

## CISCO NOTES.

### Chapter 1

Inter networking.

#### **Cause LAN congestion ....**

- too many hosts in a broadcast domain
- broadcast storms
- multicasting
- low bandwidth
- Adding hubs for connectivity to the network
- A bunch of ARP or IPX traffic

#### **Advantages of using routers.**

- They don't forward broadcast automatically
- They can filter the network on Layer 3 - network layer - information.

Switches create separate collision domains but a signal broadcast domain. Routers provide a separate broadcast domain for each interface.

You would use a bridge in a network to reduce collisions within a broadcast domain and to increase the number of collision domains in your network. Doing this provides more bandwidth for users. and keep in mind that using hubs in your network can contribute to congestion on your ethernet network. As always, plan your network design carefully.

Routers are at the center stage and connect each physical layer together.

Connections between switches are considered a collision domain.

#### **Inter-networking Models.**

**OSI** - Allows different manufactures and developers to communicate.

- Splits network communication into smaller and simpler components. Easier for troubleshooting, development and design of a network.
- encourages industry standardization.
- allows various types of network hardware and software to communicate.

**Top Layers** - Define how the applications within the end stations will communicate.

**Bottom Layers** - Define how the data is transmitted.

#### **Top Layers**

- Application - Provides the user interface
- Presentation - Presents the data, handles processing such as encryption.
- Session - Keeps different application data separate.

#### **Bottom Layers**

- Transport - Provides reliable or unreliable delivery, Performs error correction before retransmit.
- Network - Provides logical addressing, which routers use for path determination
- Data Link - Combines packets into bytes and bytes into frames, provides access to media using MAC address, performs error detection not correction

•Physical - moves bits between devices, specifies voltage, wire speed and pin out of cables.

All People seem to need data processing.

The application layer is acting as an interface between the actual application. Some programs interface with the application layer and some actually are in the application layer such as ftp, ssh etc.

Flow Control - A way for the receiver to govern the amount of data sent by the sender.

Window - The amount of data which can be sent without receiving an acknowledgement from the receiver.

Data Link - Responsible for taking packets from the network layer and placing them on the network medium.

The transmitting device carries out ...

1. User information is converted to data for transmission along the medium and network.
2. Data is converted into the segments and a reliable connection is made to the receiving hosts.
3. The segments are then converted to packets or datagrams, and a logical address is placed in the header so each packet can be routed through the network.
4. Packets are converted to frames for transmission on the local network. Hardware addresses are used to uniquely identify hosts on a local network segment.
5. The frames are converted to bits, and a digital encoding and clocking scheme is used.

the network layer is responsible for finding the destination host and dictates where the packet should be sent along the local network .

### **The Cisco Three-Layer Hierarchical Model**

Core layer - Backbone

Distribution Layer - Routing

The Access Layer - Switching

Core Layer - Is responsible for transporting large amounts of traffic reliably and quickly. Its main purpose is to switch traffic as fast as possible. If there is a error in the core layer, every user may be affected.

Fault tolerance at this layer is an issue!

Distribution Layer - Responsible for providing routing, filtering and WAN access, also to determine how packets can access the core if needed. The distribution layer decides on the best path possible.

The Access Layer - Controls user and workgroup access to resources.

The main causes of LAN Congestion are Too many hosts in a broadcast domain, Broadcast storms, multicasting and low bandwidth are all issues for congesting.

The difference between Collision Domain and broadcast domain is that a collision domain is an ethernet term used to describe a network collection of devices which one particular device sends a packet on a network segment, forcing every other device on that segment to pay attention to that one packet. The broadcast domain is the set of devices on a network that hear all broadcasts sent on that segment.

Hubs, Bridge, Switch and Router - Hubs create one collision domain and one broadcast domain. Bridges breakup collision domains but create one large broadcast domain. Switches are really just multiple port bridges with more intelligence. They breakup collision domains, but create one large broadcast domain. Routers Breakup Broadcast domains and use logical addressing to filter the network.

Connection-oriented services use acknowledgments and flow control to create a reliable session. More overhead is used than in a connectionless network service. Connectionless services are used to send data with no acknowledgments or flow control. This is considered unreliable.

### **OSI Model - All People Seem To Need Data Processing**

Application, Presentation, Session - Upper Layers - Responsible for communicating from a user interface to the application.

The transport Layer provides segmentations, sequencing and virtual circuits.

The network Layer is there for logical addressing and routing through an internetwork.

The data link provides framing and placing of data onto the medium.

The physical layer takes the 1's and 0's and encodes them into a digital signal for the transmission on the network.

### **The different types of Ethernet Cabling**

Straight through - Connect a PC to a Router, hub or switch.

CrossOver - To connect hub to hub or switch to switch or maybe PC to PC

Rollover - Used to connect to a Console port on a device.

## **Chapter 1 Lab1 .1 OSI Question Answers.**

1. The application layer is responsible for Data integrity and Error Recovery.
2. The Physical layer takes the frames from the data link layer and encodes the 1's and 0's into a digital signal ready to be placed on the medium.
3. The network Layer enables connections and the path between two end systems.
4. The presentation layer is the layer which defines how data is formatted and presented so that the application layer can read the data.
5. The Session layer sets up connections between end hosts.
6. PDUs at the Data link layer
7. The transport layer makes reliable communication over networks.
8. The network layer is in charge of the logical addressing.
9. The physical layer is the layer which defines voltages, pin layouts and cables.
10. The data link layer converts bits into bytes and bytes into frames.
11. The session layer is responsible for creating different sessions between hosts.
12. Data link layer represents frames
13. The transport layer segments data.
14. The network layer creates packets.
15. The physical layer is the layer for transferring bits along physical medium.
16. Segments - Packets - frames - bits
17. The transport layer segments and reassembles data into a data stream.
18. Data Link controls error notification and flow control.
19. The network layer decides the tracks and location of devices on a network.
20. 48Bit is the length of a Mac codes which is the same as a hex number.

## **Chapter 1 Lab 1.2 Defining the OSI Layers and Devices.**

1. The Router sends and receives information about the network layer.
2. The transport layer creates a virtual circuit before transmitting.
3. The data link uses service access points.
4. Switch filters hardware addresses
5. The physical layer defines that ethernet is going to be used.
6. Transport layer supports flow control and sequencing.
7. Router can measure the distance to a remote network.
8. Network layer uses logical addressing.
9. Data Link (MAC Sub Layer) defines hardware address
10. A Hub creates one big collision domain but one large broadcast domain.
11. A Switch creates lots of smaller collision domains but the network is still one large broadcast domain.
12. A Hub cannot run at full Duplex.
13. A Router breaks up broadcast domains.

## **Chapter 1 Lab 1.3 Identifying Collision and Broadcast Domains.**

1. A Hub - One Big collision domain and one big broadcast domain
2. A Bridge - Two collision domains but still one broadcast domain
3. A Switch - Lots of smaller collision domains but one big broadcast domain
4. A Router - Breaks up both Collision domains and broadcast domains.

## Chapter 1 Lab 1.4 Binary/Decimal/Hexadecimal Conversion

128 64 32 16 8 4 2 1

1. 192.168.10.15 - 11000000101010000000101000001111
2. 172.16.20.55 - 10101100000100000001010000110111
3. 10.11.12.99 - 00001010000010110000110001100011