Assignment 2

Dr Perigo:

When IPv4 was created, it was under the intention that the public space would never run out of IPs, but due to the boom of the internet, this became a reality. IPv6 was introduced to eliminate this problem, but it also introduced a new problem, being the communication between the two protocols. I will be explaining the different type of transitioning mechanisms of IPv4 to IPv6 and then giving my personal recommendation on best practices for transitioning from a IPv4 network to a IPv6 network.

**Dual-Stack Routers:**

* A device that can understand both incoming IPv4 and IPv6 packets. [3]
* The router can send those packets of information to devices on the network without changing the protocol for interpretation. [1]

**Tunneling:**

* The action of encapsulating an IPv6 packet to be perceived as a IPv4 packet so it can traverse an IPv4 network. [1]
* The IPv6 packet acquires an IPv4 header that can be attached for IPv4 use and then broken off for IPv6 communication. [4]
* Tunneling mechanisms do not scale well as they introduce large overhead for bigger networks. [4]

**NAT Protocol Translation:**

* Acts like network address translation (NAT) but provides the functionality for translating IPv4 information into IPv6 information. [2]
* A IPv4 header is replaced by an IPv6 header instead of adding a header like tunneling. [4]
* This does not happen host-host, rather a network device like a router will perform this conversion before reaching the destination.

**Network Refresh:**

* Simply get rid of the IPv4 space within a network.
* Either initiate a hardware refresh cycle or reformat the network to only deal with IPv6. [2]

Overall, all these transition mechanisms are reasonable and have been done before in production environments. As for the best practice in my opinion, for a network that started as a IPv4 network, NAT-PT would be a good option as it would be a simple addition to the routers that already preform NAT. While dual-stack routers and tunneling are a good option, they introduce overhead for any sized network and can be a hinderance when it comes to scalability. The best mechanism is no mechanism at all, that being a network refresh. While this would be the most ideal option, in most cases it is not reasonable for large networks to completely throw away their IPv4 architecture due to compatibility and complexity.

Best Regards,

Logan Chayet

Sources:

[1] <https://www.geeksforgeeks.org/transition-from-ipv4-to-ipv6-address/>

[2] <https://www.techtarget.com/searchnetworking/tip/How-enterprises-can-migrate-from-IPv4-to-IPv6>

[3] <https://www.juniper.net/documentation/us/en/software/junos/is-is/topics/concept/ipv6-dual-stack-understanding.html#:~:text=A%20dual%2Dstack%20device%20is,preferable%20solution%20in%20many%20scenarios>

[4] <https://www.ripe.net/publications/ipv6-info-centre/deployment-planning/transition-mechanisms/>