

Storage Networking Management & Administration Workshop

Duration: 2 Days

Type: Lecture

Course Summary & Description

Achieving SNIA Certification for storage networking management and administration knowledge and capabilities provides industry recognition of a highly valued skill set in today's IT environments.

Storage Networking Management & Administration Certification Workshop provides a comprehensive review of the processes, technologies and solutions dealt with in day-to-day management and administration of storage networks as defined by the SNIA Storage Networking Management / Administration Exam (S10-200).

Course Objectives

- Describe criteria and steps for planning SAN growth.
- Identify steps and processes to plan and manage changes in SANs.
- Understand how to assess, monitor and perform problem analysis of a SAN environment.
- Understand use of zoning and describe approaches to troubleshooting zoning issues.
- Describe HBA and fabric configuration parameters and reasons for changes.
- Define LUN mapping and understand impacts on the fabric.
- Describe implementation considerations and processes for business data recovery situations.
- Identify performance, restore and troubleshooting steps for data backup and recovery situations.
- Understand fabric security.

Who Should Attend

This course is designed for individuals who want to earn their SNIA Certified Systems Engineer (SCSE) through passing the SNIA Storage Networking Management & Administration Exam S10-200. This course will also benefit individuals responsible for storage networking administration and management or those working in traditional IT and storage administration who wish to assume storage networking management and administration responsibilities. The course content and technical level are targeted for professionals working in roles similar to the following:

- Storage Network Administrator
- Storage Manager

- Systems Administrator

Prerequisites

Attend Storage Network Foundations Certification Workshop or equivalent training courses. Participants should have fundamental knowledge of basic storage concepts and technologies along with O/S system administration experience and knowledge of basic networking technologies and solutions.

Course Topics

- Network Administration
- Change Management
- Performance
- Storage Networking Management
- Business Continuance
- Backup and Recovery
- Fabric Security

Detailed Course Outline

Module 1: Introduction

- Module Outline
- Workshop Audiences
- The SNIA Education Continuum:
- SNIA Storage Network Certification Program
- SNCP Certification Credentials and Exams
- Storage Networking Management/Administration Exam (S10-200).
- Exam Topics
- Exam Guidelines

Module 2: Fabric Services

- Module Outline
- Fabric Services
- Name Server
- Login Server
- Fabric/Switch Controller
- Alias Server
- Multicast
- Other Fabric Services
- Well-Known Addresses
- Volume Allocation and Security
- Fabric Zoning
- Overlapping Zones
- Port Zoning

- WWN Zoning
- “Hard” and “Soft” Zoning
- Zoning
- LUN Mapping and Masking
- Drive Mapping: Host Level
- Drive Mapping: RAID Volumes
- LUN Mapping
- LUN Masking
- LUN Mapping/Masking Implementations
- Steps to add New Storage
- SAN File Systems
- Review Questions

Module 3: Fabric Login

- Module Outline
- Fabric Login
- Login to Name Server
- Logout Switch
- Port Login to Target
- Process Login
- Login Process Summary
- Login Process Examples
- Screen Shot
- Login Process Examples
- Screen Shot
- Review Questions

Module 4: SAN Security Management

- Module Outline
- Enterprise Data Security
- Sources of Vulnerabilities
- Points of Vulnerability
- Types of Security
- FC-SANs—Inherent Security?
- Is the Core Secure
- Types of Attacks
- Points of Vulnerability
- FC Specifications
- Zoning
- WWN Spoofing
- Hardware-Enforced Zoning
- Port Binding
- Fabric Binding
- Port Type Restriction

- Layers of Security
- FC-SP Fibre Channel - Security Protocol
- FC-SP Encryption
- FC-SP Authentication
- FC-SP Encryption
- SNIA SSIF Security Policy Considerations
- SNIA SSIF Storage Security Best Practices
- Review Questions

Module 5: SAN Topology Design

- Module Outline
- Planning and Design
- Switch Topology
- Reviewing Port Terminology
- Comparing Fabric Topologies
- Cascade
- Cascade Ring
- Full Mesh
- Full Mesh
- Partial Mesh
- Core-Edge
- Multi-tier Fabrics
- Mesh Designs
- Full Mesh
- Full Mesh Ports
- Core-Edge Designs
- Core-Edge Ports
- Port Availability Calculations
- Port Math
- Port Density
- SAN Islands
- Scalability Issues With Large Fabrics
- SAN Consolidation
- Next-Generation Switch Platforms
- Collapsed Fabrics
- Collapsed Core Fabrics
- Advantages of Directors
- Disadvantages of Directors
- HA Design
- Redundant Fabrics
- Site Considerations
- Multipathing
- Multipathing Without Load-Balancing
- Multipathing With Load-Balancing

- Load-Balancing Algorithms
- Routing Requirements
- FSPF
- FSPF Functions
- FSPF Load Sharing
- FSPF Performance Issues
- FSPF Availability Issues
- Review Questions

Module 6: Host Metrics

- Module Outline
- Typical Data Path
- Typical Data Paths
- Moving Data
- Where's the Bottleneck
- Host I/O Bus Speeds
- PCI Bus (32 bit)
- PCI-X Bus (64 bit)
- PCI Architecture
- PCI Express
- HBA Feature Sets
- HBA Management
- HBA Performance
- Review Questions

Module 7: Storage Metrics

- Module Outline
- Disk Metrics
- RAID Array Comparison
- Array Performance Factors
- Oversubscription
- Proving Array Performance
- Array Architectures
- RAID Configurations
- RAID 0
- RAID 1
- RAID 0+1
- RAID 1+0
- RAID 5
- Comparing RAID 0+1 and 1+0 Reliability
- LUN Virtualization
- LUN Virtualization HP Example
- LUN Virtualization
- Disk Caching

- Cache Features
- Cache Protection
- Cache Configuration
- Solid-State Disks
- Configuring LUNs Guide lines for Increasing Performance
- Mapping Hosts to Storage
- Guidelines for Increasing Performance
- Mapping Hosts to Storage
- Capacity Planning Process
- Capacity Planning Tools
- Review Questions

Module 8: Fabric Performance Tuning

- Module Outline
- Measuring and Monitoring Performance
- Considerations
- What Impacts SAN Performance?
- Fibre Channel Layers
- Upper-Layer Protocols
- Block Size
- Fibre Channel Layers
- Frame Size
- Buffer Credits
- Buffer Credit Calculations
- Switch Performance Characteristics
- Buffer Credit Calculations
- Fibre Channel Layers
- Physical Layer Problems
- FC Droop
- SAN Design Issues and Performance
- Centralized Storage and Performance
- Locality and Performance
- Core-Edge
- Core-Edge Design
- Multi-Tier Design
- Fan-in Ratio from a server perspective (the SNIA view)
- Fan-out Ratio from a server perspective (the SNIA view)
- Fan-in Ratio from a storage perspective
- Fan-out Ratio from a storage perspective
- Throughput Planning
- Over-Subscription
- Target Over-Subscription
- Fabric Over-Subscription
- Switch Over-Subscription

- Path Selection
- Port Zoning
- QoS
- Review Questions

Module 9: Backup and Recovery

- Module Outline
- Tape Metrics
- Tape Restore Times
- Backup Models
- LAN-Based Backup
- SME LAN-Free Backup
- Enterprise LAN-Free Backup
- LAN-Free Backup
- Serverless Backup
- Remote Backup
- Point-in-Time Copies
- Snapshots
- Snapshot Step by Step
- The Snapshot Process
- Snapshot
- Snapshot Advantages
- Snapshot Uses
- Split Mirrors
- Split Mirror Advantages
- Split Mirrors
- Host-Based Virtualization
- Remote Host-Based Virtualization
- Multi-Array, Replicated, Host-Based Virtualization
- Remote Mirroring
- Synchronous Mirroring
- Asynchronous Mirroring
- Semi-Synchronous Mirroring
- Storage-Based Mirroring
- Server-Based Mirroring
- Performance Impacts
- Complementary Solutions
- Disaster Awareness
- Disaster Recovery and Business Continuity
- Tier 1 and Tier 2
- Tier 3
- Tier 4
- Tier 5
- Tier 6

- Replacing a Node in a Cluster
- Multiple Levels of Protection
- Failover Steps for Stretch Clustering
- Disaster Recovery Planning
- Prioritizing Data
- RTO and RPO
- Prioritizing Recovery
- Data Recovery Options
- Creating a Disaster Recovery Plan
- Testing the Plan
- Review Questions

Module 10: Troubleshooting Methodology

- Module Outline
- Overview
- Assess the Environment
- Identify the Problem
- First Steps
- Troubleshooting Performance Issues
- Physical Layer Tools
- Expert Analysis Tools
- Creating Trace Files from Analyzers
- Develop a Solution
- Apply the Solution
- Troubleshooting Tips
- Performance Problem Troubleshooting
- Host Cannot See Storage Device
- Host Sees Device Intermittently
- Where to Look
- Physical Layer
- Fiber Bend Radius
- Hosts and HBAs
- Storage Devices
- SAN Fabric
- Power-Up Order
- Arbitrated Loops
- Environmental Issues
- Review Questions

Module 11: Troubleshooting the Fabric

- Module Outline
- Multi-Switch Fabrics
- Fabric Configuration
- Stage 1: Link Initialization

- Stage 2: Principal Switch Selection
- Fabric Stability Time-Out Value (F_S_TOV)
- Stage 2: Principal Switch Selection
- Stage 3: Domain ID Assignment
- FSPF Overview
- FSPF Stage 1—The Hello Protocol
- FSPF Stage 2—Synchronization
- FSPF Stage 3—Database Updates
- FSPF Stage 4—Path Discovery
- FSPF Stage 5—Path Computation
- FSPF Frame Error Recovery
- HelloInterval
- LSR Update Timers
- Replacing HBA Issues
- Old Switch Replacement with a New Switch
- Insert a New Populated Switch into an Existing Fabric
- Zoning Issues
- Configuration Mismatch
- Content Mismatch
- Type Mismatch
- Preventing Zoning Issues
- Interoperability Modes
- Firmware Revisions
- Zoning Issues
- Zone Attribute Issues
- Zone Propagation
- Default Zone Behavior
- ISLs and FSPF
- Domain IDs
- Configuring Time-Out Values
- Interoperability Limitations by Vendor
- Summary
- Review Questions

Module 12: SAN Extension over IP

- Module Outline
- FCIP Concepts
- FCIP Implementations
- B_Port Implementations
- Cisco VE_Port Implementations
- FCIP HA Configurations
- HA and Interoperability
- Performance Features
- Write Acceleration

- iFCP Concepts
- FCIP and iFCP
- McDATA IPS Multiprotocol Switches
- IP Transport Architectures
- Review Questions

Module 13: SAN Extension over Optical Networks

- Module Outline
- SONET/SDH Concepts
- SONET/SDH Implementations
- SONET/SDH Topologies
- DWDM Concepts
- DWDM Components
- WAN Design Metrics9
- Applications for SAN Extension
- Best Practices
- Review Questions