

CCNA Routing and Switching Scope and Sequence (DRAFT)

Last updated 4 June 2013

This DRAFT Scope and Sequence for the Cisco CCNA® Routing and Switching curriculum is an evolving document that will be revised on a regular basis as we progress through the development and release cycles. Our objective is to share detailed information about the curriculum and the courses with academies and instructors as soon as possible. For the most recent version of this document, please view the [CCNA Routing and Switching Instructor Resource Spotlight](#) page in the Cisco NetSpace™ learning environment.

Target Audience

The Cisco CCNA Routing and Switching curriculum is designed for Cisco Networking Academy® students who are seeking entry-level jobs in the ICT industry or hope to fulfill prerequisites to pursue more specialized ICT skills. CCNA Routing and Switching provides an integrated and comprehensive coverage of networking topics, from fundamentals to advanced applications and services, while providing opportunities for hands-on practical experience and career skills development.

The curriculum is appropriate for students at many education levels and types of institutions, including high schools, secondary schools, universities, colleges, career and technical schools, and community centers.

Curriculum Overview

The CCNA Routing and Switching curriculum consists of seven courses, which provides greater flexibility to accommodate different student learning goals and allow instructors to personalize their teaching styles and instructional flows. Students will be prepared to take the Cisco CCENT® certification exam after completing a set of two courses or the CCNA Routing and Switching certification exam after completing a set of four courses. The curriculum also helps students develop workforce readiness skills and builds a foundation for success in networking-related careers and degree programs. Figure 1 shows the different courses included in the CCNA Routing and Switching curriculum.

Figure 1. CCNA Routing and Switching Courses



In each course, Networking Academy™ students will learn technology concepts with the support of interactive media and apply and practice this knowledge through a series of hands-on and simulated activities that reinforce their learning.

CCNA Routing and Switching teaches comprehensive networking concepts and skills, from network applications to the protocols and services provided to those applications by the lower layers of the network. Students will progress from basic networking to more complex enterprise and theoretical networking models later in the curriculum.

CCNA Routing and Switching includes the following features:

- Students learn the basics of routing, switching, and advanced technologies to prepare for the Cisco CCENT and CCNA certification exams, networking related degree programs, and entry-level networking careers.
- The language used to describe networking concepts is designed to be easily understood by learners at all levels and embedded interactive activities help reinforce comprehension.
- Courses emphasize critical thinking, problem solving, collaboration, and the practical application of skills.
- Multimedia learning tools, including videos, games, and quizzes, address a variety of learning styles and help stimulate learning and promote increased knowledge retention.
- Hands-on labs and Cisco® Packet Tracer simulation-based learning activities help students develop critical thinking and complex problem solving skills.
- Embedded assessments provide immediate feedback to support the evaluation of knowledge and acquired skills.

Course Structure and Sequences

Instructors will have the flexibility to adapt the CCNA Routing and Switching curriculum by teaching it through a traditional instructional flow, or an instructional flow that reflects the redesigned CCNA certification program.

For the first course, also referred to as the introductory course, instructors can select one of the following options:

- The Introduction to Networks course, taught within an everyday experience context with a bottom-up approach to the OSI model
- The Network Basics course, taught within a business applications context with a top-down approach to the OSI model

For the second and third course, instructors choose from one of the following options:

- Teaching routing and switching technologies together for earlier certification opportunities, using the Routing and Switching Essentials and Scaling Networks courses
- Teaching routing and switching technologies separately in a traditional instructional flow, using the Routing Protocols and Switched Networks courses

The fourth course, Connecting Networks, serves as a capstone for either instructional flow to prepare students for certification and career success.

Lab Equipment Requirements

Detailed equipment information, including descriptions and part numbers, is available in the CCNA Equipment List, which is located on the Cisco NetSpace [Equipment Information](#) site. Please refer to that document for the latest information, which includes specifications for the following minimum equipment required:

- 3 CISCO1941/K9 Integrated Services Routers Generation 2 (ISR-G2)
- 3 HWIC-2T Serial WAN Interface Cards
- 3 WS-C2960-24TT-L Cisco Catalyst switches
- 2 Linksys EA Series routers (2700, 3500, 4500) or equivalent
- Assorted Ethernet and Serial cables and hubs

CCNA Routing and Switching Introductory Course Outlines

Table 1. CCNA Routing and Switching Introductory Course Outlines

Chapter	Introduction to Networks	Network Basics
1	Exploring the Network	Exploring the Network
2	Configuring a Network Operating System	Configuring a Network Operating System
3	Network Protocols and Communications	Network Protocols and Communications
4	Network Access	Application Layer
5	Ethernet	Transport Layer
6	Network Layer	Network Layer
7	Transport Layer	IP Addressing
8	IP Addressing	Subnetting IP Networks
9	Subnetting IP Networks	Network Access
10	Application Layer	Ethernet
11	It's a Network	It's a Network

Introduction to Networks and Network Basics

The CCNA Routing and Switching introductory courses are designed to give instructors a choice between teaching introductory networking as it relates to students' everyday experiences or to business applications and

requirements. Upon completion of either introductory course, students will have the necessary knowledge to continue with the next sequence of CCNA courses that their academy offers.

The CCNA Routing and Switching introductory courses introduce the architecture, structure, functions, components, and models of the Internet and other computer networks. The principles and structure of IP addressing and the fundamentals of Ethernet concepts, media, and operations are introduced to provide a foundation for the curriculum. By the end of either course, students will be able to build simple LANs, perform basic configurations for routers and switches, and implement IP addressing schemes.

Students who complete Introduction to Networks or Network Basics will be able to perform the following functions:

- Understand and describe the devices and services used to support communications in data networks and the Internet
- Understand and describe the role of protocol layers in data networks
- Understand and describe the importance of addressing and naming schemes at various layers of data networks in IPv4 and IPv6 environments
- Design, calculate, and apply subnet masks and addresses to fulfill given requirements in IPv4 and IPv6 networks
- Explain fundamental Ethernet concepts such as media, services, and operations
- Build a simple Ethernet network using routers and switches
- Use Cisco command-line interface (CLI) commands to perform basic router and switch configurations
- Utilize common network utilities to verify small network operations and analyze data traffic

Teaching Routing and Switching Technologies Together Course Outlines

Table 2. Teaching Routing and Switching Technologies Together Course Outlines

Chapter	Routing and Switching Essentials	Scaling Networks
1	Introduction to Switched Networks	Building a Small to Medium-Sized Network
2	Basic Switching Configuration	DHCP
3	VLANs	The Spanning Tree Protocol
4	Routing Concepts	Link Aggregation
5	Inter-VLAN Routing	Troubleshooting Layer 2 Issues
6	Static Routing	Implementing EIGRP
7	Routing Dynamically	Implementing Multi-Area OSPF
8	Single-Area OSPF	IOS File Management
9	Access Control Lists	
10	DHCP	
11	Network Address Translation for IPv4	

Routing and Switching Essentials

This course describes the architecture, components, and operations of routers and switches in a small network. Students learn how to configure a router and a switch for basic functionality. By the end of this course, students will be able to configure and troubleshoot routers and switches and resolve common issues with RIPv1, RIPv2, single-area and multi-area OSPF, virtual LANs, and inter-VLAN routing in both IPv4 and IPv6 networks.

Students who complete the Routing and Switching Essentials course will be able to perform the following functions:

- Understand and describe basic switching concepts and the operation of Cisco switches
- Understand and describe enhanced switching technologies such as VLANs, VLAN Trunking Protocol (VTP), Rapid Spanning Tree Protocol (RSTP), Per VLAN Spanning Tree Protocol (PVSTP), and 802.1q
- Configure and troubleshoot basic operations of a small switched network
- Understand and describe the purpose, nature, and operations of a router, routing tables, and the route lookup process
- Configure and verify static routing and default routing
- Understand and describe how VLANs create logically separate networks and how routing occurs between them
- Understand and describe dynamic routing protocols, distance vector routing protocols, and link-state routing protocols
- Configure and troubleshoot basic operations of routers in a small routed network:
 - Routing Information Protocol (RIPv1 and RIPv2)
 - Open Shortest Path First (OSPF) protocol (single-area OSPF)
- Configure and troubleshoot VLANs and inter-VLAN routing
- Understand and describe the purpose and types of access control lists (ACLs)
- Configure, monitor, and troubleshoot ACLs for IPv4 and IPv6
- Understand and describe the operations and benefits of Dynamic Host Configuration Protocol (DHCP) and Domain Name System (DNS) for IPv4 and IPv6
- Understand and describe the operations and benefits of Network Address Translation (NAT)
- Configure and troubleshoot NAT operations

Scaling Networks

This course describes the architecture, components, and operations of routers and switches in a larger and more complex network. Students learn how to configure routers and switches for advanced functionality. By the end of this course, students will be able to configure and troubleshoot routers and switches and resolve common issues with OSPF, EIGRP, STP, and VTP in both IPv4 and IPv6 networks. Students will also develop the knowledge and skills needed to implement DHCP and DNS operations in a network.

Students who complete the Scaling Networks course will be able to perform the following functions:

- Configure and troubleshoot DHCP and DNS operations for IPv4 and IPv6
- Understand and describe the operations and benefits of the Spanning Tree Protocol (STP)
- Configure and troubleshoot STP operations
- Understand and describe the operations and benefits of link aggregation and Cisco VLAN Trunk Protocol (VTP)
- Configure and troubleshoot VTP, STP, and RSTP
- Configure and troubleshoot basic operations of routers in a complex routed network for IPv4 and IPv6
 - Open Shortest Path First (OSPF) protocol (single-area OSPF and multi-area OSPF)
 - Enhanced Interior Gateway Routing Protocol (EIGRP)

- Configure and troubleshoot advanced operations of routers and implement RIP, OSPF, and EIGRP routing protocols for IPv4 and IPv6
- Manage Cisco IOS® Software licensing and configuration files

Teaching Routing and Switching Technologies Separately Course Outlines

Table 3. Teaching Routing and Switching Technologies Separately Course Outlines

Chapter	Routing Protocols	Switched Networks
1	Routing Concepts	Introduction to Switched Networks
2	Static Routing	Basic Switching Concepts and Configuration
3	Routing Dynamically	VLANs
4	EIGRP	LAN Redundancy
5	EIGRP Advanced Configurations and Troubleshooting	Link Aggregation
6	Single-Area OSPF	Inter-VLAN Routing
7	Adjust and Troubleshoot Single-Area OSPF	DHCP
8	Multi-Area OSPF	Wireless LANs
9	Access Control Lists	
10	IOS File Management	

Routing Protocols

This course describes the architecture, components, and operations of routers, and explains the principles of routing and routing protocols. Students learn how to configure a router for basic and advanced functionality. By the end of this course, students will be able to configure and troubleshoot routers and resolve common issues with RIPv1, RIPv2, EIGRP, and OSPF in both IPv4 and IPv6 networks.

Students who complete the Routing Protocols course will be able to perform the following functions:

- Understand and describe the purpose, nature, and operations of a router, routing tables, and the route lookup process
- Configure and verify static routing and default routing
- Understand and describe dynamic routing protocols, distance vector routing protocols, and link-state routing protocols
- Configure and troubleshoot basic operations of routers in a complex routed network for IPv4 and IPv6:
 - Routing Information Protocol (RIPv1 and RIPv2)
 - Open Shortest Path First (OSPF) protocol (single-area OSPF and multi-area OSPF)
 - Enhanced Interior Gateway Routing Protocol (EIGRP)
- Configure and troubleshoot advanced operations of routers and implement RIP, OSPF, and EIGRP routing protocols for IPv4 and IPv6
- Understand and describe the purpose and types of access control lists (ACLs)
- Configure, monitor, and troubleshoot ACLs for IPv4 and IPv6
- Manage Cisco IOS Software licensing and configuration files

Switched Networks

This course describes the architecture, components, and operations of a converged switched network. Students learn about the hierarchical network design model and how to configure a switch for basic and advanced functionality. By the end of this course, students will be able to troubleshoot and resolve common issues with Virtual LANs, VTP, and inter-VLAN routing in a converged network. Students will also develop the knowledge and skills needed to implement a WLAN in a small-to-medium network.

Students who complete the Switched Networks course will be able to perform the following functions:

- Understand and describe basic switching concepts and the operation of Cisco switches
- Understand and describe enhanced switching technologies such as VLANs, VLAN Trunking Protocol (VTP), Rapid Spanning Tree Protocol (RSTP), Per VLAN Spanning Tree Protocol (PVSTP), and 802.1q
- Configure and troubleshoot basic operations of a small switched network
- Understand and describe how VLANs create logically separate networks and how routing occurs between them
- Configure and troubleshoot VLANs, trunking on Cisco switches, inter-VLAN routing, VTP, and RSTP
- Understand and describe the operations and benefits of Dynamic Host Configuration Protocol (DHCP) and Domain Name System (DNS) for IPv4 and IPv6
- Configure and troubleshoot DHCP and DNS operations for IPv4 and IPv6
- Understand and describe the purpose of the components in a small wireless network:
 - Service Set Identification (SSID)
 - Basic Service Set (BSS)
 - Extended Service Set (ESS)
- Compare and contrast Wi-Fi Protected Access (WPA) security features and the capabilities of open, Wired Equivalent Privacy (WEP), and WPA1/2 networks
- Configure and troubleshoot basic operations of a small wireless network

Connecting Networks Course Outline

Table 4. Connecting Networks Course Outline

Chapter	Connecting Networks
1	Connecting to the WAN
2	Configuring Serial Connections
3	Broadband Solutions
4	Securing Site-to-Site Connectivity
5	Monitoring the Network
6	Troubleshooting the Network
7	Network Architectures

Connecting Networks

This course discusses the WAN technologies and network services required by converged applications in a complex network. The course enables students to understand the selection criteria of network devices and WAN technologies to meet network requirements. Students learn how to configure and troubleshoot network devices and

resolve common issues with data link protocols. Students will also develop the knowledge and skills needed to implement IPsec and virtual private network (VPN) operations in a complex network.

Students who complete the Connecting Networks course will be able to perform the following functions:

- Understand and describe different WAN technologies and their benefits
- Understand and describe the operations and benefits of virtual private networks (VPNs) and tunneling
- Configure and troubleshoot serial connections
- Configure and troubleshoot broadband connections
- Configure and troubleshoot IPsec tunneling operations
- Monitor and troubleshoot network operations using syslog, SNMP, and NetFlow
- Design network architectures:
 - Borderless networks
 - Data centers and virtualization
 - Collaboration technology and solutions

CCNA Routing and Switching Introductory Courses Detailed Outline

Table 5. CCNA Routing and Switching Introductory Courses Detailed Outline

Ch.	Introduction to Networks	Network Basics
1	Exploring the Network	Exploring the Network
	1.1 Globally Connected	1.1 Communicating in a Network-Centric World
	1.2 LANs, WANs, and the Internet	1.2 The Network as a Platform
	1.3 The Network as a Platform	1.3 LANs, WANs, and the Internet
	1.4 The Changing Network Environment	1.4 The Expanding Network
2	Configuring a Network Operating System	Configuring a Network Operating System
	2.1 IOS Bootcamp	2.1 IOS Bootcamp
	2.2 Getting Basic	2.2 Getting Basic
	2.3 Addressing Schemes	2.3 Addressing Schemes
3	Network Protocols and Communications	Network Protocols and Communications
	3.1 Rules of Communications	3.1 Network Protocols and Standards
	3.2 Network Protocols and Standards	3.2 Using Requests for Comments
	3.3 Moving Data in the Network	3.3 Moving Data in the Network
4	Network Access	Application Layer
	4.1 Physical Layer Protocols	4.1 Application Layer Protocols
	4.2 Network Media	4.2 Well-Known Application Layer Protocols and Services
	4.3 Data Link Layer Protocols	
	4.4 Media Access Control	
5	Ethernet	Transport Layer
	5.1 Ethernet Protocol	5.1 Transport Layer Protocols
	5.2 Address Resolution Protocol	5.2 TCP and UDP

	5.3	LAN Switches		
6	Network Layer		Network Layer	
	6.1	Network Layer Protocols	6.1	Network Layer Protocols
	6.2	Routing	6.2	Routing
	6.3	Routers	6.3	Routers
	6.4	Configuring a Cisco Router	6.4	Configuring a Cisco Router
7	Transport Layer		IP Addressing	
	7.1	Transport Layer Protocols	7.1	IPv4 Network Addresses
	7.2	TCP and UDP	7.2	IPv6 Network Addresses
			7.3	Connectivity Verification
8	IP Addressing		Subnetting IP Networks	
	8.1	IPv4 Network Addresses	8.1	Subnetting an IPv4 Network
	8.2	IPv6 Network Addresses	8.2	Addressing Schemes
	8.3	Connectivity Verification	8.3	Design Considerations for IPv6
9	Subnetting IP Networks		Network Access	
	9.1	Subnetting an IPv4 Network	9.1	Data Link Layer
	9.2	Addressing Schemes	9.2	Media Access Control
	9.3	Design Considerations for IPv6	9.3	Physical Layer
			9.4	Network Media
10	Application Layer		Ethernet	
	10.1	Application Layer Protocols	10.1	Ethernet Protocol
	10.2	Well-Known Application Layer Protocols and Services	10.2	Address Resolution Protocol
	10.3	The Message Heard Around The World	10.3	LAN Switches
11	It's a Network		It's a Network	
	11.1	Create and Grow	11.1	Create and Grow
	11.2	Keeping the Network Safe	11.2	Keeping the Network Safe
	11.3	Basic Network Performance	11.3	Basic Network Performance
	11.4	Managing IOS Configuration Files	11.4	Managing IOS Configuration Files
	11.5	Integrated Routing Services		

Teaching Routing and Switching Technologies Together Detailed Course Outlines

Table 6. Teaching Routing and Switching Technologies Together Detailed Course Outlines

Ch.	Routing and Switching Essentials	Scaling Networks
1	Introduction to Switched Networks	Building a Small to Medium-Sized Network
	1.1 LAN Design	1.1 Switch Hardware
	1.2 The Switched Environment	1.2 Router Hardware
2	Basic Switching Concepts and Configuration	DHCP
	2.1 Basic Switch Configuration	2.1 Implementing DHCP Options
	2.2 Switch Security: Management and Implementation	2.2 DHCP Operation

			2.3	Troubleshooting DHCP
3	VLANs		The Spanning Tree Protocol	
	3.1	VLAN Segmentation	3.1	Spanning Tree Operation
	3.2	VLAN Implementations	3.2	Configuring Spanning Tree
	3.3	VLAN Security and Design		
4	Routing Concepts		Link Aggregation	
	4.1	Initial Configuration of a Router	4.1	Link Aggregation Configuration
	4.2	Routing Decisions	4.2	Link Aggregation Concepts
	4.3	Router Operation	4.3	Troubleshooting Link Aggregation
	4.4	VLAN Best Practices		
5	Inter-VLAN Communication		Troubleshooting Layer 2 Issues	
	5.1	Inter-VLAN Routing Configuration	5.1	Troubleshooting Switching
	5.2	Troubleshoot Inter-VLAN Routing		
	5.3	Layer 3 Switching		
6	Static Routing		Implementing EIGRP	
	6.1	Static Routing Implementation	6.1	Characteristics of EIGRP
	6.2	Configure Static and Default Routes	6.2	Configuring EIGRP for IPv4
	6.3	Review of CIDR and VLSM	6.3	Operation of EIGRP
	6.4	Configure Summary and Floating Static Routes	6.4	Configuring EIGRP for IPv6
	6.5	Troubleshoot Static and Default Route issues	6.5	Troubleshooting EIGRP Implementation
7	Routing Dynamically		Implementing Multi-Area OSPF	
	7.1	Dynamic Routing Protocols	7.1	Multi-Area OSPFv2
	7.2	Distance Vector Routing Protocols	7.2	Multi-Area OSPF Operation
	7.3	RIP and RIPng Routing	7.3	Configuring Multi-Area OSPFv3
	7.4	Link-State Dynamic Routing	7.4	Troubleshooting Complex OSPF Networks
	7.5	The Routing Table		
8	Single-Area OSPF		IOS File Management	
	8.1	Characteristics of OSPF	8.1	Managing IOS System Files
	8.2	Configuring Single-Area OSPFv2	8.2	IOS Licensing
	8.3	Configure Single-Area OSPFv3		
9	Access Control Lists			
	9.1	IP ACL Operation		
	9.2	Standard IPv4 ACLs		
	9.3	Extended IPv4 ACLs		
	9.4	Debug with ACLs		
	9.5	Troubleshoot ACLs		
	9.6	IPv6 ACLs		
10	DHCP			
	10.1	Dynamic Host Configuration Protocol v4		
	10.2	Dynamic Host Configuration Protocol v6		

11	Network Address Translation for IPv4			
	11.1	NAT Operation		
	11.2	Configuring NAT		
	11.3	Troubleshooting NAT		

Teaching Routing and Switching Technologies Separately Detailed Course Outlines

Table 7. Teaching Routing and Switching Technologies Separately Detailed Course Outlines

Ch.	Routing Protocols		Switched Networks	
1	Routing Concepts		Introduction to Switched Networks	
	1.1	Initial Configuration of a Router	1.1	LAN Design
	1.2	Routing Decisions	1.2	Convergence in Switched Networks
	1.3	Router Operation	1.3	Selecting LAN Switches
2	Static Routing		Basic Switching Concepts and Configuration	
	2.1	Static Routing Implementation	2.1	Frame Forwarding
	2.2	Configuring Static and Default Routes	2.2	Basic Switch Port Configuration
	2.3	Review of CIDR and VLSM	2.3	Connecting to a Switch Remotely
	2.4	Configure Summary and Floating Static Routes	2.4	Implementing Switch Security
	2.5	Troubleshoot Static and Default Route Issues		
3	Routing Dynamically		VLANs	
	3.1	Dynamic Routing Protocols	3.1	VLAN Segmentation
	3.2	Distance Vector Dynamic Routing	3.2	Configuring VLANs
	3.3	RIP and RIPng Routing	3.3	VLAN Security
	3.4	Link-State Dynamic Routing	3.4	VTP Configuration
	3.5	The Routing Table		
4	EIGRP		LAN Redundancy	
	4.1	Characteristics of EIGRP	4.1	Spanning Tree Concepts
	4.2	Configuring EIGRP for IPv4	4.2	Per VLAN Spanning Tree
	4.3	Operation of EIGRP	4.3	Spanning Tree Configuration
	4.4	Configuring EIGRP for IPv6	4.4	First Hop Redundancy Protocol
5	EIGRP Advanced Configurations and Troubleshooting		Link Aggregation	
	5.1	Advanced EIGRP Configurations	5.1	Link Aggregation Concepts
	5.2	Troubleshoot EIGRP Implementation	5.2	Link Aggregation Configuration
6	Single-Area OSPF		Inter-VLAN Routing	
	6.1	Characteristics of OSPF	6.1	Inter-VLAN Routing Configuration
	6.2	Configuring Single-Area OSPFv2	6.2	Layer 3 Switching
	6.3	Configuring Single-Area OSPFv3	6.3	Troubleshooting Switching Implementations
7	Adjust and Troubleshoot Single-Area OSPF		DHCP	
	7.1	Advanced Single-Area OSPF Configurations	7.1	Dynamic Host Configuration Protocol v4
	7.2	Troubleshooting Single-Area OSPF Implementations	7.2	Dynamic Host Configuration Protocol v6

8	Multi-Area OSPF		Wireless LANs	
	8.1	Multi-Area OSPF Operation	8.1	Wireless LAN Concepts
	8.2	Configuring Multi-Area OSPF	8.2	Wireless LAN Standards
			8.3	Wireless LAN Security
			8.4	Wireless LAN Configuration
9	Access Control Lists			
	9.1	IP ACL Operation		
	9.2	Standard IPv4 ACLs		
	9.3	Extended IPv4 ACLs		
	9.4	Debug with ACLs		
	9.5	Troubleshooting ACLs		
	9.6	IPv6 ACLs		
10	IOS File Management			
	10.1	Managing IOS System Files		
	10.2	IOS Licensing		

Connecting Networks Detailed Course Outline

Table 8. Connecting Networks Detailed Course Outline

Ch.	Connecting Networks	
1	Connecting to the WAN	
	1.1	Hierarchical Network Design
	1.2	WAN Technologies
2	Configuring Serial Connections	
	2.1	Configuring PPP
	2.2	Configuring Frame Relay
	2.3	Troubleshooting WAN Connectivity
3	Broadband Solutions	
	3.1	Compare Broadband Solutions
	3.2	Configuring xDSL Connectivity
4	Securing Site-to-Site Connectivity	
	4.1	Tunneling
	4.2	Configuring IPSec VPN
5	Monitoring the Network	
	5.1	Syslog Operation
	5.2	SNMP Operation
6	Troubleshooting the Network	
	6.1	Troubleshooting with a Systematic Approach
	6.2	Interpreting Network Monitoring Output
7	Network Architectures	
	7.1	Borderless Networks

	7.2	Virtualization
	7.3	Collaboration



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