

Transition Tactics in the IP Ecosystem

IPv6 Summit – Melbourne 2009

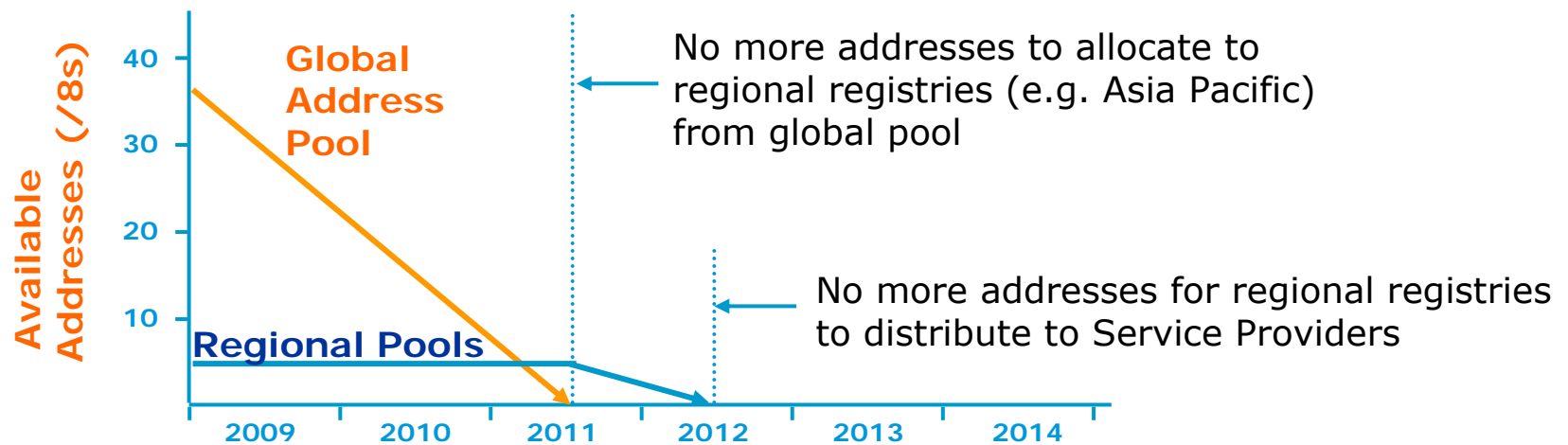
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9 December 2009



IPv4 to IPv6 Transition

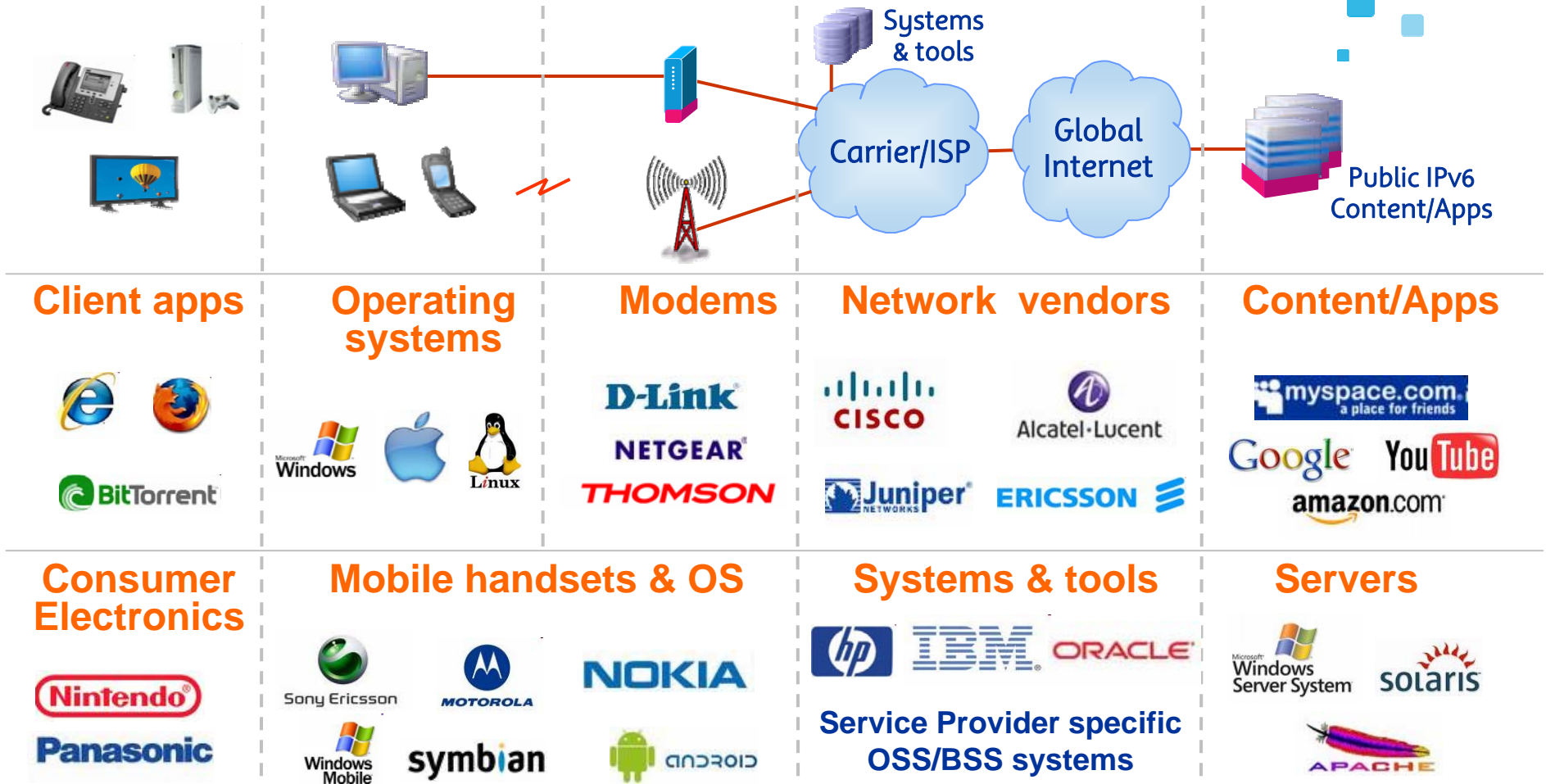


source: <http://www.potaroo.net/tools/ipv4/index.html> - as at 18 Nov 2009

- Public IPv4 Addresses are running out
- IPv6 is the accepted industry direction

How do we get there and what are some of the key considerations?

IPv6 Ecosystem

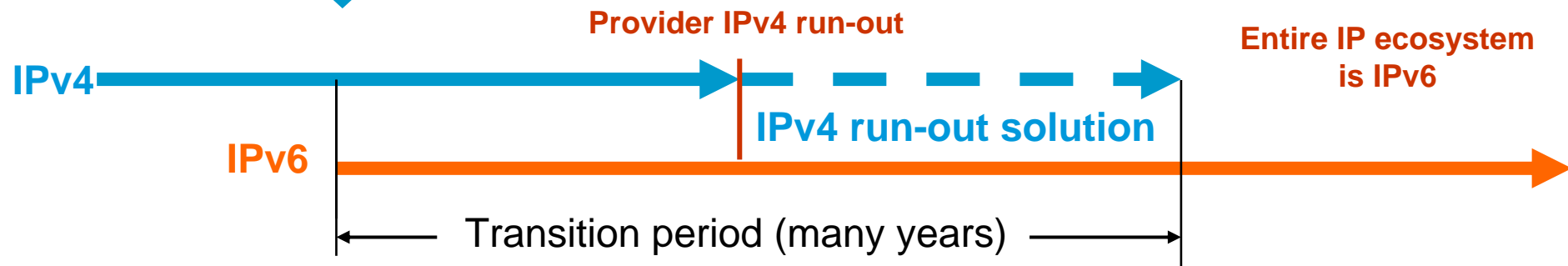


Moving the entire ecosystem to IPv6 will take many years



Two key parts of the transition

1. Introduction of IPv6



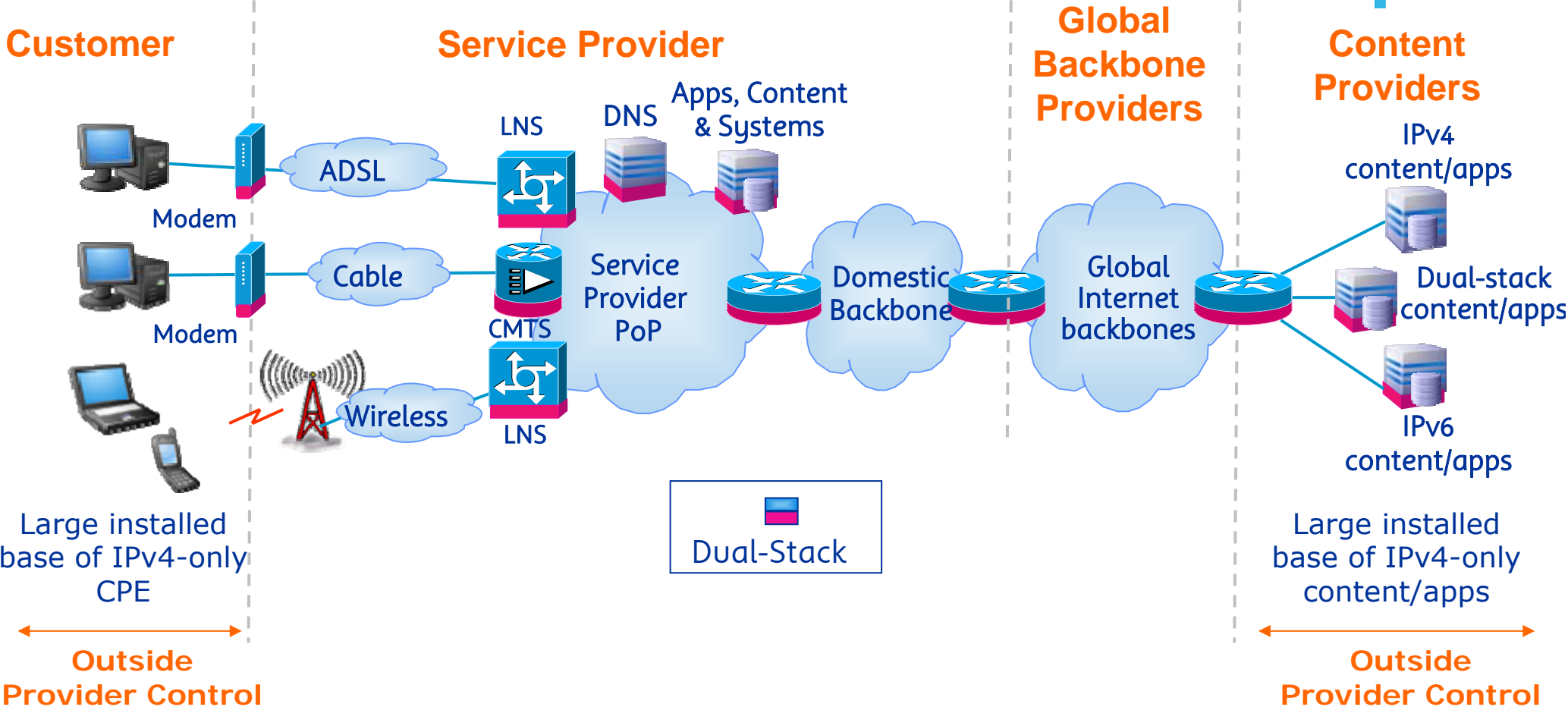
2. Maintaining IPv4 connectivity



- Despite IPv6 introduction, customers will still need to use IPv4 in some cases:
 - for remaining IPv4-only devices in their home environment
 - to access any IPv4-only content and applications

We can't just focus on IPv6 introduction

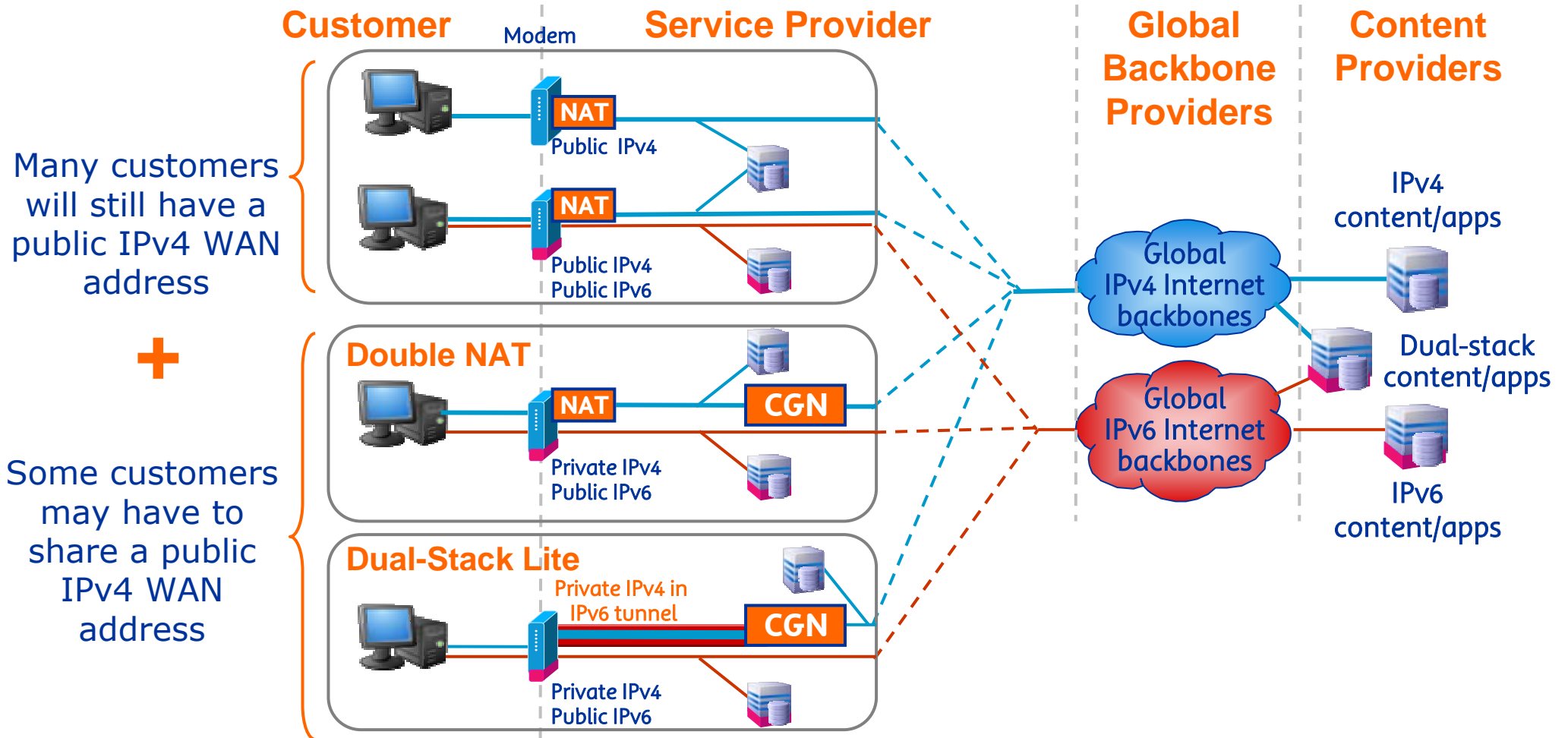
IPv6 Introduction



Dual-Stack enables a smooth transition



Maintaining IPv4 connectivity



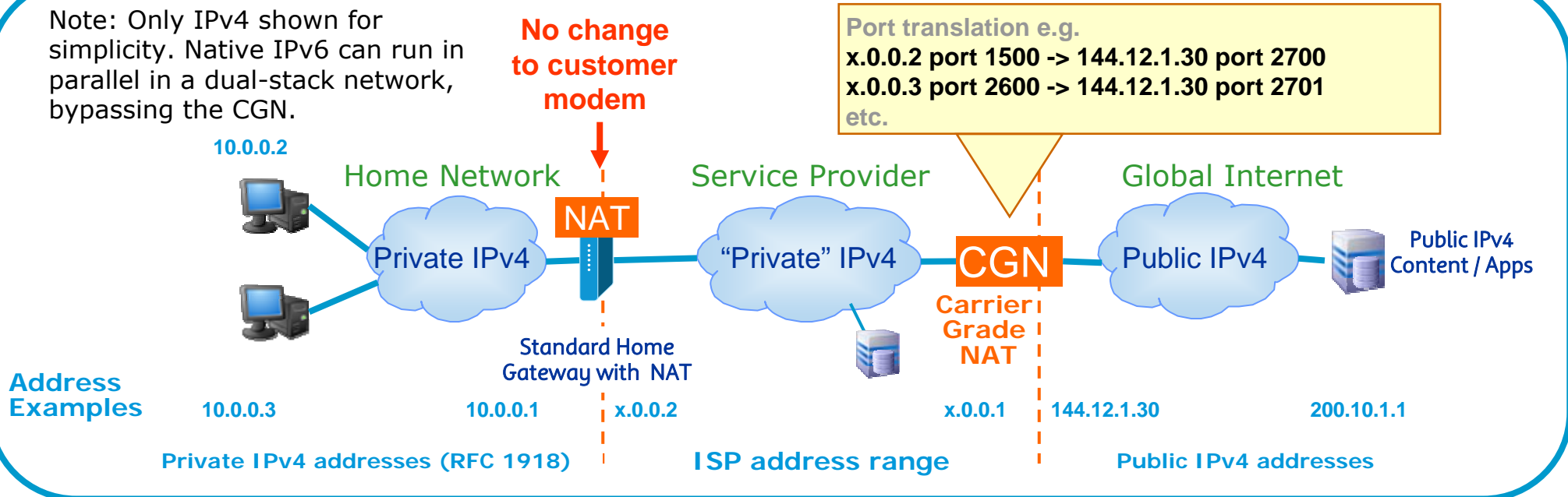
NAT = Network Address Translation (in customer modem)

CGN = Carrier Grade NAT (Network Address Translation in Service Provider network)

Some customers may have to share a public IPv4 address

Double NAT architecture

Note: Only IPv4 shown for simplicity. Native IPv6 can run in parallel in a dual-stack network, bypassing the CGN.



- Carrier Grade NAT (CGN) put at a central location at the gateway to the global Internet
- The CGN has a pool of public IPv4 addresses. Each public address can be shared by many end-users because of the use of port numbers.
- The CGN maps 'Private IP + Port' to 'Public IP + port'
- No change to customer CPE or customer environment
- The customer can transition to dual-stack IPv4/IPv6 as part of normal lifecycle (no forced change)

Double NAT allows sharing of public IPv4 addresses and can be used in conjunction with IPv6



Impact of sharing IPv4 addresses

- Applications that may be impacted:
 - Home based web servers and others using “well-known” ports
 - Applications that establish inbound connections
 - Applications that carry address and/or port information in the payload
- Mitigation
 - Application developers can use established NAT traversal techniques which will also work with network based address sharing
 - The more applications that support IPv6 the less traffic that must use a shared IPv4 address (as more end-users gain IPv6 capability)
- Standardisation
 - NAT traversal is aided by standardised address sharing behaviour (e.g. IETF BEHAVE Working Group recommendations)
 - We must build on existing IETF standardisation efforts to ensure that as an industry we have workable solutions that make the transition as smooth as possible for customers

For non-server applications, the impact is equivalent to turning off UPnP and Port Forwarding



Summary

- Global IPv4 addresses will run out and we must do two things:
 - Introduce IPv6
 - Maintain IPv4 connectivity during the transition
- The full transition to IPv6 will take many years
- Introducing IPv6 using Dual-Stack IPv4/IPv6 will provide the smoothest transition for both customers and providers
- Following IPv4 run-out, Service Providers may have to share public IPv4 addresses for some customers
 - Most applications will not be impacted
 - Application developers can mitigate impacts through the use of IPv4 NAT traversal techniques and support for IPv6
- We must build on standardisation efforts to ensure the transition is as smooth as possible for customers

Thankyou