

REVIEW LESSON

MTA Course: 98-366 Networking Fundamentals

Lesson name: Understanding Network Hardware 2.1_B

Topic: Understand switches

(One 50-minute class periods)

File name: NetFund_RL_2.1

Lesson Objective

2.1_B: Understand switches. *This objective may include but is not limited to:* Layer 2 and layer 3 switches, security options; hardware redundancy; support; backplane speed; switching types, MAC table; understanding capabilities of hubs vs. switches.

Preparation Details

Prerequisite student experiences and knowledge

This MTA Certification Exam Review lesson is written for students who have learned about networking fundamentals. Students who do not have the prerequisite knowledge and experiences cited in the objective will find additional learning opportunities using resources such as those listed in the Microsoft® resources and Web links at the end of this review lesson.

Instructor preparation activities

- None

Resources, software, and additional files needed for this lesson

- NetFund_PPT_2.1_B

Teaching Guide

Essential Vocabulary

Backplane—a large circuit board in large switches that modules plug into. The speed and characteristics can greatly improve the network capability. At multi-gigahertz data rates, backplane traces are actually microwave transmission lines.

hub—similar to an ordinary junction box that passes along what it receives to all the other ports on the hub.

layer 2 switches—provide the same functionality as bridges with an important difference: a switch is “smart” enough to determine which port is connected to the computer to which the message is addressed and to send it only to that port.

layer 3 switches—routers that do layer 3 forwarding in hardware and perform the functions of a layer 2 switch.

hardware redundancy—a duplication of hardware within the system, such as a redundant (duplicate) power supply that auto-switches when the original component fails.

MAC address—known as the hardware address or physical address, a unique value related to a network adapter, and uniquely identifies an adapter on a LAN. MAC addresses are 12-digit hexadecimal numbers (48 bits in length) and are written in one of two formats: MM:MM:MM:SS:SS:SS or MM-MM-MM-SS-SS-SS.

security options—defining what users can see and defining what they can connect to are the two basic steps to switch security.

switch—more intelligent and selective about where it passes data; learns where certain equipment is located and passes along the data only to the ports that need to receive it.

switch support—managed switches provide support for the network through flexibility, security, reliability, and expandability. They provide status alerts through email or texting, logs, SNMP, and more. Switches are also supported by their manufacturer through online manuals.

switching types—There are three types of switching used in networks: circuit, packet and cell relay.

Lesson Sequence

Activating prior knowledge/lesson staging (Anticipatory Set: 10 minutes)

1. Student prompt (PowerPoint® slide 3):
Recall what you learned about networking and the use of the switch.
 1. Explain when you would use a hub rather than a switch.
 2. List reasons for using an unmanaged switch.
2. Have students form groups of three to discuss their answers.
3. Give students a few minutes to respond, allowing them to work until they have finished.
4. As time permits, call on a few students to report to the group with their responses.

Lesson activity (30 minutes)

1. Teacher Instruction
 - Use the included PowerPoint slideshow to review switches and the following details: layer 2 and layer 3 switches, security options, hardware redundancy, support, backplane speed, switching types, MAC table, capabilities of hubs vs. switches.

Assessment/lesson reflection (10 minutes)

1. As indicated in the slideshow, recall what you learned.
 - Explain why it is preferable to use a switch rather than a hub.
 - List reasons for using a managed switch versus unmanaged switches.
2. If time permits, have groups informally present their designs to the class.
Encourage students to discuss the different designs they created.

Microsoft resources and Web links

- **About.com: MAC Addresses**
<http://compnetworking.about.com/od/networkprotocolsip/l/aa062202a.htm>
- **Candelatech: VLAN**
<http://www.candelatech.com/~greear/vlan.html>
- **Cisco: Switches**
http://www.cisco.com/web/about/ac123/ac147/archived_issues/ipj_1-2/switch_evolution.html
- **Fengnet: VLAN**
<http://www.fengnet.com/book/icuna/ch05lev1sec5.html>

- **How Stuff Works: How Switches Work**
<http://computer.howstuffworks.com/lan-switch12.htm>
- **HP: Switches**
<http://docs.hp.com/en/5992-0538/ar01s01.html>
- **It Knowledge Exchange: Unmanaged vs. managed switch**
<http://itknowledgeexchange.techtarget.com/itanswers/unmanaged-vs-managed-switch/>
- **Juniper.net: Aggregated Ethernet**
http://www.juniper.net/techpubs/en_US/junos9.5/topics/example/interfaces-aggregated-ethernet-virtual-chassis-uplinks.html
- **Networking IT Toolbox: Switch-backplane**
<http://networking.ittoolbox.com/groups/technical-functional/cisco-infrastructure-l/switch-backplane-560672>
- **Network World: Layer 4 switches**
<http://www.networkworld.com/details/725.html?def>
- **Speedguide.net**
http://www.speedguide.net/faq_in_q.php?category=90&qid=85
- **Support.3com: Switches**
http://support.3com.com/infodeli/tools/switches/s_stack2/3c16902/manual.a02/
- **Tech Republic: Switch security**
http://articles.techrepublic.com.com/5100-10878_11-5754342.html
- **Tekelec: Switching**
<http://www.tekelec.com/ss7/protocols/switching.asp>
- **Wikipedia: Network switch**
http://en.wikipedia.org/wiki/Network_switch
- **Wikipedia: High Speed Uplink**
http://en.wikipedia.org/wiki/High-Speed_Uplink_Packet_Access
- **Wikipedia: MAC Address**
http://en.wikipedia.org/wiki/MAC_address
- **Wikipedia: OSI model**
http://en.wikipedia.org/wiki/OSI_model