

Cabling and Internetworking

Level: 2

Career Cluster: Digital Technology

Program: Information Technology

Pathway(s): Networking Systems and Security

Course Catalog Description

Course that introduces students to the principles of structured cabling systems and network connectivity. Students develop foundational skills in cable installation, termination, testing, network devices, addressing, and troubleshooting while applying safety standards, industry practices, and problem-solving strategies to design and maintain reliable network infrastructure systems.

Summary

Course that provides students with foundational knowledge and hands-on skills in network cabling systems and internetworking technologies. Students explore structured cabling design, cable types and standards, transmission media, and network topologies while developing practical skills in installation, termination, testing, and troubleshooting of cabling systems. Through applied learning experiences, students examine how network devices, protocols, and addressing systems enable communication across interconnected networks, and they analyze data flow, connectivity, and system performance. The course emphasizes safe work practices, compliance with industry standards, and systematic troubleshooting to maintain reliable network infrastructure. Students also develop professional and collaborative skills through work-based learning tasks, team-based network implementation, and technical documentation. The course culminates in a final project in which students design, install, test, and present a complete cabling and networking solution that demonstrates their ability to apply technical knowledge and problem-solving skills in a real-world context.

Notes

The updated course reflects a shift from a primarily task-based, installation-focused curriculum to a more comprehensive, structured program that integrates both foundational knowledge and applied technical skills with professional competencies. The original course emphasized hands-on cabling practices such as installation, termination, and basic network connectivity, along with understanding devices and internetworking concepts as discrete technical tasks. In contrast, the revised course organizes these topics into clearly defined learning sections, including cabling systems, transmission media, network design, protocols, troubleshooting, and safety practices, providing a more intentional progression of learning and deeper conceptual understanding. The updated version also expands the scope by incorporating stronger emphasis on network design principles, data flow, infrastructure evaluation, and performance analysis rather than focusing only on physical installation skills.

Student Learning Outcomes

1. Career Exploration and Postsecondary Opportunities

Objective: *Students will analyze career pathways in information technology, exploring industry roles, workplace expectations, required education, certifications, professional organizations, and postsecondary opportunities available in Colorado in order to make informed academic and career decisions.*

- 1) Identify employment opportunities in various fields with a focus in the area of information technology
 - a. Recognize the work typically performed, tools and technology used, and nature of work environments
 - b. Identify potential certifications within the careers
 - c. Find membership organizations associated with the careers
 - d. Understand the necessary education associated within the careers
- 2) Define professionalism within the context of information technology
 - a. Criticism and evaluation
 - b. Presentation
 - c. Assessment
- 3) Recognize laws, regulations, and ethics significant to the fields of information technology
- 4) Identify postsecondary opportunities offered in the state of Colorado
 - a. Technical college, community college, 4-year institutions
 - b. Certificates, associates, bachelor, and advanced degree opportunities

2. Foundations of Network Cabling Systems

Objective: *Students will explain the purpose and structure of cabling systems in order to support reliable communication within networked environments.*

- 5) Define key terminology related to network cabling and infrastructure
- 6) Identify components of structured cabling systems
- 7) Differentiate between voice, data, and network cabling applications
- 8) Explain how cabling supports data transmission across networks
- 9) Analyze the impact of cabling design on performance and reliability
- 10) Evaluate cabling solutions for different environments and use cases

3. Cable Types, Standards, and Transmission Media

Objective: *Students will analyze cable types and transmission media in order to select appropriate solutions for network connectivity.*

- 11) Identify characteristics of twisted pair, coaxial, fiber optic, and wireless technologies
- 12) Compare cable types based on speed, bandwidth, distance, and cost
- 13) Explain industry standards for network cabling installation and performance
- 14) Interpret specifications such as CAT ratings and fiber classifications
- 15) Analyze how environmental factors impact cable performance
- 16) Select appropriate cabling types based on network requirements

4. Network Topologies and Infrastructure Design

Objective: Students will evaluate network topologies and infrastructure layouts in order to design efficient and scalable networks.

- 17) Identify common network topologies including star, bus, ring, and mesh
- 18) Explain how topology impacts performance, reliability, and troubleshooting
- 19) Compare physical and logical network designs
- 20) Analyze infrastructure needs for small and large network environments
- 21) Apply design principles to create basic network layout diagrams
- 22) Evaluate topology choices based on scalability and fault tolerance

5. Cabling Installation and Termination Techniques

Objective: Students will apply installation and termination procedures in order to construct functional and standards-compliant network cabling systems.

- 23) Demonstrate proper use of cabling tools and equipment
- 24) Construct cable runs following structured cabling standards
- 25) Terminate cables using connectors, patch panels, and keystone jacks
- 26) Apply color-coding standards and wiring schemes
- 27) Test cable connections for continuity and performance
- 28) Evaluate installation quality based on industry expectations
- 29) Troubleshoot installation errors and revise work as needed

6. Network Devices, Connectivity, and Internetworking Concepts

Objective: Students will explain how network devices and internetworking technologies support communication between systems and networks.

- 30) Identify and describe the function of hubs, switches, routers, and access points
- 31) Explain how devices connect networks and manage traffic
- 32) Differentiate between local and wide area network connectivity
- 33) Analyze how data moves between interconnected networks
- 34) Interpret the role of protocols in internetworking communication
- 35) Evaluate device selection based on network purpose and design

7. Protocols, Addressing, and Data Flow

Objective: Students will analyze protocols and addressing systems in order to understand how data is transmitted and routed across networks.

- 36) Define protocols and explain their role in communication
- 37) Identify basic TCP IP concepts and how data is transmitted
- 38) Explain how addressing allows devices to communicate on a network
- 39) Analyze how packets travel between devices and networks
- 40) Evaluate protocol effectiveness for different communication tasks
- 41) Apply networking terminology to describe data flow processes

8. Testing, Troubleshooting, and Network Maintenance

Objective: Students will apply troubleshooting strategies and maintenance practices in order to ensure reliability and performance of network cabling systems.

- 42) Explain the purpose of systematic troubleshooting in networking
- 43) Identify common cabling and connectivity issues
- 44) Use testing equipment to diagnose cable faults
- 45) Apply troubleshooting models to isolate network problems
- 46) Implement corrective actions to resolve performance issues
- 47) Document troubleshooting steps and results clearly
- 48) Evaluate system performance after maintenance or repairs

9. Network Safety, Compliance, and Best Practices

Objective: Students will apply safety standards and best practices in order to maintain safe and compliant networking environments.

- 49) Demonstrate safe handling of tools and equipment during installation
- 50) Identify hazards related to electrical and network infrastructure
- 51) Apply proper labeling and documentation practices
- 52) Follow safety protocols for working with cables and devices
- 53) Evaluate compliance with industry and organizational standards
- 54) Justify the importance of safety and organization in network systems

10. Work-Based Learning and Professional Practice

Objective: Students will apply cabling and networking knowledge in authentic workplace settings in order to develop technical and professional skills.

- 55) Apply cabling and networking skills during hands-on projects or simulations
- 56) Demonstrate workplace behaviors including time management and accountability
- 57) Communicate technical processes clearly to peers or instructors
- 58) Document installation, testing, and troubleshooting procedures
- 59) Collaborate with others to complete networking tasks
- 60) Reflect on technical performance and areas for improvement
- 61) Evaluate how industry expectations influence work quality

11. Leadership and Collaborative Network Implementation

Objective: Students will demonstrate leadership and collaboration skills in order to contribute effectively to team-based networking projects.

- 62) Collaborate with team members to design and install network systems
- 63) Demonstrate leadership by organizing tasks and supporting group goals
- 64) Communicate ideas clearly during planning and implementation
- 65) Evaluate individual and group contributions to technical tasks
- 66) Defend design decisions using networking knowledge
- 67) Practice ethical and professional behavior in team environments
- 68) Reflect on leadership growth and set improvement goals

12. Final Assessment Project

Objective: *Students will design, install, test, and present a complete cabling and networking solution that demonstrates technical knowledge, problem solving, and professional communication.*

- 69) Design a structured cabling system for a defined scenario
- 70) Install and terminate cabling using appropriate tools and standards
- 71) Configure network connectivity using devices and protocols
- 72) Test and troubleshoot the system to ensure functionality
- 73) Document all installation, testing, and troubleshooting processes
- 74) Present the completed project and justify design decisions
- 75) Evaluate project outcomes and recommend improvements

13. Career and Technical Student Organizations

Objective: *Using the CTSO Resource Document, chapter activities will provide some of the best opportunities CTSO members will have to learn by doing. A successful program of work creates a positive learning atmosphere in the classroom. CTSO members learn how to accept responsibility, work as a team, manage a budget, and handle success and failure. Per the CTE Admin Handbook, CTSOs are embedded into curriculum.*

Professional Development

Prepare each member for entry into the workforce and provide a foundation for success in a career. Becoming a professional does not stop with acquiring a skill, but involves an increased awareness of the meaning of good citizenship and the importance of labor and management in the world of work.

Community Service

Promote and improve goodwill and understanding among all segments of the community through services donated by CTSO chapters, and to instill in its members a lifetime commitment to community service.

Business and Industry Connections

Increase awareness of quality job practices and attitudes, and increase the opportunities for employer engagement and eventual employment.

Financial Leadership

Plan and participate in activities to allow all members to carry out the chapter's projects. Educate members on their own personal finance for current and future success.

Public Relations

Make the general public aware of the good work that students in career and technical education are doing to better themselves and their community, state, nation, and world.

Social Activities

To increase cooperation in the school and community through activities that allow CTSO members to get to know each other in something other than a business or classroom setting.

Academic Standards Alignment

Colorado CTE courses are required to integrate academic and essential skills into course content. The following academic standards have been identified as aligned to this course and should be integrated throughout instruction.

[CO CTE Academic Standards Resources](#) (Rubrics, integration strategies, etc)

[CDE Colorado Academic Standards Online](#) (Online standards lookup tool)

Note: Mathematics and Science standards will be added in the future. Visit the [Colorado Academic Standards](#) page for the most current version.

Reading, Writing and Communicating Crosswalk

Course: Cabling and Internetworking

Colorado Academic Standards – Reading, Writing, and Communicating

Standard	Prepared Graduate Competency	Description	Course Evidence / Alignment
Standard 1: Oral Expression and Listening	Prepared Graduate 1 – Collaboration	Collaborate effectively as group members or leaders	Students collaborate during hands-on cabling installations, safety procedures, and troubleshooting tasks, requiring clear communication and shared responsibility.
Standard 1: Oral Expression and Listening	Prepared Graduate 2 – Oral Presentations	Deliver effective oral presentations	Students explain cabling designs, safety procedures, installation choices, and troubleshooting results to peers and instructors.
Standard 2: Reading for All Purposes	Prepared Graduate 4 – Informational Texts	Read a wide range of informational texts	Students read and interpret technical manuals, wiring diagrams, network design documentation, safety codes, and industry

			standards.
Standard 3: Writing and Composition	Prepared Graduate 7 – Informational Writing	Craft informational/explanatory texts	Students create written documentation such as installation plans, cable labeling, testing records, and troubleshooting reports.
Standard 3: Writing and Composition	Prepared Graduate 9 – Writing Process	Demonstrate mastery of the writing process	Students produce clear, accurate, and polished technical documentation following industry conventions.
Standard 4: Research Inquiry and Design	Prepared Graduate 10 – Research and Ethics	Gather and ethically use information	Students research cabling standards and organizations (e.g., NEC, UL, IEEE), evaluate technical information, and apply it safely and ethically in network installations.

Free Resource Links

1. Career Exploration and Postsecondary Opportunities

- CompTIA IT Career Pathways (certifications, networking careers, industry pathways)
<https://www.comptia.org/content/it-careers-path-roadmap>
- O NET Online Technology Careers (job roles, skills, work environments)
<https://www.onetonline.org>
- CareerOneStop IT Careers (career exploration, job outlook, education pathways)
<https://www.careeronestop.org/ExploreCareers/explore-careers.aspx>
- Colorado Community Colleges (postsecondary programs, certificates, degrees)
<https://cccs.edu>

2. Foundations of Network Cabling Systems

- BICSI Cabling Resources (structured cabling, infrastructure design, standards)
<https://www.bicsi.org>
- Computer Hope Cabling Guide (cable types, basics, networking concepts)
<https://www.computerhope.com>
- Cisco Network Cabling Basics (cabling systems, communication infrastructure)
<https://www.cisco.com>
- Electronics Tutorials Cabling Systems (network cabling, infrastructure, design)
<https://www.electronics-tutorials.ws>

3. Cable Types Standards and Transmission Media

- Cable Matters Guide (cable types, connectors, performance)
<https://www.cablematters.com/blog>
- Fiber Optic Association (fiber optics, standards, transmission media)
<https://www.thefoa.org>
- Fluke Networks Cable Testing (cable standards, testing, diagnostics)
<https://www.flukenetworks.com>
- Electronics Tutorials Transmission Media (twisted pair, fiber, coaxial)
<https://www.electronics-tutorials.ws>

4. Network Topologies and Infrastructure Design

- Cisco Network Topologies (topologies, infrastructure, design)
<https://www.cisco.com>
- GeeksforGeeks Network Topology (topology types, comparisons, design)
<https://www.geeksforgeeks.org/computer-network-topologies/>
- TechTarget Network Design (infrastructure planning, layout, scalability)
<https://www.techtarget.com>
- Network Encyclopedia Topologies (network layout, structure, performance)
<https://networkencyclopedia.com>

5. Cabling Installation and Termination Techniques

- BICSI Installation Practices (cable installation, structured cabling practices)
<https://www.bicsi.org>
- Fluke Networks Installation Basics (termination, testing, tools)
<https://www.flukenetworks.com>
- CableOrganizer Installation Guide (patch panels, termination, best practices)
<https://www.cableorganizer.com>
- TrueCable Installation Guide (cable termination, tools, procedures)
<https://www.truecable.com>

6. Network Devices Connectivity and Internetworking Concepts

- Cisco Networking Devices Overview (routers, switches, connectivity)
<https://www.cisco.com>
- Network Direction Devices Guide (routers, switches, roles)
<https://networkdirection.net>
- IBM Networking Concepts (devices, connectivity, systems)
<https://www.ibm.com/topics/networking>
- GeeksforGeeks Networking Devices (hardware, functions, internetworking)
<https://www.geeksforgeeks.org/network-devices/>

7. Protocols Addressing and Data Flow

- Cisco TCP IP Guide (protocols, addressing, communication)
<https://www.cisco.com>
- Cloudflare Learning Center (IP addressing, protocols, packet flow)
<https://www.cloudflare.com/learning>
- IBM TCP IP Overview (protocols, communication, addressing systems)
<https://www.ibm.com>
- GeeksforGeeks TCP IP (protocol stack, data flow, communication)
<https://www.geeksforgeeks.org/computer-networks/tcp-ip-model/>

8. Testing Troubleshooting and Network Maintenance

- Fluke Networks Testing Guide (cable testing, troubleshooting, diagnostics)
<https://www.flukenetworks.com>
- Cisco Troubleshooting Basics (network diagnostics, troubleshooting steps)
<https://www.cisco.com>
- CompTIA Troubleshooting Methods (problem solving, diagnostics, repair)
<https://www.comptia.org>
- SolarWinds Network Diagnostics (network performance, monitoring, analysis)
<https://www.solarwinds.com>

9. Network Safety Compliance and Best Practices

- OSHA Electrical Safety (workplace safety, electrical hazards, compliance)
<https://www.osha.gov>

- NFPA Safety Standards (electrical standards, safety practices, compliance)
<https://www.nfpa.org>
- BICSI Safety Practices (installation safety, compliance, guidelines)
<https://www.bicsi.org>
- IEC Safety Standards (international standards, electrical safety)
<https://www.iec.ch>

10. Work Based Learning and Professional Practice

- LinkedIn Learning IT Skills (professional development, technical growth)
<https://www.linkedin.com/learning>
- Coursera IT Programs (technical training, applied skills)
<https://www.coursera.org>
- Google Career Certificates IT (technical skills, workplace readiness)
<https://grow.google/certificates>
- Harvard Online Professional Skills (professional practice, communication)
<https://online.hbs.edu>

11. Leadership and Collaborative Network Implementation

- MindTools Leadership Skills (leadership, teamwork, communication)
<https://www.mindtools.com>
- Harvard Business Review Leadership (decision making, teamwork, leadership)
<https://hbr.org>
- Atlassian Team Playbook (collaboration, project coordination, teamwork)
<https://www.atlassian.com/team-playbook>
- Toastmasters Communication Resources (public speaking, leadership skills)
<https://www.toastmasters.org>

12. Final Assessment Project

- Cisco Packet Tracer (network simulation, design, testing)
<https://skillsforall.com/resources/lab-downloads>
- GitHub (project documentation, collaboration, version control)
<https://github.com>
- CodeHS Networking Projects (hands on projects, networking applications)
<https://codehs.com>
- Microsoft Learn Labs (hands on labs, system configuration, projects)
<https://learn.microsoft.com/training>