Networking with Windows Server

About this course

This course examines the services and features of Microsoft Windows Server from 2012 to 2022, including lessons and lab exercises on key attributes you'll need on the job. It's designed for IT professionals who have some networking knowledge and experience, and who are looking for a single course that provides insight into core and advanced Windows Server networking technologies. This audience typically includes network administrators and system and infrastructure administrators.

By completing this course, you will achieve the knowledge and skills to:

- Plan and implement IPv4.

- Implement Dynamic Host Configuration Protocol (DHCP).

- Plan and implement IPv6.

- Implement name resolution with Domain Name System (DNS).

- Implement and manage IP Address Management (IPAM).

- Plan and implement remote access.

- Implement networking for branch offices.

- Configure advanced networking features.

Audience profile

This course is for IT pros that have some networking knowledge and experience, and who are looking for a single course that provides insight into core and advanced Windows Server networking technologies. This audience typically includes network administrators and system and infrastructure administrators.

Recommended prerequisite knowledge

Before attending this course, students should have:

- Knowledge of the TCP/IP protocol stack, addressing, and name resolution.

- Understanding of networking-infrastructure components, such as cabling, routers, hubs, and switches.

- Familiarity with networking topologies and architectures, such as local area networks (LANs), wide area networks (WANs), and wireless networking.
- Knowledge of TCP/IP protocol stack, addressing, and name resolution.
- Practical experience with Windows Server.
- Practical experience with Windows Server Hyper-V.
- Practical experience with Windows 10 or Windows 11.

Course Outline

Module 1 Plan and implement IPv4

This module details how to plan and implement an IPv4 addressing scheme to support your organization's needs. The module also explains how to use fundamental networking tools and techniques to configure and troubleshoot IPv4-based networks.

Lesson 1 Plan IPv4 addressing

- Overview of IPv4 settings
- Define IPv4 subnets
- Identify public, private, and Automatic Private IP Addressing (APIPA) IPv4 addresses
- Determine IPv4 notation and translation
- Create a subnetting scheme for a new office
- Create IPv4 supernets

Lesson 2 Configure IPv4

- Configurable IPv4 settings
- Tools for configuring IPv4
- Configure IPv4 manually to provide a static configuration for a server
- Demonstration: Configure IPv4
- Configure IPv4 automatically

Lesson 3 Manage and troubleshoot IPv4

- IPv4 routing
- Modify IPv4 routing
- IPv4 troubleshooting methodology
- Tools for troubleshooting IPv4
- Use IPv4 troubleshooting tools

- Demonstration: Troubleshoot IPv4

By completing this module, you will achieve the knowledge and skills to:

- Plan IPv4 addressing and subnetting.

- Configure Windows Server with IPv4.

- Manage and troubleshoot IPv4 network connectivity.

Lab 1 Plan an IPv4 addressing scheme

- Plan the IPv4 address assignments

- Verify IPv4 communication

- Troubleshoot IPv4

By completing this exercise, you will achieve the knowledge and skills to:

- Plan IPv4 address assignments.

- Verify IPv4 communication.

- Troubleshoot IPv4 connectivity issues.

Module 2 Implement DHCP

Automatic IP configuration makes it easier to manage IP hosts. In this module, students learn how to deploy and manage the DHCP server role, select a high-availability option for DHCP, and configure DHCP failover.

Lesson 1 What is DHCP?

- Benefits of DHCP

- How does DHCP work?

- How are addresses leased?

- What is DHCP renewal?

Lesson 2 Deploy DHCP

- Install DHCP

- Authorize DHCP

- Demonstration: Perform post-installation configuration

- Allocate IPv4 addresses

- Manage options

- Demonstration: Configure a DHCP server

- What's a DHCP relay agent?

Lesson 3 Manage DHCP high availability

- High-availability and failover options for DHCP

- How DHCP failover works

- Demonstration: Configure DHCP failover

Lesson 4 Manage and troubleshoot DHCP

- Configure DHCP security options

- Configure advanced DHCP configuration options

- Configure superscopes and multicast scopes

- Maintain the DHCP database

- Troubleshoot DHCP

By completing this module, you will achieve the knowledge and skills to:

- Explain what DHCP server is and how it works.
- Install DHCP server and configure it to lease TCP/IP settings on a network.
- Manage DHCP high availability by implementing DHCP failover.
- Manage and troubleshoot DHCP.

Lab 2 Implement DHCP

- Plan a DHCP server implementation

- Implement the DHCP configuration

- Implement DHCP failover

- Validate the DHCP implementation

By completing this exercise, you will achieve the knowledge and skills to:

- Plan a DHCP server implementation.
- Implement a DHCP configuration.
- Plan DHCP high-availability options.
- Validate a DHCP deployment.

Module 3 Plan and implement IPv6

This module details how to plan and implement an IPv6 addressing scheme to support your organization's needs. It also includes specifics about configuring coexistence between IPv4 and IPv6 and explains options for transitioning to IPv6.

Lesson 1 Implement IPv6

- What is IPv6?

- Benefits of IPv6

- IPv6 addressing

- Types of IPv6 addresses

- Autoconfiguration options

- Configure IPv6 settings

- Demonstration: Configure IPv6

- Implement DHCPv6

- Demonstration: Configure DHCP for IPv6

Lesson 2 Manage IPv4 and IPv6 coexistence

- Node types

- Options for IPv4 and IPv6 coexistence

- What is IPv6 over IPv4 tunneling?

Lesson 3 Migrate to IPv6

- Implement ISATAP

- Implement 6to4

- Implement Teredo

By completing this exercise, you will achieve the knowledge and skills to:

- Describe the features and benefits of IPv6.

- Configure an IPv6 host.

- Implement coexistence between IPv4 and IPv6 networks.

- Transition from an IPv4 network to an IPv6 network.

Lab 3 Configure and evaluate IPv6 transition technologies

- Review the default IPv6 configuration

- Implement DHCPv6

- Configure network integration by using ISATAP

- Configure native IPv6 connectivity

- Configure 6to4 connectivity

By completing this exercise, you will achieve the knowledge and skills to:

- Review the default IPv6 configuration.

- Create and configure IPv6 configuration.

- Configure network integration by using ISATAP.

- Configure native IPv6 connectivity.
- Configure network integration by using 6to4 integration.

Module 4 Implement name resolution with DNS

This module explains the fundamentals of using Domain Name System (DNS) for simple name resolution, and then details more advanced topics, such as the GlobalNames zone, Domain Name System Security Extensions (DNSSEC), and split-brain syndrome. These modules detail how you can install, configure, and troubleshoot DNS within an organization's network.

Lesson 1 Deploy DNS servers

- Overview of the DNS name-resolution process
- DNS components
- DNS zones and records overview
- Demonstration: Install and configure DNS
- Configure DNS clients
- Manage and maintain DNS services
- How to troubleshoot name resolution
- Demonstration: Troubleshoot name resolution
- Test DNS.servers

Lesson 2 Configure zones in DNS server

- Create records in DNS
- Configure DNS zones
- Configure DNS zone replication

Lesson 3 Configure name resolution between DNS zones

- DNS caching
- DNS forwarding
- DNS stub zones
- DNS zone delegation

Lesson 4 Configure DNS integration with AD DS

- AD DS and DNS integration overview
- How does a client locate a domain controller?

- Active Directory-integrated zones overview
- DNS data in AD DS application partitions
- Overview of the dynamic-update process
- Demonstration: Configure AD DS-integrated zones

Lesson 5 Configure advanced DNS settings

- Configure advanced options for DNS name resolution
- Configure DNS root hints
- GlobalNames zone overview
- Demonstration: Configure the GlobalNames zone
- Split DNS overview
- Implement split DNS
- DNS policies
- Demonstration: Configure DNS policies
- Implement DNS security
- Implement DNSSEC
- Demonstration: Configure DNSSEC

By completing this module, you will achieve the knowledge and skills to:

- Deploy and administer a DNS Server.
- Configure DNS zones.
- Configure name resolution on DNS.
- Integrate DNS with Active Directory Domain Services.
- Configure advanced settings on DNS server.

Lab 4 Plan and implement DNS name resolution

- Plan DNS name resolution
- Implement DNS servers and zones

By completing this exercise, you will achieve the knowledge and skills to:

- Plan the DNS infrastructure.
- Implement DNS servers and zones.

Lab 5 Integrate DNS with AD DS

- Integrate DNS with AD DS

By completing this exercise, you will achieve the knowledge and skills to:

- Integrate DNS with AD DS.

Lab 6 Configure advanced DNS settings

- Configure DNS policies
- Validate a DNS implementation
- Troubleshoot DNS

By completing this exercise, you will achieve the knowledge and skills to:

- Configure DNS policies.
- Validate a DNS implementation.
- Troubleshoot DNS.

Module 5 Implement and manage IPAM

This module introduces IPAM functionality, explains how to deploy IPAM, and shows students how to manage DNS and DHCP functionality by using IPAM.

Lesson 1 What is IPAM?

- Overview of IPAM
- IPAM architecture
- Deployment requirements
- IPAM deployment considerations
- Integrate IPAM with System Center Virtual Machine Manager

Lesson 2 Deploy IPAM

- The IPAM implementation process
- Demonstration: Install and provision the IPAM on Windows Server
- Perform IPAM administration
- Demonstration: Administer IPAM
- Configure IPAM options
- Manage DNS with IPAM
- Demonstration: Manage DNS zone and records with IPAM
- Manage DHCP with IPAM
- Demonstration: Manage DHCP scopes with IPAM

Lesson 3 Manage IP address spaces with IPAM

- Use IPAM to manage addressing
- Import and update IP address spaces in IPAM
- Find, allocate, and reclaim IP addresses

- Demonstration: Manage IP addressing with IPAM

- Monitor and report

By completing this module, you will achieve the knowledge and skills to:

- Describe IPAM functionality and components.

- Deploy IPAM.

- Manage IP address spaces by using IPAM.

Lab 7 Implement IPAM

- Install the IPAM Server feature

- Provision the IPAM Server

- Manage IP address spaces by using IPAM

By completing this exercise, you will achieve the knowledge and skills to:

- Install the IPAM Server feature.

- Provision IPAM to manage servers.

- Manage IP address spaces by using IPAM.

Module 6 Implement remote access

In this module, students learn how to implement remote access technologies in Windows Server.

They will also learn about different implementation scenarios for small or medium-sized organizations and enterprise organizations. In Windows Server, four component technologies—virtual private network (VPN), DirectAccess, Routing, and Web Application Proxy—integrate into a single, unified server role called Remote Access.

Lesson 1 Overview of remote access options

- When is remote access necessary?
- What options does Windows Server provide?
- Implement the Network Policy Server
- Configure network policies
- Demonstration: Install and manage the Remote Access server role
- Demonstration: Configure NPS policies
- Factors to consider when deploying PKI for remote access
- Configure routing and NAT

Lesson 2 Implement WAP

- What is WAP?

- Authentication options

- Publish apps with WAP

- What is Azure AD Application Proxy?

- Demonstration: Publish a secure website

Lesson 3 Plan VPNs

- VPN scenarios

- Site-to-site VPN

- Tunneling options

- Authentication protocols

- VPN Reconnect and app-triggered VPN

- Configure a VPN server

- Demonstration: Configure VPM

- Configure and deploy VPN profiles

- Demonstration: Create a connection profile

- What is Always On VPN?

- Implement Always On VPN

By completing this module, you will achieve the knowledge and skills to:

- Install and manage the Remote Access server role in Windows Server.

- Implement Web Application Proxy.

- Implement VPNs in Windows Server.

Lab 8 Implement a Web Application Proxy

- Implement Web Application Proxy

- Validate a Web Application Proxy deployment

By completing this exercise, you will achieve the knowledge and skills to:

- Implement Web Application Proxy.

- Validate a Web Application Proxy deployment.

Lab 9 Implement a VPN

- Implement VPN

- Validate the VPN deployment

- Troubleshoot VPN access

By completing this exercise, you will achieve the knowledge and skills to:

- Implement a VPN solution.

- Validate the VPN deployment.
- Troubleshoot a SSTP VPN connection.
- Implement Always On VPN.

Module 7 Implement branch office networking

In this module, students learn several ways in which to use Windows Server to overcome the limitations of branch-office scenarios. They'll learn about using Distributed File System (DFS) and Windows BranchCache.

Lesson 1 Networking features and considerations for branch offices

- Special considerations for branch office networking
- Options for providing network connectivity to branch offices
- Plan for domain controllers and name resolution
- Provide file and print services

Lesson 2 Implement DFSR

- What is DFS?
- Implement DFS Namespaces
- Deploy DFS Namespaces
- Implement DFSR
- Scenarios for DFSR implementation
- Optimize DFS Namespaces
- Demonstration: Configure DFS Namespaces and replication
- Manage DFS databases
- Monitor and troubleshoot DFSR

Lesson 3 Implement BranchCache for branch offices

- What is BranchCache?
- What are BranchCache modes?
- BranchCache requirements
- Configure BranchCache server settings
- Configure BranchCache client settings
- Demonstration: Configure BranchCache

- Use BranchCache for servers

- Monitor BranchCache

By completing this module, you will achieve the knowledge and skills to:

- Describe networking features and considerations for branch offices.

- Explain how to implement DFS for branch offices.

- Explain how to implement BranchCache for branch offices.

Lab 10 Implement DFS for branch offices

- Implement DFS

- Validate the deployment

By completing this exercise, you will achieve the knowledge and skills to:

- Implement DFS for the Toronto branch office.

- Validate the deployment.

Lab 11 Implement BranchCache

- Implement BranchCache

- Validate the deployment

By completing this exercise, you will achieve the knowledge and skills to:

- Implement BranchCache.

- Validate the deployment.

Module 8 Implement advanced networking

Windows Server includes advanced high-performance networking features, such as server message block (SMB) 3.1.1, Quality of Service (QoS) options, and several enhancements on the receiving end of network packet processing. Additionally, high-performance networking features are available to the Microsoft Hyper-V role and the virtual machines (VMs) that are running under Hyper V, such as expanded virtual-switch functionality and extensibility, single-root I/O virtualization (SR-IOV), dynamic virtual-machine queuing, and NIC Teaming for VMs. In this module, you will learn how to deploy and configure advanced networking in Windows Server and the new Hyper-V networking features.

Lesson 1 Overview of high-performance networking features

- What is RSS?

- What is RSC?

- What is DCB?

- What is RDMA?

- What is NIC teaming?

- What is Microsoft LBFO?

- Demonstration: Implement LBFO

- What is SMB?

- Categorization activity

Lesson 2 Configure advanced Hyper-V networking features

- What is a Hyper-V virtual switch?

- Demonstration: Configure network adapter advanced features

- What are Hyper-V virtual switch extensions?

- What is vRSS?

- Demonstration: Enable virtual RSS

- What is VMQ?

- Demonstration: Enable network hardware acceleration features

- What is Dynamic VMQ?

- What is VMMQ?

- What is Dynamic VMMQ?

- What is RSC in the Hyper-V virtual switch?

- What is SET?

- Demonstration: Implement SET

- Configure NIC teaming for Hyper-V VMs

- RDMA virtualization capabilities

- What is SR-IOV?

- SMB virtualization capabilities

- What is QoS?

By completing this module, you will achieve the knowledge and skills to:

- Describe the high-performance networking enhancements in Windows Server 2016.

- Configure the advanced Hyper V networking features.

- Create and use Hyper V virtual switches.

- Configure and use the advanced features of a virtual switch.

Lab 12 Configure advanced Hyper-V networking features

- Create and use Hyper-V virtual switches

- Configure and use the advanced features of a virtual switch

By completing this exercise, you will achieve the knowledge and skills to:

- Create and use Hyper V virtual switches.

- Configure bandwidth management and DHCP guarding.