

IPv6 Migration Technologies

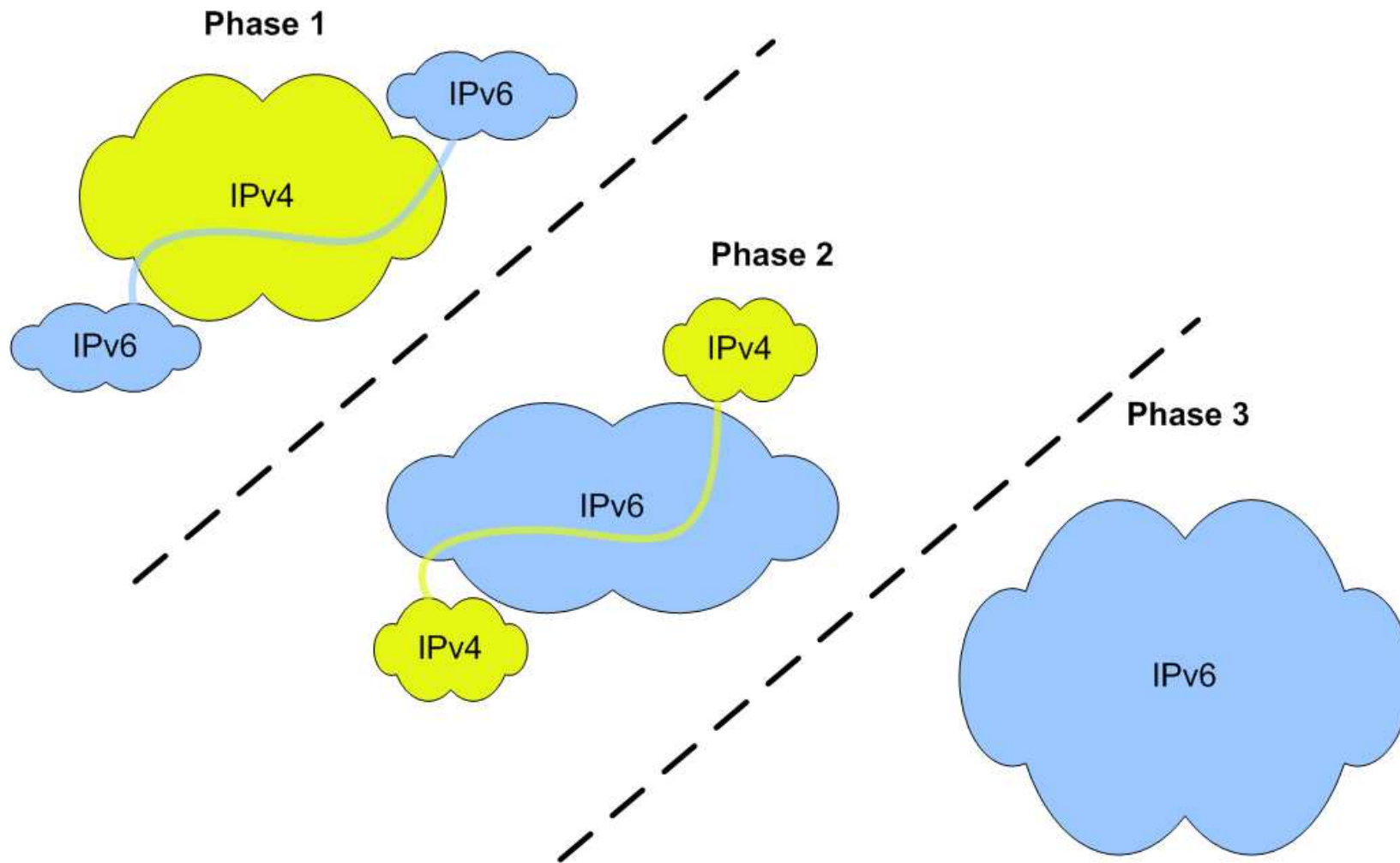
IBM Research - Zurich



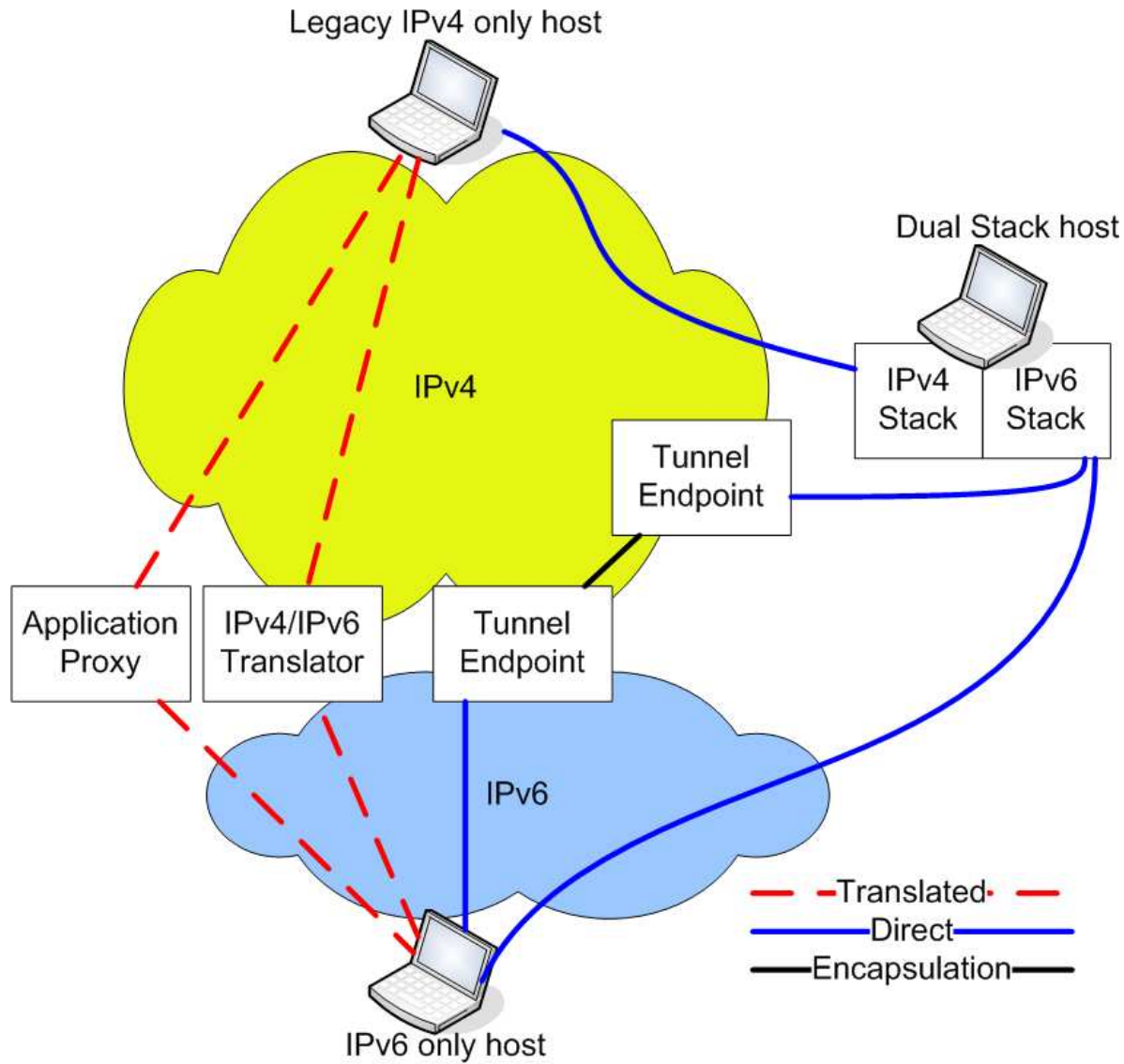
Agenda

- Overview
- Dual Stack
- Tunnels
- Translations

IPv4-to-IPv6 Transition Phases



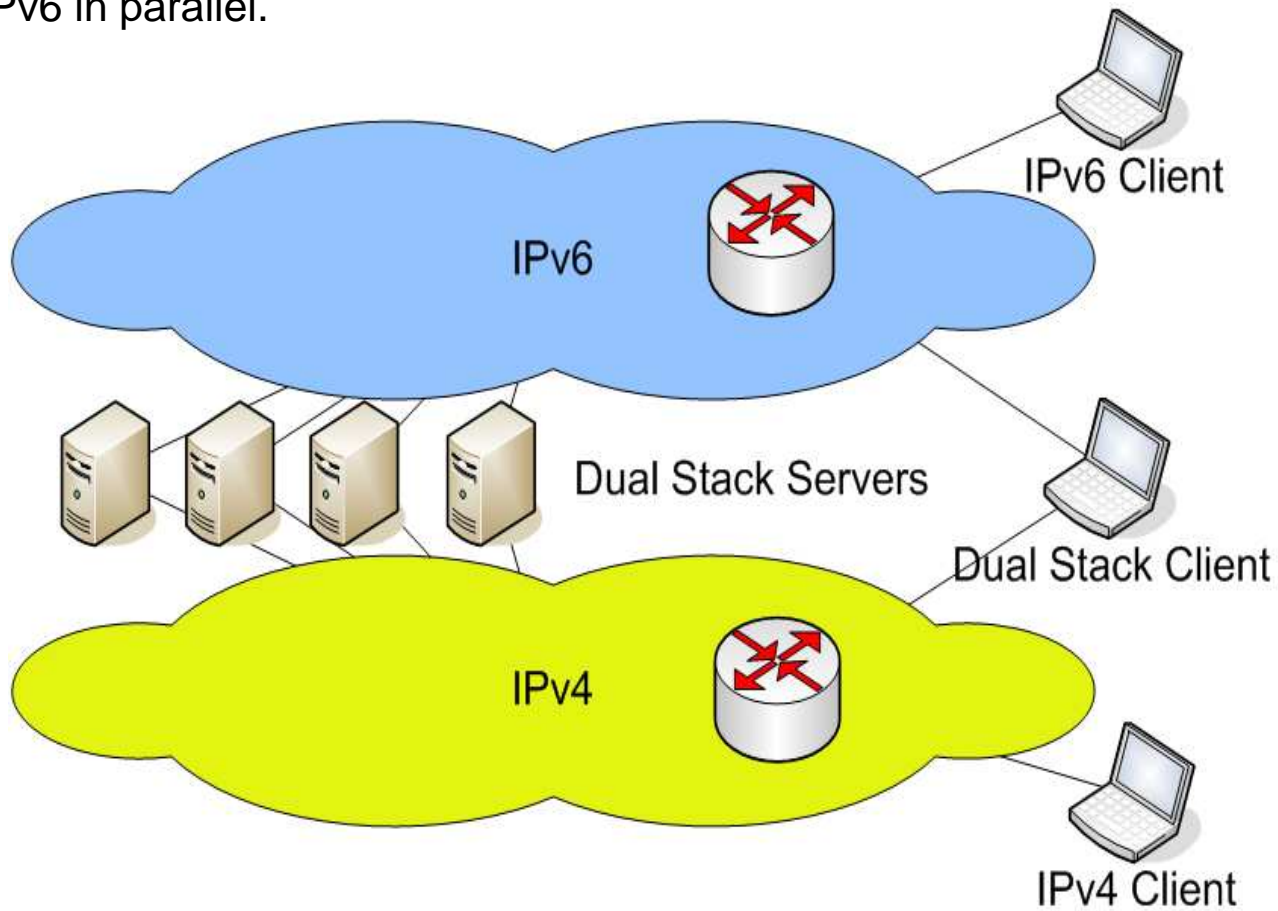
IPv4/6 Migration Mechanisms



Dual Stack

Use whenever possible

IPv4 and IPv6 in parallel.

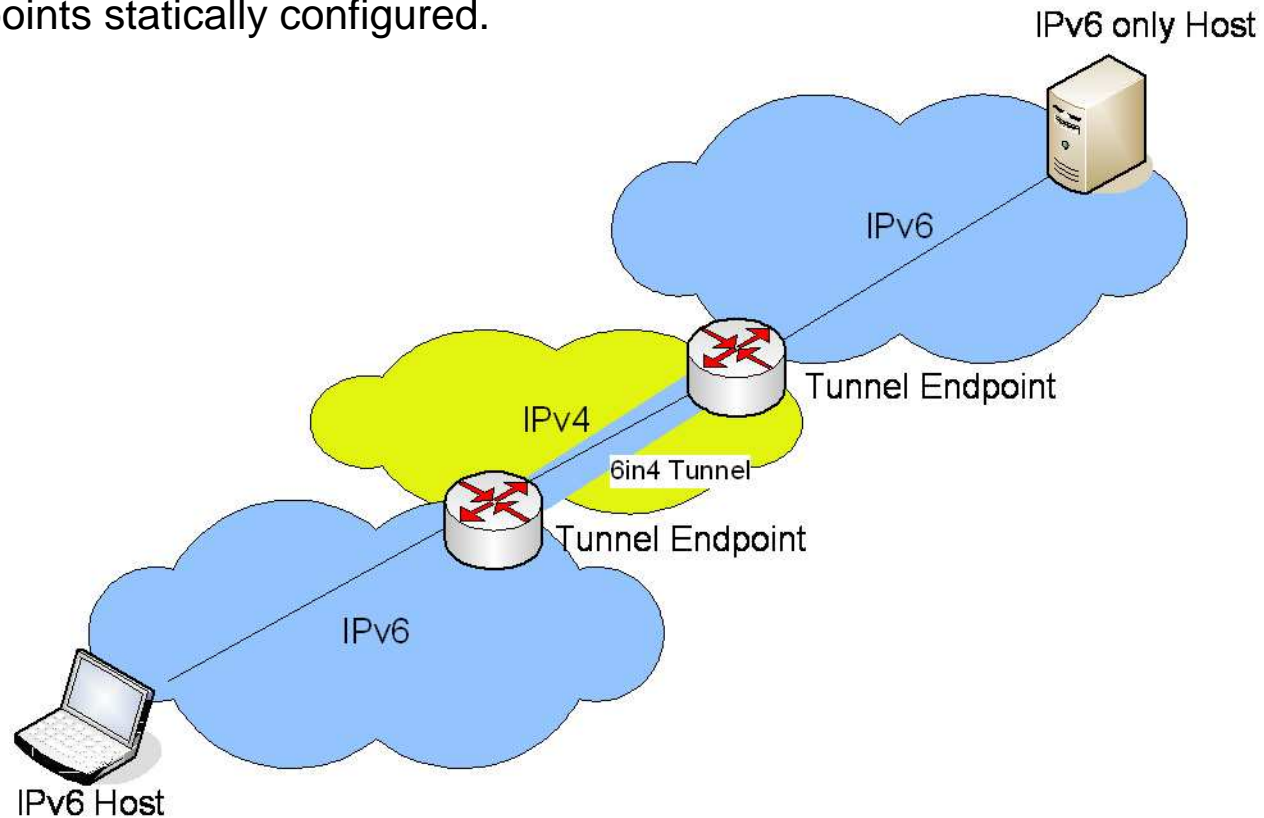


Tunnels technologies

- **6in4**
- **6rd**
- **ISATAP**
- **Teredo**
- 4in6
- 6over4
- 6to4
- GRE
- MAP

6in4

Tunnel IPv6 over IPv4 in the network infrastructure.
Tunnel endpoints statically configured.



6rd

One way for providers to deploy IPv6 without reconfiguring their whole network.
 Customer IPv4 address mapped to IPv6 address.

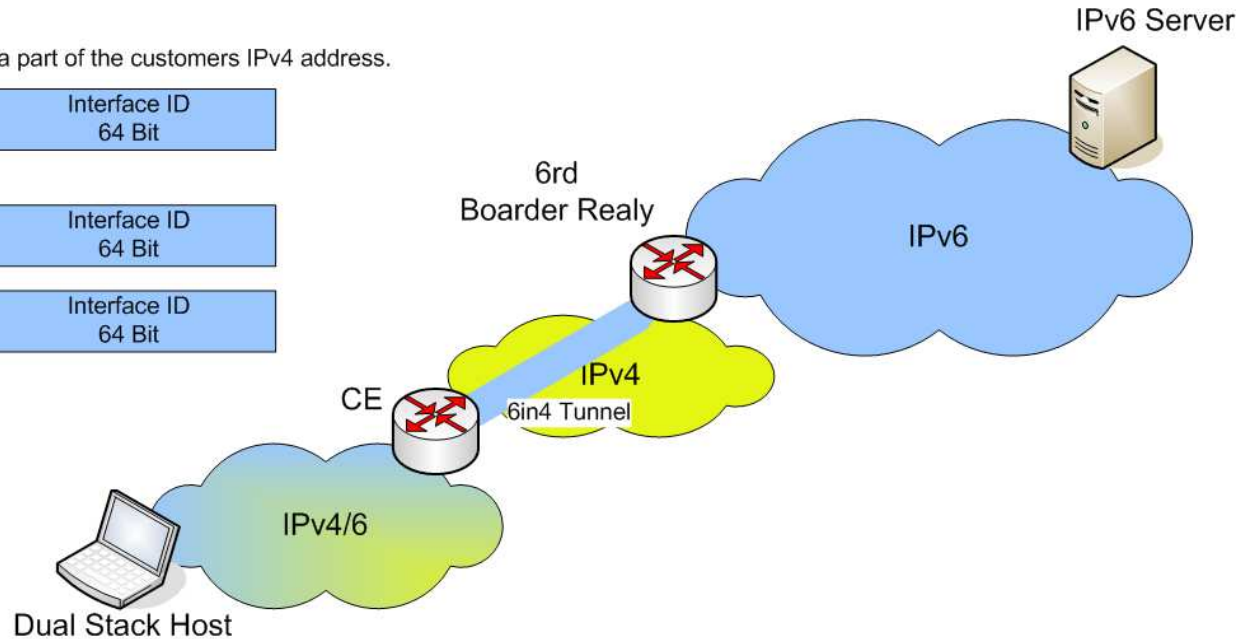
IPv6 addresses range will be derived from a part of the customers IPv4 address.

6rd IPv6 Prefix	Part of Customer IPv4 Address	Subnet ID	Interface ID
		4 Bit	64 Bit

Examples:

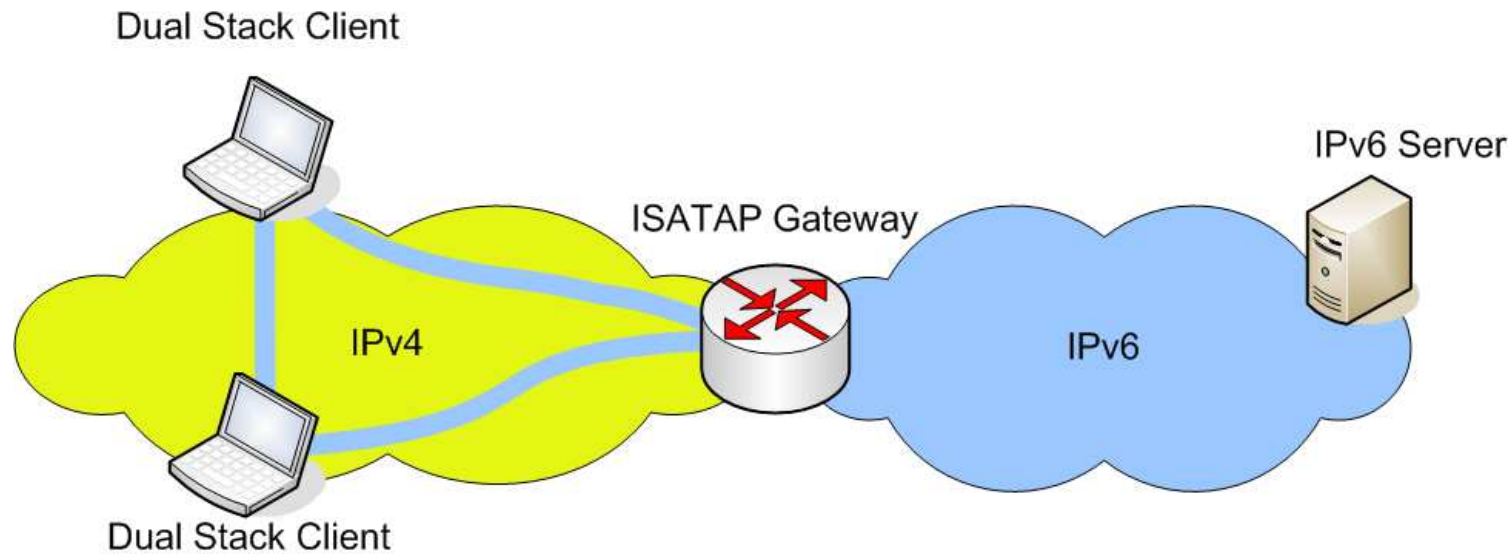
2001:0DB	198.0.2.1	Subnet ID	Interface ID
28 Bit	32 Bit	4 Bit	64 Bit

2001:0DB8	0.2.1	Subnet ID	Interface ID
32 Bit	24 Bit	8 Bit	64 Bit



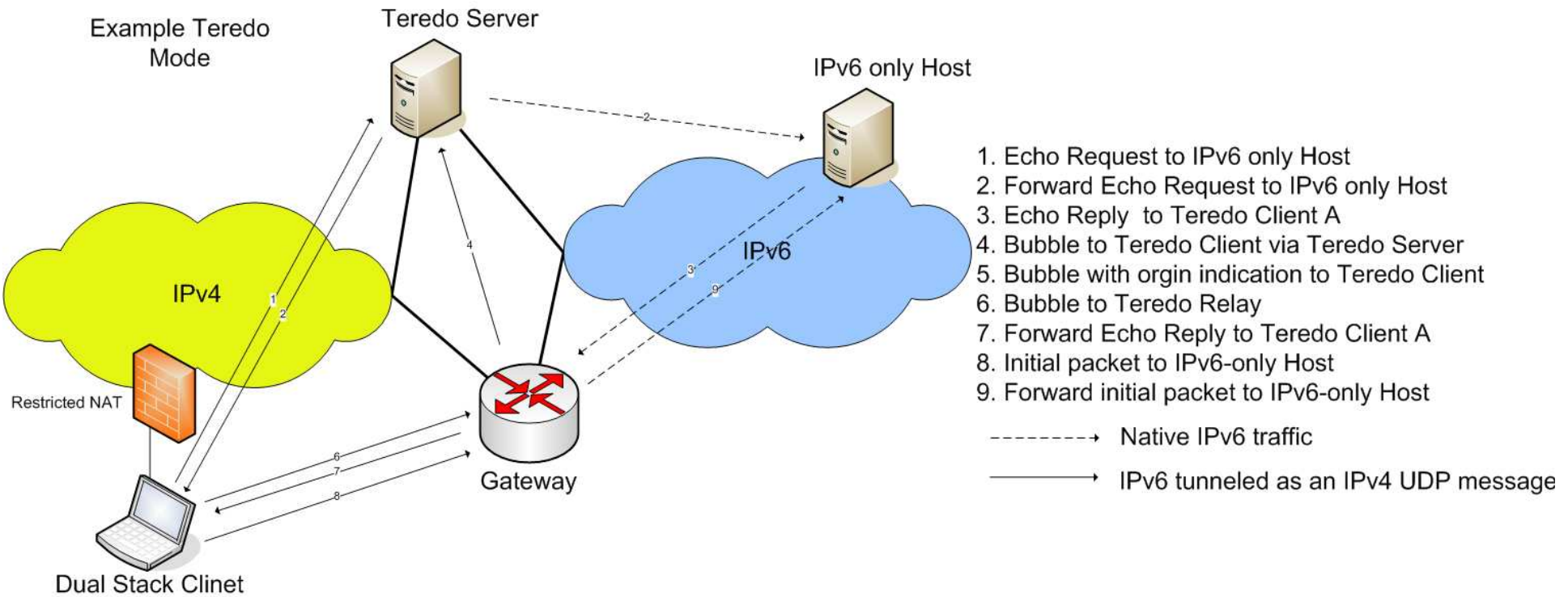
ISATAP

Very fast and easy way to connect to the IPv6 network.
Requires support from the client operating system.



Teredo

Designed to connect through IPv4 NAT firewalls. Basically establishes a tunnel through the firewall to the internet.



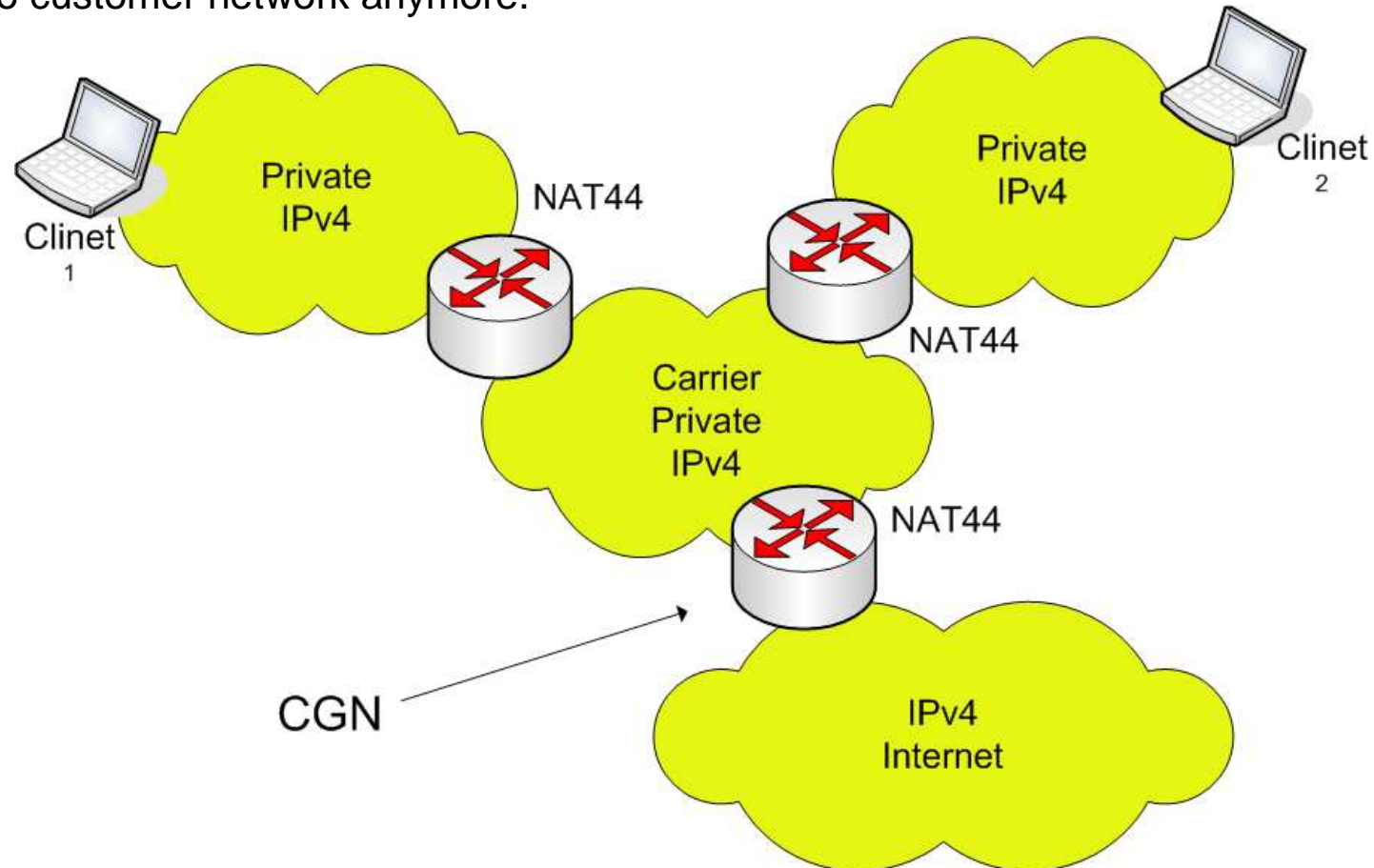
Translation technologies

- **CGN/LSN/Nat444 – to extend IPv4 address space**
- **DS-lite**
- **Nat64/DNS64**
- Nat46/DNS46
- Transport Relay Translation (TRT)
- Stateless IP/ICMP Translation (SIIT)

CGN/LSN/NAT444

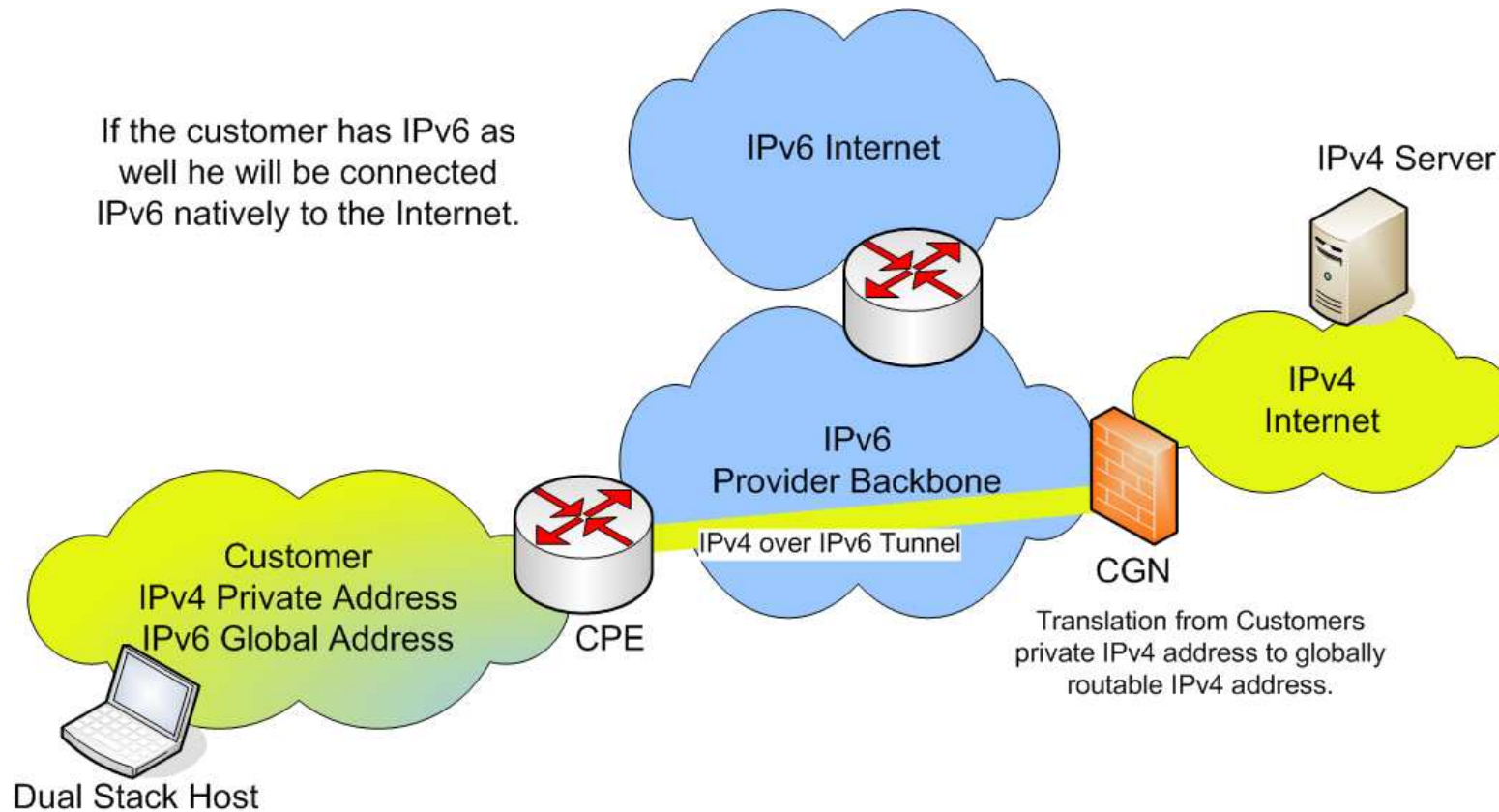
In this use case not related to IPv6

Extends IPv4 address space of providers. Not possible to connect from the internet to customer network anymore.



DS-Lite

Extends IPv4 address space of providers. Not possible to connect from the internet to customer network anymore.



NAT64/DNS64

To connect from IPv6 to IPv4.
 Some gateways also do NAT46 to enable connections from IPv4 to IPv6.

