MICROSOFT

TRAINING
AND CERTIFICATION

Module 8: Configuring and Troubleshooting Names Resolution

Contents

Microsoft®

Instructor Notes

Presentation:
60 Minutes

Lab:
30 Minutes

This module provides an introduction to host names and NetBIOS name resolution on Microsoft® Windows® XP Professional. The module covers resolution by using HOSTS files, LmHOSTS files, Domain Name System (DNS), and Windows Internet Name Service (WINS).

The module provides an overview of the name resolution process, describes how to configure your Windows XP Professional computer as a DNS client or as a WINS client, and discusses troubleshooting the name resolution process.

After completing this module, students will be able to:

- Differentiate between the various name resolution methods used by Windows XP Professional.
- Configure a computer running Windows XP Professional to use DNS.
- Configure the WINS client on a computer running Windows XP Professional.
- Import an LmHOSTS file in Windows XP Professional.

Materials and Preparation

This section provides the materials and preparation tasks that you need to teach this module.

Required Materials

To teach this module, you need Microsoft PowerPoint® file 2272A_8.ppt.

Preparation Tasks

To prepare for this module, you should:

- Read all of the materials for this module.
- Complete the labs.
- Review the Delivery Tips and Key Points for each section and topic.
- Study the review questions and prepare alternative answers for discussions.
- Anticipate student questions about material and write out answers to those questions.
- Familiarize yourself with the build slides in this module.

Instructor Setup for a Lab

This section provides setup instructions that are required to prepare the instructor computer or classroom configuration for a lab.

Lab 8A: Configuring the DNS Client for Windows XP Professional

► **To prepare for the lab**

1. The lab requires that the student computers are running Microsoft Windows XP Professional.

2. The instructor Windows 2000 Advanced Server computer should be configured with the Dynamic Host Configuration Protocol (DHCP) service.

3. The student computers should be configured as DHCP clients.

Lab 8B: Configuring the WINS Client for Windows XP Professional

► **To prepare for the lab**

1. This lab requires that the instructor server London be configured as a WINS server.

2. The lab requires that the student computers are running Microsoft Windows XP Professional.

3. The LmHOSTS file from C:\MOC\2272a\labfiles\mod8 must be present on each student machine.

4. The student computers must have NetBIOS enabled.

Module Strategy

Use the following strategy to present this module:

- Determining TCP/IP Name Resolution Methods

  This section of the module describes the name resolution methods. It begins with a description of host names and NetBIOS names, and then explains static and dynamic mapping and how the name resolution process works. This section of the module provides a framework and set of definitions for the remaining module.

- Configuring DNS Client Name Resolution and Dynamic Updates

  This section focuses on DNS client configuration the services. Begin by distinguishing between a host name, domain name, and connection-specific name. Demonstrate how to configure a Windows XP Professional-based computer with these DNS settings. Explain the value of multiple DNS servers and how to configure a Windows XP Professional-based computer for multiple DNS servers and set the query order. Next, explain how DNS is dynamically updated and how to set the dynamic update options on Windows XP Professional-based computer. Finally, review the function of Nslookup and demonstrate the information that can be obtained from using it to troubleshoot suspected DNS problems.

- Lab A: Configuring the DNS Client for Windows XP Professional

  In this lab, students focus on options to configure a computer running Windows XP Professional as a DNS client. Students configure both a primary and secondary DNS server address, modify the search order for a DNS server, and change the DNS domain suffix.

- Configuring Name Resolution on WINS ClientsThis section of the module presents configuring name resolution for WINS. It provides a discussion on the function of WINS and how to configure Windows XP Professional as a WINS client. Review the query process when the environment has multiple WINS servers. Explain both name registration and name renewal and how these processes impact user operations.

- Working with LmHOSTsThis section of the module presents how to import and read an LmHOSTS file for manual NetBIOS name-to-IP address mapping.

- Lab B: Configuring the WINS Client for Windows XP Professional

  In this lab, students focus on options to resolve NetBIOS names. They configure Windows XP Professional to use WINS, and then import an LmHOSTS file.

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 Training and Certification courseware.

Important The labs in this module are also dependent on the classroom configuration that is specified in the Customization Information section at the end of the *Classroom Setup Guide* for Course 2272A, *Implementing and Supporting Microsoft Windows XP Professional (Course Beta)*.

Lab Results

Performing the labs in this module introduces the following configuration changes:

- The student computers are configured with an additional DNS server address in the DNS search order list.

- The student computers are configured as WINS clients, and have imported an LmHOSTS file that includes an entry for a fictional server name of contoso with the IP address equal to the London server.

Overview

- **Determining TCP/IP Name Resolution Methods**

- **Configuring DNS Client Name Resolution and Dynamic Updates**

- **Configuring Name Resolution on WINS Clients**

- **Working with LmHOSTS**

TCP/IP (Transmission Control Protocol/Internet Protocol) identifies source and destination computers by their IP addresses. There are applications, such as browsers, that do not refer to a device by its IP address. Instead these applications refer to a device by the device's name. A device name is generally a user-friendly word or set of words uniquely identifying the device on the network. An example of a user-friendly name is the name you provide your computer, or the host name, when you install Windows XP Professional.

For applications that use names instead of IP addresses, Windows XP Professional has several possible methods to map the names to IP addresses. Without the ability to map names to IP addresses, some applications would not be able to communicate in a TCP/IP environment.

After completing this module, you will be able to:

- Differentiate between the various name resolution methods used by Windows XP Professional.

- Configure a computer running Windows XP Professional to use DNS.

- Configure the WINS client on a computer running Windows XP Professional.

- Import an LmHOSTS file in Windows XP Professional.

◆ Determining TCP/IP Name Resolution Methods

- **Types of Names**
- **Mapping Names to IP Addresses**
- **Static IP Mapping**
- **Dynamic IP Mapping**
- **Selecting a Name Resolution Method**
- **Host Name Resolution Process**
- **NetBIOS Name Resolution Process**

Determining the name resolution method used by your computer depends on the network environment and the client computer's configuration. Knowing the various name resolution methods can help you:

- Configure Windows XP Professional with the appropriate name resolution configuration
- Troubleshoot communication problems related to name resolution

Correctly configuring one or more of these methods on a Windows XP Professional computer ensures network interoperability.
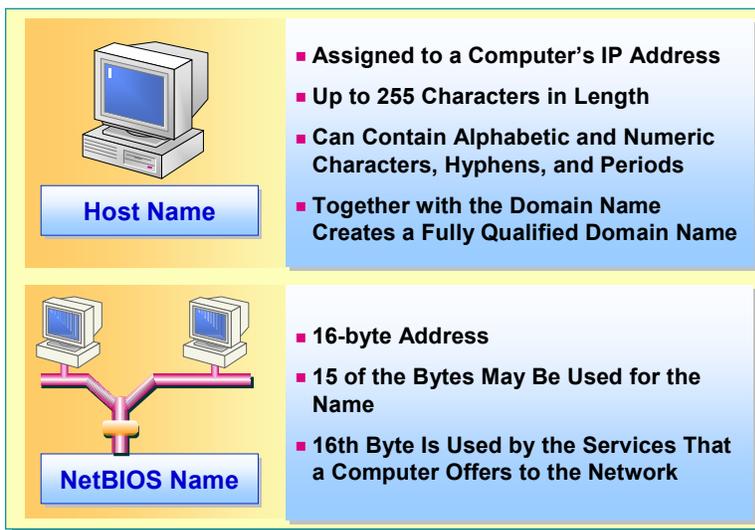
Types of Names

- **Assigned to a Computer's IP Address**
- **Up to 255 Characters in Length**
- **Can Contain Alphabetic and Numeric Characters, Hyphens, and Periods**
- **Together with the Domain Name Creates a Fully Qualified Domain Name**

Host Name

- **16-byte Address**
- **15 of the Bytes May Be Used for the Name**
- **16th Byte Is Used by the Services That a Computer Offers to the Network**

NetBIOS Name

There are two types of user-friendly names: host names and NetBIOS names. A *host name* is a user-friendly name that is assigned to a computer's IP address to identify it as a TCP/IP host. A *NetBIOS name* is a unique name that is used to identify a NetBIOS device on a local network. In Windows XP Professional, the host name is the name assigned to the computer during Windows XP Professional Setup. The NetBIOS name is a truncated version of the host name.

Host Names

Host names are used in virtually all TCP/IP environments. The following list provides a description of a host name:

- A host name is an alias assigned to a computer by an administrator to identify a TCP/IP host. Multiple host names can be assigned to the same host.

- The host name can be up to 255 characters in length and can contain alphabetic and numeric characters, hyphens, and periods.

  Note   While the host name can be up to 255 characters, when you install Windows XP Professional and create a computer name, the computer name can only be up to 63 characters.

- A host name simplifies the way a user references other TCP/IP hosts. Host names are easier to remember than IP addresses.

- A host name can be used in place of an IP address when using PING or other TCP/IP utilities.

- A host name always corresponds to an IP address that is stored in a HOSTS file or in a database on a DNS name server.

- When you append a host name to your computer's domain name, you have a fully qualified domain name. For example, computer1 in the nwtraders.msft domain would have the fully qualified domain name, computer1.nwtraders.msft.

NetBIOS Names

Although Windows XP Professional does not require NetBIOS names, Windows NT 4.0 and other older operating systems require NetBIOS names to support networking capabilities. *NetBIOS* is a standard application programming interface for user applications to submit network and control directives to underlying network protocol software. The following list provides a description of a NetBIOS name:

- A NetBIOS name is a 16-byte name.

- In Windows XP Professional, you cannot configure a NetBIOS name as a separate task. The NetBIOS name is created using the first 15 letters of the host name. The 16th and final character of the NetBIOS name is used to identify the resource or service that is being referred to on the computer. Services are specific functions of the network such as the directory service or messenger service. If the host name is changed after installation, the NetBIOS names changes also.
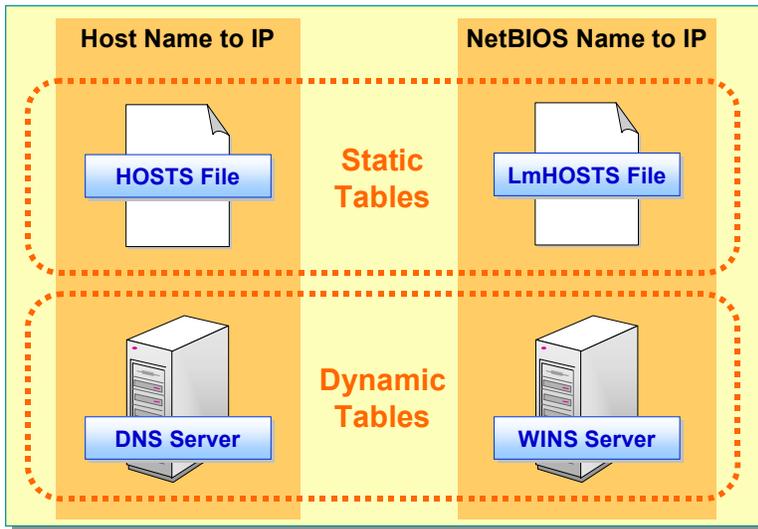
Mapping Names to IP Addresses

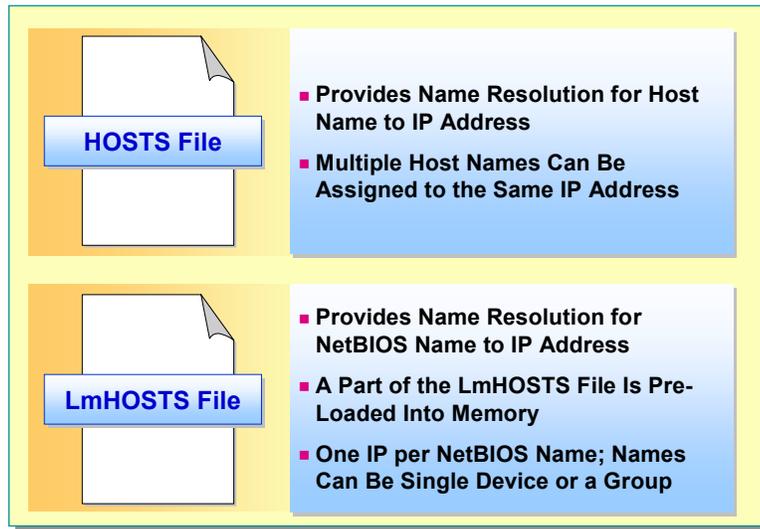| Host Name to IP		NetBIOS Name to IP
HOSTS File	**Static Tables**	LmHOSTS File
DNS Server	**Dynamic Tables**	WINS Server

Windows XP Professional stores a mapping of user-friendly names to an IP address as a static table or dynamic table.

- A *static* table is a table that you manually enter names and IP addresses. In a static table, mappings are stored in one of two text files:

  - HOSTS file for host names.

  - LmHOSTS file for NetBIOS names.

- A *dynamic* table is a table that is automatically updated by network services with names and IP addresses. To accomplish automatic update, one or both of the following services are used:

  - Domain Name System (DNS) for host names.

  - Windows Internet Name Service (WINS) for NetBIOS names.

Static IP Mapping

HOSTS File

- Provides Name Resolution for Host Name to IP Address
- Multiple Host Names Can Be Assigned to the Same IP Address

LmHOSTS File

- Provides Name Resolution for NetBIOS Name to IP Address
- A Part of the LmHOSTS File Is Pre-Loaded Into Memory
- One IP per NetBIOS Name; Names Can Be Single Device or a Group

If you implement a HOSTS file or LmHOSTS file, a copy of this file resides on each computer in the network. The advantage of using the text file is the ability to customize it. The tables in these files contain any number of required entries, including easy-to-remember aliases for frequently accessed resources. However, if the file contains a large number of IP address mappings or if the IP addresses change, the maintenance task becomes equally large.

Some non-Windows operating systems are case sensitive (for example, UNIX). If a single, centralized table is maintained and used by various operating systems, ensure that the entries will be accepted by all hosts on the network.

HOSTS File

The *HOSTS file* is a text file that contains IP address-to-host name mappings. The following list describes the HOSTS file:

- A single entry consists of an IP address corresponding to one or more host names.

- A HOSTS file must reside on each computer.

- The HOSTS file is used by PING and other TCP/IP utilities to resolve a host name to an IP address on both local and remote networks.

- In Windows XP Professional, the HOSTS file can also be used to resolve NetBIOS names if necessary.

- The HOSTS file can be edited with any text editor. The directory location is:

  %systemroot%\system32\drivers\etc

LmHOSTS File

The *LmHOSTS file* is a text file that contains the IP address-to-NetBIOS name mappings. A portion of the LmHOSTS file is pre-loaded into memory and is referred to as the NetBIOS name cache. The LMHOSTS file has the following characteristics:

- It resolves NetBIOS names used in Windows NT and other NetBIOS applications.

- Entries consist of one NetBIOS name and its corresponding IP address. The NetBIOS name is either a unique (exclusive) or group (non-exclusive) name. Unique names are typically used to send network communication to a specific process on a computer. Group names are used to send information to multiple computers at one time.

- Each computer has its own file. The directory location is:
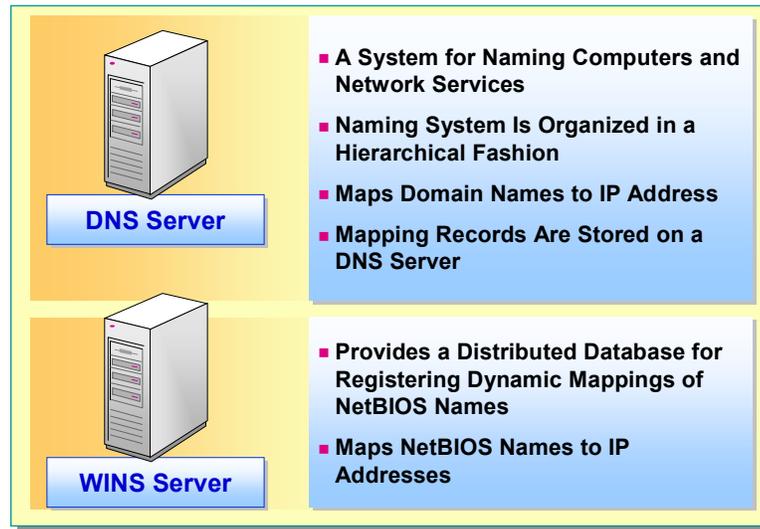
    %systemroot%\system32\drivers\etc

Dynamic IP Mapping

DNS Server

- A System for Naming Computers and Network Services
- Naming System Is Organized in a Hierarchical Fashion
- Maps Domain Names to IP Address
- Mapping Records Are Stored on a DNS Server

WINS Server

- Provides a Distributed Database for Registering Dynamic Mappings of NetBIOS Names
- Maps NetBIOS Names to IP Addresses

An alternative to static mapping is dynamic mapping. The advantage of dynamic IP mappings is that these tables are updated automatically. To accomplish automatic update, the dynamic tables use one of two services: Domain Name System (DNS) for host names and Windows Internet Name Service (WINS) for NetBIOS names.

Domain Name System

DNS is a hierarchical client/server-based distributed database management system. The purpose of the DNS database is to translate computer names into IP addresses. When a user enters a domain name in an application, the DNS service maps the name to an IP address.

The DNS naming system is analogous to a telephone book in that it maps names to numbers. And like a telephone book, the DNS naming system is organized in a hierarchical fashion to enable scalability to large systems. Individuals within the same city code must have a unique phone number. Individuals in other cities can have a duplicate telephone number as long as the city codes are unique. Individuals in different countries can use the same city code and telephone number as long as the country code is unique. Similarly, a host name can be duplicated as long as some portion of the domain names is unique.

Each computer that stores the domain name–to–IP address mapping records has mappings for only its area. These computers, known as DNS servers, only process queries for computers located in their respective areas. As the mappings in the area change, DNS servers can be automatically updated with the new information.

Windows Internet Name Service

In Windows XP Professional, the primary means for client computers to locate and communicate with other computers on a TCP/IP network is by using DNS. However, clients using previous versions of Windows, such as computers running Microsoft Windows 98 or Microsoft Windows NT 4.0, also use NetBIOS names for network communication. As a result, these clients require a method of resolving NetBIOS names to IP addresses.

WINS provides a distributed database for registering dynamic mappings of NetBIOS names that are used on a network. WINS maps NetBIOS names to IP addresses and enables NetBIOS names to be used across routers.

Note   A WINS server is not required for a Windows XP Professional only network, but if there are applications or servers using NetBIOS names, WINS is needed for name resolution.
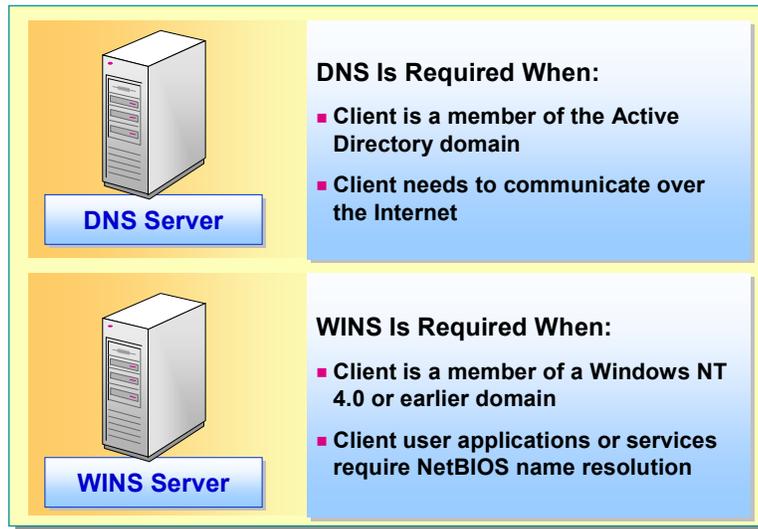
Selecting a Name Resolution Method

DNS Is Required When:

- **Client is a member of the Active Directory domain**
- **Client needs to communicate over the Internet**

DNS Server

WINS Is Required When:

- **Client is a member of a Windows NT 4.0 or earlier domain**
- **Client user applications or services require NetBIOS name resolution**

WINS Server

Before you can select a name resolution method, you need to determine if your environment and client requirements must be configured with DNS only or DNS and WINS.

DNS is recommended when the client computer:

- Is a member of an Active Directory™ directory service domain.
- Needs to communicate over the Internet.

Windows XP Professional supports NetBIOS over TCP/IP (NetBT) to provide name resolution and connection services for clients that use earlier versions of Windows operating systems, applications and services. NetBT enables NetBIOS-based applications to communicate by using TCP/IP.

WINS is recommended when the client computer:

- Is a member of a Windows NT 4.0 or earlier domain.
- Uses applications or services that require NetBIOS name resolution.

If a WINS server is not available and NetBIOS name resolution is needed, configure the Windows XP Professional client to use an LmHOSTS file for NetBIOS name resolution
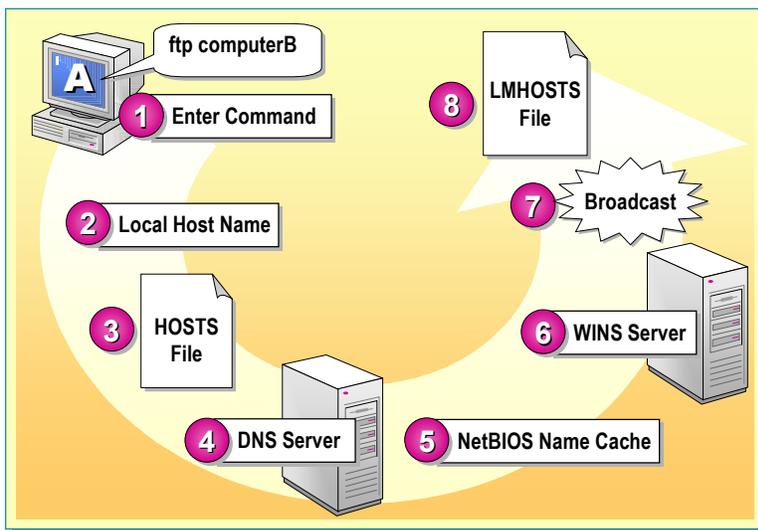
Host Name Resolution Process

Understanding the name resolution process is important if you are troubleshooting a communication problem on the network. Host names can be resolved directly by the HOSTS file or by a DNS server. If the name is not resolved at that point, Windows XP Professional will attempt to resolve the host name as a NetBIOS name. As soon as the name and IP address is resolved, the name resolution process discontinues.

Applications in Windows XP Professional are designed to use host names, but both NetBIOS and host names can be resolved by using either process. It is the order of resolution and the time it takes to resolve names that differs between the methods.

The default host name resolution process is as follows:

1. The user issues a command on Computer A, such as **ftp**, specifying the host name of Computer B.

2. Computer A checks to see if the specified name matches a local host name.

3. If the name does not match, Computer A checks its HOSTS file looking for Computer B's name.

4. If Computer A does not find Computer B's host name in the HOSTS file, it sends a query to the DNS server.

5. If the host name is not found on the DNS server, Windows XP Professional checks for the name in the NetBIOS name cache.

6. If the NetBIOS name cache does not have the NetBIOS name, a query is sent to the WINS server.

7. If the WINS server cannot resolve the name, a broadcast message is sent out on the network.

8. If no host responds to the broadcast, the LmHOSTS file is checked for the host or NetBIOS name.

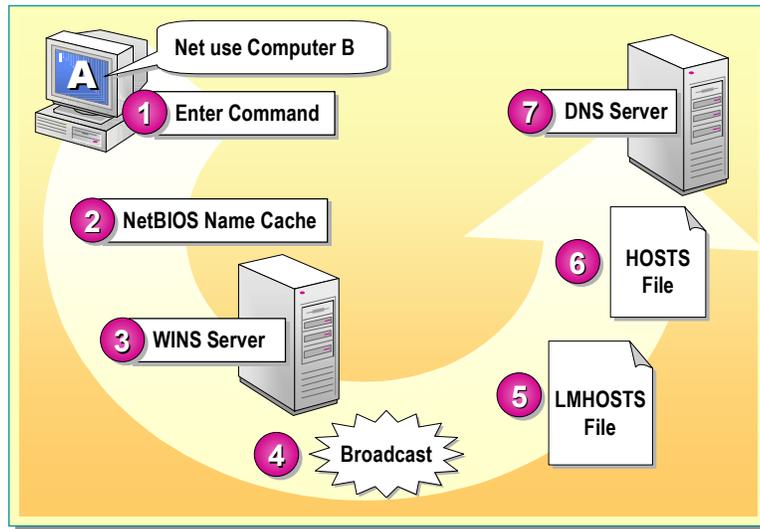9. If the name is not found, an error message is returned to Computer A.

NetBIOS Name Resolution Process

If a NetBIOS command is issued, then the procedure for resolving NetBIOS names is as follows:

1. The user issues a command on Computer A, such as **net use**, and references the NetBIOS name of Computer B.

2. Computer A checks to see if the specified name is in its NetBIOS name cache.

3. If the name is not in the NetBIOS name cache, Computer A queries a WINS server.

4. If the WINS server cannot locate the name, Computer A sends a broadcast message out on the network.

5. If a broadcast message does not resolve the name, then Computer A checks its LmHOSTS file.

6. If the above NetBIOS methods do not resolve the name, Computer A checks the HOSTS file.

7. Finally, if the name is not resolved, Computer A queries the DNS server.

8. If the name is not found, an error message is returned to Computer A.

◆ Configuring DNS Client Name Resolution and Dynamic Updates

- **Specifying Host Names, Domain Names, and Connection-Specific Names**

- **Configuring a DNS Client**

- **Specifying Additional DNS Servers**

- **Configuring DNS Query Settings**

- **Configuring DNS Dynamic Updates**

- **Troubleshooting DNS Name Resolution**

Windows XP Professional uses DNS as its primary method for name resolution and to locate services, including domain controllers that provide user authentication. If your environment has multiple DNS servers, in Windows XP Professional, you can specify which DNS servers to query and what order to perform the query. The reasons to have secondary DNS servers are:

- *Redundancy*. If one of the servers becomes unavailable, another server is can provide the DNS service.

- *Faster access for remote locations*. If you have a number of clients in remote locations, having secondary name servers (or other primary name servers for subdomains) prevents these clients from communicating across slow links for name resolution.

- *Reduction of load*. Secondary name servers reduce the load on the primary server.

With multiple DNS servers, you need to understand how to configure the various options available on your DNS client.
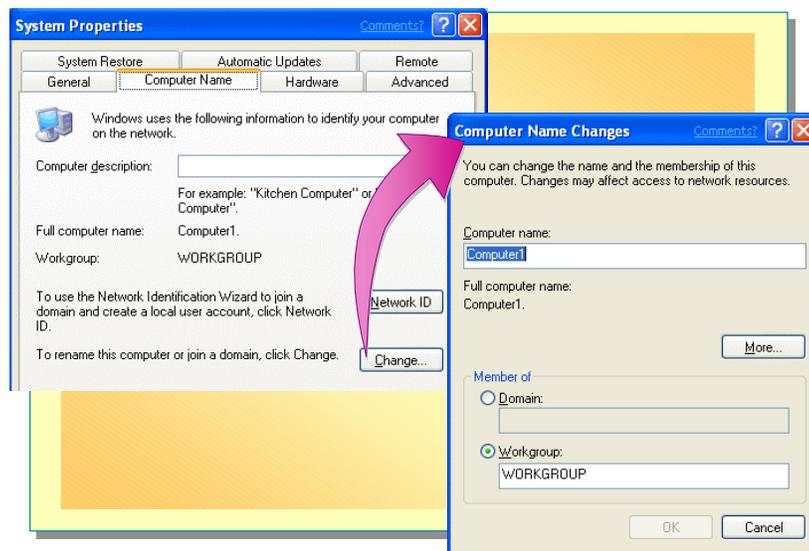
Specifying Host Names, Domain Names, and Connection-Specific Names

A Windows XP Professional-based computer has a host name and a Primary DNS Suffix. When resolving an unqualified host name, the DNS client will use both the host name and Primary DNS suffix.

To view and/or change the host name and the primary DNS suffix:

1. Click **Start**, right-click **My Computer** and then click **Properties**.

   On the **Computer Name** tab, the fully qualified domain name is provided.

2. To change the host name, click **Change**, and then type the new name in the **Computer name** text box.

3. To change the primary DNS suffix of the computer, click **More**, and then type a name in the **Primary DNS suffix of this computer** text box.

In a multihomed computer, you can specify a connection-specific DNS suffix for each adapter installed. When resolving an unqualified host name, the DNS client will use the host name, the Primary DNS suffix, and the connection-specific suffixes.

To set or change the connection-specific DNS suffix name:

1. Click **Start**, click **Control Panel**, click **Network and Internet Connections**, and then click **Network Connections**.

2. Right-click the network connection, and then click **Properties**.

3. In the **Local Area Connection Properties** dialog box, in the list box, click **Internet Protocol (TCP/IP)**, and then click **Properties**.

4. **In the Internet Protocol (TCP/IP) Properties** dialog box, click **Advanced**.

5. On the **DNS** tab, in the **DNS suffix for this connection** box, type the connection-specific DNS suffix.
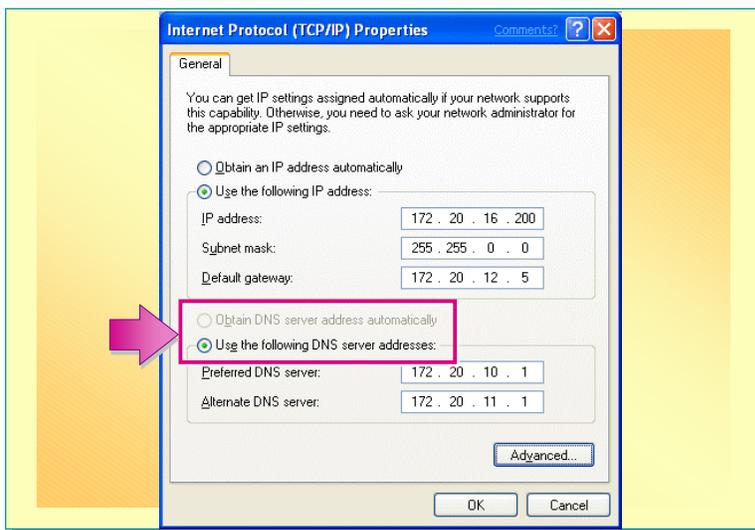
Configuring a DNS Client

A DNS client uses a DNS server to resolve queries and locate resources on the network. In Windows XP Professional, configuring a computer as a DNS client involves only one configuration parameter: the IP address of the DNS server. Optionally, but recommended, is the configuration of a secondary or alternate server.

To configure a client to use a DNS server for name resolution:

1. Click **Start**, click **Control Panel**, click **Network and Internet Connections**, and then click **Network Connections**.

2. Right-click the network connection, and then click **Properties**.

3. In the list box, click **Internet Protocol (TCP/IP)** and click **Properties**.

4. If you want DNS server addresses to be provided by a DHCP server, click **Obtain DNS server address automatically**.

   If you want to manually configure an IP address for a DNS server, click **Use the following DNS server addresses**, and then type the IP address of the primary server in the **Preferred DNS server** box. If a second DNS server is configured, type the IP address of the additional DNS server in the **Alternate DNS server** box. If the primary server is unavailable, Windows XP Professional will query the second DNS server for host name resolution.

If you use DHCP for automatic configuration, a DHCP server can provide the client configuration details, which are the DNS and WINS server addresses and host name. If you do not use DHCP, you must manually configure these parameters.
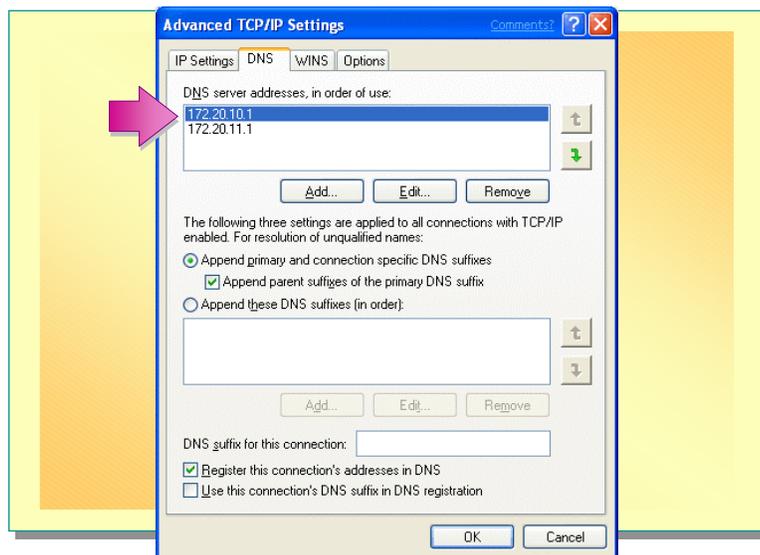
Specifying Additional DNS Servers

If your network requires more than two DNS servers, then the additional DNS servers must be configured. When configured properly, you can optimize the network response time when accessing resources across the network

To specify an additional DNS servers:

1. Click **Start**, click **Control Panel**, click **Network and Internet Connections**, and then click **Network Connections**.

2. Right-click the network connection, and then click **Properties**.

3. In the list box, click **Internet Protocol (TCP/IP)**, and then click **Properties**.

4. Click **Advanced**, and then click the **DNS** tab.

   If the IP addresses of DNS servers were specified in the **Internet Protocol (TCP/IP) Properties** dialog box, the servers will appear here in the order that they were entered. You may add, remove, modify, or change the order of the DNS server entries.

5. Click **Add**, and then type the IP address of additional servers.

6. When you finish adding alternate servers, click **Add** to enter the new server to the list.

   When you list additional servers, list local servers ahead of remote servers to improve response time.
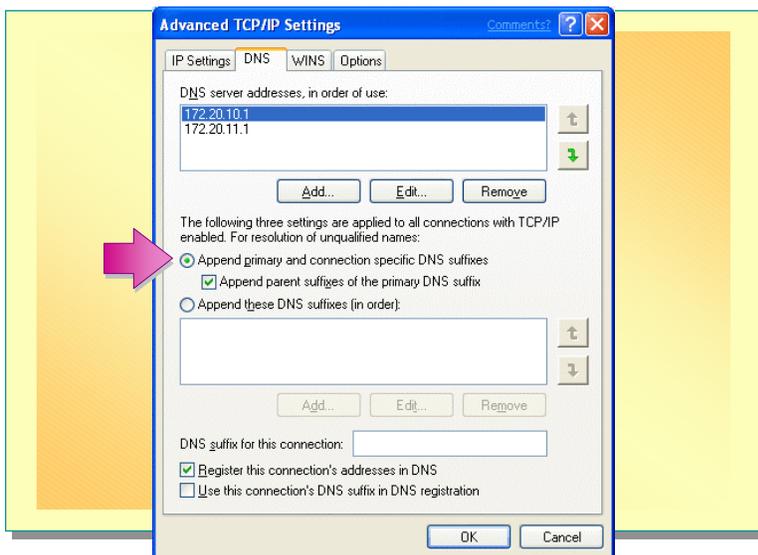
Configuring DNS Query Settings

You can specify which DNS servers are queried for name resolution in the
Advanced TCP/IP Settings dialog box. When multiple DNS servers are
specified, the host name resolution process is the same, however, instead of
querying a single DNS server, multiple DNS servers are queried. The
networking component that performs DNS query is referred to as a *resolver*.
The resolver automatically queries the DNS servers in the following order:

1. The resolver sends the query to the first server on the preferred adapters
    search list, and waits one second for a response from the first server.

2. If the resolver does not receive a response from the first server, it sends a
    query to the first DNS server on all adapters on the list that is still a possible
    candidate, and waits two seconds for a response from those servers.

3. If the resolver does not receive a response from any server within two
    seconds, the resolver sends the query to all DNS servers on all adapters still
    under consideration and waits another two seconds for a response from
    those servers.

If the resolver receives a positive response, it stops querying for the name, adds
the response to the cache and returns the response to the client. If the resolver
does not receive a response, it maintains the server on the list and continues to
query, extending the time frame it will wait for a response. If the resolver
receives a negative response from a server, it removes the server from
consideration.

If the resolver has not received a response from any server by the end of the
eight-second time period, the resolver responds with a time-out. The resolver
will stop querying servers that do not respond within the next 30 seconds.

To specify the advanced DNS query settings:

1. Click **Start**, click **Control Panel**, click **Network and Internet Connections**, and then click **Network Connections**.
2. Right-click the network connection, and then click **Properties**.
3. In the list box, click **Internet Protocol (TCP/IP)**, and then click **Properties**.
4. Click **Advanced**, and then click the **DNS** tab.

By default, the option **Append primary and connection specific DNS suffixes** is selected. This option causes the resolver to append the client name to the primary DNS suffix, as defined in the **Computer Name** tab of the **System Properties** as well as the connection-specific DNS suffix.

For example, if your primary DNS suffix is dev.nwtraders.msft, the connection-specific suffix is contoso.com, and your host name is computer1, the resolver queries:

```
computer1.dev.nwtraders.msft
computer1.contoso.msft
```

If you check the box, **Append parent suffixes of the primary DNS suffix**, the resolver performs name devolution on the primary DNS suffix. *Name devolution* strips off the leftsmost label and attempts the resulting domain name until only two labels remain. Using the previous example, if **Append parent suffixes of the primary DNS suffix** was checked, the resolver would query the following DNS servers in this order:

```
computer1.dev.nwtraders.msft
computer1.nwtraders.msft
```

To disable name devolution, clear the box, **Append parent suffixes of the primary DNS suffix**.

The box labeled, **Append these DNS suffixes (in order)** enables you to specify a list of domain suffixes. If you enter DNS suffixes in this box, the resolver does not try any other domain names including the connection-specific DNS suffix.
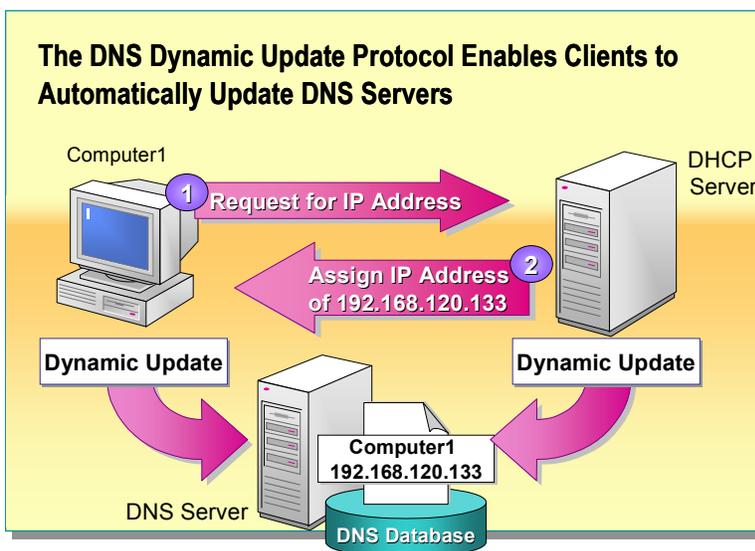
Configuring DNS Dynamic Updates

The DNS Dynamic Update Protocol Enables Clients to Automatically Update DNS Servers

Computer1

1 Request for IP Address

DHCP Server

Assign IP Address of 192.168.120.133 2

Dynamic Update

Dynamic Update

Computer1
192.168.120.133

DNS Server

DNS Database

When a client receives a new IP address from a DHCP server, the name-to-IP address mapping information that is stored on a DNS server must be updated. In Windows XP Professional, DHCP servers and clients can register with and dynamically update name-to-IP address mapping information on DNS servers that are configured to support dynamic updates.

Dynamic Update Protocol

The dynamic update protocol enables client computers to automatically update their resource records on a DNS server without administrator intervention. By default, Windows XP Professional–based computers are configured to perform dynamic updates when they are also configured with a static IP address.

Dynamic Update Process

When a DHCP server assigns an IP address to a Windows XP Professional–based DHCP client, the following process occurs:

1. The client initiates a DHCP request message to the DHCP server, requesting an IP address. This message includes the fully qualified domain name (FQDN).

2. The DHCP server returns a DHCP acknowledgment message to the client, and grants an IP address lease to the client computer.

3. Depending on the configuration, either the clients or the DHCP server updates the DNS database.

Configuring Windows XP Professional–Based Clients for Dynamic Updates

To configure Windows XP Professional–based clients to update the DNS database:

1. In **Network Connections**, right-click the connection that you want to configure, and then click **Properties**.

2. In the **Properties** dialog box for the connection, click **Internet Protocol (TCP/IP)**, and then click **Properties**.

3. In the **Internet Protocol (TCP/IP) Properties** dialog box, click **Advanced**.

4. In the **Advanced TCP/IP Settings** dialog box, on the **DNS** tab, select the appropriate check box:

   - **Register this connection's addresses in DNS**. Enables the client to register resource records in DNS by using the full computer name and the IP address of the network connection.

   - **Use this connection's DNS suffix in DNS registration**. Enables the client to register resource records in DNS by using the first label of the computer name in addition to the DNS suffix for the connection. Use this option only if the DNS suffix differs from the domain name.
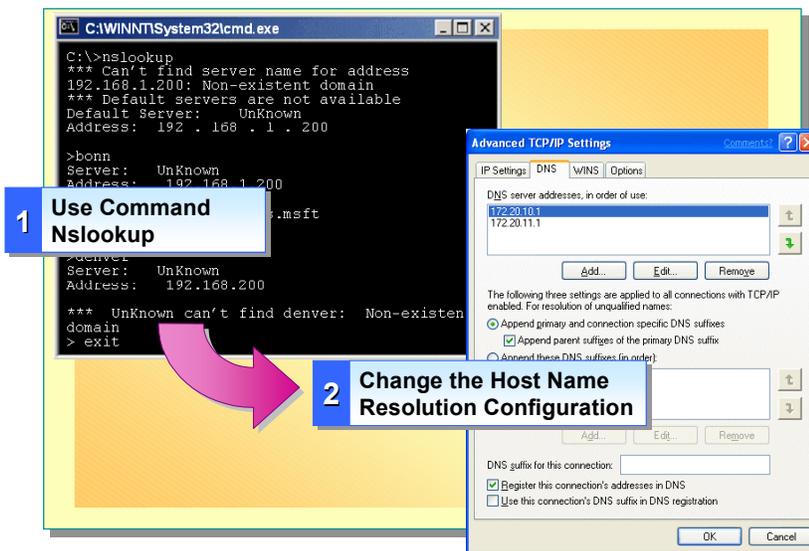
Troubleshooting DNS Name Resolution

Problems with host name resolution can arise from various sources. In Windows XP Professional, you can use the Nslookup utility to assist you in locating the origin of the problem. If the problem resides on the DNS client, you can modify the host name resolution configuration.

Nslookup Utility

Nslookup is a command-line utility that you can use to query and troubleshoot your DNS installation. Name resolution errors can result if one or more of the following occur:

- DNS client entries are not configured correctly.

- DNS server is not running.

- There is a problem with network connectivity.

At a command prompt, type **nslookup** to view the host name and IP address of the DNS server that is configured for the local computer.

If the DNS server is offline, the DNS service is not enabled on the host computer, or if a hardware or routing problem exists, the following message appears:

```
C:\nslookup
*** Can't find server name for address <IP_Address>: No
response from server
*** Default servers are not available.
```

If a query is successful, the following message appears:

```
C:\nslookup
Default Server: <fully_qualified_domain_name>
Address: w.x.y.z
```

To look up a host's IP address by using DNS, type the host name and press ENTER. By default, **nslookup** uses the DNS server configured for the computer on which it is running. If the DNS server cannot resolve the host name, the following message appears:

```
C:\nslookup <Destination_host>
Server: <fully_qualified_domain_name>
Address: <server_IP_address>
***  <fully_qualified_domain_name> can't find
<Destination_host>: Non-existent domain
```

If a query fails as a result of connectivity issues or network congestion, or if the DNS server is overloaded with requests, the following message appears:

```
C:\nslookup Valid_Host
Server: [IP_Address]
Address: w.x.y.z
DNS request timed out.
  timeout was 2 seconds.
```

Verifying Host Name Resolution Configuration

To fix a problem with the host name resolution configuration:

Delivery Tip
Demonstrate the procedure for verifying host name resolution configuration.

1. Open **Network and Dial-up Connections**, right-click **Local Area Connections**, and then click **Properties**.

2. Click **Internet Protocol (TCP/IP)**, and then click **Properties**.

3. In the **Internet Protocol (TCP/IP) Properties** dialog box, click **Advanced**.

4. On the **DNS** tab of the **Advanced TCP/IP Settings** dialog box, confirm that DNS is configured properly. If the DNS server IP address is missing, add it to the list of DNS server addresses.

Note This procedure does not include DHCP clients, because DNS servers are not listed for DHCP clients.

Lab 8A: Configuring the DNS Client for Windows XP Professional
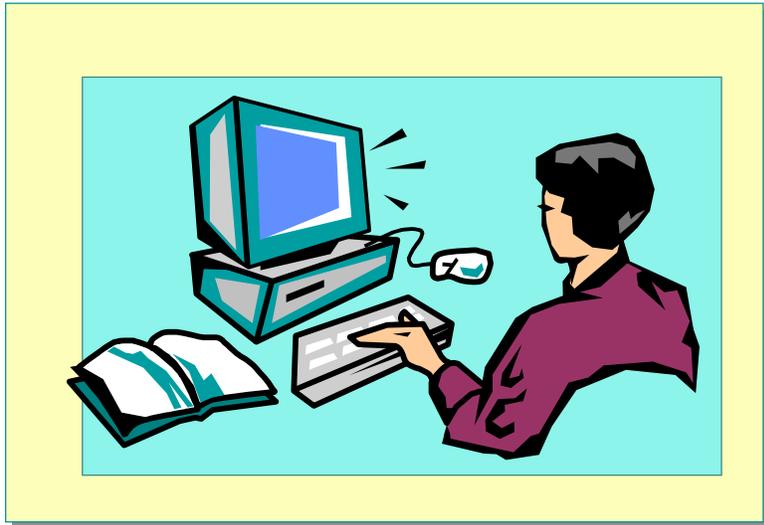
Objectives

After completing this lab, you will be able to:

- Configure a computer running Windows XP Professional to use DNS.
- Configure a Primary DNS server address.
- Configure a Secondary DNS server address.
- Configure a DNS domain suffix.
- Change the order in which DNS server addresses are used.

Prerequisites

Before working on this lab, you must have:

- Basic knowledge of the DNS service.
- Basic understanding of TCP/IP name resolution.
- Basic knowledge of Active Directory domains.

Estimated time to complete this lab: 15 minutes

◆ Configuring Name Resolution on WINS Clients

- **NetBIOS Name Registration**

- **Registration Renewal**

- **Configuring WINS Clients**

WINS provides 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.

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.

You can configure WINS clients using the WINS settings on your Windows XP Professional computer or by using DHCP scope options. DHCP scope options can be used to assign an IP address to a NetBIOS name automatically updating the WINS server.
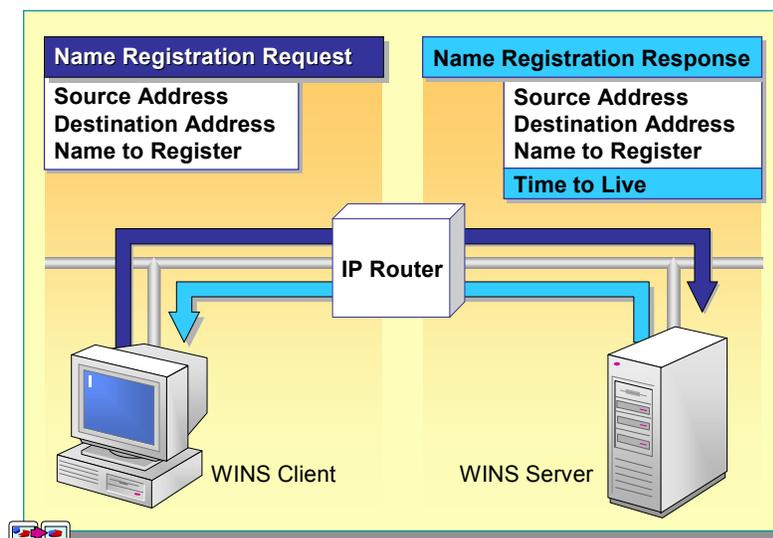
NetBIOS Name Registration

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.

When multiple WINS servers are specified, the NetBIOS name resolution process is the same as if there was a single WINS server. However, instead of querying a single WINS server, multiple WINS servers must be queried. 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 XP Professional 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 enables only WINS clients to query a WINS server for computers with specific capabilities. Registration of the Messenger service and the user name enables 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.

If the registered computer has multiple network adapters, known as a multihomed computer, 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 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.

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.
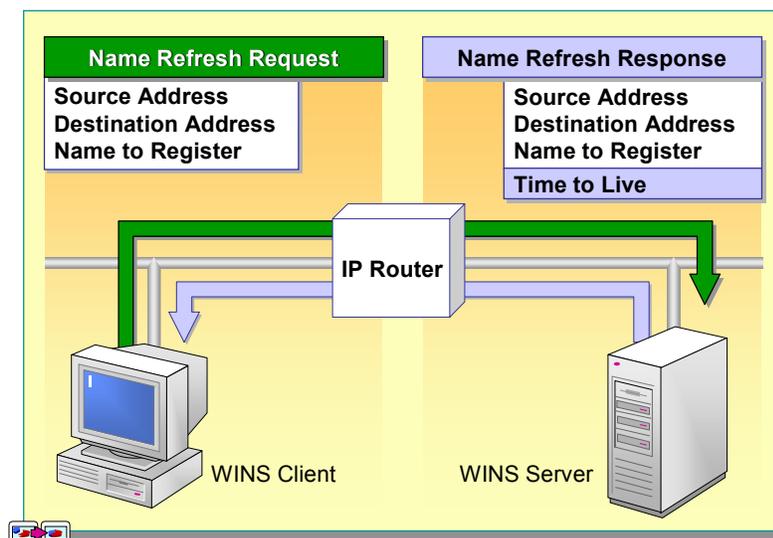
Registration Renewal

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 occasionally a WINS client must renew its name or the lease will expire.

Client name registrations with a WINS server are temporary, and occasionally 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.

Delivery Tip
The slide for this topic includes animation. Click or press 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.

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.
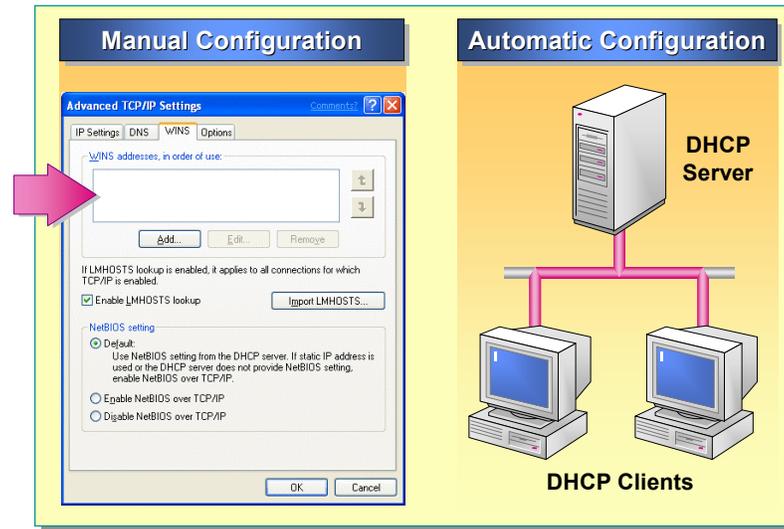
Configuring WINS Clients

You can configure WINS clients manually by configuring the TCP/IP properties on each client, or automatically using DHCP.

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.

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.

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.

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.

Working with LmHOSTS

Lmhosts File

192.168.1.1	Mexico		# Sales Server
192.168.2.1	France		# Database Server
192.168.3.1	UK		# Training Server
192.168.4.1	Sweden	#PRE	# Main Office Server
192.168.5.1	Australia	#PRE	# MIS Server

WINS Client

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.

Preconfigured Entries in an LmHOSTS File

Computers running Windows XP Professional 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. Adding these entries can increase the speed of name resolution, because names in the cache are resolved first.

An LmHOSTS file can contain predefined keywords that begin with a number sign (#). The following table lists the keywords available for the 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.

(*continued*)

Predefined keyword	Description
#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 XP Professional 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 XP Professional 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 LmHOSTS list. Add the #PRE-tagged entries near the bottom of the list, because they are loaded when TCP/IP initializes and are not accessed again.

Enabling and Disabling an LmHOSTS File

To enable the use of an LmHOSTS file:

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Delivery Tip
Demonstrate the procedures for enabling and disabling an LmHOSTS file.

</td>
</tr>
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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, select the **Enable LMHOSTS lookup** check box.

   To disable the use of an LmHOSTS file, clear the **Enable LMHOSTS lookup** check box.

Lab 8B: Configuring the WINS Client for Windows XP Professional

Objectives

After completing this lab, you will be able to:

- Configure the WINS client on a computer running Windows XP Professional.
- Import a LMHOSTS file in Windows XP Professional.

Prerequisites

Before working on this lab, you must have:

- Knowledge about the WINS server service.
- Knowledge about the WINS client service.
- Basic understanding about TCP/IP names resolution.

Estimated time to complete this lab: 15 minutes

Review

- **Determining TCP/IP Name Resolution Methods**

- **Configuring DNS Client Name Resolution and Dynamic Updates**

- **Configuring Name Resolution on WINS Clients**

- **Working with LmHOSTS**

1. You are the administrator for a network with both Windows NT 4.0 and Windows XP Professional computers. Your network uses WINS. You want to propose a new naming scheme for all new computers. The scheme will use the first 9 characters to indicate the group and division, the next 3 characters to indicate the location, and the last 4 characters to indicate the assigned user. Will this naming scheme work in your environment?

   No. This would produce a NetBIOS computer name of 16 characters. Although NetBIOS uses a 16-byte name, the last byte is reserved to indicate the service.

2. You are the network administrator in a Windows 2000 domain. A user with a computer running Windows XP Professional reports being unable to connect to a file server. You can successfully ping the IP address of the file server, but not its computer name. What do you suspect is the problem?

   Name resolution is not occurring. It may be a problem with the DNS configuration on the Windows XP Professional computer, or with the DNS server.

3. You are the network administrator for 75 computers running Windows XP Professional. The network is configured to use LmHOSTS files to resolve computer names. These computers are in two physical locations, connected by a router. A user reports being unable to connect to a share located on the other subnet. You can successfully ping the IP address of the computer. What may be the problem?

   The LmHOSTS file on the local computer is not configured with the correct NetBIOS name and IP address of the remote file server.

4. Your network consists of 250 computers running Windows XP Professional. This network is configured to use WINS for name resolution. All computers are configured with WINS server addresses by using DHCP. One user reports being unable to connect to a remote file server. During your investigation of this issue, you have determined that you can successfully ping the remote computer and you have also verified that the DHCP server is configured with the correct WINS server TCP/IP address. What could be the issue?

   At some time the user's computer was configured to use a different WINS server's IP address, and this address was entered manually. Using DHCP for WINS configuration is ignored if there is an IP address entered manually on the computer.

5. You are a network administrator, and you are responsible for a large number of computers running Windows XP Professional. Your DNS server is controlled by another company, and you need to verify that a host entry was made in the DNS database. You do not have access to the DNS server, but want to ensure that the record is not already created before you send in the request for its creation. What tool can you use to check if the DNS record for the host is present in DNS?

   Nslookup is used to query DNS for resource records.