

# **CISCO I** 10-12, Career & Technical Education

# **Developed By:** Mr. Vance Campbell & Mr. Vincent Vicchiariello **Effective Date:** Fall 2023 Scope and Sequence

Month	Unit	Activities
September	<ul><li>Networking Today</li><li>Basic Device Configuration</li></ul>	• Explain the advances in modern network technologies.
October	<ul> <li>Networking Today         <ul> <li>Basic Switch and End Device Configuration</li> </ul> </li> <li>Basic Device Configuration</li> </ul>	• Implement initial settings including passwords, IP addressing, and default gateway parameters on a network switch and end devices.
November	<ul> <li>Protocols &amp; Models</li> <li>Basic Device Configuration         <ul> <li>Number Systems</li> <li>IPv4 Addressing</li> </ul> </li> </ul>	<ul> <li>Explain how network protocols enable devices to access local and remote network resources.</li> <li>Explain how physical layer protocols, services, and network media support communications across data networks.</li> <li>Calculate numbers between decimal, binary, and hexadecimal systems.</li> <li>Calculate an IPv4 subnetting scheme to efficiently segment a network</li> </ul>
December	<ul> <li>Protocols &amp; Models         <ul> <li>Physical Layer</li> <li>Data Link Layer</li> <li>Ethernet Switching</li> </ul> </li> <li>Basic Device Configuration</li> </ul>	<ul> <li>Explain how media access control in the data link layer supports communication across networks</li> <li>Explain how Ethernet operates in a switched network.</li> </ul>
January	<ul> <li>Protocols &amp; Models         <ul> <li>Network Layer</li> </ul> </li> <li>Basic Device Configuration         <ul> <li>Address Resolution</li> <li>IPv6 Addressing</li> </ul> </li> </ul>	<ul> <li>Explain how routers use network layer protocols and services to enable end-to-end connectivity.</li> <li>Explain how ARP and ND enable communication on a network.</li> <li>Implement an IPv6 addressing scheme.</li> </ul>
February	<ul> <li>Protocols &amp; Models         <ul> <li>Transport Layer</li> <li>Application Layer</li> <li>Network Security Fundamentals</li> </ul> </li> <li>Basic Device Configuration         <ul> <li>Build a Small Network</li> </ul> </li> </ul>	<ul> <li>Compare the operations of transport layer protocols in supporting end-to-end communication.</li> <li>Explain the operation of application layer protocols in providing support to end-user applications.</li> <li>Configure switches and routers with device hardening features to enhance security.</li> <li>Implement a network design for a small network to include a router, a switch, and end devices.</li> </ul>
March	Basic Device Configuration     Switching Concepts	<ul> <li>Configure a Switch with Initial Settings</li> <li>Basic Router Configuration</li> </ul>
April	<ul> <li>Advanced Device Configuration</li> <li>Wireless &amp; Virtual Local Area Networks (WLAN &amp; VLAN)         <ul> <li>VLANs</li> <li>Inter-VLAN Routing</li> <li>EtherChannel</li> <li>DHCPv4</li> <li>LAN Security Concepts</li> </ul> </li> </ul>	<ul> <li>Overview of VLANs</li> <li>VLAN Configuration</li> <li>Router-on-a-Stick Inter-VLAN Routing</li> <li>Configure EtherChannel</li> <li>DHCPv4 Concepts</li> <li>Endpoint Security</li> </ul>
May	<ul> <li>Advanced Device Configuration</li> <li>Wireless &amp; Virtual Local Area Networks (WLAN &amp; VLAN)         <ul> <li>WLAN Concepts</li> <li>WLAN Configuration</li> </ul> </li> </ul>	<ul> <li>Introduction to Wireless</li> <li>WLAN Operation</li> <li>Configure a WPA2 Enterprise WLAN on the WLC</li> <li>Static and Dynamic Routing</li> </ul>

	<ul> <li>Routing         <ul> <li>Routing Concepts</li> </ul> </li> </ul>	
June	<ul> <li>Advanced Device Configuration</li> <li>Wireless &amp; Virtual Local Area Networks (WLAN &amp; VLAN)         <ul> <li>IP Static Routing</li> <li>Troubleshoot Static and</li> </ul> </li> <li>Routing         <ul> <li>Default Routes</li> </ul> </li> </ul>	<ul> <li>Static Routes</li> <li>Troubleshoot IPv4 Static and Default Route Configuration</li> </ul>

# Networking Today

### Summary and Rationale

Communication is almost as important to us as our reliance on air, water, food, and shelter. In today's world, through the use of networks, we are connected like never before. All end devices and network devices require an operating system (OS).

### **Recommended Pacing**

7-8 Weeks

### Standards

#### 9.3 Career and Technical Education (Link)

9.3.IT.1	Demonstrate effective professional communication skills and practices that enable positive customer relationships.
9.3.IT.2	Use product or service design processes and guidelines to produce a quality information technology (IT) product or service.
9.3.IT.4	Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.
9.3.IT.5	Explain the implications of IT on business development.
9.3.IT.6	Describe trends in emerging and evolving computer technologies and their influence on IT practices.
9.3.IT.7	Perform standard computer backup and restore procedures to protect IT information.
9.3.IT.9	Describe quality assurance practices and methods employed in producing and providing quality IT products and services.
9.3.IT.12	Demonstrate knowledge of the hardware components associated with information systems.
9.3.IT.13	Compare key functions and applications of software and determine maintenance strategies for computer systems.
Pathway: Information Support & Services (IT-SUP)	

9.3.IT-SUP.1	Provide technology support to maintain service.	
9.3.IT-SUP.2	Manage operating systems and software applications, including maintenance of upgrades, patches and service packs.	
9.3.IT-SUP.3	Apply appropriate troubleshooting techniques in resolving computer hardware, software and configuration problems.	
9.3.IT-SUP.4	Perform installation, configuration and maintenance of operating systems.	
NJSLS: Comp	outer Science & Design Thinking (2020) (Link)	
Computing Sy	stems	
8.1.12.CS.1	Describe ways in which integrated systems hide underlying implementation details to simplify user experiences.	
8.1.12.CS.2	Model interactions between application software, system software, and hardware.	
Engineering Design		
8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.	
Networks and the Internet		
8.1.12.NI.1	Evaluate the scalability and reliability of networks, by describing the relationship between routers, switches, servers, topology, and addressing.	
Data & Analysis		
8.1.12.DA.3	Translate between decimal numbers and binary numbers.	
Interaction of Technology and Humans		
8.2.12.ITH.1	Analyze a product to determine the impact that economic, political, social, and/or cultural factors have had on its design, including its design constraints.	
NJSLS: Career Readiness, Life Literacies, & Key Skills (2020) (Link)		
9.2 Career Awareness, Exploration, Preparation, and Training		
9.2.12.CAP.2	Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.	
9.2.12.CAP.3	Investigate how continuing education contributes to one's career and personal growth.	

9.2.12.CAP.4	Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.	
9.2.12.CAP.5	Assess and modify a personal plan to support current interests and postsecondary plans.	
9.2.12.CAP.7	Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.	
9.4 Life Litera	icies and Key Skills	
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).	
9.4.12.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).	
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).	
9.4.12.DC.3	Evaluate the social and economic implications of privacy in the context of safety, law, or ethics (e.g., 6.3.12.HistoryCA.1).	
9.4.12.DC.4	Explain the privacy concerns related to the collection of data (e.g., cookies) and generation of data through automated processes that may not be evident to users (e.g., 8.1.12.NI.3).	
9.4.12.DC.8	Explain how increased network connectivity and computing capabilities of everyday objects allow for innovative technological approaches to climate protection.	
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).	
	Instructio	onal Focus
Enduring Und	lerstandings:	Essential Questions:
• What is a world without boundaries and how will the world we live in now be changed by what we do today.		<ul> <li>What wouldn't we have without the internet?</li> <li>What will be possible in the future using "the network" as the platform for virtual and non-virtual world?</li> </ul>
Evidence of Learning (Assessments)		
<ul> <li>Packet Tracer</li> <li>Explaining how computers communicate on a network by creating a slideshow and building a success simulation.</li> <li>Interactive formative and summative assessments are integrated into the Intro to Networking</li> <li>Chapter tests in the curriculum are supported by an advanced online delivery system that presents assessment tasks, automatically scores and records results, and provides feedback to aid in learning.</li> </ul>		

• Immediate feedback supports instructor and student evaluation of acquired knowledge and skills.

• Assessments can be as simple as a multiple-choice question or as complex as troubleshooting a simulated network

#### **Objectives (SLO)**

<ul> <li>Students will know:</li> <li>Networks Affect our Lives</li> <li>Network Components</li> <li>Network Representations and Topologies</li> <li>Common Types of Networks</li> <li>Internet Connections</li> <li>Reliable Networks</li> <li>Network Trends</li> <li>Network Security</li> <li>The IT Professional</li> <li>Cisco IOS Access</li> <li>IOS Navigation</li> <li>The Command Structure</li> <li>Basic Device Configuration</li> <li>Save Configurations</li> <li>Ports and Addresses</li> <li>Configure IP Addressing</li> <li>Verify Connectivity</li> </ul>	<ul> <li>Students will be able to:</li> <li>Explain how networks affect our daily lives.</li> <li>Explain how host and network devices are used.</li> <li>Explain network representations and how they are used in network topologies.</li> <li>Compare the characteristics of common types of networks.</li> <li>Explain how LANs and WANs interconnect to the internet.</li> <li>Describe the four basic requirements of a reliable network.</li> <li>Explain how trends such as BYOD, online collaboration, video, and cloud computing are changing the way we interact.</li> <li>Identify some basic security threats and solutions for all networks.</li> <li>employment opportunities in the networking field.</li> <li>Explain how to access a Cisco IOS device for configuration purposes.</li> <li>Explain how to navigate Cisco IOS to configure</li> </ul>
<ul><li>The Command Structure</li><li>Basic Device Configuration</li></ul>	collaboration, video, and cloud computing are changing the way we interact.
<ul> <li>Basic Device Configuration</li> <li>Save Configurations</li> </ul>	<ul> <li>changing the way we interact.</li> <li>Identify some basic security threats and solutions</li> </ul>
<ul> <li>Ports and Addresses</li> </ul>	for all networks.
Configure IP Addressing	• employment opportunities in the networking field.
Verify Connectivity	<ul> <li>Explain how to access a Cisco IOS device for configuration purposes.</li> </ul>
	<ul> <li>Explain how to navigate Cisco IOS to configure network devices.</li> </ul>
	• Describe the command structure of Cisco IOS software.
	• Configure a Cisco IOS device using CLI.
	• Use IOS commands to save the running configuration
	<ul> <li>Explain how devices communicate across network media.</li> </ul>
	• Configure a host device with an IP address.
	• Verify connectivity between two end devices.
Suggested Resource	es/Technology Tools
<ul> <li>At www.netacad.com you can click the Careers met</li> <li>Find employment opportunities by using the Talent</li> </ul>	nu and then select Employment opportunities. Bridge Matching Engine.

Search for jobs with Cisco, Cisco partners and distributors seeking Cisco Networking Academy students and alumni.

# Tier 1 Modifications and Accommodations

Including special education students, Multilingual Language Learners (MLLs), students at risk of school failure, gifted and talented students, and students with 504 plans Special Education/IEP/504 - Modifications and accommodations must be aligned to the stated plan and uphold expectations of the plan lawfully. Every student requires a different set of accommodations based upon need. Examples specific to visual arts practice include, but are not limited to:

- Follow individual IEP/504 plans for specific modifications.
- Preferential seating
- Extended/Additional time for assessments
- Behavior management support
- Assignments/resources in electronic and physical format
- Break down assignments with oral directions, written directions, and visuals.
- Provide frequent reminders to stay on task and reinforce on-task behavior
- Work on organizational skills
- Provide visual supports
- Partnering/Grouping of students
- Re-teaching and review
- Multi-media approach to accommodate various learning styles
- Decrease/Modify number of project requirements
- Teacher/Aide/Para assistance
- Demonstrations of techniques on an individual level
- Show slide presentations to encourage exploration of project ideas

MLL - Teachers identify the modifications that they will use in the unit as related to the needs of their student population. Examples specific to visual arts practice include, but are not limited to:

- Allow the use of Google Translate where appropriate.
- Provide alternate ways for the student to respond (verbal/pictographic answers instead of written)
- Substitute a hands-on activity or use of different media in projects for a written activity
- Prepare and distribute advance notes
- Provide model sentence frames and sentence starters for both oral responses and written responses
- Provide additional time to complete assessments and assignments
- Model and use gestures to aid in understanding
- Model tasks by giving one or two examples before releasing students to work independently
- Present instructions both verbally and visually
- Simplify written and verbal instructions
- Speak clearly and naturally, and try to enunciate words, especially their ending sounds.
- Provide Visual, Graphic, Interactive, and/or Sensory Supports
- Simplify the language, format, and directions of the assessment
- Allow for alternate seating for proximity to peer helper or teacher as necessary
- When showing videos, use Closed Captioning.
- Support use of student's primary language by translating key words in directions, or key vocabulary terms or giving students opportunities to communicate in their primary language (written or orally).

Gifted and Talented/Enrichment - Utilize differentiation in the areas of acceleration, enrichment, and grouping. Examples specific to visual arts practice include, but are not limited to:

- Complex, in-depth research assignments
- Independent study where applicable
- Provide a variety of individualized work centers or student choice
- Lead demonstrations for class
- Individual presentation

- □ Act as a responsible and contributing citizen and employee.
- □ Apply appropriate academic and technical skills.
- □ Attend to personal health and financial well being.
- □ Communicate clearly and effectively and with reason.
- □ Consider the environmental, social and economic impacts of decisions.
- Demonstrate creativity and innovation.
- **□** Employ valid and reliable research strategies.
- **U**tilize critical thinking to make sense of problems and persevere in solving them.
- □ Model integrity, ethical leadership, and effective management.
- □ Plan education and career paths aligned to personal goals.
- □ Use technology to enhance productivity.
- $\Box$  Work productively in teams while using cultural global competence.

## Protocols & Models

## Summary and Rationale

The question is often asked, "Why are network protocols necessary in network communication?"

Essentially, it allows connected devices to communicate with each other, regardless of any differences in their internal processes, structure or design. Network protocols are the reason you can easily communicate with people all over the world, and thus play a critical role in modern digital communications.

### **Recommended Pacing**

14-16 Weeks

### Standards

9.3 Career and Technical Education (	Link)
--------------------------------------	-------

9.3.IT.1	Demonstrate effective professional communication skills and practices that enable positive customer relationships.
9.3.IT.2	Use product or service design processes and guidelines to produce a quality information technology (IT) product or service.
9.3.IT.4	Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.
9.3.IT.5	Explain the implications of IT on business development.
9.3.IT.6	Describe trends in emerging and evolving computer technologies and their influence on IT practices.
9.3.IT.7	Perform standard computer backup and restore procedures to protect IT information.
9.3.IT.9	Describe quality assurance practices and methods employed in producing and providing quality IT products and services.
9.3.IT.12	Demonstrate knowledge of the hardware components associated with information systems.
9.3.IT.13	Compare key functions and applications of software and determine maintenance strategies for computer systems.
Pathway: Information Support & Services (IT-SUP)	

9.3.IT-SUP.1	Provide technology support to maintain service.	
9.3.IT-SUP.2	Manage operating systems and software applications, including maintenance of upgrades, patches and service packs.	
9.3.IT-SUP.3	Apply appropriate troubleshooting techniques in resolving computer hardware, software and configuration problems.	
9.3.IT-SUP.4	Perform installation, configuration and maintenance of operating systems.	
NJSLS: Comp	outer Science & Design Thinking (2020) (Link)	
Computing Sy	stems	
8.1.12.CS.1	Describe ways in which integrated systems hide underlying implementation details to simplify user experiences.	
8.1.12.CS.2	Model interactions between application software, system software, and hardware.	
Engineering D	esign	
8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.	
Networks and the Internet		
8.1.12.NI.1	Evaluate the scalability and reliability of networks, by describing the relationship between routers, switches, servers, topology, and addressing.	
Data & Analysis		
8.1.12.DA.3	Translate between decimal numbers and binary numbers.	
Interaction of Technology and Humans		
	rechnology and frumany	
8.2.12.ITH.1	Analyze a product to determine the impact that economic, political, social, and/or cultural factors have had on its design, including its design constraints.	
8.2.12.ITH.1 NJSLS: Caree	Analyze a product to determine the impact that economic, political, social, and/or cultural factors have had on its design, including its design constraints. <b>r Readiness, Life Literacies, &amp; Key Skills (2020) (Link)</b>	
8.2.12.ITH.1 NJSLS: Caree 9.2 Career Aw	Analyze a product to determine the impact that economic, political, social, and/or cultural factors have had on its design, including its design constraints. <b>Tr Readiness, Life Literacies, &amp; Key Skills (2020) (Link)</b> <b>Training</b>	
8.2.12.ITH.1 NJSLS: Caree 9.2 Career Aw 9.2.12.CAP.2	Analyze a product to determine the impact that economic, political, social, and/or cultural factors have had on its design, including its design constraints. <b>Tr Readiness, Life Literacies, &amp; Key Skills (2020) (Link) Training</b> Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.	

9.2.12.CAP.4	Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.	
9.2.12.CAP.5	Assess and modify a personal plan to support current interests and postsecondary plans.	
9.2.12.CAP.7	Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.	
9.4 Life Litera	cies and Key Skills	
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).	
9.4.12.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).	
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).	
9.4.12.DC.3	Evaluate the social and economic implications of privacy in the context of safety, law, or ethics (e.g., 6.3.12.HistoryCA.1).	
9.4.12.DC.4	Explain the privacy concerns related to the collection of data (e.g., cookies) and generation of data through automated processes that may not be evident to users (e.g., 8.1.12.NI.3).	
9.4.12.DC.8	Explain how increased network connectivity and computing capabilities of everyday objects allow for innovative technological approaches to climate protection.	
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).	
Instructional Focus		
Enduring Understandings: Essential Questions:		Essential Questions:
• What a and dis	layered model is and the advantages advantages of using a layered model.	• Why do we use layered model versus proprietary systems?
Evidence of Learning (Assessments)		

- Written assessment on -
  - Binary is a base two numbering system that consists of the numbers 0 and 1, called bits.
  - Decimal is a base ten numbering system that consists of the numbers 0 through 9.
  - Binary is what hosts, servers, and networking equipment use to identify each other.
  - Hexadecimal is a base sixteen numbering system that consists of the numbers 0 through 9 and the letters A to F.
  - The data link layer of the OSI model.
- Interactive formative and summative assessments are integrated into the Intro to Networking
- Chapter tests in the curriculum are supported by an advanced online delivery system that presents assessment tasks, automatically scores and records results, and provides feedback to aid in learning.

- Immediate feedback supports instructor and student evaluation of acquired knowledge and skills.
- Assessments can be as simple as a multiple-choice question or as complex as troubleshooting a simulated network

#### **Objectives (SLO)**

Students will know:	Students will be able to:
<ul> <li>Describe the types of rules that are necessary to successfully communicate.</li> <li>Explain why protocols are necessary in network communication.</li> <li>The Rules</li> <li>Protocols</li> <li>Protocol Suites</li> <li>Standards Organizations</li> <li>Reference Models</li> <li>Data Encapsulation</li> <li>Data Access</li> <li>Purpose of the Physical Layer</li> <li>Physical Layer Characteristics</li> <li>Binary Number System</li> <li>Hexadecimal Number System</li> <li>Purpose of the Data Link Layer</li> <li>Ethernet Frame</li> <li>Ethernet MAC Address</li> <li>The MAC Address Table</li> </ul>	<ul> <li>Explain the purpose of adhering to a protocol suite.</li> <li>Explain the role of standards organizations in establishing protocols for network interoperability.</li> <li>Explain how the TCP/IP model and the OSI model are used to facilitate standardization in the communication process.</li> <li>Explain how data encapsulation allows data to be transported across the network.</li> <li>Explain how local hosts access local resources on a network.</li> <li>Describe the purpose and functions of the physical layer in the network.</li> <li>Calculate numbers between decimal and binary systems.</li> <li>Calculate numbers between decimal and hexadecimal systems.</li> <li>Describe the purpose and function of the data link layer in preparing communication for transmission on specific media.</li> <li>Explain how the Ethernet sublayers are related to the frame fields.</li> <li>Describe the Ethernet MAC address.</li> </ul>
~ 1 D	

### Suggested Resources/Technology Tools

- Wireshark
- Packet Tracer
- Hands-on lab activities and virtual learning tools are integrated into the curriculum

### Tier 1 Modifications and Accommodations

Including special education students, Multilingual Language Learners (MLLs), students at risk of school failure, gifted and talented students, and students with 504 plans

Special Education/IEP/504 - Modifications and accommodations must be aligned to the stated plan and uphold expectations of the plan lawfully. Every student requires a different set of accommodations based upon need. Examples specific to visual arts practice include, but are not limited to:

- Follow individual IEP/504 plans for specific modifications.
- Preferential seating
- Extended/Additional time for assessments
- Behavior management support
- Assignments/resources in electronic and physical format

- Break down assignments with oral directions, written directions, and visuals.
- Provide frequent reminders to stay on task and reinforce on-task behavior
- Work on organizational skills
- Provide visual supports
- Partnering/Grouping of students
- Re-teaching and review
- Multi-media approach to accommodate various learning styles
- Decrease/Modify number of project requirements
- Teacher/Aide/Para assistance
- Demonstrations of techniques on an individual level
- Show slide presentations to encourage exploration of project ideas

MLL - Teachers identify the modifications that they will use in the unit as related to the needs of their student population. Examples specific to visual arts practice include, but are not limited to:

- Allow the use of Google Translate where appropriate.
- Provide alternate ways for the student to respond (verbal/pictographic answers instead of written)
- Substitute a hands-on activity or use of different media in projects for a written activity
- Prepare and distribute advance notes
- Provide model sentence frames and sentence starters for both oral responses and written responses
- Provide additional time to complete assessments and assignments
- Model and use gestures to aid in understanding
- Model tasks by giving one or two examples before releasing students to work independently
- Present instructions both verbally and visually
- Simplify written and verbal instructions
- Speak clearly and naturally, and try to enunciate words, especially their ending sounds.
- Provide Visual, Graphic, Interactive, and/or Sensory Supports
- Simplify the language, format, and directions of the assessment
- Allow for alternate seating for proximity to peer helper or teacher as necessary
- When showing videos, use Closed Captioning.
- Support use of student's primary language by translating key words in directions, or key vocabulary terms or giving students opportunities to communicate in their primary language (written or orally).

Gifted and Talented/Enrichment - Utilize differentiation in the areas of acceleration, enrichment, and grouping. Examples specific to visual arts practice include, but are not limited to:

- Complex, in-depth research assignments
- Independent study where applicable
- Provide a variety of individualized work centers or student choice
- Lead demonstrations for class
- Individual presentation

- □ Act as a responsible and contributing citizen and employee.
- □ Apply appropriate academic and technical skills.
- □ Attend to personal health and financial well being.
- □ Communicate clearly and effectively and with reason.
- □ Consider the environmental, social and economic impacts of decisions.

- Demonstrate creativity and innovation.
- **D** Employ valid and reliable research strategies.
- $\Box$  Utilize critical thinking to make sense of problems and persevere in solving them.
- □ Model integrity, ethical leadership, and effective management.
- □ Plan education and career paths aligned to personal goals.
- □ Use technology to enhance productivity.
- □ Work productively in teams while using cultural global competence.

# Basic Device Configuration

# Summary and Rationale

The basic features allow you to configure basic network options. Basic users with minimal network configuration experience will be able to use the basic features. The basic user can utilize features and should become familiar with basic networking in general and understand the consequences of the changes you can make at this level.

# **Recommended Pacing**

26-28 Weeks

### Standards

**9.3 Career and Technical Education (Link)** 

9.3.IT.1	Demonstrate effective professional communication skills and practices that enable positive customer relationships.
9.3.IT.2	Use product or service design processes and guidelines to produce a quality information technology (IT) product or service.
9.3.IT.4	Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.
9.3.IT.5	Explain the implications of IT on business development.
9.3.IT.6	Describe trends in emerging and evolving computer technologies and their influence on IT practices.
9.3.IT.7	Perform standard computer backup and restore procedures to protect IT information.
9.3.IT.9	Describe quality assurance practices and methods employed in producing and providing quality IT products and services.
9.3.IT.12	Demonstrate knowledge of the hardware components associated with information systems.
9.3.IT.13	Compare key functions and applications of software and determine maintenance strategies for computer systems.
Pathway: Information Support & Services (IT-SUP)	
9.3.IT-SUP.1	Provide technology support to maintain service.

9.3.IT-SUP.2	Manage operating systems and software applications, including maintenance of upgrades, patches and service packs.	
9.3.IT-SUP.3	Apply appropriate troubleshooting techniques in resolving computer hardware, software and configuration problems.	
9.3.IT-SUP.4	Perform installation, configuration and maintenance of operating systems.	
NJSLS: Comp	uter Science & Design Thinking (2020) (Link)	
Computing Systems		
8.1.12.CS.1	Describe ways in which integrated systems hide underlying implementation details to simplify user experiences.	
8.1.12.CS.2	Model interactions between application software, system software, and hardware.	
Engineering D	esign	
8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.	
Networks and the Internet		
8.1.12.NI.1	Evaluate the scalability and reliability of networks, by describing the relationship between routers, switches, servers, topology, and addressing.	
Data & Analys	is	
8.1.12.DA.3	Translate between decimal numbers and binary numbers.	
Interaction of '	Fechnology and Humans	
8.2.12.ITH.1	Analyze a product to determine the impact that economic, political, social, and/or cultural factors have had on its design, including its design constraints.	
NJSLS: Career Readiness, Life Literacies, & Key Skills (2020) (Link)		
9.2 Career Awareness, Exploration, Preparation, and Training		
9.2.12.CAP.2	Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.	
9.2.12.CAP.3	Investigate how continuing education contributes to one's career and personal growth.	
9.2.12.CAP.4	Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.	

9.2.12.CAP.5	Assess and modify a personal plan to support current interests and postsecondary plans.			
9.2.12.CAP.7	Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.			
9.4 Life Litera	cies and Key Skills			
9.4.12.CI.1	Demonstrate the ability to reflect,	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).		
9.4.12.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).			
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).			
9.4.12.DC.3	Evaluate the social and economic implications of privacy in the context of safety, law, or ethics (e.g., 6.3.12.HistoryCA.1).			
9.4.12.DC.4	Explain the privacy concerns related to the collection of data (e.g., cookies) and generation of data through automated processes that may not be evident to users (e.g., 8.1.12.NI.3).			
9.4.12.DC.8	Explain how increased network connectivity and computing capabilities of everyday objects allow for innovative technological approaches to climate protection.			
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).			
	Ins	structional Focus		
Enduring Und	erstandings:	Essential Questions:		
<ul> <li>What IP addresses are used for:         <ul> <li>IPV4</li> <li>IPV6</li> </ul> </li> </ul>		• Why do you we use IPV 4 and IPV 6 as our addressing system around the world?		
Evidence of Learning (Assessments)				
<ul> <li>Create and solve packet tracer using IP addressing system.</li> <li>Hands-on lab activities and virtual learning tools are integrated into the curriculum</li> </ul>				
Students will know:St• Network Layer CharacteristicsIPv4 Packet• Router Routing TablesMAC and IP• Configure Initial Router Settings• Transportation of Data• Application, Presentation, and Session		<ul> <li>Students will be able to:</li> <li>Explain how the network layer uses IP protocols for reliable communications.</li> <li>Explain the role of the major header fields in the IPv4 packet.</li> <li>Explain the function of fields in the routing table of a router.</li> <li>Compare the roles of the MAC address and the IP address.</li> </ul>		

- Security Threats and Vulnerabilities
- Device Security

- Configure initial settings on an IOS Cisco router.
- Explain the purpose of the transport layer in managing the transportation of data in end-to-end communication.
- Explain how the functions of the application layer, presentation layer, and session layer work together to provide network services to end user applications.
- Explain why basic security measures are necessary on network devices.
- Configure network devices with device hardening features to mitigate security threats.

# Suggested Resources/Technology Tools

- Packet Tracer
- Hands-on lab activities and virtual learning tools are integrated into the curriculum

### Tier 1 Modifications and Accommodations

Including special education students, Multilingual Language Learners (MLLs), students at risk of school failure, gifted and talented students, and students with 504 plans

Special Education/IEP/504 - Modifications and accommodations must be aligned to the stated plan and uphold expectations of the plan lawfully. Every student requires a different set of accommodations based upon need. Examples specific to visual arts practice include, but are not limited to:

- Follow individual IEP/504 plans for specific modifications.
- Preferential seating
- Extended/Additional time for assessments
- Behavior management support
- Assignments/resources in electronic and physical format
- Break down assignments with oral directions, written directions, and visuals.
- Provide frequent reminders to stay on task and reinforce on-task behavior
- Work on organizational skills
- Provide visual supports
- Partnering/Grouping of students
- Re-teaching and review
- Multi-media approach to accommodate various learning styles
- Decrease/Modify number of project requirements
- Teacher/Aide/Para assistance
- Demonstrations of techniques on an individual level
- Show slide presentations to encourage exploration of project ideas

MLL - Teachers identify the modifications that they will use in the unit as related to the needs of their student population. Examples specific to visual arts practice include, but are not limited to:

- Allow the use of Google Translate where appropriate.
- Provide alternate ways for the student to respond (verbal/pictographic answers instead of written)
- Substitute a hands-on activity or use of different media in projects for a written activity
- Prepare and distribute advance notes
- Provide model sentence frames and sentence starters for both oral responses and written responses
- Provide additional time to complete assessments and assignments
- Model and use gestures to aid in understanding
- Model tasks by giving one or two examples before releasing students to work independently

- Present instructions both verbally and visually
- Simplify written and verbal instructions
- Speak clearly and naturally, and try to enunciate words, especially their ending sounds.
- Provide Visual, Graphic, Interactive, and/or Sensory Supports
- Simplify the language, format, and directions of the assessment
- Allow for alternate seating for proximity to peer helper or teacher as necessary
- When showing videos, use Closed Captioning.
- Support use of student's primary language by translating key words in directions, or key vocabulary terms or giving students opportunities to communicate in their primary language (written or orally).

Gifted and Talented/Enrichment - Utilize differentiation in the areas of acceleration, enrichment, and grouping. Examples specific to visual arts practice include, but are not limited to:

- Complex, in-depth research assignments
- Independent study where applicable
- Provide a variety of individualized work centers or student choice
- Lead demonstrations for class
- Individual presentation

- □ Act as a responsible and contributing citizen and employee.
- □ Apply appropriate academic and technical skills.
- □ Attend to personal health and financial well being.
- □ Communicate clearly and effectively and with reason.
- □ Consider the environmental, social and economic impacts of decisions.
- Demonstrate creativity and innovation.
- **□** Employ valid and reliable research strategies.
- $\Box$  Utilize critical thinking to make sense of problems and persevere in solving them.
- □ Model integrity, ethical leadership, and effective management.
- $\hfill\square$  Plan education and career paths aligned to personal goals.
- Use technology to enhance productivity.
- □ Work productively in teams while using cultural global competence.

# Advanced Device Configuration

# Summary and Rationale

The advanced features allow you to configure more technical options. Advanced users with extensive network configuration experience will be able to use the advanced features. The advanced user can utilize features and should be thoroughly familiar with advanced networking in general and understand the consequences of the changes you can make at this level.

## **Recommended Pacing**

10-12 Weeks

Standards

#### **9.3** Career and Technical Education (Link)

9.3.IT.1	Demonstrate effective professional communication skills and practices that enable positive customer relationships.
9.3.IT.2	Use product or service design processes and guidelines to produce a quality information technology (IT) product or service.
9.3.IT.4	Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.
9.3.IT.5	Explain the implications of IT on business development.
9.3.IT.6	Describe trends in emerging and evolving computer technologies and their influence on IT practices.
9.3.IT.7	Perform standard computer backup and restore procedures to protect IT information.
9.3.IT.9	Describe quality assurance practices and methods employed in producing and providing quality IT products and services.
9.3.IT.12	Demonstrate knowledge of the hardware components associated with information systems.
9.3.IT.13	Compare key functions and applications of software and determine maintenance strategies for computer systems.
Pathway: Information Support & Services (IT-SUP)	

9.3.IT-SUP.1	Provide technology support to maintain service.	
9.3.IT-SUP.2	Manage operating systems and software applications, including maintenance of upgrades, patches and service packs.	
9.3.IT-SUP.3	Apply appropriate troubleshooting techniques in resolving computer hardware, software and configuration problems.	
9.3.IT-SUP.4	Perform installation, configuration and maintenance of operating systems.	
NJSLS: Comj	outer Science & Design Thinking (2020) (Link)	
Computing Sy	vstems	
8.1.12.CS.1	Describe ways in which integrated systems hide underlying implementation details to simplify user experiences.	
8.1.12.CS.2	Model interactions between application software, system software, and hardware.	
Engineering Design		
8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.	
Networks and the Internet		
8.1.12.NI.1	Evaluate the scalability and reliability of networks, by describing the relationship between routers, switches, servers, topology, and addressing.	
Data & Analysis		
8.1.12.DA.3	Translate between decimal numbers and binary numbers.	
Interaction of Technology and Humans		
8.2.12.ITH.1	Analyze a product to determine the impact that economic, political, social, and/or cultural factors have had on its design, including its design constraints.	
NJSLS: Career Readiness, Life Literacies, & Key Skills (2020) (Link)		
9.2 Career Awareness, Exploration, Preparation, and Training		
9.2.12.CAP. 2	Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.	
9.2.12.CAP. 3	Investigate how continuing education contributes to one's career and personal growth.	

9.2.12.CAP. 4	Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.		
9.2.12.CAP. 5	Assess and modify a personal plan to support current interests and postsecondary plans.		
9.2.12.CAP. 7	Use online resources to examine licensing, state, and national levels to maintain compl	certification, and credentialing requirements at the local, iance with industry requirements in areas of career interest.	
9.4 Life Litera	acies and Key Skills		
9.4.12.CI.1	12.CI.1 Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).		
9.4.12.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).		
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).		
9.4.12.DC.3	Evaluate the social and economic implications of privacy in the context of safety, law, or ethics (e.g., 6.3.12.HistoryCA.1).		
9.4.12.DC.4	Explain the privacy concerns related to the collection of data (e.g., cookies) and generation of data through automated processes that may not be evident to users (e.g., 8.1.12.NI.3).		
9.4.12.DC.8	Explain how increased network connectivity and computing capabilities of everyday objects allow for innovative technological approaches to climate protection.		
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).		
	Instructional Focus		
Enduring Understandings: Es		Essential Questions:	
• Switching and routing concepts and how to can switches make networks run more efficiently		<ul> <li>Why is it important to configure device security on routers?</li> <li>Why is it important to configure device security on switches?</li> </ul>	
Evidence of Learning (Assessments)			
<ul> <li>Create and solve packet tracer using         <ul> <li>Network configuration and troubleshooting</li> <li>Mitigate LAN security threats</li> <li>Configure and secure a basic WLAN</li> </ul> </li> <li>Hands-on lab activities and virtual learning tools are integrated into the curriculum</li> </ul>			
Objectives (Sl	LO)		

Students will know:

- How to configure a switch with initial settings
- How to configure switch ports
- How to secure remote access
- Basic Router Configuration
- How to verify directly connected networks
- Frame Forwarding
- Switching Domains
- Inter-VLAN Routing Operation
- Router-on-a-Stick Inter-VLAN Routing
- Inter-VLAN Routing using Layer 3 Switches
- How to troubleshoot inter-VLAN routing
- The purpose of STP
- How to configure EtherChannel.
- DHCPv4 Concepts
- First Hop Redundancy Protocol
- LAN Attacks
- How to implement port security

Students will be able to:

- Configure devices by using security best practices.
- Configure initial settings on a Cisco switch.
- Configure switch ports to meet network requirements
- Configure secure management access on a switch.
- Configure basic settings on a router, using CLI, to route between two directly-connected networks.
- Verify connectivity between two networks that are directly connected to a router.
- Explain how frames are forwarded in a switched network.
- Compare a collision domain to a broadcast domain.
- Implement VLANs and trunking in a switched network.
- Explain the purpose of VLANs in a switched network.
- Explain how a switch forwards frames based on VLAN configuration in a multi-switch environment.
- Configure a switch port to be assigned to a VLAN based on requirements.
- Configure a trunk port on a LAN switch.
- Configure Dynamic Trunking Protocol (DTP).

### Suggested Resources/Technology Tools

- Cisco IOS versions
- Routers: Version 15.0 or higher, IP Base feature set
- Switches: Version 15.0 or higher, lanbaseK9 feature set
- Packet Tracer v7.3
- Open-source server software

### Tier 1 Modifications and Accommodations

Including special education students, Multilingual Language Learners (MLLs), students at risk of school failure, gifted and talented students, and students with 504 plans

Special Education/IEP/504 - Modifications and accommodations must be aligned to the stated plan and uphold expectations of the plan lawfully. Every student requires a different set of accommodations based upon need. Examples specific to visual arts practice include, but are not limited to:

- Follow individual IEP/504 plans for specific modifications.
- Preferential seating
- Extended/Additional time for assessments
- Behavior management support
- Assignments/resources in electronic and physical format
- Break down assignments with oral directions, written directions, and visuals.
- Provide frequent reminders to stay on task and reinforce on-task behavior
- Work on organizational skills
- Provide visual supports
- Partnering/Grouping of students

- Re-teaching and review
- Multi-media approach to accommodate various learning styles
- Decrease/Modify number of project requirements
- Teacher/Aide/Para assistance
- Demonstrations of techniques on an individual level
- Show slide presentations to encourage exploration of project ideas

MLL - Teachers identify the modifications that they will use in the unit as related to the needs of their student population. Examples specific to visual arts practice include, but are not limited to:

- Allow the use of Google Translate where appropriate.
- Provide alternate ways for the student to respond (verbal/pictographic answers instead of written)
- Substitute a hands-on activity or use of different media in projects for a written activity
- Prepare and distribute advance notes
- Provide model sentence frames and sentence starters for both oral responses and written responses
- Provide additional time to complete assessments and assignments
- Model and use gestures to aid in understanding
- Model tasks by giving one or two examples before releasing students to work independently
- Present instructions both verbally and visually
- Simplify written and verbal instructions
- Speak clearly and naturally, and try to enunciate words, especially their ending sounds.
- Provide Visual, Graphic, Interactive, and/or Sensory Supports
- Simplify the language, format, and directions of the assessment
- Allow for alternate seating for proximity to peer helper or teacher as necessary
- When showing videos, use Closed Captioning.
- Support use of student's primary language by translating key words in directions, or key vocabulary terms or giving students opportunities to communicate in their primary language (written or orally).

Gifted and Talented/Enrichment - Utilize differentiation in the areas of acceleration, enrichment, and grouping. Examples specific to visual arts practice include, but are not limited to:

- Complex, in-depth research assignments
- Independent study where applicable
- Provide a variety of individualized work centers or student choice
- Lead demonstrations for class
- Individual presentation

- $\hfill\square$  Act as a responsible and contributing citizen and employee.
- □ Apply appropriate academic and technical skills.
- □ Attend to personal health and financial well being.
- □ Communicate clearly and effectively and with reason.
- □ Consider the environmental, social and economic impacts of decisions.
- Demonstrate creativity and innovation.
- □ Employ valid and reliable research strategies.
- **U**tilize critical thinking to make sense of problems and persevere in solving them.
- □ Model integrity, ethical leadership, and effective management.
- □ Plan education and career paths aligned to personal goals.

- □ Use technology to enhance productivity.
- □ Work productively in teams while using cultural global competence.

# Wireless & Virtual Local Area Networks (WLAN & VLAN)

# Summary and Rationale

The second course in the CCNA curriculum focuses on switching technologies and router operations that support small-to-medium business networks and includes wireless local area networks (WLANs) and security concepts.

### **Recommended Pacing**

10-12 Weeks

### Standards

#### 9.3 Career and Technical Education (Link)

Career C	luster:	Information	Technology	(IT)

9.3.IT.1	Demonstrate effective professional communication skills and practices that enable positive customer relationships.
9.3.IT.2	Use product or service design processes and guidelines to produce a quality information technology (IT) product or service.
9.3.IT.4	Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.
9.3.IT.5	Explain the implications of IT on business development.
9.3.IT.6	Describe trends in emerging and evolving computer technologies and their influence on IT practices.
9.3.IT.7	Perform standard computer backup and restore procedures to protect IT information.
9.3.IT.9	Describe quality assurance practices and methods employed in producing and providing quality IT products and services.
9.3.IT.12	Demonstrate knowledge of the hardware components associated with information systems.
9.3.IT.13	Compare key functions and applications of software and determine maintenance strategies for computer systems.
Pathway: Information Support & Services (IT-SUP)	
9.3.IT-SUP.1	Provide technology support to maintain service.

9.3.IT-SUP.2	Manage operating systems and software applications, including maintenance of upgrades, patches and service packs.	
9.3.IT-SUP.3	Apply appropriate troubleshooting techniques in resolving computer hardware, software and configuration problems.	
9.3.IT-SUP.4	Perform installation, configuration and maintenance of operating systems.	
NJSLS: Comj	outer Science & Design Thinking (2020) (Link)	
Computing Sy	zstems	
8.1.12.CS.1	Describe ways in which integrated systems hide underlying implementation details to simplify user experiences.	
8.1.12.CS.2	Model interactions between application software, system software, and hardware.	
Engineering I	Design	
8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.	
8.2.12.ED.6	Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).	
Networks and the Internet		
8.1.12.NI.1	Evaluate the scalability and reliability of networks, by describing the relationship between routers, switches, servers, topology, and addressing.	
Data & Analysis		
8.1.12.DA.3	Translate between decimal numbers and binary numbers.	
Interaction of Technology and Humans		
8.2.12.ITH.1	Analyze a product to determine the impact that economic, political, social, and/or cultural factors have had on its design, including its design constraints.	
Nature of Technology		
8.2.12.NT.2	Redesign an existing product to improve form or function.	
NJSLS: Career Readiness, Life Literacies, & Key Skills (2020) (Link)		
9.2 Career Awareness, Exploration, Preparation, and Training		

9.2.12.CAP.2	Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.		
9.2.12.CAP.3	Investigate how continuing education contributes to one's career and personal growth.		
9.2.12.CAP.4	Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.		
9.2.12.CAP.5	Assess and modify a personal plan to support current interests and postsecondary plans.		
9.2.12.CAP.7	Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.		
9.4 Life Litera	acies and Key Skills		
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).		
9.4.12.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).		
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).		
9.4.12.DC.3	Evaluate the social and economic implications of privacy in the context of safety, law, or ethics (e.g., 6.3.12.HistoryCA.1).		
9.4.12.DC.4	Explain the privacy concerns related to the collection of data (e.g., cookies) and generation of data through automated processes that may not be evident to users (e.g., 8.1.12.NI.3).		
9.4.12.DC.8	Explain how increased network connectivity and computing capabilities of everyday objects allow for innovative technological approaches to climate protection.		
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).		
Instructional Focus			
Enduring Understandings: Essential Questions:		Essential Questions:	
• The importance of Inter-VLAN Routing Operation on a small to medium size network		<ul> <li>Why do we need the options of inter-VLAN routing?</li> <li>Why did we use Router on a stick for so long?</li> </ul>	
Evidence of Learning (Assessments)			

- Create and solve packet tracer using network configuration to inter-VLAN Routing
- Hands-on lab activities and virtual learning tools are integrated into the curriculum

#### **Objectives (SLO)**

<ul> <li>Students will know:</li> <li>WLAN Operation</li> <li>CAPWAP Operation</li> <li>Channel Management</li> <li>WLAN Threats</li> <li>Secure WLANs</li> <li>Remote Site WLAN</li> <li>Configuration</li> <li>Configuration</li> <li>Configure a Basic WLC on the WLC</li> <li>Inter-VLAN Routing Operation</li> <li>Router-on-a-Stick Inter-VLAN Routing</li> <li>Inter-VLAN Routing using Layer 3 Switches</li> </ul>	<ul> <li>Students will be able to:</li> <li>Explain how WLANs enable network connectivity</li> <li>Describe WLAN technology and standards</li> <li>Describe the components of a WLAN infrastructure</li> <li>Explain how wireless technology enables WLAN operation.</li> <li>Describe threats to WLANs.</li> <li>Describe WLAN security mechanisms</li> <li>Configure a WLAN to support a remote site.</li> </ul>
<ul> <li>Inter-VLAN Routing using Layer 3 Switches</li> <li>Troubleshoot Inter-VLAN Routing</li> <li>Purpose of STP</li> <li>Configure EtherChannel.</li> <li>DHCPv4 Concepts</li> <li>First Hop Redundancy Protocol</li> <li>LAN Attacks</li> <li>Implement Port Security</li> </ul>	<ul> <li>Configure a WLAN to support a remote site.</li> <li>Configure a WLC WLAN to use the management interface and WPA2 PSK authentication</li> <li>Troubleshoot common wireless configuration issues</li> <li>Describe options for configuring inter-VLAN routing.</li> <li>Configure router-on-a-stick inter-VLAN routing.</li> <li>Configure inter-VLAN routing using Layer 3 switching.</li> <li>Troubleshoot common inter-VLAN configuration issues</li> <li>Explain common problems in a redundant, L2 switched network.</li> <li>Configure EtherChannel.</li> <li>Explain how DHCPv4 operates across multiple LANs. Explain the purpose and operation of first hop redundancy protocols.</li> <li>Explain how LAN attacks compromise LAN</li> </ul>
	<ul> <li>security.</li> <li>Implement port security to mitigate MAC address table attacks.</li> </ul>

## Suggested Resources/Technology Tools

- Cisco IOS versions
- Routers: Version 15.0 or higher, IP Base feature set
- Switches: Version 15.0 or higher, lanbaseK9 feature set
- Packet Tracer v7.3
- Open-source server software

# Tier 1 Modifications and Accommodations

Including special education students, Multilingual Language Learners (MLLs), students at risk of school failure, gifted and talented students, and students with 504 plans Special Education/IEP/504 - Modifications and accommodations must be aligned to the stated plan and uphold expectations of the plan lawfully. Every student requires a different set of accommodations based upon need. Examples specific to visual arts practice include, but are not limited to:

- Follow individual IEP/504 plans for specific modifications.
- Preferential seating
- Extended/Additional time for assessments
- Behavior management support
- Assignments/resources in electronic and physical format
- Break down assignments with oral directions, written directions, and visuals.
- Provide frequent reminders to stay on task and reinforce on-task behavior
- Work on organizational skills
- Provide visual supports
- Partnering/Grouping of students
- Re-teaching and review
- Multi-media approach to accommodate various learning styles
- Decrease/Modify number of project requirements
- Teacher/Aide/Para assistance
- Demonstrations of techniques on an individual level
- Show slide presentations to encourage exploration of project ideas

MLL - Teachers identify the modifications that they will use in the unit as related to the needs of their student population. Examples specific to visual arts practice include, but are not limited to:

- Allow the use of Google Translate where appropriate.
- Provide alternate ways for the student to respond (verbal/pictographic answers instead of written)
- Substitute a hands-on activity or use of different media in projects for a written activity
- Prepare and distribute advance notes
- Provide model sentence frames and sentence starters for both oral responses and written responses
- Provide additional time to complete assessments and assignments
- Model and use gestures to aid in understanding
- Model tasks by giving one or two examples before releasing students to work independently
- Present instructions both verbally and visually
- Simplify written and verbal instructions
- Speak clearly and naturally, and try to enunciate words, especially their ending sounds.
- Provide Visual, Graphic, Interactive, and/or Sensory Supports
- Simplify the language, format, and directions of the assessment
- Allow for alternate seating for proximity to peer helper or teacher as necessary
- When showing videos, use Closed Captioning.
- Support use of student's primary language by translating key words in directions, or key vocabulary terms or giving students opportunities to communicate in their primary language (written or orally).

Gifted and Talented/Enrichment - Utilize differentiation in the areas of acceleration, enrichment, and grouping. Examples specific to visual arts practice include, but are not limited to:

- Complex, in-depth research assignments
- Independent study where applicable
- Provide a variety of individualized work centers or student choice
- Lead demonstrations for class
- Individual presentation

- □ Act as a responsible and contributing citizen and employee.
- □ Apply appropriate academic and technical skills.
- □ Attend to personal health and financial well being.
- □ Communicate clearly and effectively and with reason.
- □ Consider the environmental, social and economic impacts of decisions.
- Demonstrate creativity and innovation.
- **□** Employ valid and reliable research strategies.
- **U**tilize critical thinking to make sense of problems and persevere in solving them.
- □ Model integrity, ethical leadership, and effective management.
- □ Plan education and career paths aligned to personal goals.
- □ Use technology to enhance productivity.
- $\Box$  Work productively in teams while using cultural global competence.

# Routing

# Summary and Rationale

Static routing can be used for small networks that require only one or two routes. This is often more efficient since a link is not being wasted by exchanging dynamic routing information. Static routing is often used as a complement to dynamic routing to provide a failsafe backup if a dynamic route is unavailable.

# **Recommended Pacing**

6-8 Weeks

### Standards

#### 9.3 Career and Technical Education (Link)

9.3.IT.1	Demonstrate effective professional communication skills and practices that enable positive customer relationships.	
9.3.IT.2	Use product or service design processes and guidelines to produce a quality information technology (IT) product or service.	
9.3.IT.4	Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.	
9.3.IT.5	Explain the implications of IT on business development.	
9.3.IT.6	Describe trends in emerging and evolving computer technologies and their influence on IT practices.	
9.3.IT.7	Perform standard computer backup and restore procedures to protect IT information.	
9.3.IT.9	Describe quality assurance practices and methods employed in producing and providing quality IT products and services.	
9.3.IT.12	Demonstrate knowledge of the hardware components associated with information systems.	
9.3.IT.13	Compare key functions and applications of software and determine maintenance strategies for computer systems.	
Pathway: Information Support & Services (IT-SUP)		

9.3.IT-SUP.1	Provide technology support to maintain service.	
9.3.IT-SUP.2	Manage operating systems and software applications, including maintenance of upgrades, patches and service packs.	
9.3.IT-SUP.3	Apply appropriate troubleshooting techniques in resolving computer hardware, software and configuration problems.	
9.3.IT-SUP.4	Perform installation, configuration and maintenance of operating systems.	
NJSLS: Com	outer Science & Design Thinking (2020) (Link)	
Computing Sy	vstems	
8.1.12.CS.1	Describe ways in which integrated systems hide underlying implementation details to simplify user experiences.	
8.1.12.CS.2	Model interactions between application software, system software, and hardware.	
Engineering Design		
8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.	
8.2.12.ED.5	Evaluate the effectiveness of a product or system based on factors that are related to its requirements, specifications, and constraints (e.g., safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, ergonomics)	
8.2.12.ED.6	Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).	
Networks and the Internet		
8.1.12.NI.1	Evaluate the scalability and reliability of networks, by describing the relationship between routers, switches, servers, topology, and addressing.	
Data & Analysis		
8.1.12.DA.3	Translate between decimal numbers and binary numbers.	
Interaction of Technology and Humans		
8.2.12.ITH.1	Analyze a product to determine the impact that economic, political, social, and/or cultural factors have had on its design, including its design constraints.	
8.2.12.ITH.2	Propose an innovation to meet future demands supported by an analysis of the potential costs, benefits, trade-offs, and risks related to the use of the innovation.	

8.2.12.ITH.3	Analyze the impact that globalization, social media, and access to open source technologies has had on innovation and on a society's economy, politics, and culture.	
Nature of Technology		
8.2.12.NT.2	Redesign an existing product to improve form or function.	
NJSLS: Career Readiness, Life Literacies, & Key Skills (2020) (Link)		
9.2 Career Awareness, Exploration, Preparation, and Training		
9.2.12.CAP.2	Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.	
9.2.12.CAP.3	Investigate how continuing education contributes to one's career and personal growth.	
9.2.12.CAP.4	Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.	
9.2.12.CAP.5	Assess and modify a personal plan to support current interests and postsecondary plans.	
9.2.12.CAP.7	Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.	
9.4 Life Literacies and Key Skills		
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).	
9.4.12.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).	
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).	
9.4.12.DC.3	Evaluate the social and economic implications of privacy in the context of safety, law, or ethics (e.g., 6.3.12.HistoryCA.1).	
9.4.12.DC.4	Explain the privacy concerns related to the collection of data (e.g., cookies) and generation of data through automated processes that may not be evident to users (e.g., 8.1.12.NI.3).	
9.4.12.DC.8	Explain how increased network connectivity and computing capabilities of everyday objects allow for innovative technological approaches to climate protection.	
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).	
Instructional Focus		

Enduring Understandings:	Essential Questions:		
• Why we set up routes for internet traffic and how it controls our lives.	<ul> <li>What are static Routes?</li> <li>What are dynamic Routes?</li> <li>What are routing protocols? (link state vs. distant vector)</li> <li>Why do we set up routes for internet traffic and how does it control our lives?</li> </ul>		
Evidence of Learning (Assessments)			
<ul> <li>Create and solve packet tracer using network configuration to configure Static and dynamic routes</li> <li>Hands-on lab activities and virtual learning tools are integrated into the curriculum</li> </ul>			
Objectives (SLO)			
<ul> <li>Students will know:</li> <li>Static Routes</li> <li>Configure IP Static Routes</li> <li>Configure IP Default Static Routes</li> <li>Configure Floating Static Routes</li> <li>Configure Static Host Routes</li> <li>Packet Processing with Static Routes</li> <li>Troubleshoot IPv4 Static and Default Route Configuration</li> </ul>	<ul> <li>Students will be able to:</li> <li>Describe the command syntax for static routes.</li> <li>Configure IPv4 and IPv6 static routes.</li> <li>Configure IPv4 and IPv6 default static routes.</li> <li>Configure a floating static route to provide a backup connection.</li> <li>Configure IPv4 and IPv6 static host routes that direct traffic to a specific host.</li> <li>Explain how a router processes packets when a static route is configured.</li> <li>Troubleshoot common static and default route configuration issues.</li> </ul>		
Suggested Resources/Technology Tools			
<ul> <li>Cisco IOS versions</li> <li>Routers: Version 15.0 or higher, IP Base feature set</li> <li>Switches: Version 15.0 or higher, lanbaseK9 feature set</li> <li>Packet Tracer v7.3</li> <li>Open-source server software</li> </ul>			
Tier 1 Modifications and Accommodations Including special education students, Multilingual Language Learners (MLLs), students at risk of school failure, gifted and talented students, and students with 504 plans			
<ul> <li>Special Education/IEP/504 - Modifications and accommodations must be aligned to the stated plan and uphold expectations of the plan lawfully. Every student requires a different set of accommodations based upon need. Examples specific to visual arts practice include, but are not limited to: <ul> <li>Follow individual IEP/504 plans for specific modifications.</li> <li>Preferential seating</li> <li>Extended/Additional time for assessments</li> <li>Behavior management support</li> <li>Assignments/resources in electronic and physical format</li> <li>Break down assignments with oral directions, written directions, and visuals.</li> </ul> </li> </ul>			

- Provide frequent reminders to stay on task and reinforce on-task behavior
- Work on organizational skills
- Provide visual supports
- Partnering/Grouping of students
- Re-teaching and review
- Multi-media approach to accommodate various learning styles
- Decrease/Modify number of project requirements
- Teacher/Aide/Para assistance
- Demonstrations of techniques on an individual level
- Show slide presentations to encourage exploration of project ideas

MLL - Teachers identify the modifications that they will use in the unit as related to the needs of their student population. Examples specific to visual arts practice include, but are not limited to:

- Allow the use of Google Translate where appropriate.
- Provide alternate ways for the student to respond (verbal/pictographic answers instead of written)
- Substitute a hands-on activity or use of different media in projects for a written activity
- Prepare and distribute advance notes
- Provide model sentence frames and sentence starters for both oral responses and written responses
- Provide additional time to complete assessments and assignments
- Model and use gestures to aid in understanding
- Model tasks by giving one or two examples before releasing students to work independently
- Present instructions both verbally and visually
- Simplify written and verbal instructions
- Speak clearly and naturally, and try to enunciate words, especially their ending sounds.
- Provide Visual, Graphic, Interactive, and/or Sensory Supports
- Simplify the language, format, and directions of the assessment
- Allow for alternate seating for proximity to peer helper or teacher as necessary
- When showing videos, use Closed Captioning.
- Support use of student's primary language by translating key words in directions, or key vocabulary terms or giving students opportunities to communicate in their primary language (written or orally).

Gifted and Talented/Enrichment - Utilize differentiation in the areas of acceleration, enrichment, and grouping. Examples specific to visual arts practice include, but are not limited to:

- Complex, in-depth research assignments
- Independent study where applicable
- Provide a variety of individualized work centers or student choice
- Lead demonstrations for class
- Individual presentation

- $\hfill\square$  Act as a responsible and contributing citizen and employee.
- □ Apply appropriate academic and technical skills.
- □ Attend to personal health and financial well being.
- □ Communicate clearly and effectively and with reason.
- □ Consider the environmental, social and economic impacts of decisions.
- Demonstrate creativity and innovation.

- **D** Employ valid and reliable research strategies.
- **U**tilize critical thinking to make sense of problems and persevere in solving them.
- □ Model integrity, ethical leadership, and effective management.
- □ Plan education and career paths aligned to personal goals.
- □ Use technology to enhance productivity.
- $\hfill\square$  Work productively in teams while using cultural global competence.