TrainSIGNAL

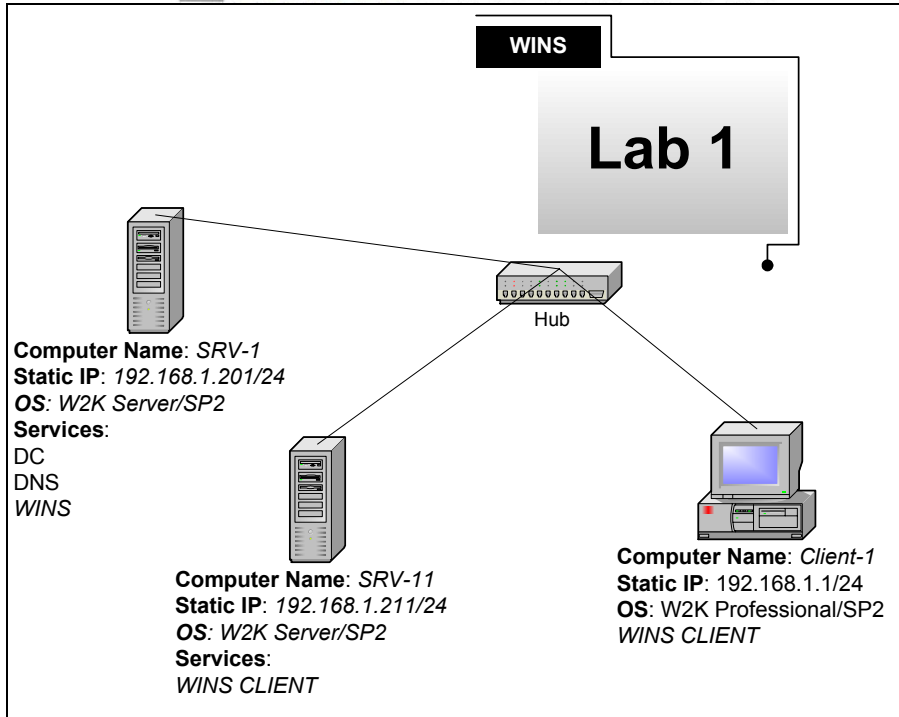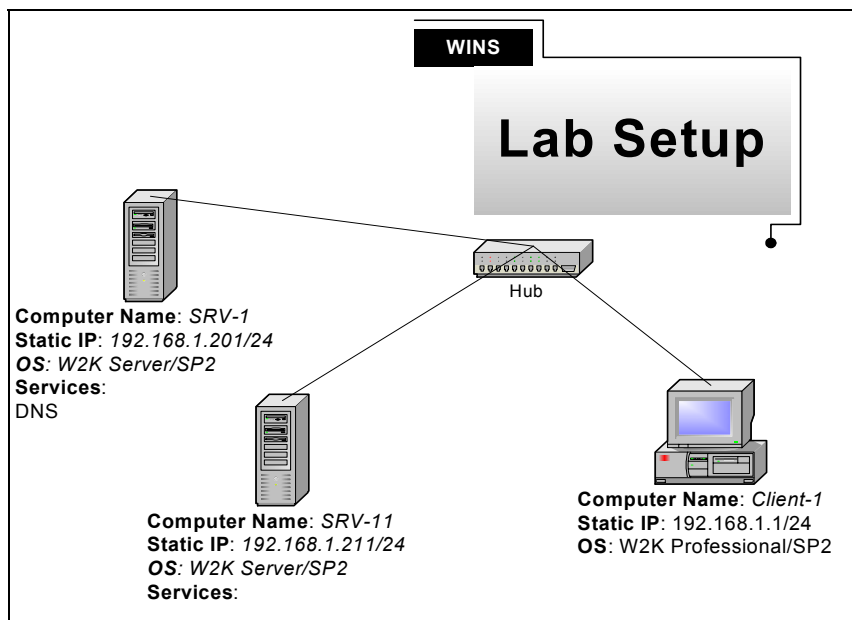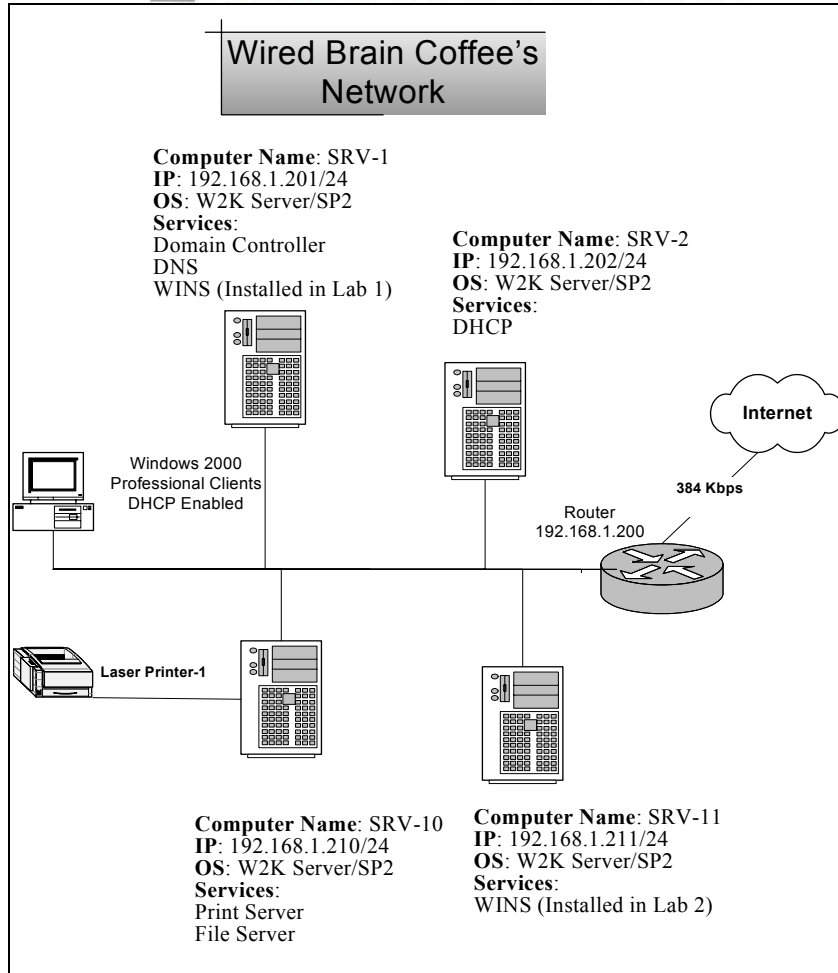## Windows 2000/Server 2003
MEGA LAB SERIES
www.trainsignal.com

Building a Windows 2000 WINS Infrastructure
for Wired Brain Coffee, Inc.

Mega Lab 6

Part 3 of 3 in the Building a Windows 2000/Server 2003
Network Infrastructure Series

TrainSIGNAL, INC.

Lab 1

Computer Name: *SRV-1*
Static IP: *192.168.1.201/24*
OS: *W2K Server/SP2*
Services:
DC
DNS
WINS

Hub

Computer Name: *SRV-11*
Static IP: *192.168.1.211/24*
OS: *W2K Server/SP2*
Services:
WINS CLIENT

Computer Name: *Client-1*
Static IP: 192.168.1.1/24
OS: W2K Professional/SP2
WINS CLIENT

Computer Name: *SRV-1*
Static IP: *192.168.1.201/24*
OS: *W2K Server/SP2*
Services:
DC
DNS
WINS

WINS

Lab 2

Hub

WINS
PUSH/PULL PARTNERS

Computer Name: *SRV-11*
Static IP: *192.168.1.211/24*
OS: *W2K Server/SP2*
Services:
WINS

Computer Name: *Client-1*
Static IP: 192.168.1.1/24
OS: W2K Professional/SP2
WINS CLIENT

Train**SIGNAL**, INC.

Wired Brain Coffee's Network

Computer Name: SRV-1
IP: 192.168.1.201/24
OS: W2K Server/SP2
Services:
Domain Controller
DNS
WINS (Installed in Lab 1)

Computer Name: SRV-2
IP: 192.168.1.202/24
OS: W2K Server/SP2
Services:
DHCP

Internet

Windows 2000
Professional Clients
DHCP Enabled

384 Kbps

Router
192.168.1.200

Laser Printer-1

Computer Name: SRV-10
IP: 192.168.1.210/24
OS: W2K Server/SP2
Services:
Print Server
File Server

Computer Name: SRV-11
IP: 192.168.1.211/24
OS: W2K Server/SP2
Services:
WINS (Installed in Lab 2)

WINS

Lab Setup

Computer Name: *SRV-1*
Static IP: *192.168.1.201/24*
OS: *W2K Server/SP2*
Services:
DNS

Hub

Computer Name: *SRV-11*
Static IP: *192.168.1.211/24*
OS: *W2K Server/SP2*
Services:

Computer Name: *Client-1*
Static IP: 192.168.1.1/24
OS: W2K Professional/SP2

Building a WINS Infrastructure for Wired Brain Coffee, Inc.

Mega Lab 6

**Part 3 of 3 in the
Building a Windows 2000
Network Infrastructure Series**

About the Authors

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Jesus Salgado (MCSE, A+) is responsible for content development for the Building a Network Infrastructure Mega Lab Series. He also repairs computer hardware, builds systems and does network consulting for his own company, JSJR3 Consulting.

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Introduction

Welcome to Train Signal!

This series of labs on Windows 2000 is designed to give you detailed, hands-on experience working with Windows 2000. Train Signal's Audio-Visual Lab courses are targeted towards the serious learner, those who want to know more than just the answers to the test questions. We have gone to great lengths to make this series appealing to both those who are seeking Microsoft certification and to those who want an excellent overall knowledge of Windows 2000.

Each of our courses put you in the driver's seat, working for different fictitious companies, deploying complex configurations and then modifying them as your company grows. They are not designed to be a "cookbook lab," where you follow along with the steps of the "recipe" until you have completed the lab and have learned nothing. Instead, we recommend that you perform each step and then analyze the results of your actions in detail.

To complete these labs yourself, you will need three computers equipped as described in the Lab Setup section. You also need to have a foundation in Windows 2000 and TCP/IP concepts. You should be comfortable with installing Windows 2000 Professional or Server and getting the basic operating system up and running. Each of the labs in this series will start from a default installation of Windows 2000 and will then run you through the basic configurations and settings that you must use for the labs to be successful. It is very important that you follow these guidelines **exactly**, in order to get the best results from this course.

The course also includes a CD-ROM that features an audio-visual walk-through of all of the labs in the course. In the walk-through, you will be shown all of the details from start to finish on each step, for every lab in the course. During the instruction, you will also benefit from live training that discusses the current topic in great detail, making you aware of many of the fine points associated with the current topic.

Thank you for choosing Train Signal!

Lab Setup

Setting up the Lab

1. Computer Equipment Needed

Item	Minimum	Recommended
Computers	(3) Pentium I 133 MHz	(3) Pentium II 300MHz or greater
Memory	128 MB	256 MB
Hard Drive	2 GB	4 GB or larger
NIC	1/machine	1/machine
Hubs	1	1
Network Cable	(3) Category 5 cables	(3) Category 5 cables

I strongly urge you to acquire all of the recommended equipment in the list above. It can all be easily purchased from eBay for around $500 (less if you already have some of the equipment). This same equipment is used over and over again in all of Train Signal's labs and will also work great in all other sorts of network configurations that you may want to set up in the future. It will be an excellent investment in your education. You may also want to look into a disk-imaging product such as Norton Ghost. Disk imaging software will save you a tremendous amount of time when it comes to reinstalling Windows 2000 for future labs. Many vendors offer trial versions or personal versions of their products that are very inexpensive.

2. Computer Configuration Overview

Computer Number	1	2	3
Computer Name	SRV-1	SRV-11	Client-1
IP Address	192.168.1.201/24	192.168.1.211/24	192.168.1.1/24
OS	W2K Server	W2K Server	W2K Pro
Additional Configurations	Domain Controller DNS Server SP2	SP2	SP2

3. Detailed Lab Configuration

Important Note
This lab should NOT be performed on a live production network. You should only use computer equipment that is not part of a business network AND is not connected to a business network. Train Signal Inc., is not responsible for any damages. Refer to the full disclaimer and limitation of liability which appears at the beginning of this document and on our web site, www.trainsignal.com.

<u>Computer 1</u>
Computer 1 will be named SRV-1 and the operating system on this computer will be Windows 2000 Server or Advanced Server. You should also install Service Pack 2 to avoid any unforeseen problems. If you do not have a copy of Windows 2000 Server you can obtain an evaluation copy of Windows 2000 Advanced Server within the Microsoft Press series of books and Service Pack 2 is available for download on Microsoft's web site.

SRV-1 will have a static IP address of 192.168.1.201 with a 255.255.255.0 subnet mask. The default gateway field can be left blank but you should enter this computer's own IP address for the Preferred DNS field (192.168.1.201). The alternate DNS Server field can be left blank. This computer will be set up as a Domain Controller by using the dcpromo.exe program. In order to make this machine a domain controller, DNS will need to be installed as well. There are 2 ways to install DNS at this point - automatically when you run dcpromo.exe or manually **before** you run dcpromo.exe.

For our purposes, we are going to install DNS automatically, when we run dcpromo.exe. Run dcpromo.exe on this machine and make the following selections as you are prompted; Create a new domain; Create a new domain tree; Create a new forest of domain trees. The domain name for the scenario is wiredbraincoffee.com. Leave all the other settings at their defaults. When the wizard asks, install DNS, by selecting install and configure DNS now. Next, choose permissions compatible for pre-Windows 2000 computers. Then you will be asked for an AD password. For our purposes we will leave this blank. Active directory installation should then take place and you can restart the computer when you are prompted. **MAKE SURE** that the network card is plugged into a hub or into another computer with a crossover cable. Otherwise, Active Directory installation will fail, without giving you a clear cause. See figure 1, next page.

<u>Computer 2</u>
Computer 2 will be named SRV-11 and Windows 2000 (either version again) will be installed on this computer with Service Pack 2. The computer will be joined to the Wired Brain Coffee domain as a member server. SRV-11 will have a static IP address of 192.168.1.211 with a 255.255.255.0 subnet mask. The default gateway can be left alone at this point. Configure the preferred DNS server setting to point to SRV-1, 192.168.1.201 and leave the alternate DNS setting blank. You will need to make this computer a member server of wiredbraincoffee.com by simply right-clicking on the "My Computer" icon on the desktop and selecting properties. Select the Network identification tab, select properties, select domain and type in the domain name of the domain it will join, which is wiredbraincoffe.com and click OK. It will then ask for a username and password. Use the administrator account name and password from the wiredbraincoffee.com domain. When it has joined successfully it will "welcome you to the domain" and then tell you that it needs to restart in order for the changes to take effect. After restarting the computer, make sure you change the "Log on to" dialog box to the domain rather than "this computer." See figure 1, next page.

<u>Computer 3</u>
Computer 3 will be named Client-1 and have Windows 2000 Professional installed as the operating system. Client-1 will be joined to the wiredbraincoffee.com domain just as SRV-11 was. Client-1 will have a static IP address of 192.168.1.1 with a 255.255.255.0 subnet mask. See figure 1, next page.

Important - You should test the network connections (using the PING command) between each of these machines to ensure that your network is set up properly. Testing before you get started will save you major time and effort later.
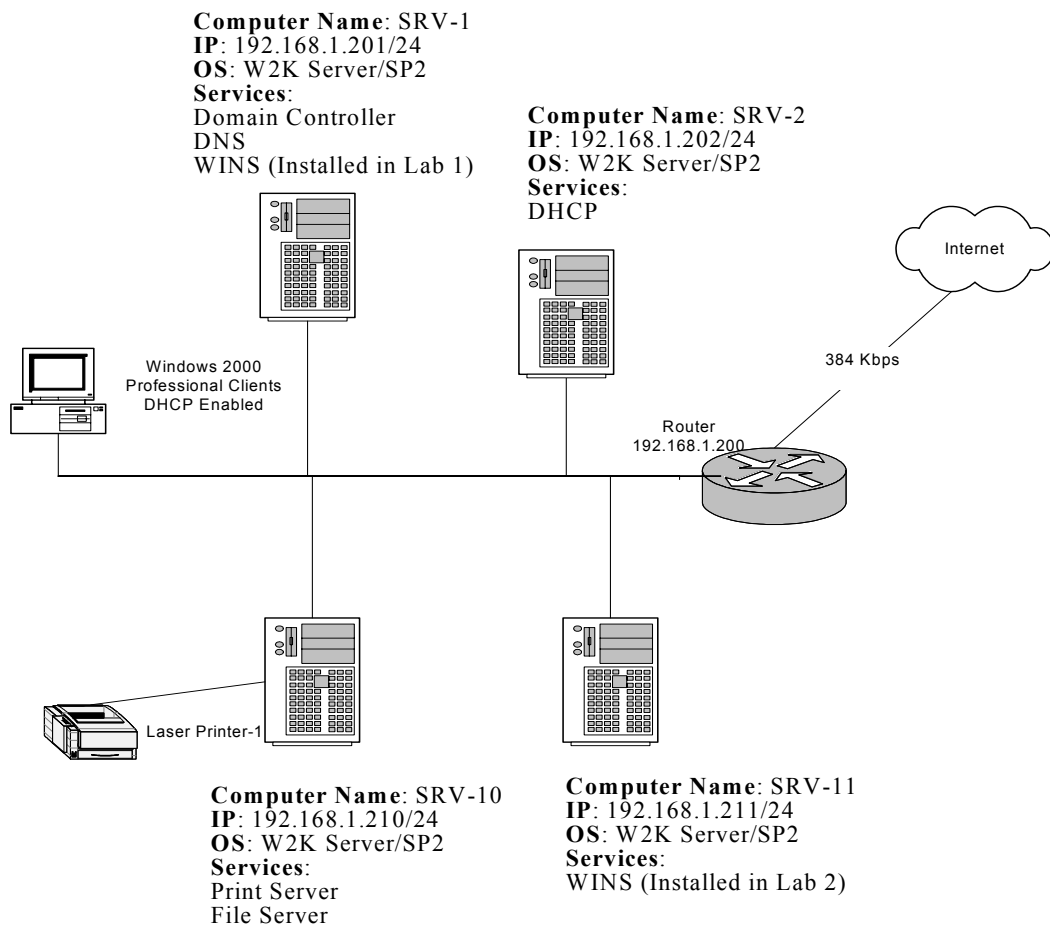
WINS

Lab

Computer Name: *SRV-1*
Static IP: *192.168.1.201/24*
OS*: W2K Server/SP2*
Services:
Domain Controller
DNS

Hub

Computer Name: *Client-1*
Static IP: 192.168.1.1/24
OS: W2K Professional/SP2

Computer Name: *SRV-11*
Static IP: *192.168.1.211/24*
OS*: W2K Server/SP2*
Services:
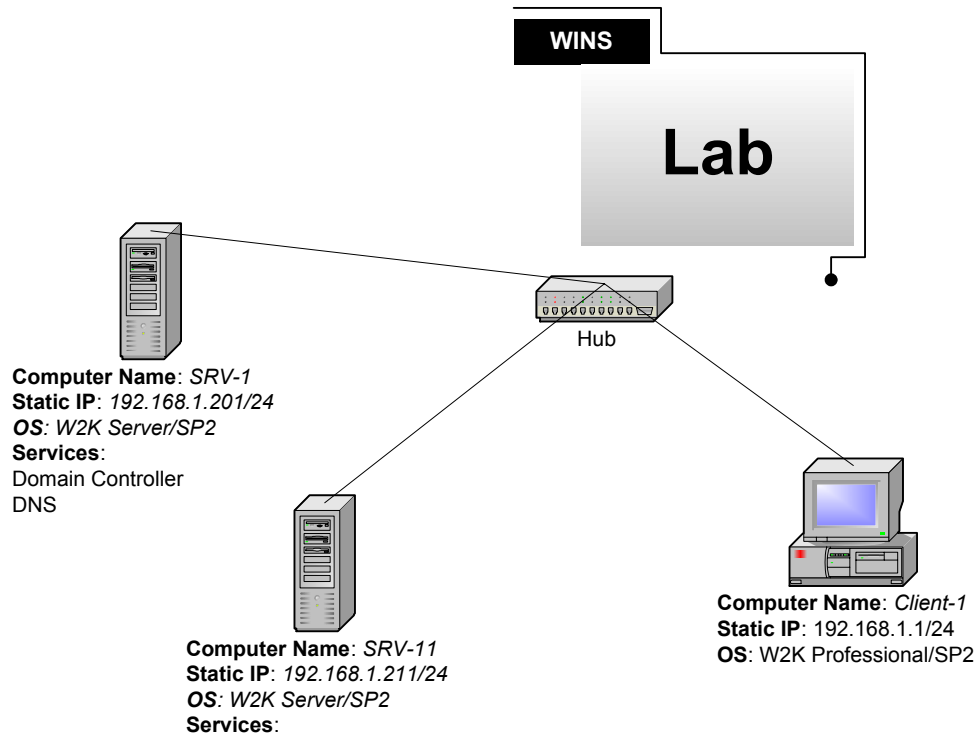
(figure 1)

Important Note
This lab should NOT be performed on a live production network. You should only use computer equipment that is not part of a business network AND is not connected to a business network. Train Signal Inc., is not responsible for any damages. Refer to the full disclaimer and limitation of liability which appears at the beginning of this document and on our web site, www.trainsignal.com.

Wired Brain Coffee's Network

Computer Name: SRV-1
IP: 192.168.1.201/24
OS: W2K Server/SP2
Services:
Domain Controller
DNS
WINS (Installed in Lab 1)

Computer Name: SRV-2
IP: 192.168.1.202/24
OS: W2K Server/SP2
Services:
DHCP

Internet

Windows 2000
Professional Clients
DHCP Enabled

384 Kbps

Router
192.168.1.200

Laser Printer-1

Computer Name: SRV-10
IP: 192.168.1.210/24
OS: W2K Server/SP2
Services:
Print Server
File Server

Computer Name: SRV-11
IP: 192.168.1.211/24
OS: W2K Server/SP2
Services:
WINS (Installed in Lab 2)

(figure 2)

Lab 1

Installing and Configuring the WINS Server & the WINS client

You will learn how to:

- Install and configure a WINS Server
- Search for registration records in the WINS database
- Create/Configure a WINS client
- Use the NBTStat command to reveal NetBIOS information

Scenario

Wired Brain Coffee, Inc., is a small startup company located in Seattle that distributes specialty coffee around the world. They have hired you recently to do some basic networking and get the current employees up and running as soon as possible. Currently, Wired Brain Coffee (WBC) has 15 employees, but within a few months, there will be over 100 full time employees. You were hired as a Jr. Network Administrator to ensure that the first group of employees has no problems with the network and also to prepare the network for rapid, future growth. Currently, your network is running only Windows 2000 Professional on the desktop machines but the integration of other operating systems (Windows 95/98) is possible, in the future. Your instructions are to install and configure a WINS infrastructure on the network in order to support NetBIOS name resolution. Initially, this will involve installing WINS on just one Windows 2000 server.

In Lab 1 you will install the WINS service on srv-1 and configure all of the computers on the network to register with and use srv-1 for NetBIOS name resolution. You will also check the WINS database to ensure that the computers are registering with WINS correctly. NBTSTAT, a command line program, will then be used to troubleshoot and monitor statistical information about NETBIOS on the network.

Computer Name: *SRV-1*
Static IP: *192.168.1.201/24*
OS: *W2K Server/SP2*
Services:
DNS
WINS

Computer Name: *SRV-11*
Static IP: *192.168.1.211/24*
OS: *W2K Server/SP2*
Services:
WINS CLIENT

Computer Name: *Client-1*
Static IP: 192.168.1.1/24
OS: W2K Professional/SP2
WINS CLIENT
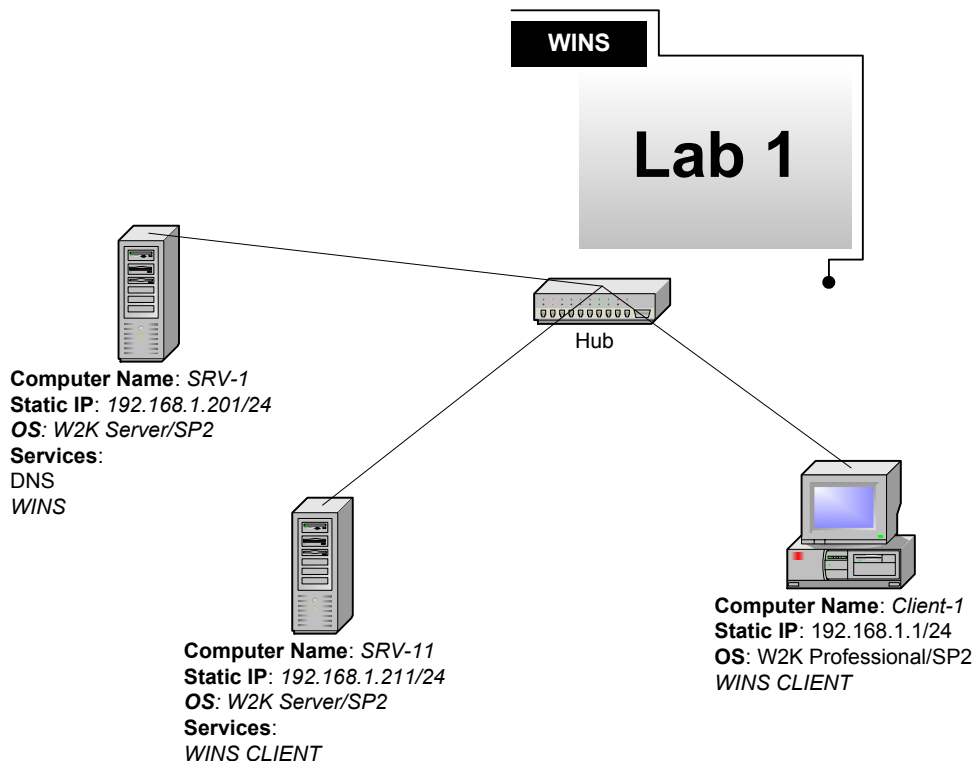
(figure 3)

Installing the WINS Service

1. On SRV-1 go to **Start→Settings→Control Panel.**
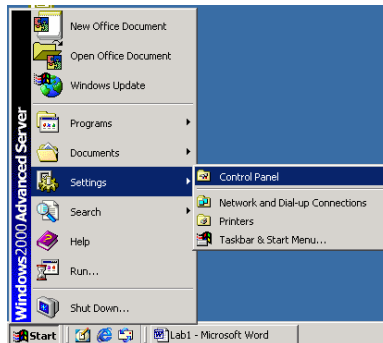
(figure 4)

2. Double click **Add/Remove Programs**, and then click on **Add/Remove Windows Components**.
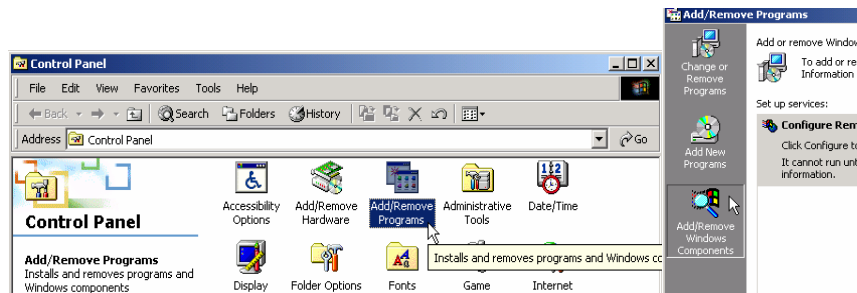
(figure 5)

3. On the next window scroll down and click on **Networking Services**. Then click **Details**. **DO NOT** check the Networking Services box, this will install of the sub-services under Networking Services!
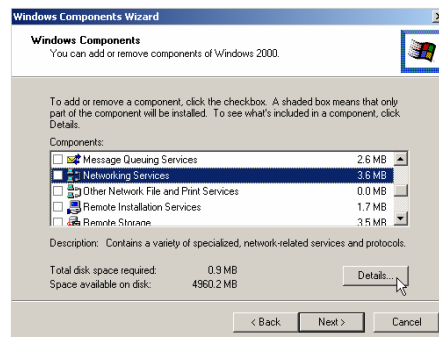
(figure 6)

4. Under the Networking Services window find and select **Windows Internet Name Service** (WINS). Click **OK**.
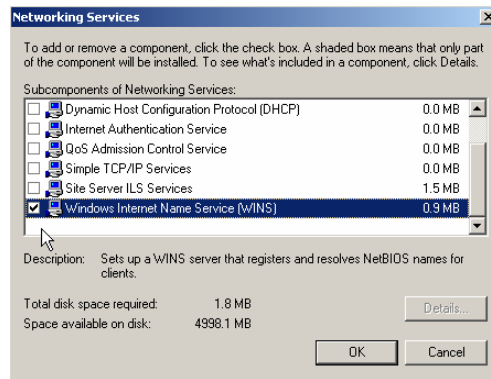
(figure 7)

5. Click **Next**, and make sure that you have your Windows 2000 server CD in the CD-ROM Drive (or browse for the I386 source files if prompted). Click **Next** for the installation to begin. When the installation is done click **Finish**.

Configuring WINS on a Windows 2000 Server

1. From your desktop go to **Start➔Programs➔Administrative Tools➔WINS.**

(figure 8)

2. On the WINS console you should see two folders underneath srv-1. One will say **Active Registrations**. The other will say **Replication Partners**. Within the active registrations folder you can search the WINS database for NetBIOS records, create static entries, import LMHOST files and delete records. The replication partners folder allows you to specify WINS replication partners. You can configure the settings to control how the partners replicate and you can also force replication between partners.
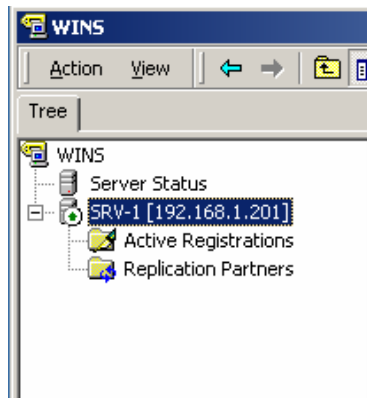
(figure 9)

3. Right click on **srv-1** and select **Properties**.

(figure 10)

© Train Signal, Inc., 2002
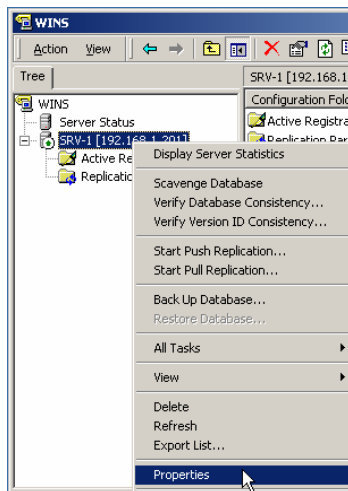
4. The first screen on the properties page is the **General** tab. On the general tab you have the option of changing the amount of time it will take for WINS to update its statistics. When you view the statistics for a WINS server it will give you up to date statistics like when the server started the WINS service, the total number of queries it has received and many other statistics to help monitor the WINS server. You can view the statistics by right clicking on the server and selecting **Display Server Statistics** instead of Properties. By default, it is set to automatically update every 10 minutes. You also have the option to specify where to backup the WINS database and whether or not you want it to backup when the server shuts down. After you specify a backup folder WINS will backup the entire database every three hours. The WINS database will not be backed up if you do not specify a location. Leave the settings at their defaults.
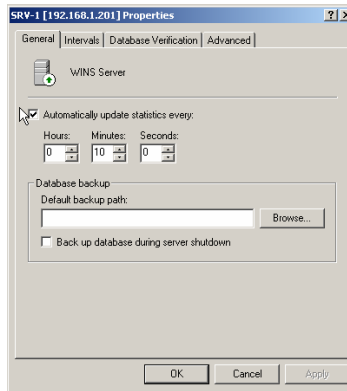
(figure 11)

6. Click on the **Intervals** tab. On the intervals tab, you can specify how often the client has to renew the registration of its NetBIOS name with the WINS server with the *Renew interval* setting. The *Verification Interval* setting controls how often the WINS server will verify database entries that it received from other WINS servers. Leave the **default** settings.
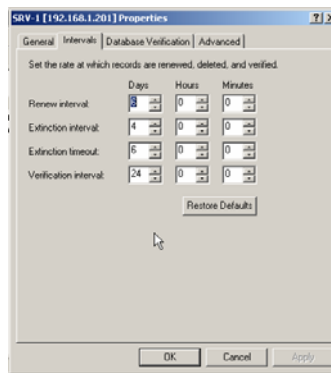
(figure 12)

7. Click on the **Database Verification** tab. On the database verification tab you can configure the server to check the WINS database to ensure that it is not corrupted. By default this is not enabled. You can enable it by checking the box next to **Verify database consistency**. By default its set to verify the database every 24 hours, if you enable it. **Begin verifying at:** tells the system how long to wait before doing its first verification. After the first verification, the database would then be verified every 24 hours. You can also set the number of maximum records to verify each time, so that it does not get overworked just verifying the database. The last setting gives you the option of having it verify against the server that owns the record or having it verify against randomly selected replication servers. Selecting it to verify against the server that owns the record takes a little longer to verify but is also more accurate than verifying against randomly selected replication servers. Leave the database verification **off** (**unchecked)**.
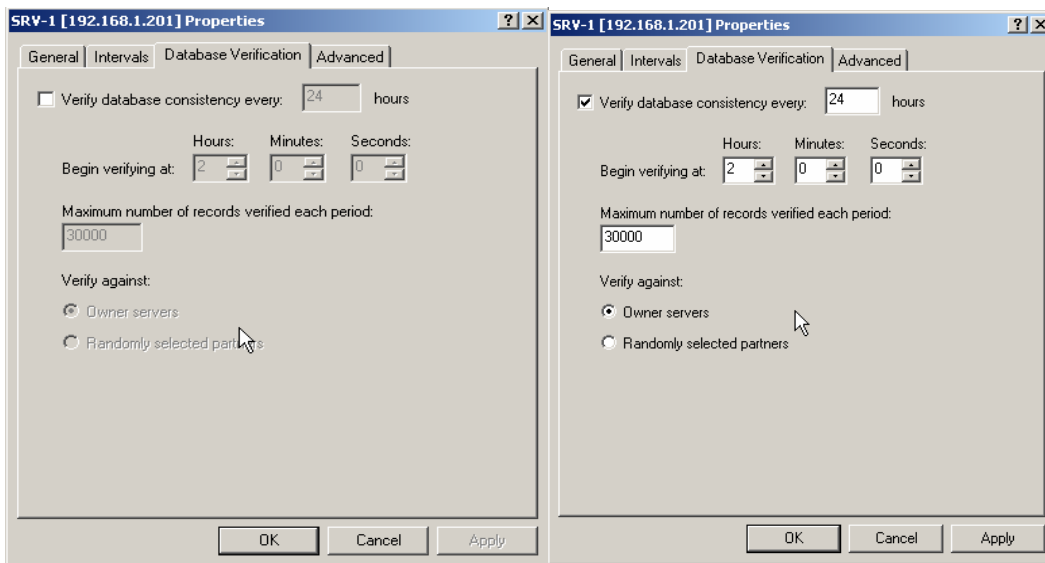
(figure 13)

8. Click on the **Advanced** tab. On the advanced tab you can enable logging of detailed events in the windows event log, but this is not recommended because it will slow the server performance. You can set the burst handling from the default setting of medium, to low, high or a custom setting. Burst handling informs the WINS client that is trying to register, that the server is busy. The server will allow the client access to the network and give the client a random amount of time to wait, before it tries to register again. This works well when there are a lot of WINS clients trying to register at the same time. The database path field tells you where the WINS database is located, by default it is in the *%windir%\system32\wins* folder. The starting version ID is a hexadecimal number that specifies the beginning version ID. This should start from zero unless you're restoring WINS and want it to begin from a higher version ID. The last option is whether or not you want to enable WINS names to use LAN Manager naming convention. This limits the computer names to 15-characters because the 16th byte is used to identify the name type. Windows 2000 follows the LAN Manager naming convention so this should be enabled unless your network will accept NetBIOS names form other sources. It will be enabled by default. Leave all the settings at their **defaults**. Click **OK**.

(figure 14)

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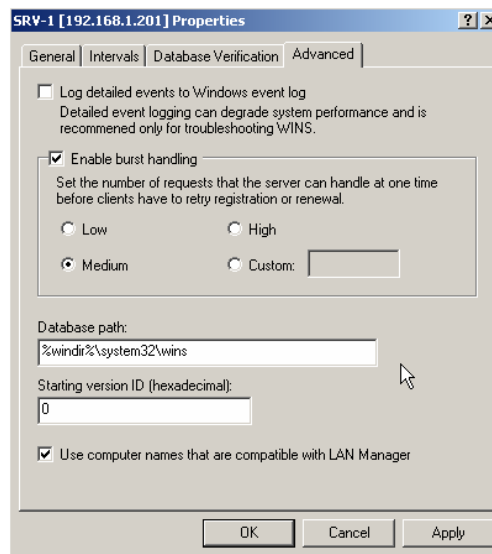
Configuring WINS Clients

1. Before you actually configure the WINS clients, you should make **srv-1** a WINS client of itself by pointing to itself for WINS. Any server running WINS should only include its own IP address in the WINS server field. Including the IP addresses of other WINS servers in this field can lead to database corruption. To set this up, open the **Internet Protocol (TCP/IP) properties**. Then click the **advanced** button.
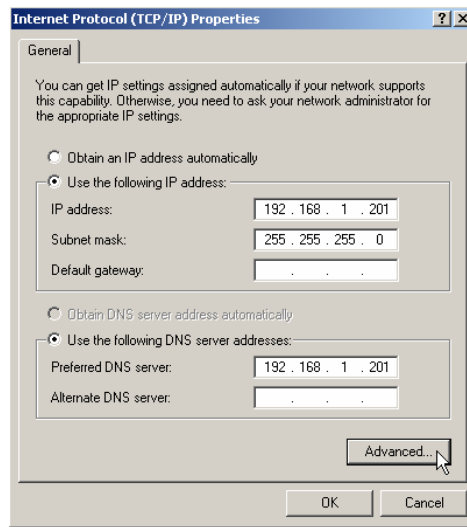
(figure 15)

2. On the advanced screen, select the **WINS** tab. Click **Add** and type in the IP address **192.168.1.201**. Notice that you can also import an LMHOST file from here and disable NetBIOS over TCP/IP as well. We will discuss both of these in more detail, later in this course. Click **OK**.
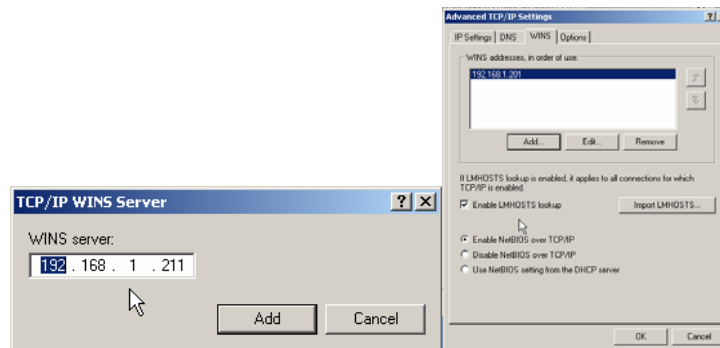
(figure 16)

3. Log on to **client-1** and repeat the steps for adding the WINS IP address. After you add the WINS server, restart client-1. Restarting client-1 will allow for it to register itself within the WINS database.

Note
You can also set the IP address of the WINS server through DHCP, if client-1 is a DHCP client.

Viewing the WINS Database on the Server

1. Log on to **srv-1** and open the WINS console. Right click on **Active Registrations.** On the menu notice your top two options are Find by Name and Find by Owner. If you are looking for particular NetBIOS name and know what the name begins with, then you can use the search by name option. If you want to look at what the WINS server has ownership of in its database you would choose find by owner. A WINS server "owns" a record if the WINS client first registered with that particular WINS server or if the record was statically created on the WINS server. If you choose to find by owner you will have to select which WINS server database you want to look at or you can choose to look at all the WINS server's databases. In your case, you only have one WINS server and you will want to find one particular record in the WINS database so try a search with the find by name option. Select **Find by Name**.
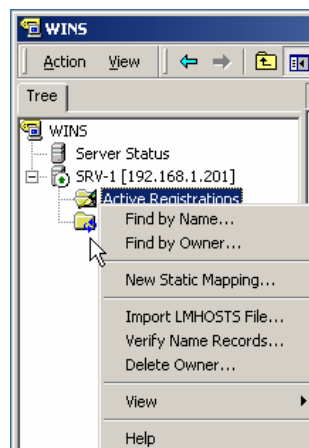
(figure 17)

2. There will be a dialog box that pops up where you can type in what name you want to search for. You can enter a specific computer name or you can enter an asterisk (*). The asterisk represents a wild card and entered alone basically means *All Records,* so it will search for every record. Click the **Find Now** button.
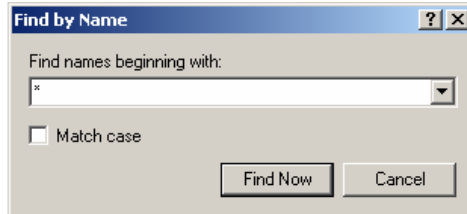
(figure 18)

3. You should now have everything that is in the WINS database show up in the right pane of the console. Notice that there are multiple entries for both srv-1 and for client-1. WINS clients register separately for different services they are running on their machines. One is called the Workstation service, which is the NetBIOS computer name; every WINS client will have this entry.   The second one is the messenger service that is used for sending and receiving messages for that WINS client. The third one is the server service; this entry will only appear if the computer is enabled with file and printer sharing. Windows 2000 Pro and Server have this enabled by default, Windows 9x systems do not. There is also an entry for the user "Administrator" as a messenger service so you are able to use the NET SEND command and send this user a message. The Workgroup entry shows the workgroup name that the WINS clients belong to. This service will allow WINS clients to browse to their workgroup or any other workgroup that WINS has on its database.
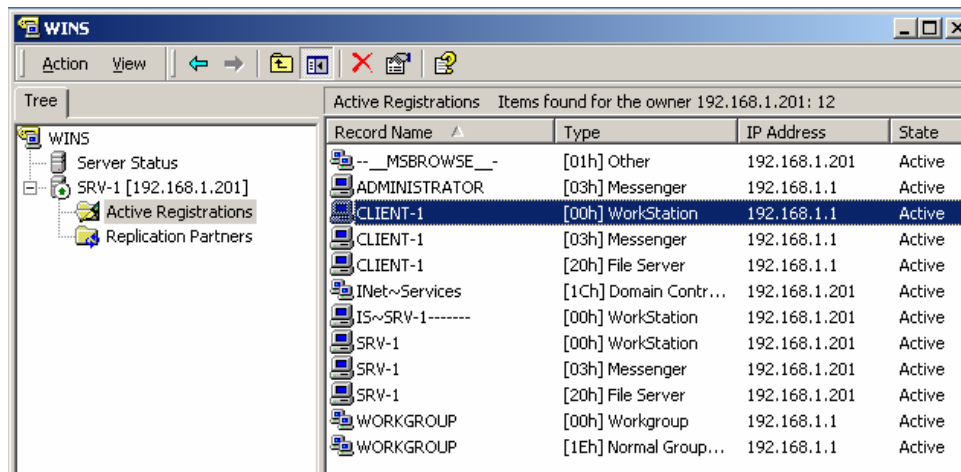
(figure 19)

Using NBTSTAT Commands

NBTSTAT is a command line program that will allow you to troubleshoot and monitor statistical information about NetBIOS over TCP/IP (NBT).

1. Log on to **client-1** and open the command prompt by entering **Start➔Run➔** and typing in **cmd**.

2. From the command prompt, type in **nbtstat** and press **enter**. Nbtstat is a command line utility that is used to show NetBIOS information associated with your computer. The screen you see will show you all the available switches that you can use with the nbtstat command and a brief overview of what each one does.

(figure 20)

3. Try running a few of these commands and look at the results you get. First, type in **nbtstat –a srv-1** and press **enter**. This will show you the NetBIOS entries that srv-1 would register with a WINS server. You can also run the same command using a capital "A" and the IP address instead of using a small "a" and the server name. This command would result in the same entries as the previous command. Also, this command can be run locally, on the system you are sitting at or across the network to get the NetBIOS table of a remote system, like we did in this example.

(figure 21)

4. From the command prompt type **nbtstat –c** and press **enter**. That will show all the NetBIOS entries your local computer has in its cache. Anytime, your system uses a NetBIOS name to communicate with another system, it will store the NetBIOS name and the IP address in a cache within the local system.

(figure 22)

5. From the command prompt, type **nbtstat –n** and press **enter**. This will show you the local name table of NetBIOS entries on client-1. If client-1 registered with a WINS server, these entries would all be included. In addition, this command is only used on your local system.

(figure 23)

6. From the command prompt type **nbtstat –r** and press **enter**. This will show you statistics on how your computer has resolved NetBIOS names. Client-1 should not have to broadcast because it's pointing to the WINS server. It would only broadcast if the WINS server was not available on the network and it did not have an entry in its local cache.

(figure 24)

Lab 2

Configuring Replication
between WINS Servers
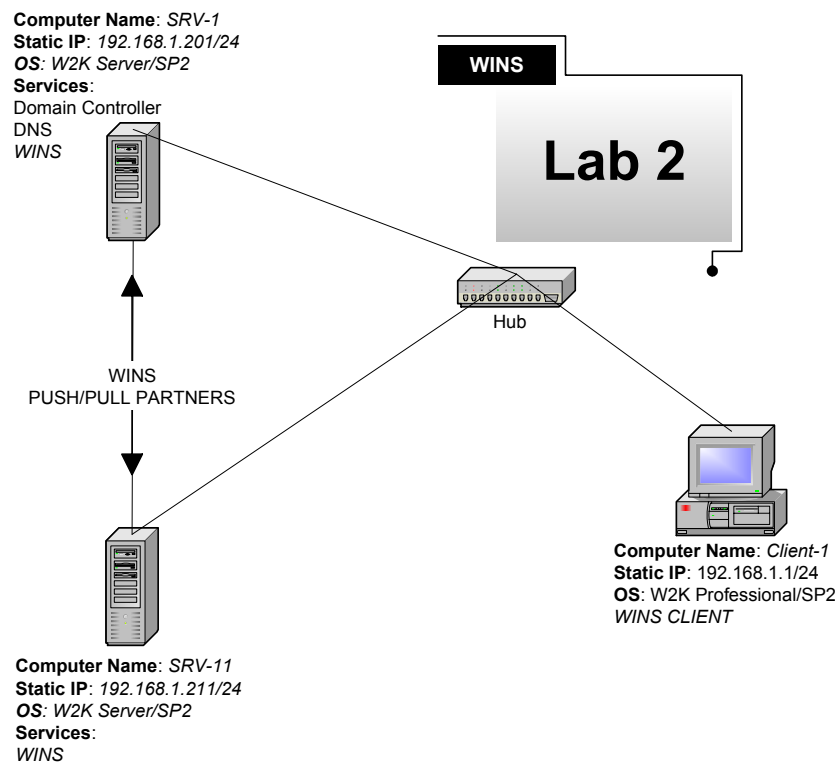
You will learn how to:

- Configure replication between WINS servers
- Differentiate between Push and Pull replication
- Delete and Tombstone WINS registrations
- Set up a WINS proxy agent

Scenario

Wired Brain Coffee's WINS server is running fine with no problems to speak of. The only *problem*, seems to be your new boss the network manager, Charlie. Charlie is concerned because the network is growing bigger by the day and the current network has added an interesting mix of client operating systems, including Windows 98, UNIX and Windows XP. Charlie explains to you, "WINS wasn't so important when were running just Windows 2000 on this network but are legacy computers, running Windows 98, depend upon the WINS service. It is also very likely that we will acquire another coffee distributor and their systems are all running legacy operating systems. Therefore, I would like you to *enhance* our network's WINS infrastructure. This will include adding fault tolerance as well as adding support for "non-WINS" clients, such as UNIX. Good job on your first project, now go do some real work," Charlie finishes. "Thanks for thoughts. Glad to have you here!" you sarcastically think to yourself.

In Lab 2 you will install the WINS service on srv-11 and configure WINS replication between srv-1 and srv-11. You will also add support for non-WINS clients by creating static mappings for each of the non-WINS (UNIX in this case) computers and by learning how to set up a WINS proxy agent.


Computer Name: *SRV-1*
Static IP: *192.168.1.201/24*
OS: *W2K Server/SP2*
Services:
Domain Controller
DNS
WINS

WINS

Lab 2

Hub

WINS
PUSH/PULL PARTNERS

Computer Name: *SRV-11*
Static IP: *192.168.1.211/24*
OS: *W2K Server/SP2*
Services:
WINS

Computer Name: *Client-1*
Static IP: 192.168.1.1/24
OS: W2K Professional/SP2
WINS CLIENT

(figure 25)

Installing and Configuring WINS Service on a Second Server

1. Log on to **srv-11** and install the WINS service. Before you install WINS, make sure that you disable the second NIC that may be installed from previous labs. ***WINS should not be installed on a multi-homed (2 network cards) computer.***

2. To disable the second NIC open the **My Network Places Properties** page. Right click on one of the connections and select **Disable**. The connection should now look grayed out.
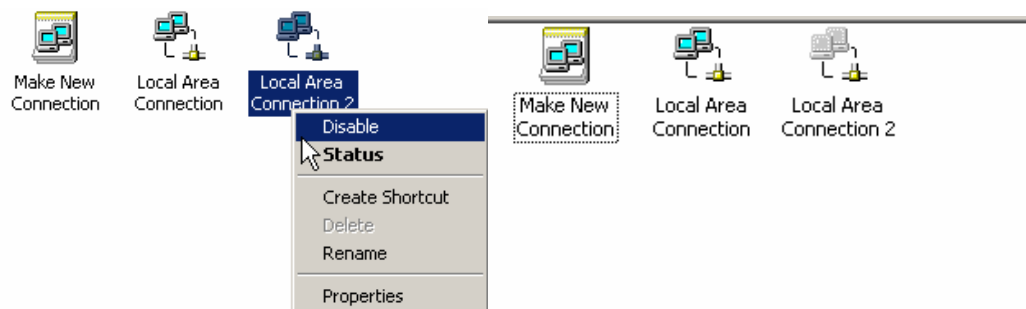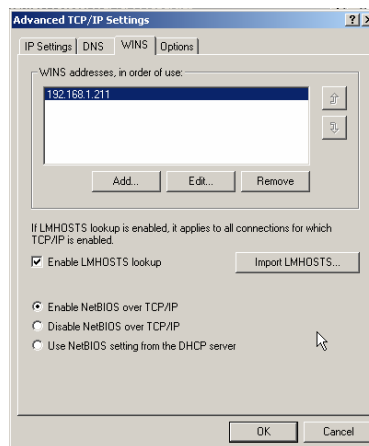

(figure 26)

3. After the installation of the WINS service on srv-11, you should open the **Internet Protocol (TCP/IP) Advanced** page and set srv-11 to point to itself for WINS resolution, by typing in the IP address **192.168.1.211**.

Note
Pointing one WINS server to another WINS server for its NetBIOS name resolution can lead to corruption of the WINS database. A WINS server should always point to itself, as pictured below.
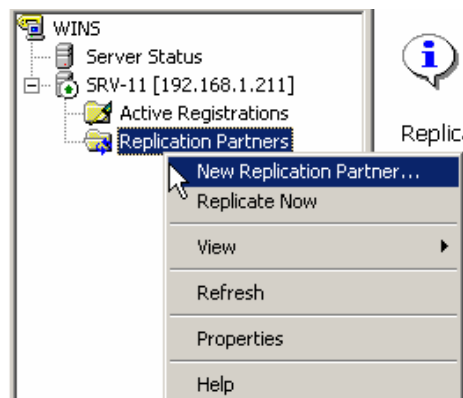

(figure 27)

Configuring Replication on WINS Servers

After you have added a second WINS server, one of the first things that you need to do is configure replication between the two WINS servers, by making them replication partners. This works in a similar fashion to zone transfers in DNS, except that both of the WINS servers are able to take registrations from clients and modify the entries. Remember, that in DNS, only the Primary DNS server was allowed to make any changes to the DNS database and the secondary DNS server would have a read only copy that was transferred from the primary. In WINS, all of the servers hold read & write copies of the master database and the WINS servers will periodically replicate to ensure that all of the WINS servers have an up to date database. For example if a client registers with the WINS server srv-11, then srv-11 will eventually replicate with its partner, srv-1 to ensure that srv-1 has up to date information on the WINS database. There are two types of replications in WINS, one is push and the other is pull. Push replication is set up based upon a predetermined number of changes to the WINS database. After this threshold is reached on one WINS server, that WINS server will go out and inform its replication partner that "a lot of changes have occurred to my database and it is probably a good idea for you to replicate them over." These changes are not *pushed* by the first server over to the second server. The first server simply notifies its replication partner of the changes and it is the second server's responsibility to go out and get the changes. Pull replication is based on time. If I configure pull replication to occur between two WINS servers every 24 hours, then every 24 hours, regardless of the number of changes, these servers will replicate. If you are in a hurry for replication to occur, you can always manually initiate it as well.
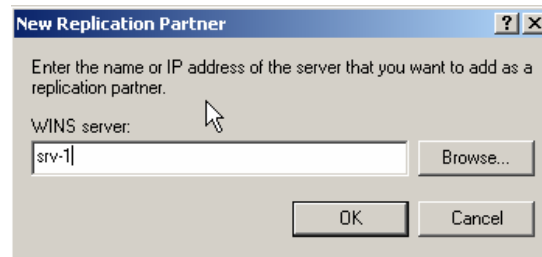
1. Open the WINS console on srv-11. Right click on replication partners and select **New Replication Partner**.
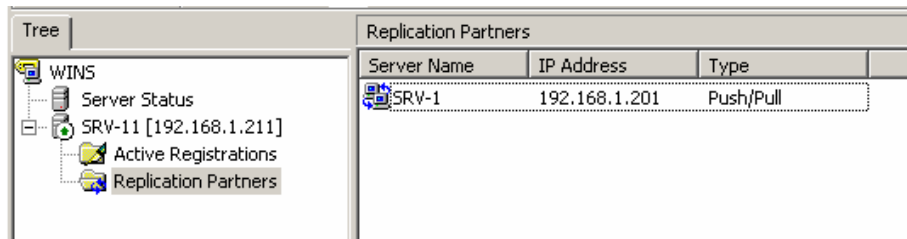

(figure 28)

2. A dialog box will pop up and ask for the name or IP address of the server that you want to add as a replication partner. Type in **srv-1** and click **OK**.
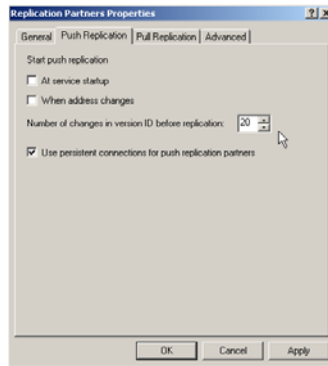

(figure 29)

3. You should now see srv-1 as a replication partner on the right pane of the WINS console. By default it will be set as a both a push and pull replication partner. To change these settings, right click on the **Replication Partners** folder and select **Properties**.
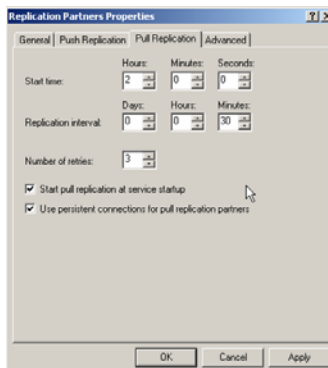

(figure 30)

4. On the properties page select the **Push Replication** tab. Here you can set when to initiate push replication. By default, push replication is set to occur after 0 changes, effectively disabling the push replication mechanism. You can also force it to push when the system starts up or when any address changes, both are disabled by default. The setting to use persistent connections for push replication is enabled by default. This is helpful because WINS servers usually disconnect from their replication partners each time replication is completed. With WINS servers that are connected through high-speed connections, its better keep the connections open, instead of closing them each time when they finish replicating. Enter **20**, for the number of changes field, to indicate that you want this WINS server to notify its partners after 20 changes to its database.
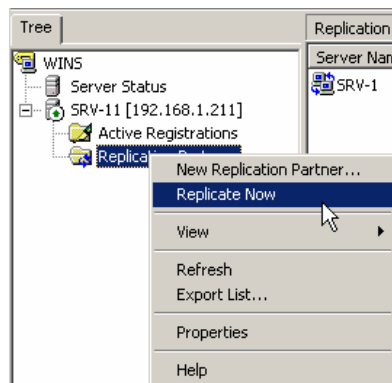

(figure 31)

5. Click on the **Pull Replication** tab. Here you can set a *time,* when the server will go out and initiate replication from the other server. The start time is used to set how soon the first pull replication occurs. It is set on zero by default. You can also set the replication interval, which will specify how often replication will take place, after the first replication occurs. The replication interval is set to 30 minutes by default. The setting to start replication at system startup is enabled by default, as is the setting to use persistent connections for pull replication partners. Leave the default settings for pull replication and click **OK**.
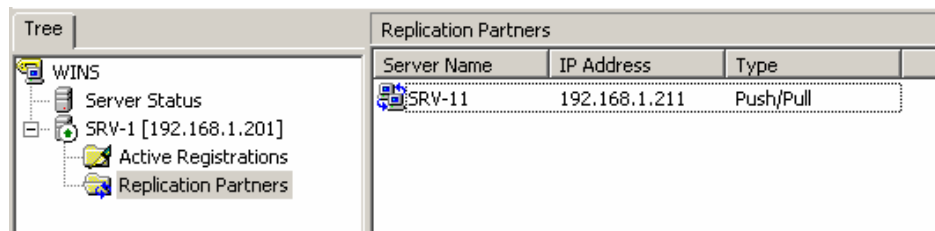

(figure 32)

6. At some point, you may want to force replication to occur between replication partners. Right click on the **Replication Partners** folder and select **Replicate Now**. A screen will pop up and ask you if you are sure that you want to replicate now. Select **Yes**. You will see a dialog box telling you that your request was queued to replicate with the WINS server and to check the event log for the status. Click **OK.** Typically, you would not use this option to replicate, but it can be very helpful when troubleshooting.

(figure 33)

7. Now log on to **srv-1** and add **srv-11** as a replication partner. Use the same settings as on srv-11. You will test replication in the next section after you create static mappings.
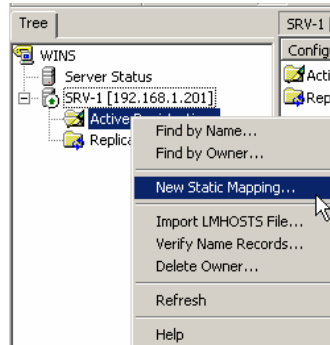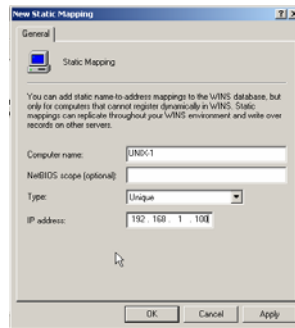

(figure 34)

Creating Static Mappings

1. Open the WINS console on **srv-1** and right click on the **Active Registrations** folder. Select **New Static Mapping**.
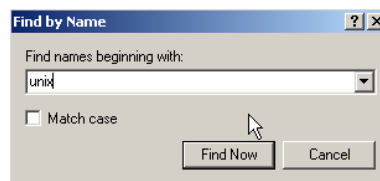

(figure 35)

2. A screen will pop up, allowing you to create a static mapping. For the computer name, enter **UNIX-1**. Leave the NetBIOS scope empty. The type of record should be **unique.** Next, type in the IP address of the UNIX client. Since this client does not really exist on our network lets just give it any IP address we have available. Use the IP address **192.168.1.100**. Click **OK**.

(figure 36)

3. From the WINS console right click on **Active Registrations** and **select Find by Name**. Do a search for all records that begin with **unix**.
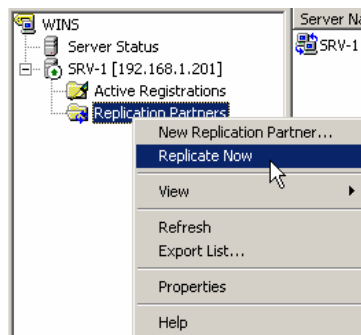

(figure 37)

4. In the right pane, you should see three entries for Unix-1, one for the messenger service, one for workstation service and one for file server service. Also notice that there is an "x" in the column under Static letting you know that this is a static entry. Take a look at the expiration date; it is set to *infinite* because the entry was manually created. If there is any change to this record, it must be done manually or else the WINS database will assume it is always going to be there.

(figure 38)

Forcing WINS Replication and Viewing Ownership of Records

1. Right click on **Replication Partners** and select **Replicate Now** to force replication between the WINS servers. The WINS server will now replicate with its replication partner, srv-11.

(figure 39)

2. Log on to **srv-11** and open the WINS console. Do a search for any record that begins with **unix**. You should get the same results as when you did this search on srv-1.

3. Create another static mapping. This time create it on srv-11. Create an entry for **UNIX-2** with the IP address of **192.168.1.102.** Then right click on **Replication Partners** and select **Replicate Now** to force WINS replication.

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4. Log on to **srv-1** and do a search for all records that begin with **unix.** You should get 6 results three for UNIX-1 and three for UNIX-2, showing that replication took place between the two WINS servers.

(figure 40)

5. On the right pane of the WINS console, find the column that has the **Expiration** and **Owner** information. The records for UNIX-1 show that the owner is the IP address 192.168.1.201, which belongs to srv-1. Now look at the records for UNIX-2, it shows that the owner for those records is the IP address 192.168.1.211, which belongs to srv-11. The owner of the record is always the WINS server where the record is created. Notice the expiration date for records is also different, UNIX-1 is Infinite and UNIX-2 has an expiration date. Remember that static mappings do not have an expiration date because they were manually created, therefore, they must be manually deleted. The reason that UNIX-2 has an expiration date is because it was replicated over from srv-11 and therefore has to be verified by srv-1 the next time the two WINS servers replicate. If the record is no longer on srv-11, then the corresponding record on srv-1 will expire on that date. If you log on to srv-11 and do the same search, you will see that UNIX-1 will have an expiration date and UNIX-2 will have an Infinite expiration.
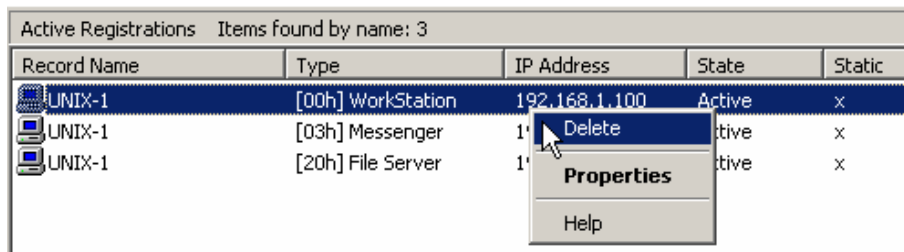

(figure 41)

Deleting and Tombstoning Records

When you want to delete a NetBIOS record from the WINS database you can't just delete it and assume that it is gone. Remember that each WINS server maintains its own read/write database. When a registration is randomly deleted from the WINS database, there is a very good chance that the entry will reappear…and leave you puzzled. What causes this? To truly delete a registration from the WINS database, you must delete the registration from the WINS server that is the owner of that record. The owner of the record is the WINS server that first registered the WINS client in the WINS database. If it is a static entry, then the server where the static entry was created would serve as the owner of the record. Just to make sure you understand, what do you do if you want to delete a record for client-1 that first registered with srv-11? You would have to go to the WINS database on srv-11 and delete the record there. Srv-1 would let you delete the record, but the record would show up again after replication between srv-1 and srv-11. There is another way of getting rid of this record. If you are in a large company and tracking down the server that owns a record is not your idea of fun, you can also *tombstone* a record. Think of tombstoning a record as *poisoning* the record. As replication occurs throughout the company, this same record will be "poisoned" on all of the WINS servers. Tombstoned records hang around until the next time the WINS database is scavenged (every 3 days by default), and then the record will be gone.

1. Log on to **srv-11** and open the WINS console. Do a search for any **NetBIOS** name that begins with **unix**. Find the workstation record for Unix-1 and right click on it. Select **Delete**.
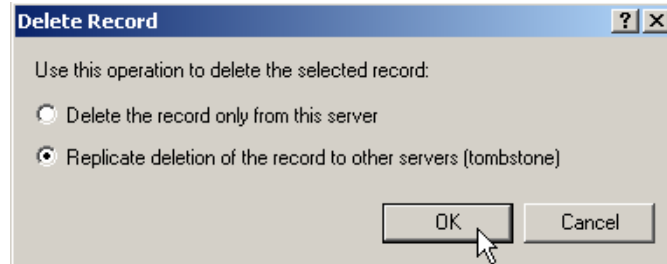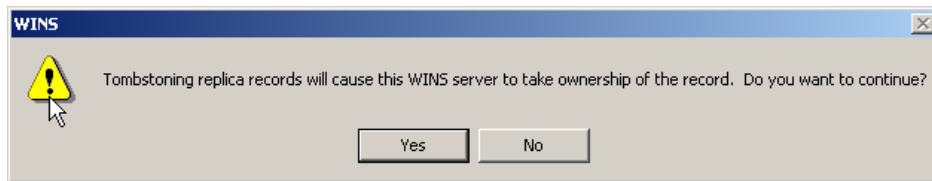

(figure 42)

2. There will be a pop up window that will give you the option of deleting the record only from this server or replicating the deletion of the record to other servers (tombstone). Select **Replicate the deletion of the record to other servers (tombstone).** Click **OK**.

(figure 43)

3. There will be a screen warning you that by tombstoning this record, this server will have to take ownership of the record and it will ask if you still want to continue. Click **Yes**.

(figure 44)

4. Look in the right pane of the WINS console and notice that the Unix-1 workstation record now shows that it is tombstoned and has an expiration date. This means that it will replicate to other WINS servers showing that the record is tombstoned and it will be deleted from each WINS server, the next time the WINS database is scavenged.

Record Name	Type	IP Address	State	Static	Owner	Version	Expiration
Active Registrations	Items found by name: 3						
UNIX-1	[00h] WorkStation	192.168.1.100	Tombstoned	x	192.168.1.201	21C	10/7/2002 2:49:01 P
UNIX-1	[03h] Messenger	192.168.1.100	Active	x	192.168.1.201	20F	Infinite
UNIX-1	[20h] File Server	192.168.1.100	Active	x	192.168.1.201	210	Infinite

(figure 45)

Creating and Configuring a WINS Proxy Agent

A WINS proxy agent is used on a network to assist non-WINS clients with NetBIOS name resolution. A non-WINS client is any pre-Windows 95, Microsoft operating system or a 3rd party operating system like UNIX or IBM's OS/2. Non-WINS clients can communicate locally by broadcasting for NetBIOS names, but are unable to communicate with NetBIOS computers on the other side of a router, because routers do not forward broadcasts. A WINS proxy agent is configured to listen for and assist any NetBIOS name resolution broadcasts made by non-WINS clients. The proxy agent will first check its local cache to try and resolve the name. If it is not cached locally, the proxy agent will forward the request to the WINS server on behalf of the non-WINS client. The WINS server will then respond to the proxy agent with the IP address of the NetBIOS name and the proxy agent will forward it on to the non-WINS client. To create a WINS proxy agent, all that you have to do is edit the registry on a WINS-enabled client. The entry is located under the subkey HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\NetBT\Parameters. The name of the entry is EnableProxy and the value must be set to 1.
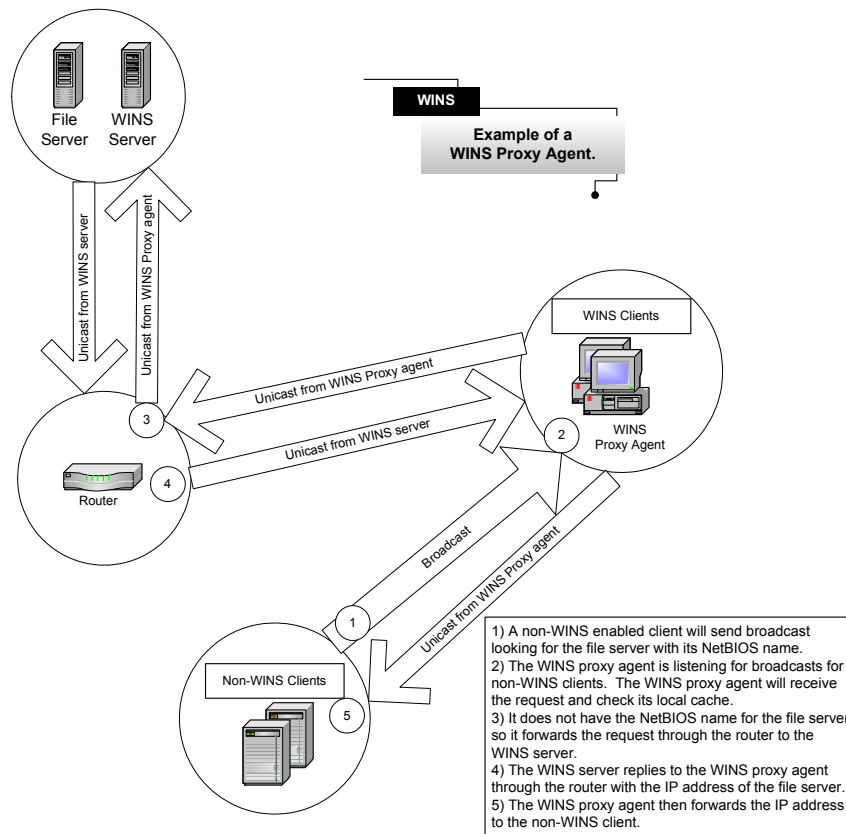
(figure 46)

Lab 3

Advanced WINS Settings

You will learn how to:

- Modify the LMHOSTS file
- Disable NetBIOS over TCP/IP (NBT)
- Design a WINS replication topology
- Configure WINS clients using DHCP
- Configure the WINS client's node-type

Scenario

Over time, Charlie has lightened up and has become much easier to work with. As a matter of fact, you are actually starting to like him! "You have done a great job building Wired Brain's WINS infrastructure," Charlie compliments you. "Now that you have it in place, I want you to learn more about how NetBIOS and WINS work, so you can troubleshoot any problems that we might face and also help me out with future planning." Wow, that sounds almost important! Kind of anyway.

In Lab 3 we will explore some of the details that are associated with NetBIOS and WINS, including how to disable NetBIOS if necessary, how to configure WINS using DHCP and how to design an efficient WINS replication topology.
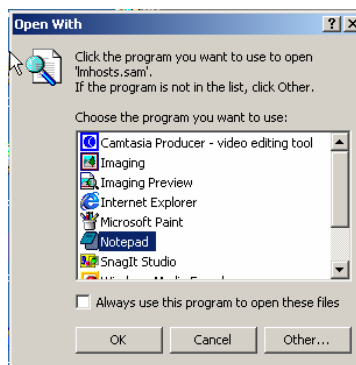
Using LMHOST Files

The LMHOST file is an ASCII based file (with no extension) that contains IP addresses and NetBIOS names. It is one method for resolving NetBIOS names to IP addresses. The LMHOST file predates the WINS server and can be used on networks to perform NetBIOS name resolution, although it is rarely used anymore. The LMHOST file may be useful in certain situations, though. For example you can set up the file to load a certain NetBIOS name and IP address in a computer's cache resulting in faster NetBIOS name resolutions. This would prevent a client from having to broadcast on the network or find a WINS server to resolve the NetBIOS name.

1. The location of the LMHOST file is **c:\winnt\system32\drivers\etc,** assuming that you installed Windows 2000 in c:\winnt.
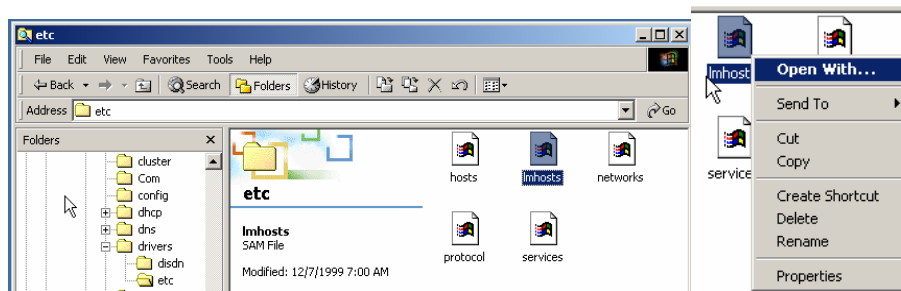
(figure 47)

2. To open the **LMHOST** file, right click on the file and select **Open With**.

3. There will be a screen that pops up and will ask you which program to open the file with. Select **Notepad** and click **OK**.

(figure 48)

4. That will open the file using notepad. The file will contain detailed information on how the LMHOST file works and the extensions that you can use. It will also show you an example of what the LMHOST file should look like.

```
#
# The following example illustrates all of these extensions:
#
# 102.54.94.97     rhino          #PRE #DOM:networking  #net group's DC
# 102.54.94.102    "appname  \0x14"                     #special app server
# 102.54.94.123    popular        #PRE                  #source server
# 102.54.94.117    localsrv       #PRE                  #needed for the include
#
# #BEGIN_ALTERNATE
# #INCLUDE \\localsrv\public\lmhosts
# #INCLUDE \\rhino\public\lmhosts
# #END_ALTERNATE
```

(figure 49)

Disabling NetBIOS Over TCP/IP

NetBIOS is a legacy Application Program Interface (API) that is used in Microsoft operating systems before Windows 2000. Windows 2000 uses the Winsock API and does not need NetBIOS to function. However, for legacy clients (anything before Windows 2000) to be able to participate on a Windows 2000 network, NetBIOS is enabled on Windows 2000 (in addition to Winsock) by default. If you have no computers on your network that run a legacy operating system AND you do not plan on adding any computers that run a legacy operating system in the future AND you do not have any applications that depend upon NetBIOS, then you can disable NetBIOS over TCP/IP. In a production environment, you should plan and test this carefully before you run around and disable NetBIOS on every machine. Disabling NetBIOS will make your network more secure and will cut down on the amount of traffic.

1. Log on to client-1. Open the **Internet Protocol (TCP/IP) properties**. Then click the **advanced** button.

(figure 50)

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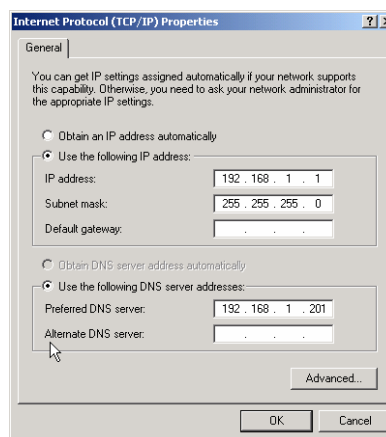
2. On the advanced screen, select the **WINS** tab. Notice that you have three options, one is to enable NetBIOS over TCP/IP another one is to disable NetBIOS over TCP/IP and one that tells the computer to use the setting from the DHCP server. Select **Disable NetBIOS over TCP/IP**. Click **OK**. This setting will need to be changed on every system, if you want to completely disable NetBIOS.

(figure 51)

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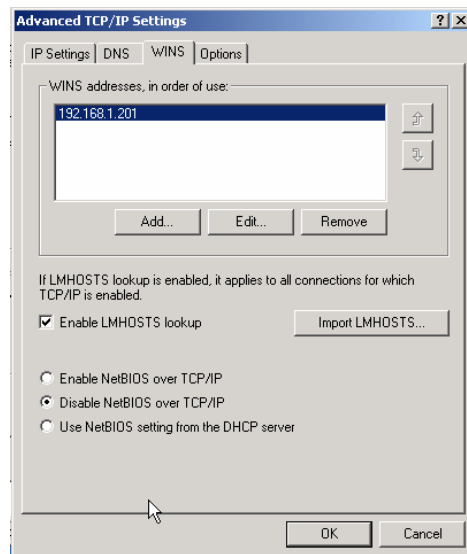
Designing WINS Replication
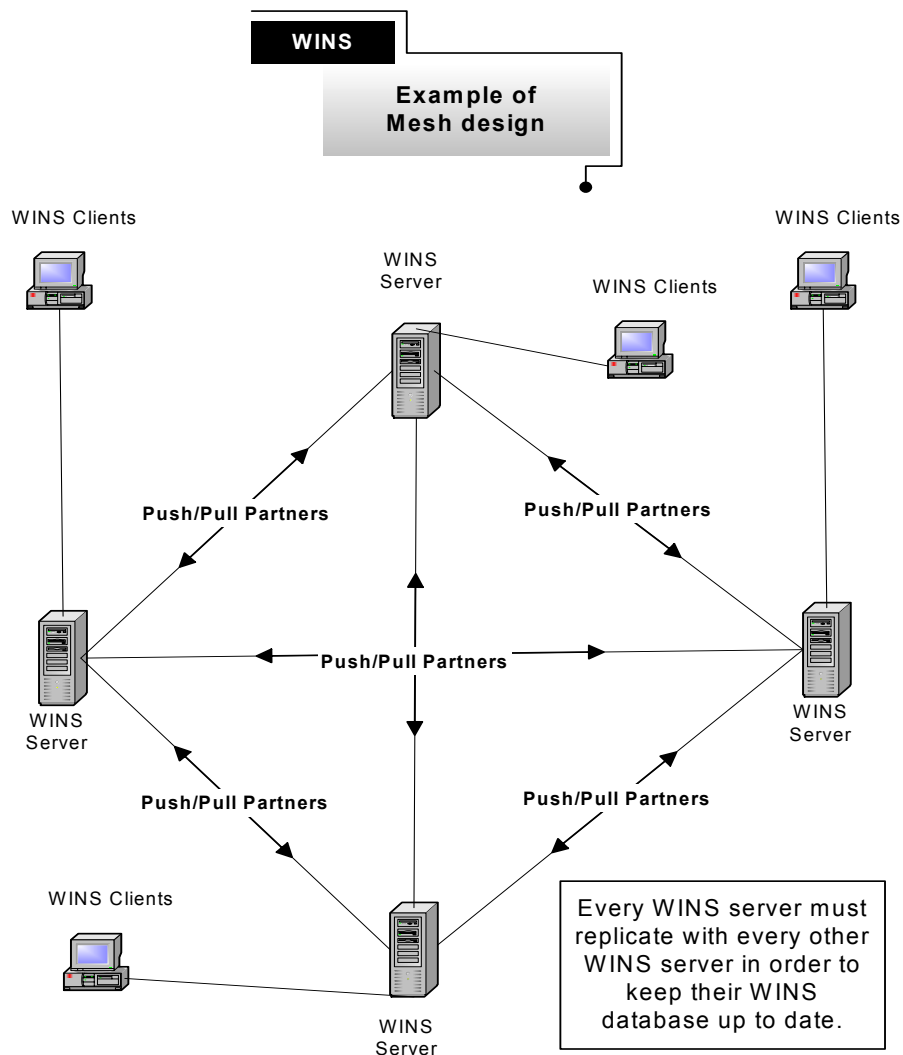
When configuring the WINS replication topology for more that 2 servers, a hub and spoke design is recommended. Many companies create a mesh design, where every WINS server is configured as a push/pull partner with every other WINS server. This often results in a corrupted WINS database, because the WINS servers get confused about conflicting entries. By using the hub and spoke-design, you are creating a central WINS server that all of the other WINS servers on the network will have as a push/pull partner. This will make it easier to configure replication, reduce WINS replication traffic and lessen the probability of having a corrupted WINS database.

(figure 52)

The Train Signal logo.

WINS

Example of Hub & Spoke design

WINS Clients

WINS Server

SPOKE

WINS Clients

WINS Clients

Push/Pull Partners

WINS Server

◄ Push/Pull Partners ►

HUB

◄ Push/Pull Partners ►

WINS Server

SPOKE

WINS Server

SPOKE

Push/Pull Partners

WINS Clients

WINS Server

SPOKE

The central WINS server known as the hub will gather the WINS databases from the other WINS servers on the network and combine them to form one main WINS database. All the other WINS servers on the network will be push/pull partners with the central WINS server only. This way all changes to the database are made to and from one main WINS database.
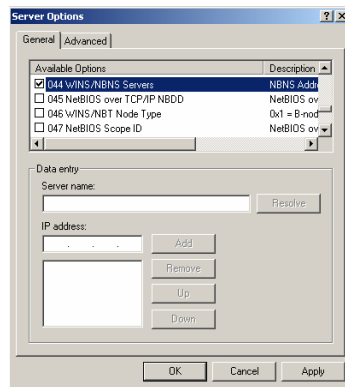
(figure 53)

Configuring the WINS Client Using DHCP

You can manually configure clients to use the WINS server, but using DHCP for WINS client configuration is much easier. The scope options within DHCP control what settings to give DHCP clients along with the IP address. One of the options it allows you to configure is the **044 WINS/NBNS Servers** option. This option allows you to assign the IP address of multiple WINS servers. All that you have to do here is enter the IP address or addresses of the WINS server the clients will point to for NetBIOS name registration and resolution, click Add and then click OK. **Because you do not have a DHCP server installed on srv-1 or srv-11 right now, you will not make the modifications described in this section.**

(figure 54)

A second option is the **046 WINS/NBT Node Type** setting, which is used to set the node type for the client. The node type is how the client handles NetBIOS name resolution. The node types are B-node, P-node, M-node and H-node. In order to set the node type you have to assign a numeric value based on the information that you see on the configuration screen.
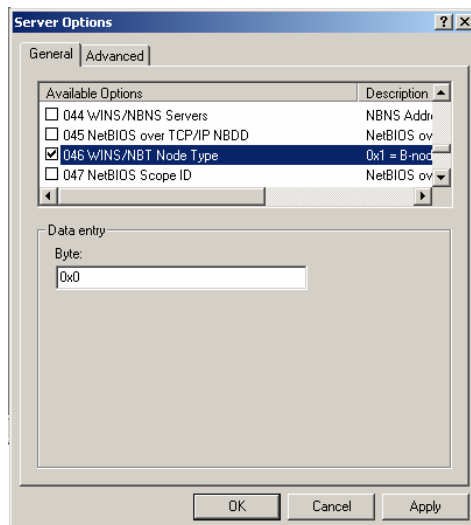
The B in **B-node** (0x1) stands for broadcast. Any computer set up as a B-node client, will send broadcasts out over the network to try and resolve NetBIOS names to IP addresses. The problem with using B-node is that it will create lots of traffic on your network and the NetBIOS broadcasts will not be able to pass through routers to other segments of your network.

The P in **P-node** (0x2) stands for point-to-point, meaning the client will point directly to a name server in order to resolve NetBIOS names to IP addresses. The problem with P-node clients is choosing which name server to point to and if that name server doesn't contain the answer for the resolution there is no other way to resolve the NetBIOS name. Broadcasting is not used with P-node.

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The M in **M-node** (0x4) stands for mixed; it's a combination of the B-node and the P-node. When a client is set to M-node it will *first* send out a broadcast, if the broadcast fails it will then try to communicate with a name server to resolve the NetBIOS name to an IP address. The problem with using M-node is that it will first broadcast on the network before communicating with the name server directly to resolve the Net BIOS name, which will create more traffic on the network.

The H in **H-node** (0x8) stands for hybrid; it's similar to the M-node in that it combines the B-node and P-node. The difference is that it will *first* communicate with the name server to try to resolve the NetBIOS name to an IP address and *then* send out a broadcast if the name server fails to resolve the NetBIOS name. WINS clients that are manually configured, default to H-node, and this setting is typically used within the company network as well.

(figure 55)