Dual Stack Transition Mechanism (DSTM)

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IETF Specification:
http://search.ietf.org/internet-drafts/draft-ietf-ngtrans-dstm-08.txt

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DSTM Home Page:
 http://www.ipv6.rennes.enst-bretagne.fr/dstm/

Dual Stack Transition Method (DSTM)

- Assumes users want Intranet native IPv6 Local-Area and Routing Domain dominant network infrastructure for deployment.

- Assumes users want Intranet native IPv6 network management, node services, and applications for their network.

- Avoids Network Address Translation by assigning temporary IPv4 Addresses to dual-stacked nodes using IPv6.

- Tunnels IPv4 packets within IPv6 to the Edge of the Network.

- Useful for Initial and Later periods of IPv6 Transition

- Extensions:

  - Address Assignment Mechanisms:

    – DHCPv6, RPCv6, Manual Configuration

  - Can leverage other Transition Mechanisms:

    – 6to4, RSIPv6 Port Ranges, SIIT, Mobile IPv4/IPv6, 3G, WLAN IPv4/IPv6

- Implementations on BSD UNIX, Linux, Microsoft 2000 and XP with trial deployment in process.

DSTM Applicability

- **IPv6 Home Network can use DSTM to connect to IPv4 World.**

- **IPv6 Mobile Devices use DSTM when requiring access to IPv4 World.**

- **IPv6 Manufacturing, Financial, or Military network can use DSTM when accessing IPv4 controls.**

- **IPv6 ISP can assign temporary DSTM IPv4 address to reach IPv4 application and avoid NAT at end user site, or integrate use of DSTM with 6to4.**

- **Avoids NAT, Maintains End-2-End, and Provides Security between two peers for IPv4 and IPv6 Interoperation.**

Schematic Implementation Overview DSTM

```
-------------------------------------------------
                                              |    IPv4 Intranet/
      DSTM Domain IPv6 Intranet               |    IPv4 Applications
                                              |        Domain
                                              |
           _____           |
          |                       |           |
          | DSTM Server           |           |
          |_____|           |
                                  |            |
   **Native IPv6 Network**        |            |
                                  |            |
    _____           |          _|_____
   |                   |          |         |        |
   | IPv6/IPv4 Node    |          |         | DSTM   |
   |-------------------|          |         | Border |
   | DSTM client       |-------|  |         | Router |
   |                   |       IPv6         | IPv6   |
   |-------------------|                    |   &    |
   | DTI/Route         |--------------------| IPv4   |
   |_____|                    |_____|
                                              |
-------------------------------------------------
```
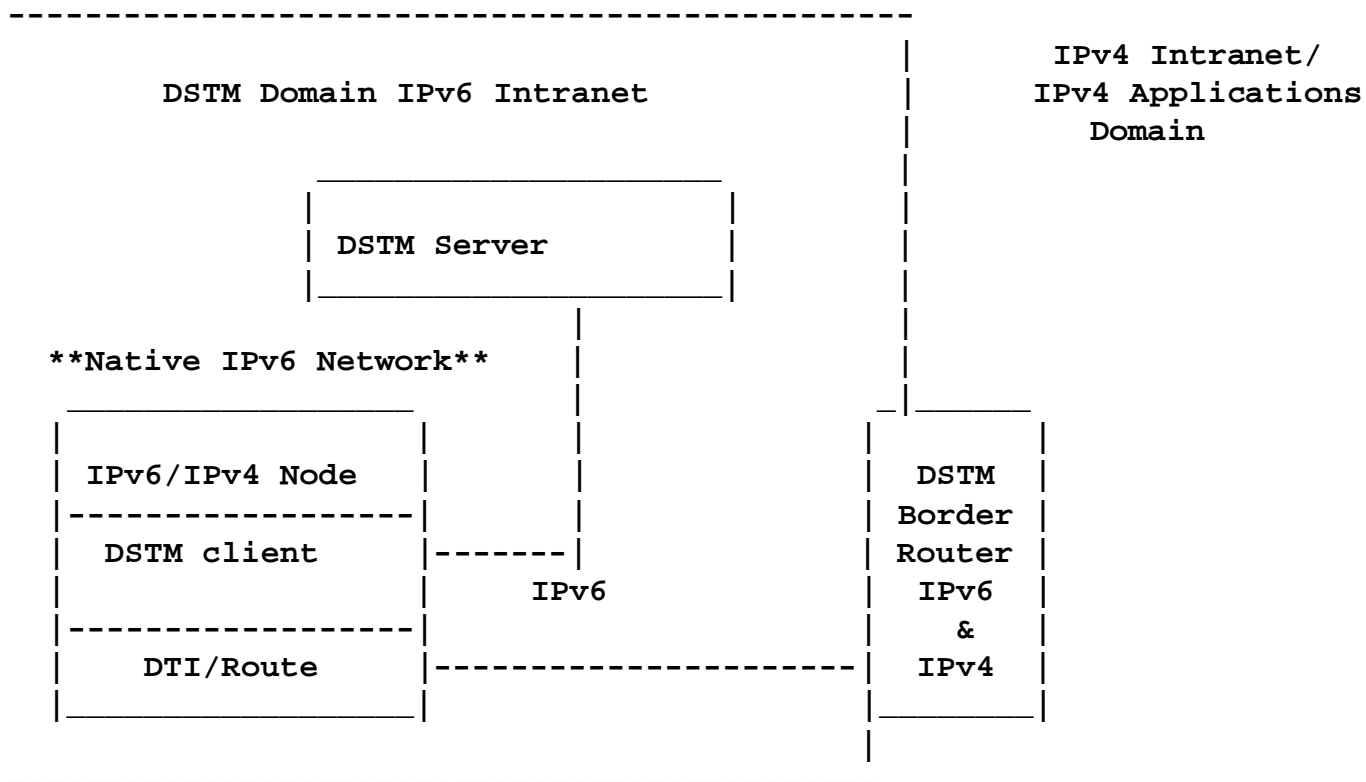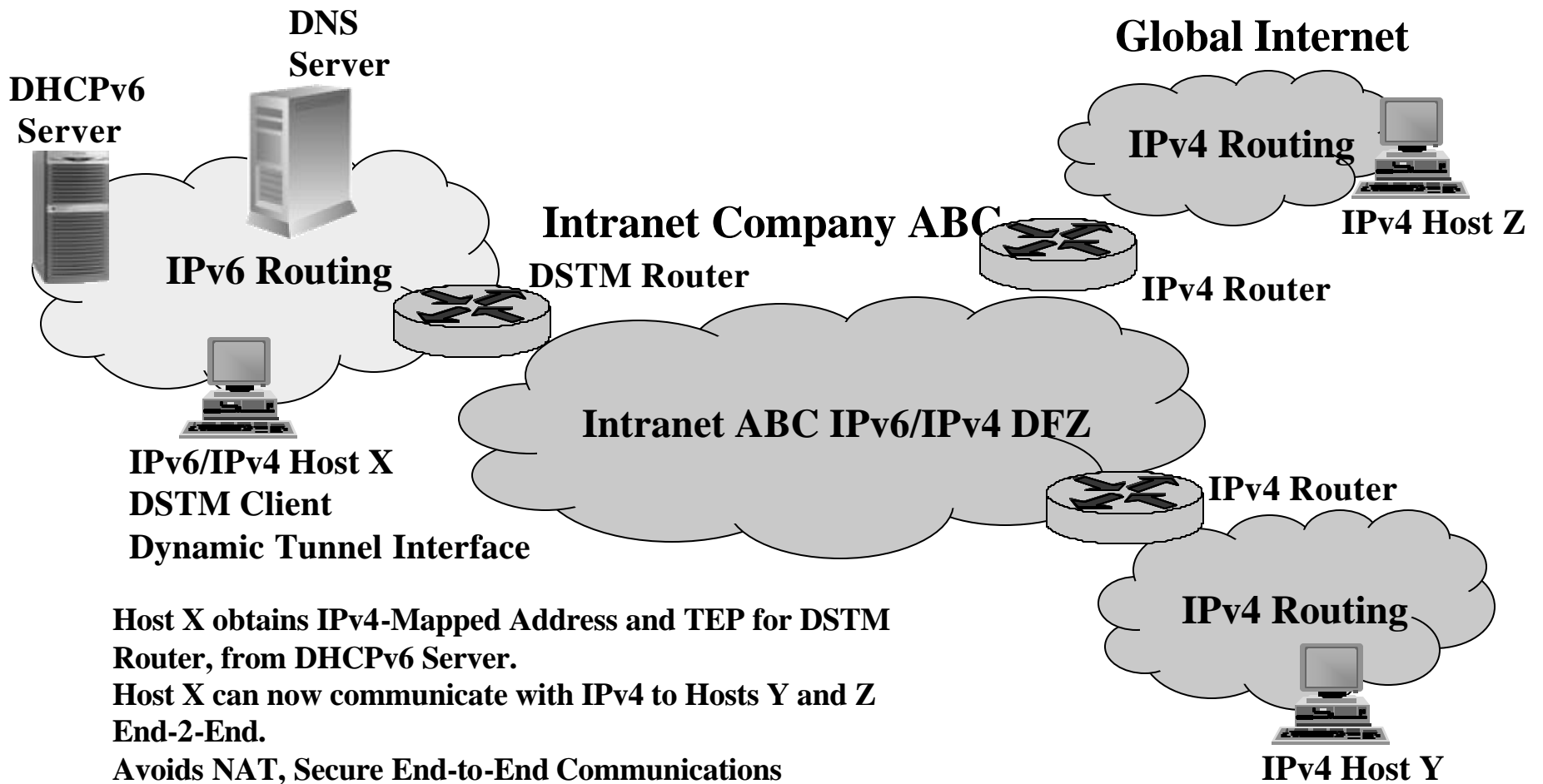
DSTM Server returns Client IPv4 address over IPv6 and/or Tunnel End
Point (TEP) of DSTM Router IPv6 Address. Dynamic Tunnel Interface (DTI)
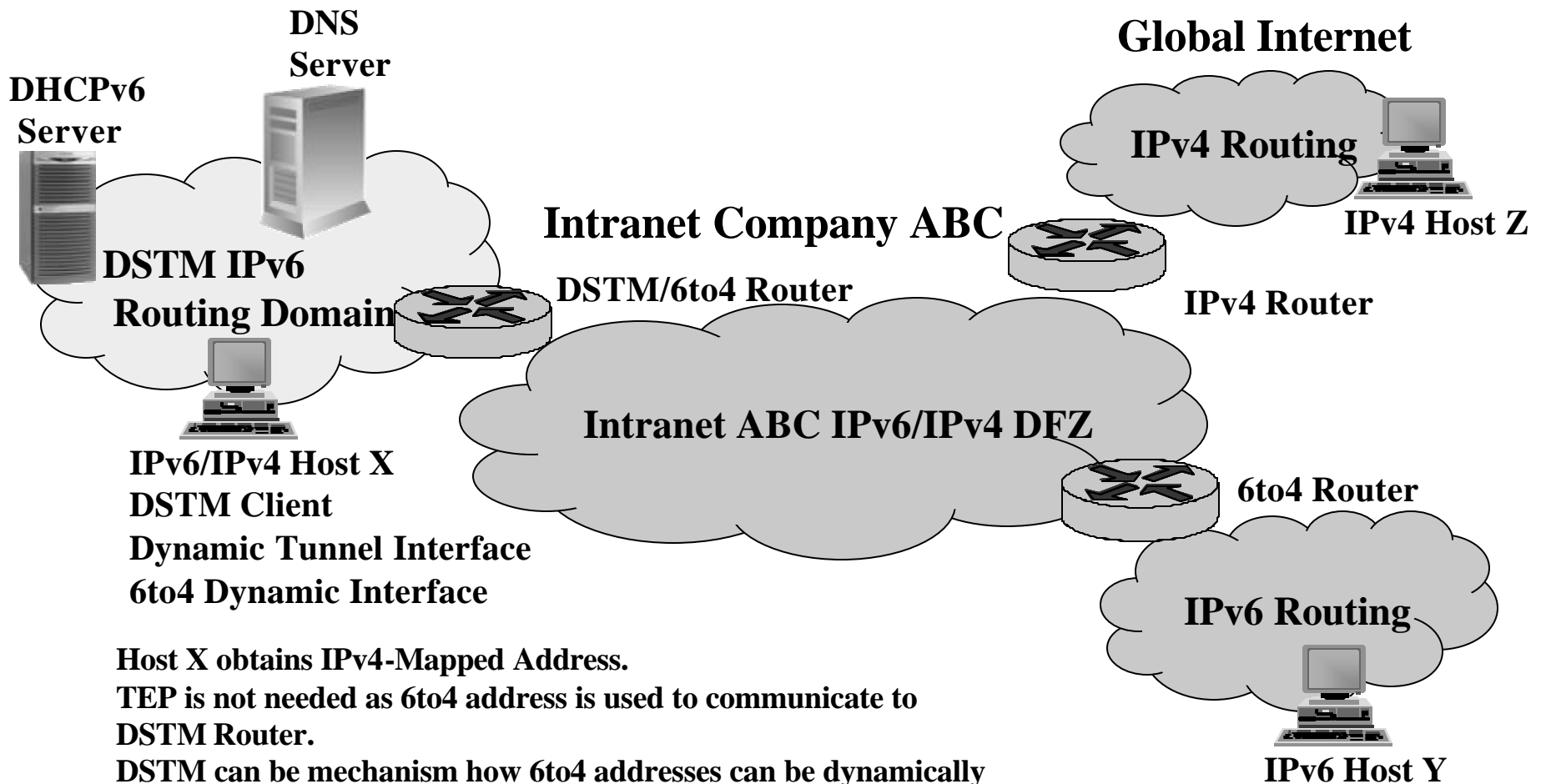sends packet to DSTM Border Router.

file name\
file location

DSTM Architecture

DHCPv6 Server

DNS Server

Global Internet

IPv4 Routing

IPv4 Host Z

IPv6 Routing

Intranet Company ABC

DSTM Router

IPv4 Router

Intranet ABC IPv6/IPv4 DFZ

IPv6/IPv4 Host X
DSTM Client
Dynamic Tunnel Interface

IPv4 Router

Host X obtains IPv4-Mapped Address and TEP for DSTM
Router, from DHCPv6 Server.
Host X can now communicate with IPv4 to Hosts Y and Z
End-2-End.
Avoids NAT, Secure End-to-End Communications

IPv4 Routing

IPv4 Host Y

DSTM Extensions + 6to4

DHCPv6 Server

DNS Server

Global Internet

IPv4 Routing

IPv4 Host Z

DSTM IPv6 Routing Domain

Intranet Company ABC

DSTM/6to4 Router

IPv4 Router

Intranet ABC IPv6/IPv4 DFZ

**IPv6/IPv4 Host X
DSTM Client
Dynamic Tunnel Interface
6to4 Dynamic Interface**

6to4 Router

IPv6 Routing
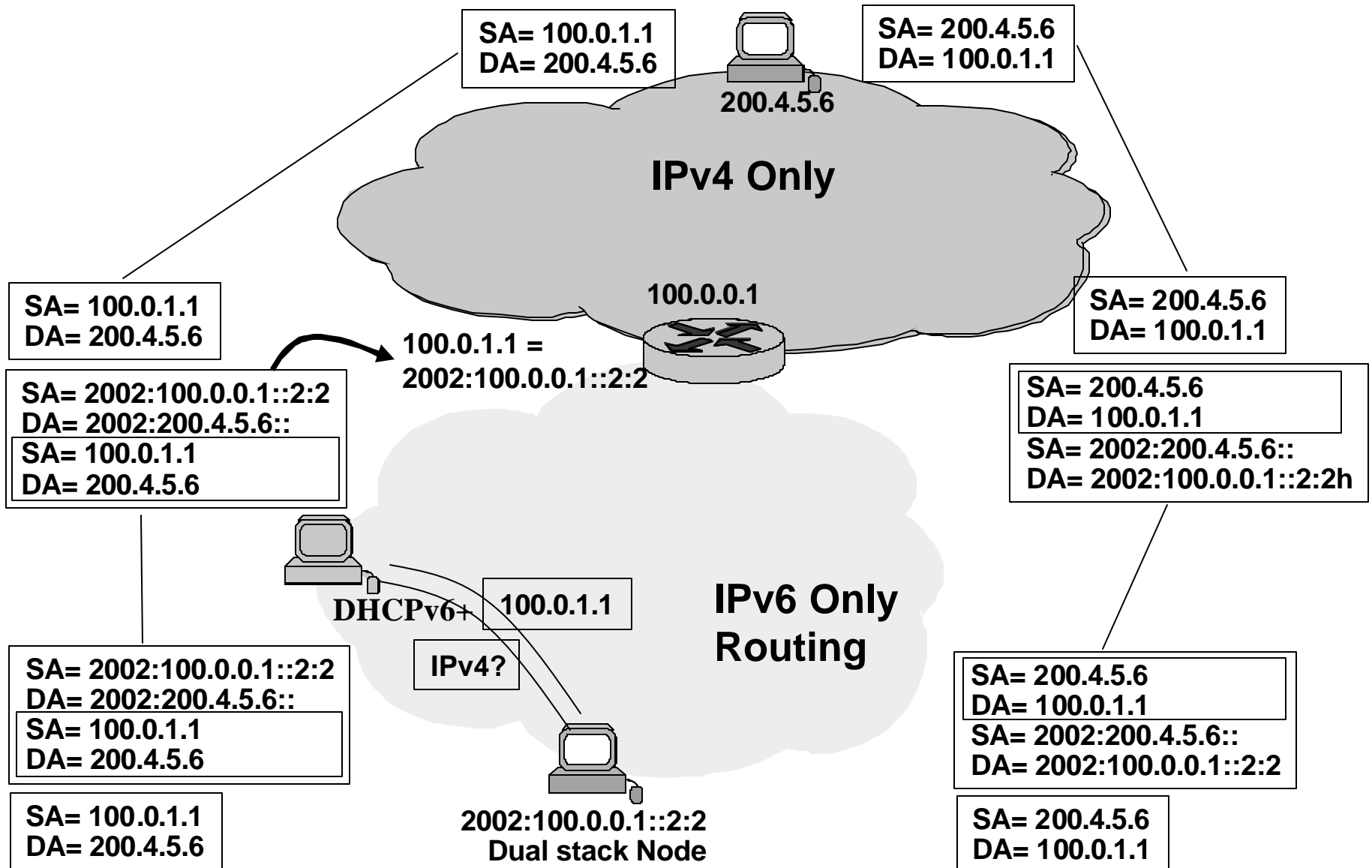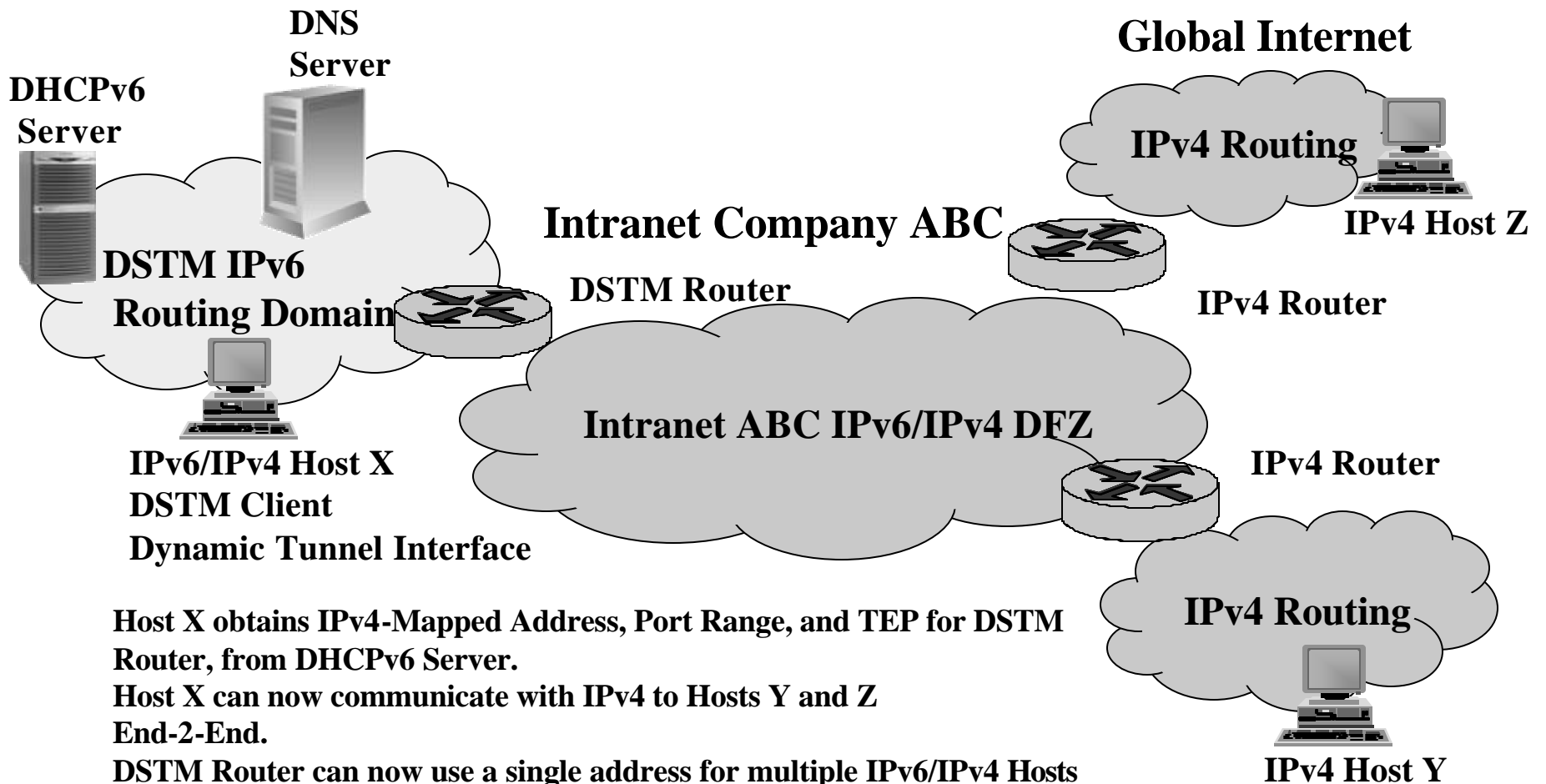
Host X obtains IPv4-Mapped Address.
TEP is not needed as 6to4 address is used to communicate to
DSTM Router.
DSTM can be mechanism how 6to4 addresses can be dynamically
assigned.

IPv6 Host Y

DSTM Extensions + 6to4

SA= 100.0.1.1
DA= 200.4.5.6

SA= 200.4.5.6
DA= 100.0.1.1

200.4.5.6

IPv4 Only

SA= 100.0.1.1
DA= 200.4.5.6

100.0.0.1

SA= 200.4.5.6
DA= 100.0.1.1

100.0.1.1 =
2002:100.0.0.1::2:2

SA= 2002:100.0.0.1::2:2
DA= 2002:200.4.5.6::
SA= 100.0.1.1
DA= 200.4.5.6

SA= 200.4.5.6
DA= 100.0.1.1
SA= 2002:200.4.5.6::
DA= 2002:100.0.0.1::2:2h

DHCPv6+   100.0.1.1

IPv6 Only Routing

IPv4?

SA= 2002:100.0.0.1::2:2
DA= 2002:200.4.5.6::
SA= 100.0.1.1
DA= 200.4.5.6

SA= 200.4.5.6
DA= 100.0.1.1
SA= 2002:200.4.5.6::
DA= 2002:100.0.0.1::2:2

SA= 100.0.1.1
DA= 200.4.5.6

2002:100.0.0.1::2:2
Dual stack Node

SA= 200.4.5.6
DA= 100.0.1.1

DSTM Extensions + Port Ranges

DHCPv6 Server

DNS Server

Global Internet

IPv4 Routing

DSTM IPv6 Routing Domain

Intranet Company ABC

DSTM Router

IPv4 Host Z

IPv4 Router

Intranet ABC IPv6/IPv4 DFZ

IPv6/IPv4 Host X
DSTM Client
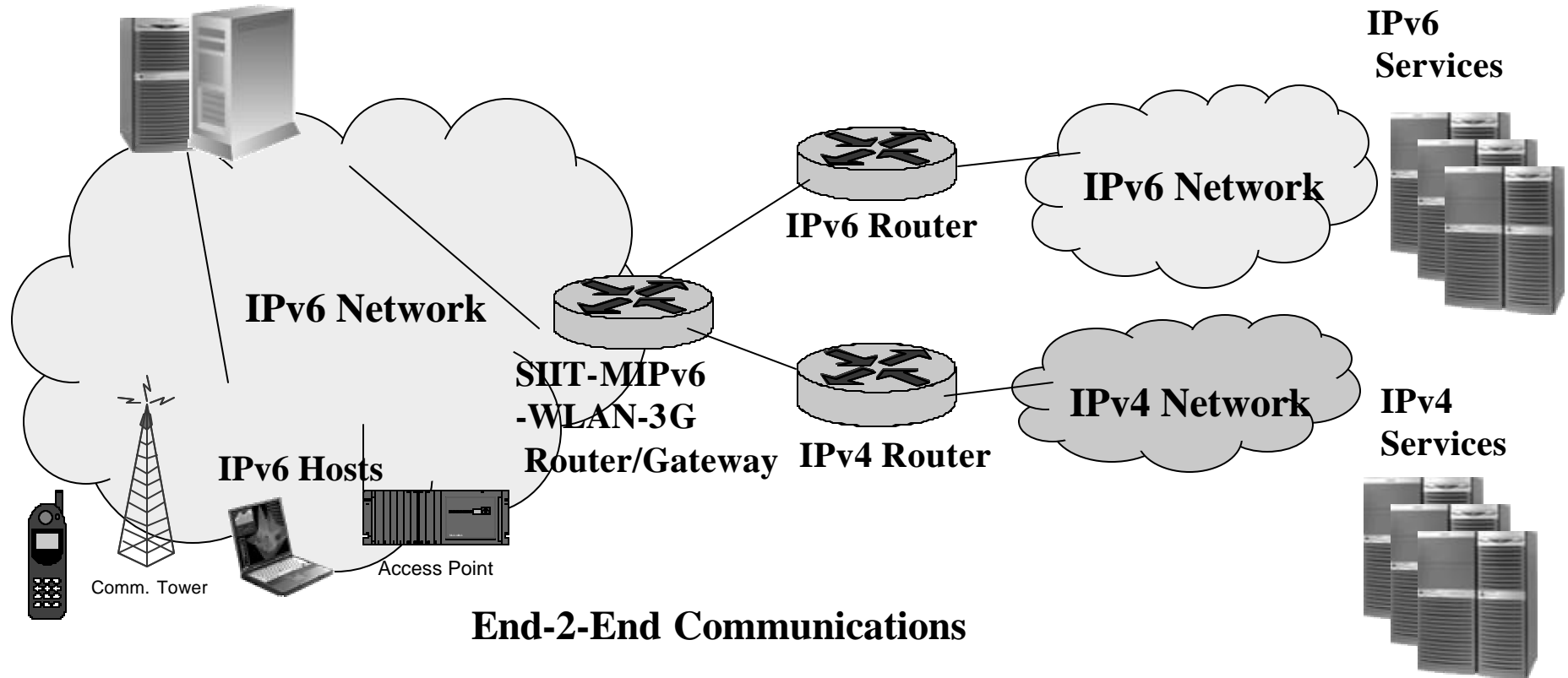**Dynamic Tunnel Interface**

IPv4 Router

IPv4 Routing

Host X obtains IPv4-Mapped Address, Port Range, and TEP for DSTM Router, from DHCPv6 Server.
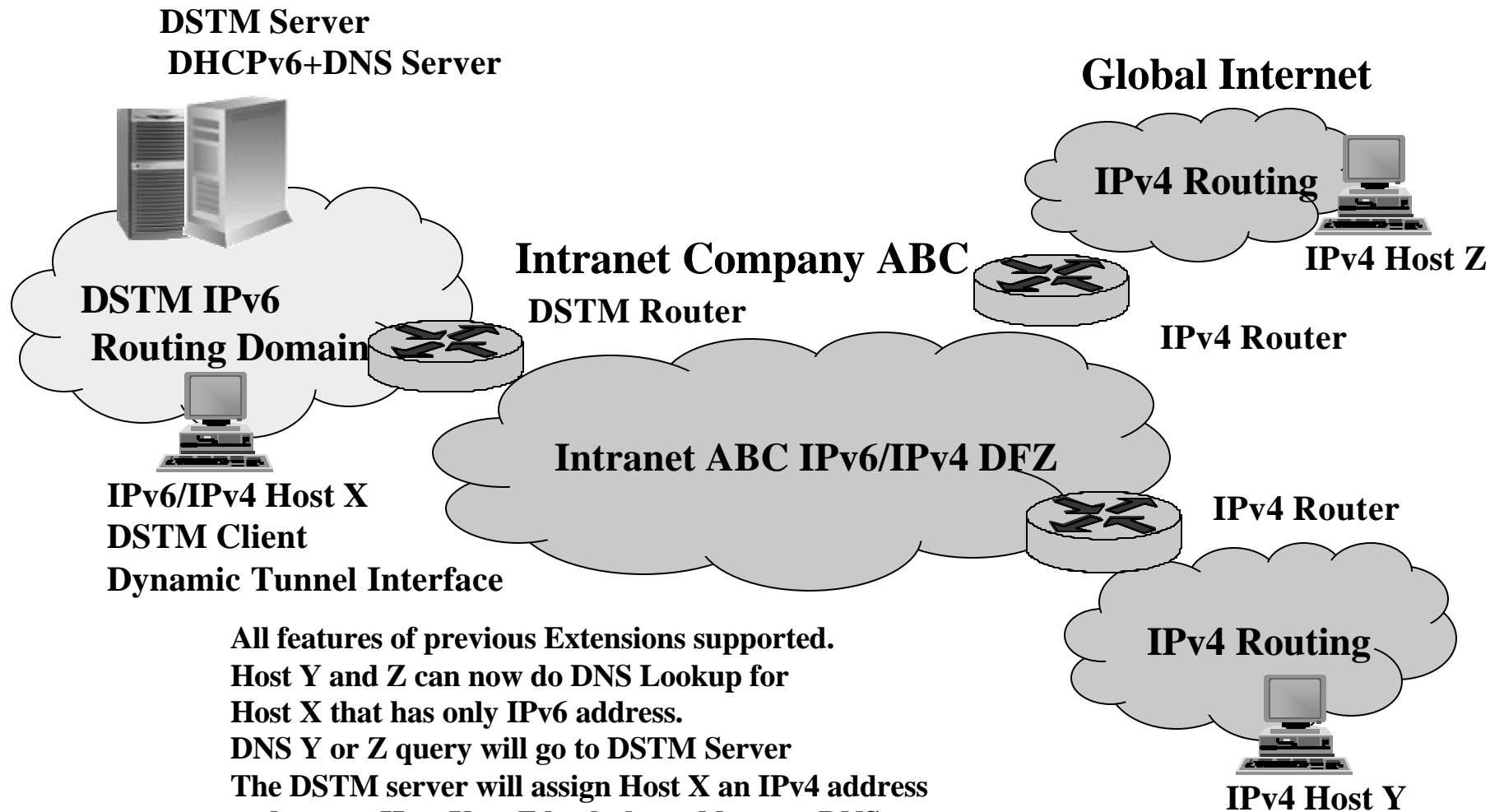Host X can now communicate with IPv4 to Hosts Y and Z End-2-End.
DSTM Router can now use a single address for multiple IPv6/IPv4 Hosts within the DSTM IPv6 Routing Domain.

IPv4 Host Y

DSTM Extensions in 3G and WLAN Network

DSTM Server Mechanisms and Extensions

IPv6
Services

IPv6 Router

IPv6 Network

IPv6 Network

SIIT-MIPv6
-WLAN-3G
Router/Gateway   IPv4 Router

IPv4 Network

IPv4
Services

IPv6 Hosts

Comm. Tower   Access Point

End-2-End Communications

DSTM Extensions + IPv4 Query to IPv6 Address

DSTM Server
DHCPv6+DNS Server

Global Internet

IPv4 Routing

IPv4 Host Z

Intranet Company ABC

DSTM IPv6
Routing Domain

DSTM Router

IPv4 Router

Intranet ABC IPv6/IPv4 DFZ

IPv6/IPv4 Host X
DSTM Client
Dynamic Tunnel Interface

IPv4 Router

IPv4 Routing

All features of previous Extensions supported.
Host Y and Z can now do DNS Lookup for
Host X that has only IPv6 address.
DNS Y or Z query will go to DSTM Server
The DSTM server will assign Host X an IPv4 address
and return Host Y or Z back that address as DNS query
response.
Transparent to DSTM Client Implementation

IPv4 Host Y