



**Course Title:** LAN Switching and Wireless v4.0

**Duration:** 33 hours

### **Course Overview**

The primary focus of this course is on LAN switching and wireless LANs. The goal is to develop an understanding of how a switch communicates with other switches and routers in a small- or medium-sized business network to implement VLAN segmentation.

This course focuses on Layer 2 switching protocols and concepts used to improve redundancy, propagate VLAN information, and secure the portion of the network where most users access network services.

Switching technologies are relatively straightforward to implement; however, as with routing, the underlying protocols and algorithms are often quite complicated. This course will go to great lengths to explain the underlying processes of the common Layer 2 switching technologies. The better the underlying concepts are understood, the easier it is to implement, verify, and troubleshoot the switching technologies.

Each switching concept will be introduced within the context of a single topology for each chapter. The individual chapter topologies will be used to explain protocol operations as well as providing a setting for the implementation of the various switching technologies.

The labs and Packet Tracer activities used in this course are designed to help you develop an understanding of how to configure switching operations while reinforcing the concepts learned in each chapter.

### **Chapter 1 LAN Design –**

In Chapter 1, you learn the fundamental aspects of designing local area networks. In particular, hierarchical network design utilizing the core-distribution-access layer model is introduced and referenced throughout the remainder of the course.

### **Chapter 2 Basic Switch Concepts and Configuration –**

Chapter 2 introduces switch forwarding methods, symmetric and asymmetric switching, memory buffering, and Layer 2 and Layer 3 switching. You are introduced to navigating the Cisco IOS CLI on a Catalyst 2960 and performing an initial switch configuration. An integral role of a switch administrator is to maintain a secure network; to this end, you learn to configure various passwords on the switch as well as SSH to mitigate common security attacks.

### **Chapter 3 VLANs –**

Chapter 3 presents the types of VLANs used in modern switched networks. It is important to understand the role of the default VLAN, user/data VLANs, native VLANs, the management VLAN, and voice VLANs. VLAN trunks with IEEE 802.1Q tagging facilitate inter-switch communication with multiple VLANs. You learn to configure, verify, and troubleshoot VLANs and trunks using the Cisco IOS CLI.

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### **Chapter 4 VTP –**

VTP is used to exchange VLAN information across trunk links, reducing VLAN administration and configuration errors. VTP allows you to create a VLAN once within a VTP domain and have that VLAN propagated to all other switches in the VTP domain. VTP pruning limits the unnecessary propagation of VLAN traffic across a LAN by determining which trunk ports forward which VLAN traffic. You learn to configure, verify, and troubleshoot VTP implementations.

### **Chapter 5 STP –**

STP makes it possible to implement redundant physical links in a switched LAN by creating a logical loop-free Layer 2 topology. By default Cisco switches implement STP in a per-VLAN fashion. The configuration of STP is fairly straightforward, but the underlying processes are quite complicated. IEEE 802.1D defined the original implementation of spanning-tree protocol. IEEE 802.1w defined an improved implementation of spanning tree called rapid spanning tree protocol. RSTP convergence time is approximately five times faster than convergence with 802.1D. RSTP introduces several new concepts, such as link types, edge ports, alternate ports, backup ports, and the discarding state. You will learn to configure both the original IEEE 802.1D implementation of STP as well as the newer IEEE 802.1w implementation of spanning tree.

### **Chapter 6 Inter-VLAN Routing –**

Inter-VLAN routing is the process of routing traffic between different VLANs. You learn the various methods of inter-VLAN routing. You learn to implement inter-VLAN routing in the router-on-a-stick topology, where a trunk link connects a Layer 2 switch to a router configured with logical subinterfaces paired in a one-to-one fashion with VLANs.

### **Chapter 7 Basic Wireless Concepts and Configuration –**

Wireless LAN standards are evolving for voice and video traffic, with newer standards being supported with quality of service. An access point connects to the wired LAN provides a basic service set to client stations that associate to it. SSIDs and MAC filtering are inherently insecure methods of securing a WLAN. Enterprise solutions such as WPA2 and 802.1x authentication enable very secure wireless LAN access. End users have to configure a wireless NIC on their client stations which communicates with and associates to a wireless access point. When configuring a wireless LAN, you should ensure that the devices have the latest firmware so that they can support the most stringent security options.