

## Understanding Switches Questions

With Eli the Computer Guy

URL: <http://www.elithecomputerguy.com/2010/07/13/understanding-switches/>

### 1. Define, compare and contrast hubs and switches.

- a. Hubs are simply Ethernet signal splitters, allowing multiple computers to connect to each other and share files or a printer. However, only one computer can communicate through the hub at one time. A switch allows multiple computers to connect to each other and communicate all at the same time. If too many computers connected through a hub try communicate data to one another at the same time, it creates a broadcast storm. When a computer wants to send data to a specific destination on the network through a hub, that data is broadcast to everyone, not only the intended receiver. Switches can learn and remember where specific computers are connected and route any communication specifically to that port, rather than all available ports.

### 2. On which OSI model layer do switches reside?

- a. Switches reside on layer 2 of the OSI model, the Data Link Layer, because it can identify network devices through their MAC address.

### 3. On which OSI model do hubs reside?

- a. Hubs reside on layer 1 of the OSI model, the Physical Layer, because it simply moves data through the physical cable to be delivered to the next system.

### 4. What information does the first half of the MAC address contain?

- a. The first half of a MAC address contains an identified for the manufacturer of the equipment.

### 5. What information does the last half of the MAC address contain?

- a. The last half of the MAC address is the serial number specific to the equipment (social security#)

### 6. What access methodology does Ethernet utilize?

- a. CSMA/CD, Carrier Sense Multiple Access/Collision Detection)

### 7. Briefly explain the difference between managed and unmanaged switches?

- a. Unmanaged switches are completely automated, sets configurations automatically based on what the communication is like between two computers. Managed switches can be configured by a user/admin to any specification they want or need on their network.

### 8. Compare and contrast full and half duplex.

- a. Full Duplex means that a device or machine can send and receive data at the same time, it can multitask. With a Half Duplex device, you can either transmit or receive data, but not at the same time.

### 9. What is a VLAN? Briefly describe its function.

- a. A Virtual LANs that are divided into certain ports on a switch to separate different networks from each other and still use the same switch

### 10. What is QoS? Briefly describe an environment where it would be useful.

- a. Quality of Service allows a network to prioritize network packets based on what protocol they are using. An environment where it would be useful would be businesses that use VOIP and File Sharing services, where VOIP connection/communication would be prioritized over file downloads or uploads

### 11. What is the spanning tree protocol? What does it prevent?

- a. Spanning Tree is a protocol that helps prevent network loops from occurring in a switch and cause a network to fail. It allows switches to talk to each other and route packets the fastest possible way.

## + Notes:

**“Switches are the core of your network...” –Eli**

### **What is a switch?**

- Much like a hub, it connects computers to a network, but is more advanced
- Switches determine the computer that data needs to be forwarded to, learns which port its connected to
  - o Allows for computers to communicate at the exact same time, no collisions
    - Switches reside at layer 2 of the OSI Model
      - It discovers the MAC address and learns that computer

### **What is a hub?**

- A way to split Ethernet signals, allow computers to connect to each other or share a printer.
- Biggest issue was that it was simply a splitter; any communication that came into the hub was sent out to all machines connected to a port on the hub.
  - o Packets collide if two machines try to send data through a hub at the same time
    - This proves problematic when you start scaling up, creating broadcast storms
      - Basically only one computer can communicate at a time...

### **MAC ADDRESS**

- All devices with a NIC have MAC addresses (Wireless and RJ-45)
  - o All MAC addresses are unique
- The first half of a MAC address is an identified for the manufacturer of the equipment
- The end of the MAC address is like a social security number / serial number

### **Managed vs Unmanaged**

- An Unmanaged Switch does a lot of is processing automatically, already configured
  - o If it work, that's good. If not, throw it away because Eli just said so...
    - Can automatically detect the transfer rate and set the port to that rate
      - It can also derp and set a wrong speed
- A Managed Switch allow you to set configuration to the needs of your system
  - o Can hardcode what each port can do, such as:
    - Speed, duplex, quality of service... examples

### **DUPLEX—means whether you can talk/listen at the same time**

- Half Duplex—you can either talk or listen, not both; like a radio
- Full Duplex—you can talk and listen at the same time; like a cell phone

### **Trunk Ports—ports that allow multiple switches to connect to one another**

- Handle much more data, up to 10GBps
- In large enterprise networks, multiple switches may be involved
  - o Data is sent into a switch to find the right port to deliver data, if it does not find the computer/device connected to that port, it sends the data to the trunk port to pass the data to another switch that may have the destination computer/device for that data

### **VLAN (Virtual Local Area Network)—allows user to separate the ports on a switch into different networks**

- Can only be set up on a managed switch
- If you have multiple network cables coming into one central location, and you don't want those networks to communicate with one another, you can put them into a separate port/virtual LAN
  - o “They cannot talk to each other at all...”
- You cannot have one VLAN to talk to another VLAN

**POWER OVER ETHERNET**—sending power (electricity) to a device (phone or camera) through Ethernet

- So that you don't need to plug into a wall or restrict where certain devices can be placed
- Communication happens between switch and device receiving power from the switch
  - o An acknowledgement requesting the version of the device that needs power is sent to the switch so that the right amount of power is sent
    - Buy good quality crap so that your shit don't suck –Eli, basically...
  - o Can power and provide connection to wireless access points, phones, security cameras, and more
    - Version 3 will be strong enough to power some laptops
      - Technology...
        - o Such wow...
          - Much amaze...

**QOS (Quality of Service)**—prioritizes packets/data based on what the packet/data is

- VOIP is considered higher priority vs file download
- This ensures that the bandwidth doesn't get bogged down or bottlenecks

**Spanning Tree Protocol**—allows switches to talk to each other and route packets the fastest way possible between multiple switches

- BIGGEST THING: Prevents routing loops, can cause the network to fail

Routing Protocols