Network Proposal

Individual Project 5

Brian Bergstrom

ITCO 251 Network Infrastructure Basics

May 2, 2017

Michael Pry

AIU Online

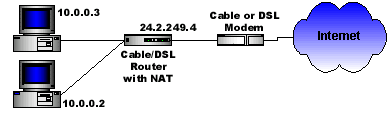
Abstract

In this proposal, guidelines will be laid out for implementing IPv6 and existing IPv4 in ZCorp’s global network infrastructure. A detailed background of IPv6 and its benefits will be explained, particularly regarding the issues and concerns with security. The reasons for keeping both IPv4 and IPv6 will also be explained as well as how to safely make the transition smoothly. Hardware requirements will also be discussed along with which IP address scheme is recommended for this sort for implementation.

Network Proposal

With technology changing ever so rapidly, it is hard to keep up with the best practice to adopt. There is pressure to convert networks over to IPv6 from IPv4 because IPv4 was only designed to have a certain amount of IP addresses available for everyone in the world to use. With the expansion of the internet, it has become clear that the networking protocol needs to be updated and changed. When originally implemented, IPv4 was mainly focused on intercommunication, not security (Pry, 2017). Since then, security has become a major issue in networks forcing companies to pay attention to their old infrastructure and upgrade what they can so they do not lose business to hackers and malicious attacks. ZCorp is one such company that needs help with implementing these new network ideas and has asked for a recommendation for how to move forward.

A network is very much like a mail delivery system. Every computer on the network has a specific address and that address tells the router and switches exactly where to send the messages being sent over the network. IPv4 is a 32 bit addressing scheme that has 4,294,967,296 different possible combinations available mathematically with some reserved addresses called special addresses. These addressees are all numbers divided into 4 octets. Not many people can remember these types of numbers so they came up with domain name servers to give those numbers a name. Today we refer to that as a web address usually with a .com or .org depending on what is registered. Another tool to help mitigate the crowded field is DHCP (Dynamic Host Configuration Protocol) which automatically generates IP addresses for the network to use and keeps track of which ones are available. This helps out with errors and allows users to move from multiple workstations without having to reconfigure their settings (Dean, 2013, p.160). Another technique used is network address translation. This gives a network a single IP address to use publically, then it allows the assignment of unique IP addresses within a private network. “Today a small business with 25 hosts, for example, might only be able to lease one IP address from its ISP. Yet the business still needs to allow all its hosts to access the internet. With address translation, all 25 hosts share a single Internet-routable IP address” (Dean, 2013, p. 412). These methods allow for better use of the limited available IP addresses in IPv4.



(Pry, 2017).

Subnetting is aver widely used practice to help designate where a message is supposed to go in a network. There are three levels involved: the network, subnet and the host. The network number is the assigned number to the network IP, similar to a zip code (Pry, 2017). The next group of numbers defines which subnet (or street) the message will travel on to the host. The host is the actual computer or device (house number) the message is travelling to. It is very common to implement a subnet mask of Class B for a business such as ZCorp because it allows them to have many different subnets within their network as well as provides ample amount of available hosts.

With the address space running out of IPv4, IPv6 was created to make more IP addresses available and make things more efficient. Instead of being only 32 bits, IPv6 is a whopping 128 bits, using eight groups of hexadecimal numbers separated by a colon. It looks like a bunch of HTML hex codes, but the nice part is, the long addresses can be shortened by truncating the zeros. One of the biggest changes to IPv6 from IPv4 is the header changes and the way packets are organized. There’s much less math involved than there was in IPv4 making it much less of a headache. No fragmentation exists which results in faster IP forwarding (Pry, 2017). This whole process makes things a lot smoother and faster to transfer network packets with more efficiency and security.

Lots of companies are jumping on the IPv6 bandwagon to stay up to date. However, only 30% of the world has made a complete turnaround. That means it’s still safe to use IPv4 devices and make them compatible with IPv6 using a dual stack implementation. This allows businesses to communicate on IPv6 devices, but also allows IPv4 to work as well. Companies are typically reluctant to replace all their hardware if it is not needed. In this case, it isn’t. Network reliability is key to maintaining a network. Converting completely over to IPv6-only may present a whole new bag of worms. Another factor to consider is the training of IT staff on the new IPv6 procedures (Pry, 2017). Odds are they are very familiar with IPv4 and would have to be given time to train on the new resources available to them.

To conclude, it is recommended ZCorp go with a dual stack implementation which would allow both the use of IPv4 and IPv6 providing a more up to date secure network. In the future, the company may decide to do a complete IPv6 conversion, but at this time it is not the best option.

References

Dean. (2013). *Network+ Guide to Networks*, 6th Edition.

[Bookshelf Online]. Retrieved from <https://online.vitalsource.com/#/books/9781133608196/>

Pry, M. (2017). *Introduction to IPv6*

[PowerPoint slides]. Retrieved from American InterContinental

     University Virtual Campus, ITCO251-1701B-01: https://mycampus.aiu

     -online.com