Stateless automatic IPv4 over IPv6 Tunneling (SA46T)

draft-matsuhira-sa46t-spec-00.txt

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Network Configuration

- Backbone Network (IPv6 only)
- SA46T
- Stub Network (IPv4 only)
- SA46T
- Stub Network (Dual Stack)
- SA46T: Stateless Automatic IPv4 over IPv6 Tunneling
Function of SA46T

(1) Encapsulation / Decapsulation of IPv4 packet

IPv4 → IPv6 → IPv4
IPv4 ← IPv6 ← IPv4

(1-1) Return ICMP Packet too big message (if exceed MTU)

Stub Network (IPv4 only)

SA46T

Backbone Network (IPv6 only)

(2) Route Advertisement of Stub Network
SA46T address architecture and routing

- IP address of inner IPv4 header
- IP address of outer IPv6 header (SA46T address)

SA46T address prefix | IPv4 network plane ID | IPv4 address

32bits

128bits

/24

/120
Example of SA46T address format

IPv6 Global Unicast Address Format (RFC3587)

3  45bits  16bits  64bits

<table>
<thead>
<tr>
<th>001</th>
<th>global routing prefix</th>
<th>subnet ID</th>
<th>Interface ID</th>
</tr>
</thead>
</table>

allocated from ISP  Select by organization  EUI-64 address (64bit MAC)

SA46T address  Use part of global address space (e.g. one subnet)

<table>
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<th>001</th>
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<th>subnet ID</th>
<th>IPv4 network plane ID</th>
<th>IPv4 address</th>
</tr>
</thead>
</table>

SA46T address prefix  $2^{32}$ = about 4.3 billions IPv4 networks space
Route Advertisement

IPv4

10.1.1.0/24

IPv6

10.1.2.0/24

IPv4

10.1.3.0/24

Prefix: 001+global routing prefix + subnet ID + IPv4 network plane ID
Stacking Multiple IPv4 Networks
(Using same IPv4 Address, i.e. private address)
Configuration of SA46T

- SA46T address prefix + IPv4 network plane ID
- Prefix Length

SA46T address (in case use part of Global address)

<table>
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Summary

- Reduce operation cost by IPv6 only
- Reallocate IPv4 addr from B.B. to Stub
- Less configuration
- No special protocol
- No dependence with L2
- Easy stop IPv4 operation (just remove SA46T)
- Provide Redundancy
- Stacking IPv4 Private networks
Applicability of SA46T

• IPv6 only Campus / Enterprise / ISP Backbone Network
  – Possible transition scenario, edge based solution
  – Interoperable between AS with SA46T Global Address

• IPv4 VPNs over IPv6 backbone
  – Pure L3 solution, can mix different L2 (wire and wireless)
  – Over 4096 possible, 4.3 billion with 32bits plane ID
  – Inter AS VPN with SA46T Global address

• IPv4 address reuse (IPv4 address sharing)
  – Possible solution for IPv4 Global address running out
  – Can reuse Net10 in each IPv4 plane
  – 4.3 billion IPv4 plane with 32bits plane ID
Next Step

• Update SA46T spec document as seed technology
  – Reflects comments

• Planning to submit SA46T Applicability documents, and compare with other methods
  – IPv6 only Enterprise / Campus / ISP Network
  – VPN
  – IPv4 address reuse (Stacking networks with Private address)
  – SA46T Global address
    • draft-matsuhira-sa46t-gaddr-00.txt
  – other?

• Interests?
  – WG documents?
IPv4 Networks as IPv6 application

provided by SA46T
Prepare for questions
Enterprise / Campus Network

Section Network (Dual Stack)

Section Network (IPv4 only)

Corporate IT Backbone Network (IPv6 only)

Section Network (IPv4 only)

Section Network (IPv6 only)

Section Network (IPv4 only)

Section Network (Dual Stack)
VPN service by ISP

ISP Backbone Network (IPv6 only)

plane #A

plane #B

plane #C

A.com (IPv4 only)

A.com (IPv4 only)

B.com (Dual Stack)

B.com (IPv4 only)

C.com (Dual Stack)

A.com (IPv4 only)

A.com (Dual Stack)

B.com (IPv4 only)

B.com (Dual Stack)

C.com (IPv4 only)

plane #A

plane #B

plane #C
Access Network with IPv4 address reuse

The Internet

- v4NAT + IPv6
  - SA46T

Access Network (IPv6 only)

- v4NAT + IPv6
  - SA46T

- v4NAT + IPv6
  - SA46T

- v4NAT + IPv6
  - SA46T

- v4NAT + IPv6
  - SA46T

Dual Stack (NAT less)

- Dual Stack IPv6 Global IPv4 Private

Home

plane #1

plane #2

plane #3

plane #n
Network Configuration without Global SA46T address
Network Configuration with SA46T
Global address

- Backbone Network (IPv6 only)
  - SA46T
  - Stub Network (IPv4 only)
  - Stub Network (Dual Stack)

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