

REVIEW LESSON

MTA Course: 98-366 Networking Fundamentals

Lesson name: Understanding Network Hardware 2.3_B

Topic: Understand media types

(Two 50-minute class periods)

File name: NetFund_RL_2.3_B

Lesson Objective

2.3_B: Understand media types. *This objective may include but is not limited to:* cable types and their characteristics, including media segment length and speed; fiber optic; susceptibility to external interference (for example, machinery, power cables); susceptibility to electricity (for example, lightning), susceptibility to interception; twisted pair shielded or non-shielded; cabling, wireless.

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

- Make copies of Student Activity NetFund_SA_2.3_B

Resources, software, and additional files needed for this lesson

- NetFund_PPT_2.3_B
- NetFund_SA_2.3_B
- Gather the following items for the student activity
- Cable – 5 feet for each pair of students

- Terminators (2 per cable)
- Any tools necessary for cutting, crimping, etc.
- Wire cutter
- Crimper for RJ-45
- Wire stripper
- Scissors
- Cable tester for both T568A & T568B cables
- Cat 5e cable (solid copper core)
- RJ-45 male connectors (2 per cable)
- Directions for use of tools

Teaching Guide

Essential Vocabulary

Bayonet Neil-Concelman or British Naval Connector (BNC)—is the type of connector plug commonly found on CCTV devices for video and audio input / output connections. BNC is the choice for broadcast video and security video professionals because of its locking design. BNC plugs are easily adapted to standard consumer RCA connectors using a simple one-piece plug adapter. Nearly all products include the necessary adapters so that users can select either BNC or RCA connections to suit their individual requirements for immediate plug and play use. A connector widely used in the CCTV industry, usually for coaxial cable. Easy to install and reliable with little video signal loss.

cables – a collection of wires shielded within a protective tube, used to connect peripheral devices to a computer.

category 1 UTP cabling—used for telephone communications.

category 2 UTP cabling—data speed at 4 Mbps.

category 3 UTP cabling—data speed of 10 Mbps, used for 10BASE-T.

category 4 UTP cabling—data speed at 16 Mbps, used for token ring.

category 5 UTP cabling—data speed up to 100 Mbps.

category 5e—a twisted pair high signal integrity cable type often referred to as **Cat-5e** used in structured cabling for computer networks. Used in networks running at speeds up to 1000 Mbps (1 gigabit per second [Gbps]).

category 6—consists of four pairs of 24 American wire gauge (AWG) copper wires and fastest standard for UTP.

coaxial cable—made of a hollow outer cylindrical conductor surrounding a single inner wire made of two conducting elements.

RJ-45—the standard connector for 10Base-T/100Base-TX Ethernet, ISDN, T1, and digital telephone systems with pinouts that describe the arrangement of individual wires required when connecting connectors to a cable.

thicknet cable—(also known as 10BASE5 or thicknet) is the original "full spec" variant of Ethernet cable, using cable similar to RG-8/U coaxial cable but with extra braided shielding.

thinnet coaxial—(also known as 10BASE2 or cheapernet, thin Ethernet, thinnet, and thinwire) is a variant of Ethernet that uses thin coaxial cable.

TIA/EIA 568A-VS-568B—standards for the cabling used in telecommunications applications.

twisted pair shielded cable—used in Ethernet networking; its techniques include shielding, cancellation, wire twisting; it reduces electrical noise both within the cable and from outside the cable.

unshielded twisted pair cable—cable has eight individual copper wires, covered by an insulating material; used for many different networks.

wireless—communication that uses radio frequencies (RF) or infrared (IR) waves to transmit data between devices on a LAN.

Lesson Sequence

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

1. Student prompt (PowerPoint® slide 3):
 - Recall what you learned about cables yesterday.
 - On paper list everything you remember about twisted pair cables.
 - Share your answers in a group and present to the class if time allows

Lesson activity (20 minutes)

Teacher Instruction (20 minutes)

1. Use the included PowerPoint presentation to review the twisted pair shielded cable, nonshielded cable, coaxial cable, cabling, and wireless connection.
2. Demonstrate making a patch cable for the students. Students should create list of the steps as you demonstrate.

Student Activity 2.3_B (20 minutes)

1. Pass the completed patch cable around the room for the students to inspect.
2. As indicated in the slideshow, group students in pairs so each student can attach an RJ-45 end to the wire to complete the patch cable.
3. Students view the YouTube video demonstration creating a patch cable that attaches a category 5 wire to two RJ-45 ends.
<http://www.youtube.com/watch?v=482VtesZwZ8>
4. Students may work in teams to create a patch cable.
5. Students are to make their own 5 foot patch cable as described in Student Activity 2.3_B. Each needs a 5 foot length of wire and two RJ-45 terminators and tools (which they are to share with other students in the classroom). Use either cat 5/5e/6 UTP copper cabling and the EIA/TIA T568-B pin assignment standard.
6. Emphasize that they must be sure to terminate the ends carefully.
7. Students should test their cables using an Ethernet cable tester.
8. It may be necessary for students to finish outside of class.
9. If time permits, have groups informally present their patch cables to the class demonstrating with the tester that the cable ends have been attached successfully.

Assessment/lesson reflection

1. Test the cable.
2. Analyze and correct any problems.
3. Detail the testing and correcting process in a written report.
4. Submit to your instructor.

Microsoft resources and Web links

- **Answers.com: Twisted-Pair**
<http://www.answers.com/topic/twisted-pair>
- **Arcelect: Fiber Cable**
<http://www.arcelect.com/fibercable.htm>
- **Cat-5 Cable Company: TIA/EIA 568A-VS-568B**
<http://www.cat-5-cable-company.com/faq-568A-VS-568B.html>
- **Cisco Press: Fiber Optic Cable**
<http://www.ciscopress.com/articles/article.asp?p=170740>
- **Cisco Press: Network Media Types**
<http://www.ciscopress.com/articles/article.asp?p=31276>

- **Cisco Press: Network Media -The Physical Layer**
<http://www.ciscopress.com/articles/article.asp?p=169686>
- **Control Cable: T568A and T568B Wiring Schemes**
<http://www.controlcable.com/custom.asp?c=61084321>
- **JMKfilters: Electromagnetic Interference**
http://www.jmkfilters.com/faq.htm#electromagnetic_interference
- **Qedata: Equipment and Cable Interference**
http://www.qedata.se/e_emi_bakgrund.htm
- **SSLHQ: Network Media**
<http://www.sslhq.com/info/network-media-utp-cat3-cat5-stp-coax-fiber-optic-cable-single-mode-mutli>
- **Webopedia: Media**
<http://www.webopedia.com/TERM/M/media.html>
- **Wikipedia: Electromagnetic Interference**
http://en.wikipedia.org/wiki/Electromagnetic_interference
- **Wikipedia: Fiber Optic Cable**
http://en.wikipedia.org/wiki/Fiber_optic_cable