FOUNDRY NETWORKS

White Paper
Making The Edge Ready for IPv6
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While everyone focuses on making sure that the Core of the network easily migrates to IPv6, it is critical to ensure that the Edge is also ready for IPv6. For seamless migration to IPv6 at the Edge, network managers must focus on some key fundamentals.

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Overview

Network managers worldwide are contemplating their migration strategy to seamlessly support IPv6. These networks are located in the following areas:

- ✓ Federal and local governments, especially in the United States of America (USA)
- ✓ Enterprise companies within Asia and Europe
- ✓ Service Providers across the globe

Although this list does not include Enterprise networks in the USA, it is still important to understand the "gotchas" for ensuring that the Edge can migrate to IPv6. There are plenty of inherent benefits to be gained from a move to IPv6, including a consistent communication medium – IPv6 – used worldwide.

Ensuring that the Edge of the network can migrate to IPv6 requires careful review, planning, and verification before deployment. This document covers the following key items to review:

- ✓ A solid network management infrastructure

  Migrating to IPv6 requires a solid and complete network management infrastructure that can deliver realtime metrics, and detailed IPv4 and IPv6 network traffic accounting.

- ✓ Support for IPv4-only devices

  IP4-only devices, such as VoIP phones and printers, will continue to exist and ensuring that a plan is in place to allow seamless co-existence of these devices in an IPv6 network is important.

- ✓ IPv6 multicast for the Edge

  Multicast is the next-generation medium for business communication, and support for multicast in IPv6 is robust. Migrating to IPv6 requires careful evaluation of all switches and routers.

Network Management

Obtaining key metrics determines the success of any network migration project. Key metrics are essential when migrating the Edge of the network to IPv6.

There are many technologies for network management today, but none stand out more than sFlow. sFlow is defined by the informational RFC 3176 and is used by many well-known networking vendors. sFlow, which is used by many Enterprise network managers (e.g., financial and government executives), delivers realtime, concurrent and detailed network traffic accounting for IP4 and IPv6 traffic. sFlow information enables fault management, device or network change management, intrusion detection and pro-active prevention, performance and capacity management, and accounting or billing.

Enabling sFlow at the Edge of the networks will help network managers determine which network services and applications need to migrate to IPv6. This provides a good baseline of the top network services, top network servers, top talkers and other detailed reports. Receiving sFlow information at the Edge of the network delivers visibility to any network application, including network traffic that never traverses the backbone or is only switched locally at the Edge, such as peer-to-peer network applications.

Edge network devices must also support IPv6 management and dual-stack configurations, giving network managers the ability to use an IPv4 and IPv6 network management station. IPv6 management includes all popular management protocols such as telnet, SNMP, AAA, SNTP, RADIUS, and others. It should also include IPv6 management troubleshooting tools such as ping, traceroute, etc.

Legacy – IPv4-only Hosts

Power over Ethernet (PoE) helped proliferate VoIP phones, but most VoIP phones deployed today do not support IPv6. Most CIOs are reluctant to choose the costly option of upgrading their existing VoIP phones to support IPv6. Eventually, CIOs of major organizations, especially those with a large installed base, will force VoIP phone vendors to move to IPv6. Unfortunately, VoIP may be one of the few applications that may remain IPv4-only for quite some time.

To ensure that the Edge supports IPv4-only and IPv6 hosts, the Edge network must support the standard 802.1v or protocol VLANs. Protocol VLANs allow Edge network equipment to switch an Ethernet frame to an appropriate VLAN based on the Ethertype (0x0800 for IPv4 and 0x88DD for IPv6). Supporting this standard is critical, because in a VoIP network hosts are often connected to a VoIP phone's LAN port.

With Protocol VLAN, network managers can ensure that a VoIP frame with an IPv4 Ethertype is switched to the Voice VLAN, and an IPv6 host is switched to a Data VLAN. In addition, protocol VLAN assists in providing a seamless infrastructure for transitioning IPv4 applications to IPv6.

Multicast-Ready Edge

Edge networks must support both Internet Group Management Protocol (IGMP) v1/v2/v3 snooping used by IPv4 hosts, and Multicast Listener Discovery (MLD) v1/v2 snooping used by IPv6 hosts for multicast transmission. MLD v2 and IGMP v3 are comparable because they provide support for source-specific multicast transmission, while MLD v1 and IGMP v2 are comparable because they do not support source-specific multicast transmission.

Support for these protocols at the Edge is required. In addition, the ability to configure a VLAN to support IGMP only, MLD only, or IGMP and MLD combined is critical when migrating to IPv6. This provides flexibility to support multicast applications, such as those used for distance learning or video editing that still relies on IGMP. It is essential during the transition that the Edge networks can support both multicast applications and any applications that still rely on IPv4.

Closing Thoughts

Migrating to IPv6 is a reality, and Asia and Europe are moving rapidly to embrace the new infrastructure for the Internet. Governments worldwide are planning to move to IPv6 and are now mandating the purchase of IPv6-enabled networking products. Service providers worldwide are also moving to IPv6 simply because the number of nodes, such as set-top boxes and cell phones, are not addressable by an IPv4 Class A subnet. In addition, service providers need IPv6 to deliver high-end multicast services, such as IPTV.

Enterprise customers in the USA must contemplate moving to IPv6, and being prepared is an essential move. Being prepared requires that the Edge network includes key solutions for network management, can support IPv4-only and IPv6 hosts, and a multicast-ready Edge.