



Lesson Plans

Managing a Windows 2003 Network Infrastructure

(Exam 70-291)

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Introduction

This module introduces the course and covers the use of Network Monitor.

Module 1

Module 1 covers TCP/IP. Students learn how to configure clients, deploy IP addressing methods, and troubleshoot TCP/IP related problems.

Module 2

Module 2 introduces DHCP. It provides an overview to the Dynamic Host Configuration Protocol (DHCP). It demonstrates the installation and configuration of the DHCP Server Service, and includes a DHCP troubleshooting section.

Module 3

Module 3 introduces DNS. The Domain Name System (DNS) links IP addresses to host names. In this module, students will learn about DNS and the role it plays in the network infrastructure. Concepts include zones queries, and name resolution.

Module 4

Module 4 introduces remote access. A remote access server lets mobile or remote users connect to your network, typically through a modem. Once connected to the remote access server, users have access to all network resources. In this module, students will learn how to install and configure remote access.

Module 5

Module 8 introduces routing. A router connects two or more networks, and allows packets to cross between networks. In this module, students will learn how to configure a Windows 2000 Server as a software router.

Module 6

Module 6 introduces the methods for establishing and maintaining security for network resources.

Module 7

Module 7 introduces the methods for managing and maintaining network services.

Section 0-1: Introduction

Preparation

Make sure you have some kind of network (in the classroom/lab or school). Install Network Monitor on your computer before class so you can demonstrate the tool. Make sure you know how to interpret the data.

Windows Server 2003 Network Infrastructure Objectives

303. Troubleshoot network protocol security. Tools might include the IP Security Monitor MMC snap-in, Event Viewer, and Network Monitor.

501. Monitor network traffic. Tools might include Network Monitor and System Monitor.

Lecture Focus Questions:

- When might you need to analyze and monitor network traffic?
- How can Network Monitor help you analyze network traffic?
- What is the difference between a counter, a filter, and a trigger?

Time

About 1 hour

Lab/Activity

- Using Network Monitor

Section 1-1: Client Configuration

Preparation

This unit introduces the student to network communications. For lecture purposes, focus on the concepts of IP address, subnet mask and default gateway.

Windows Server 2003 Network Infrastructure Objectives

101. Configure TCP/IP addressing on a server computer.

Lecture Focus Questions:

- What is the purpose of an IP address?
- What is the purpose of a subnet mask?
- What is the purpose of a default gateway?

Time

About 1 hour

Lab/Activity

- Configure IP settings

Section 1-2: IP Addressing

Preparation

If you're network uses DHCP, configure at least one computer with a static IP address so that you can demonstrate it to the students.

Windows Server 2003 Network Infrastructure Objectives

101. Configure TCP/IP addressing on a server computer.

Lecture Focus Questions:

- What are the four ways to assign an IP address?
- What happens if any of the methods fail?

Time

About 1 hour

Lab/Activity

- Configure client addressing
- Configure a client for DHCP
- Configure an alternate IP address

Section 1-3: Troubleshooting IP

Preparation

Be familiar with the tools introduced in this unit. If you're on a standalone network, disable one of the machines to work through some troubleshooting scenarios with your students.

Windows Server 2003 Network Infrastructure Objectives

- 102. Troubleshoot TCP/IP addressing.
- 103. Troubleshoot DHCP.

Lecture Focus Questions:

- What TCP/IP tools can you use for troubleshooting?
- What is the difference between Tracert, Ping, and Pathping?
- Which protocol do most of these tools use?

Time

About 1 hour

Section 2-1: Configuring DHCP

Preparation

Install DHCP on the instructor computer for demonstrations. You may want to configure this service to start manually so your computer doesn't try to hand out invalid IP addresses.

Windows Server 2003 Network Infrastructure Objectives

101. Configure TCP/IP addressing on a server computer.

- Manage DHCP.

Lecture Focus Questions:

- What is a *scope*?
- How can you change the subnet on a scope?
- What two security features must be enabled for a DHCP server to function correctly?

Time

About 1 hour

Lab/Activity

- Install DHCP
- Install and authorize a DHCP server
- Authorize a DHCP server

Section 2-2: Managing Scopes

Preparation

This section takes off from the last section. You'll need to make sure the students understand what scopes are, and how they affect DHCP management.

Windows Server 2003 Network Infrastructure Objectives

101. Configure TCP/IP addressing on a server computer.

- Manage DHCP scope options.

Lecture Focus Questions:

- What are the two ways to exclude IP addresses from a scope?
- What information is necessary to configure a reservation?
- What is the difference between a reservation and a manual IP assignments?

Time

About 1 hour

Lab/Activity

- Create a scope
- Add exclusions and reservations
- Create an exclusion range
- Create a client reservation

Section 2-3: Configuring DHCP Options

Preparation

You'll need to understand how to configure DHCP options to be able to show the students the process during lecture.

Windows Server 2003 Network Infrastructure Objectives

101. Configure TCP/IP addressing on a server computer.

- Manage DHCP.
- Manage DHCP scope options.

Lecture Focus Questions:

- What is a DHCP *option*?
- What is the benefit of using options?
- What are some common options?
- What is the order of precedence between all of the different levels of options?

Time

About 1 hour

Lab/Activity

- Configure server options
- Configure scope options
- Design scope options
- Design DHCP options

Section 2-4: Managing the DHCP Server

Preparation

Know the steps for backing up and restoring DHCP. You also need to be familiar with the advanced DHCP configuration options.

Windows Server 2003 Network Infrastructure Objectives

103. Troubleshoot DHCP.

Lecture Focus Questions:

- How can you back up DHCP?
- What is the purpose of conflict detection?
- What is the purpose of NIC bindings?

Time

About 1 hour

Lab/Activity

- Configure DHCP server parameters

Section 2-5: Troubleshooting DHCP

Preparation

This section presents some common problems you may encounter as you manage a DHCP server, and explains how to troubleshoot them. If you work in a DHCP environment and have any troubleshooting examples of your own, this is a great time to share them with the class.

Windows Server 2003 Network Infrastructure Objectives

103. Troubleshoot DHCP.

Lecture Focus Questions:

- What are the steps of the DORA process?
- What three ways can we provide IP addresses to all clients in a routed network?
- What is a rogue DHCP server? What security is present in 2003 DHCP to prevent this?
- How can you detect rogue DHCP servers?

Time

About 1 hour

Lab/Activity

- Monitor DHCP broadcasts
- Manage DHCP status

Section 3-1: DNS Concepts

Preparation

DNS is a difficult concept to grasp. Make sure you have a thorough understand of DNS and its deployment before you work through this section and module. Prepare a diagram demonstrating the domain name space. Use your organization name as part of the example, and include some of your hosts. Create a second diagram demonstrating DNS zones. Prepare a couple of name resolution examples. Try to use your own environment in the example. Include some zone examples.

Lecture Focus Questions:

- What is the purpose of DNS?
- What are the steps in the client name resolution process?
- What are the steps in a DNS server's name resolution process?
- What is the purpose of subdomains?
- Is a zone the same thing as a domain?

Time

About 1 hour

Section 3-2: Configuring DNS

Preparation

This section covers the installation and configuration of DNS. Use the DNS service on the instructor computer to demonstrate DNS configuration tasks.

Windows Server 2003 Network Infrastructure Objectives

201. Install and configure the DNS Server service.

202. Manage DNS.

Lecture Focus Questions:

- What is a zone?
- What is the difference between a standard primary and secondary zone?
- How do standard primary and secondary zones differ from Active Directory-integrated zones?
- What is the difference between a zone and a domain?
- What is a reverse lookup zone?

Time

About 1 hour

Lab/Activity

- Install DNS and create a secondary zone
- Create a reverse lookup zone

Section 3-3: Managing DNS Records

Preparation

This section builds on previous sections by covering more zone management tasks. In the last section you installed DNS on student computers and created a zone. This section builds on those tasks. As a demonstration, create a standard primary zone to manage records on your instructor computer. Make a chart that lists the records.

Windows Server 2003 Network Infrastructure Objectives

202. Manage DNS.

- Manage DNS record settings.

Lecture Focus Questions:

- What are the seven most common resource records?
- What three kinds of servers receive NS records?
- What records are used to identify and locate domain controllers?
- What is round robin DNS?

Time

About 1 hour

Lab/Activity

- Create a zone and add records
- Create A and CNAME records
- Troubleshoot name resolution 1, 2, and 3

Section 3-4: Dynamic DNS Updates

Preparation

This section covers dynamic DNS, the ability of a system to register its own records. Be familiar with how to enable, configure, and manage dynamic DNS. During the lecture, show the students the DNS Zone property sheet.

Windows Server 2003 Network Infrastructure Objectives

201. Install and configure the DNS Server service.

202. Manage DNS.

Lecture Focus Questions:

- How does dynamic DNS differ from standard DNS?
- How do you enable dynamic updates on a DNS server?
- What are secure dynamic updates?
- How can DHCP be used to help the dynamic update process?

Time

About 1 hour

Lab/Activity

- Enable dynamic DNS updates

Section 3-5: Configuring DNS Clients

Preparation

To make sure students understand client configuration, open the Advanced TCP/IP Settings dialog box and discuss each of the client settings options.

Windows Server 2003 Network Infrastructure Objectives

201. Install and configure the DNS Server service.

- Configure DNS server options.

202. Manage DNS.

Lecture Focus Questions:

- What is the purpose of listing multiple DNS IP addresses on the client?
- What is a primary suffix?
- What is a connection-specific suffix?
- What is a parent suffix?
- What is the suffix search order?

Time

About 1 hour

Lab/Activity

- Configure DNS Server addresses
- Configure search suffixes
- Configure DNS client registration

Section 3-6: Active Directory-integrated Zones

Preparation

Active Directory allows administrators to store DNS information in Active Directory in an Active Directory-integrated zone. Discuss the pros and cons of integrated zones with your students. Make sure they understand how integrated-zone information is replicated.

Windows Server 2003 Network Infrastructure Objectives

201. Install and configure the DNS Server service.

- Configure DNS zone options.

202. Manage DNS.

- Manage DNS zone settings.

Lecture Focus Questions:

- What are some of the benefits of Active Directory-integrated (AD-I) zones?
- How do AD-I zones integrate with other zone types such as primary or secondary?
- What are the four replication scopes of an AD-I zone?
- How do AD-I zones integrate with non-Microsoft DNS?
- How do you configure zone transfer with standard vs. AD-I zones?

Time

About 1 hour

Lab/Activity

- Create an Active Directory-Integrated zone
- Convert a zone to Active-Directory Integrated

Section 3-7: Delegating Domains

Preparation

This section introduces more configuration principles. You should understand how root hints are used in DNS.

Windows Server 2003 Network Infrastructure Objectives

201. Install and configure the DNS Server service.

202. Manage DNS.

Lecture Focus Questions:

- What is domain delegation?
- When would you need to delegate domain?
- What records are created when you delegate a domain?

Time

About 1 hour

Lab/Activity

- Delegating a domain
- Troubleshooting delegation

Section 3-8: Managing Root Zones and Hints

Preparation

Zone transfer preserves the integrity of DNS data. This section builds on concepts introduced in earlier sections.

Windows Server 2003 Network Infrastructure Objectives

201. Install and configure the DNS Server service.

202. Manage DNS.

Lecture Focus Questions:

- What is the name resolution order for a DNS server?
- Why would you want to create a zone named . (dot)?
- What is the purpose of the root hints file?
- Why would you delete the root hints?
- What is the name and location(s) of the root hints file on a Windows 2003 server?

Time

About 1 hour

Lab/Activity

- Configure root hints
- Create a root zone

Section 3-9: Stub Zones and Forwarding

Preparation

Zone transfer preserves the integrity of DNS data. This section builds on concepts introduced in earlier sections by introducing new record management practices.

Windows Server 2003 Network Infrastructure Objectives

201. Install and configure the DNS Server service.

- Configure DNS zone options.

202. Manage DNS.

- Manage DNS zone settings.

Lecture Focus Questions:

- What configuration options do you have to control and manage name resolution?
- How does conditional forwarding differ from standard forwarding?
- How does a stub zone differ from a secondary zone?
- How do conditional forwarders differ from stub zones?

Time

About 1 hour

Lab/Activity

- Configure a stub zone
- Configure a server to use forwarders
- Configure conditional forwarding

Section 3-10: Zone Transfers

Preparation

Storing DNS resource records is a key principle in preserving network integrity. Prepare diagrams of different storage configurations to discuss the merits of different methods.

Windows Server 2003 Network Infrastructure Objectives

202. Manage DNS.

203. Monitor DNS. Tools might include System Monitor, Event Viewer, Replication Monitor, and DNS debug logs.

Lecture Focus Questions:

- What is zone transfer?
- What is the difference between AXFR and IXFR?
- How do primary and secondary zones share zone data with other DNS servers?
- What are the advantages of AD-I zones in relation to zone transfers?

Time

About 1 hour

Lab/Activity

- Configure a caching only server
- Enable zone transfer to name servers
- Enable zone transfer to listed servers
- Disable zone transfer
- Troubleshoot zone transfer

Section 3-11: Designing DNS

Preparation

Familiarize yourself with the different DNS designs and the pros and cons of each.

Lecture Focus Questions:

- When using internal and external DNS, what are the three possible scenarios for the DNS namespace?
- What are the advantages and disadvantages of each of the three methods?
- What are the four goals of any split namespace design?

Time

About 1 hour

Section 3-12: Troubleshooting DNS

Preparation

This section presents some common problems you may encounter as you manage a DNS server, and explains how to troubleshoot them. If you work with a DNS server and have any troubleshooting examples of your own, this is a great time to share them with the class.

Windows Server 2003 Network Infrastructure Objectives

203. Monitor DNS. Tools might include System Monitor, Event Viewer, Replication Monitor, and DNS debug logs.

502. Troubleshoot connectivity to the Internet.

Lecture Focus Questions:

- What are some of the troubleshooting tools available for DNS?
- How does using Ipconfig /registerdns differ from restarting the Netlogon service?
- How does Nslookup differ from Dnscmd?

Time

About 1 hour

Section 4-1: Configuring Remote Access

Preparation

This section covers configuring remote access services. If remote access is enabled on your computer, disable it before class, so you can show students how to enable the remote access server. If you are using remote access in your environment, plan to incorporate examples into your lecture. Create diagrams to describe a routing example, a remote access example, and a VPN example

Windows Server 2003 Network Infrastructure Objectives

402. Manage remote access.

- Manage Routing and Remote Access routing interfaces.

Lecture Focus Questions:

- What are the three steps in the remote access connection process?
- How can you implement a dial-up solution?
- How do remote access clients get an IP address for the remote access connection?

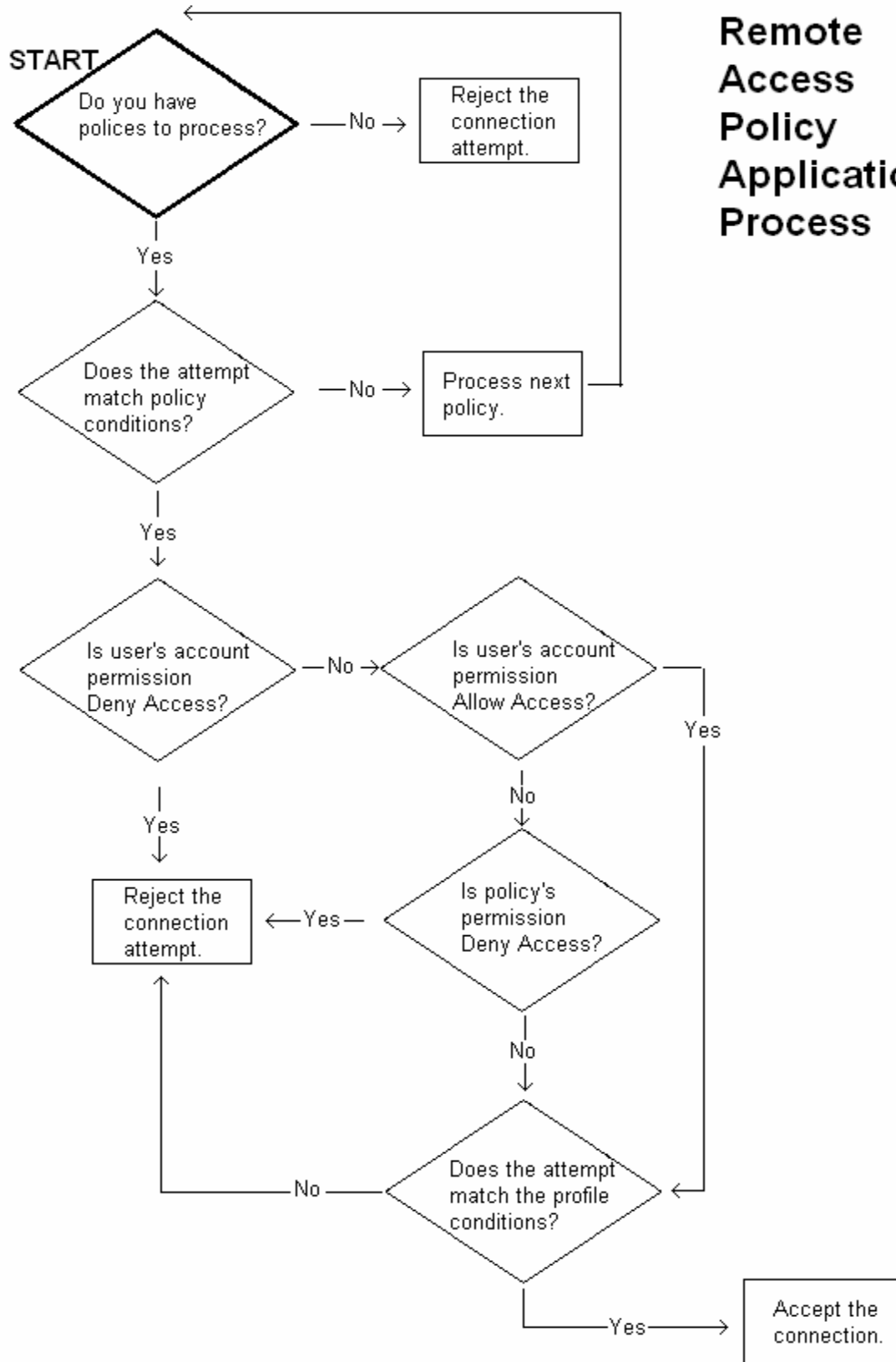
Time

About 1 hour

Lab/Activity

- Configure a remote access server
- Reconfigure a server for remote access

Remote Access Policy Application Process



Section 4-2: Remote Access Clients

Preparation

This section deals primarily with the different types of authentication protocols. Be familiar with the uses of each protocol.

Windows Server 2003 Network Infrastructure Objectives

401. Configure Routing and Remote Access user authentication.

- Configure remote access authentication protocols.

Lecture Focus Questions:

- What is the difference between authentication and authorization?
- What authentication protocols are supported by Windows remote access clients and servers?
- When should each authentication protocol be used?
- What authentication protocol is used with smart cards?

Time

About 1 hour

Lab/Activity

- Configure a remote access client connection

Section 4-3: Remote Access Policies

Preparation

This section covers remote access policies. Policies are used to control access to the remote access server. You may want to make copies of the flow chart included with this section.

Windows Server 2003 Network Infrastructure Objectives

401. Configure Routing and Remote Access user authentication.

- Configure Routing and Remote Access policies to permit or deny access.

Lecture Focus Questions:

- How are remote access policies applied to incoming connections?
- Where are remote access policies stored?
- What is the difference between conditions, permissions, and profile settings?

Time

About 1 hour

Lab/Activity

- Configure a remote access policy
- Configure profile settings

Section 4-4: Using IAS

Preparation

This section covers IAS, Microsoft's RADIUS implementation. Students do not need an in depth knowledge of IAS configuration. However, they do need a basic understanding of what IAS can do for a remote access environment, and how it works with remote access.

Windows Server 2003 Network Infrastructure Objectives

401. Configure Routing and Remote Access user authentication.

- Configure Internet Authentication Service (IAS) to provide authentication for Routing and Remote Access clients.

Lecture Focus Questions:

- How does IAS differ from a normal remote access server? Why use it?
- How does IAS relate to RADIUS?
- What are the three "A's" handled by the IAS server?
- When using IAS, where are remote access policies stored?

Time

About 1 hour

Lab/Activity

- Configure IAS

Section 4-5: Troubleshooting Remote Access

Preparation

This section presents some common problems you may encounter as you manage remote access servers, and explains how to troubleshoot them. If you use remote access servers and have any troubleshooting examples of your own, this is a great time to share them with the class.

Windows Server 2003 Network Infrastructure Objectives

405. Troubleshoot Routing and Remote Access routing.

Lecture Focus Questions:

- What process does a remote access client use to establish a remote access connection?
- What troubleshooting steps should you take if a remote access connection fails?
- How do the troubleshooting steps differ depending on when the connection fails?

Time

About 1 hour

Section 5-1: Routing

Preparation

This section introduces IP routing. Students should be familiar with the basic concept of routing, but most won't be familiar with routing table contents or dynamic routing algorithms. Create a diagram with two routers and one client for each subnet. Label IP addresses and MAC addresses for each device.

Windows Server 2003 Network Infrastructure Objectives

403. Manage TCP/IP routing.

- Manage routing protocols.
- Manage routing tables.
- Manage routing ports.

Lecture Focus Questions:

- What is the purpose of routing?
- What is a routing table?
- What routes are automatically added to the routing table when routing is enabled?

Time

About 1 hour

Lab/Activity

- Configure routing
- Enable LAN routing
- Configure static routes

Section 5-2: Configuring Routing Protocols

Preparation

This section examines RIP routing, and shows students how to configure an RIP router.

Windows Server 2003 Network Infrastructure Objectives

403. Manage TCP/IP routing.

- Manage routing protocols.
- Manage routing tables.
- Manage routing ports.

Lecture Focus Questions:

- What is the difference between static and dynamic routing?
- Under what circumstances do you not need to configure static routes or a routing protocol?
- When should you choose static routes over a routing protocol?
- How do RIP and OSPF differ? When should you choose each?
- In the remote access console, what does it mean to add an interface to a routing protocol?

Time

About 1 hour

Lab/Activity

- Configure RIP routing
- Configure a routing solution 1, 2, and 3

Section 5-3: Demand Dial Routing

Preparation

This section introduces demand-dial routing and explains how to configure a demand-dial router. You can use the real or fake modem installed during earlier sections to demonstrate demand-dial routing to your students.

Windows Server 2003 Network Infrastructure Objectives

405. Troubleshoot Routing and Remote Access routing.

- Troubleshoot demand-dial routing.

Lecture Focus Questions:

- What is the purpose of demand-dial routing?
- How would you compare and contrast demand-dial routing with normal dial-up and normal routing?
- How do Dial-Out credentials differ from Dial-In credentials?
- How does a demand-dial filter differ from packet filters?

Time

About 1 hour

Lab/Activity

- Configure demand dial routing
- Configure Auto-static routing
- Configure demand dial solution 1 and 2

Section 5-4: Network Address Translation

Preparation

This section explains how NAT works, and how to install and manage a NAT server. Create a diagram to show students how NAT works. You will demonstrate the configuration of a NAT router on your instructor computer. If necessary, install a fake NIC before class. This NIC will represent your connection to the Internet.

Lecture Focus Questions:

- What is the purpose of NAT?
- How does NAT accomplish its goal?
- What is address and port mapping?

Time

About 1 hour

Section 5-5: DHCP Relay Agent

Preparation

This section covers the use and configuration of a DHCP relay agent.

Windows Server 2003 Network Infrastructure Objectives

101. Configure TCP/IP addressing on a server computer.

- Manage DHCP Relay Agent.

103. Troubleshoot DHCP.

- Verify that the DHCP Relay Agent is working correctly.

Lecture Focus Questions:

- How can you provide DHCP services in a routed network?
- Why would you implement DHCP relay?
- What tool do you use to configure a DHCP relay agent?
- What information does the DHCP relay need to function correctly?

Time

About 1 hour

Lab/Activity

- Configure a DHCP relay agent

Section 6-1: Firewalls and Packet Filters

Preparation

This section examines security features, including ICF and packet filtering. Prepare a few packet filters before class.

Windows Server 2003 Network Infrastructure Objectives

402. Manage remote access.

- Manage packet filters.
- Manage devices and ports.

Lecture Focus Questions:

- What is the purpose of a *firewall*?
- What are the basic methods we can use to block traffic through a router?
- What are the three firewalls built into Windows 2003 and how do they differ?
- What are the TCP/IP ports used by common traffic types?

Time

About 1 hour

Lab/Activity

- Configure packet filters

Section 6-2: Virtual Private Networking

Preparation

This section explains how a VPN functions. It also explains configuring and troubleshooting VPN clients and servers. Create a diagram that shows students how a VPN connection works. You will use your instructor computer to show students how to configure a VPN server. You will also show students how to create a client connection to a VPN server.

Windows Server 2003 Network Infrastructure Objectives

404. Implement secure access between private networks

- Diagnose and resolve issues related to remote access VPNs.

Lecture Focus Questions:

- What is the purpose of a VPN connection?
- What are the two tunneling protocols available for use with VPNs?
- How do the two protocols differ?

Time

About 1 hour

Lab/Activity

- Configure the VPN client

Section 6-3: IP Security (IPSec)

Preparation

This section covers IPSec.

Windows Server 2003 Network Infrastructure Objectives

302. Monitor network protocol security. Tools might include the IP Security Monitor Microsoft Management Console (MMC) snap-in and Kerberos support tools.

303. Troubleshoot network protocol security. Tools might include the IP Security Monitor MMC snap-in, Event Viewer, and Network Monitor.

Lecture Focus Questions:

- What is the purpose of IPSec?
- What are the three default IPSec policies and how do they interact?
- What is the easiest way to deploy uniform IPSec policies to a group of computers?

Time

About 1 hour

Lab/Activity

- Configure IPSec
- Monitor IPSec

Section 6-4: Templates

Preparation

Templates are one of the tools administrators can use to secure their systems and networks. This section builds on template concepts introduced in a previous course.

Windows Server 2003 Network Infrastructure Objectives

301. Implement secure network administration procedures.

- Implement security baseline settings and audit security settings by using security templates.

Lecture Focus Questions:

- What are the two purposes of security templates?
- What are the basic features of the built-in templates?
- What is the easiest way to deploy uniform security settings to a group of computers?
- What tools can be used to deploy templates to a single computer?

Time

About 1 hour

Lab/Activity

- Configure security templates
- Analyze security baselines

Section 6-5: Security Principles

Preparation

By understanding the principles of security discussed in this section, students should be able to apply the principles in live situations.

Windows Server 2003 Network Infrastructure Objectives

301. Implement secure network administration procedures.

- Implement the principle of least privilege.

Lecture Focus Questions:

- What are the two basic goals of any security system?
- What is the principle of least privilege?
- What are some of the most important security considerations for computer systems?

Time

About 1 hour

Lab/Activity

- Delegate administrative control
- Configure auditing

Section 7-1: Services

Preparation

Services are vital to system and network functionality. Familiarize yourself with the different ways to manage services to be able to demonstrate the techniques to the students.

Windows Server 2003 Network Infrastructure Objectives

503. Troubleshoot server services.

- Diagnose and resolve issues related to service dependency.
- Use service recovery options to diagnose and resolve service-related issues.

Lecture Focus Questions:

- What is a service?
- What is service startup behavior and why might you modify this?
- What are the three user accounts that various XP/2003 services run under?
- What is a service dependency?

Time

About 1 hour

Lab/Activity

- Restart a service
- Change service startup type
- Configure service recovery 1, 2, and 3
- Configure service logon

Section 7-2: Software Update Services

Preparation

This section covers the Software Update Services component of Windows Server 2003. SUS was introduced in a previous course, so students should already be aware of it.

Windows Server 2003 Network Infrastructure Objectives

301. Implement secure network administration procedures.

Lecture Focus Questions:

- What is the purpose of Software Update Services (SUS)?
- What are the two basic steps to set up SUS after it is installed?
- What does a client need to use SUS?

Time

About 1 hour