IV

6. Switching to IPv6 independently

Network A | Internet | Network B
--------- | -------- | ---------
IPv6      | IPv6     | IPv6     
--------- | -------- | ---------
IPREF g-way GWA | IPREF g-way GWA | 
--------- | -------- | ---------
IPv4      | g-way    | IPv4     
--------- | -------- | ---------
GW A      | GW B     | GW A     
--------- | -------- | ---------

7. Completing transition

Network A | Internet | Network B
--------- | -------- | ---------
IPv6      | IPv6     | IPv6     
--------- | -------- | ---------
IPREF g-way GWA | IPREF g-way GWA | 
--------- | -------- | ---------
 IPv4      | g-way    | IPv4     
--------- | -------- | ---------
 GW A      | GW B     | GW A     
--------- | -------- | ---------

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IPREF Succeeds Where Others Fail

• Taking down IPv4 Internet
  – no need for IPv4 addresses
  – dropping IPv4 early

• Enterprises
  – decoupling transition effort from peers
  – work at own pace, lower cost, lower risk
  – pure IPv6

• Procrastinators
  – lower threshold for transition
Transitioning with IPREF, Highlights

• Needs only pure IPv6 Internet
• Transitions directly to pure IPv6
• No need for global IPv4 addresses
• Allows to drop IPv4 Internet early
• Allows to transition at own pace
• Massively scalable
• Huge cost savings
The End