

معاونت پژوهش، برنامه‌ریزی و سنجش مهارت

دفتر پژوهش، طرح و برنامه‌ریزی درسی

## استاندارد آموزش شغل

# Cisco Certified Entry Networking Technician(CCENT)Routing And Switching

## گروه شغلی

## فناوری اطلاعات

کد ملی آموزش شغل

۲	۵	۲	۳	۴	۰	۵	۳	۱	۹	۱	۰	۰	۰	۱
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Ministry of cooperatives  
Labour and Social Welfare



Iran Technical and Vocational  
Training Organization

Deputy of training  
Plan and curriculums office

# Job Training standard

## Title

**Cisco Certified Entry Networking Technician (CCENT)  
Routing And Switching**

## Occupational group

**Information Technology (IT)**

**International code**

2523-53-140-1

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**Member of Specialized commission IT Curriculum development:**

- Ali Mosavi: Director Manager of Iran TVTO Curriculum Development Office
- Cirrus Soltani (Head of the General Department of Vocational Hormozgan)
- Ramak Farahabad(Deputy for Planning and Training)
- Golzar nazari gazi(Vice Minister of the General Administration of professional technical and Hormozgan)
- fatemeh taheri (Expert technical and vocational education, the Department of Hormozgan)
- Asma Karimi: Director of Information Technology Training Centre in Bandar Abbas
- mohamamd reza kanjeh moradi: Director Manager of Iran TVTO Curriculum Development Office
- Shahram Shokofian: Manager of Iran TVTO IT Curriculum Development

**Cooperator Specialized organizations for compiling the training standard :**

- Hormozgan Technical and Vocational Training Organization
- IT Training Centre in Bandar Abbas

**Revision Process:**

- Scientific content
- According to market
- Equipment
- Tools

Plan & Curriculum Office  
97, nosrat avenue –Tehran, Iran

Tel:+98-21-66569900-9

Fax: +98-21-66944117

E-mail:Barnamehdarci@yahoo.com

	Name & Family name	Academic document	field	Job & post	Relevant experiences	Add & Tel & Email
1	Ashkan Eghdami	B. SC	Computer engineer	Technical Manager	Instaling and Configuring Window Server 2012 R2 Installing and Configuring Cisco Equipments	Post Box NO : 7917765814 , Bandarabbass , Iran
2	Amir BalAfkan	B.SC	Electronics Engineer	Trainer	12 Years	Post Box NO : 7916853689, Bandarabbass , Iran
3	Eisa Naderi	B.S	Computer Engineer	Trainer	11 Years	Post Box NO : 7916853689 , Bandarabbass , Iran
4	Mahyar TajDini	B.SC	Network Engineer	Network Security Consultant / Auditor	Hormozgan Petro Gas Co / Satrap Net Rasha / Hormozgan TVTO	Post Box NO : 791454334 , Bandarabbass , Iran
5	Asma Karimi	B.S	Electronics Engineer	Trainer	9 Years	Post Box NO : 7916853689, Bandarabbass , Iran

## **Definitions:**

### **Job standard:**

The characteristics ' required competencies and abilities for Efficient Performance in work environment is called "the Job standard", and sometimes “The Occupational standard”

### **Training standard:**

The Training Map for achieving the Job’s subset Competencies.

### **Job title:**

Is a set of Tasks and Abilities which is expected from an employed person in the defined level

### **Job description:**

A statement covering the most important elements of a job, namely the position or title of the job, the duties, job’s relation with other jobs in a occupational field, the responsibilities, workplace conditions and required performance standards.

### **Course duration:**

The minimum of time which is required to achieve the training objects.

### **Admission requirements:**

The minimum of competencies and abilities which are obligatory for a potential admission.

### **Evaluation:**

The process of collecting evidence and judgment about wether a competency is achieved or not. Include: written examination, practical examination

### **Required Qualifications for Trainers:**

The minimum of Trainer’s technical and vocational abilities which the trainer is required to have.

### **Competency:**

The ability of efficient performing a duty in a variety of workplaces conditions

### **Knowledge:**

The minimum set of facts and mental capacities which is necessary for achieving a competency. This can include science, (Mathematics, physics, chemistry or biology), technology or technical.

### **Skill:**

The minimum coordination between mind and body for achieving an ability or competency. It normally applied to practical skills.

### **Attitude:**

A set of emotional behaviors required for achieving a competency and can have non-technical skills and occupational ethics.

### **Safety:**

The cases which doing or not doing something can cause harm or accident

### **Environmental Consideration:**

A set of consideration about the act which should be done to minimize the environmental damage or pollution.

<b>job/competency title:</b>
<b>Cisco Certified Entry Networking Technician (ICND1 Routing And Switching)</b>
<b>Job/competency description:</b>
<b>Cisco Certified Entry Networking Technician (CCENT) validates the ability to install, operate and troubleshoot a small enterprise branch network, including basic network security. With a CCENT, a network professional demonstrates the skills required for entry-level network support positions - the starting point for many successful careers in networking. The curriculum covers networking fundamentals, WAN technologies, basic security and wireless concepts, routing and switching fundamentals, and configuring simple networks. CCENT is the first step toward achieving CCNA, which covers medium-size enterprise branch networks with more complex connections.</b>
<b>admission requirements:</b>
<b>minimum degree of education: Post first year of high school</b>
<b>minimum physical and mental ability:</b>
<b>prerequisite skills: CompTIA network+ certification</b>
<b>Course duration:</b>
<i>Course duration : 180 hours</i> <i>-Theoretical: 60 Hours</i> <i>-Practical: 120 Hours</i> <i>-Apprenticeship: ... Hours</i> <i>-Project: ... Hours</i>
<b>Evaluation : (%)</b>
<b>Written:25%</b> <b>Practical:65%</b> <b>Work ethics:10%</b>
<b>Required Qualifications for Trainers:</b>
<b>CISCO CCNA degree holders with 2 years experiences</b>

**job/competency training standard  
competencies /tasks**

	<b>Title</b>
<b>1</b>	<b>The TCP/IP and OSI Networking Models</b>
<b>2</b>	<b>Fundamentals of Ethernet LANs</b>
<b>3</b>	<b>Fundamentals of WANs</b>
<b>4</b>	<b>Fundamentals of IPv4 Addressing and Routing</b>
<b>5</b>	<b>Fundamentals of TCP/IP Transport and Applications</b>
<b>6</b>	<b>Building Ethernet LANs with Switches</b>
<b>7</b>	<b>Installing and Operating Cisco LAN Switches</b>
<b>8</b>	<b>Configuring Ethernet Switching</b>
<b>9</b>	<b>Implementing Ethernet Virtual LANs</b>
<b>10</b>	<b>Troubleshooting Ethernet LANs</b>
<b>11</b>	<b>Perspectives on IPv4 Subnetting</b>
<b>12</b>	<b>Analyzing Classful IPv4 Networks</b>
<b>13</b>	<b>Analyzing Subnet Masks</b>
<b>14</b>	<b>Analyzing Existing Subnets</b>
<b>15</b>	<b>Operating Cisco Routers</b>
<b>16</b>	<b>Configuring IPv4 Addresses and Routes</b>
<b>17</b>	<b>Learning IPv4 Routes with OSPFv2</b>
<b>18</b>	<b>Configuring and Verifying Host Connectivity</b>
<b>19</b>	<b>Subnet Design</b>
<b>20</b>	<b>Variable-Length Subnet Masks</b>
<b>21</b>	<b>Route Summarization</b>
<b>22</b>	<b>Basic IPv4 Access Control Lists</b>
<b>23</b>	<b>Advanced IPv4 ACLs and Device Security</b>
<b>24</b>	<b>Network Address Translation</b>
<b>25</b>	<b>Fundamentals of IP Version 6</b>
<b>26</b>	<b>IPv6 Addressing and Subnetting</b>
<b>27</b>	<b>Implementing IPv6 Addressing on Routers</b>
<b>28</b>	<b>Implementing IPv6 Addressing on Hosts</b>
<b>29</b>	<b>Implementing IPv6 Routing</b>

<b>Title: The TCP/IP and OSI Networking Models</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Knowledge and Skill : TCP/IP Networking Model TCP/IP Application Layer HTTP Protocol Mechanisms TCP/IP Transport Layer TCP Error Recovery Basics Same-Layer and Adjacent-Layer Interactions TCP/IP Network Layer Internet Protocol Internet Protocol Addressing Basics IP Routing Basics TCP/IP Link Layer (Data Link Plus Physical) TCP/IP Model and Terminology Comparing the Original and Modern TCP/IP Data Encapsulation Terminology Names of TCP/IP Messages OSI Networking Model Comparing OSI and TCP/IP Describing Protocols by Referencing the OSI Layers OSI Layers and Their Functions OSI Layering Concepts and Benefits OSI Encapsulation Terminology	Determined by the instructor			From Cisco
Attitude: <b>Speed and accuracy in doing the right thing</b>				
Health & Safety: <b>Compliance with safety protection in the workplace</b>				
Environmental Consideration: <b>Compliance with environmental protection</b>				



<b>Title: Fundamentals of Ethernet LANs</b>	time					
	theoretical	practical	total			
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books		
Knowledge and Skill : Typical SOHO LANs Typical Enterprise LANs The Variety of Ethernet Physical Layer Standards Building Physical Ethernet Networks with UTP Transmitting Data Using Twisted Pairs Breaking Down a UTP Ethernet Link UTP Cabling Pinouts for 10BASE-T and 100BASE-T Straight-Through Cable Pinout Crossover Cable Pinout Choosing the Right Cable Pinouts UTP Cabling Pinouts for 1000BASE-T Sending Data in Ethernet Networks Ethernet Data Link Protocols Ethernet Addressing Identifying Network Layer Protocols with the Ethernet Type Field Error Detection with FCS Sending Ethernet Frames with Switches and Hubs Sending in Modern Ethernet LANs Using Full-Duplex Using Half-Duplex with LAN Hubs	Determined by the instructor			From Cisco		
	Attitude: <b>Speed and accuracy in doing the right thing</b>					
	Health & Safety: <b>Compliance with safety protection in the workplace</b>					

	time			
	theoretical	practical	total	
<b>Title: Fundamentals of WANs</b>				
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Knowledge and Skill :	Determined by the instructor			From Cisco
Leased Line WANs				
Positioning Leased Lines with LANs and Routers				
Physical Details of Leased Lines				
Leased Line Cabling				
Building a WAN Link in a Lab				
Data Link Details of Leased Lines				
HDLC Basics				
How Routers Use a WAN Data Link				
Ethernet as a WAN Technology				
Route IP Packets Using Ethernet Emulation				
Accessing the Internet				
The Internet as a Large WAN				
Internet Access (WAN) Links				
Digital Subscriber Line				
Cable Internet				
Attitude: <b>Speed and accuracy in doing the right thing</b>				
Health & Safety: <b>Compliance with safety protection in the workplace</b>				
Environmental Consideration: <b>Compliance with environmental protection</b>				

<b>Title: Fundamentals of IPv4 Addressing and Routing</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipment's ,tools, materials ,books
Knowledge and Skill :	Determined by the instructor			From Cisco
Overview of Network Layer Functions				
Network Layer Routing (Forwarding) Logic				
Host Forwarding Logic: Send the Packet to the Default Router				
R1 and R2's Logic: Routing Data Across the Network				
R3's Logic: Delivering Data to the End Destination				
How Network Layer Routing Uses LANs and WANs				
IP Addressing and How Addressing Helps IP Routing				
Routing Protocols				
IPv4 Addressing				
Rules for IP Addresses				
Rules for Grouping IP Addresses				
Class A, B, and C IP Networks				
IP Subnetting				
IPv4 Routing				
IPv4 Host Routing				
Router Forwarding Decisions and the IP Routing Table				
IPv4 Routing Protocols				
Other Network Layer Features				
Using Names and the Domain Name System				
The Address Resolution Protocol				
ICMP Echo and the ping Command				
Attitude:				
<b>Speed and accuracy in doing the right thing</b>				

Health & Safety:	
<b>Compliance with safety protection in the workplace</b>	
Environmental Consideration:	
<b>Compliance with environmental protection</b>	



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Title : <b>Fundamentals of TCP/IP Transport and Applications</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Knowledge and Skill :	Determined by the instructor			From Cisco
Transmission Control Protocol				
Multiplexing Using TCP Port Numbers				
Popular TCP/IP Applications				
User Datagram Protocol				
TCP/IP Applications				
QoS Needs and the Impact of TCP/IP				
Applications				
Defining Interactive and Batch				
Applications				
Real-Time Voice and Video Applications				
The World Wide Web, HTTP, and SSL				
Uniform Resource Locators				
Finding the Web Server Using DNS				
Transferring Files with HTTP				
Attitude: <b>Speed and accuracy in doing the right thing</b>				
Health & Safety: <b>Compliance with safety protection in the workplace</b>				
Environmental Consideration: <b>Compliance with environmental protection</b>				

<b>Title: Building Ethernet LANs with Switches</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Knowledge and Skill :	Determined by the instructor			From Cisco
Historical Progression: Hubs, Bridges, and Switches				
Switching Logic				
The Forward-Versus-Filter Decision				
How Switches Learn MAC Addresses				
Flooding Frames				
Avoiding Loops Using Spanning Tree Protocol				
Internal Processing on Cisco Switches				
LAN Switching Summary				
Design Choices in Ethernet LANs				
Collision Domains, Broadcast Domains, and VLANs				
Collision Domains				
Broadcast Domains				
The Impact of Collision and Broadcast Domains on LAN Design				
Virtual LANs (VLAN)				
Choosing Ethernet Technology for a Campus LAN				
Campus Design Terminology				
Ethernet LAN Media and Cable Lengths				
Autonegotiation				
Autonegotiation Results When Only One Node Uses Autonegotiation				
Autonegotiation and LAN Hubs				
Attitude: <b>Speed and accuracy in doing the right thing</b>				
Health & Safety: <b>Compliance with safety protection in the workplace</b>				
Environmental Consideration: <b>Compliance with environmental protection</b>				

Title <b>Installing and Operating Cisco LAN Switches</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Knowledge and Skill :	Determined by the instructor			From Cisco
Switch CLI				
Cisco Catalyst Switches and the 2960 Switch				
Switch Status from LEDs				
Accessing the Cisco IOS CLI				
Cabling the Console Connection				
Configuring the Terminal Emulator for the Console				
Accessing the CLI with Telnet and SSH				
Password Security for CLI Access				
User and Enable (Privileged) Modes				
CLI Help Features				
The debug and show Commands				
Configuring Cisco IOS Software Configuration Submodes and Contexts				
Storing Switch Configuration Files				
Copying and Erasing Configuration Files				
Initial Configuration (Setup Mode)				
IOS Version and Other Reload Facts				
Attitude: <b>Speed and accuracy in doing the right thing</b>				
Health & Safety: <b>Compliance with safety protection in the workplace</b>				
Environmental Consideration: <b>Compliance with environmental protection</b>				

<b>Title: Configuring Ethernet Switching</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Securing the Switch CLI	Determined by the instructor			From Cisco
Securing Access with Simple Passwords				
Securing Access with Local Usernames and Passwords				
Securing Access with External Authentication Servers				
Configuring Secure Shell (SSH)				
Encrypting and Hiding Passwords				
Encrypting Passwords with the service password Command				
Hiding the Enable Password				
Hiding the Passwords for Local Usernames Console and vty Settings				
Banners				
History Buffer Commands				
The logging synchronous and exec-timeout Commands				
LAN Switch Configuration and Operation				
Enabling IP for Remote Access				
Configuring IPv4 on a Switch				
Verifying IPv4 on a Switch				
Configuring Switch Interfaces				
Port Security				
Configuring Port Security				
Verifying Port Security				
Port Security Actions				
Securing Unused Switch Interfaces				
Attitude: <b>Speed and accuracy in doing the right thing</b>				
Health & Safety: <b>Compliance with safety protection in the workplace</b>				
Environmental Consideration: <b>Compliance with environmental protection</b>				



Title: Implementing Ethernet Virtual LANs	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Knowledge and Skill : Virtual LAN Concepts Creating Multiswitch VLANs Using Trunking VLAN Tagging Concepts The 802.1Q and ISL VLAN Trunking Protocols Forwarding Data Between VLANs Routing Packets Between VLANs with a Router Routing Packets with a Layer 3 Switch VLAN and VLAN Trunking Configuration and Verification Creating VLANs and Assigning Access VLANs to an Interface VLAN Trunking Protocol (VTP) VLAN Trunking Configuration Controlling Which VLANs Can Be Supported on a Trunk	Determined by the instructor			From Cisco
Attitude: <b>Speed and accuracy in doing the right thing</b>				
Health & Safety: <b>Compliance with safety protection in the workplace</b>				
Environmental Consideration: <b>Compliance with environmental protection</b>				

<b>Title: Troubleshooting Ethernet LANs</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Troubleshooting Process	Determined by the instructor			From Cisco
Analyzing LAN Topology Using Cisco Discovery Protocol				
Examining Information Learned by CDP				
Examining the Status of the CDP Protocols				
Analyzing Switch Interface Status				
Interface Status Codes and Reasons for Nonworking States				
Interface Speed and Duplex Issues				
Common Layer 1 Problems on Working Interfaces				
Predicting Where Switches Will Forward Frames				
Predicting the Contents of the MAC Address Table				
Analyzing the Forwarding Path				
Port Security and Filtering				
Analyzing VLANs and VLAN Trunks				
Ensuring That the Right Access Interfaces Are in the Right VLANs				
Access VLANs Not Being Defined				
Access VLANs Being Disabled				
Check the Allowed VLAN List on Both Ends of a Trunk				
Mismatched Trunking Operational States				
Attitude: <b>Speed and accuracy in doing the right thing</b>				
Health & Safety: <b>Compliance with safety protection in the workplace</b>				
Environmental Consideration: <b>Compliance with environmental protection</b>				

<b>Title: Perspectives on IPv4 Subnetting</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Knowledge and Skill : Operational View Versus Design View of Subnetting Analyze Subnetting and Addressing Needs Determining the Number of Subnets Determining the Number of Hosts per Subnet Defining the Size of a Subnet Multiple Subnet Sizes (Variable-Length Subnet Masks) Make Design Choices Choose a Classful Network Public IP Networks Growth Exhausts the Public IP Address Space Private IP Networks Choosing an IP Network During the Design Phase Choose the Mask Classful IP Networks Before Subnetting Borrowing Host Bits to Create Subnet Bits Choosing Enough Subnet and Host Bits Masks and Mask Formats Build a List of All Subnets	Determined by the instructor			From Cisco
	Attitude: <b>Speed and accuracy in doing the right thing</b>			
Health & Safety: <b>Compliance with safety protection in the workplace</b>				
Environmental Consideration: <b>Compliance with environmental protection</b>				

<b>Title: Analyzing Classful IPv4 Networks</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Knowledge and Skill :	Determined by the instructor			From Cisco
Classful Network Concepts				
IPv4 Network Classes and Related Facts				
Actual Class A, B, and C Networks				
Address Formats				
Default Masks				
Number of Hosts per Network				
Deriving the Network ID and Related Numbers				
Unusual Network IDs and Network Broadcast Addresses				
Practice with Classful Networks				
Practice Deriving Key Facts Based on an IP Address				
Practice Remembering the Details of Address Classes				
Attitude: <b>Speed and accuracy in doing the right thing</b>				
Health & Safety: <b>Compliance with safety protection in the workplace</b>				
Environmental Consideration: <b>Compliance with environmental protection</b>				

<b>Title: Analyzing Subnet Masks</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Knowledge and Skill : Subnet Mask Conversion Three Mask Formats Converting Between Binary and Prefix Masks Converting Between Binary and DDN Masks Converting Between Prefix and DDN Masks Identifying Subnet Design Choices Using Masks Masks Divide the Subnet's Addresses into Two Parts Masks and Class Divide Addresses into Three Parts Classless and Classful Addressing Calculations Based on the IPv4 Address Format	Determined by the instructor			From Cisco
Attitude: <b>Speed and accuracy in doing the right thing</b>				
Health & Safety: <b>Compliance with safety protection in the workplace</b>				
Environmental Consideration: <b>Compliance with environmental protection</b>				

<b>Title: Analyzing Existing Subnets</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Knowledge and Skill :	Determined by the instructor			From Cisco
Subnet ID Concepts				
Subnet Broadcast Address				
Range of Usable Addresses				
Analyzing Existing Subnets: Binary				
Finding the Subnet ID: Binary				
Finding the Subnet Broadcast Address: Binary				
Binary Practice Problems				
Shortcut for the Binary Process				
Brief Note About Boolean Math				
Finding the Range of Addresses				
Analyzing Existing Subnets: Decimal				
Analysis with Easy Masks				
Predictability in the Interesting Octet				
Finding the Subnet ID: Difficult Masks				
Finding the Subnet Broadcast Address: Difficult Masks				
Attitude: <b>Speed and accuracy in doing the right thing</b>				
Health & Safety: <b>Compliance with safety protection in the workplace</b>				
Environmental Consideration: <b>Compliance with environmental protection</b>				

<b>Title: Operating Cisco Routers</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Knowledge and Skill :	Determined by the instructor			From Cisco
Installing Enterprise Routers				
Cisco Integrated Services Routers				
Physical Installation				
Installing Internet Access Routers				
A SOHO Installation with a Separate Switch, Router, and Cable Modem				
A SOHO Installation with an Integrated Switch, Router, and DSL Modem				
Enabling IPv4 Support on Cisco Routers				
Comparisons Between the Switch CLI and Router CLI				
Router Interfaces				
Interface Status Codes				
Router Interface IP Addresses				
Bandwidth and Clock Rate on Serial Interfaces				
Router Auxiliary (Aux) Port				
Operational Status with the show version Command				
Attitude: <b>Speed and accuracy in doing the right thing</b>				
Health & Safety: <b>Compliance with safety protection in the workplace</b>				
Environmental Consideration: <b>Compliance with environmental protection</b>				

<b>Title: Configuring IPv4 Addresses and Routes</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Knowledge and Skill :	Determined by the instructor			From Cisco
Routing				
Potential Routing Performance Issues				
Cisco Router Fast Switching and CEF				
Configuring Connected Routes				
Connected Routes and the ip address Command				
Routing Between Subnets on VLANs				
Configuring Routing to VLANs using 802.1Q on Routers				
Configuring Routing to VLANs Using a Layer 3 Switch				
Secondary IP Addressing				
Supporting Connected Routes to Subnet Zero				
Configuring Static Routes				
Static Route Configuration				
Static Default Routes				
Attitude: <b>Speed and accuracy in doing the right thing</b>				
Health & Safety: <b>Compliance with safety protection in the workplace</b>				
Environmental Consideration: <b>Compliance with environmental protection</b>				



<b>Title: Learning IPv4 Routes with OSPFv2</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Comparing Dynamic Routing Protocol Features	Determined by the instructor			From Cisco
Routing Protocol Functions				
Interior and Exterior Routing Protocols				
Comparing IGPs				
IGP Routing Protocol Algorithms				
Metrics				
Other IGP Comparisons				
Administrative Distance				
Understanding the OSPF Link-State Routing Protocol				
Building the LSDB and Creating IP Routes				
Topology Information and LSAs				
Applying Dijkstra SPF Math to Find the Best Routes				
Using OSPF Neighbor Relationships				
The Basics of OSPF Neighbors				
Meeting Neighbors and Learning Their Router ID				
Scaling OSPF Through Hierarchical Design				
OSPF Configuration				
OSPF Single-Area Configuration				
Matching with the OSPF network Command				
Verifying OSPF				
Configuring the OSPF Router ID				
Miscellaneous OSPF Configuration Settings				
OSPF Passive Interfaces				
OSPF Default Routes				
Attitude: <b>Speed and accuracy in doing the right thing</b>				
Health & Safety: <b>Compliance with safety protection in the workplace</b>				
Environmental Consideration: <b>Compliance with environmental protection</b>				

<b>Title: Configuring and Verifying Host Connectivity</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Knowledge and Skill : Configuring Routers to Support DHCP DHCP Protocol Messages and Addresses Supporting DHCP for Remote Subnets with DHCP Relay Information Stored at the DHCP Server DHCP Server Configuration and Verification on Routers IOS DHCP Server Configuration IOS DHCP Server Verification Detecting Conflicts with Offered Versus Used Addresses Verifying Host IPv4 Settings IP Address and Mask Configuration Name Resolution with DNS Default Routers Testing Connectivity with ping, traceroute, and telnet The ping Command Testing IP Routes with ping on a Router Controlling the Source IP Address with Extended ping The traceroute Command How the traceroute Command Works traceroute and Similar Commands Telnet and Suspend	Determined by the instructor			From Cisco
Attitude:				
<b>Speed and accuracy in doing the right thing</b>				
Health & Safety:				
<b>Compliance with safety protection in the workplace</b>				
Environmental Consideration:				
<b>Compliance with environmental protection</b>				

<b>Title: Subnet Design</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Finding All the Masks: Concepts	Determined by the instructor			From Cisco
Finding All the Masks: Math				
The Formal Process				
Finding All Subnet IDs				
First Subnet ID: The Zero Subnet				
Finding the Pattern Using the Magic Number				
A Formal Process with Less Than 8 Subnet Bits				
Finding All Subnets with Exactly 8 Subnet Bits				
Finding All Subnets with More Than 8 Subnet Bits				
Process with 9–16 Subnet Bits				
Process with 17 or More Subnet Bits				
Finding All Subnet IDs				
Problems for Finding All Subnet IDs				
Additional Practice for Finding All Subnet IDs				
Attitude: <b>Speed and accuracy in doing the right thing</b>				
Health & Safety: <b>Compliance with safety protection in the workplace</b>				
Environmental Consideration: <b>Compliance with environmental protection</b>				

<b>Title: Variable-Length Subnet Masks</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
<b>Knowledge and Skill :</b> VLSM Concepts and Configuration Classless and Classful Routing Protocols VLSM Configuration and Verification Finding VLSM Overlaps Adding a New Subnet to an Existing VLSM Design Adding New VLSM Subnets	Determined by the instructor			<b>From Cisco</b>
<b>Attitude:</b> <b>Speed and accuracy in doing the right thing</b>				
<b>Health &amp; Safety:</b> <b>Compliance with safety protection in the workplace</b>				
<b>Environmental Consideration:</b> <b>Compliance with environmental protection</b>				

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<b>Title: Route Summarization</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Knowledge and Skill : Manual Route Summarization Concepts Route Summarization Basics Route Summarization and the IPv4 Subnetting Plan Verifying Manually Summarized Routes Choosing the Best Summary Routes The Process to Find the Best Summary Route	Determined by the instructor			From Cisco
Attitude: <b>Speed and accuracy in doing the right thing</b>				
Health & Safety: <b>Compliance with safety protection in the workplace</b>				
Environmental Consideration: <b>Compliance with environmental protection</b>				

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<b>Title: Basic IPv4 Access Control Lists</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Knowledge and Skill : IPv4 Access Control List Basics ACL Location and Direction Matching Packets Standard Numbered IPv4 ACLs List Logic with IP ACLs Matching Logic and Command Syntax Matching the Exact IP Address Matching a Subset of the Address with Wildcards Binary Wildcard Masks Finding the Right Wildcard Mask to Match a Subnet Matching Any/All Addresses Implementing Standard IP ACLs Troubleshooting and Verification Tips Practice Applying Standard IP ACLs Practice Building access-list Commands Reverse Engineering from ACL to Address Range	Determined by the instructor			From Cisco
Attitude:				
<b>Speed and accuracy in doing the right thing</b>				
Health & Safety:				
<b>Compliance with safety protection in the workplace</b>				
Environmental Consideration:				
<b>Compliance with environmental protection</b>				

<b>Title: Advanced IPv4 ACLs and Device Security</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Knowledge and Skill :	Determined by the instructor			From Cisco
Extended Numbered IP Access Control Lists				
Matching the Protocol, Source IP, and Destination IP				
Matching TCP and UDP Port Numbers				
Extended IP ACL Configuration				
Building access-list Commands				
Named ACLs and ACL Editing				
Named IP Access Lists				
Editing ACLs Using Sequence Numbers				
Numbered ACL Configuration Versus Named ACL Configuration				
Router and Switch Security				
Controlling Telnet and SSH Access with ACLs				
ACL Implementation Considerations				
Network Time Protocol				
Attitude: <b>Speed and accuracy in doing the right thing</b>				
Health & Safety: <b>Compliance with safety protection in the workplace</b>				
Environmental Consideration: <b>Compliance with environmental protection</b>				

<b>Title: Network Address Translation</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Knowledge and Skill :	Determined by the instructor			From Cisco
IPv4 Address Scalability				
CIDR				
Route Aggregation for Shorter Routing Tables				
IPv4 Address Conservation				
Private Addressing				
Network Address Translation Concepts				
Static NAT				
Dynamic NAT				
Overloading NAT with Port Address Translation (PAT)				
NAT Overload (PAT) on Consumer Routers				
NAT Configuration and Troubleshooting				
Static NAT Configuration				
Dynamic NAT Configuration				
Dynamic NAT Verification				
NAT Overload (PAT) Configuration				
NAT Troubleshooting				
Attitude: <b>Speed and accuracy in doing the right thing</b>				
Health & Safety: <b>Compliance with safety protection in the workplace</b>				
Environmental Consideration: <b>Compliance with environmental protection</b>				



<b>Title: Fundamentals of IP Version</b> <b>6</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Knowledge and Skill : The Historical Reasons for IPv6 The IPv6 Protocols IPv6 Routing IPv6 Routing Protocols IPv6 Addressing Formats and Conventions Representing Full (Unabbreviated) IPv6 Addresses Abbreviating and Expanding IPv6 Addresses Abbreviating IPv6 Addresses Expanding Abbreviated IPv6 Addresses Representing the Prefix Length of an Address Calculating the IPv6 Prefix (Subnet ID) Finding the IPv6 Prefix Working with More Difficult IPv6 Prefix Lengths	Determined by the instructor			From Cisco
Attitude:				
<b>Speed and accuracy in doing the right thing</b>				
Health & Safety:				
<b>Compliance with safety protection in the workplace</b>				
Environmental Consideration:				
<b>Compliance with environmental protection</b>				

<b>Title: IPv6 Addressing and Subnetting</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Knowledge and Skill :	Determined by the instructor			From Cisco
Global Unicast Addressing Concepts				
Public IPv4 Addressing Concepts				
Private IPv4 Addressing Concepts				
Public and Private IPv6 Addresses				
The IPv6 Global Routing Prefix				
Address Ranges for Global Unicast Addresses				
IPv6 Subnetting Using Global Unicast Addresses				
The Mechanics of Subnetting IPv6 Global Unicast Addresses				
Listing the IPv6 Subnet Identifier				
List All IPv6 Subnets				
Assign Subnets to the Internetwork Topology				
Assigning Addresses to Hosts in a Subnet				
Unique Local Unicast Addresses				
Subnetting with Unique Local IPv6 Addresses				
The Need for Globally Unique Local Addresses				
Attitude:				
<b>Speed and accuracy in doing the right thing</b>				
Health & Safety:				
<b>Compliance with safety protection in the workplace</b>				
Environmental Consideration:				
<b>Compliance with environmental protection</b>				

<b>Title: Implementing IPv6 Addressing on Routers</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Knowledge and Skill :	Determined by the instructor			From Cisco
Implementing Unicast IPv6 Addresses on Routers				
Static Unicast Address Configuration				
Configuring the Full 128-Bit Address				
Enabling IPv6 Routing				
Verifying the IPv6 Address Configuration				
Generating a Unique Interface ID Using EUI-64				
Dynamic Unicast Address Configuration				
Special Addresses Used by Routers				
Link-Local Addresses				
Link-Local Address Concepts				
Creating Link-Local Addresses on Routers				
IPv6 Multicast Addresses				
Broadcasts Versus Multicasts				
Common Local Scope Multicast Addresses				
Solicited-Node Multicast Addresses				
Miscellaneous IPv6 Addresses				
Attitude: <b>Speed and accuracy in doing the right thing</b>				
Health & Safety: <b>Compliance with safety protection in the workplace</b>				
Environmental Consideration: <b>Compliance with environmental protection</b>				

<b>Title: Implementing IPv6 Addressing on Hosts</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Knowledge and Skill : The Neighbor Discovery Protocol Discovering Routers with NDP RS and RA Discovering Addressing Info for SLAAC with NDP RS and RA Discovering Neighbor Link Addresses with NDP NS and NA Discovering Duplicate Addresses Using NDP NS and NA NDP Summary Dynamic Configuration of Host IPv6 Settings Dynamic Configuration Using Stateful DHCP and NDP Differences Between DHCPv6 and DHCPv4 DHCPv6 Relay Agents Using Stateless Address Autoconfiguration Building an IPv6 Address Using SLAAC Combining SLAAC with NDP and Stateless DHCP Verification of Host IPv6 Connectivity Verifying Host IPv6 Connectivity from Hosts Verifying Host Connectivity from Nearby Routers	Determined by the instructor			From Cisco
Attitude: <b>Speed and accuracy in doing the right thing</b>				
Health & Safety: <b>Compliance with safety protection in the workplace</b>				
Environmental Consideration: <b>Compliance with environmental protection</b>				

<b>Title: Implementing IPv6 Routing</b>	time			
	theoretical	practical	total	
Knowledge ,skill ,attitude ,safety, Environmental Consideration				Equipments ,tools, materials ,books
Knowledge and Skill :	Determined by the instructor			From Cisco
Connected and Local IPv6 Routes				
Rules for Connected and Local Routes				
Static IPv6 Routes				
Static Routes Using the Outgoing Interface				
Static Routes Using Next-Hop IPv6 Address				
Static Default Routes				
Dynamic Routes with OSPFv3				
Comparing OSPF for IPv4 and IPv6				
OSPF Routing Protocol Versions and Protocols				
Comparing OSPFv2 and OSPFv3				
Configuring Single-Area OSPFv3				
OSPFv3 Passive Interfaces				
Verifying OSPFv3 Status and Routes				
Verifying OSPFv3 Configuration Settings				
Verifying OSPFv3 Neighbors				
Examining the OSPFv3 Database				
Examining IPv6 Routes Learned by OSPFv3				
Attitude:				
<b>Speed and accuracy in doing the right thing</b>				
Health & Safety:				
<b>Compliance with safety protection in the workplace</b>				
Environmental Consideration:				
<b>Compliance with environmental protection</b>				

### Equipment standard form

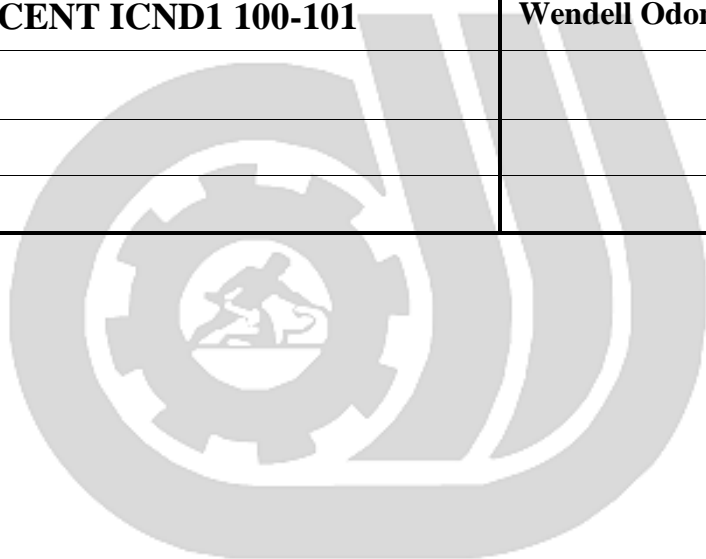
	Title	Technical specification	Quantity
1	Computer	Ram:2G VGA:Intel CPU:i3 HDD:256	7
2	Switch	Switch Cisco 2960 & 2950	1
3	Router	Router Cisco 2911 & 2901 & 2811	1
4	Console Cable		2
5	Ethernet Cable		2
6	Packet Tracer	Last Version	7
7	Video Projector		1
8	Smart Board & Whiteboard		1

**\*Required quantity for each 15 Trainees**

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## Resources (books, site, software...)

title	author	publication
<b>CISCO.com</b>		
<b>Packet Tracer Software</b> <b>Boson NetSim Software</b> <b>GNS 3</b>		
<b>Cisco CCENT ICND1 100-101</b>	<b>Wendell Odom</b>	<b>Cisco press</b>



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