

Module 4: Implementing Name Resolution by Using WINS

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Instructor Notes

Presentation:
90 Minutes

This module provides students with the knowledge and skills necessary to enable Windows Internet Name Service (WINS) name resolution in a Microsoft® Windows® 2000 network.

Lab:
45 Minutes

At the end of this module, students will be able to:

- Explain how to connect to NetBIOS-based networks.
- Describe the WINS name resolution process.
- Configure computers as WINS servers and clients.
- Configure support for non-WINS clients.
- Enable WINS database replication.
- Maintain the WINS database.

Materials and Preparation

This section provides you with the required materials and preparation tasks that are needed to teach this module.

Required Materials

To teach this module, you need the Microsoft PowerPoint® file 2153a_04.ppt.

Preparation Tasks

To prepare for this module, you should:

- Read all of the materials for this module.
- Complete the lab.
- Read the appendix *Computer Browser Service*, under **Additional Reading** on the Web page on the Student Materials compact disc.
- Read the white paper *Windows 2000 Server Windows Internet Name Service (WINS) Overview*, under **Additional Reading** on the Web page on the Student Materials compact disc.
- Search for and read each of the following topics and appendices in the Windows 2000 Server Resource Kit:
 - “Windows Internet Name Service”
 - “Microsoft WINS Proxy”
 - *LMHOSTS File*
 - *Windows 2000 Browser Service*

Module Strategy

Use the following strategy to present this module:

- Connecting to NetBIOS-Based Networks

This topic provides information about network basic input/output system (NetBIOS) name resolution and concepts to provide a better understanding of how WINS functions on a Microsoft Windows 2000 network. Explain that previous versions of Windows and some Windows-based applications rely on NetBIOS names to identify network resources.

Describe the purpose NetBIOS names, NetBIOS name resolution, NetBIOS scopes, and browsing. Explain how NetBIOS name registration, discovery, and release is used for interacting with NetBIOS hosts. Describe the standard methods for NetBIOS name resolution, and identify the NetBIOS over Transmission Control Protocol/Internet Protocol (TCP/IP) name resolution nodes. Finally, describe the purpose of the Lmhosts file, and explain the procedure for creating, configuring, and disabling an Lmhosts file.

- WINS Overview

This topic provides an overview of WINS functionality. Provide a high-level overview of WINS name resolution, and then describe the details of the three main functions of WINS: name registration, name discovery, and name release.

- Configuring WINS Servers and Clients

This topic describes how to configure WINS servers and clients. Identify the software and configuration requirements for a WINS server, and then list the operating systems that are supported on WINS client computers. Demonstrate the procedure for creating a WINS server by installing WINS on a computer running Windows 2000 Server. Emphasize that students must configure the advanced TCP/IP settings of a WINS server so that it is a client of itself.

Describe the manual and automatic methods of configuring WINS clients, and demonstrate how to configure a client manually. Explain that students can configure up to 12 WINS servers per client. Complete the topic by demonstrating how to configure Dynamic Host Configuration Protocol (DHCP) scope options to provide WINS configuration information automatically.

- **Configuring Support for Non-WINS Clients**

This topic provides information about how to support non-WINS clients in a Windows 2000 network. Begin by describing the importance of supporting non-WINS clients. Describe how Domain Name System (DNS) and WINS interoperate to provide name resolution in a Windows 2000 network. Describe the process that occurs when you configure a DNS server to forward queries to a WINS server, and explain that doing so enables DNS clients to query the DNS server for computer names that are registered in WINS.

Explain how to enable WINS lookup on DNS zones, and describe the WINS lookup process. Demonstrate the procedures for configuring DNS to forward queries to WINS servers and for configuring static mappings on a WINS server to add name resolution information for computers that are not WINS clients.

Finally, describe the purpose and function of a WINS proxy. Demonstrate how to edit the registry to modify the value of the **EnableProxy** entry to configure the WINS proxy.

- **Enabling WINS Database Replication**

This topic describes WINS replication in a Windows 2000 environment. Begin by discussing the purpose of WINS replication, and then describe the types of replication partners and when to use them. Finally, explain and demonstrate how to add a replication partner for a WINS server and how to configure push and pull parameters.

- **Maintaining the WINS Server Database**

This topic provides information about how to maintain the WINS server database to ensure that the data it contains is valid. Demonstrate the procedures for opening the WINS database and searching for specific entries, and identify the information that a WINS record contains. Demonstrate the procedure for deleting WINS records to ensure that the information in the WINS database is correct.

Demonstrate the procedure for manually compacting the WINS database. Explain how to remove records from the WINS database by demonstrating the procedures for clearing WINS database entries and configuring intervals. Explain how to initiate and configure WINS database consistency verification. Explain how to configure advanced WINS server options to specify how a WINS server operates. Finally, explain how to back up and restore the WINS database.

Customization Information

This section identifies the lab setup requirements for a module and the configuration changes that occur on student computers during the labs. This information is provided to assist you in replicating or customizing Microsoft Official Curriculum (MOC) courseware.

Important The lab in this module is also dependent on the classroom configuration that is specified in the Customization Information section at the end of the Classroom Setup Guide for course 2153, *Implementing a Microsoft Windows 2000 Network Infrastructure*.

Lab Setup

There are no lab setup requirements that affect replication or customization.

Lab Results

There are no configuration changes on student computers that affect replication or customization.

Overview

Topic Objective

To provide an overview of the module topics and objectives.

Lead-in

In this module, we will discuss how to configure the Windows Internet Name Service.

- **Connecting to NetBIOS-Based Networks**
- **WINS Overview**
- **Configuring WINS Servers and Clients**
- **Configuring Support for Non-WINS Clients**
- **Enabling WINS Database Replication**
- **Maintaining the WINS Server Database**

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In Microsoft® Windows® 2000, the primary means for client computers to locate and communicate with other computers on an Internet Protocol (IP) network is by using the Domain Name System (DNS). However, clients using previous versions of Windows, such as computers running Microsoft Windows 98 or Microsoft Windows NT® version 4.0, also use network basic input/output system (NetBIOS) names for network communication. As a result, these clients require a method of resolving NetBIOS names to IP addresses.

You can install Windows Internet Name Service (WINS) to register NetBIOS computer names and resolve them to IP addresses. Implementing WINS in a Windows 2000 network ensures that clients using previous versions of Windows can locate and communicate with network resources as needed.

At the end of this module, you will be able to:

- Explain how to connect to NetBIOS-based networks.
- Explain the WINS name resolution process.
- Configure computers as WINS servers and clients.
- Configure support for non-WINS clients.
- Enable WINS database replication.
- Maintain the WINS database.

◆ Connecting to NetBIOS-Based Networks

Topic Objective

To list the topics that are related to connecting to a NetBIOS-based network.

Lead-in

NetBIOS enables computers that are running previous versions of Windows to identify network resources.

- NetBIOS Names
- NetBIOS Name Registration, Discovery, and Release
- NetBIOS Name Resolution
- NetBIOS over TCP/IP Name Resolution Nodes
- The Lmhosts File

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NetBIOS provides programs with a uniform set of commands for requesting the lower-level network services that are required to manage names, conduct sessions between nodes on a network, and transmit information.

It is important to understand NetBIOS name resolution concepts and methods to understand WINS functionality, because previous versions of Windows and some Windows-based applications rely on NetBIOS names to identify network resources.

NetBIOS Names

Topic Objective

To list the characteristics of NetBIOS names.

Lead-in

The NetBIOS name is the name assigned to a computer during installation.

- **NetBIOS Names Are Registered Dynamically and Can Be:**
 - Used only once within a network
 - Registered as unique names or group names
- **Use a NetBIOS Scope to Group Computers in a Network**
- **Use Browsing to Locate Shared Resources on the Network**

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Delivery Tip

Emphasize that other NetBIOS-based computers, such as computers running previous versions of Windows, also use NetBIOS names.

NetBIOS names are a more limiting alternative for naming computers to DNS names. Windows 2000 can use DNS names for most functions, but a NetBIOS name resolution method must exist on any network with computers that are running earlier versions of Windows and applications that depend on NetBIOS names.

NetBIOS names are 16 bytes in length, and the NetBIOS namespace has only one level. This means that NetBIOS names can be used only once within a network. In contrast, the DNS namespace has multiple levels because DNS uses a fully qualified domain name (*FQDN*), which combines the host name with the name of its domain.

NetBIOS Name Registration

NetBIOS names are registered dynamically when computers and services start and when users log on. A NetBIOS name can be registered as a unique name, which maps to a single address, or as a group name, which maps to multiple addresses.

Key Point

NetBIOS names are registered dynamically when computers and services start and when users log on.

Important Because multiple services that are running on the same computer can register a computer's NetBIOS name, several NetBIOS name registrations can be generated for the same computer name. The registered name is the 15-character computer name plus a sixteenth character. The sixteenth character uniquely identifies each service that uses the computer name to build its NetBIOS name.

Example of NetBIOS Name Registration

An example of a service that uses a NetBIOS name is the Server service in Windows 2000, which provides file and printer sharing. When you start your computer, the service registers a unique NetBIOS name that is based on the computer name. The registered name is the 15-character computer name plus a sixteenth character of 0x20. The sixteenth character uniquely identifies the Server service.

When you attempt to connect to a shared folder by using a NetBIOS name, a name query is initiated to search for the NetBIOS name of the Server service. Communication is established when the NetBIOS name is located, and then you can connect to the server on which the shared folder is stored.

NetBIOS Scope

Key Point

You can use a NetBIOS scope to group computers in a network.

A NetBIOS name can also contain extra characters that make up a scope. A NetBIOS *scope* is an optional extension to a computer name. You can use a NetBIOS scope to group computers in a network. Only computers with the same NetBIOS scope name can locate each other by using the NetBIOS name. Computers that are outside the scope cannot access computers that are within the scope.

Note NetBIOS scopes are used to segment a large NetBIOS-based network; however, the use of NetBIOS scopes is not recommended.

For more information about configuring NetBIOS scopes, see RFC 1001 under **Additional Reading** on the Web page on the Student Materials compact disc.

Browsing

Delivery Tip

Describe the browsing process, and demonstrate the procedure for accessing shared resources.

Windows 2000 creates lists of registered NetBIOS names to enable users to locate computers that contain shared resources on the network. The process of building these lists is called *browsing*.

To access these shared resources:

1. Open My Network Places, and then double-click **Entire Network**.
2. Click **entire contents**.
3. Double-click **Microsoft Windows Network**.
4. Double-click the appropriate domain or workgroup, and then double-click the name of computer on which the resource is stored.

Key Point

Open Network Neighborhood to access browsing information on computers running earlier versions of Windows.

Note Open Network Neighborhood to access browsing information on computers running earlier versions of Windows.

For more information about browsing, see the appendix *Computer Browser Service*, under **Additional Reading** on the Web page on the Student Materials compact disc, and the appendix *Windows 2000 Browser Service*, in the Windows 2000 Server Resource Kit.

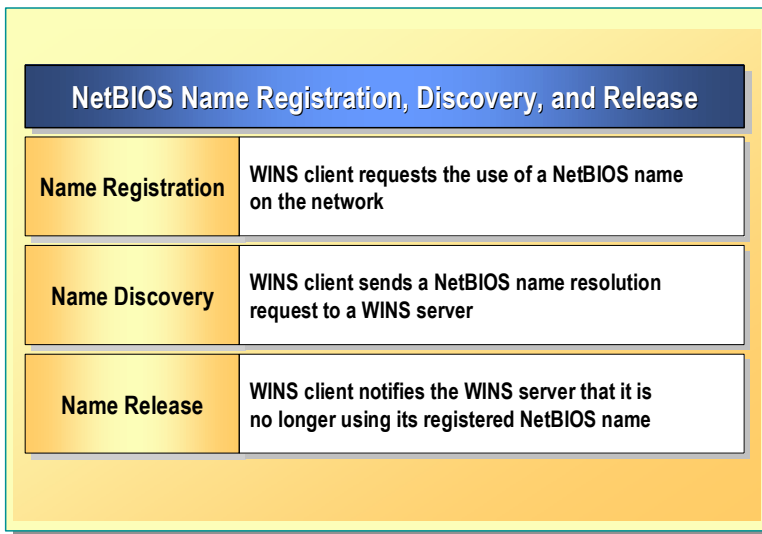
NetBIOS Name Registration, Discovery, and Release

Topic Objective

To explain how NetBIOS names are registered, discovered, and released as part of the NetBIOS name resolution process.

Lead-in

All name resolution methods of NetBT use name registration, name discovery, and name release for interacting with NetBIOS hosts.



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Computers running Windows 2000 support several methods for name registration, name discovery, and name release. These methods are used for interacting with other NetBIOS-based hosts.

Delivery Tip

Explain that in name registration, the WINS client requests the use of a NetBIOS name on the network.

Name Registration

Large or routed networks use the NetBIOS over Transmission Control Protocol/Internet Protocol (TCP/IP) component of NetBIOS. When a NetBIOS over TCP/IP (NetBT) host initializes, it registers its NetBIOS name by using a NetBIOS name registration request. This registration uses a broadcast or a directed message to a NetBIOS name server.

If another host has registered the same NetBIOS name, either that host or a NetBIOS name server responds to the request with a negative name registration response. Because the initiating host cannot use a name that is already in use, it receives an initialization error and is unable to communicate by using NetBIOS.

Delivery Tip

Explain that in name discovery, the WINS client sends a NetBIOS name resolution request to a WINS server.

Name Discovery

Local broadcasts or a NetBIOS name server perform name discovery. When a computer running Windows 2000 communicates with another TCP/IP host, it broadcasts a NetBIOS name query request containing the destination NetBIOS name on the local network, or sends the request to a NetBIOS name server for resolution. If the NetBIOS name is in use, either the host that owns the NetBIOS name or a NetBIOS name server responds by sending a positive name query response.

Delivery Tip

Explain that in name release, the WINS client notifies the WINS server that it is no longer using its registered NetBIOS name.

Name Release

Name release occurs automatically whenever a NetBIOS application or service is shut down properly. For example, when a service on a host stops, the host will not send a negative name registration response when another user tries to use the NetBIOS name. The NetBIOS name is released and is available for another host to use.

NetBIOS Name Resolution

Topic Objective

To list the standard methods of NetBIOS name resolution.

Lead-in

NetBIOS name resolution is the process of successfully mapping a computer's NetBIOS name to an IP address.

Standard Methods of NetBIOS Name Resolution Include:

- NetBIOS Name Cache
- NetBIOS Name Server
- Local Broadcast

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Delivery Tip

Describe the purpose of the NetBIOS name cache, the NetBIOS name server, and a local broadcast.

NetBIOS name resolution is the process of mapping a computer's NetBIOS name to an IP address. A computer's NetBIOS name must be resolved to an IP address before the IP address can be resolved to a hardware address. The Microsoft implementation of TCP/IP uses several methods to resolve NetBIOS names.

NetBIOS Name Cache

The NetBIOS name cache contains the NetBIOS names that the local computer recently resolved and the name resolution results. Name resolution is performed more quickly because the cached results are accessed for name resolution. However, name resolution data is limited to recently resolved names.

You can use the Nbtstat utility to view the contents of the NetBIOS name cache by typing **nbtstat -c** at a command prompt.

NetBIOS Name Server

A NetBIOS name server maintains a database of NetBIOS names and IP addresses and responds to client name resolution requests. In Windows 2000, a WINS server is a NetBIOS name server that handles name registration requests from WINS clients, registers their names and IP addresses, and responds to NetBIOS name queries.

Note For more information about NetBIOS name servers, see RFC 1001 and RFC 1002 under **Additional Reading** on the Web page on the Student Materials compact disc.

Local Broadcast

A NetBIOS client can issue a broadcast on the local network for the IP address of the destination NetBIOS name. The host that owns the NetBIOS replies with its IP address, and the host that initiated the broadcast can then connect to the host that owns the NetBIOS name.

Note Avoid configuring NetBIOS name resolution for local broadcasts because they can create excessive network traffic. Also, most routers are configured not to forward NetBIOS broadcasts, which limits NetBIOS name resolution to a single network.

NetBIOS over TCP/IP Name Resolution Nodes

To list the NetBIOS name resolution nodes that Windows 2000 supports.

Lead-in

Windows 2000 provides support for all of the NetBIOS over TCP/IP nodes. Each node resolves NetBIOS names differently.

NetBIOS over TCP/IP Name Resolution Nodes	
B-node	Uses broadcasts for name registration and resolution
P-node	Uses a NetBIOS name server such as WINS to resolve NetBIOS names
M-node	Combines B-node and P-node, and functions as a B-node by default
H-node	Combines P-node and B-node, and functions as a P-node by default

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Delivery Tip

Identify the methods that can be used for NetBIOS name resolution. Explain that these methods are also called nodes.

The different methods that a computer can use to resolve a NetBIOS name into an IP address are referred to as nodes. The nodes that Windows 2000 supports include:

- *B-node (broadcast)*. Uses broadcasts for name registration and resolution.

Note In a large network, broadcasts can increase the network load. In addition, routers typically do not forward broadcasts, so only computers on the local network can respond.

- *P-node (peer-to-peer)*. Uses a NetBIOS name server such as WINS to resolve NetBIOS names. P-node does not use broadcasts because it queries the name server directly, enabling computers to span routers. P-node requires that all computers be configured with the IP address of the NetBIOS name server. If the NetBIOS name server is not functioning, computers will not be able to resolve the name.
- *M-node (mixed)*. Combines B-node and P-node, and functions as a B-node by default. If M-node is unable to resolve a name by broadcast, it uses the NetBIOS name server of P-node.
- *H-node (hybrid)*. Combines P-node and B-node, and functions as a P-node by default. If H-node is unable to resolve a name by using the NetBIOS name server, it uses a broadcast to resolve the name.

Note For more information about NetBIOS over TCP/IP nodes, see RFC 1001 and RFC 1002 under **Additional Reading** on the Web page on the Student Materials compact disc.

Configuring Node Types

The system defaults to B-node if there are no WINS servers configured. If there is at least one WINS server configured, the system defaults to H-node. You can configure the NetBIOS name resolution method that Windows 2000 employs by using Dynamic Host Configuration Protocol (DHCP) to assign a node type, or by editing the following registry value:

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Netbt\Parameters\NodeType

The following table lists the registry values that correspond to each node type:

Node type	Value
B-node	1
P-node	2
M-node	4
H-node	8

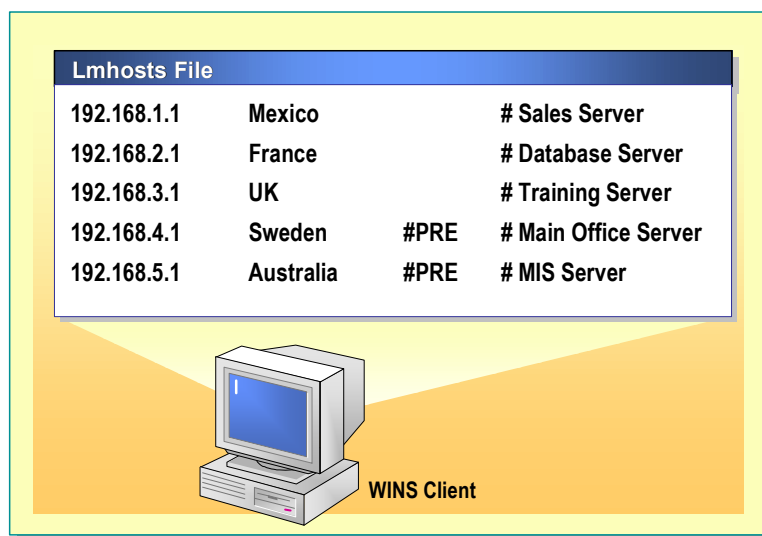
The Lmhosts File

Topic Objective

To illustrate the contents of the Lmhosts file.

Lead-in

The Lmhosts file is a static text file that is used to map an IP address to the corresponding NetBIOS name of a remote host.



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An Lmhosts file is a local text file that contains NetBIOS name-to-IP address mapping information. The Lmhosts file helps computers to resolve the NetBIOS names of other computers that cannot respond to NetBIOS name query broadcasts, such as a computer that is located on a remote network. The Lmhosts file is similar in functionality to the Hosts file in DNS, except that the Hosts file is used for mapping IP addresses for host names in the DNS namespace, rather than NetBIOS names.

Note Avoid using an Lmhosts file for regular name resolution because you must manually maintain a separate Lmhosts file on each computer.

Creating an Lmhosts File

When you create an Lmhosts file, Windows 2000 automatically queries the file to resolve NetBIOS names when other name resolution methods fail.

Delivery Tips

Explain how to use the sample Lmhosts file (Lmhosts.sam) to create an Lmhosts file on a computer running Windows 2000.

Emphasize that the Lmhosts file must be saved with the file name **Lmhosts**, and without a file extension.

By default, Lmhosts files do not exist on computers running Windows 2000. Therefore, you must create the file and save it in the *systemroot\System32\Drivers\Etc* folder. This folder also includes a sample Lmhosts file (Lmhosts.sam), which you can use as a template to create an Lmhosts file.

You can use any text editor to create an Lmhosts file. Save the file with the file name **Lmhosts**, and without a file extension.

Note Some text editors may automatically assign a file extension. Therefore, you must verify the file name in the *systemroot\System32\Drivers\Etc* folder. If necessary, remove the file extension.

Preconfigured Entries in an Lmhosts File

Computers running Windows 2000 can load preconfigured entries from the Lmhosts file into the NetBIOS name cache when TCP/IP is initialized. For example, entries in the Lmhosts file that are designated with **#PRE** are added to the NetBIOS name cache when TCP/IP initializes. This can increase the speed of name resolution, because names in the cache are resolved first.

Delivery Tip

Identify the predefined keywords that you can add to an Lmhosts file.

An Lmhosts file can contain predefined keywords that begin with a number sign (#). The following table lists the keywords that you can add to an Lmhosts file:

Predefined keyword	Description
#PRE	Defines the entries that are initially preloaded as permanent entries in the name cache. Entries with a #PRE tag are loaded automatically when TCP/IP initializes, or manually by typing nbtstat -R at a command prompt.
#DOM:[domain_name]	Indicates that the computer is a domain controller. Facilitates domain activity, such as logon validation over a router, account synchronization, and browsing.
#INCLUDE	Loads and searches NetBIOS entries in a separate file from the default Lmhosts file. Typically, the #INCLUDE file is a centrally located shared Lmhosts file. Refer to the #INCLUDE file by using a universal naming convention (UNC) path. Any computer referred to in the UNC path must also have a name-to-IP address mapping in the Lmhosts file. This enables Windows 2000 to resolve a computer's NetBIOS name when it reads the #INCLUDE file.
#BEGIN_ALTERNATE #END_ALTERNATE	Defines a redundant list of alternate locations for Lmhosts files. When you include multiple #INCLUDE lines between #BEGIN_ALTERNATE and #END_ALTERNATE , Windows 2000 includes the first file that it can locate in the list.
#MH	Adds multiple entries for a multihomed computer. A multihomed computer is a computer that contains IP addresses that belong to different networks.

Note The NetBIOS name cache and file are always read sequentially. Add the most frequently accessed computers to the top of the list. Add the **#PRE**-tagged entries near the bottom, because they are loaded when TCP/IP initializes and are not accessed again.

Disabling an Lmhosts File

To disable the use of an Lmhosts file:

Delivery Tip

Demonstrate the procedure for disabling an Lmhosts file.

1. In the **Internet Protocol (TCP/IP) Properties** dialog box, click **Advanced**.
2. In the **Advanced TCP/IP Settings** dialog box, on the **WINS** tab, clear the **Enable LMHOSTS lookup** check box.

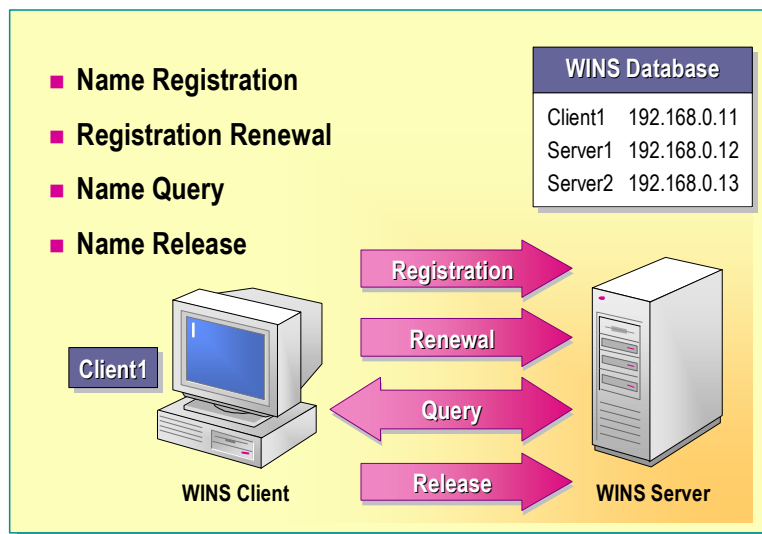
◆ WINS Overview

Topic Objective

To list the topics that are related to WINS functionality.

Lead-in

Understanding the details of WINS functionality provides a foundation for implementing NetBIOS name resolution in a network environment.



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WINS is a method of NetBIOS name resolution that reduces broadcast traffic and enables clients to resolve NetBIOS names of computers that are on different network segments. For WINS to function properly on a network, each client must register its name in the WINS database. The client can then perform a name query to locate and establish communication with other computers that are registered in the database.

For example, each time a WINS client starts, it registers its NetBIOS name and IP address with a configured WINS server. When a WINS client initiates a command to communicate with another host, the client sends a name query request directly to the WINS server instead of broadcasting it on the local network. The WINS server searches its database for a registration from the host. If the WINS server finds a registration, and it is active, WINS returns the destination host's IP address to the WINS client.

WINS name registrations are temporary, so clients must periodically renew their registrations. In addition, the client computer issues a name release request to delete its registration from the WINS database when it no longer requires a name registration, such as when the client computer shuts down.

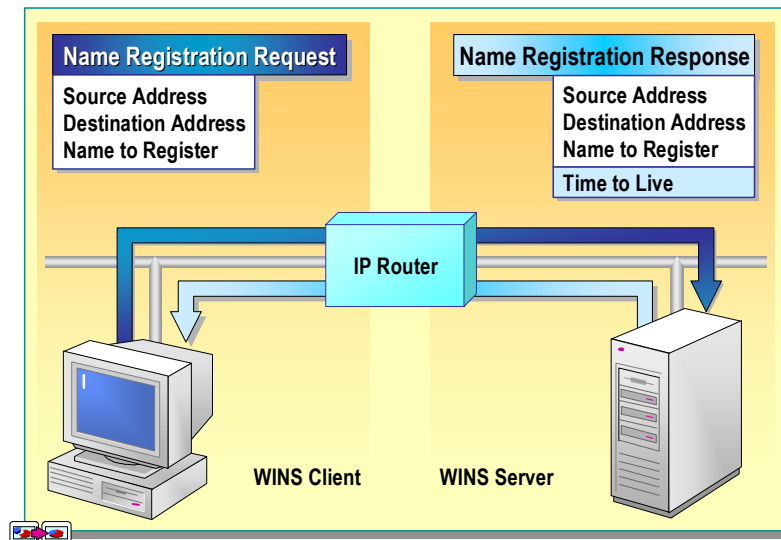
Name Registration

Topic Objective

To illustrate how a WINS client registers its NetBIOS name with a WINS server.

Lead-in

When a client starts, it registers its NetBIOS name and IP address by sending a name registration request directly to the configured WINS server.



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Delivery Tip

The slide for this topic includes animation. Click or press the SPACEBAR to advance the animation.

The WINS configuration of a computer includes the IP address of a primary WINS server and, optionally, a secondary WINS server. When a client computer starts, it registers its NetBIOS name and IP address by sending a name registration request directly to the primary WINS server.

If the WINS server is available and another WINS client has not registered the name already, the WINS server returns a successful registration message to the client. This message contains the amount of time that the NetBIOS name is registered to the client, specified as the Time to Live (TTL). In addition, the WINS server stores the NetBIOS name-to-IP address mapping of the client in its database. Whenever a WINS client's addressing information changes, the client automatically requests that the WINS server update its database.

Note Typically, computers request more than one entry in the WINS database. For example, a computer running Windows 2000 registers with a WINS server the Workstation, Server, and Messenger services; the workgroup or domain to which the computer belongs; and the name of the user currently logged on. Registration of services instead of computer names only allows WINS clients to query a WINS server for computers with specific capabilities. Registration of the Messenger service and the user name allow other users to send network messages to the registered computer or user.

When a Name Is Already Registered

If the name is already registered in the WINS database, the WINS server sends a name query request to the currently registered owner of the name to determine whether the computer that owns the record is still active. The WINS server sends the request three times at 500-millisecond intervals.

Delivery Tip

Mention that a computer that has multiple network adapters is also known as a multihomed computer.

If the registered computer has multiple network adapters that are bound to TCP/IP, the WINS server attempts to contact each IP address that it has for the computer until it receives a response, or until it has tried all of the IP addresses.

If the current registered owner responds successfully to the WINS server, the WINS server sends a negative name registration response to the WINS client that is attempting to register the name. The WINS client then does not use the name and displays an error message. If the current registered owner does not respond to the WINS server, the WINS server registers the name with the IP address of the WINS client that is attempting to register the name, and sends a successful name registration response to the client.

Delivery Tip

Describe the purpose of the NetBIOS name cache, the NetBIOS name server, and a local broadcast.

When the WINS Server Is Unavailable

A WINS client makes three attempts to find its primary WINS server. If the client fails after the third attempt, it sends the name registration request to the secondary WINS server (if one is configured for the client).

If neither server is available, the WINS client sends the name registration to any other WINS server that is configured on the client. If no WINS server is available, the client initiates a broadcast to register its name.

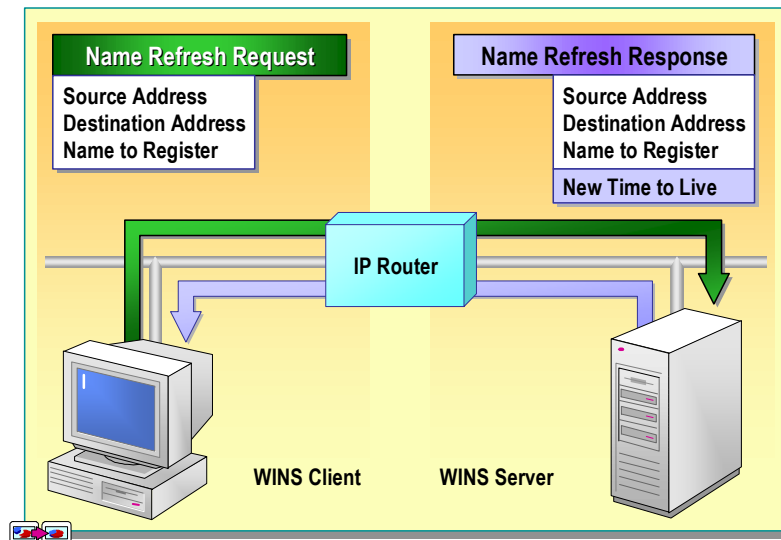
Registration Renewal

Topic Objective

To illustrate how a WINS client renews its name registration with a WINS server.

Lead-in

Client name registrations with a WINS server are temporary, and from time to time a WINS client must renew its name or the lease will expire.



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Delivery Tip

The slide for this topic includes animation. Click or press the SPACEBAR to advance the animation.

Key Point

A WINS client periodically attempts to refresh its name registration, first with its primary WINS server, and then with its secondary WINS server.

Client name registrations with a WINS server are temporary, and from time to time a WINS client must renew its name or the lease will expire. If a client does not renew its lease before it expires, the WINS server marks the database records that represent the client for deletion and no longer replies to queries for that client.

Name Refresh Request

When a client computer first registers with a WINS server, the WINS server returns a message with a TTL value that indicates when the client registration expires or needs to be renewed. If renewal does not occur by that time, the name registration expires on the WINS server and the name entry is eventually removed from the WINS database.

The default renewal interval for entries in the WINS database is six days. Renewal occurs every three days for most WINS clients because WINS clients attempt to renew their registrations when 50 percent of the TTL value has elapsed. A WINS client sends a name refresh request to the WINS server to renew its name in the WINS database.

Name Refresh Response

When a WINS server receives the name refresh request, it sends to the client a name refresh response with a new TTL.

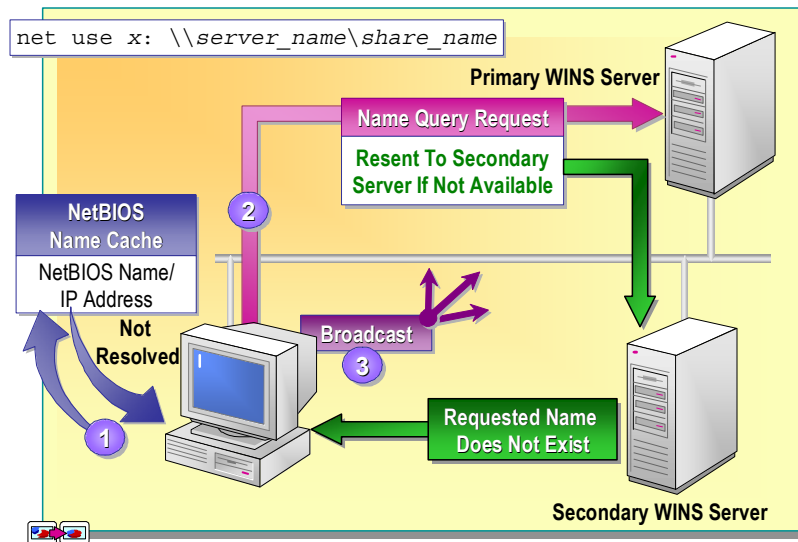
Name Query

Topic Objective

To illustrate the NetBIOS name query process.

Lead-in

A WINS client can use the NetBIOS name of another WINS client to query the WINS server to obtain the IP address of the other client.



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Delivery Tip

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A WINS client can use the NetBIOS name of another WINS client to obtain the IP address of that client from the WINS server. The client can then use the IP address of the other client to establish a connection with that client.

By default, a WINS client attempts to resolve the NetBIOS name of another computer to an IP address in the following way:

Key Point

A WINS client attempts to resolve the NetBIOS name of another computer to an IP address by checking its NetBIOS name cache, then by checking with its primary and secondary name servers, and finally by initiating a network broadcast.

1. The client checks its NetBIOS name cache for the NetBIOS name-to-IP address mapping of the destination computer.
2. If the client cannot resolve the name from its cache, it sends a name query request directly to its primary WINS server. If the primary WINS server is unavailable, the client resends the request two more times.
3. If the client does not receive a response from the primary WINS server, the client resends the request to any additional WINS servers that are configured on the client. If a WINS server resolves the name, it responds to the client with the IP address for the requested NetBIOS name.
4. The client initiates a network broadcast if it does not receive a response from any WINS servers, or if a WINS server indicates that it cannot resolve the name by sending a Requested Name Does Not Exist message.
5. If there is no reply to the broadcast, the client searches the Lmhosts file for the name that is trying to resolve. The client only checks the Lmhosts file if it is configured to do so.

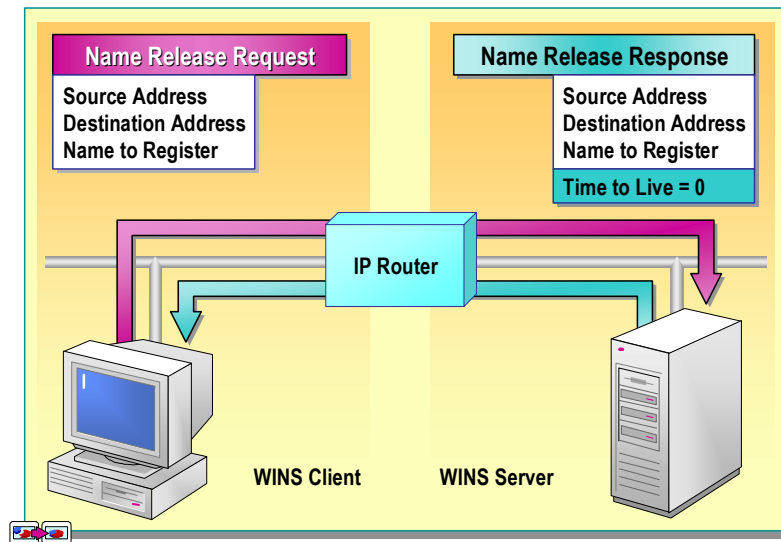
Name Release

Topic Objective

To illustrate how a WINS client releases a NetBIOS name from a WINS server.

Lead-in

When a WINS client no longer requires a name, the client sends a message to the WINS server to release the name.



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Delivery Tip

The slide for this topic includes animation. Click or press the SPACEBAR to advance the animation.

When a WINS client no longer requires a name, the client sends a message instructing the WINS server to release the name.

Name Release Request

When you shut down a WINS client properly by using the operating system shutdown sequence or by stopping a registered network service, the client sends a name release request directly to the WINS server for each registered name. The request includes the IP address and the NetBIOS name of the client so that the server can remove the mappings for the client from the WINS database.

Note When a WINS client is not shut down properly, it does not release its name registration and the WINS database contains outdated information. When another WINS client receives an outdated IP address for the WINS client that is still registered, the requesting client may make an attempt to connect to that outdated address and will eventually time out.

Name Release Response

When the WINS server receives the name release request, it checks its database for the specified name. If the WINS server finds an entry for the specified name, the WINS server sends a positive name release response, and then the server designates the specified name as released in its database. The name release response contains the released NetBIOS name and a TTL value of zero.

If the WINS server does not find an entry for the specified name or if the name maps to a different IP address from that of the computer requesting the release, the WINS server sends a negative name release response to the WINS client.

◆ Configuring WINS Servers and Clients

Topic Objective

To highlight the topics that are relevant to configuring WINS servers and clients.

Lead-in

When you install WINS on a server, you must configure that server with a static IP address. You must also configure WINS clients so that they recognize the static IP address on the server.

- Requirements for WINS Servers and Clients
- Installing WINS
- Configuring Computers As WINS Clients

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WINS has certain installation requirements for both servers and clients. If you are installing WINS on a server, you must configure that server with a static IP address so that WINS clients can contact it. In addition, you will need to configure the WINS clients so that they recognize the IP address of the server.

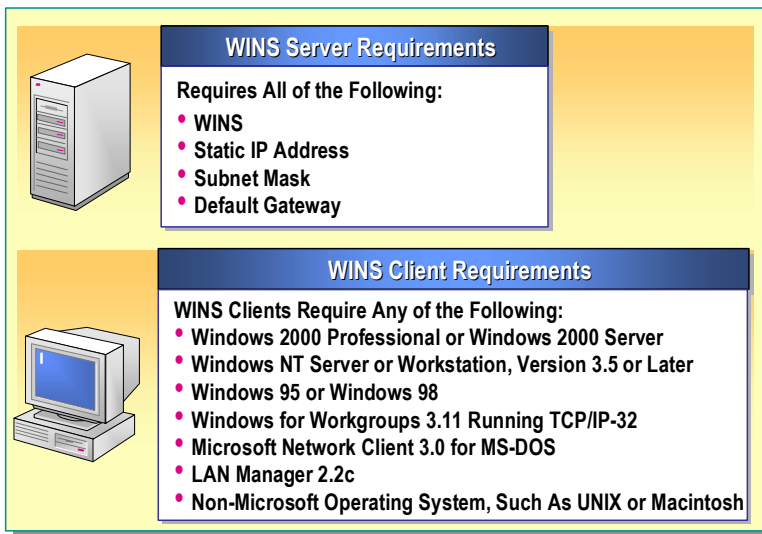
Requirements for WINS Servers and Clients

Topic Objective

To describe the requirements for WINS servers and clients.

Lead-in

Before you implement WINS, you must ensure that the servers and client computers meet certain requirements.



WINS Server Requirements	
	Requires All of the Following:
	• WINS
	• Static IP Address
	• Subnet Mask
	• Default Gateway

WINS Client Requirements	
	WINS Clients Require Any of the Following:
	• Windows 2000 Professional or Windows 2000 Server
	• Windows NT Server or Workstation, Version 3.5 or Later
	• Windows 95 or Windows 98
	• Windows for Workgroups 3.11 Running TCP/IP-32
	• Microsoft Network Client 3.0 for MS-DOS
	• LAN Manager 2.2c
	• Non-Microsoft Operating System, Such As UNIX or Macintosh

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Before you implement WINS, you must ensure that the servers and client computers meet certain requirements.

WINS Server Requirements

To configure a computer running Windows 2000 Server as a WINS server, you must:

- Install WINS.
- Configure a static IP address, subnet mask, and default gateway.

WINS Client Requirements

WINS clients must be configured with the static IP address of a WINS server, and must be computers running any of the following supported operating systems:

- Windows 2000 Professional or Windows 2000 Server
- Windows NT Server or Windows NT Workstation, version 3.5 or later
- Microsoft Windows 95 or Windows 98
- Microsoft Windows for Workgroups version 3.11 running Microsoft TCP/IP-32
- Microsoft MS-DOS® with the Microsoft Network Client version 3.0 for MS-DOS that is configured with the real-mode TCP/IP driver
- Microsoft LAN Manager version 2.2c (LAN Manager 2.2c for OS/2 is not supported)
- Some non-Microsoft operating systems, such as versions of UNIX or Macintosh

Delivery Tip

Mention that a WINS server does not need to be a domain controller. In large networks, member servers often are configured to serve only as WINS servers.

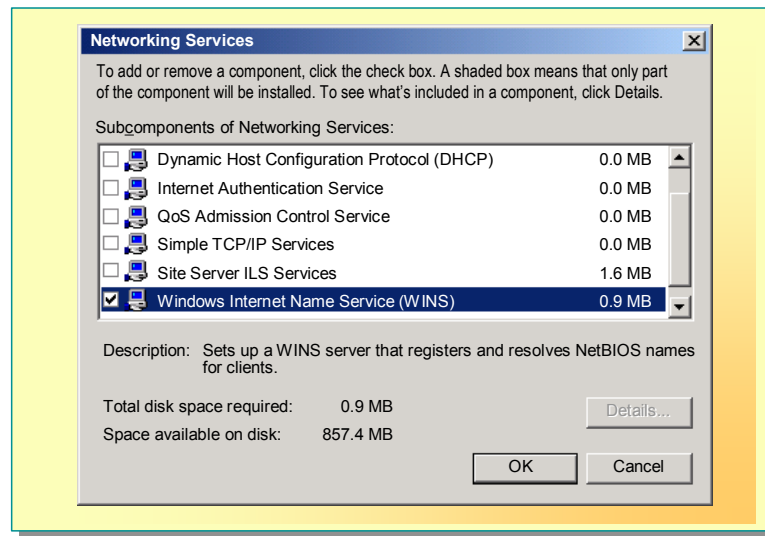
Installing WINS

Topic Objective

To illustrate the user interface for installing WINS.

Lead-in

To implement WINS, install WINS on a computer running Windows 2000 Server.



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To create a WINS server, install WINS on a computer running Windows 2000 Server.

To install WINS:

Delivery Tip

Demonstrate the procedure for installing WINS.

1. In Control Panel, double-click **Add/Remove Programs**.
2. Click **Add/Remove Windows Components**.
3. In the Windows Components wizard, on the **Windows Components** page, under **Components**, click **Networking Services**, and then click **Details**.
4. In the **Networking Services** dialog box, under **Subcomponents of Networking Services**, select the **Windows Internet Name Service (WINS)** check box, click **OK**, and then click **Next**.

Important You must configure the advanced TCP/IP settings on a WINS server so that it is a WINS client of itself. This ensures that the WINS server registers itself in its own database.

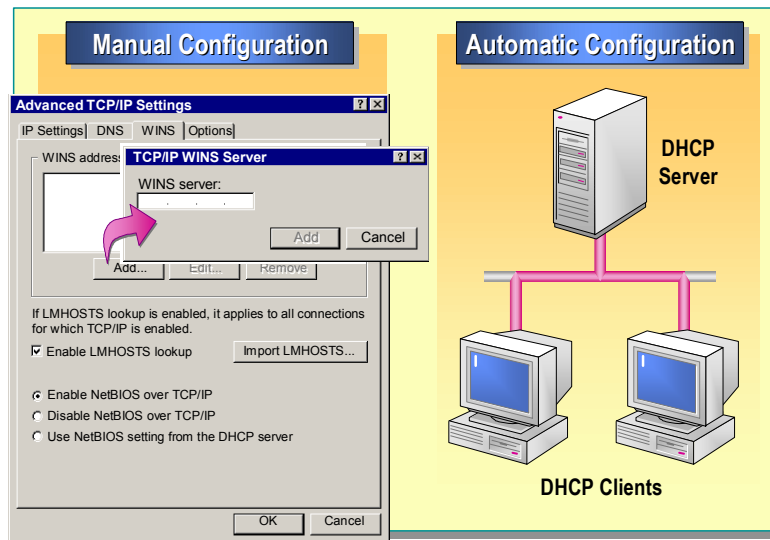
Configuring Computers As WINS Clients

Topic Objective

To illustrate the methods for configuring computers as WINS clients.

Lead-in

You configure WINS clients in one of two ways: manually by configuring TCP/IP properties, or automatically by configuring DHCP options.



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After you install WINS to create a WINS server, you can configure WINS clients in one of two ways: manually by configuring the TCP/IP properties on each client, or automatically by configuring DHCP scope options.

Manually Configuring WINS Clients

To configure a WINS client manually:

1. In the **Internet Protocol (TCP/IP) Properties** dialog box, click **Advanced**.
2. In the **Advanced TCP/IP Settings** dialog box, on the **WINS** tab, click **Add**.
3. Type the IP address of the WINS server, and then click **Add**.
4. Repeat steps 2 and 3 to add additional WINS servers.

Delivery Tip

Demonstrate how to configure a WINS client manually.

Note Typically, you do not need to configure a WINS client for more than two WINS servers. If you require a high level of fault tolerance because of unreliable connections to WINS servers, you can specify up to 12 WINS servers on a WINS client. The first and second WINS servers are the primary and secondary servers, and any remaining servers are backup WINS servers.

Delivery Tip

Demonstrate how to configure a DHCP server for WINS support.

Automatically Configuring WINS Clients

If a computer is a DHCP client, you can configure DHCP scope options to provide WINS configuration information to DHCP clients automatically. To configure a DHCP server for WINS support, use the following DHCP scope options when configuring a DHCP scope:

- **044 WINS/NBNS Servers.** Configure the address of primary and secondary servers.
- **046 WINS/NBT Node Type.** Configure to 0x8 (H-node).

Note For more information about node types, see RFC 1001 and RFC 1002 under **Additional Reading** on the Web page on the Student Materials compact disc.

When the DHCP client leases an address or renews a lease and you configured the WINS/NBNS Servers and WINS/NBT Node Type scope options, the client receives the settings that you configured. When the client applies these settings, it becomes a WINS client.

Important If you manually configure WINS client computers with IP addresses of a primary and secondary WINS server, those values take precedence over the same parameters that a DHCP server provides.

◆ Configuring Support for Non-WINS Clients

Topic Objective

To introduce topics related to supporting non-WINS clients.

Lead-in

You can configure a DNS server to use a WINS server to resolve client queries, and you can provide support for non-WINS clients by configuring static mappings and a WINS proxy.

- Overview of WINS and DNS Interoperability
- Integrating DNS and WINS
- Enabling WINS Lookup on DNS Zones
- Configuring DNS to Forward Queries to WINS Servers
- Configuring Static Mappings
- Configuring a WINS Proxy

*****ILLEGAL FOR NON-TRAINER USE*****

Microsoft Windows 2000 uses DNS as its primary method of name resolution, whereas computers running previous versions of Windows use WINS. When most of the client computers on your network are configured to use DNS as the primary method for name resolution, you must configure DNS to use a WINS server to resolve client queries.

A DNS server can forward queries that it is unable to resolve to a WINS server, which enables DNS clients to use DNS for name resolution and still have access to records in a WINS database.

In a WINS environment, you can also provide support for clients that do not use WINS by using static mappings and configuring a WINS proxy. By understanding how to configure a static mapping and a WINS proxy, you can ensure efficient communication between the WINS clients and non-WINS clients on your network.

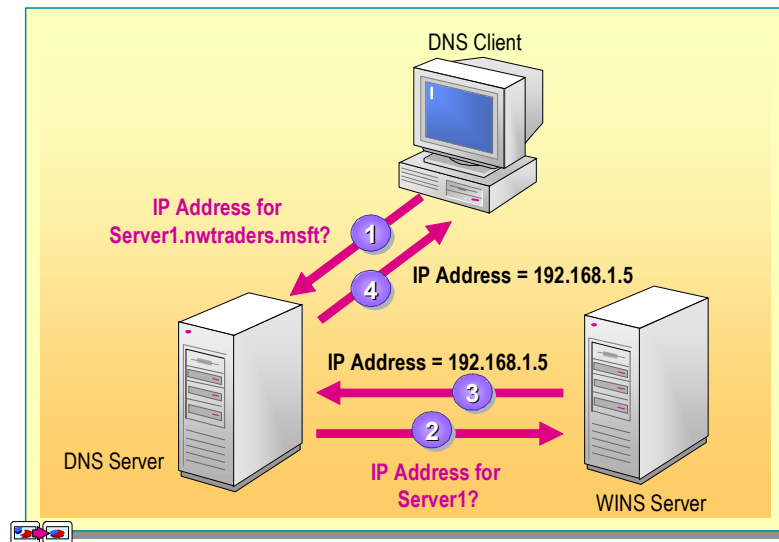
Overview of WINS and DNS Interoperability

Topic Objective

To list the benefits of WINS and DNS interoperability.

Lead-in

DNS and WINS interoperate to provide name resolution in a Windows 2000 network.



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Delivery Tip

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WINS is required in a mixed environment where computers running Windows 2000 interoperate with computers running Windows NT, Windows 98, and Windows for Workgroups. In such a mixed environment, a computer running Windows 2000 might need to resolve the name of a computer running a previous version of Windows and registered with WINS.

Integrating WINS with DNS name resolution enables client computers to use DNS exclusively for name resolution. Clients gain access to data in a WINS database through the DNS server. However, if the DNS server cannot locate the mapping information for the requested name, it may need to query a WINS server for the information. The client communicates only with the DNS server, even if the DNS server forwards the client request to a WINS server.

In Windows 2000, you can configure interoperability between WINS and DNS to enable non-WINS clients to resolve NetBIOS names by querying a DNS server. For example, if a Windows 2000-based client needs to access a shared folder on a server running Windows NT, the client computer can query the DNS server. The DNS server then queries a WINS server, and the name is resolved and returned to the client. This is more efficient than configuring all client computers as WINS clients.

Integrating DNS and WINS

Topic Objective

To list the steps that occur when a client requests a computer name that is registered in WINS.

Lead-in

When you configure a DNS server to forward queries to a WINS server, DNS clients can query the DNS server to request computer names that are registered in WINS.

When a Client Requests a Computer Name That Is Registered in WINS:

- 1 The DNS client queries its preferred DNS server
- 2 The preferred DNS server contacts the DNS server that is authoritative for the zone
- 3 The server that is authoritative for the zone forwards the request to a WINS server
- 4 The WINS server resolves the name and returns the IP address to the server that is authoritative for the zone
- 5 The server that is authoritative for the zone returns the IP address to the preferred DNS server
- 6 The preferred DNS server returns the IP address to the client

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Delivery Tip

Describe the process that occurs when a DNS client requests a computer name that is registered in WINS.

When you configure a DNS server to forward queries to a WINS server, DNS clients can query the DNS server to request computer names that are registered in WINS. For example, the following process takes place when a client requests the IP address for a computer named server1.nwtraders.msft:

1. The DNS client queries its preferred DNS server for the IP address of the computer named server1.nwtraders.msft.
2. The preferred DNS server contacts the DNS server that is authoritative for the zone nwtraders.msft.
3. The server that is authoritative for the zone forwards the request to a WINS server.
4. The WINS server resolves the name and returns the IP address to the DNS server that is authoritative for the zone.

Note If the WINS server is unable to resolve the name, it sends a message to the DNS server.

5. The DNS server that is authoritative for the zone returns the IP address to the preferred DNS server.
6. The preferred DNS server returns the IP address information to the client.

Only the DNS server that is authoritative for the zone needs to be configured for WINS lookup. The client and any intermediate DNS servers are unaware that the IP address maps to a name that is registered in WINS.

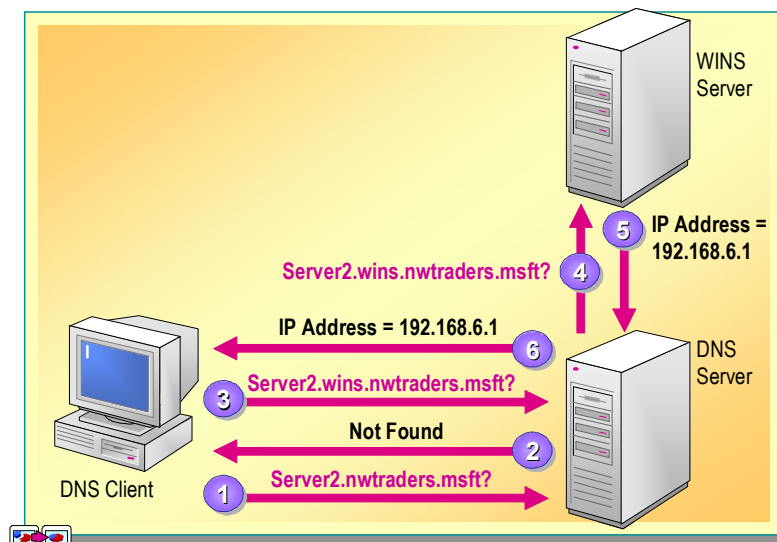
Enabling WINS Lookup on DNS Zones

Topic Objective

To list the configuration tasks that are required for enabling WINS lookup on DNS zones.

Lead-in

To allow a third-party DNS server to be authoritative for a DNS zone that is configured for WINS lookup, you must create a separate zone and configure the client computers.



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Delivery Tip

The slide for this topic includes animation. Click or press the SPACEBAR to advance the animation.

When you configure a DNS zone to use WINS lookup, Windows 2000 creates nonstandard DNS resource records. Make only DNS servers running Windows 2000 or Windows NT 4.0 authoritative for such a zone, because DNS servers running other versions of Windows cannot use these records or perform WINS lookups.

Note If you use a mixture of Windows-based and other DNS servers to host a zone, it is recommended that you enable the **Do not replicate this record** check box option for any primary zones in which you use the WINS lookup record. This prevents the WINS lookup record from being included in zone transfers to other DNS servers that do not support or recognize the WINS lookup record.

Enabling WINS Lookup with Third-Party DNS Servers

Although you can enable any zone for WINS lookup, creating a separate DNS zone for WINS lookup facilitates interoperability with third-party DNS servers. To use a separate zone for WINS lookups:

- Create a DNS zone without host records and enable it for WINS lookup. For example, assign the name wins.nwtraders.msft to the DNS zone.
- For each client computer, on the **DNS** tab of the **Advanced TCP/IP Properties** dialog box, add the name of the zone that you created to the **Append these DNS suffixes (in order)** box.

This configuration allows for WINS lookup and allows third-party DNS servers to be authoritative for the domain nwtraders.msft.

Delivery Tip

Explain how to create a separate DNS zone for WINS lookups.

WINS Lookup Process

Delivery Tip

Describe the WINS lookup process that occurs when you create a separate DNS zone for WINS lookups.

When a client computer in the domain nwtraders.msft queries for a server called server2, the following process occurs:

1. The DNS client queries the DNS server for the IP address of server2.nwtraders.msft.
2. The DNS server that is authoritative for the zone returns a negative response to the client.
3. The client immediately issues another name query to the DNS server for the IP address of server2.wins.nwtraders.msft.
4. The DNS server that is authoritative for the zone wins.nwtraders.msft performs a WINS lookup by querying the WINS server.
5. The WINS server returns the correct IP address to the DNS server.
6. The DNS server returns the correct IP address to the client.

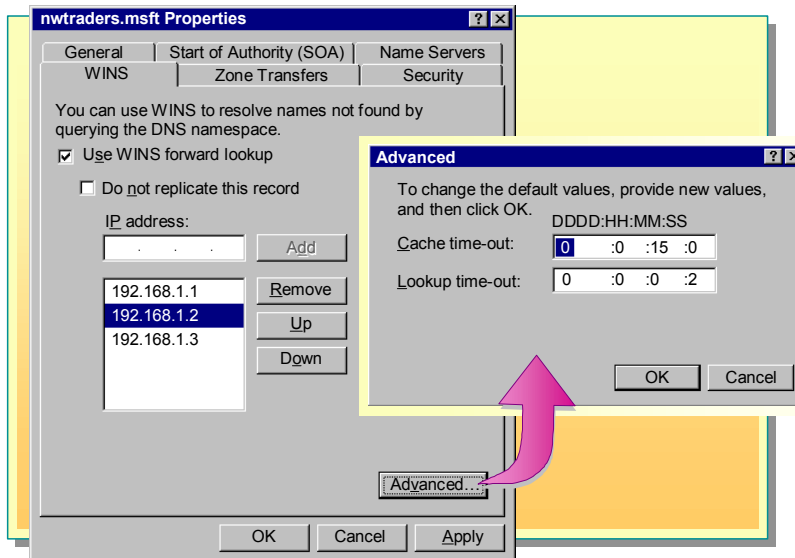
Configuring DNS to Forward Queries to WINS Servers

Topic Objective

To illustrate the user interface for configuring DNS to forward queries to WINS servers.

Lead-in

You must configure a DNS zone to forward queries to WINS servers.



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Delivery Tip

Demonstrate the procedure for configuring DNS to forward queries to WINS servers.

You can configure DNS to forward queries to WINS servers. To configure a DNS zone to use WINS lookup:

1. Open DNS from the **Administrative Tools** menu.
2. In DNS, expand the server that is authoritative for the zone, expand **Forward Lookup Zones**, and then click the name of the zone that you are configuring.
3. Right-click the zone that you are configuring, and then click **Properties**.
4. In the **Properties** dialog box for the zone, on the **WINS** tab, select the **Use WINS forward lookup** check box.
5. If there are third-party DNS servers that are authoritative for the zone, select the **Do not replicate this record** check box.
6. In the **IP address** box, type the IP address of the WINS server that will provide lookups, and then click **Add**.

Note For fault tolerance, repeat this step if you add any additional WINS servers. To set the preferred order of use, click the IP address that you want to move up or down in the list of IP addresses, and then click the **Up** or **Down** button.

7. Click **Advanced** if you want to change the following values:
 - **Cache time-out.** The length of time for which the DNS server caches WINS lookup results. Increasing this time reduces the number of WINS lookups but may result in outdated responses.
 - **Lookup time-out.** The length of time for which the DNS server waits for a response from a WINS server. Increase this value if the WINS server is taking longer than two seconds to respond.
8. Click **OK**.

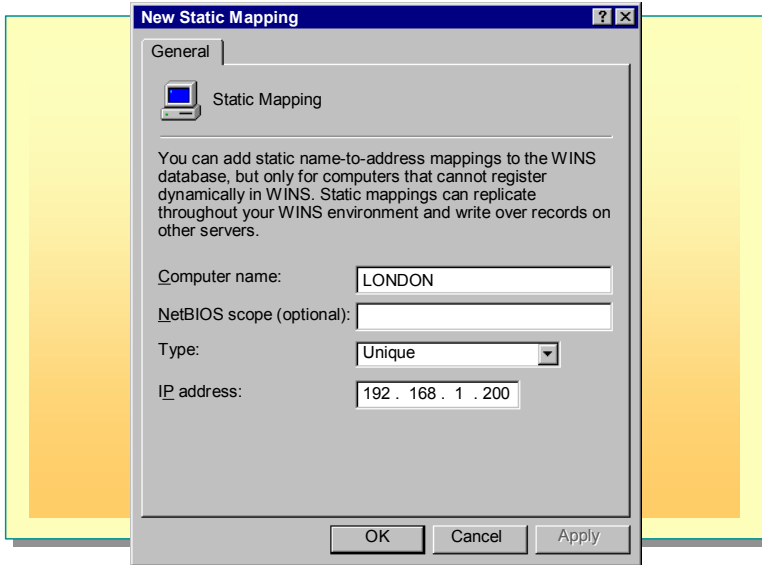
Configuring Static Mappings

Topic Objective

To illustrate the user interface for configuring a static mapping.

Lead-in

To ensure that WINS clients can resolve the NetBIOS names of the non-WINS clients on a network, you need to configure a static mapping for each non-WINS client.



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Key Point

Configure static mappings on a WINS server to add name resolution information for computers that are not WINS clients to the WINS server database.

A *static mapping* is a manual entry in the WINS database that maps a NetBIOS name to an IP address. You can configure static mappings on a WINS server to add name resolution information for NetBIOS-based computers that are not WINS clients to the WINS server database. When you configure static mappings, WINS clients can resolve the NetBIOS names of these computers by querying the WINS server.

To configure a static mapping for a computer that is not a WINS client:

Delivery Tip

Demonstrate the procedure for configuring static mappings.

1. Open WINS from the **Administrative Tools** menu.
2. In the console tree, expand the entry for the WINS server on which you want to create a static mapping.
3. Right-click **Active Registrations**, and then click **New Static Mapping**.
4. In the **New Static Mapping** dialog box, in the **Computer name** box, type the name of the non-WINS client.
5. In the **NetBIOS scope** box, you have the option to specify a scope.
6. Under **Type**, specify the type of entry that you are creating. For a computer, click **Unique**.
7. In the **IP Address** box, type the IP address of the non-WINS client, and then click **OK**.

Note Windows 2000 adds static mappings to the WINS database as soon as you click **OK**. If you provide incorrect information for a static mapping, you must delete the entry for the mapping from the list of active registrations for the specific WINS server and then create a new static mapping.

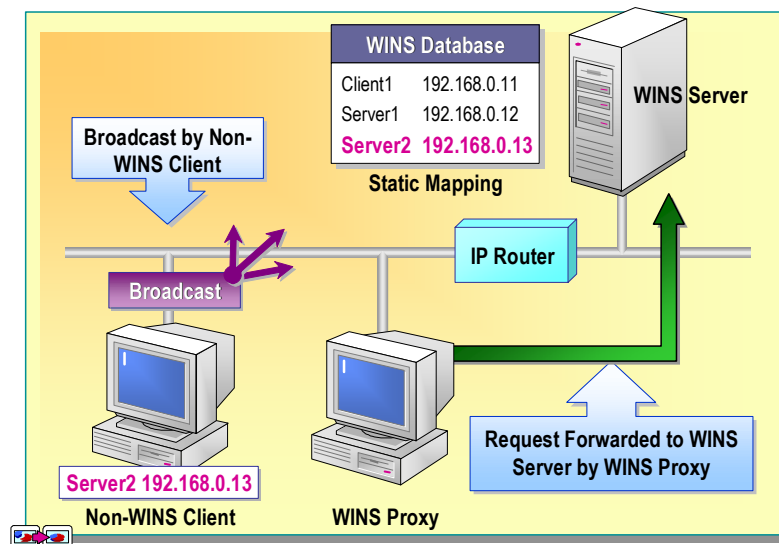
Configuring a WINS Proxy

Topic Objective

To show the function of a WINS proxy.

Lead-in

A WINS proxy extends the name resolution capabilities of a WINS server to non-WINS clients.



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Delivery Tip

The slide for this topic includes animation. Click or press the SPACEBAR to advance the animation.

A WINS proxy is a computer configured to forward broadcast name resolution requests to a WINS server for name resolution. A NetBIOS-based computer that is not a WINS client registers its name on the network by broadcasting its name registration, and resolves NetBIOS names to IP addresses by broadcasting name resolution requests. A WINS proxy extends the name resolution capabilities of a WINS server to non-WINS clients by listening for broadcasts that indicate name registrations and name resolution requests, and then forwarding them to a WINS server.

Note Configure at least one but not more than two WINS proxies on a subnet with non-WINS clients. Configuring more than two WINS proxies can result in excessive network traffic and WINS server workloads.

NetBIOS Name Registration

When a non-WINS client broadcasts a name registration request, the WINS proxy forwards the request to the WINS server. A WINS proxy agent does not participate in the name registration process, nor does it check for duplicate names in the WINS server database for the b-node client.

NetBIOS Name Resolution

When a WINS proxy detects a name resolution broadcast, it checks its NetBIOS name cache and attempts to resolve the name. If the name is not in its cache, the WINS proxy sends a name resolution request to a WINS server. The WINS server sends the IP address for the requested NetBIOS name to the WINS proxy. The WINS proxy then returns this information to the non-WINS client.

Delivery Tip

Demonstrate how to configure a computer as a WINS proxy.

To configure a computer as a WINS proxy, edit the registry and set the value for the **EnableProxy** entry to **1**, and then restart the computer. The **EnableProxy** entry is located in the registry under the following subkey:

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\NetBT\Parameters

◆ Enabling WINS Database Replication

Topic Objective

To introduce topics related to configuring WINS replication.

Lead-in

If there are multiple WINS servers on your network, you can configure them to replicate the records in their databases to other servers.

- Overview of WINS Replication
- Examining Replication Partners
- Configuring WINS Replication

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Although a single WINS server can support more than 5,000 clients under typical workloads, always install a second WINS server on a network to provide fault tolerance for NetBIOS name resolution. This way, if one of the WINS servers fails, the remaining server continues to provide NetBIOS name resolution on the network.

Each WINS server on a network maintains its own WINS database. As a result, if there are multiple WINS servers on your network, configure each of them to replicate the records in their databases to the other WINS servers.

Understanding the function and configuration of WINS replication helps to ensure the maintenance and distribution of a consistent set of WINS database information throughout a network.

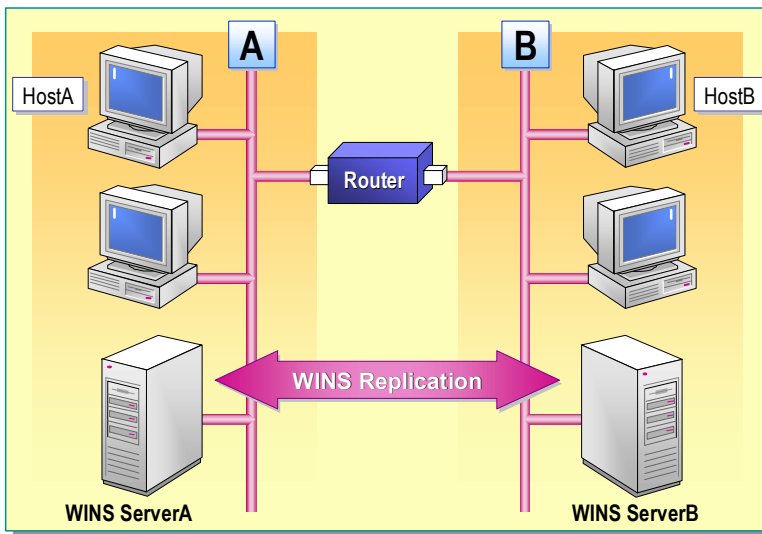
Overview of WINS Replication

Topic Objective

To show the basic function of WINS replication.

Lead-in

Database replication between WINS servers occurs whenever the database changes, including when a name is released.



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Replication of WINS databases ensures that a name that is registered with one WINS server is replicated to all other WINS servers on the network. As a result, a WINS client can resolve any NetBIOS name in the network, regardless of the WINS server on which the name was registered. For example:

- HostA on SubnetA registers with the WINS ServerA on SubnetA.
- HostB on SubnetB registers with the WINS ServerB on SubnetB.
- WINS replication occurs, and each WINS server updates its database with the new entry from the other server's database.

As a result of replication, both WINS servers have information about both hosts, and HostA and HostB can resolve each other's names by contacting their local WINS servers.

Note Rather than replicate the entire database, WINS servers only replicate changes to their database.

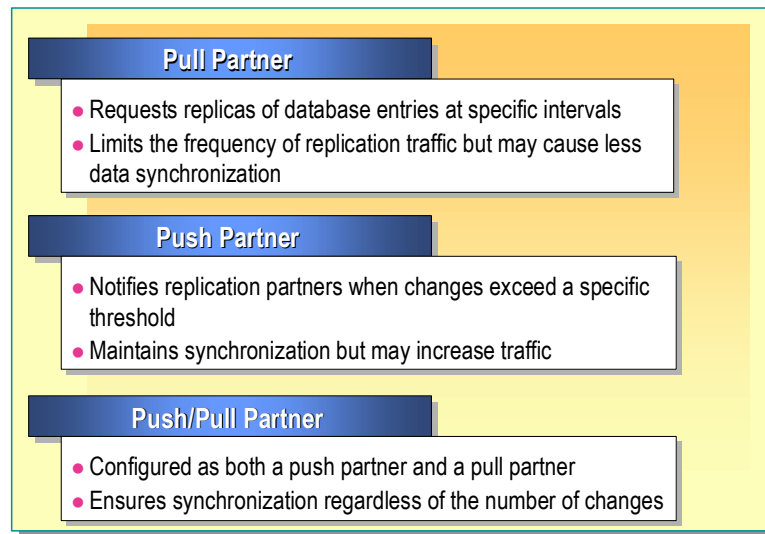
Examining Replication Partners

Topic Objective

To list the differences between the different types of replication partners.

Lead-in

Before replication can occur, you must configure at least one replication partner for each WINS server.



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Delivery Tip

Describe the types of replication partners that can be configured on a WINS server.

For replication to occur, you must configure each WINS server with at least one replication partner. When you configure a replication partner for a WINS server, you can specify the partner as a pull partner, a push partner, or a push/pull partner in the replication process.

Pull Partner

A *pull partner* requests replicas of new database entries from its replication partners at specific, configurable intervals. For example, you can configure a pull partner to request database changes every eight hours.

Configure a replication partner as a pull partner if slow communication links connect the servers. This configuration limits the frequency of replication traffic across the link, although a slower replication frequency causes the WINS databases to become increasingly less synchronized. When a WINS server has incomplete data, some name resolution attempts may fail. Configure pull replication across slow links to restrict replication to specific times.

Push Partner

A *push partner* notifies its replication partners when the number of changes to its WINS database surpasses a specific, configurable threshold. For example, you can configure a push partner to notify replication partners when 50 changes have occurred to the WINS database. When replication partners respond to the notification with a replication request, the push partner sends replicas of its new database entries.

Configure a replication partner as a push partner if fast communication links connect the servers. This ensures that the WINS databases maintain a high level of synchronization, although the replication traffic generally increases as a result.

Important By default, WINS replication between two WINS servers only occurs when both servers are configured for replication and when one of them is configured as a pull partner and the other is configured as a push partner.

Push/Pull Partner

A *push/pull partner* is configured as both a push partner and a pull partner. WINS replication partners are, by default, configured as push/pull partners.

Configure a replication partner as a push/pull partner if you want to specify both a replication threshold and a replication interval for the partner. This ensures that the WINS databases remain synchronized regardless of the number of changes that occur. In effect, replication occurs when either the threshold of changes has been reached, or when a maximum period between replication notifications has been exceeded. When configuring a WINS server as a push/pull partner of another WINS server, you typically configure each of the WINS servers as a push/pull partner of the other server.

Tip Configure the primary and secondary WINS servers of any client as push/pull partners of each other to ensure that the databases on these servers are close to identical at any given time.

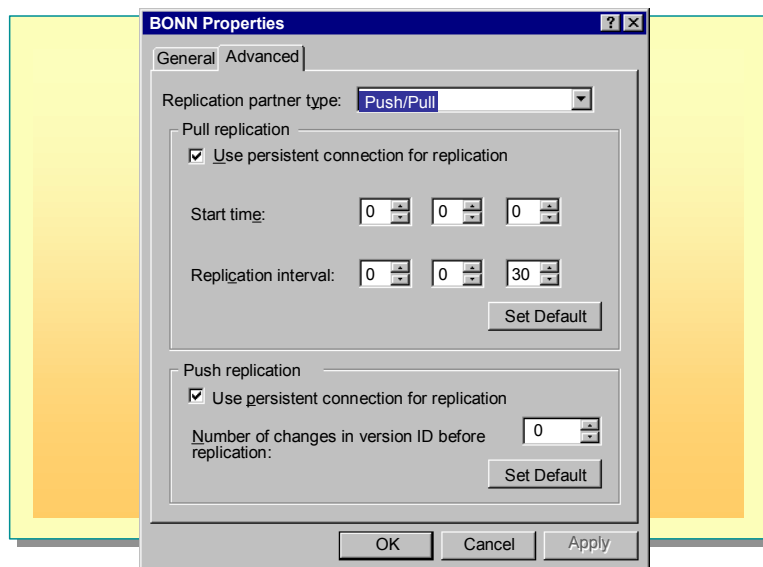
Configuring WINS Replication

Topic Objective

To illustrate the user interface for configuring WINS replication.

Lead-in

Database replication requires that you configure at least one push partner and one pull partner.



*****ILLEGAL FOR NON-TRAINER USE*****

To enable replication, you must add replication partners to a WINS server, and then configure the pull and push parameters on each partner as needed. You can also configure WINS servers for automatic discovery of replication partners.

Adding a Replication Partner

To add a replication partner for a WINS server:

1. Open WINS from the **Administrative Tools** menu.
2. In the console tree, expand the entry for the WINS server for which you want to add a replication partner.
3. Right-click **Replication Partners**, and then click **New Replication Partner**.
4. In the **New Replication Partner** dialog box, in the **WINS server** box, type the computer name or IP address of the WINS server that you want to configure as a replication partner, and then click **OK**.

Configuring Push and Pull Parameters

To customize WINS replication on your network, specify push parameters and pull parameters for each configured replication partner. You configure pull and push parameters on the **Advanced** tab in the **Properties** dialog box for a WINS replication partner.

Delivery Tip

Demonstrate how to add a replication partner.

Delivery Tip

Demonstrate how to configure push and pull parameters.

The following table explains the options for WINS replication.

Option	Explanation
Replication partner type	The WINS server that you are configuring contacts a pull partner for updates at specified intervals, sends an update to a push partner after a number of updates has occurred, and performs both types of replication with a push/pull partner.
Use persistent connection for replication	Maintains connections between WINS servers. Persistent connections increase the speed at which each replication occurs because no new connection needs to be established. Disable persistent connections for replication across slow wide area network (WAN) links.
Start time and replication interval	Set the times at which replication occurs. For example, if you set the start time to midnight and the replication interval to 12 hours, the WINS server contacts this pull partner at midnight and noon every day. Set the pull replication values to minimize the impact of replication on other network traffic and to avoid having a WINS server replicate with multiple WINS server at the same time.
Number of changes in version ID before replication	A low number of updates that are required for replication ensures frequent replication but leads to more network traffic. Setting this value to 0 disables any push replication but leaves the replication partner configured to exchange data with its corresponding pull partner.

Note Use the **Replication Partners Properties** dialog box to configure a replication partner that you have already added, and to configure the default replication settings for replication partners that you will add in the future.

Automatic Replication Partner Discovery

If your network supports multicasting, you can configure your WINS servers to find other WINS servers on the network automatically. When enabled, WINS servers use the multicast address 224.0.1.24 to discover other WINS servers. If routers do not support multicasting, WINS servers only find other WINS servers on the same subnet. WINS servers that locate each other by using multicasting act as push/pull partners with replication set to occur every two hours.

Delivery Tip

Demonstrate how to enable automatic replication partner discovery.

To enable automatic replication partner discovery, in the **Replication Partners Properties** dialog box, on the **Advanced** tab, click **Enable automatic partner configuration**, and then configure the length of time between discovery multicasts. To open the dialog box, in WINS, expand the WINS server, right-click **Replication Partners**, and then click **Properties**.

Delivery Tip

Demonstrate how to initiate replication with a partner.

Initiating Replication

To initiate replication with a partner, in WINS, expand your WINS server, expand **Replication Partners**, right-click the replication partner, and then click **Start Pull Replication** or **Start Push Replication**. You can choose whether you want to push database changes only to this replication partner, or whether you want to propagate the changes by initiating a push replication from your pull partner to all of its configured push partners. Forcing propagation ensures that updates are quickly replicated throughout the network, but this can result in excessive network traffic.

To enable replication even when only one computer is configured as a replication partner, in the **Replication Partners Properties** dialog box, on the **General** tab, clear the **Replicate only with partners** check box.

◆ Maintaining the WINS Server Database

Topic Objective

To list the topics that are related to maintaining the WINS server database.

Lead-in

It is important to maintain the WINS server database to ensure that the data is valid.

- Reconciling WINS Database Records
- Compacting the WINS Database
- Removing Records from the WINS Database
- Verifying WINS Database Consistency
- Configuring Advanced WINS Server Options
- Backing Up and Restoring the WINS Database

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The WINS database stores and replicates the NetBIOS name-to-IP address mappings for your network. The WINS database changes over time as clients log on and log off the network. Therefore, it is important to maintain the WINS server database to ensure that the data is valid.

To maintain the WINS server database, it is important to know how to reconcile WINS database records to ensure database integrity among WINS servers in a large network. You must also be able to compact the WINS database to recover unused space, remove records to delete obsolete information, and back up and restore the WINS database to prevent loss of data or recover lost data.

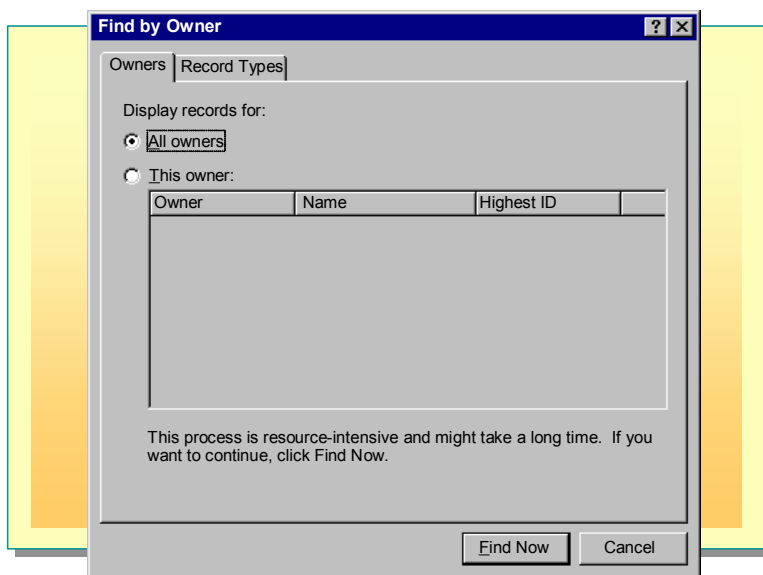
Reconciling WINS Database Records

Topic Objective

To show students how to view the WINS database and search for specific entries.

Lead-in

You can view the contents of the WINS database and search for specific entries through WINS Manager.



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WINS in Microsoft Management Console (MMC) enables you to view the contents of the WINS database and search for specific entries.

Opening the WINS Database

To open the WINS database:

1. In WINS, expand the name of the server, and then click **Active Registrations**.
2. Right-click **Active Registrations**, and then click **Find by Owner**.
3. In the **Find by Owner** dialog box, on the **Owners** tab, click **All owners**, and then click **Find Now**.

Delivery Tips

Demonstrate the steps for viewing the database.

Describe the different columns in which WINS record information is organized.

Note To view only those entries that originate from a specific WINS server, click **This owner**, and then select the WINS Server. To view only certain record types, on the **Record Types** tab, select the check boxes for the types of records that you want to view, and clear the check boxes for all other record types.

Updating the List of Owners

If the **Find by Owner** dialog box does not display all owners of database records, you can update the list. To update the list of owners, in the console tree, right-click the server, and then click **Refresh**.

WINS Record Information

WINS displays all records in the database and organizes WINS record information into the following columns:

- *Record Name*. The registered NetBIOS name, which can be a unique name or can represent a group, internet group, or multihomed computer.
- *Type*. The service that registered the entry, including the hexadecimal type identifier.

Note For a list of identifiers, see “NetBIOS Names Reference” in Windows 2000 Server Help.

- *IP Address*. The IP address that corresponds to the registered name.
- *State*. The state of the database entry, which can be active, released, or tombstoned. A tombstoned entry is no longer active and will be removed from the database.
- *Static*. Indicates whether the mapping is static.
- *Owner*. The WINS server from which the entry originates. Because of replication, this is not necessarily the same server on which you view the database.
- *Version*. A unique hexadecimal number assigned by the WINS server during name registration. It is used by the server’s pull partner during replication to find new records.
- *Expiration*. Shows when the entry will expire. When a replica is stored in the database, its expiration data is set to the current time on the receiving WINS server, plus the renewal interval that is set on the client.

Deleting WINS Records

Occasionally you may have to delete incorrect records from the WINS database. There are two methods that you can use to delete a WINS record.

Delivery Tip

Demonstrate the procedure for deleting WINS records, and describe the effect that each option has on the WINS database.

To delete a WINS record:

1. Open WINS, and verify that the details pane displays the contents of the WINS database.
2. Right-click the record that you want to delete, and then click **Delete**.
3. In the **Delete Record** dialog box, click one of the following options:
 - **Delete the record only from this server.** Removes the record from the database of the WINS server that you are configuring. Select this option when the database of the WINS server that you are configuring contains incorrect information, but other WINS servers contain the correct information.
 - **Replicate deletion of the record to other servers (tombstone).** Removes the record from the database of the WINS server that you are configuring, and deletes the record on other WINS servers. Select this option when the databases of all of the WINS servers contain incorrect information. This type of deletion is called *tombstoning*.

When you mark a record as tombstoned, it remains in the database, but it is no longer active. The WINS server no longer responds to queries for the name, and the status of the record is replicated to other WINS servers. To prevent deleted records from reappearing in WINS after subsequent replication with other servers, you must delete the record on the WINS server that is listed as the record's owner.
4. Click **OK**.

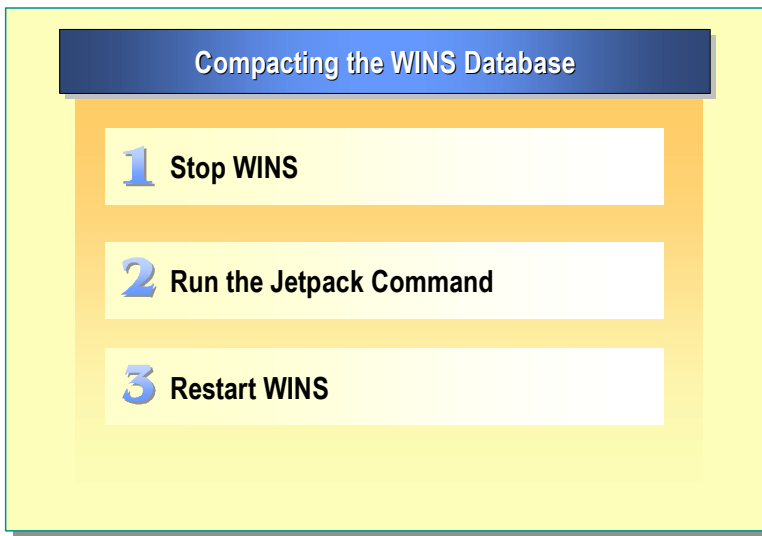
Compacting the WINS Database

Topic Objective

To explain the procedures for compacting the WINS database.

Lead-in

Windows NT Server 4.0 is designed to automatically compact the DHCP database; generally you do not need to run this procedure.



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By default, Windows 2000 compacts the WINS database automatically. You can compact the database manually by using the **jetpack** command that Windows 2000 Server includes.

To compact the WINS database:

1. Stop WINS.
2. From the *systemroot\system32\wins* directory, run the Jetpack.exe command-line utility by using the following command syntax:

jetpack wins.mdb *temporary_name.mdb* (where *temporary_name* is any file name that you assign)

This compacts the contents of **wins.mdb** in *temporary_name.mdb*, copies the temporary file to **wins.mdb**, and deletes the temporary name.

3. Restart WINS.

Delivery Tips

Demonstrate the procedure for compacting the WINS database.

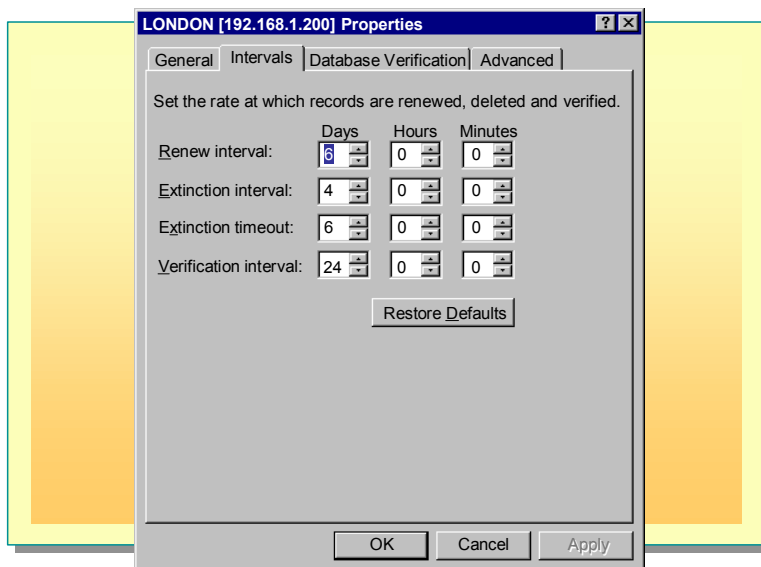
Removing Records from the WINS Database

Topic Objective

To illustrate the user interface for configuring the WINS database to automatically remove obsolete entries.

Lead-in

You can manually remove obsolete database entries, or you can configure WINS to remove them automatically.



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When WINS database records are marked as released, the records remain in the database to inform replication partners of the record's status. Therefore, you must periodically clear each WINS database of released entries, in addition to entries that were registered at another WINS server but were never removed.

Delivery Tip

Demonstrate the procedure for manually clearing entries in the WINS database.

Clearing WINS Database Entries

To manually clear entries in the WINS database, open WINS, right-click the server name, and then click **Initiate Scavenging**. You can also configure WINS to automatically remove entries in the database at configured intervals.

Configuring Intervals

To configure the interval that is used for WINS operations:

1. Open WINS, right-click the server name, and then click **Properties**.
2. In the **Properties** dialog box, on the **Intervals** tab, specify the intervals for each of the following options:
 - **Renewal interval.** The frequency at which a WINS client renews its name registration with the WINS server. The default value is six days.
 - **Extinction interval.** The interval between the time when an entry is marked as *released* (no longer registered) and the time when it is marked as *extinct*. The default value is four days.
 - **Extinction timeout.** The interval between the time when an entry is marked *extinct* and the time when the entry is scavenged (removed) from the WINS database. The default is the same as the renewal interval, and cannot be less than 24 hours.
 - **Verification interval.** The time after which the WINS server will verify that those names that it does not own—those replicated from other WINS servers—are still active. The minimum value is 24 days.

Delivery Tip

Demonstrate the procedure for configuring intervals.

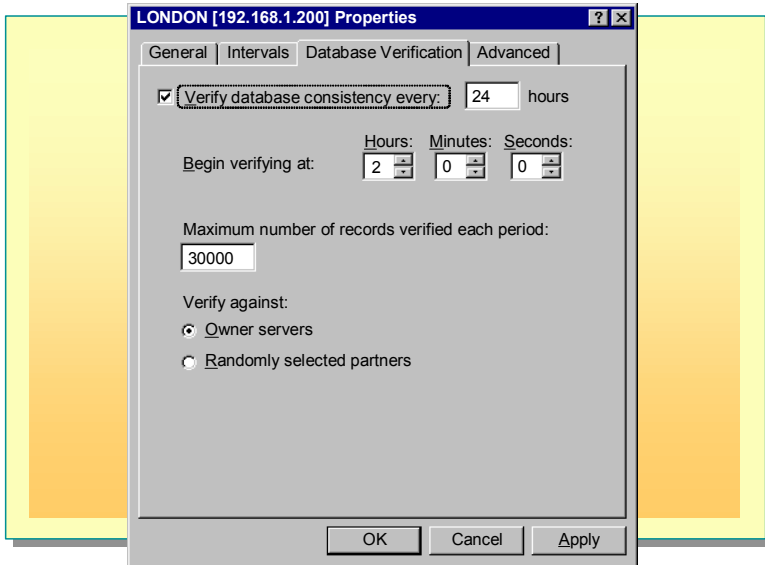
Verifying WINS Database Consistency

Topic Objective

To illustrate the user interface for verifying WINS database consistency.

Lead-in

Verify WINS database consistency to determine whether incorrect entries exist.



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Verifying WINS database consistency enables you to determine whether the WINS database contains incorrect entries. When a WINS server verifies its database, it compares all of its entries with entries on other WINS servers that belong to the same replication topology. It compares all records that it pulls from remote databases with records in the local database, as follows:

- If the record in the local database is identical to the record pulled from the owner database, its time stamp is updated to that of the owner database.
- If the record that is pulled from the owner database has a higher version identifier (ID) than the record in the local database, the pulled record is added to the local database, and the original local record is marked for deletion.

Delivery Tip

Describe the procedure for verifying WINS database consistency.

Initiating WINS Database Consistency Verification

To verify WINS database consistency, open WINS, and then click the server name. Click **Action**, and then click **Verify Database Consistency**.

Note Consistency verification of a large database is resource intensive and can increase network traffic. Schedule the verification process for off-hours and restrict how many records are checked at any given time.

Delivery Tip

Describe the options that are available for configuring WINS database consistency verification.

Configuring WINS Database Consistency Verification

To configure the details of the database verification:

1. In WINS, right-click the server name, and then click **Properties**.
2. In the **Properties** dialog box, on the **Database Verification** tab, specify the intervals for each of the following options:
 - **Verify database consistency.** Select to enable consistency checking and specify how often the checking occurs.
 - **Begin verifying at.** Specify the time of day at which verification begins.
 - **Maximum number of records verified each period.** Use this number to keep each consistency check small. Increasing this number can be taxing on the server's resources, such as memory and processor load.
 - **Verify against.** Indicate whether records are verified against their owner. Selecting to check against a randomly selected WINS server distributes the load on remote WINS servers more evenly.

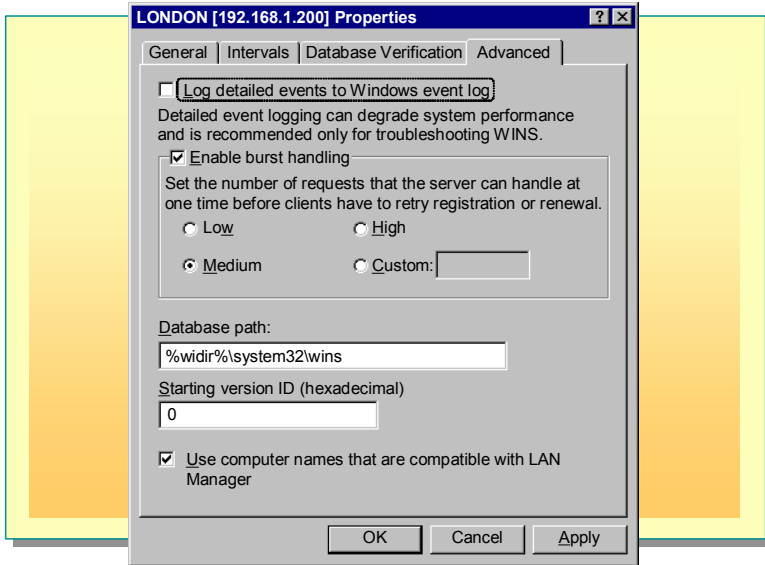
Configuring Advanced WINS Server Options

Topic Objective

To illustrate the user interface for configuring advanced WINS server options.

Lead-in

You can specify how a WINS server operates by configuring advanced options.



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Delivery Tip

Describe the options that you can configure on the **Advanced** tab of the **Properties** dialog box for a WINS server.

The **Advanced** tab of the **Properties** dialog box for a WINS server contains the following options through which you can specify how the WINS server operates.

Log Detailed Events to Windows Event Log

This option logs detailed events about WINS server operations to the Windows system log. Consider the impact on WINS server operation and increase the size of the system log before you enable this option.

Enable Burst Handling

WINS servers can support handling of high-volume (burst) server loads. The **Enable burst handling** option configures a WINS server to respond to client requests even when there is a temporary increase in the number of client requests. When burst handling is enabled, and WINS cannot update its database quickly enough to keep up with client requests, the WINS server issues short leases to clients and does not record these leases in the database. If the WINS server is less busy when the clients renew these leases, the server issues a new lease and updates its database.

Enabling burst handling eliminates errors on WINS clients that occur when a WINS server is too busy to reply. The default burst handling setting is **Medium**. On slow WINS servers, you can decrease the setting to **Low**. On a fast server, increase the setting to **High**.

Database Path

This option specifies the location of the WINS database and log files. The default location is *systemroot\system32\wins*. When changing this path, ensure that the database files are in the new location and initiate replication with all partners to rebuild the contents of the database. Changing this value requires restarting WINS.

Starting Version ID

This option specifies the highest version ID number for the database. This number is used to determine which version of a record is most recent during replication between servers that store the same record. Usually, you do not need to change this value unless you want to force the update and replication of records between servers.

Note For more information about how to use the starting version ID, see the topic “Increase the Starting Version Count” in Windows 2000 Server Help.

Use Computer Names That Are Compatible With LAN Manager

This option restricts the NetBIOS names that clients can register to 15 characters. Leave this setting enabled if only computers running Microsoft-based operating systems will register names with the WINS server. Non-Microsoft operating systems may register names that are 16 characters long. If you have clients that register long names, disable this setting.

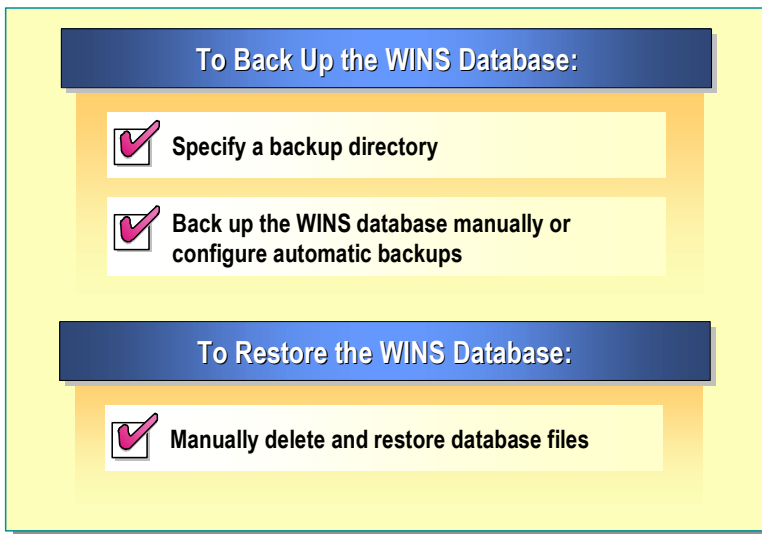
Backing Up and Restoring the WINS Database

Topic Objective

To explain how to back up and restore the WINS database files.

Lead-in

After you specify a backup directory, the WINS database is automatically backed up every 24 hours.



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It is important to back up the WINS database in the event of system failure or database corruption, because you can use the backup to restore the database. To back up the WINS database, you need to specify a directory for the backup and initiate a manual backup. You can also specify settings for automatic backups.

Specifying a Backup Directory

To specify a backup directory:

1. In WINS, right-click the name of the server that you are configuring, and then click **Properties**.
2. In the **Properties** dialog box, on the **General** tab, in the **Default backup path** box, type the name of the directory that the WINS server uses for database backups.

When WINS backs up the server database, it creates a Wins_bak\New folder under the backup folder that you specified. Actual backups of the WINS database (Wins.mdb) are stored in this folder. By default, the backup path is the root folder on your system partition. The backup folder must be on the local computer. After you specify a backup directory, WINS performs a complete backup to that directory every three hours.

Delivery Tip

Demonstrate the procedure for specifying a backup directory.

Delivery Tip

Demonstrate the procedure for backing up the WINS database manually, and for configuring automatic backups.

Backing Up a WINS Database

To back up the WINS database manually, open WINS, right-click the name of the server that you are configuring, and then click **Back Up Database**.

To configure automatic backups of the WINS database:

1. In WINS, right-click the name of the server that you are configuring, and then click **Properties**.
2. In the **Properties** dialog box, on the **General** tab, click **Back up database during server shutdown**.

Important WINS stores information about its configuration and replication partners in the registry. As part of your WINS disaster-recovery strategy, make sure that you always have a recent backup of your registry; for example, as part of a system state backup.

Restoring a WINS Database

In the event that the WINS database becomes corrupt and cannot be repaired, restore the WINS database from a recent backup.

To restore a WINS database from a recent backup:

1. Stop WINS.

Wait for WINS to completely stop before proceeding. A busy server might require several minutes before it can stop WINS and you can proceed with restoring the database.

2. Delete all files in the folder path on the WINS server computer where you are restoring the database. This path is determined by the current setting of **Database path**, which is located on the **Advanced** tab in the **Properties** dialog box for the server.
3. In WINS, right-click the name of the server that you are configuring, and then click **Restore Database**.

The **Restore Database** option is only available when viewing a computer on which WINS is stopped. In some cases, you might need to refresh the WINS console to activate the restore option. If necessary, right-click the server, and then click **Refresh** to refresh the server node so that WINS detects that WINS is stopped on the server.

4. In the **Browse for Folder** dialog box, click the folder that you used previously to back up the local WINS database, and then click **OK**.

When you restore the database, WINS requires that the backup path used for restoration match the path that was originally specified in *server* **Properties** as the **Backup path**.

Delivery Tips

Demonstrate the procedure for restoring the WINS database.

Lab A: Installing and Configuring WINS

Topic Objective

To introduce the lab.

Lead-in

In this lab, you will install and configure WINS.



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Explain the lab objectives.

Objectives

After completing this lab, you will be able to:

- Install WINS.
- Manually configure a client computer to use WINS.
- Add static entries to the WINS database.
- Configure replication between WINS servers.
- Remove records from the WINS database.

Prerequisite

Before working on this lab, you must be familiar with WINS concepts.

Key Points

The lab does not reflect the real-world environment. It is recommended that you always use complex passwords for any administrator accounts, and never create accounts without a password.

Outside of the classroom environment, it is strongly advised that you use the most recent software updates that are necessary. Because this is a classroom environment, we may use software that does not include the latest updates.

Lab Setup

To complete this lab, you need the following:

- A computer running Windows 2000 Advanced Server
- A partner with a similarly configured computer

Important The lab does not reflect the real-world environment. It is recommended that you always use complex passwords for any administrator accounts, and never create accounts without a password.

Important Outside of the classroom environment, it is strongly advised that you use the most recent software updates that are necessary. Because this is a classroom environment, we may use software that does not include the latest updates.

Scenario

Your organization has multiple subnets with client computers running Windows 98 and Windows 2000 Professional. Several applications that users are running use NetBIOS names for connections to servers. You must configure your network so that all computers can resolve NetBIOS names. You must also ensure that these computers can do this without using an Lmhosts file or contacting WINS servers that are in a remote location.

Estimated time to complete this lab: 45 minutes

Exercise 1

Installing WINS

Scenario

To allow client computers to resolve NetBIOS names, you need to configure a server as a WINS server.

Goal

In this exercise, you will install the WINS Server service and configure your computer to use WINS for NetBIOS name resolution.

Tasks	Detailed Steps
1. Add WINS.	- Log on as administrator@domain.nwtraders.msft (where <i>domain</i> is the name of your domain) with a password of password. - In Control Panel, double-click Add/Remove Programs. - In Add/Remove Programs, click Add/Remove Windows Components.
 Note: In the next detailed step, click the text Networking Services rather than the check box to avoid selecting all options under Networking Services .	
1. (continued)	- In the Windows Components wizard, on the Windows Components page, click Networking Services, and then click Details. - In the Networking Services dialog box, select the Windows Internet Name Service (WINS) check box, and then click OK. - Click Next. - In the Files Needed dialog box, type \\London\Setup\Winsrc and then click OK. - When the configuration process is complete, click Finish, and then close all open windows.

(continued)

Tasks	Detailed Steps
2. Configure the TCP/IP properties of your computer so that it is a WINS client of itself.	- Right-click My Network Places, and then click Properties. - In Network and Dial-up Connections, right-click Classroom, and then click Properties. - In the Classroom Properties dialog box, click Internet Protocol (TCP/IP), and then click Properties. - In the Internet Protocol (TCP/IP) Properties dialog box, click Advanced, and then on the WINS tab, click Add. - In the TCP/IP WINS Server dialog box, type the IP address of your PartnerNet connection, and then click Add. - Click OK to close the Advanced TCP/IP Settings dialog box. - Click OK to close the Internet Protocol (TCP/IP) Properties dialog box. - Click OK to close the Classroom Properties dialog box. - Complete steps b through h to configure the properties of the PartnerNet connection. - Close Network and Dial-up Connections.
 Why would you configure a WINS server to be a WINS client of itself? By making the WINS server a client of itself, the WINS server will register itself in its WINS database when the system starts.	
3. Verify that your computer is registered in the WINS database.	- Start WINS from the Administrative Tools menu. - In the console tree, expand <i>server</i> (where <i>server</i> is the name of your computer), and then click Active Registrations. - Right-click Active Registrations, and then click Find by Owner. - In the Find by Owner dialog box, on the Owners tab, click All owners, and then click Find Now.
 Why are multiple names listed for your IP address? The names listed for your IP address represent the computer name and the domain name in which the computer is a domain controller. The user who is logged on is also registered in the WINS database.	

Exercise 2

Administering WINS

Scenario

Your organization has NetBIOS clients in addition to some older NetBIOS-based servers that do not register themselves with WINS servers. You have configured multiple WINS servers on your network, and users with computers running Windows 2000 must be able to connect to all servers by using a NetBIOS name, regardless of the part of the network to which their computers are connected. You also need to ensure that the WINS database does not contain outdated records.

Goal

In this exercise, you will create static WINS records, configure a WINS server for replication, and delete WINS records.

Tasks	Detailed Steps
1. Add a static WINS record for SERVER x (where x is your student number) with an IP address of 192.168.200. x (where x is your student number).	- In WINS, in the console tree, right-click Active Registrations, and then click New Static Mapping. - In the New Static Mapping dialog box, type SERVERx (where x is your student number) in the Computer name box, verify that Unique is selected in the Type box, type 192.168.200.x (where x is your student number) in the IP address box, and then click OK. - Minimize WINS. - At a command prompt, type ping serverx (where x is your student number), and then press ENTER. <i>Because the computer SERVERx is not a computer on your network, there is no reply. However, the ping command displays the correct IP address of the server, which confirms that name resolution was successful.</i> - Close the command prompt window.
2. Configure Push/Pull replication with your partner's WINS server, and then initiate replication.	- Restore WINS, and then in the console tree, click Replication Partners. - Right-click Replication Partners, and then click New Replication Partner. - In the New Replication Partner dialog box, type the IP address of your partner's PartnerNet network connection, and then click OK. - In the details pane, right-click your partner's computer name, and then click Properties.

Tasks	Detailed Steps
2. (continued)	e. In the Properties dialog box for your partner's computer, on the Advanced tab, verify that the replication partner type is Push/Pull, and then verify that persistent connections are used both for pull and push replication. f. If your student number is lower than your partner's, set the start time for pull replication to 18:00:00 (6:00 P.M.) and the replication interval to 12 hours. If your student number is higher than your partner's, set the start time for pull replication to 21:00:00 (9:00 P.M.) and the replication interval to 12 hours. g. In the Number of changes in version ID before replication box, type 200
 Explain the impact of the replication setting that you configured. One WINS server will contact its replication partners and request changes at 6:00 P.M. and 6:00A.M. The other WINS server will request changes from its replication partner at 9:00 P.M. and 9:00 A.M. When one of the WINS servers has recorded more than 200 changes, it will notify its replication partner, which will then request the updates.	
2. (continued)	h. Click OK to close the Properties dialog box for the replication partner. i. In the console tree, right-click Replication Partners, and then click Replicate Now. j. In the WINS message box, click Yes. k. In the WINS message box, click OK.
 Wait for your partner to complete the preceding step before continuing with the next step.	
2. (continued)	l. In the console tree, click <i>server</i> (where <i>server</i> is the name of your computer). m. On the Action menu, click Refresh to update the console with the names of all replication partners. n. In the console tree, click Active Registrations. o. Right-click Active Registrations, and then click Find by Owner. p. In the Find by Owner dialog box, on the Owners tab, click All owners, and then click Find Now.  <i>If the static entries that your partner created do not appear, wait for one minute, and then repeat the preceding step.</i>

(continued)

Tasks	Detailed Steps
3. Delete the WINS records that you created. Perform the deletion both with and without tombstoning.	a. In the details pane, right-click the WorkStation WINS record for SERVERx (where x is your student number), and then click Delete. b. In the Delete Record dialog box, click Replicate deletion of this record to other servers (tombstone), and then click OK. c. In the WINS message box, click Yes. d. Right-click the Messenger WINS record for SERVERx (where x is your student number), and then click Delete. e. In the Delete Record dialog box, click Replicate deletion of this record to other servers (tombstone), and then click OK. f. In the WINS message box, click Yes. g. Right-click the File Server WINS record for SERVERx (where x is your student number), and then click Delete. h. In the Delete Record dialog box, verify that Delete the record only from this server is selected, and then click OK. i. In the console tree, right-click Replication Partners, and then click Replicate Now. j. In the WINS message box, click Yes. k. In the WINS message box, click OK. l. In the console tree, click Active Registrations. m. Right-click Active Registrations, and then click Find by Owner. n. In the Find by Owner dialog box, verify that All owners is selected, and then click Find Now.  <i>If the deletions that your partner made do not appear, wait for one minute and then repeat the preceding two steps.</i> o. Compare the WINS records on your server with the WINS records on your partner's server.
 Why is there a discrepancy between the WINS records on your partner's server and the records on your server? You deleted one record from your server only. The deletion was not replicated. Your partner also deleted one record and WINS did not replicate it.	
3. (continued)	p. Close WINS.

Exercise 3

Removing WINS

Scenario

After you have tested a WINS configuration for your organization, you must restore your original configuration.

Goal

In this exercise, you will restore the original computer configuration.

Tasks	Detailed Steps
 Do not start the following procedure until your partner has completed the preceding procedure.	
1. Remove WINS from your computer.	a. In Control Panel, double-click Add/Remove Programs . b. In Add/Remove Programs, click Add/Remove Windows Components .
 Note: In the next detailed step, click the text Networking Services rather than the check box to avoid selecting all options under Networking Services .	
1. <i>(continued)</i>	c. In the Windows Components wizard, on the Windows Components page, click Networking Services , and then click Details . d. In the Networking Services dialog box, clear the Windows Internet Name Service (WINS) check box, and then click OK . e. On the Windows Components page, click Next . f. When the configuration process is complete, click Finish , and then close all windows.
2. Configure the TCP/IP properties of your computer so that it is no longer a WINS client.	a. Right-click My Network Places , and then click Properties . b. In Network and Dial-up Connections , right-click Classroom , and then click Properties . c. In the Classroom Properties dialog box, click Internet Protocol (TCP/IP) , and then click Properties . d. In the Internet Protocol (TCP/IP) Properties dialog box, click Advanced . e. In the Advanced TCP/IP Settings dialog box, on the WINS tab, click the IP address of your computer, click Remove , and then click OK . f. In the Microsoft TCP/IP dialog box, click Yes . g. Click OK to close the Internet Protocol (TCP/IP) Properties dialog box. h. Click OK to close the Classroom Properties dialog box. i. Complete steps b through h to configure the properties of the PartnerNet connection. j. Close all open windows, and then log off.

Review

Topic Objective

To reinforce module objectives by reviewing key points.

Lead-in

The review questions cover some of the key concepts taught in the module.

- **Connecting to NetBIOS-Based Networks**
- **WINS Overview**
- **Configuring WINS Servers and Clients**
- **Configuring Support for Non-WINS Clients**
- **Enabling WINS Database Replication**
- **Maintaining the WINS Server Database**

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1. What processes does a WINS client use to interact with a WINS server?
Name registration, name renewal, name release, and name discovery.
2. What are the steps that you must perform to configure a computer running Windows 2000 as a WINS server?
You must configure a static IP address and install WINS.
3. What must you do to ensure that computers that use NetBIOS and are not WINS clients can resolve NetBIOS names of servers that are registered with a WINS server?
You must configure a WINS proxy.

4. You are concerned that replication traffic between WINS servers across a slow network link might cause other network traffic to slow down. What can you do to manage WINS replication traffic?

You can schedule replication traffic to occur only during those times when the slow network connection is not busy.

5. You are troubleshooting network problems and you notice that computers in one branch office are resolving NetBIOS names to incorrect IP addresses when they connect to several servers on your network. Client computers in other locations are resolving the NetBIOS names correctly. What is the most likely cause of the problem, and how can you resolve it?

Most likely, the WINS server to which the clients in the branch office connect has incorrect database records. When the WINS server is not busy, perform a database consistency verification.