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SA46T Address Translator
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Abstract

This document specifies SA46T Address Translator (SA46T-AT) specification. SA46T-AT enable access to IPv4 only host from IPv6 host. IPv4 host is identified as SA46T global address in IPv6 address space. The address assigned to IPv4 host may be global IPv4 address or private IPv4 address. SA46T-AT does not support access to IPv6 host from IPv4 only host.

Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119].

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1. Introduction

The IPv4 address exhaustion already became the real.

In 03-Feb-2011, IANA Unallocated Address Pool was exhausted. And in 19-Apr-2011, APNIC unallocated address pool was exhausted. Other RIRs, unallocated address pool does not exhausted now, however, it should be a matter of time. For more details, please refer to IPv4 address report , <http://www.potaroo.net/tools/ipv4/>.

After IPv4 address running out, IPv6 only network service should be provided. SA46T [I-D.matsuhira-sa46t-spec] provide IPv4 network service over IPv6 only network environments. And SA46T global address [I-D.matsuhira-sa46t-gaddr] is proposed for The Internet scale.

On the other side, to maintain the continuance of service by the server, shifting to IPv6 is also needed. However, there should be a service which has difficulty to quick shift to the IPv6. That mean IPv4 service continuance is still important.

There are two approaches which use IPv4 address effectively. One is address sharing approach such as Address plus port (A+P) Approach [RFC6346], and the other is address re-use approach such as IPv4 private address [RFC1918].

SA46T-AS [I-D.matsuhira-sa46t-as] is also address sharing approach. SA46T-AT is equivalent to address reuse approach.

2. SA46T-AT Architecture

2.1. SA46T address

Figure 1 show SA46T address [I-D.matsuhira-sa46t-spec]. SA46T global address is same format with SA46T address, and "SA46T address prefix" part should allocate for this usage. And "IPv4 network plane ID" value MUST unique.

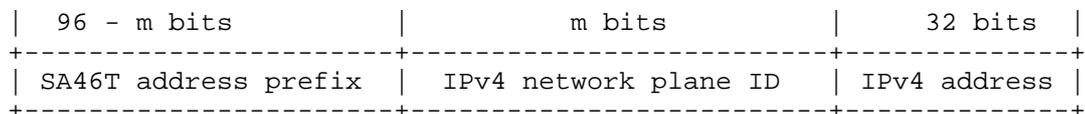


Figure 1

2.2. Mapping IPv4 address and IPv6 address

SA46T address contain IPv4 address. Mapping IPv4 host address to IPv6 address space is already done with SA46T address. Address translation for IPv4 address is same as resolving SA46T address.

IPv6 host address and corresponding IPv4 address should manage.

2.3. AddressTranslation Table

Figure 2 shows translation table for SA46T-AT. Translation table contain three value, IPv6 address of IPv6 host, mapped IPv4 address for the IPv6 host, and entry expire timer for remove the entry.

Address of IPv6 host	mapped IPv4 address for IPv6 host	entry expire timer
:	:	:
:	:	:
:	:	:
Address of IPv6 host	mapped IPv4 address for IPv6 host	entry expire timer

Figure 2

2.4. DNS mapping of IPv4 only host

In the Domain Name System, hostnames are mapped to IPv6 addresses by AAAA resource records. SA46T address can be mapped to IPv4 only host name.

3. Sample Configuration

3.1. SA46T address and IPv4 network plane ID

In this example, SA46T address prefix length is 64bits, and IPv4 network plane ID length is 32 bits. SA46T prefix value is 2001:0DB8:0:46, and IPv4 network plane ID value is 0:46. Figure 3 shows these value.

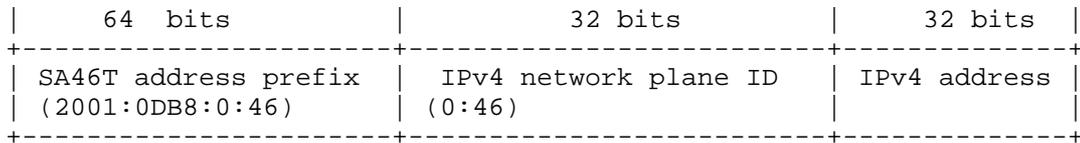


Figure 3

3.2. Network Configuration

Figure 4 shows sample network configuration. IPv6 network have 2001:0DB8:1:0/64 network prefix and IPv4 network have 10.0.0.0/24 network prefix.

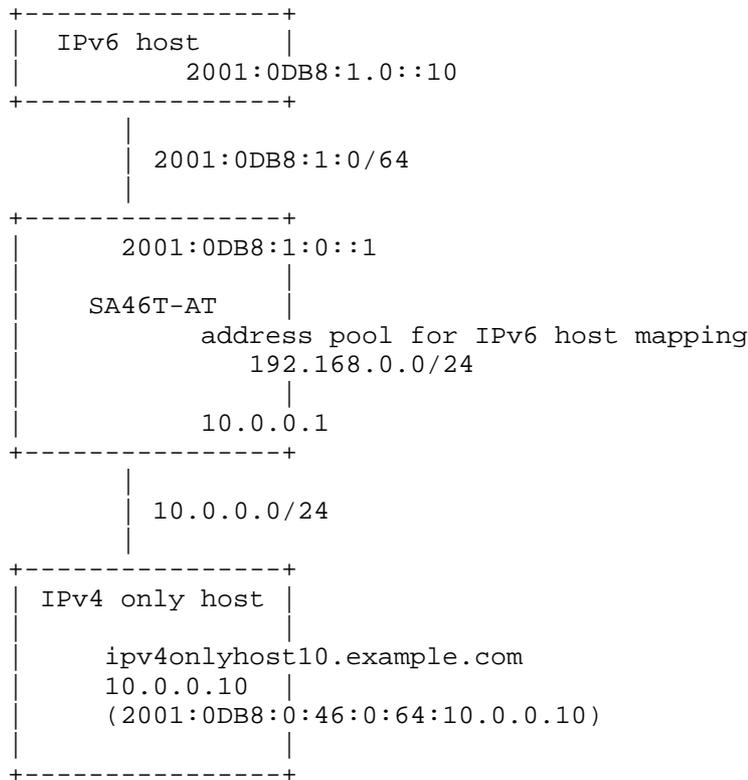


Figure 4

IPv6 host address is 2001:0DB8:1:0::10. IPv4 only host address is 10.0.0.10. SA46T address for IPv4 only host is 2001:0DB8:0:46:0:64:10.0.0.10. FQDN of IPv4 only host is ipv6onlyhost10.example.com. Figure 5 shows DNS entry in IPv4 address space, and Figure 6 shows DNS entry in IPv6 space.

```
ipv6onlyhost10.example.com IN A 10.0.0.10
```

Figure 5

```
ipv6onlyhost10.example.com IN AAAA 2001:0DB8:0:46:0:64:10.0.0.10
```

Figure 6

The address of IPv4 interface of SA46T-AT is 10.0.0.1, and the address of IPv6 interface of SA46T-AT is 2001:0DB8:1:0::1. SA46T-AT have also IPv4 address pool for IPv6 host mapping. This example, the IPv4 address pool is 192.168.0.0/24.

The default router for IPv4 only host is SA46T-AT's IPv4 interface address, 10.0.0.1.

3.3. Routing

SA46T-AT advertise SA46T address prefix for IPv4 only host, 2001:0DB8:0:46:0:64:10.0.0.0/120. This manner is same as SA46T.

4. Processing of SA46T-AT

4.1. Configuration of SA46T-AT

1. SA46T address prefix for route advertisement (2001:0DB8:0:46:0:64:10.0.0.0/120)
2. IPv4 address pool for IPv6 hosts
3. entry expire default time (TBD)

SA46T address contain IPv4 network plane ID, so SA46T-AT know IPv4 network plane ID from SA46T address prefix.

4.2. Processing from IPv6 to IPv4

1. SA46T-AT examine the exists of the entry for IPv6 host, that is source IPv6 address of IPv6 packet.
2. If there is no entry, get IPv4 address for mapping of IPv6 host from IPv4 address pool, and make entry to the translation table.
3. IF there is the entry, resove mapped IPv4 address for IPv6 host.
4. Make IPv4 header, source address is mapped IPv4 address, and destination address is from SA46T address.
5. Translate IPv6 packet to IPv4 packet, and send it, and reset entry expire timer.

The example address translation table is shown in Figure 7. In this example, IPv6 host address is mapped to 192.168.0.200.

Address of IPv6 host	mapped IPv4 address for IPv6 host	entry expire timer
2001:0DB8:1.0::10	192.168.0.200	TBD

Figure 7

4.3. Processing from IPv6 to IPv4

1. Search address translation table with key destination IPv4 address, and resolve corrensponding IPv6 address.
2. Resolve source IPv6 address from source IPv4 address with SA46T address generation rule.
3. Translate IPv4 packet to IPv6 packet, and sent it, and reset extry expire timer.

4.4. Other processing

1. Remove the entry of address translation table if expire.

5. IANA Considerations

This document may requests IANA to assign IPv6 prefix for SA46T Global address.

6. Security Considerations

Security consideration does not discussed in this memo, at this time.

7. Acknowledgements

8. References

8.1. Normative References

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