

# IPv6 Migration Strategies

## NAT-PT and Tunneling



# IPv6 Overview

- Large Address Space
- Simplified Header
- Fixed Length Header
- Stateless Autoconfiguration
- Integrated IPsec

# IPv6 Header

IPv4 Header

0	4	8	12	16	20	24	28	31
Version	IHL	Type of Service	Total Length					
Identification				Flags	Fragment Offset			
Time to Live		Protocol		Header Checksum				
Source Address								
Destination Address								

IPv6 Header

0	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	63
Version	Traffic Class		<i>Flow Label</i>					Payload Length				Next Header	Hop Limit			
Source Address																
Destination Address																

# IPv6 Addressing

- 128 Bit Addresses
- Hexadecimal Format
- e.g. 2001:0000:0000:065a:0000:0000:0000:000d
- Or 2001:0:0:65a:0:0:0:d
- Or 2001:0:0:65a::d



# Address Types

- Aggregatable Global Address
- Link Local Address
- IPv4 Compatible IPv6 Address
- Unique Local Address
- Multicast Address
- Anycast Address

# Migration/Transition Techniques

- Dual Stack
- NAT-PT
- Tunneling



# Dual Stacking

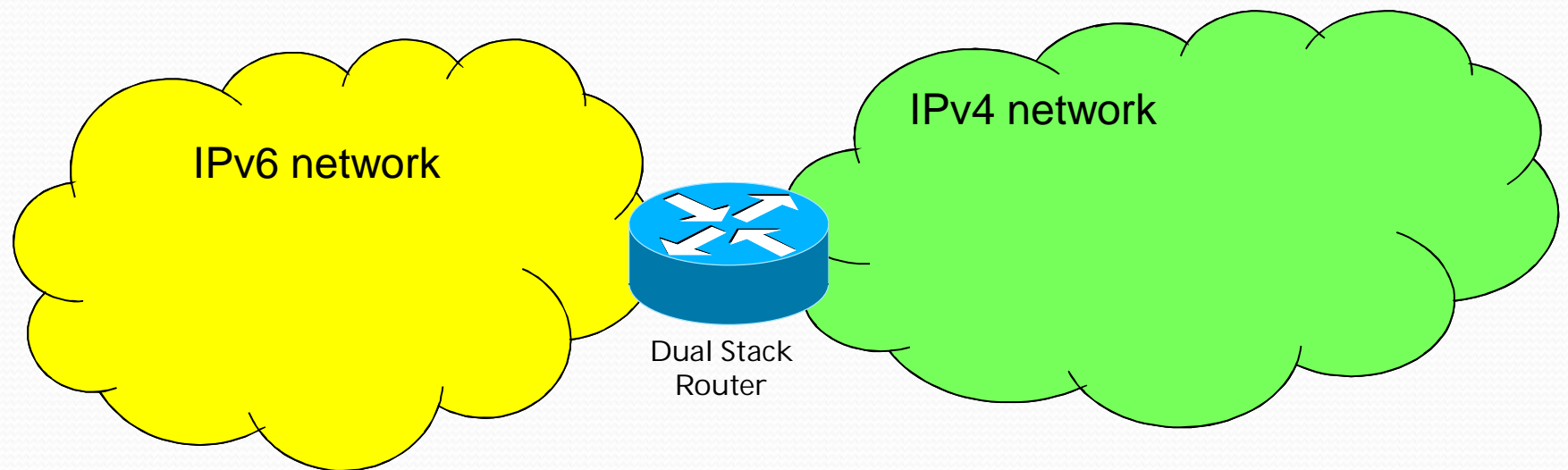
- IPv4 and IPv6 coexist on the same host
- IPv4 stack used for communicating with IPv4 only hosts
- IPv6 stack used for communicating with IPv6 only hosts
- Inter-stack communication not possible

# NAT-PT

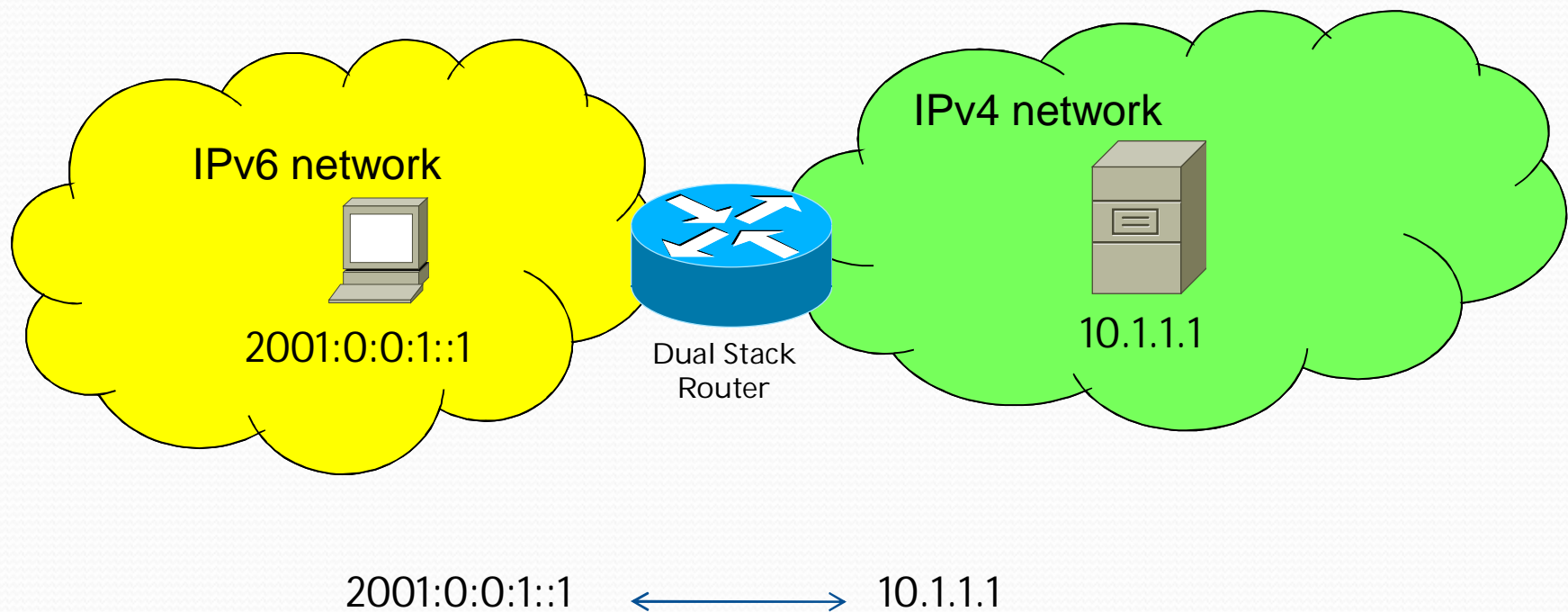
- Network Address Translation – Protocol Translation
- Dual Stack Router needed for doing NAT-PT



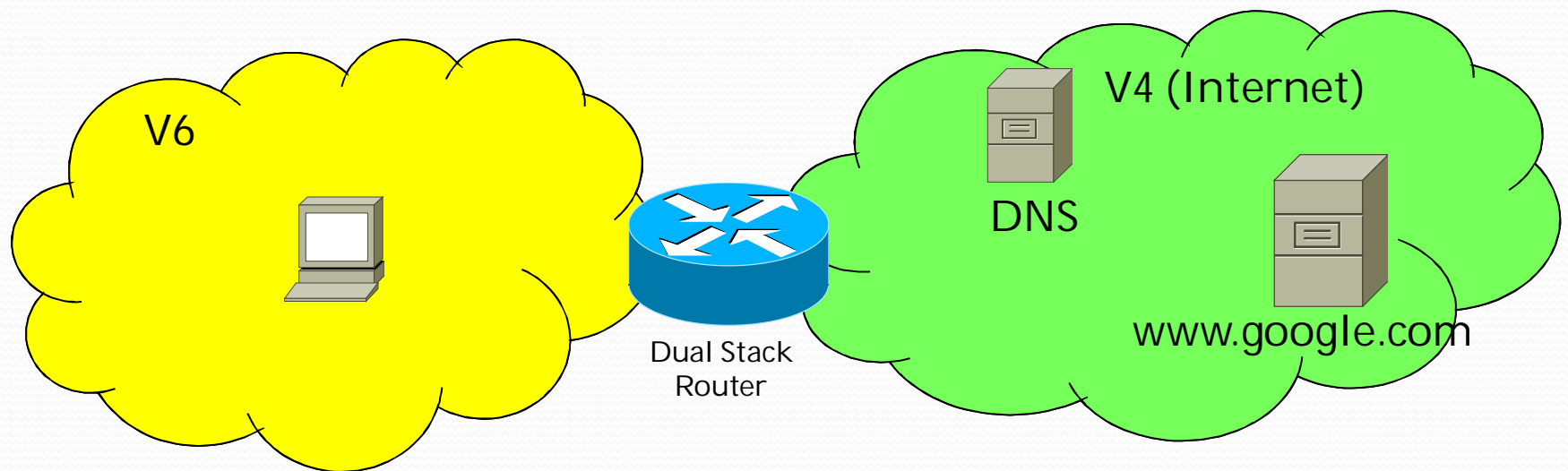
# NAT-PT



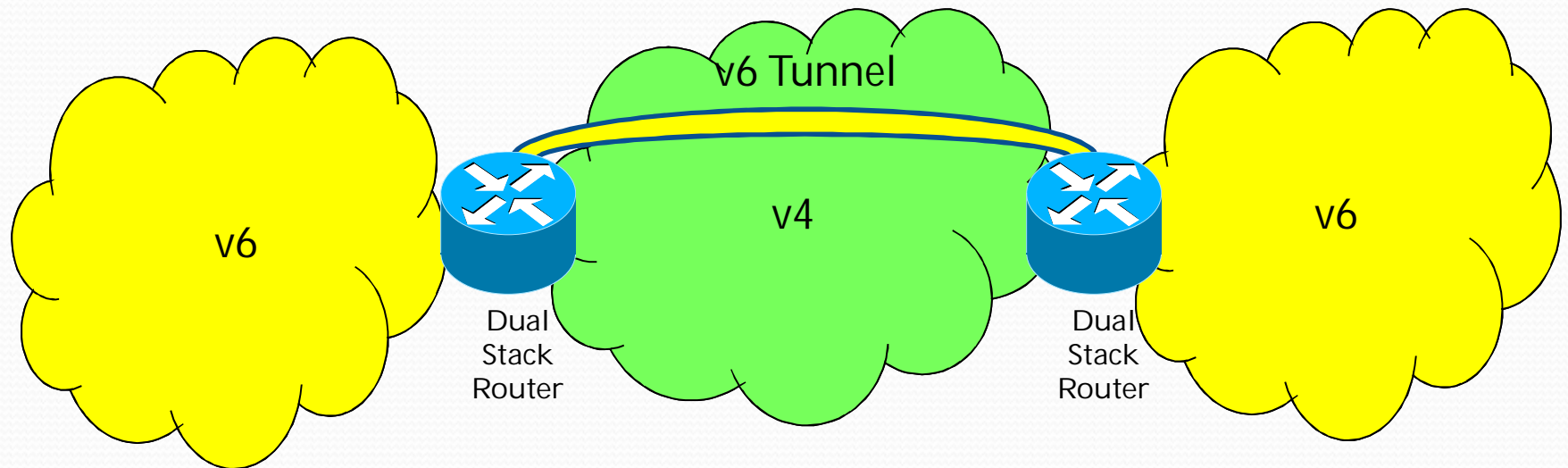
# Static Mapping



# Dynamic Mapping



# IPv6 Tunneling





# Tunneling Techniques

- Manually Configured
- IPv6 over IPv4 GRE
- Automatic IPv4 Compatible
- Automatic 6to4
- ISATAP



# Manually Configured

- Point to Point
- Any Address Space
- Dual Stack Support Required at Both Ends
- Can Only Carry IPv6 Packets Across IPv4 Domains
- Tunnel Source
- Tunnel Destination



# IPv6 Over IPv4 GRE

- Point to Point
- Unicast Addresses
- Dual Stack Support Required at Both Ends
- Carries IPv6, CLNS and Other Traffic
- Tunnel Source
- Tunnel Destination



# Automatic IPv4 Compatible

- Point to Multipoint
- `::/96` Address Space
- Dual Stack Support Required at Both Ends
- Not Widely Deployed
- Not Scalable
- Not Recommended





# Automatic 6to4

- Point to Multipoint
- 2002::/16 Address Space
- Connecting Isolated IPv6 Island Networks
- Tunnel Source
- No Tunnel Destination

# ISATAP

- Intra-Site Automatic Tunnel Addressing Protocol
- Point to Multipoint
- For Connecting IPv6 Hosts Within a Single Site
- Tunnel Source
- No Tunnel Destination