Chapter 4: Network Services

Outcome:

1. You’ll be able to describe why name resolution is important, identify the many steps involved with the DNS lookup, and understand the most common DNS record types

2. You’ll be able to explain how DHCP makes network administrators job simpler

3. You’ll be able to demonstrate how NAT technologies help keep networks secure and help preserve precious IP address space

4. You’ll be able to describe how VPNs and proxies help users get connected and stay secure.

4.2.1 DNS

What is DNS?

- DNS is a system that resolves domain names into IP addresses and vise-versa.
- Name Resolution, what it is?
- It is a process of using DNS to turn a domain into an IP address and vise-versa.
- Forward lookup - A way to find a host’s IP address by using that host’s name.
- Reverse lookup - A way to find a host’s name by using that host’s numeric IP address.
- **PTR records** are used for the reverse DNS lookup, while A records are used for the forward lookup.
- IP address, subnet mask, gateway and DNS server IP must be configured on the host as part of standard network configuration.

4.2.2 Types of primary DNS Servers

1. **Caching name servers** - *name servers with no authoritative information of their own*

2. **Recursive name servers** - communicate with several other DNS servers to hunt down an IP address and return it to the client.

3. **Root name servers** - are the servers at the root of the Domain Name System (DNS) hierarchy.

4. **TLD name servers** - are a group of **servers** that facilitate the generation of websites' Internet Protocol (IP) addresses. Without these **servers**, it would be practically difficult for Domain **Name** System to function properly. E.g .com, .org, etc

5. **Authoritative name servers** - name servers that give answers in response to questions asked about names in a zone.

Quiz Time

What is reverse lookup?

A. A way to find a host's numeric IP address by using the host's name

B. A way to replace a host's numeric IP address with a host name

C. A way to find a host's name by using that host's numeric IP address

D. A way to subdivide a domain name into additional names

Correct Answer: C

4.3 DHCP

- Without DHCP, the network administrator manually has to assign addresses to the individual hosts or routers.
- This tedious task however can be done automatically using the Dynamic Host Configuration Protocol (DHCP).
- DHCP is often called *plug-and-play protocol*
- *Operations of DHCP (DORA Process)*

I. Discover

II. Offer

III. Request

IV. Acknowledge

4.4 Network Address Translation (NAT)

4.4.1 Basics of NAT

- Network Address Translation takes one IP address and translates into another.

- Reasons:

I. Security reasons

II. Preserving of IP space

III. Cheaper

4.4.2 NAT and the Transport Layer

- One IP address is translated to another by a device usually a router.
- One-to-many NAT gets little complicated once return traffic is involved
- The simple way to ease the issue is through port preservation
- The port preservation is a technique where the source port chosen by a client is the same port used by the router.

4.4.3 Non-Routable Address Space and the limits of IPv4

- When using IP as a routable protocol, typically you are connecting to the Internet. Internet IP addresses are global in nature, and your end user device is able to access the Internet via the router. ...

- The term non routable on the other hand means that IP packets cannot be directed from one network to another.

- 172.31.0.0 - 172.31. 255.255, 192.168. 0.0 - 192.168. 255.255) are commonly referred to as "non-routable" addresses.

- The 4.2 billion possible IPv4 addresses have been predicted to run out.

- The IPv6 will possibly solve this issue but takes long time to implement.

- The workaround is NAT and non-routable address space

4.5 VPNs and Proxies

4.5.1 Virtual Private Network

- What is a VPN?

Allows a trusted network to communicate to another trusted network over un-trusted public network (internet).

- VPN Characteristics

1. *Traffic is encrypted*
2. *Remoted site is authenticated*
3. *Connection is point-to-point*

VPN Functions and Classifications

VPN Functions

- Authentication
- Access Control
- Confidentiality
- Data Integrity

VPN Classification

- Site-to-Site VPN
- Client VPN/Dial-up VPN

Types of VPN

1. Secure VPN – *You are doing everything (setting up everything)*

2. Trusted VPN – *You are trusting the service provider to do the set up for you*

4.5.2 Proxies

- A **proxy** server acts as a gateway between you and the internet. It's an intermediary server separating end users from the websites they browse. ...

- **Proxy** servers act as a firewall and web filter, provide shared network connections, and cache data to speed up common requests.

- A real life example of proxy is when you register to vote and have someone else actually cast your ballot.

Questions ???