Network Basics & Addressing

Network Components

Host – Any device connected to network

P2P – 2 hosts which uses services from the other

Intermediary device – devices added to network for a function e.g., router

Network Media – Media used for transmission e.g., cables

Lan – local Area Network

WAN – Wide area Network

Distinguishable based on geographical location

Who has access:

Internet – The world

Extranet – Suppliers, Customers, Collaborators

Intranet – Company only

Intranet vs Extranet – Intranet is private to your organization; Extranet is private but will give certain access privileges to some outside of the organization

Internet comes from internetworks, is the collection of all the networks in the world. Web is just one of the services on the internet.

Communication Fundamentals:

Message Source (Sender)

Message Destination (Receiver)

Channel – Media which provides the pathway for the message to travel from source to destination

Message Delivery Options

Unicast – sent to a single device

Multi cast – sent to a specified group of devices which meet a specific criterion. Can be heard by other but is not a broadcast

Broadcast – sent to all devices

OSI Model:

7. Application – Network process to application

6. Presentation – Data representation and encryption

5. Session – Interhost communication

4. Transport – End-to-end connections and reliability

3. Network – Path determination and logical addressing

2. Data Link – Physical addressing

1. Physical – Media, signal, and binary transmission

Encapsulation/Decapsulation

Addressing Standards

Positional Numeral System

Positional notation means that a digit represents different values depending on the position the digit occupies in the sequence of numbers.

Decimal numeral system (Base 10)

Binary Numeral system (Base 2)

Hexadecimal Numeral system (Base 16)

Datalink addressing (Layer 2 devices)

This uses MAC address as they are unique

Sometimes known as hardwired, hard-coded, fixed or physical address.

Formed out of 48 bits, written as 12-digit colon hexadecimal number (equals to 6 bytes/octets)

e.g., 02:42:90:E1:B4:8C

MAC Addresses are like serial numbers

MAC Address is unique, read-only, and are not routable

You can tell your OS to use a different MAC address to the one on the hardware

1st 6 Digits of a MAC Address identifies the vendor which is unique (OUI – Organizational Unique Identifier)

2nd 6 Digits of MAC Address identifies the device itself (Device Identifier)

IPCONFIG – Windows

IFCONFIG – Linux/MacOS

IPv4 – Consists of a string of 32 bits divided into four sections called octets. Each octet contains 8 bits (or 1 byte) separated with a dot. Only uses 1s and 0s.

Made of 2 portions – Network portion and a host portion

Legacy Classful Addressing

Class A 1st Octet is Network ID. Network starts with 0 it is a class A .0 – 127 network ID

Class B 1st 2 Octet is Network ID. Network starts with 10 it’s a class B. 128 – 191 Network ID

Class C 1st 3 Octet is Network ID. Network starts with 110 it’s a class C. 192 – 223 Network ID

Class D Network ID starts with 1110 it’s a class D. This is a multicast group address. 224 – 239 Network ID

Class E starts with 1111 and is an experimental address space. 240 – 255 Network ID