Stateless IPv4 over IPv6 report
draft-janog-software-report-01

Shishio Tsuchiya shtsuchi@cisco.com
Shuichi Ohkubo ohkubo@sakura.ad.jp
Yuya Kawakami kawakami@mfeed.ad.jp
What is JANOG?

- JAPan Network Operator’s Group
- 2 Major Activities
  - Mailing list janog@janog.gr.jp +6200 subscribers
  - 2 Meetings per year
  - Working Group focus special technology
- JANOG established Working group to focus the stateles IPv4 over IPv6.
- WG had held MAP-E interop events at Nagaoka.
- 7 vendors and 9 implementations attended to the interop events
The documents

• Implementation Report
• IPv4 functionality over IPv6
  – ICMP, FTP, IPSec VPN, SSL VPN, PPTP, L2TP
  – Instant Messaging and VoIP [RFC6586]
  – STUN, NAT-Analyzer
• BR redundancy
• Interoperability
The interop event network topology

IPv4 internet

IPv6 internet

NSCS

BR

CE
## BR Participant list

<table>
<thead>
<tr>
<th>Vendor</th>
<th>OS/Equipement</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP Infusion</td>
<td>Linux 2.6.18</td>
</tr>
<tr>
<td></td>
<td>NetBSD 4.0.1</td>
</tr>
<tr>
<td>Furukawa Network Solution Corp.</td>
<td>FX5000</td>
</tr>
<tr>
<td>ASAMAP</td>
<td>Vyatta</td>
</tr>
<tr>
<td>Internet Initiative Japan Inc.</td>
<td>SEIL/X1</td>
</tr>
<tr>
<td>Cisco Systems</td>
<td>IOS-XR/ASR9000</td>
</tr>
</tbody>
</table>

- 5 vendors, 6 implementations
# CE Participant list

<table>
<thead>
<tr>
<th>Vendor</th>
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<tr>
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<tr>
<td>Furukawa Network Solution Corp.</td>
<td>F60W</td>
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<td>Internet Initiative Japan Inc.</td>
<td>SEIL/X1</td>
</tr>
<tr>
<td>CERNET</td>
<td>OpenWRT</td>
</tr>
<tr>
<td>Yamaha Corporation</td>
<td>RTX1200</td>
</tr>
</tbody>
</table>

- 6 vendors, 7 implementations
- Total 7 vendors, 9 implementations
Implementation Report cont’d

• Security mechanism
  – ask consistency checks between IPv4 and IPv6 src on BR/CE Section 13 of [I-D.ietf-softwire-map].

• Provisioning method
  – all of attendee only support manual configuration.
  – There is difference configuration type for “Length of EA bits”

• Reachability to BR address
  – 3BR can confirm reachability of BR address
  – 2BR can not confirm reachability of BR address but can confirm reachability of BR’s interface address.
Difference configuration type for “Length of EA bits”

| Rule IPv6 prefix:            | 2403:9200::/32 |
| Rule IPv4 prefix:            | 203.86.225.0/28 |
| EA bits:                     | 16bit (48–32)   |
| Port-Set ID:                 | 12bit           |
| PSID offset:                 | 4               |
| BR IPv6 address:             | 2403:9200:fff0::2 |

- # set interfaces map map0 role br
- # set interfaces map map0 br-address 2001:db8::1/64
- # set interfaces map map0 default-forwarding-mode translation
- # set interfaces map map0 default-forwarding-rule true
- # set interfaces map map0 rule 1 ipv6-prefix 2001:db8:89ab::/48
- # set interfaces map map0 rule 1 ipv4-prefix 192.0.2.0/24
- # set interfaces map map0 rule 1 ea-length 16

service cgn JANOG
service-location preferred-active 0/0/CPU0
service-type map-e Softwire
cpe-domain ipv4 prefix 203.86.225.0/28
cpe-domain ipv6 prefix 2403:9200::/32
sharing-ratio 12
after-endpoint-address 2403:9200:fff0::2
contiguous-ports 0

useful for operation and trouble shooting

• Appendix 2 all of configuration

easy to understand design
# Test Parameter

## MAP-E

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rule IPv6 prefix</td>
<td>2403:9200::/32</td>
</tr>
<tr>
<td>Rule IPv4 prefix</td>
<td>203.86.225.0/28</td>
</tr>
<tr>
<td>End-user IPv6 prefix</td>
<td>2403:9200::/48 - 2403:9200::/48</td>
</tr>
<tr>
<td>EA bits</td>
<td>16bit(48-32)</td>
</tr>
<tr>
<td>Port-Set ID</td>
<td>12bit</td>
</tr>
<tr>
<td>PSID offset</td>
<td>4</td>
</tr>
<tr>
<td>BR IPv6 address</td>
<td>2403:9200::/48</td>
</tr>
<tr>
<td>Topology</td>
<td>Mesh</td>
</tr>
</tbody>
</table>

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**Only 15 Port for CE, Sharing ratio 1:4096**

- IPv6: 2403:9200:0:0/32
- IPv4: 203.86.225.0/28

16 IPv4 addresses, 65536 users, 15 ports each 1:4096
# Test Parameter MTU

<table>
<thead>
<tr>
<th>Parameter</th>
<th>IPv6 MTU</th>
<th>TCP MSS clamp</th>
<th>Tunnel IF IPv4 MTU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>1500byte</td>
<td>Enable</td>
<td>1460byte</td>
</tr>
</tbody>
</table>

Not 1280 byte
IPv4 functionality over IPv6

ICMP

• With Identifier message for CE/BR
• Null Identifier message for BR
IPv4 functionality over IPv6

- VPN (IPSec VPN, SSL VPN, PPTP, L2TP), FTP (Port/PASV)
- Instant Messaging, VoIP and Video
- NAT Verification tool
  - KONAMI [RFC4787] verification tool
  - NAT-Analyzer (TUM)
Issue of IPv4 functionality

• Even DNS query occupy NAT table (only 15)
  – UDP/DNS timeout immediately
  – DNS transport proxy, section-3 of [I-D.draft-dec-stateless-4v6]

• Implicit IPv6 MTU limitation (1280 byte)
  – could not browse, could not video chat
  – should well-managed, section 10.1 of [I-D.ietf-softwire-map]

• All of vendor support NAT Traversal
• Most of modern message tools are succeed
• NAT-verification tool and FTP (ACTV) result depends on implementation of NAT.
BR redundancy

- Confirmed BR redundancy by routing convergence
- Skype session kept, could communicate after converged
Interoperability
The IPv6 Interface Identifier

<table>
<thead>
<tr>
<th>PL</th>
<th>8 16 24 32 40 48 56</th>
</tr>
</thead>
<tbody>
<tr>
<td>64</td>
<td>u</td>
</tr>
</tbody>
</table>

Wrong: 2403:9200:fff6:0:cb:56e1:fff:6000
Correct: 2403:9200:fff6:0:cb:56e1:f0f:f600

- mis-understanding “left-padding” and “right-padding”
- If it could add example to explain format in Section6, then it would be more understandable.
Conclusion

• Many vendors already supported MAP-E.
• No critical interoperability issue between multivendor CE and CE,CE and BR,BR and BR.
• DNS transport proxy and MTU issue already discussed on IETF and draft.
• MAP-E is mature