CCNA 3: Scaling Networks

Description:

CCNA 3: Scaling Networks for cable professionals is the third of four courses that may be used to prepare for the Cisco Certified Network Associate (CCNA) exam. CCNA3 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.

CCNA3 introduces SCTE students to intermediate level networking concepts and technologies using a hands-on approach, with an emphasis on cable operator operations. In addition, the course will assist the student in developing the skills necessary to plan and implement switching and routing polices. SCTE courses emphasize critical thinking, problem solving, collaboration, and the practical application of skills.

By the end of this course, students will be able to configure and troubleshoot routers and switches and resolve common issues with EIGR, single and multi-area OSPF, gateway redundancy protocols HSRP, VRRP and GLBP and link aggregation PAgP and LACP

Download Course Description (PDF)

Format: Online, Self-Paced Scheduled:

This course is expected to take 12 weeks to complete online, 5 days onsite for a total of 40 hours. Learners view online interactive materials and complete learning activities at a time that is convenient for the learner. Scheduled virtual online instructor coaching sessions will be optional, but participation is strongly suggested by SCTE/ISBE to provide direct interaction with the certified instructor. However, if the learner is unable to attend, these sessions are recorded. The coaching session times are determined by the students and instructor during the orientation that is held on the first day of the course. Learners spend approximately 6-8 hours per week completing the various course activities.

Access information will be emailed when the course is purchased.

System Requirements:

- High speed Internet (HSD) connection
- Updated Internet Browser (Chrome, Firefox, Safari or Internet Explorer)
  - HTML 5 Support
Target Audience:
The target audience is anyone who desires a practical and technical introduction to the field of networking. This includes field technicians, headend technicians, network operations center (NOC) staff, network engineers, network administrators, and IT help-desk staff.

Prerequisites:
- CCNA2 Routing and Switching Essentials

NOTE: a student can ONLY sign up for one CCNA course at a time

Course Materials:
Interactive and engaging SCTE/ISBE and Cisco Network Academy course content that includes chapter assessments, learning activities, practice exams and a course final confirmation of learning, along with, a requirement to complete a number of hands-on labs using a lab simulator.

Course Objectives
Upon completion of this course, students will:
- Explore a hierarchical network and associated requirements
- Understand, configure and troubleshoot enhanced switching technologies such as; Extended VLANs, Rapid Spanning Tree Protocol (RSTP), Per VLAN Spanning Tree Plus Protocol (PVST+), and EtherChannel
- Troubleshooting networks with several VLANs
- Understand, configure, and troubleshoot first hop redundancy protocols (HSRP) in a switched network
- Configure and troubleshoot routers in a complex routed IPv4 or IPv6 network using single-area OSPF& multiarea OSPF, and Enhanced Interior Gateway Routing Protocol (EIGRP)
- Manage Cisco IOS® Software licensing and configuration files
- Switch Stacking implementation

Course Outline
NOTE: Cisco is in the process of updating the course outline and associated content. As a result, this chapter outline includes the current CCNA-3 chapter outline in addition to the new content, which is listed at the end as “Bridging Material” and will be infused with CCNA-3 course content mid-2017

Course Modules:
1. Introduction to Scaling Networks
2. LAN Redundancy
3. Link Aggregation
4. Wireless LANs
5. Adjust and Troubleshoot Single-Area OSPF
6. Multiarea OSPF
7. Enhanced Interior Gateway Protocol (EIGRP)
8. EIGRP Advanced Configurations and Troubleshooting
9. IOS Images and Licensing
Course Outline:

Chapter 1: Introduction to Scaling Networks
- Explore the use of a hierarchical network for a small business.
- Describe recommendations for designing a network that is scalable.
- Describe the type of switches available for small-to-medium-sized business networks.
- Define switch platforms, port density, frame forwarding rates, Power-over-Ethernet (PoE) and multi-layer devices.
- Describe the type of routers available for small-to-medium-sized business networks.
- Use Command Line Interface (CLI) to configure and verify basic settings on a Cisco IOS device.

Chapter 2: LAN Redundancy
- Explore network redundancy from a LAYER-2 perspective and how Spanning Tree Protocol (STP) helps to avoid network congestions issues.
- Describe IEEE 802.1D STP operation, including Bridge Protocol Data Unit (BPDU) messages and switchport roles in STP operation.
- Describe Cisco’s Per-VLAN-STP “PVST+” operation in a switched LAN environment.
- Explore IEEE 802.1W Rapid-STM “RSTP”, how it differs from the 802.1D.
- Describe and configure Rapid PVST+ operation in a switched LAN environment.
- Identify common STP configuration issues.
- Explore how First-Hop Redundancy Protocols (FHRP) operate.
- Explore Hot Standby Router Protocol (HSRP), Virtual Routing Redundancy Protocol (VRRP) and Gateway Load Balancing Protocol (GLBP).

Chapter 3: Link Aggregation
- Explore link aggregation concepts and what it provides.
- Define Etherchannel in terms of Port Aggregation Protocol (PAgP) and Link Aggregation Control Protocol (LACP).
- Use CLI to configure and verify LACP and PAgP.
- Learn troubleshoot techniques with respect to EtherChannel.

Chapter 4: Wireless LANs
- Explore wireless access.
- Describe wireless LAN technology and standards.
- Learn how Wi-Fi frames are sent across a Wireless-LAN “WLAN”.
- Describe the components of a wireless LAN infrastructure & wireless topologies.
- Describe the 802.11 frame structure.
- Describe the media contention method used by wireless technology.
- Describe channel management in a WLAN.
- Describe threats to wireless LANs & wireless LAN security mechanisms.
- Configure a wireless router to support a remote site & clients to connect to a wireless router.
- Troubleshoot common wireless configuration issues.

Chapter 5: Adjust and Troubleshoot Single-Area OSPF
- Modify the OSPF interface priority to influence the DR/BDR election.
- Configure a router to propagate a default route in an OSPF network.
- Modify the OSPF interface settings to improve network performance.
- Configure OSPF authentication to ensure secure routing updates.
- Explain the process and tools used to troubleshoot a single-area OSPF network.
- Troubleshoot missing route entries in a single-area OSPFv2 route table.
- Troubleshoot missing route entries in a single-area OSPFv3 route table.

Chapter 6: Multiarea OSPF
- Explore multiarea OSPF and when it is used
- Describe how multiarea OSPF uses link-state advertisements in order to maintain routing tables.
- Define different Link State Advertisement (LSA) types
- Explore routing table entries with respect to multiarea OSPF
- Explain how OSPF established neighbor adjacencies in a multiarea OSPF implementation.
- Configure multiarea OSPFv2 & route summarization in a routed network.
- Verify multiarea OSPFv2 operations.

Chapter 7: Enhanced Interior Gateway Protocol (EIGRP)
- Explore Cisco’s dynamic routing protocol – EIGRP
- Describe the features and operation of EIGRP.
- Examine the different EIGRP packet formats.
- Describe the concepts and operation of DUAL.
- Define Diffusing Update Algorithm (DUAL) and how primary and backup routes are determined
- Use CLI to configure and verify basic EIGRP operations for IPv4 and IPv6.

Chapter 8: EIGRP Advanced Configurations and Troubleshooting
- Use CLI to configure EIGRP auto-summarization & manual summarization.
- Explore how EIGRP propagates a default route
- Use CLI to modify EIGRP interface settings to improve network performance.
• Use CLI configure EIGRP authentication to ensure secure routing updates.
• Explain the process and tools used to troubleshoot an EIGRP network.
• Troubleshoot neighbor adjacency issues in an EIGRP network.
• Troubleshoot missing route entries in an EIGRP routing table.

Chapter 9: IOS Images and Licensing
• Understand the necessity of managing IOS system image files to increase network reliability in a small-to-medium-sized business network.
• Explain the Cisco IOS image naming conventions.
• Calculate memory requirements needed when upgrading an IOS system image.
• Explain the licensing process for the Cisco IOS software in a small-to-medium-sized business network.
• Configure a router to install a Cisco IOS image license.

CCNAv6 Bridging Material to be added by Cisco to the course in 12Q17
• Explore VLAN Trunking Protocol (VTP) from and overall impact on network operations and when not to use it
• Define extended VLANs and how they are used
• Describe when to use Dynamic Trunking Protocol (DTP) and when to turn it off
• Use CLI to troubleshoot networks with a higher number of VLANs
• Explore Cisco’s “switch stacking” feature
• Use CLI to configure basic to advanced HSRP features

Requirements for Successful Course Completion:
• Average score of 70%, or greater, on all chapter assessments and final exam.
• Participants may take exams up to 3 times.
• Complete all assigned Packet Tracer labs.

Upon Successful Course Completion Learners Will Receive:
• SCTE Course Certificate
• Cisco Course Certificate
• 3 Recertification Units (Rus) toward SCTE certification renewal

Certification Exam Information:
• After completing CCNA1 to CCNA4 students may take the Certified Cisco Network Associate exam number 200-125

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\text{CCNA1} + \text{CCNA2} + \\
\text{CCNA3} + \text{CCNA 4} = \\
\text{CCNA}
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The CCNA program also helps individuals prepare for the SCTE IPEP Certification.

NOTE: Cisco certification exams are scheduled at Pearson VUE
http://pearsonvue.com/cisco/