NOVA COLLEGE-WIDE COURSE CONTENT SUMMARY
ITN 156 – BASIC SWITCHING AND ROUTING: CISCO (4 CR.)

Course Description

Centers instruction in LAN segmentation using bridges, routers, and switches. Includes fast Ethernet, access lists, routing protocols, spanning tree protocol, virtual LANS and network management. Lecture 3 hours. Laboratory 2 hours. Total 5 hours per week.

General Course Purpose

In this course students will study the advantages of LAN segmentation using routers and switches. The course will provide extensive hands-on configuration of switches using the command-line interface method. Surveys protocols needed to design and implement a converged switched network. Includes Spanning Tree Protocol (STP), VLAN Trunking Protocol (VTP) and the different methods of inter-VLAN routing.

Course Prerequisites/Corequisites

Prerequisites: ITN 155 – Introductory Routing: CISCO

Course Objectives

Upon completing the course, the student will be able to:

• Configure and troubleshoot DHCP and DNS operations for IPv4 and IPv6
• Describe the operations and benefits of the Spanning Tree Protocol (STP)
• Configure and troubleshoot STP operations
• 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
• 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

Major Topics to be Included

• Introduction to Scaling Network
• LAN Redundancy
• Link Aggregation
• Adjust and Troubleshoot single-area OSPF
• Multi-area OSPF
• EIGRP
• EIGRP Advanced Configurations and troubleshooting
• ISO Images and Licensing
Student Learning Outcomes

Introduction to Scaling Network
- Describe 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.
- Describe the type of routers available for small-to-medium-sized business networks.

LAN Redundancy
- Describe the issues with implementing a redundant network.
- Describe IEEE 802.1D STP operation.
- Describe the different spanning tree varieties.
- Describe PVST+ operation in a switched LAN environment.
- Describe Rapid PVST+ operation in a switched LAN environment.
- Configure Rapid PVST+ in a switched LAN environment.
- Identify common STP configuration issues.
- Describe the purpose and operation of first-hop redundancy protocols.
- Describe the different varieties of first hop redundancy protocols.
- Use Cisco IOS commands to verify HSRP and GLBP implementations.

Link Aggregation
- Explain the operation of link aggregation in a switched LAN environment.
- Describe EtherChannel technology.
- Configure link aggregation to improve performance on high-traffic switch links.
- Configure link aggregation with EtherChannel.
- Verify and troubleshoot link aggregation with EtherChannel.

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.

Multi-area OSPF
- Explain why multiarea OSPF is used.
- Explain how multiarea OSPF uses link-state advertisements in order to maintain routing tables.
- Explain how OSPF established neighbor adjacencies in a multiarea OSPF implementation.
- Configure multiarea OSPFv2 in a routed network.
- Configure multiarea route summarization in a routed network.
- Verify multiarea OSPFv2 operations

EIGRP
- Describe the features and operation of EIGRP.
- Examine the different EIGRP packet formats.
- Calculate the composite metric used by Diffusing Update Algorithm (DUAL).
- Describe the concepts and operation of DUAL.
- Examine the commands to configure and verify basic EIGRP operations for IPv4 and IPv6.

EIGRP Advanced Configurations and troubleshooting
- Configure EIGRP Automatic summarization.
- Configure EIGRP Manual Summarization.
- Configure A Router To Propagate A Default Route In An EIGRP Network.
- Modify EIGRP Interface Settings To Improve Network Performance.
- 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.

**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.

**Required Time Allocation per Topic**

In order to standardize the core topics of ITN 156, the following student contact hours per topic are required. Each syllabus should be created to adhere as closely as possible to these allocations. Of course, the topics cannot be followed sequentially. Many topics are taught best if it reflects the current android version. There are normally 60 student contact-hours per semester for a four credit course. (This includes 15 weeks of instruction and does not include the final exam week so 15* 4 = 60 hours. Sections of the course that are given in alternative formats from the standard 16 week section still meet for the same number of contact hours.) The final exam time is not included in the time table. The changes in Android Development are happening so fast that some of the content easily could be less significant soon. So it is really important to include the changes in syllabus. Also, additional topic/ Optional Content, leaves ample time for an instructor to tailor the course to special needs or resources.

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<thead>
<tr>
<th>Topic</th>
<th>Hours</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Introduction to Scaling Network</td>
<td>6</td>
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<tr>
<td>LAN Redundancy</td>
<td>6</td>
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<tr>
<td>Link Aggregation</td>
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<tr>
<td>Adjust and Troubleshoot single-area OSPF</td>
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<td>Multi-area OSPF</td>
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<tr>
<td>EIGRP</td>
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<tr>
<td>EIGRP Advanced Configurations and troubleshooting IOS Images and Licensing</td>
<td>10</td>
<td>16%</td>
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<td>Testing to include quizzes, tests, and exams (not including final exam)</td>
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<tr>
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