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IPV6 DEPLOYMENT GUIDELINES FOR CABLE OPERATORS

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Current IPv4 Situation

- IANA has already assigned the last IPv4 Blocks to the RIRs.
- RIRs address exhaustion may come in the next two years depending on the region.
- The growth rate of connected devices keeps increasing.
- Exhaustion may impact Cable Operators' ability to increase customers and new services.

Current IPv6 Situation

- The IPv6 RFC has been approved for more than 10 years.
- Adoption was delayed mainly by the impact of NAT and the related slowdown of required public IPv4 addresses.
- Newer devices and Operating Systems come with full IPv6 Support.
- Cable Operators need to plan the transition.

Implementation - Addressing

- Site Local Addresses - fd00::/8

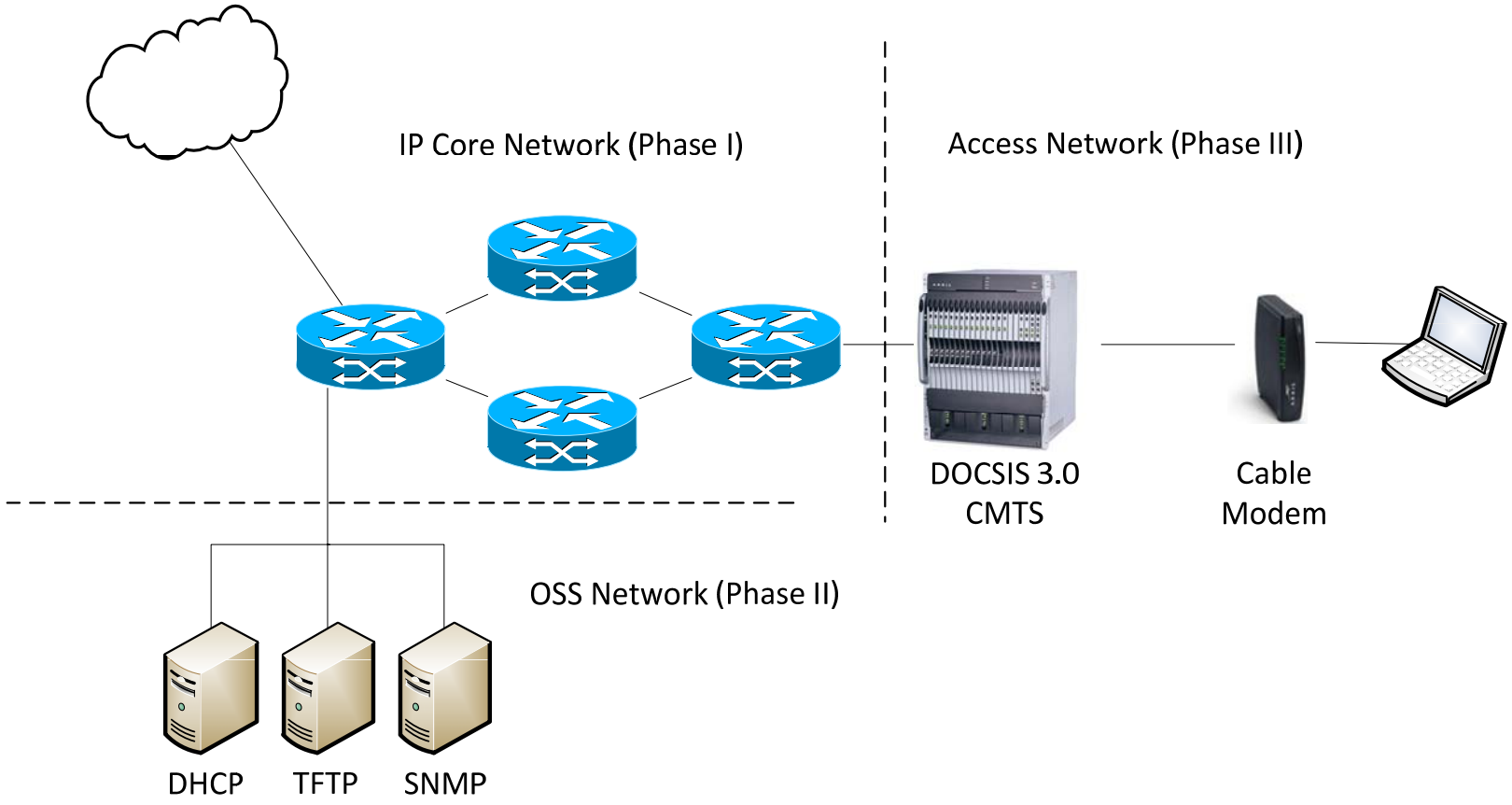
  Private IPv4 Address equivalent
- Global Addresses - 2000::/3

  ISPs typically are being assigned /32 prefixes

Main implementation Guidelines:

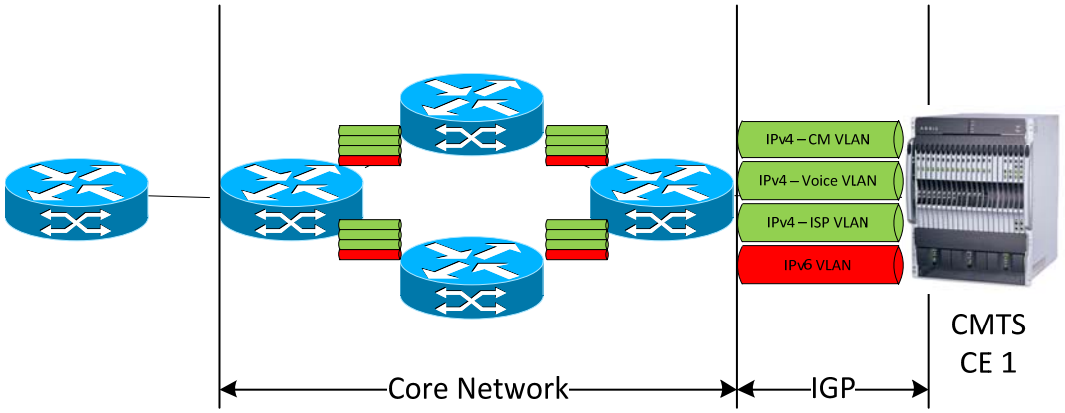
- Can be All Global or Global + Unique Local
- Use Site-Local addresses for all the inter-router connections.
- Use Site-Local addresses for the Operation Support Services that do not need Access from the internet (DHCP, TFTP, Time, etc).
- Use Site-local addresses for the Cable modems and Settop-box management.
- Use Global addresses for the end user devices.
- Use Global addresses in routers only to allow ICMP diagnostics.

Phases of Deployment

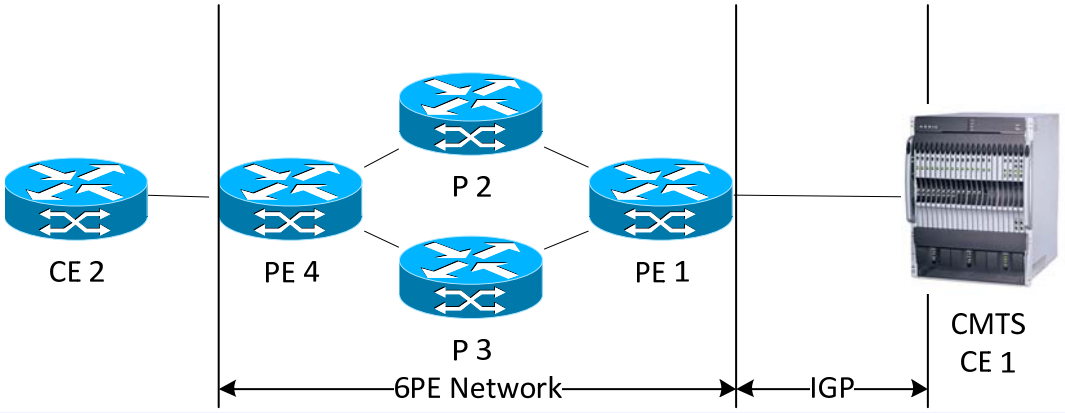


Core Network

IPv4 over 802.1q



IPv4 over MPLS



IGP Protocol

- OSPFv2 has been widely adopted on IPv4, IS-IS has been growing in the last years.
- On IPv6, IS-IS and OSPv3 are the options.

	Advantages	Disadvantages
OSPFv2 + OSPFv3	• Reduced Training • Incremental addition of IPv6	• Dual Routing Instances • Reduced Scaling
IS-IS	• Single Instance for IPv4 and IPv6 • Increased Scaling	• Migration Effort for IPv4 • Higher Training Costs

OSS Network

DHCP Server: Most Commercial implementations support IPv6. Support for some extensions is recommended.

- IPv6 Prefix Delegation
- Bulk lease-query.

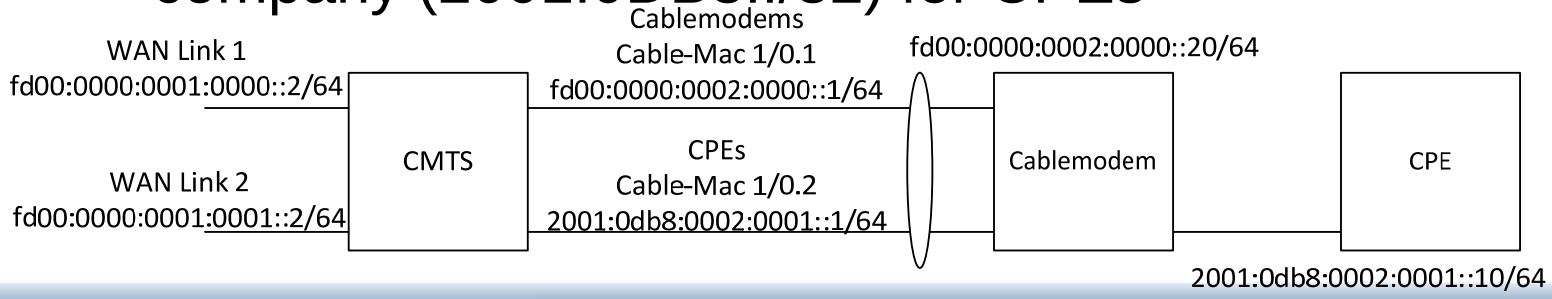
DNS Server: ISC Bind has dual-stack support for AAAA records

- Support of DNS64 is recommended.

SNMP Poolers: Need to support IPv6 in order to be able to monitor v6 provisioned devices.

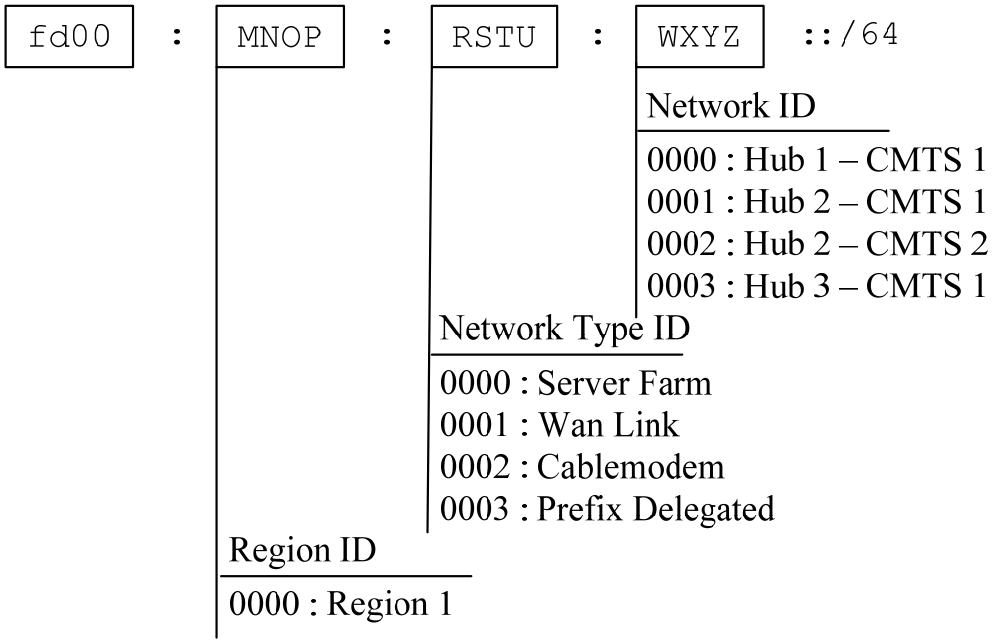
Access Network

- Separate addressing for Cable modems and CPEs.
- All Global or Global + Unique Local Options
  - Site-Local network of the fd00::/8 range for Cable modems
  - Global network from the prefix assigned to the Cable company (2001:0DB8::/32) for CPEs



Access Network

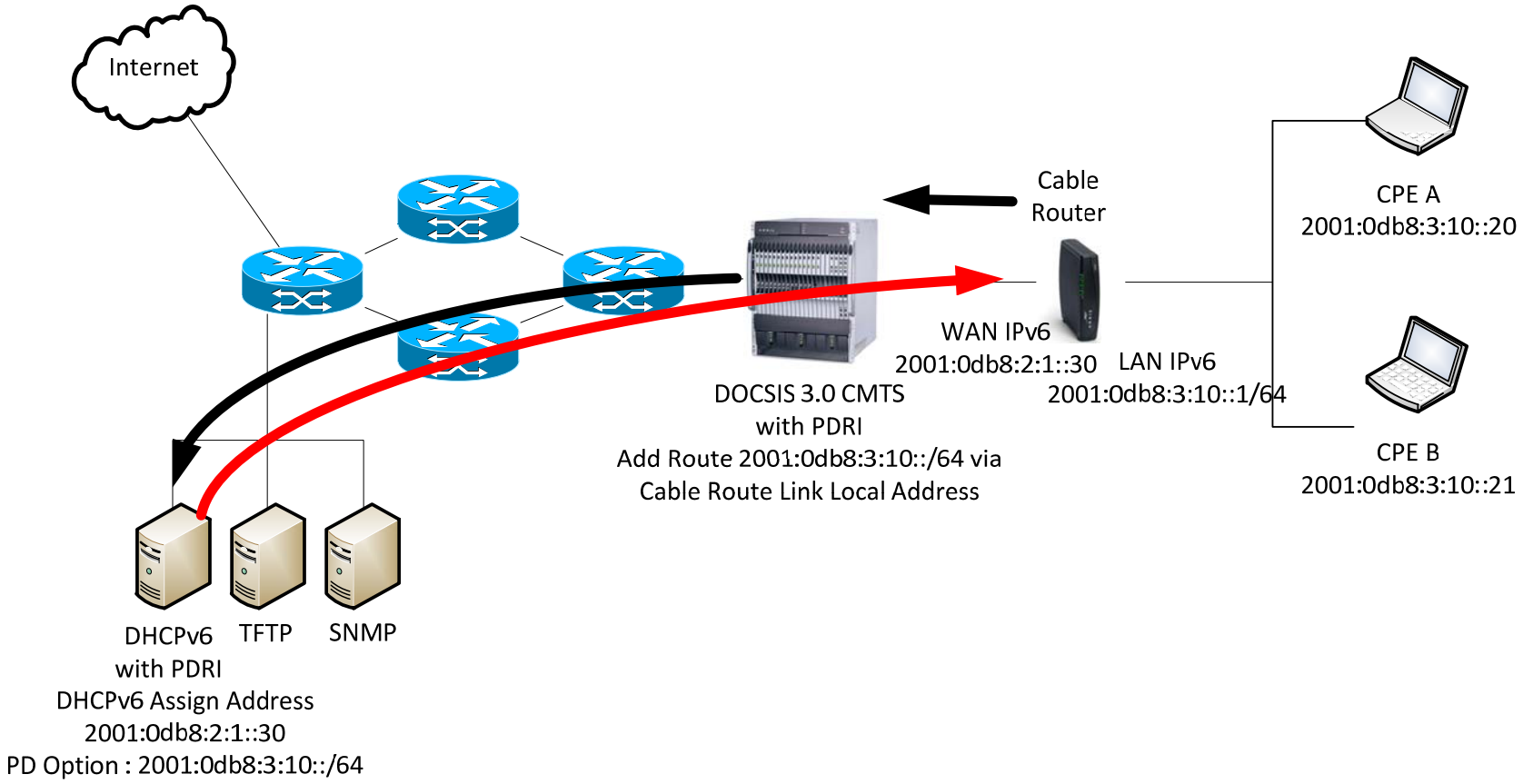
- Systematic and hierarchical approach to IPv6 numbering is strongly recommended.



Address Assignation

- DHCP is still required to handle configuration options such as DNS Servers to end Devices.
- DHCPv6 provides the advantage of Centralized Logging
- SLAAC Auto-configuration of an address is done in a stateless way, however not recommended except if the CMTS can log Neighbor Discovers
- Some Legacy OS do not support DHCPv6. SLAAC is an option.

Prefix Delegation



Security Considerations

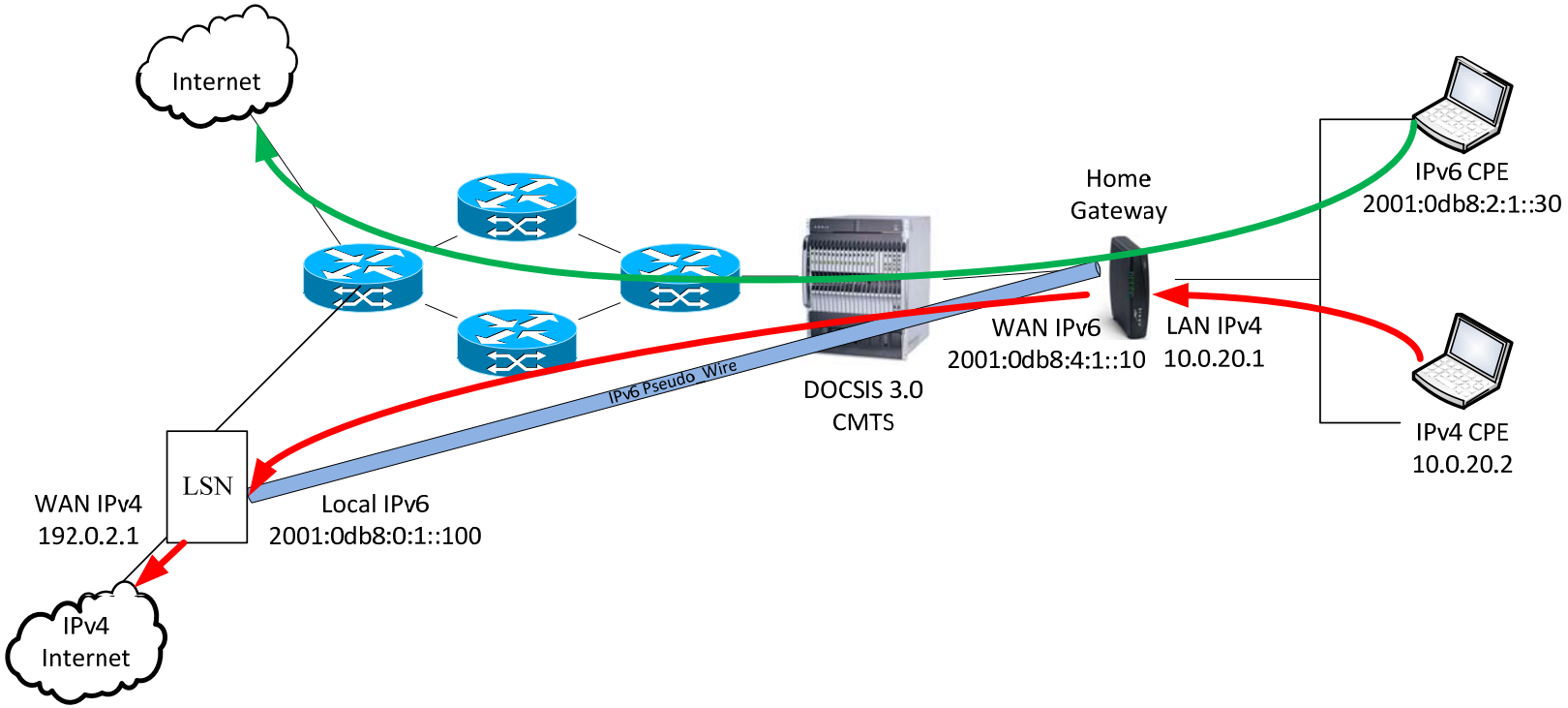
A Set of Security features is recommended to be deployed from the beginning.

- CMTS IPv6 Duplicate Address Detection Proxy
- CMTS IPv6 Source Address Verification
- IPv6 Filters

DOCSIS 2.0 Cable Modems

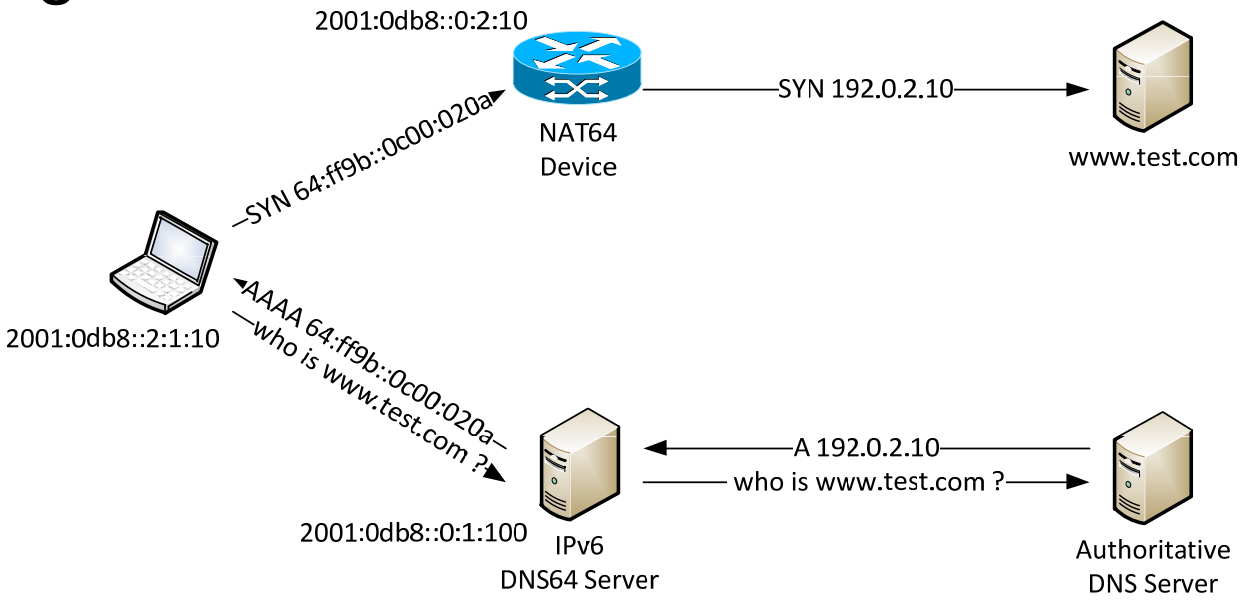
- DOCSIS 2.0 was not designed to natively support IPv6.
- DOCSIS 2.0 CMs filter by default multicast traffic required by IPv6.
- *DOCSIS 2.0 + IPv6 Cable Modem* specification provides the required changed to have CMs and CPEs operation in IPv6
- A software upgrade is required on the Cable modems

Dual Stack Strategies
DS-Lite



Dual Stack Strategies NAT64/DNS64

- Address native IPv6 implementation and the issue of small quantity of internet servers running on IPv6.



Conclusions

- IPv6 technology is ready for initial adoption
- Dual Stack coexistence strategies ease the migration path from IPv4
- Cable operators need to start working on their planning now in order to avoid IPv4 address exhaustion