

# **CCNA EXPLORATION v4.0 NETWORK FUNDAMENTALS INSTRUCTOR REFERENCE GUIDE**

## **COMPARISON OF NEW CURRICULA WITH EXISTING CURRICULA**



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## **Network Fundamentals Summary**

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New CCNA curriculum has been created to improve student experience, improve quality, and increase flexibility.

## Network Fundamentals Course Outline

Following is the outline for this new course with indications as to which topics contain new content.

Course Outline				New/ Existing Content
<b>1.0</b>			<b>Living in a Network-centric world- Chapter Intro</b>	
		1.0.1	Chapter Introduction	New
	1.1		Communicating in a Network-Centric World	New
		1.1.1	Networks supporting the Way We live	New
		1.1.2	Examples of Today's Popular Communication Tools	New
		1.1.3	Networks Supporting the Way We Learn	New
		1.1.4	Networks Supporting the Way We Work	New
		1.1.5	Networks Supporting the Way We Play	P-New 2.1.1
	1.2		Communication- An Essential Part of Our Lives	New
		1.2.1	What Is Communication?	New
		1.2.2	Quality of Communications	New
	1.3		The Network as a Platform	New
		1.3.1	Communicating over Networks	New
		1.3.2	The Elements of a Network	New
		1.3.3	Converged Networks	New
	1.4		The Architecture of the Internet	New
		1.4.1	The Network Architecture	New
		1.4.2	A Fault Tolerant Network Architecture	New
		1.4.3	A Scalable Network Architure	New
		1.4.4	Providing Quality of Service	New
		1.4.5	Providing Network Security	New
	1.5		Trends in Networking	New
		1.5.1	Where is it all Going	New
		1.5.2	Networking Career Opportunities	New
	1.6		Chapter Labs	New
		1.6.1	Lab- Using collaboration tools- Internet relay chat (IRC) and instant messaging (IM)	New
		1.6.2	Lab- Using collaboration tools- Wiki's and Web logs	New
	1.7			
		1.7.1.1and 1.7.1.2	Summary and Review	
		1.7.1.3	Packet Tracer Skills integration challenge	P-New
		1.7.4	Learn more	New

Course Outline				New/ Existing Content
		1.8.1	Chapter Quiz	New
<b>2.0</b>		2.0.1	<b>Communicating over the Network- Chapter Introduction</b>	
	2.1		The Platform for Communications	New
		2.1.1	The Elements of Communication	New
		2.1.2	Communicating the Messages	New
		2.1.3	Components of the Network	New
		2.1.4	End Devices and their Role on the Network	New
		2.1.5	Intermediary devices and their Role on the Network	P-New 5.1.7, 5.1.10
		2.1.6	Network Media	P-New 3.1.8, 3.2.1,3.3.1
	2.2		LANS, WANS, and Internetworks	
		2.2.1	Local Area Networks	P-New 2.1.6
	2.2	2.2.2	Wide Area Networks	P-New 2.1.7
		2.2.3	The Internet- A Network of Networks	P-New 2.1.7
		2.2.4	Network Representations	P-New 2.3.2
		2.2.5	Activity- Using NeoTrace to View Internetworks	New
	2.3		Protocols	
		2.3.1	Rules that Govern Communications	New
		2.3.2	Network Protocols	P-New 2.1.5
		2.3.3	Protocol Suites and Industry Standards	2.1.5, 2.3.2
		2.3.4	The Interaction of Protocols	P-New 2.1.5, 2.3.2
		2.3.5	Technology Independent Protocols	New
	2.4		Using Layered Models	
		2.4.1	The Benefits of Using a Layered Model	2.3.3
		2.4.2	Protocols and Reference Models	P-New 2.1.5
		2.4.3	The TCP/IP Model	2.3.6
		2.4.4	The Communication Process	P-New 2.3.4, 2.3.6
		2.4.5	Protocol Data Units and Encapsulation	2.3.7
		2.4.6	The Sending and Receiving Process	P-New 2.3.4, 2.3.5, 2.3.6
		2.4.7	The OSI Model	2.3.4
		2.4.8	Comparing the OSI Model with the TCP/IP Model	2.2.5
	2.5		Network Addressing	
		2.5.1	Addressing the Network	New
		2.5.2	Getting the Pieces of Data to the End Device	P-New 6.2.1
		2.5.3	Getting the Pieces of Data through the Internetwork	New
		2.5.4	Getting the Pieces of Data to the Right Application	New
		2.5.5	Warriors of the Net	New
	2.6		Chapter Labs	

Course Outline				New/ Existing Content
		2.6.1	Lab: Topology Orientation and Building a Small Network	New
		2.6.2	Lab: Using Wireshark to View Protocol Data Units	New
	2.7		Chapter Summary	
		2.7.1	Summary and Review	
		2.7.2	Check Your Understanding	
		2.7.3	Chapter Problems and Discussion	
		2.7.4	PT Skills Integration Challenge	New
		2.7.5	To Learn More	
	2.8	2.8.1	Chapter Quiz	
<b>3.0</b>			<b>Application Layer Functionality and Protocols</b>	
		3.0.1	Chapter Introduction	New
	3.1		Applications – the interface between the networks	New
		3.1.1	OSI and TCP/IP Model	New
		3.1.2	Application layer software	New
		3.1.3	User Applications, services, and application layer protocols	New
		3.1.4	Application layer protocol functions	New
	3.2		Making provisions for application layer services	
		3.2.1	The client-server model	P-New 11.2.3
		3.2.2	Servers	New
		3.2.3	Application layer services and protocols	11.2.1,11.2.2,11.2.4 11.2.5, 11.2.7
		3.2.4	Peer-to-peer networking and P2P	New
	3.3		Application Layer protocols and services examples	
		3.3.1	DNS services and protocol	11.2.2
		3.3.2	WWW service and HTTP	11.2.4
		3.3.3	E-mail services and SMTP/POP Protocols	11.2.5
		3.3.4	FTP	P-New 11.2.3
		3.3.5	DHCP	P-New 9.3.5
		3.3.6	File Sharing Services and SMB protocol	New
		3.3.7	P2P services and Gnutella protocol	New
		3.3.8	Telnet Services and Protocol	11.2.7
	3.4		Chapter labs and activities	
		3.4.1	Data stream capture	New
		3.4.2	Lab: Managing a web server	New
		3.4.3	Lab: Email services and protocols	New
	3.5		Chapter Summary	
		3.5.1	Summary and Review	

Course Outline				New/ Existing Content
	3.6		Chapter Quiz	
		3.6.1	Chapter Quiz	
<b>4.0</b>		4.0.1	<b>OSI Transport Layer- Chapter Introduction</b>	
	4.1		Roles of the Transport Layer	
		4.1.1	Purpose of the Transport Layer	P-New 11.1.1
		4.1.2	Controlling the conversations	11.1.3
		4.1.3	Supporting Reliable Communication	P-New 11.1.6
		4.1.4	TCP and UDP	11.1.7, 11.1.8
		4.1.5	Port Addressing	P-New 11.1.9
		4.1.6	Segmentation and Reassembly- Divide and Conquer	New
	4.2		The TCP protocol – Communicating with reliability	
		4.2.1	TCP- Making Conversations Reliable	11.1.1
		4.2.2	TCP Server Processes	New
		4.2.3	TCP Connection Establishment and Termination	11.1.3
		4.2.4	TCP Three-Way Handshake	P-New ,11.1.4
		4.2.5	TCP Session Termination	New
	4.3		Managing TCP Sessions	
		4.3.1	TCP Segment Reassembly	11.1.3, 11.1.6
		4.3.2	TCP Acknowledgement with Windowing	11.1.5
		4.3.3	TCP Retransmission	11.1.6
		4.3.4	TCP Congestion Control- Minimizing Segment Loss	P-New 11.1.3
	4.4		The UDP protocol – Communicating with Low Overhead	
		4.4.1	UDP- Low Overhead vs. Reliability	P-New 11.1.8
		4.4.2	UDP Datagram Reassembly	P-New 11.1.8
		4.4.3	UDP Server Processes and Requests	New
		4.4.4	UDP Client Processes	New
	4.5		Lab Activities	New
		4.5.1	Observing TCP and UDP using Netstat	New
		4.5.2	TCP/IP Transport Layer Protocols, TCP and UDP	New
		4.5.3	Application and Transport Layer Protocols- Lab	New
	4.6	4.6.1	Chapter Summary and Review	New
	4.7	4.7.1	Chapter Quiz	New
<b>5.0</b>		5.0.1	<b>Chapter Introduction OSI Network Layer</b>	
	5.1		Roles of the Network Layer – from host to host	
		5.1.1	Network Layer - Communication from host to host	8.2.6,9.2.1,10.2.1
		5.1.2	The IP v4 protocol - example network layer	P-New 9.2.1

Course Outline				New/ Existing Content
			protocol	
		5.1.3	IP v4 protocol - connectionless	10.1.2, 10.1.4
		5.1.4	IP v4 protocol- best effort	P-New10.1.2,10.1.4
		5.1.5	The IP protocol – media independent	New
		5.1.6	IPv4 packet- Packaging the Transport layer pdu	P-New 10.1.2
		5.1.7	IPv4 packet header	10.1.5
	5.2		Networks – Dividing hosts into groups	P-New 10.3.2
		5.2.1	Networks - separating host into common groups	New
		5.2.2	Why separate hosts into networks? - performance	P-New 8.2.4,8.2.5
		5.2.3	Why separate hosts into networks? - security	New
		5.2.4	Why separate hosts into networks? – Address Management	P-New 8.2.3
		5.2.5	How do we separate hosts into networks? - Hierarchical addressing	P-New 9.2.3
		5.2.6	Dividing the networks - networks from networks	P-New 9.2.3,9.2.7
	5.3		Routing – How our data packets are handled	10.2.1
		5.3.1	Device parameters - supporting communication outside our network	New
		5.3.2	IP Packets - Carrying data end to end	P-New 10.1.3
		5.3.3	A gateway - the way out of our network	New
		5.3.4	A route- the path to a network	P-New10.2.4,10.2.5
		5.3.5	The Destination Network	P-New10.2.4,10.2.5
		5.3.6	The next hop - where the packet goes next	P-New,10.2.5
		5.3.7	Packet forwarding - moving the packet toward its destination	P-New10.2.4
		5.4	Routing processes: how routes are learned	P-New10.2.4,10.2.5
		5.4.1	Routing protocols- sharing the routes	P-New10.2.4,10.2.5
		5.4.2	Static routing	P-New10.2.4
		5.4.3	Dynamic routing	P-New10.2.4
	5.5		Labs	New
		5.5.1	Lab- Examining a device's gateway	New
		5.5.2	Examining a route	New
	5.6	5.6.1	Summary	New
	5.7	5.7.1	Chapter Quiz	New
<b>6.0</b>		6.0.1	<b>Chapter Introduction: Addressing the Network – IPv4</b>	
	6.1		IP v4 Addresses	
		6.1.1	The anatomy of an IPv4 address	9.2.1
		6.1.2	Knowing the numbers- Binary to decimal conversion	1.2.6, 9.2.2

Course Outline			New/ Existing Content
	6.1.3	Practicing binary to decimal conversions	1.2.6
	6.1.4	Knowing the numbers- Decimal to binary conversion	1.2.5
	6.1.5	Practicing decimal to binary conversion	1.2.5
6.2		Addresses for different purposes	
	6.2.1	Types of addresses in an IPv4 network	P-New, 9.2.5
	6.2.2	Calculating network, hosts, and broadcast addresses	9.2.5
	6.2.3	Unicast, multicast, broadcast - types of communication	9.2.4, 9.2.5
	6.2.4	Reserved IPv4 address ranges	9.2.5
	6.2.5	Public and private address	9.2.6
	6.2.6	Special IPv4 addresses	New
	6.2.7	Legacy IPv4 addressing	10.3.1
6.3		Assigning addresses	
	6.3.1	Planning to address the network	P-New, 9.3.1,9.3.2
	6.3.2	Static or dynamic addressing for end user devices	P-New, 9.3.1,9.3.2
	6.3.3	Assigning addresses to other devices	P-New,9.3.2
	6.3.4	Who assigns the different addresses	P-New, 9.2.4
	6.3.5	ISP's	New
	6.3.6	Overview of IPv6	P-New, 9.2.8
6.4		Is it on my network?	
	6.4.1	The subnet mask- defining the network and host portions	P-New, 1.2.10,10.3.3,10.3.4
	6.4.2	ANDing- What is in our network?	1.2.9, 1.2.10, 10.3.6
	6.4.3	The ANDing process	1.2.9, 10.3.6
6.5		Calculating Addresses	
	6.5.1	Basic Subnetting	P-New 9.2.7,10.3.2
	6.5.2	Subnetting- Dividing Networks into the Right Sizes	New
	6.5.3	Subnetting- Subnetting a Subnet	New
	6.5.4	Determining the Network Address	P-New 10.3.2
	6.5.5	Calculating the Number of Hosts	10.3.3-10.3.5
	6.5.6	Determining Valid Addresses for Hosts	10.3.3-10.3.5
	6.5.7	Assigning Addresses	New
	6.5.8	Addressing in a Tiered Internetwork	New
6.6		Testing the Network Layer	
	6.6.1	ping 127.0.0.1 - Testing the local stack	P-New 1.1.7
	6.6.2	ping gateway - Testing connectivity to the local LAN	P-New 1.1.7
	6.6.3	ping remote host - Testing connectivity to remote LAN	P-New 1.1.7

Course Outline				New/ Existing Content
		6.6.4	tracert (tracert) - Testing the path	P-New 1.1.7
		6.6.5	ICMPv4 - the protocol supporting testing and messaging	New
	6.7		Labs and Activities	
		6.7.1	Lab- Ping and Traceroute	New
		6.7.2	Lab- Examining ICMP packet	New
		6.7.3	Activity- IPv4 address subnetting part 1	10.3.4, 10.3.5
		6.7.4	Activity- IPv4 address subnetting part 2	10.3.4, 10.3.5
		6.7.5	Subnet and Router Configuration	New
	6.8	6.8.1	Chapter summary and review	
	6.9	6.9.1	Chapter Quiz	
<b>7.0</b>		7.0.1	<b>OSI Data Link Layer-</b> Chapter Introduction	
	7.1		Data Link layer – Accessing the media	
		7.1.1	Data Link layer – Supporting and connecting to upper layer	6.2.1, 6.1.3
		7.1.2	Data Link layer – Controlling transfer across local media	6.2.1, 6.2.2
		7.1.3	Data Link layer – Creating a frame	6.1.5, 6.1.6
		7.1.4	Data Link Layer – Connecting upper layer services to the media	6.2.1
		7.1.5	Data link layer standards	6.1.2
	7.2		Media Access control techniques	
		7.2.1	Placing data on the media	5.1.11, 6.2.1, 6.2.2
		7.2.2	Media access control for shared media	6.1.3, 6.2.2
		7.2.3	Media access control for non-shared media	6.2.10
		7.2.4	Logical topology vs. physical topology	2.1.4
		7.2.5	Point to point topology	5.1.12
		7.2.6	Multi-access topology	6.1.3
		7.2.7	Ring topology	2.1.4
	7.3		Media access control addressing and framing data	6.1.5,6.1.6
		7.3.1	Data link layer protocols- the frame	6.1.5
		7.3.2	Framing - the role of the header	6.1.6, 6.1.7
		7.3.3	Addressing- Where the frame goes	6.1.6, 6.1.7
		7.3.4	Framing - the role of the trailer	6.1.6, 6.1.7
		7.3.5	Data Link layer protocols - the frame	6.1.5
	7.4		Putting it all together	
		7.4.1	Follow data through an internetwork	New
	7.5		Labs and activities	
		7.5.1	Investigating layer 2 frame headers	New
		7.5.2	Lab- Frame examination	New
	7.6	7.6.1	Chapter Summary and Review	

Course Outline				New/ Existing Content
	7.7	7.7.1	Chapter quiz	
<b>8.0</b>		<b>8.0.1</b>	<b>OSI Physical Layer- Chapter Introduction</b>	
	8.1		The Physical layer –Communication Signals	
		8.1.1	Physical Layer - Purpose	2.3.7
		8.1.2	Physical Layer – Operation	4.2.1, 6.1.7
		8.1.3	Physical Layer - Standards	2.3.3, 2.3.4, 5.1.1-5.1.3, 6.1.2
		8.1.4	Physical Layer Fundamental Principles	4.1.1,4.1.2, 4.2.1, 6.1.5, 6.2.3
	8.2		Physical Signaling and Encoding – Representing Bits	
		8.2.1	Signaling Bits for the Media	4.1.6, 4.2.1, 6.1.5
		8.2.2	Encoding – Grouping Bits	P-New 4.1.6, 4.2.1, 6.1.5
		8.2.3	Data Carrying Capacity	P-New 2.2, 2.25, 3.1.9, 4.18, 5.1.1, 5.1.5
	8.3		Physical media – Connecting Communication	
		8.3.1	Types of Physical Media	3.1.6, 4.2.1, 5.1.3, 5.1.4
		8.3.2	Copper Media	3.1.6, 4.2.1-4.2.3, 5.1.1, 5.1.4, 5.1.5
		8.3.3	Unshielded Twisted Pair (UTP) Cable	4.2.1-4.2.5, 5.1.3-5.1.5
		8.3.4	Other Copper Cable	3.1.7, 3.1.8
		8.3.5	Copper Media Safety	P-New 3.1.2, 3.1.4, 3.1.5
		8.3.6	Fiber Media	P-New 3.2.6, 3.2.7, 3.2.9, 3.2.10, 4.2.8, 5.1.1
		8.3.7	Wireless Media	P-New 5.1.8
		8.3.8	Media Connectors	P-New 5.1.3-5.1.5
		8.4.1	Media Connectors Lab Activity	3.1.9
		8.5.1	Summary and Review	
		8.6.1	Chapter Quiz	
<b>9.0</b>		<b>9.0.1</b>	<b>Ethernet- Chapter Introduction</b>	
	9.1		Overview of Ethernet	
		9.1.1	Ethernet – Standards and Implementation	P-New 5.1.2, 6.1.1, 6.1.3
		9.1.2	Ethernet- Layer 1 and Layer 2	5.1.2, 6.1.3
		9.1.3	Logic Link Control – Connecting to the Upper Layers	6.1.3, 6.2.1
		9.1.4	MAC – Getting Data to the Media	P-New 6.2.1
		9.1.5	Physical Implementations of Ethernet	P-New 6.1.5

Course Outline			New/ Existing Content
9.2		Ethernet- Communication through the LAN	
	9.2.1	Historic Ethernet	6.1.1, 6.1.2
	9.2.2	Ethernet Collision Management	6.1.3, 6.2.2
	9.2.3	Moving to 1 Gbps and Beyond	2.1.8, 6.1.2, 7.2.4
9.3		The Ethernet Frame	
	9.3.1	The Frame – Encapsulating the Packet	6.1.5, 6.1.6
	9.3.2	The Ethernet MAC Address	6.1.4
	9.3.3	Hexadecimal Numbering and Addressing	1.1.6, 1.2.8
	9.3.4	Another Layer of Addressing	P-New 9.2.1
	9.3.5	Ethernet Unicast, Multicast and Broadcast	P-New 6.1.4, 8.2.4, 9.2.5
9.4		Ethernet Media Access Control	
	9.4.1	Media Access Control in Ethernet	6.2.1
	9.4.2	CSMA/CD – The Process	P-New 6.2.2
	9.4.3	Ethernet Timing	6.2.3
	9.4.4	Interframe Spacing and Backoff	6.2.3,6.2.4, 6.2.5
9.5		Ethernet Physical Layer	
	9.5.1	Overview of Physical Layer	P-New 5.1.1, 5.1.2, 6.1.2
	9.5.2	10 and 100Mbps Ethernet	5.1.2, 5.1.3, 5.1.4
	9.5.3	1000Mbps Ethernet	New
	9.5.4	Ethernet – Future Options	New
9.6		Hubs and Switches	
	9.6.1	Legacy Ethernet – Using Hubs	5.1.6, 5.1.7
	9.6.2	Ethernet – Using Switches	P-New 5.1.10
	9.6.3	Switches – Selective Forwarding	P-New 5.1.10
	9.6.4	Ethernet – Comparing Hubs and Switches	New
9.7		Address Resolution Protocol (ARP)	
	9.7.1	The ARP Process – Mapping IP to MAC Addresses	9.3.6, 9.3.7
	9.7.2	The ARP Process – Destinations Outside the Local Network	9.3.6, 9.3.7
	9.7.3	The ARP Process – Removing Address Mappings	New
	9.7.4	ARP Broadcasts - Issues	New
	9.7.5	ARP – Layer 2 to Layer 3 Mapping	New
9.8		Chapter Labs	
	9.8.1	Lab – Address Resolution Protocol (ARP)	9.3.7
	9.8.2	Lab Activities – Cisco Switch MAC Table Examination	New
	9.8.3	Lab – Intermediary Device as an End Device	New
9.9		Chapter Summary	

Course Outline				New/ Existing Content
		9.9.1	Summary and Review	
	9.10		Chapter Quiz	
		9.10.1	Chapter Quiz	
<b>10.0</b>			<b>Planning and Cabling Your Networks</b>	
		10.0.1	Chapter Introduction	
	10.1		LANS - Making the Physical Connection	
		10.1.1	Choosing the Appropriate LAN Device	P-New 2.1.3, 8.2.3, 8.2.5
		10.1.2	Device Selection Factors	P-New 2.1.3,5.1.7, 5.1.10, 5.2.3, 8.2.1
	10.2		Device Interconnections	
		10.2.1	LAN and WAN- Getting Connected	P-New 5.1.1-5.1.4
		10.2.2	Making LAN Connections	5.1.3, 5.1.5
		10.2.3	Making WAN Connections	P-New 5.2.2, 5.2.3
	10.3		Developing an Addressing Scheme	
		10.3.1	How Many Hosts in the Network	P-New 9.2.7
		10.3.2	How Many Networks	P-New 9.2.7
		10.3.3	Designing the Address Standard for our Internetwork	New
	10.4		Calculating the Subnets	
		10.4.1	Calculating Addresses: Case 1	P-New 9.2.7
		10.4.2	Calculating Addresses: Case 2	P-New 9.2.7
	10.5		Device Interconnections	
		10.5.1	Device Interfaces	P-New 5.1.4
		10.5.2	Making the Device Management Connection	5.2.6, 5.2.7
	10.6		Chapter Labs	
		10.6.1	Lab- Creating a Small Lab Topology	New
		10.6.2	Establishing a Console Session with hyperterminal	5.2.7
		10.6.3	Establishing a Console Session with Minicom	New
	10.7		Chapter Summary	
		10.7.1	Summary and Review	
	10.8		Chapter Quiz	
		10.8.1	Chapter Quiz	
<b>11.0</b>			<b>Configuring and Testing Your Network</b>	
		11.0.1	Chapter Introduction	
	11.1		Configuring Cisco devices – IOS basics	
		11.1.1	Cisco IOS	New
		11.1.2	The Configuration files	New
		11.1.3	Cisco IOS modes	New
		11.1.4	Basic IOS command structure	New
		11.1.5	Using CLI help	New

Course Outline				New/ Existing Content
		11.1.6	IOS "examination" commands	New
		11.1.7	IOS Configuration Modes	New
	11.2		Applying a basic configuration using Cisco IOS	
		11.2.1	Devices need names	New
		11.2.2	Limiting device access - Configuring passwords and using banners	New
		11.2.3	Managing configuration files	New
		11.2.4	Configuring Interfaces	P- New 5.2.4
	11.3		Verifying Connectivity	
		11.3.1	Test the Stack	P-New 1.1.6, 1.1.7
		11.3.2	Testing the Interface Assignment	New
		11.3.3	Testing the Local Network	New
		11.3.4	Testing Gateway and Remote Connectivity	P-New 1.1.6, 1.1.7
		11.3.5	Tracing and Interpreting Trace Results	P-New 1.1.6, 1.1.7
	11.4		Monitoring and Documenting of Networks	
		11.4.1	Basic Network Baselines	New
		11.4.2	Capturing and Interpreting Trace Information	New
		11.4.3	Learning About the Nodes on the Network	New
	11.5		Lab Activity	
		11.5.1	Basic Cisco Device Configuration	New
		11.5.2	Managing Device Configuration	New
		11.5.3	Configure Host Computers For IP Networking	P-New 5.1.12, 5.1.13
		11.5.4	Network Testing	New
		11.5.5	Network Documentation with Utility Commands	New
		11.5.6	Case Study	New
	11.6		Summary	
		11.6.1	Summary and Review	
	11.7	11.7.1	Chapter Quiz	

## Network Fundamentals Summary of Skills and Equipments Changes

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There are new skills as well as new equipment being introduced in the CCNA Exploration curriculum.

### **NEW SKILLS REQUIRED**

Following is a list of the new skills that shall be required for the Networking Fundamentals course:

- Use of Wiki's
- Use of Internet Relay Chat and Instant Messenger
- Use of Weblogs
- Use of NeoTrace™ to View Internetworks.
- Use of Wireshark for frame capture
- Use of Packet Tracer 4.1 to build virtual networks
- Set up and use for the hard wired semester lab topologies
- Set up and use of the "Explorer" server along with the applications that will be run through it
- The ability to teach classless IP addressing
- Basic router and switch configuration and connectivity

### **EQUIPMENT REQUIRED**

#### **Academies adopting all CCNA Discovery courses and/or all CCNA Exploration courses - Minimum Required Equipment Bundle:**

In order to be able to implement the different topologies that are used in the lab exercises of the CCNA curricula, Academies teaching the four courses of either CCNA Exploration and/or CCNA Discovery require as a minimum the following equipment:

- 3 Cisco 1841 Integrated Services Routers (ISR) with Base IP IOS 12.4
- 3 2960 switches
- 2 Linksys wireless routers (Linksys 300N is preferred but 54G or the WRV200 is alternative) or SOHO equivalent

Note: The routers and switches in this equipment bundles can be substituted by other models of Cisco routers and switches with equal or higher specifications.

#### **Additional Lab Equipment Required:**

In addition to the networking equipment specified above, the lab topologies of CCNA Exploration and Discovery require the use of the following equipment and accessories:

- 1 PC acting as an Application Server
- 2 desktop/laptop PCs acting as clients
- NIC Cards for the PC server and PC clients
- 2 Wireless LAN Adapters for the client PCs
- Ethernet cables and Serial Cables
- Cable-making and testing equipment

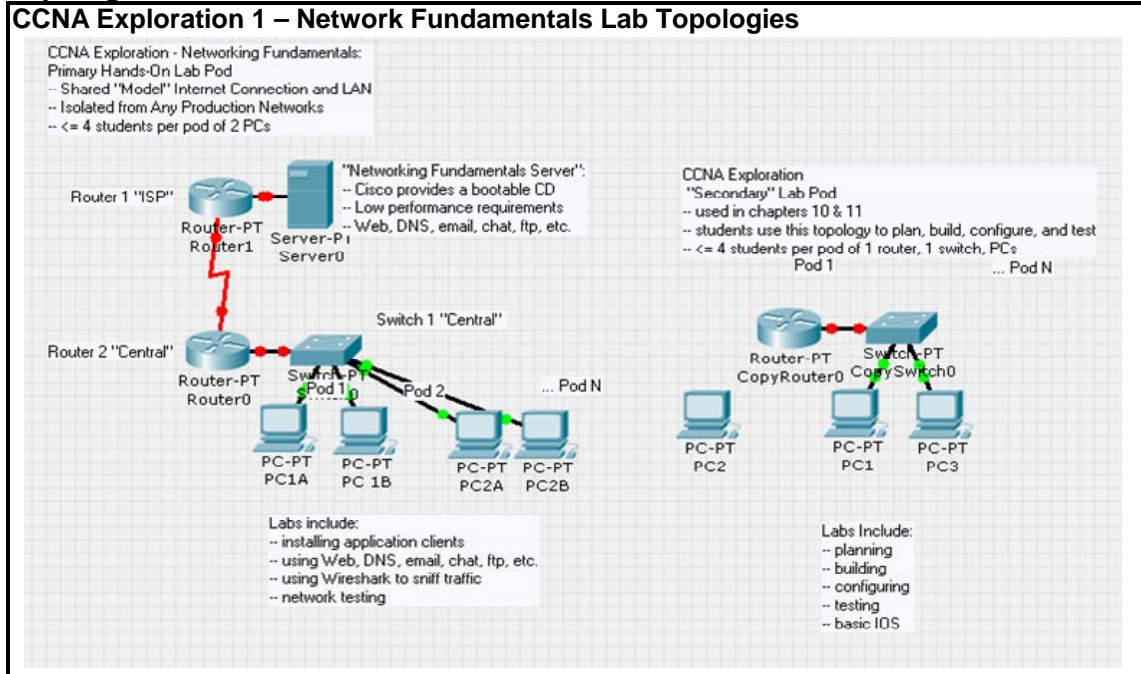
**IOS Option:**

In order to keep equipment investment to a minimum, the Product Development team designed all lab exercises for both CCNA Exploration and Discovery using the BASE IP IOS 12.4. For those Academies that wish to drill deeper into some of the routing functionalities, Cisco recommends an upgrade of the BASE IP IOS to the Advanced Services IOS. In addition to the software itself, this upgrade requires additional DRAM and Flash memories for the 1841 Routers. Details of the upgrade can be found in the Advanced IP Options tab of this document.

**Mounting Rack Accessories:**

The 1841 is a desktop router. Academies that prefer to install lab equipment in standard 19" racks, can use the optional Rack Kit for the 1841.

**Topologies:**



## Summary of Changes

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An emphasis on the network-centric view of the world.

Top-down approach to explaining how networks work using the OSI model

Converged networks (networks consists of more than just PC to PC communication. We now have many devices on the network such as phones, PDAs, TVs, etc)

Experiencing user applications such as blogs, podcasts and IM

Integrated use of Packet Tracer for network visualization, skill building and simulation.

More engaging lab activities that emphasize use of network tools and experience with applications such as Wire Shark and Neotrace

IP addressing is presented by teaching classless addressing and the concepts of VLSM without calling it VLSM.

Basic Quality of Service (QoS) concepts in networks

Basic Security concepts

Basic router and switch configuration and connectivity.

Use of a "Model Internet" hands-on lab topology pod of equipment for labs.

Use of a simple server with applications and utilities to demonstrate client/ server relationships across the model internet pod.

The use of wireless Linksys routers is introduced.