'_'_
Client Name:
Client Comment:
lıı||||
2.   In the Add Reserved Clients dialog box, type information to identify the first reserved client:
•——

l IP Address specifies an address from the reserved address pool. You can specify any
reserved, unused IP address. DHCP Manager checks and warns you if ~~aduplicate~~a duplicate or
nonreserved address is entered.

•——

' Unique Identifier usually specifies the media access control (MAC) address for the
client computer's network adapter card. You can determine this address by typing net
config wksta at the command prompt on the client computer.

•——

' Client Name specifies the computer name for this client. This is used for identification
purposes only and does not affect the actual computer name for the client. This is not
llllIIII||||I||Illl|Ill||I||lll |:|| II .||||| IIII.|:II :.||| Il |Il||
||.||||: I I Il II ||||.|| II||l|| I I ||||II|I|I| II|: |||||ll| ||||
||||||||||||| 11:1:111.1111 111.11.111.111.11111 I||||| || |.|1|Ll| |.| II
111111111.1111111111111111.111. :|.| Il |||::||.|
. Installing and Configuring DHCP Sewers 17of33
1. From the Scope menu, choose Add Reservations.
l I nj
un11lIr"l|'11'n1l1'||r' Hr-n'1|*\|»mln'n|"1F pmI"| wr! rlmnn 'wr r||*|l1
,,..»»~~ ,
111111||llII1i1|I||IIi|1I|I|I ||l||||u||l:|

available for MS-~~DOS based~~DOSbased clients~~,~~, in this case, only the Unique ~~Identifier~~identifier appears.

•——

l Client Comment is any optional text that you enter to describe this client.
3.   Choose the Add button to add the reservation to the DHCP database. You can continue to
add reservations without dismissing this dialog box.
4.   When you have added all reservations, choose the Close button.
After the IP address is reserved in DHCP Manager, the client computer must be restarted to be
configured with the new IP address.
If you want to change a reserved IP address for ~~aclient~~a client, you have to remove the old reserved

address and add a new reservation. You can change any other information about a reserved
client while keeping the reserved IP address~~.~~,
~~llJo~~ To change the reserved IP address
1.   Make sure the reserved client is not using the old IP address. To do this, shut down the
client computer immediately after issuing the ip ~~configlrelease~~config/release command on that client
computer.
2.   In the Active Leases dialog box, select the reserved IP address in the Client list, and
choose the Delete button. ~~Then~~Tnen choose the OK button.
3.   From the Scope menu, choose Add Reservations, and then enter information for a new
reservation as described earlier in this section~~.~~,
~~llJo~~ To change basic information for ~~areserved~~a resewed client
1.   From the Scope menu, choose Active Leases.
2.   In the Client list of the Active Leases dialog box, select the address of ~~the~~time reserved client
that you want to change, and then choose the Properties button.
3.   In the Client Properties dialog box, change the unique identifier, client name, or comment,
and then choose the OK button.
Note
You can only change values in the Client Properties dialog box for reserved clients.
You can also view and change the options types that define configuration parameters for
selected reserved clients by choosing the Options button in the Client Properties dialog box.
Changing options for a reserved client follows the same procedure as use to originally define
options, as described in "~~Defming~~Defining Options for Reservations" earlier in this chapter.

Managing the DHCP Database Files
The following files are stored in the \~~systemroot~~systemroof\SYSTEM32\DHCP directory that is created
when you set up a DHCP server:
•
~~DHCP.MDB~~' DHCPMDB is the DHCP database file.

•
~~DHCP.TMP~~DHCPTMP is a temporary file that DHCP creates for temporary database information.

•
l JET.LOG and the JET*.LOG files contain logs of all transactions done with the database.
These files are used by DHCP to recover data if necessary.

•
~~SYSTEM.MOB~~l SYSTEMMDE3 is used by DHCP for holding information about the structure of its database.

Caution
The DHCP.TMP~~, DHCP.MDB,~~. DHCPMDB. JET.LOG, and ~~SYSTEM.MDB~~SYSTEMMDB files should not be removed or
tampered with.
The DHCP database and related Registry entries are backed up automatically at a specific
interval (15 minutes by default), based on the value of Registry parameters (as described later
in this chapter). You can also forced database backup while working in DHCP Manager.

Troubleshooting DHCP
The following error conditions can appear to indicate potential ~~problems~~probiems with the DHCP server:
●
l The administrator can't connect for a DHCP server using DHCP Manager. The message
that appears might be, "The RPC ~~server~~ser\/er is unavailable."

●

l DHCP clients cannot renew the leases for their ~~IP~~lP addresses. The message that appears
on the client computer is, "The DHCP client ~~could~~couid not renew the IP address ~~lease~~Iease."

●

l The DHCP Client service or Microsoft DHCP Server service may be down and cannot be
restarted.
The first task is to make sure the DHCP services are running.
~~.,~~ To ensure the DHCP ~~services~~sewices are running
1.   Use the Services option in Control Panel to verify that the DHCP services are ~~runnmg~~running.
~~In~~ln the Services dialog box for the client computer, Started should appear in the Status
column for the DHCP Client service. For the DHCP server itself, the Started should appear
in the Status column for the Microsoft DHCP Server ~~servtce~~service.
2.   If a necessary service is not started on either computer, start the service.
In rare circumstances, the DHCP server may not boot or ~~aSTOP~~a STOP error may occur. If the DHCP
server is down, follow these steps to restart.
~~Chapter 4 Installing and Configuring DHCP Servers~~
~~.,.~~ To restart a DHCP ~~server~~sewer that is down
1.   ~~Tum~~Turn off the power to the server and wait one minute.
2.   ~~Tum~~Turn on the power, start Windows NT Server, and log on under an account with
Administrator rights.
3.   At the command prompt, type net start dhcpserver and press ~~ENTER~~Enter.
Note
Use Event Viewer to find the possible source of problems with DHCP services.

Restoring the DHCP Database
~~Ifyou~~If you ascertain that the DHCP ~~services~~sewices are running on both the ~~client~~ciient and server computers
but the error conditions described ~~earlier~~eariier persist, then the DHCP database is not available or
has becomes corrupted. ~~If~~lf a DHCP server fails for any reason, you can restore the database
from the automatic backup ~~files~~fiies.
~~.,.~~To restore a DHCP database
• Restart the DHCP server. If ~~the~~tbe DHCP database has become corrupted, it is automatically
restored from the DHCP backup directory specified in the Registry, as described later in
this chapter.
~~.,.~~To force the restoration of a DHCP database
~~•~~Set the value of RestoreFlag in the Registry to 1, and then restart the computer. For
information about this parameter, see "Registry Parameters for DHCP Servers" later in this
chapter.
~~.,.~~To manually restore a DHCP database
• ~~Ifthe~~If the two restore methods described earlier do not work, manually copy all DHCP
database files from the backup directory to the \DHCP working directory. Then restart the
Microsoft DHCP Server service.

Backing up the DHCP Database onto Another Computer
You may also find a situation where you need to backup ~~aDHCP~~a DHCP database to another
computer. To do this, follow these steps.
~~.,.~~To move a DHCP database
• Use the Replicator service to copy the contents of the DHCP backup directory to the new
computer~~.,~~.

Advanced Configuration Parameters for DHCP
This section presents configuration parameters that affect the behavior of DHCP servers and
clients, and that can be modified only through Registry Editor. For the changes to take effect
after you modify any of these value entries, you must restart the Microsoft DHCP ~~Server~~Sen/er
service for server parameters or the DHCP Client service for client parameters.
~~Caution~~CauUon
You can impair or disable Windows NT if you make incorrect changes in the Registry while

using Registry Editor. Whenever possible, use DHCP Manager to make configuration changes,
rather than using Registry Editor. ~~If~~lf you make errors while changing values with Registry Editor,
you will not be warned, because Registry Editor does not recognize semantic errors.
~~lJJ!>~~ To make changes to the DHCP ~~server~~sewer or client configuration using Registry Editor
1.   Run REGEDT32.EXE from File Manager or Program Manager, or at a command prompt,
type start regedt32 and press ENTER~~.~~,
When the Registry Editor window appears, you can press ~~Fl~~F1 to get Help on ~~how~~pow to make
changes in Registry Editor~~.~~,
2.   In Registry Editor, click the window titled HKEY_LOCAL_~~MACHINE~~ MACHlNE on Local Machine, and ~~then click~~ tnen Click the icons for the SYSTEM subtree until you reach the subkey for the specific
parameter, as described in the following sections.
The following sections describe the value entries for parameters for DHCP servers and clients
that can be set only by adding an entry or changing their values in Registry Editor.

~~Chapter 4 Installing and Configuring DHCP Servers~~ Advanced Configuration Parameters for DHCP
Registry Parameters DHCP Servers
~~When~~Wrren you change any of these parameters except ~~RestoreFiag~~RestoreFIag, you must restart the
computer for the changes to take effect. For the RestoreFlag parameter, you must restart the
Microsoft DHCP Server service.
The Registry parameters for DHCP servers are specified under the following key:
~~.~~.
SYSTEM\current\~~currentcontrolset~~cu1'rentcontrolset\services\DHCPServer\Parameters
~~APIProtocoiSupport~~ AP|ProtocoISupport
Data type = REG_DWORD
Range = ~~Oxl, Ox~~0x1, 0x2, ~~Ox~~OX4, ~~Ox~~0x5, ~~Ox~~0x7 ~~Default =Oxl~~ Defauit : 0x1
Specifies the supported protocols for the DHCP server. You can change this value to
ensure that different computers running different protocols can access the DHCP server.
The values for this parameter can be the following:
~~Oxl For RPC over TCPIP protocols Ox2 For RPC over named pipes protocols Ox4 For RPC over local procedure call (LPC) protocols Ox5 For RPC over TCPIP and RPC over LPC Ox7 For RPC over all three protocols (TCP/IP, named pipes, and LPC)~~
BackupDatabasePath
Data type = REG_EXPAND_SZ
Range =~~filename~~ Hlename
Default = %SystemRoot%\system32\dhcp\backup

Specifies the location of the backup database file where the database is backed up

periodically. The best ~~location~~Iocation for the backup file is on another hard drive, so that the

database can be recovered in case of ~~asystem~~a system drive crash. Do not specify ~~anetwork~~a network

drive, because DHCP Manager cannot access a network drive for database backup and

recovery.

~~BackupInterval~~ BackupInterval

Data type = REG_DWORD

Range = no limit

Default = 15 minutes

Specifies the interval for backing up the database.

~~DatabaseCieanupInterval~~ DatabaseCleanupInterval

Data type = REG_DWORD

Range = No limit

Default = ~~0x~~0X15180 (864,000 minutes - 24 hours)

Specifies the interval for cleaning up expired client records from the DHCP database,

0x1

0x2

0x4

0x5

0x7

For RPC over TCPIP protocols

For RPC over named pipes protocols

For RPC over local procedure call (LPC) protocols

For RPC over TCPIP and RPC over LPC

For RPC over all three protocols (TCP/IP, named pipes, and LPC)

freeing up those IP addresses for reuse.

~~DatabaseI..oggingFiag~~ DatabaseLoggingFIag

Data type = REG~~-~~-DWORD

Range = 0 or 1

Default = 1 (true-that is, database logging is enabled)

Specifies ~~whether~~ Whether to record the database changes in the ~~JET.LOG~~JETLOG file. This log file is used

after ~~asystem~~a system crash to recover changes that have not been made to the database file

defined by DatabaseName. Database logging affects system performance, so ~~DatabaseI..ogging~~

DatabaseLogging can be turned off if you believe the system is highly stable and ~~iflogging~~if

logging is adversely affecting system performance.

DatabaseName

Data type = REG_~~SZ~~sz

Range = filename

Default =~~dhcp.mdb~~ dhcpmdb

Specifies the name of the database file to be used for the DHCP client information

database.

DatabasePath

Data type = REG__EXPAND_SZ
Range = pathname
Default = %SystemRoot%\System32\dhcp
Specifies the location of the database files that have been created and opened.
~~RestoreFlag~~ RestoreFlag
Data type = REG_ ~~DWORD~~ DwoRD
Range = ~~0or~~ 0 or 1
Default = 0 (false- ~~that~~ tlwat is, do not restore)
Specifies ~~whether~~ Whether to restore the database from the backup directory.
This flag is reset
automatically after the successful restoration of the database.

Advanced Configuration Parameters for DHCP
Registry Parameters for DHCP Clients
The Registry parameters for DHCP clients are specified under the following
key:
.. SYSTEM\current\currentcontrolset\services\DHCP\Parameter\<option#>
The ~~Option~~ Opt/on# keys are a list of DHCP options that the client can request
from the DHCP server.
For each of the default options, the following values are defined:
RegLocation
Data type = REG__SZ
Default = Depends on the Registry location for the specific option
Specifies the location in the Registry where the option value is written when
it is obtained
from the DHCP server. The "~~!~~?" character expands to the adapter name for which
this
option value is obtained.
KeyType
Data type = REG_DWORD
Default ~~=Ox~~ : 0x7
Specifies the type of Registry ~~key~~ Key for the option.
~~Guidelines for Setting Local Policies~~
. Installing and Configuring DHCP Servers 24 of 33

This section provides some suggestions for setting lease options, dividing
the free address
pool among DHCP servers, and avoiding DNS naming problems.
Installing and Configuring DHCP Sewers
Guidelines for Setting Local Policies
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Guidelines for Setting Local Policies
Guidelines for Managing DHCP Addressing Policy
Allocation of IP addresses for distribution by DHCP servers can be done
dynamically or
manually. These methods use the same DHCP ~~client~~ olient~server protocol, but
the network
administrator manages them differently at the DHCP server.
Dynamic Allocation of IP Addresses
Dynamic allocation allows ~~aclient~~ a client to be assigned an IP address from
the free address pool.
The lease for the address has a lease duration (expiration date), before which
the client must

renew the lease to continue using that address. Depending on the local lease policies ~~defmed~~defined
by the administrator, dynamically allocated addresses can be returned to the free address pool
if the client computer is not being used, if it is moved to another subnet, or if its lease expires.
Any IP addresses that are returned to the free address pool can be reused by the DHCP server
when allocating an IP address to a new client. Usually the local policy ensures that the same IP
address is assigned to a client each time that system starts and that addresses returned to the
pool are reassigned.
After the renewal time of the lease time has passed, the DHCP client enters the renewing state
(as described in Chapter 3, "Networking Concepts for TCP/~~IP~~lP"). The client sends a request
message to the DHCP server that provided its configuration information. ~~Ifthe~~lf the request for a
lease extension fits the local lease policy, the DHCP server sends an acknowledgment that
contains the new lease and configuration parameters. The client then updates its configuration
values and returns to the bound state.
When the DHCP client is in the renewing state, it must release its address immediately in the
rare event that the DHCP server sends a negative acknowledgment. The DHCP server sends
this message to inform ~~aclient~~a client that it has incorrect configuration information, forcing it to
release its current address and acquire new information.
~~Ifthe~~If the DHCP client cannot successfully renew its lease, the client enters ~~arebinding~~a rebinding state. At
this stage, the client sends a request message to all DHCP servers in its range, attempting to
renew its lease. Any server that can extend the lease sends an acknowledgment containing the
extended lease and updated configuration information. ~~Ifthe~~lf the lease expires or if a DHCP server
responds with a negative acknowledgment, the client must release its current configuration and
return to the initializing state. (This happens automatically, for example, for ~~acomputer~~a computer that is
moved from one subnet to another.)
~~Ifthe~~lf the DHCP client uses more than one network adapter to connect to multiple networks, this
protocol is followed for each adapter that the user wants to configure for TCP/~~IP~~lP. Windows NT
allows multihomed systems to selectively configure any combination of the system's interfaces.
You can use ~~the~~tne ipconfig utility to view the local IP configuration for ~~aclient~~a client computer.
When a DHCP-enabled computer is restarted, it sends a message to the DHCP server with its

current configuration information. The DHCP server either confirms this configuration or sends
a negative reply so that the client must begin the initializing stage again. System startup might
therefore result in a new IP address for ~~aclient~~a client computer, but neither the user nor the network
administrator has to take any action in the configuration process. ~~Chapter 4 Installing and Configuring DHCP Servers~~
Manual Allocation of IP Addresses
Manual allocation follows the policy used in most current TCP/~~IP~~lP
implementations. With this
method, the network administrator defines the IP address and other configuration options that

the DHCP servers will provide for a particular computer. The DHCP servers respond based on
the client's unique identifier, which is the network adapter's MAC-layer address. Any IP
addresses assigned in this way cannot be allocated by DHCP servers to other clients using
either automatic or dynamic allocation. The address has ~~apermanent~~a permanent lease.
For example, for the range of IP addresses to be provided ~~through~~tnrough RAS servers, these
addresses should be manually excluded from the range of dynamically allocated addresses.

Guidelines for Setting Local Policies
Guidelines for Lease Options
To define appropriate values for lease duration, you should consider the frequency of the
following events for your network:
●———
' Changes to DHCP options ~~arid~~and default values

●———
' Network interface failures

●———
l Computer removals for any purpose

●———
' Subnet changes by users because of office moves, laptop computers docked at different
workstations~~,~~. and so on
~~All~~An of these types of events cause IP addresses to be released by the client or cause the
leases to expire at the DHCP server. Consequently, the ~~IP~~lP addresses will be returned to the
free address pool to be reused.
~~Ifmany~~If many changes occur on your ~~internetwork~~intemetwork, you should assign short lease times, such as two

weeks. This ~~way~~Way, the addresses assigned to systems that leave the subnet can be reassigned
quickly to new DHCP client computers requesting TCP/IP configuration information.
Another important factor is the ratio between connected computers and available IP addresses.
For example, the demand for reusing addresses is low in a network where 40 systems share a
class ~~Caddress~~C address (with 254 available addresses). ~~Along~~A long lease time such as two months would
be appropriate in such a situation. However, if 230 computers share the same address pool,
demand for available addresses is much greater, so a lease time of a few days or weeks is
more appropriate.
Notice, however, that short lease durations require that the DHCP server be available when the
client seeks to renew the lease. So backup servers are especially important when short lease
durations are specified.

Guidelines for Setting Local Policies
Guidelines for Partitioning the Address Pool
You will probably decide to install more than one DHCP server, so the failure of any individual
server will not prevent DHCP clients from starting. However, DHCP does not provide ~~away~~a way for
DHCP servers to cooperate in ensuring that assigned addresses are unique. Therefore, you
must divide the available address pool among the DHCP servers to prevent duplicate address
assignment.
~~Atypical~~A typical scenario is a local DHCP server that maintains TCP/IP configuration information for
two subnets. For each DHCP server, the network administrator allocates 70 percent of the IP
address pool for local clients and 30 percent for clients from the remote subnet, and then
configures a relay agent to deliver requests between the subnets.
This scenario allows the local DHCP server to respond to requests from local DHCP clients
most of the time. The remote DHCP server will assign addresses to clients on the other subnet
only when the local server is not available or is out of addresses. This same method of
partitioning among subnets can be used in a multiple subnet ~~s cenario~~scenario to ensure the availability
of a responding server when a DHCP client requests configuration information.

Guidelines for Setting Local Policies
Guidelines for Avoiding DNS Naming Conflicts
DNS can be used to provide names for network resources, as described in Chapter 3,

"Networking Concepts for TCP/~~IP~~1P." However, DNS configuration is static. With DHCP, a host
can easily have a different IP address if its lease expires or for other reasons, but there is no
standard for updating DNS servers dynamically when IP address information changes.
Therefore, DNS naming conflicts can occur if you are using DHCP for dynamic allocation of ~~IP~~1P
addresses.
This problem will primarily affect systems that extend internetworking services to local network
users. For example, a server acting as an anonymous FTP server or as an e-mail gateway
might require users to contact it using DNS names. In such cases, such clients should have
reserved leases with an unlimited duration..
For workstations in environments that do not require the computers to register in the DNS
name space, DHCP dynamic allocation can be used without problems.
~~Chapter 4~~ Installing and Configuring DHCP Servers <u>29 of 33</u>

<u>Guidelines for Setting Local Policies</u>
Using DHCP with Diskless Workstations
~~Ifyour~~<u>If your</u> network includes diskless workstations or ~~Xterminal~~<u>X terminal</u>
BOOTP clients that need
configuration information to use TCP/IP, you must build profiles. (BOOTP is the ~~intemetworking~~
<u>internewvorking</u> Bootstrap Protocol used to configure systems across ~~intemetworks~~<u>internetworks</u>. DHCP is
an extension of BOOTP.)
You might decide to continue to manage these workstations using your existing BOOTP
servers. If so, you must be sure to exclude these addresses from the free address pool
maintained by the DHCP server.
<u>Installing and Configuring DHCP Servers 30 of 33</u>

Planning ~~aStrategy~~<u>a Strategy</u> for DHCP
This section describes how to develop strategies for placing DHCP servers on small-scale and
large-scale installations. Most network administrators implementing DHCP will also be planning
a strategy for implementing WINS servers. The planning tasks described here also apply for
WINS servers, and in fact, the administrator ~~will~~<u>Will</u> probably want to plan DHCP and WINS
implementation in tandem.
The following describes the general planning tasks:
1.   Compile a list of a requirements, including:
•

<u>'</u> Client support (numbers and kinds of systems to be supported)

•

l Interoperability with existing systems, especially requirements for mission--critical
accounting, personnel, and similar information systems

- l Hardware support and related software compatibility (including routers, ~~switches~~switciwes, and
servers)

- ' Network monitoring software, including SNMP requirements and other tools
2.   Isolate the areas of the network ~~where~~Where processes must continue uninterrupted, and target ~~these~~
tnese areas for the last stages of implementation.
3.   Review ~~the~~tne geographic and physical structure of the network to determine the best plan for
defining logical subnets as segments of the internetwork.
4. ~~Defme~~Define the components in the new system that require testing, and develop a phase plan
for testing and adding components.
For example, the plan could ~~defme~~define units of the organization to be phased into using DHCP,
and the order for types of computers to be phased in (including Windows NT servers and
workstations, Microsoft RAS servers and clients, Windows for Workgroups computers, and
MS-DOS clients).
5.   Create a pilot project for testing. Be sure that the pilot project addresses all the
requirements identified in Task #~~1.~~1,
6.   Create a second test phase, including tuning the DHCP (and WINS) server--client
configuration for efficiency. This task can include determining strategies for backup servers
and for partitioning the address pool at each server to be provided to local versus remote
clients.
7.   Document all architecture and administration issues for network administrators.
8.   Implement a final phase for bringing ~~all~~ali organizational units into using DHCP.
While planning, remember that the actual placement of the servers in the physical network
need not be a major planning issue. DHCP servers (and WINS servers) do not participate in
the Windows NT Server domain model, so domain membership is not an issue in planning for
server placement. Because most routers can forward DHCP configuration requests, DHCP
servers are not required on every subnet in the internetwork. Also, because these servers can
be administered remotely from any Windows NT Server computer that is DHCP- or

WINS-enabled, location is not ~~amajor~~a major issue in planning for server placement.

g
Planning ~~aSmall~~a Strategy for DHCP
Planning a Small-Scale Strategy for DHCP Servers
For ~~asmall~~a small LAN that does not include routers and subnetting, the server needs for the network
can probably be provided with ~~asingle~~a single DHCP server.
Planning in this case includes determining the following:

•

' The hardware and storage requirements for the DHCP server

•

' Which computers can immediately become DHCP clients for dynamic addressing and

which should keep their static addresses

•

' The DHCP option types and their values to be predefined for the DHCP clients
DHCP wwf
address
d3a e
Local
Netuuo
~§~
'r DHCP climts
~~ASingle~~A Single Local Network Using Automatic TCPIIP Configuration with DHCP
~~Chapter 4~~ Installing and Configuring DHCP Servers

Planning ~~aLarge~~a Strategy for DHCP
Planning a Large-Scale Strategy for DHCP Servers
The network administrator can use relay agents implementing RFC 1542 (usually IP routers)
so that DHCP servers located on one node of the internetwork can respond to TCP/IP
configuration requests from remote nodes. The relay agent forwards requests from local DHCP
clients to the DHCP server and subsequently relays responses back to the clients.
Ef,fn'
$1b1e` "Qi/" IP rodef
Slble`
DHCP clieffs
An ~~Internetwork~~lnternetwork Using Automatic ~~TCP/IP~~TCPIIP Configuration with DHCP
The additional planning issues for a large enterprise network includes:
~~1~~' Compatibility of hardware and software routers with DHCP, as described at the beginning
of this chapter.
~~1~~' Planning the physical subnetting of the network and relative placement of DHCP servers.

This includes planning for placement of DHCP (and WINS servers) among subnets in ~~away~~a
way that reduces b-node broadcasts across routers.
~~1~~" Specifying the DHCP option types and their values to be predefined per scope for the
DHCP clients. This may include planning for scopes based on the needs of particular
groups of users. For example, for a marketing group that uses portable computers docked
at different stations, or for a unit that frequently moves computers to different locations,
shorter lease durations can be defined for the related scopes. This way, frequently
changed ~~IP~~lP addresses can be freed for reuse.
As one example, the segmenting of ~~theWAN~~the WAN into logical subnets could match the physical
structure of the internetwork. Then one ~~IP~~lP subnet can serve as the backbone, and off this
backbone each physical subnet would maintain a separate IP subnet address.
In this case, for each subnet ~~asingle~~a single computer running Windows NT Server could be
configured as both the DHCP and WINS server. Each server would administer a defined
number of IP addresses with ~~aspecific~~a specific subnet mask, and would also be defined as the default
gateway. Because the server is also acting as the WINS server, it can respond to name
resolution requests from all systems on its subnet.
These DHCP and WINS servers can in ~~tum~~turn be backup servers for each other. The
administrator can partition the address pool for each server to provide addresses to remote
clients.
There is no limit to the maximum number of clients that can be served by ~~asingle~~a single DHCP
server. However, your network may have practical constraints based on the IP address class
and server configuration issues such as disk capacity and CPU speed.
~~CHAPTER 5~~
Installing and Configuring ~~WINS Servers~~DHCP Sewers 33 of 33
8 clients
primary saver
-__-»;~;;__-»-
.55
r
IP address
database

Installing and Configuring WINS
Sewers
~~AWINS server~~A WINS sewer is ~~aWindows~~a Windows NT Server computer running
Microsoft ~~TCPIIP~~TCP/IP and the Windows
Internet Name Service (WINS) server software. WINS servers maintain a database that maps

computer names to IP addresses, allowing users to easily communicate with other computers
while gaining all the benefits ~~ofTCP~~of TCP/IP.
This chapter describes how to install WINS servers and how to use WINS Manager to manage
these servers. The topics include the following:
~~1~~ ' WlNS benefits
~~1~~ l Installing and administering WINS servers
~~1~~ ' Configuring WINS ~~servers~~sewers and replication partners
~~1~~ ' Managing static mappings
~~1~~ ' Setting preferences for WINS Manager
~~1~~ " Managing the WINS database
~~1~~ l Troubleshooting WINS
~~1~~ l Advanced configuration parameters for WINS
~~1~~ l Planning ~~astrategy~~a strategy for WINS servers
For an overview of how WINS works, see "Windows Internet Name ~~Service~~Sen/ice and Broadcast
Name ~~Resolution~~Resoiution" in Chapter 3, "Networking Concepts for TCP/IP."
Note
WINS can also be configured and monitored using SNMP. All configuration parameters can be
set using SNMP, including configuration parameters that can ~~otherwise~~othenivise only be set by editing
the Registry. For ~~alist~~a list of WINS MIB object types, see Appendix A, "MIB Object Types for
Windows NT."
You can also use Performance Monitor to track WINS server performance, as described in
Chapter 8, "Using Performance Monitor with ~~TCPIIP Services~~TCP/IP Sen/ices."
Chapter 5 1of27

WINS Benefits
Using WINS servers can offer these benefits on your ~~internetwork:~~internetworkz
●

' Dynamic database maintenance to support computer name registration and name
resolution. Although WINS provides dynamic name services, it offers a NetBIOS
namespace, making it much more flexible than DNS for name resolution.

●

' Centralized management of the computer name database and the database replication
policies, alleviating the need for managing LMHOSTS files.

●

l Dramatic reduction of IP broadcast traffic in Microsoft ~~intemetworks~~internetworks, while allowing client
computers to easily locate remote systems across local or wide area networks.

●

l The ability for clients on ~~aWindows~~a Windows NT ~~Server~~Sewer network
(including Windows NT, Windows
for Workgroups, and LAN Manager 2.x) to browse domains on the far side of a
router

without a local domain controller being present on the other side of the router.

- ~~Ascalable~~' A scalable design, making it a good choice for name ~~resolution~~resoiution for medium to very large ~~intemetworks~~ internetworks.

Note
WINS client software is part of the Microsoft TCP/IP-32 for Windows for Workgroups and the
Microsoft Network Client 2.0 software that is included on the Windows NT Server compact
disc. For information about installing these clients, see the ~~Windows NT Server Installation~~ VW/vdows NT Sen/erlnsfallafion
Guide.
Installing and Configuring WINS Servers 2of 27

You install ~~aWINS~~a WINS server as part of the process of installing Microsoft TCP/IP in Windows NT
Server. These instructions assume you have already installed the Windows NT ~~Server~~Sen/er
operating system on the computer.
~~IEPI~~ You must be logged on as a member of the Administrators group to install a WINS server.
~~IJllo~~ To install a WINS server
1.   Choose the Network options in Control Panel~~.~~, When the Network Settings dialog box
appears, choose the Add Software button.
2.   In the Network Software list in the Add Network Software dialog box, select TCP/IP
Protocol And Related Components, and then choose the Continue button.
3.   In the Windows NT TCP/IP Installation Options dialog box, check the appropriate options
to install, including at least the following:

~~Chapter 5 Installing and Configuring WINS Servers~~

- l WINS Server Service

- l SNMP Service (for configuring and monitoring WINS using SNMP or Performance Monitor)

4.   Choose the OK button. Windows NT Setup displays a message asking for the full path to
the Windows NT Server distribution files. Type the appropriate location, and choose the
Continue button.
All necessary files are copied to your hard disk.
5.   Complete all the required procedures for manually configuring TCP~~/IP~~/lP as described in
"Configuring TCP~~/~~/IP" in Chapter 2. When the Network Settings dialog box reappears after
you finish configuring TCP~~/~~/IP, choose the Close button.

All the appropriate TCP~~+~~/IP and WINS server software is ready for use after you reboot the
computer.
The Windows Internet Name Service is a Windows NT service running on a Windows NT
computer. The supporting WINS client software is automatically installed for Windows NT
Server and for Windows NT computers when the basic operating system is installed.
~~...~~ To start and stop the WINS service on any Windows NT computer
1.   In Control Panel, choose the Services icon. —
Or—
In Server Manager, choose Services from the Computer menu.
2.   In the Services dialog box, select the Windows Internet Name Service, and choose the
Start or Stop button. Then choose the Close button.
You can start and stop ~~the~~tne WINS service at the command prompt using the commands net
start wins or net stop wins.
~~Administering~~
M.
Installing and Configuring WINS Sewers
Installing WINS Servers
30f27

§erver 'jiew Mappings Qptiuns Help
Ffié 5189
WINS Servers Stan stics
Sewer Start Time:
Database lnitialized:
Statistics Cleared:
Last Replication Times:
Periodic:
Admin Trigger:
Net Update:
Total U ueries Received:
Successful:
Failed:
Total Fl eleasesz
Successful:
Failed:
Total Fl egistrations:
5:1 9:94 1 38 45 PH
34589
34001
488
345
321
24
33453
1.1[l1.4.1E2
8
a"*......~.

When you install ~~aWINS~~a WINS server, an icon for WINS Manager is added to the Network
Administration group in Program Manager. You can use this tool to view and change
parameters for any WINS server on the internetwork. To administer a WINS server remotely,
you can run WINS Manager on ~~aWindows~~a Windows NT Server computer that is not a WINS server.
You must be logged on as ~~amember~~a member of the Administrators group for a WINS server to
configure that server.
~~.,~~ To start WINS Manager
1. ~~Double~~Doubie-click the WINS Manager icon in Program Manager.
—Or—
At the command prompt, type start winsadmn and press ~~ENTER~~Enter. You can include a WINS
server name or IP address with the command, for example, start winsadmn 11.103.41.12
or start winsadmn ~~myserver~~mysewer.
2.   If the Windows Internet Name Service is running on the local computer, that WINS server
is opened automatically for administration. If the Windows Internet Name Service is not
running when you start WINS, the Add WINS ~~Server~~Sewer dialog box appears, as described in
the following procedure.
~~Settings in the Preferences dialog box determine whether the~~
~~IP address or computer name appears first in the list.~~

~~Statistic. Cleared:~~
~~Last Repf!Calion Tirrles: Periodic:~~
~~Admin Trigger:~~
~~Net Update:~~
~~Total Queries Received: Successlul:~~
~~Fa-~~
~~Total Releases: Successful:~~
~~F.»ed:~~
~~34589 34001 488~~
~~345 321 24~~
~~Drag the spin bar to size the panes.~~
Installing and Configuring WINS Sewers
Administering WINS Sewers
4of27

Enlaf tha cumputer name nr the IP address
of the WINS server to be added:
WINS Server:
g. .... a\...m.1 T .s I * |
\\a-iimp1
Note
If you specify an IP address when connecting to ~~aWINS~~a WINS server, the connection is made using
TCP/IP. ~~Ifyou~~If you specify a computer name, the connection is made over NetBIOS. The list that

appears in the WINS Server window shows the IP address first if you connected using TCP/IP,
or the computer name first, if the connection was made over NetBIOS.
Chapter 5 Installing and Configuring WINS Servers
IJI> To connect to a WINS serversewer for administration
• In the WINS Manager windowWindow, select aservera sewer in the WINS Servers list. This list contains
all WINS servers that you previously connected to or that have been reported by partners
of this WINS server.
—Or—
1.   If you want to select another server that you have not previously connected to, choose the
Add WINS Server command from the Server menu.
        Add Wins Server
Enter the computer name or the IP address
of the 'WINS server to be added:

r——————————,
111111111

'WINS Server: j\\a·jimpl ———
2.   In the WINS Server box of the Add WINS Server dialog box, type the IP address or
computer name of the WINS server you want to work with, and then choose the OK button.
(You do not have to includeInclude double backslashesbacksiashes before the
name. WINS Manager willManagervvill add
these for you.)
The title bar in the WINS Manager window shows the IP address or computer name for the
currently selected server, depending on whether you used the address or name to connect to
the server. WINS Manager also shows some basic statistics for the selected server, as
described in the following table. Additional statistics can be displayed by choosing the Detailed Information
information command from the Server menu.
Statistics in WINS Manager
Statistic   Meaning
Total Queries Received The number of name query request messages received by this
WINS server. Successful indicates how many names were
successfully matched in the database, and Failed indicates how
many names this WINS server could not resolve.
Database Initialized initialized The time when this WINS database was initialized.
Statistics Cleared   The time when statistics for the WINS server were lasttest cleared with
witii the Clear Statistics command from the View menu.
Last Replication Times   The times at which the WINS database was last replicated.
Periodic   The last time the WINS database was replicated based on the
replication interval specified in the Preferences dialog box.

Admin Trigger   The last time the WINS database was replicated because the administrator chose the Replicate Now button in the Replication Partners dialog box.

~~Statistics in WINS Manager (continued)~~
~~Statistic   Meaning~~
Net Update The last time the WINS database was replicated as a result of a network request, which is a push notification message that requests propagation.

~~Total Queries Received   The number of name query request messages received by this WINS server. Successful indicates how many names were successfully matched in the database, and Failed indicates how many names this WINS server could not resolve.~~

'WINS Server Address
Computer Name:
IP Address:
Connected Via:
Connected Since:
Last Address Change:
Last S cavengrng Times:
Periodic:
Admin Trigger:
E xtinctiun:
Verification:
U nique R egistrations:
Conflicts:
Renewals:
Group Registrations:
Conflicts:
Renewals:
\'\A-ANNIEP2
11.1 I]3.41 .1 2
T[jp;|p
5f2uf94 4:1 9:03 PM
5.-°'2l].-'94 4:U8:43 PH
5;2[|;34 3:38:49 PH
5.*2nf94 1l]:D8:48 AH
2?`89B
1]
2?856
455
1
455
f§lf*SB
Help
»
≥
~~Total Releases   The number of messages received that indicate a NetBIOS~~ application has shut itself down. Successful indicates how many names were successfully released, and Failed indicates how many names this WINS server could not release.
~~Total Registrations   The number of messages received that indicate name~~ registrations for clients.
~~....~~To refresh the statistical display in WINS Manager

• From the View menu, choose the Refresh Statistics command, or press F5.
—Or—
From the View menu, choose the Clear Statistics command to reset ~~all~~alt
statistical counters.
—Or—
Use automatic screen refreshing, based on the interval you specify in the
Preferences ~~dialog box, as described in "Setting Preferences for WINS Manager"~~
~~later in this chapter.~~
d.|qb d 'bd"'sif lac ox, as escri e in e ing Pre ferences forW|NSManag er"
iaieri'n tifISCh ap ter.
~~Chapter 5 Installing and Configuring WINS Servers~~
~~""~~ To see information about the current WINS ~~server~~sewer
1. From the Server menu, choose the Detailed Information command.
~~.:'J Detailed Information~~
~~\1/INS Server Address~~
~~,,...~~

~~Computer Name: \\A ANNIEP2~~
~~IPAddress: 11.103.41.12~~
~~Coooected Via: TCP/IP IIIII~~
~~Connected Since: 5120194 4:19:09 PM~~
~~last Address Change:~~
~~last Scavenging Times:~~
~~Periodic: 5/20/94 4:08:49 PM~~
~~Admin Trigger:~~
~~Extinction: 5120/94 3:38:49 PM~~
~~Verification: 5120/94 10:08:48 AM~~

~~Unique Registrations: 27896~~
~~Conflicts: 0~~
~~Renewals: 27896~~

~~Group Registrations: 456~~
~~Conflicts: 1~~
~~Renewals: 455~~
The Detailed ~~Information~~information dialog box shows information about the
selected WINS server, as
described in the table below.
2. To dismiss the Detail ~~Information~~information dialog box, choose the Close
button.
Detailed ~~Infonnation~~information Statistics for WINS Manager
Statistic   Meaning
Total Releases The number of messages received that indicate a NetBIOS
Total Registrations The number of messages received that indicate name
Last Address Change   Indicates ~~the~~time time at which the last WINS database
change was
replicated.
Last Scavenging Times The last times that the database was cleaned for
specific types

Last Scavenging Times
Periodic
Admin Trigger
Extinction

of entries. (For information about database scavenging, see
"Managing the WINS Database" later in this chapter.

Periodic   Indicates when the database was cleaned based on the renewal interval specified in the WINS Server Configuration dialog box.

Admin Trigger   Indicates when the database was last cleaned because the administrator chose the Initiate Scavenging command.

Detailed Information Statistics for WINS Manager (continued)

Statistic   Meaning

Extinction Indicates when the database was last cleaned based on the Extinction interval specified in the WINS Server Configuration dialog box.

Indicates when the database was last cleaned based on theVerificationthe Verify interval specified in thetne WINS Server Configuration dialog box.

Unique Registrations   The number of name registration requests that have been accepted by this WINS server.,

Unique Conflicts The number of conflicts encountered during registration of unique names owned by this WINS server.

Unique Renewals   TheTne number of renewalsrenewais received for unique names.

Group Registrations   The number of registration requests for groups that have been accepted by this WINS server. For information about groups, see "Managing Special Names" later in this chapter.

Group Conflicts   The number of conflicts encountered during registration of group names.

Group Renewals   The number of renewals received for group names.

For descriptions of the related intervals, see "Configuring WINS Servers" later in this chapter.

Configuring WINS ServersSewers and Replication Partners

You will want to configure multiple WINS servers to increase the availability and balance the load among servers. Each WINS server must be configured with at least one other WINS server sen/er as its replication partner.

Configuring aWINSa WINS server includes specifying information about when database entries are replicated between partners. Apull partnerA pullparfner is a WINS server that pulls in replicas of database entries from its partner by requesting and then accepting replicas. ApushA push partner is a WINS

server that sends update notification messages to its partner when its WINS database has
changed. When its partner responds to the notification with a replication request, the push
partner sends ~~acopy~~a copy of its current WINS database to the partner.
For information about configuring preferences, see "Setting Preferences for
WINS Manager" ~~later~~
Ieter in this chapter.
~~Chapter 5 Installing and Configuring WINS Servers~~ Installing and Configuring
WINS Sewers 5of27

| | un lw|\ \|\|m\||\|W W W N- ||\.\ um |\||m ~.|m| W
~|\\|gym¢=|u4asu»rf~u¢»»'~»-- ~-uw M1-944 . mu'wn°&..,,. , . .,_*_,..m,, ,W,
. *m, .m. .... .,..,,.....,.|....\.. ~*.W.,,..,
I |~ i *
'WINS Server Configuration
Eenewal Interval [h:m:s]:
Qxtinction Interval [h:m:s]:
Eqtinction Timeout [h:m:s]:
Eerily Interval [h:m:s]:
Pull Parameters Push Parameters
IZ] Initial Replication x Initial Replication
Fletry Count Fleplicate on Address Change
Advanced WINS Server Configuration
>< Il_r_:q§|g.|n.g.lfnaliileilf Starting Version Count [hex]:
>< Log Qetailed Events Database Backup Path:
X Heglicate Only With Partners
>< Qackup Un Termination
Migrate onmff
UK
0
*z
yn 40 AI nn
4
8 Cancel 3
* : [ll] 9
v4 nu .AJ
V
8
n
nu A [ll] 71
180 y UU
4
v: [ID
4
..H.81n
3
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u
D:'\usels'\lesl
Configuring WINS ~~Servers~~ Sewers and Replication
Partners

For each WINS server, you must configure threshold intervals for triggering database

replication, based on ~~aspecific~~a specific time, a time period, or ~~acertain~~a certain number of new records. ~~Ifyou~~lf you designate ~~aspecific~~a specific time for replication, this occurs one time only. ~~If~~lf a time period is specified,
replication is repeated at that interval.
~~...,~~ To configure a WINS ~~server~~sewer
1. From the Server menu, choose ~~the~~tne Configuration command. This command is available only if you are logged on as a member of the Administrators
group for the ~~WINS~~WlNS server you want to configure.
2. To view all the options in this dialog box, choose the Advanced button.

~~f. WINS Server Configuration -\\RONALDM2~~
~~\IIINS Server Configuration ,~~
~~fl.enewallnterval (h:m:s): -:-:looiiJ~~
~~f.xtinction Interval (h:m:s): -:@!)1:@!111~~
~~E!tinction Timeout (h:m:s): -:-:looll~~
~~Y.erifylnterval (h:m:s):~~

~~PuD Parameters ..., Push Parameters , [81 !nitial Replication~~
~~[8llnilii!_l Replication Retry Cou!!_tl'3 l""' DRep-cate on Address Change~~
~~Advanced \IIINS Server Configwa!ion , [8lf_ ii.I l~~
~~-tarting Version Count (hex): ILo '~~
~~[81 Log .!!_etailed Events Database Bac-up Path:~~
~~[gl ReJ!,Iica!e Only \llilh Partners ._lo_:_us_er_s_tes_t .~~
~~[81 J!ackup On Terminalion~~
~~D,Migrate On/Off~~

3. For the configuration options in the WINS Server Configuration dialog box, specify time
intervals using the spin buttons, as described in the following list.
Configuration option Meaning
_|

Renewal Interval Specifies how often ~~aclient~~a client reregisters its name. The default is five
hours.

Extinction Interval
Extinction Timeout
Verify Interval
Specifies the interval between when an ~~entry~~entn/ is marked as released and when it is marked as ~~extinct~~exfincf. The default is four times the renewal interval.
~~Extinction Timeout~~ Specifies the ~~interval~~lnten/al between when an entry is marked extinct and
when the entry is finally scavenged from the database. The default
is the same as the renewal interval.
~~Verify Interval~~ Specifies the interval after which the WINS server must verify that
old names it does not own are still active. The default is 20 times

the extinction interval.
The replication interval for this WINS server's pull partner is defined in the Preferences
dialog box, as described in "Setting Preferences for WINS Manager" later in this chapter.
4.   ~~Ifyou~~If you want this WINS server to pull replicas of new WINS database entries from its
partners when the system is initialized or when ~~areplication~~a replication-related parameter changes,
check ~~Initial~~initial Replication in the Pull Parameters options, and then type ~~avalue~~a value for Retry
Count.
The retry count is the number of times the server should attempt to connect (in case of
failure) with a partner for pulling replicas. Retries are attempted at the replication interval
specified in the Preferences dialog box. ~~Ifall~~If all retries are unsuccessful, WINS waits for a
period before starting replication again. For information about setting the start time and
replication interval for pull and push partners, see "Setting Preferences for ~~WINS~~WlNS Manager"
later in this chapter.
5.   To inform partners of the database status when the system is initialized, check Initial
Replication in the Push Parameters group. To inform partners of the database status when
an address changes in a mapping record, check Replicate On Address Change.
6.   Set any Advanced WINS Server Configuration options, as described in the following table.

~~Chapter 5 Installing and Configuring WINS Servers~~
7.   When you have completed all changes in the WINS Server Configuration dialog box,
choose ~~the~~tiwe OK button.
Advanced WINS ~~Server~~Sewer Configuration Options
Configuration option
Logging Enabled
Log Detailed Events
Replicate Only With
Partners
Backup On Termination
Migrate ~~On/Off~~ on/off
~~Starting~~Staniing Version Count
~~Database Backup Path~~
Meaning
Specifies whether logging of database changes to JET.LOG should
be turned on.
Specifies whether logging events is verbose. (This requires
considerable system resources and should be turned off if you are
tuning for performance.)
Specifies that replication will be done only with WINS pull or push
partners. ~~If~~lf this option is not checked, an administrator can ask ~~aWINS~~a

WINS server to pull or push from or to ~~anon~~a non-listed WINS server partner. By default, this option is checked.
Specifies that the database ~~will~~wil! be backed up automatically when WINS Manager is closed.
Specifies that static unique and multihomed records in the database are treated as dynamic when they conflict with a new registration or replica. This means that if they are no longer valid, they will be overwritten by the new registration or replica. Check this option if you are upgrading non~~-~~-Windows NT systems to Windows NT. By default, this option is not checked.
Specifies the highest version ID number for the database. Usually, you will not need to change this value unless the database becomes corrupted and needs to start fresh. In such a case, set this value to a number higher than appears as the version number

Database Backup Path
this value to a number higher than appears as the version number
counter for this WINS server on all the remote partners that earlier replicated the local WINS server's records. This value can be seen in the View Database dialog box in WINS Manager.
Specifies the directory where the WINS database backups will be stored. WINS uses this directory to perform an automatic restoration of the database in the event that the database is found to be corrupted when WINS is started. Do not specify ~~anetwork~~ a network directory.

4
Configuring WINS Sewers and Replication Partners
Configuring Replication Partners
WINS servers communicate among themselves to fully replicate their databases, ensuring that
a name registered with one WINS server is eventually replicated to all other WINS servers
within the internetwork. All mapping changes converge within the replication period for the
entire WINS system, which is the maximum time for propagating changes to all WINS servers.
All released names are propagated to all WINS servers after they become extinct, based on
the ~~interval~~Interval specified in WINS Manager.
Replication is carried out among replication partners, rather than each server replicating to all
other servers. ~~In~~ln the following illustration, ~~Serverl~~Server1 has only Server2 as ~~apartner~~a partner, but Server2
has three partners. So, for example, ~~Serverl~~Sen/er1 gets all replicated information from ~~Server~~Sen/er2, but
Server2 gets information from ~~Serverl, Server~~Sen/er1, Sen/er3, and ~~Server~~Sen/er4.
S9092
861183
Replication Configuration Example for WINS ~~Servers~~Sewers
Ultimately, all replications are pulled from the other WINS servers on an internetwork, but

triggers are sent by WINS servers to indicate when a replication should be pulled. To achieve

replication, each WINS server is a push partner or pull partner with at least one other WINS

server. ~~Apull~~A pull partner is a WINS server that pulls in database replicas from its push partner by

requesting and then accepting replicas of new database entries in order to synchronize ~~its~~Its own

database. ~~Apush~~A push partner is a WINS server that sends notification of changes and then sends

replicas to its pull partner upon receiving a request. When the server's pull partner replicates

the information, it pulls replicas by asking for all records with ~~ahigher~~a higher version number than the

last record stored from the last replication for that server.

~~Chapter 5 Installing and Configuring WINS Servers~~

Choosing whether to configure another WINS server as a push partner or pull partner depends

on several considerations, including the specific configuration of servers at your site, whether

the partner is across ~~awide~~a wide area network (WAN), and how important it is to propagate the

changes.

• ──────

l If Server2, for example, needs to perform pull replications with ServerB, make sure it is a

push partner of Server3.

• ──────

' If Server2 needs to push replications to Server3, it should be a pull partner ~~of WINS~~OfW|NS

ServerB.

WINS Server Push Pull
'w`|ns Servers To Lrsl
>< Push Partners 8 Pull Partners M Uther
Flepllcatron Dplmns Send Hephcalron Trigger New
Push Partner
P-4" Partner l Push wrth Propagation
82'°-1 11.1u1.4_162
~f*"11.1m.5.158
y'-' 11.1U1.13E.131
V" 11.103.41.112
UK
Cancel
H elp
Add
D elete
F\'q_pllcale Now

Configure Push Pu
Cunhgure

Replication is triggered when a WINS server polls another server to get a replica. This can
begin at system startup and can also be at ~~aspecific~~ a specific time, and it can then repeat at the time
interval specified for periodic replication. Replication is also triggered when ~~aWINS server~~ a WINS sen/er
reaches ~~athreshold~~ a threshold set by the administrator, which is an update ~~count for~~ counffor registrations and
changes. In this case, the server notifies its pull partners that it has reached this threshold, and
the other servers may then decide to pull replicas.

~~.,.~~ To add a replication partner for a WINS server

1.   From the Server menu, choose the Replication Partners command. This command is available only if you are logged on as a member of the Administrators
group for the local server.

~~Replication Partners (Local}~~
~~Push Pull~~
~~'' 11.101.196.191~~
~~1UOH1.12~~

~~,...~~
~~.~~

~~Wins Servers To List   .~~
~~Push Par!ners Pull Partners !!ther~~
~~IIIIJIRJ~~

~~Replication Options Send Replication Trigger Now~~
~~= ,   .. =&F11f~~

~~.. ,~~&J, hiif W
~~DP.ush Partner 'i5,j;~~
~~1111; 11111~~

~~D Pyll Partner IIWIJGJII D Push with Propagation~~

2.   In the Replication Partners dialog box, choose the Add button.
3.   In the Add WINS Server dialog box, type the name or IP address of the WINS server that
you want to add to ~~the~~ tne list, and then choose the OK button. ~~IfWINS~~ If WINS Manager can ~~fmd~~ find this
server, it ~~will~~ vviII add it to the WINS Server list in the Replication Partners dialog box.
4.   From the WINS Server list in the Replication Partners dialog box, select the server you
want to configure, and then complete ~~the~~ tne actions described in "Configuring Replication

Partner Properties" later in this chapter.
5.   If you want to limit which WINS servers are displayed in the Replication Partners dialog
box, check or clear ~~the~~tiwe options as ~~follows:~~foiiovvsz

• ——
'_Check Push Partners to display push partners for the current WINS server.

• ——
'_Check Pull Partners to display pull partners for the current WINS server.

• ——
'_Check Other to ~~display~~disptay the WINS servers that are neither push partners nor pull
partners for the current WINS server.
6.   To specify replication triggers for ~~the~~tne partners you add, follow the
procedures described in
"Triggering Replication Between Partners" later in this chapter.

Pull Partner: 11.1n3.41.12 gg.
Stall lime:
B_eplicalion Interval [h:m:s]:
11:30
Canhel
3 -
iv UU 6% UI]
!i8llr*
Qel Default Values
7.   When you finish adding replication partners, choose the OK button.
————To delete replication partners
1.   From the Server menu, choose the Replication Partners command.
2.   In the Replication Partners dialog box, select one or more servers in
the WINS ~~Server~~Sen/er list,
and then choose the Delete button, or press DEL.
WINS Manager asks you to confirm the deletion if you checked the related confirmation
option in the Preference dialog box, as described in "Setting Preferences for WINS
Manager" later in this chapter.
Configuring Replication Partner Properties
When you designate replication partners, you need to specify parameters for when replication
will begin.
————To configure replication partners for a WINS ~~server~~sewer
1.   In the WINS Server list of the Replication Partners dialog box, select the server you want to
configure.
2.   Check either Push Partner or Pull Partner or both to indicate the replication partnership you
want, and then choose the related Configure button.
3.   Complete the entries in the appropriate Properties dialog box, as described in the following
procedures.

_., To define pull partner properties

1.   In the Start Time box of the Pull Partner Properties dialog box, type a time to indicate when
replication should begin.
You can use any separator for hours, minutes, and seconds. You can type AM or PM, for
example, only if these designators are part of your time setting, as defmeddefined using the
International option in Control Panel.
= Pull Partner Properties
Pull Partner: 11.103.41.12
2.   In the Replication Interval box, type a time in hours, minutes, and seconds to indicate how
often replications will occur, or use the spin buttons to set the time you want.
If you want to return to the values specified in the Preferences dialog box, choose the Set
Default Values button.
3.   Choose the OK button to return to the Replication Partners dialog box.

UK
Cancel
.4819
3.3! D efault"1P'a|ue
_., P To define push partner properties
1.   In the Update Count box of the Push Partner Properties dialog box, type a number for how
many additions and updates made to records in the database will result in changes that
need replication. (Replications that have been pulled in from partners do not count as
insertions or updates in this context.)
The minimum value for Update Count is 5.
Push Partner: 11.103.41.1211.1 U3.-41 .1 2
yPdalej_.l_pdale Count: ci·'J=!It=l!J____ J
1
If you want to return to thetne value specified in the Preferences dialog box, choose the Set Default
Defauit Values button.
2.   Choose the OK button to return to the Replication Partners dialog box.
Triggering Replication Between Partners
You can also replicate the database between the partners immediately, rather than waiting for
the start time or replication interval specified in the Preference dialog box, as described in
"Setting Preferences for WINS Manager" later in this chapter.
You willWill probably want to begin replication immediately after you make a series of changes
such as entering a range of static address mappings.
..,. * To send a replication trigger