Cabling & Internetworking

Level 4: Student explored previously; third or higher pathway specific course
Pathway(s): Networking Systems & Security

Description

Cabling & Internetworking is an advanced course intended to equip students with the conceptual and practical skills necessary to install voice and data network cabling. This course emphasizes industry standards, types of media and cabling, physical and logical networks, and signal transmission. Upon completion of this course, proficient students will have skills in cable termination, reading network design documentation, pulling and mounting cable, setting up telecommunications rooms, basic cable testing and troubleshooting.

Student Learning Outcomes

Cabling Overview

1) Research the history and development of communications cabling to acquire knowledge of present-day network cabling concepts and uses, including:
    a. History of telephone and wireless communications in the United States
    b. The differences between analog and digital communication systems
    c. The three main types and typical applications of twisted-pair cabling
    d. Proper use of plenum- and riser-rated cabling

Safety

2) Assess a variety of situations requiring the use of networking cabling and demonstrate the ability follow procedures safely.
3) Explain the applicability of various safety standards and procedures, such as:
    a. Safety codes and standards for the cabling materials and installation methods
    b. Safe practices working around electricity
    c. Workplace safety practices
    d. Personal safety equipment

Computers and Electronics

4) Accurately read, interpret and demonstrate adherence to safety rules.
5) Identify and explain the intended sue of safety equipment available in the classroom.

Career Exploration

6) Compare and contrast aspects of communication signals carried by various types of cabling, identifying which types are best suited for different applications.

Transmission Media

7) Compare and contrast the typical applications for various types of data cables (such as twisted pair, coaxial cable, fiber optic), and the conditions under which a technician may use them.
8) Compare and contrast conducting data cables with fiber-optic data cables, including;
    a. Transmission modes (electrical conduction versus optical transmission)

      b. Connectors

      c. Installation issues

      d. Advantages and disadvantages

Specifications and Standards

9) Research wiring standards and the organizations responsible for drafting and overseeing them.

10) Explain how the communications standards impact a user's ability to specify, install, and test the appropriate cabling.

11) Describe the applicability of the various industry/association requirements (e.g. NEC, UL, etc.)

Cabling System Design

12) Design a telecommunications closet (TC) for a Local Area Network (LAN) installation.

      a. Explain differences between TC and equipment rooms

      b. Recommend number of TCs in a large building

      c. TC construction standards (including required and prohibited features and dimensions)

      d. Typical equipment and features in TC

      e. Required environmental conditions inside the TC

13) Explain and demonstrate the role played by each component in a typical star network installation, including the Network Interface card (NIC), media converter, repeater, hub, bridge, switch, server, and router.

      a. Detail the likely consequences in the event of failure.

      b. Prescribe strategies for prevention and maintenance.

Cabling Installation

14) Plan and implement a small-scale LAN installation, properly use the tools, techniques, and materials accepted in cabling industry (including but not limited to building schematics, wire cutters and wire strippers, cable crimpers, punch-down tool, "fish tape" and pull/pushrods, diagnostic test tools, lubricants, and cable identification tags).

15) Explain and demonstrate the rough-in phase for both horizontal and vertical installations of data cabling in small office.

      a. Horizontal and vertical installations

      b. Fire stops

      c. Telecommunications closet construction or upgrades

16) Explain and demonstrate the trim-out phase of an installation.

      a. Cable management

      b. Connectors

      c. Splices for copper media and fiber-optic media

      d. Patch panels

17) Explain and demonstrate the completion stage of an installation.

      a. Cable testing and certification

      b. Performance testing

      c. Final dressing of the installation

      d. Documentation and drawings representing the finished installation and test results

Special Cabling Situations

18) Demonstrate and understanding of the special cabling situations required for high bandwidth scenarios, providing power over Ethernet (PoE), standards of SCADA systems, industrial-grade data cabling requirements, and preventative maintenance programs for cabling systems.