

## Cisco Networking Academy Curriculum - Semester Four Scope and Sequence

### Course Description:

This is the fourth course in four courses designed to introduce new content and extend previously learned networking skills which will empower the student to enter the workforce and/or further their education and training in the computer networking field. A task analysis of current industry standards and occupational analysis was used in the development of content standards. Instruction introduces and extends the student's knowledge and practical experience with Wide Area Networks (WANs), Integrated Services Data Networks (ISDN) and Point-to-Point Protocols (PPP) and Frame Relay design, configuration and maintenance. Students develop practical experience in skills related to configuring WAN's, ISDN, PPP and Frame Relay protocols and network troubleshooting.

Topics	Content Standards
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**Students will:**

### Wide Area Networks (WAN)

1. Understand the basics of WANs including common WAN technologies, types of wide area services, encapsulation formats and link options.
  - Understand and describe the purpose of WANs
  - Describe the various WAN devices
  - Understand and be able to apply the standards in WANs
  - Understand and apply WAN operation at the physical layer
  - Understand and apply WAN operation at the data link layer
  - Understand and interface with WAN service providers
  - Understand using WAN services with routers
  - Understand WAN encapsulation formats
    - -protocols
    - -serial line encapsulation
    - -High-Level Data Link Control (HDLC)
    - -Point-to-Point Protocol (PPP)
2. Understand WAN link options
  - -standards/capacities
  - -dedicated
  - -switched
  - -dial on demand
3. Understand the process and considerations for designing a hierarchical model of a WAN.
  - understand the process for gathering data about the needs of the user; gather user data
  - understand the benefits of using a hierarchical design model
  - understand the three layers of the hierarchical model and their functions
  - describe placement of Integrated Services Data Network (ISDN) and Frame Relay
  - understand the impact on traffic of placement of the enterprise and workgroup servers
4. Design a hierarchical WAN model

Topics (Continued)	Content Standards
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**Students will:**

5. Implement a hierarchical WAN Model

**Point-to-Point Protocol (PPP)**

6. Understand the components, process, and operation of PPP communication.
  - understand the basic components defining PPP communication
  - describe PPP's connection negotiation process
  - understand the use of Link Control Protocol (LCP) and Network Control Protocol (NCP) frames in PPP
  - understand the process for configuring and verifying PPP
  - negotiate a PPP connection
  - configure and verify a PPP connection

**Integrated Services Digital Network (ISDN)**

7. Understand the services, standards, components, operation and configuration of ISDN communication.
  - understand and articulate why ISDN is used
  - understand and be able to describe the special services offered by ISDN communication
  - understand and apply the standards of ISDN
  - understand the components of ISDN
  - understand the operation of ISDN
  - understand the process for configuring and verifying ISDN
8. Configure and verify an ISDN connection

**Frame Relay**

9. Understand the services, standards, components, operation and configuration of Frame Relay communication.
  - understand and use the basic devices of Frame Relay
  - understand the functions of Data-Link Connection Identifier (DLCI) in Frame Relay
  - understand the operation of Frame Relay
  - understand the issue of split horizon
  - understand subinterface
  - understand how Frame Relay uses subinterfaces to solve the problem of split horizon
  - understand the process for configuring and verifying Frame Relay on router interfaces
  - understand the process for configuring Frame Relay subinterfaces
10. Configure a Frame Relay using
  - Subinterfaces
  - DLCI functions

