

Hands-On

# Network Management ( SNMP & OSPF)

SNMP & OSPF



## Course Description

In this Hands-On Network Management course, the student will work on a live SNMP and OSPF network reinforcing the discussed subject material . All the various concepts, techniques, terminology, conventions, and components of both SNMP management and OSPF route management and configuration will be discussed with the focus on making the student productive in his/her network environment.

A practical approach will be accomplished by building, adding, modifying, and troubleshooting an OSPF network in class. The instructor will introduce configuration and hardware faults into the network to assist the students in isolating and resolving network failures in an OSPF environment.

## Students Will Learn

- Access and configure SNMP network components, using a SNMP management station.
- Generate traps and analyze them, using your SNMP management station.
- Verify the correct SNMP polling sequence.
- Use a MIB Browser to access private enterprise MIBs.
- Capture and analyze with a protocol analyzer SNMP Get, Get Next, Set, and Trap messages.
- Understand what it means when a device is MIB-2 compatible.
- Access a SNMP table using the Get Next Command.
- Control RMON Probes for performance monitoring.
- Understand the importance of distributed network management.
- Understand the theory of Link State protocols.
- Configure OSPF in a single area.
- Create and apply VLSM IP subnet addresses.
- Configure OSPF in multiple areas. .
- Configure route summarization
- Become aware of how different area types function.
- Configure OSPF passwords for security purposes.
- Become familiar with the various show commands for configuration verification and troubleshooting.
- Troubleshoot a Cisco router network using PING, trace route, debug, and telnet.
- And more

## Target Audience

Individuals who want to learn the concepts and gain knowledge and practical Hands-On skills in the use of both SNMP based management systems and to install and maintain complex OSPF networks using Cisco routers. Also for those individuals that require to build and design SNMP agents for their products.

## Prerequisites

Attendees should already be familiar with the TCP/IP protocol, common operating systems and Routing and switching technologies in a network.

## Course Outline

### I. NETWORK MANAGEMENT INTRODUCTION

- A. The need for network management
- B. Ingredients for successful network management
  - Fault monitoring
  - Performance monitoring
  - Security
- C. Trend analysis
- D. Network Management cost justification
  - Network Management budget
  - Cost analysis
- E. In-band network management
- F. Out-of-band network management

### II. SNMP OVERVIEW

- A. SNMP and its relationship with TCP/IP
- B. RFC review
- C. Life before SNMP
  - ICMP
  - PING
- D. SNMP components
  - Management station, Management agent, Management Information Base (MIB)
  - Network management protocol
- E. SNMP Polling
- F. SNMP messages
  - Get, Get-Next, Get-Response, Trap
- G. Proxy agents

### III. SNMP MANAGEMENT INFORMATION BASE (MIB)

- A. Purpose of MIB
- B. Structure of Management Information (SMI)
  - Abstract Syntax Notation 1 (ASN.1)

- C. Defining an ASN.1 OBJECT-TYPE macro
- D. MIB I and MIB II
- E. MIB groupings
- F. Private MIBs
- G. The accuracy of SNMP

#### IV. REMOTE NETWORK MONITORING (RMON)

- A. RMON defined
  - Extension of MIB-2
  - Interface for communicating to remote
- B. monitors via SNMP
- C. Location of RMON
- D. RMON design goals
- E. RMON configuration and table management
- F. Multiple managers
- G. RMON MIB groups analyzed
- H. Integrating RMON into hubs, routers and switches

#### V. NETWORK MANAGEMENT PROTOCOLS

- A. Review of TCP/IP protocols
  - TCP, IP, ICMP (ARP, RARP, BOOTP)
- B. SNMP Community String
  - Authentication Service
  - Access Policy
- C. SNMP encapsulated with User Datagram Protocol (UDP)
- D. SNMP Message Structure
  - Get, Get-Next, Get-Response, Trap
- E. SNMP Polling
- F. Limitations of SNMP
- G. SNMP Structure Details
  - Bit Encoding Rules (BER)
  - Type, Length and Value (TLV) Construction

#### VI. SNMPv2

- A. Origins and history
- B. SNMPv2 Enhancements
  - Manager to manager capability
  - Greater security
  - More operational capability
- C. Differences between SNMP and SNMPv2
- D. Migrating to SNMPv2
- E. SNMP Management Systems
- F. SNMP platforms
- G. Extending SNMP to the desktop
- H. SNMP in an SNA environment
- I. Expert systems

#### VII. OSPF HISTORY

- A. Reasons and needs for OSPF

#### VIII. OSPF THEORY AND OPERATIONS

- A. OSPF Operations
  - Distance Vector Protocol vs Link State Protocols.
  - Distance Vector Protocols in large scale implementations.
- B. Router IDs
- C. Components
- D. Packet Types
  - OSPF Update process
  - Designated Router
- E. Link State Advertisements
  - Types of Link State Advertisements (LSAs)
- F. SPF Algorithm reviewed

## IX. OSPF CONFIGURATION - SINGLE AREA

- A. IOS configuration statements

## X. SHOW AND DEBUG COMMANDS

- A. OSPF show and debug commands explained

## XI. OSPF AUTHENTICATION

- A. Area authentication is discussed and implemented

## XII. OSPF WAN AREA TYPES

- A. WAN connectivity, Broadcast and a Non-Broadcast Multiple Access network.

## XIII. OSPF OPERATION IN MULTIPLE AREAS

- A. VLSM
- B. Router Types
- C. Area Types
- D. Standard areas, Stub Areas, Not-So-Stubby Areas, and the Backbone
  - Inter-area LSAs
- E. Type 3 and Type 4 LSAs
- F. Configuring Multiple Area OSPF
- G. Route summarization
- H. OSPF areas
- I. Virtual links
- J. OSPF dial-up considerations
- K. OSPF timers

## **Delivery Method**

Instructor led with numerous "Hands-On" demonstrations and exercises.

## **Equipment Requirements**

**(This apply's to our hands-on courses only)**

BTS always provides equipment to have a very successful Hands-On course. BTS also encourages all attendees to bring their own equipment to the course. This will provide attendees the opportunity to incorporate their own gear into the labs and gain valuable training using their specific equipment.

### **Course Length**

3 Days