IBM

IBM Systems - iSeries

Networking
NetWare on iSeries

Version 5 Release 4

IBM

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> **Note**
>
> Before using this information and the product it supports, be sure to read the information in
> "Notices," on page 65.

Sixth Edition (February 2006)

This edition applies to version 5, release 4, modification 0 of the i5/OS Operating System (product number
5722–SS1) and to all subsequent releases and modifications until otherwise indicated in new editions. This version
does not run on all reduced instruction set computer (RISC) models nor does it run on CISC models.

Contents

NetWare on iSeries

If you are responsible for a network that includes both iSeries servers and Novell NetWare servers, you recognize the advantages of network integration. As of V4R5, IBM® no longer supports NetWare Integration on an Integrated xSeries Server, but you can still use NetWare Enhanced Integration to integrate remote NetWare servers with your iSeries server. This feature allows you to integrate file and print services, user profile management, and network operations.

Get up and running:

> **Print**
> Display or print a PDF version of this topic. Be aware that not all links show up in the printed version.
>
> **Install Overview**
> Install NetWare Enhanced Integration on your iSeries server.
>
> **Configure Netware Enhanced Integration**
> Configure your choice of protocol, install code fixes, install the NLM on your NetWare servers, define network server attributes for your servers, and more.
>
> **Manage NetWare server connections and authentication**
> Start a connection from iSeries server, create an authentication entry, or create a user profile to automate the authentication.

Manage NetWare users and data from iSeries server:

> **Manage NetWare users from iSeries server.**
> Understand user enrollment concepts. Set up your iSeries server and NetWare server for user enrollment. Create user and group profiles on iSeries server and enroll them to NetWare servers.
>
> **Manage NetWare volumes.**
> Create, change, and delete NetWare volumes and display or print volume information.
>
> **Manage NetWare files and directories.**
> Read about the QNetWare directory structure and how to work with your NetWare files and directories through the QNetWare file system.
>
> **Save and restore.**
> Save and restore your NetWare files and directories through the QNetWare file system.

Set up your system to **print to NetWare printers.**

If you have problems with Netware Enhanced Integration, see **Troubleshoot problems**.

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NetWare Enhanced Integration advantages

NetWare Enhanced Integration provides the following advantages:
- Gives iSeries server users access to network data. Integrated file system support allows users and applications to access files and directories in multiple NDS trees. An iSeries server user can easily work with files on any of the NetWare servers in a network such as this one:
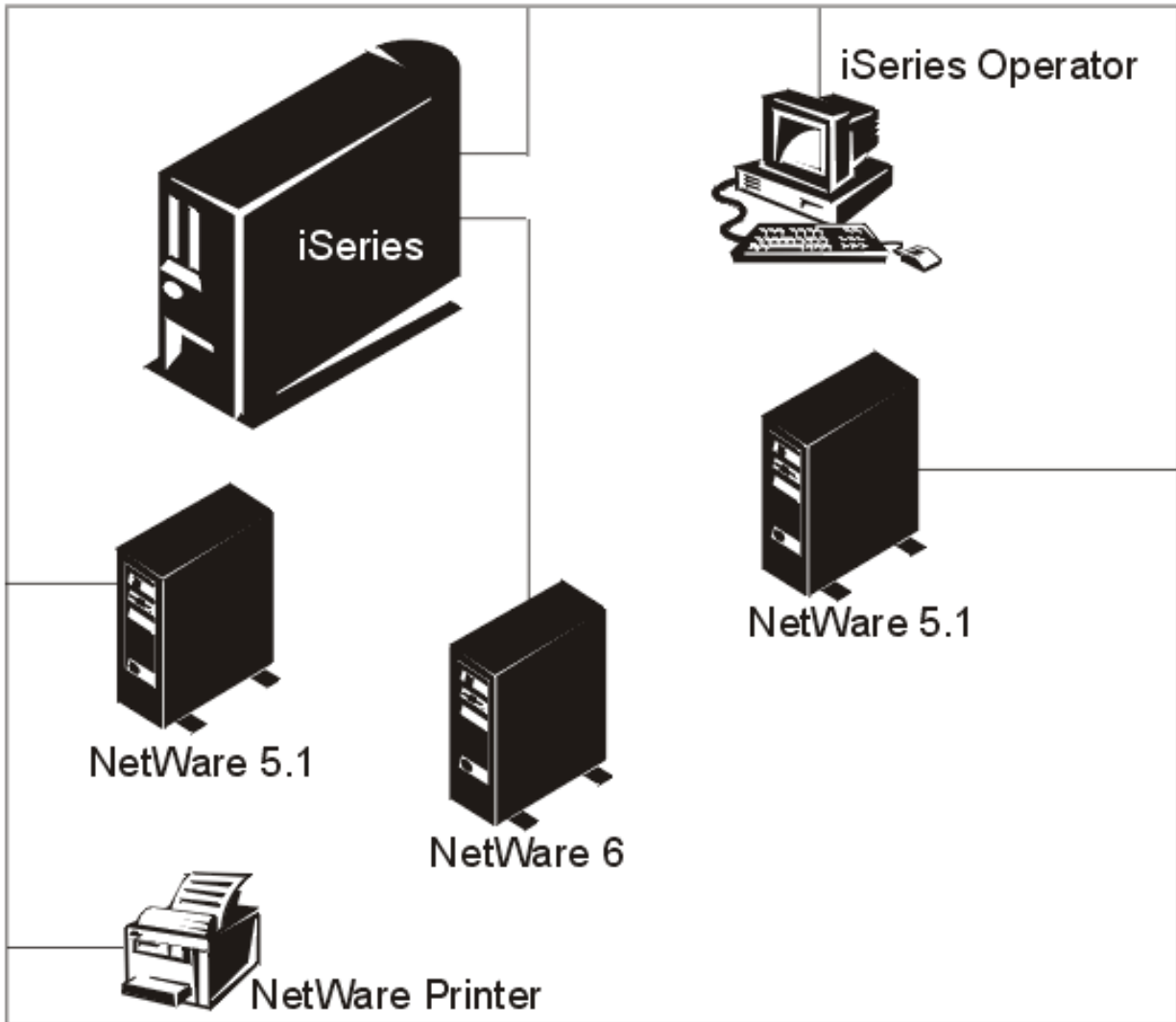
RV3D682-8

- Gives iSeries server users access to network printers. Printer files go from an iSeries server output queue to a printer queue managed by the NetWare server.
- Simplifies network administration with user profile and password propagation. The iSeries server group or user profiles and associated information are distributed to multiple NDS trees. For more information, see "Advantages of managing NetWare users from iSeries" on page 17.
- Simplifies network operations by allowing you to manage NetWare user connections and disk volumes from the iSeries server.
- Keeps your network secure by authenticating each iSeries server user in NDS.
- Connects to iSeries server by using a token-ring, Ethernet, X.25, or frame relay connection and Transmission Control Protocol/Internet Protocol (TCP/IP).

Install NetWare Enhanced Integration

This topic contains the steps to install the NetWare Enhanced Integration feature on iSeries™ servers:

Attention: If you are upgrading from an earlier version of i5/OS and have NetWare data on an Integrated xSeries Server, be sure to first migrate that data to a remote PC server. Otherwise you will not be able to recover your data after upgrading to V4R5 or later versions of i5/OS. At V4R5, IBM no longer supports NetWare Integration on an Integrated xSeries Server (5769–SA3). You cannot use the Restore License Program command to load a previous release of the SA3 product onto a server with V4R5 or later version of the operating system. The product will no longer work.

First ensure that you have the necessary software and hardware to install NetWare Enhanced Integration. Then install the i5/OS feature, which is option 25.

To install the NetWare Enhanced Integration on iSeries, follow these steps:
1. Insert the CD-ROM for licensed programs. (If the licensed programs are on a different CD-ROM from the one you inserted, iSeries prompts you to insert the next CD-ROM.)
2. At the server command prompt, type GO LICPGM; then select Option 11 (Install).
3. To install NetWare Enhanced Integration, type 1 in the option column next to the entry for OS/400 NetWare Enhanced Integration, as in this example.

```
                    Install Licensed Programs
                                             System:    RCHASNTH
   Type options, press Enter.
     1=Install                       -

            Licensed   Product
   Option   Program    Option    Description

     _      5769SS1     12        OS/400 - Host Servers
     _      5769SS1     13        OS/400 - System Openness Includes
     _      5769SS1     14        OS/400 - GDDM
     _      5769SS1     15        OS/400 - Common Programming APIs Toolkit
     _      5769SS1     16        OS/400 - Ultimedia System Facilities
     _      5769SS1     17        OS/400 - PSF/400 Fax Support
     _      5769SS1     18        OS/400 - Media and Storage Extensions
     _      5769SS1     21        OS/400 - Extended NLS Support
     _      5769SS1     22        OS/400 - ObjectConnect
     _      5769SS1     23        OS/400 - OptiConnect
     1      5769SS1     25        OS/400 - NetWare Enhanced Integration
     _      5769SS1     26        OS/400 - DB2 Symmetric Multiprocessing
                                                              More...
   F3=Exit   F11=Display status/release   F12=Cancel   F19=Display trademarks


   MA    a             MW                                    04/035
```

   Repeat this step for any additional language.
4. For the program you just installed, install the latest cumulative program temporary fix (PTF) package on the iSeries.

   Type GO CMDPTF to find the PTF commands. You can find more information about PTFs in the book

   Software Installation .
5. Apply any additional PTFs.

   The latest code updates for NetWare Enhanced Integration are available on the Internet. Start at the

   iSeries Web address and follow these links:
   • Products
   • Client/server applications
   • Novell NetWare
   • Service and Support
   • Code Updates
6. You have the option to either restart your server now or wait until after you complete the configuration steps.

Software and hardware requirements for NetWare Enhanced Integration

NetWare Enhanced Integration does not require any other products as prerequisites. However, you must have an active TCP/IP configuration on iSeries to run NetWare Enhanced Integration.

Software requirements:

To install NetWare Enhanced Integration on your iSeries, you need this software:
- OS/400 V3R7 or later. If your iSeries is not yet running a supported version of Operating System/400,

  you can find information about upgrading to a newer release in the book Software Installation .
- NetWare Enhanced Integration (option 25 of i5/OS).

  This program is included with i5/OS™. It provides integration services through a NetWare Loadable Module (IBM) that you must install on each NetWare server in your network. An NLM is available for NetWare 5.1 and NetWare 6 servers. You need one license for each NetWare server that runs the NLM.

  NetWare Enhanced Integration is available in the same language versions as OS/400. Your installation diskette comes in the national language version that you order.
- TCP/IP on iSeries.
- A CD-ROM version of NetWare in the national language appropriate for your country or region. You can use any of these Novell NetWare versions:
  - NetWare 5.1 Server
  - NetWare 6 Server

  You need a NetWare license for every PC server that has NetWare installed. You can migrate an existing license to a new server or purchase a new license from Novell.

Hardware requirements:

To install NetWare Enhanced Integration, you need this hardware:
- Any Version 3 Release 7 or later iSeries.
- To install NetWare on a PC with a TCP/IP connection to an iSeries, you can use one of these communication adapters:
  - Token-ring
  - Ethernet
  - X.25
  - Frame Relay
  - Distributed data interface (DDI)
  - Asynchronous
  - Point-to-point
  - Wireless

Configure NetWare Enhanced Integration

Once you have installed NetWare Enhanced Integration, you must configure it before you are ready to manage your network. Configuring NetWare Enhanced Integration involves doing these tasks:
1. Activate the TCP/IP protocol to communicate with the NetWare servers on your network. (Systems before V4R3 can use only IPX.)
2. Install the latest Novell NetWare patches.
3. Install the NetWare Enhanced Integration NLM on the servers.
4. If you want to enroll iSeries users on the NetWare network, create a QNetWare user on each server.
5. (Optional) You can automate many administrative tasks by changing the QRETSVRSEC system value to allow the server to store passwords. Doing this enables the iSeries to start authenticated connections.
6. (Optional) You can create authentication entries for each user so that the NetWare Enhanced Integration support automatically starts authenticated connections as needed to the appropriate

server in the network. If you do not create an authentication entry, you must manually start the connection before using most of the administration and file system functions. For details about authentication entries, you can refer to "Manage NetWare server connections and authentication" on page 13.

7. Whenever convenient after installing the NetWare Enhanced Integration product, perform an IPL. The IPL mounts the QNetWare file system in the server's integrated file system. After the IPL, verify that the QNetWare file system is mounted by typing DSPMSG QSYSOPR on the command line and look for the message CPCA08C that says

    /QNetWare file system mounted.

8. (Optional) Verify connections to the NLMs. Once the QNetWare file system is mounted and TCP/IP is active, the NetWare Enhanced Integration support is available.

9. If your network has primarily NetWare servers, you can simplify working with those servers by defining network server attributes that change iSeries command defaults. You must use this step to identify the NetWare servers to iSeries.

10. If you are upgrading to Version 4, Release 5 and previously had NetWare Integration installed on an Integrated xSeries Server, you can save space by unlinking and deleting network server descriptions.

Once you complete these configuration tasks, you are ready to manage your network. If you plan to manage NetWare users and their passwords from an iSeries server, you need to enroll the iSeries user profiles. Refer to "Manage NetWare users from iSeries" on page 17 for more information about enrolling and managing users.

Activate the TCP/IP protocol

Beginning with V5R2, TCP/IP is the only supported communications protocol for NetWare.

Configure TCP/IP for NetWare

If your system is at V4R3 or later, you can use iSeries Navigator to configure your TCP/IP connections. You can find more information on configuring TCP/IP in the iSeries Navigator online help.

Note: You must also use the Change Network Server Attributes (CHGNWSA) command to specify the NetWare TCP/IP port and NetWare IP/ server list. "Define network server attributes" on page 11 has information about using this command to change system defaults.

If you do not have iSeries Navigator, you can use the Configure TCP/IP (CFGTCP) command. To configure TCP/IP, follow these steps:

1. On the iSeries console, enter the command CFGTCP. The Configure TCP/IP menu appears.
2. Select option 12. Change TCP/IP Domain information. The Change Local Domain and Host Names display appears.
3. Specify the Local domain name; then press Enter.
4. In the Server Address field, specify up to 3 server addresses.

For more information about TCP/IP, you can refer to the book TCP/IP Configuration and Reference .

When you are done configuring TCP/IP, you are ready to install Novell NetWare patches on the servers.

Install Novell NetWare patches on servers

You need to install the latest Novell NetWare patches on each server in the NDS tree. Novell provides these patches on its home page on the World Wide Web.

Installing NetWare patches:

To get Novell NetWare patches from the Web, do this:

1. Go to one of these Web addresses:

    • First try the Novell patch site .

- If that does not work, go to Novell home page . At that Web site, select `Technical Support`.
2. Select `Minimum Patch List`. A page with lists of Novell patches should appear.
3. Download the appropriate patches for your environment and apply them to your NetWare servers.

Installing NetWare-J Patches:

To get NetWare-J patches from the Web, do this:

1. Go to this Web address: Novell-J patch site .
2. Select the product from the list of Novell patches that appears.
3. Download the patches and apply them to your NetWare servers.

When you are done installing the NetWare patches, you are ready to install the NetWare Enhanced Integration NLM.

Install the NetWare Enhanced Integration NLM on servers

You must install and load the NetWare Loadable Module (NLM) appropriate for your version of NetWare on the servers that you will manage from iSeries. The NLM must be running on at least one server in the NetWare Directory Services (NDS) tree. The best solution is to run the NLM on all, or most of, the NetWare servers in the tree.

To install the NLMs, do this:
1. Create installation diskettes and apply any needed PTFs.
2. Use NetWare `LOAD` commands to load the NetWare Enhanced Integration NLM.

Create installation diskettes for NetWare Enhanced Integration NLMs

NetWare Enhanced Integration provides an installation diskette image with NetWare Loadable Modules (NLMs) that you must install on each server that you will manage from iSeries. IBM sometimes posts updates to the NLMs on the Internet Web site and updates the installation diskette image in a program temporary fix (PTF). Consequently, you can get the NLM to create updated installation diskettes and to update your servers from either of those sources. To create updated installation diskettes, do this:
1. Get the NLMs you need by either of these methods:

- Download the NLMs from the Internet . Then load them on your servers.
- Apply the iSeries PTF with the updated installation diskette image. You might also need to apply a PTF on NetWare servers that are already in your network.

  When you apply the PTF, the updated installation diskette image goes in the QDLS directory in the Integrated File System. If you are using iSeries Access, you can download the diskette image from QDLS and rebuild the installation diskette.
2. To create updated installation diskettes, use one of these methods:
- Use iSeries Access if you have it installed. This is the shorter method.
- Use NetWare Enhanced Integration already installed on a server. To use NetWare Enhanced Integration to create the diskettes, you must first use the diskettes that are shipped with the product to install NetWare Enhanced Integration.

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Apply a PTF to a NetWare Enhanced Integration NLM: If IBM provides a PTF for the iSeries NetWare Enhanced Integration NLM, you need to apply the PTF on **each** NetWare server to be updated:
1. Load the NetWare Enhanced Integration NLM on the server if the NLM is not already loaded.
2. At the server's console, enter this command:

   `modules`

   The description of the NetWare Enhanced Integration NLM provides its version number. If the version currently on the server is equal to or greater than the NLM version listed in the PTF cover letter, you do not need to update the NLM on this server. In that case, skip the remaining instructions.
3. Copy the updated NLM to the server.

   The following method for doing this uses the iSeries integrated file system to copy the NLM. Other methods for copying the updated NLM are possible using iSeries Access and a NetWare client workstation or FTP and a NetWare client workstation. These methods are not described here.
4. On the iSeries system where the PTF was installed (NetWare Enhanced Integration must be installed), do this:
   a. Ensure that your user ID is enrolled in the system directory.

      You must be enrolled in the system directory to access /qdls/qfpntwe. If you are not enrolled in the directory, use the ADDDIRE command to enroll.
   b. Establish a connection to the server.
   c. Remove the link and copy the object, substituting the name of your server for *server1*

      If the server is running NetWare 4.1 or higher run

      `RMVLNK OBJLNK('/qnetware/`*server1*`.svr/sys/as4nw/as4nw410.nlm')`

      ```
      CPY OBJ('/qdls/qfpntwe/as4nw410.nlm')
          TODIR('/qnetware/server1.svr/sys/as4nw')
      ```
5. Unload the NetWare Enhanced Integration NLM and reload the updated NLM.

   Wait until the server's file system is not in use by the integrated file system of any iSeries system.

   If the server is running NetWare 4.10 or higher, run these commands at the server's console:

   ```
   unload as4nw410
   load sys:as4nw\as4nw410
   ```
6. When you apply a PTF to a NetWare Enhanced Integration NetWare Loadable Module (NLM), iSeries does not automatically activate the changes. The PTF puts the updated version of the NLM into the iSeries integrated file system in the /qdls/qfpntwe directory. To activate the changes when applying a PTF to an NLM, copy the appropriate NLM from the iSeries integrated file system to the AS4NW directory on the SYS: volume of each NetWare server in your network that has the NetWare Enhanced Integration NLM product installed on it.

If you remove the PTF after applying it temporarily, follow the same activation procedures to restore the previous version of the NLM on each server that you updated.

Method 1: Use iSeries Access to create updated installation diskettes:

Note: Read the "Code disclaimer information" on page 1 for important legal information.
1. From a DOS prompt on a PC that is running iSeries Access, change to the QFPNTWE folder.

   For iSeries Access for DOS or DOS Extended:

```
CD I:\QFPNTWE
```

For IBM eServer iSeries Access for Windows:

```
CD I:\QDLS\QFPNTWE
```

2. Run the QFPNLMDK.BAT file to create the diskette.

There are 3 parameters:
- Source Drive Letter
- Target Drive Letter
- NLM version to create.

```
QFPNLMDK I A 4      where I is the source drive
                      where A is the target drive
          where 4 is to create 4.10 diskettes


QFPNLMDK I A 411    where 411 is to create 4.11 diskettes


QFPNLMDK I A 5      where 5 is to create 5.x diskettes


CD I:\QFPNTWE          - for iSeries Access for DOS or DOS Extended
-or-
CD I:\QDLS\QFPNTWE     - for iSeries Access Express for Windows
```

3. Insert a diskette into your target drive (A:) when prompted and press ENTER.

The diskette is formatted.

4. Answer N to the questions about formatting another diskette.

Files are copied to the target drive, and you receive a success message when completed. When your installation diskettes are ready, load the NetWare Enhanced Integration NLM on your NetWare servers.

Method 2: Use the NetWare Enhanced Integration NLM to create updated installation diskettes: This method requires that the NetWare Loadable Module (NLM) for NetWare Enhanced Integration is already loaded on at least one NetWare server.

Note: Read the "Code disclaimer information" on page 1 for important legal information.

1. Copy the contents of the QFPNTWE folder to a NetWare server that is running the NetWare Enhanced Integration NLM.

SERV in the examples is the name of the NetWare server.

```
CPY OBJ('/QDLS/QFPNTWE/') TODIR('/QNETWARE/SERV.SVR/SYS/QFPNTWE') SUBTREE(*ALL)
```

2. From a NetWare client PC, map a drive to the servers SYS volume.

```
MAP I:=SERV\SYS:
```

3. From a DOS prompt change to the QFPNTWE directory on the NetWare server.

```
CD I:\QFPNTWE
```

4. Go to step 2 and complete the steps under "Method 1: Use iSeries Access to create updated installation diskettes" on page 8.

Load the NetWare Enhanced Integration NLM

To use NetWare Enhanced Integration functions on a NetWare server, you must install the appropriate version of the NetWare Loadable Module (NLM). You do this with a NetWare console LOAD command. You can run this command either on the NetWare server console or remotely from iSeries by using the RCONSOLE utility. You might want to first read about the options that these LOAD commands provide that allow you to tailor your environment. When you are done loading the NLM on your servers, the next step is to create a QNETWARE user on those servers.

To install the as4nw410.nlm on the NetWare 5.1 and 6 servers:
1. Put the installation diskette for the NetWare server in the diskette drive on your PC.
2. Bring up RCONSOLE.
3. Select and log in to the NetWare server.

4. On the RCONSOLE display type `LOAD NWCONFIG`.
5. Select **Product options**.
6. Select **Install a product not listed**.
7. Press F4, remote workstation path, and type `>A:\`.
8. Press Enter, and a menu appears that indicates which file groups to install. De-select NWPSRV.NLM and PARTAPI.NLM as these are already provided with NetWare.

   If a later version of the NLMs already exists on your server, the files are not replaced with the versions that are on the diskette.
9. Press ESC or Alt-F3 to return to the RCONSOLE display, and type: `LOAD SYS:AS4NW\AS4NW410`

LOAD AS4NW410 command: The LOAD AS4NW410 console command loads the appropriate version of the NetWare Enhanced Integration NetWare Loadable Module (NLM).

The `LOAD` command provides options that allow you to tailor your environment:

/MAXCNN=
   Specifies the maximum number of concurrent connections from iSeries hosts that can be active to this server. Specify a value in the range 1 to 100 connections (or use the default of 50 connections).

/CLSALLIDL
   Specifies to close connections with open files that have been idle for the amount of time you specify when you start the connection. iSeries uses a default value of 15 minutes for connections or the time you set with the CNNIDLTIME parameter on the STRNTWCNN command.

   If you do not specify this parameter, the system closes only connections with no associated open files when the specified CNNIDLTIME value has passed.

/SRBUFNUM
   Specifies the number of buffers (between 2 and 10 inclusive) to use in a Save/Restore session. The default is 3.

/SRBUFLEN
   Specifies the length of each buffer to use in a Save/Restore session. The length must be between 64K (65536) and 1M (1048576) inclusive. The default is 320K (327680).

To load the NLM:

`LOAD AS4NW410`

This command loads the NetWare Enhanced Integration NLM. It changes the server path environment variable to include the directory SYS:/AS4NW by using a `search add` statement in AUTOEXEC.NCF. Use the NWConfig utility to edit AUTOEXEC.NCF. The maximum number of allowed connections is the default value of 50. This command specifies use of the TCP/IP protocol.

Create a QNETWARE user profile on NetWare servers

You can use the features of NetWare Enhanced Integration without enrolling iSeries users on NetWare, particularly if you are not concerned about synchronizing passwords. You might not want to enroll a user who just wants to use NetWare printers, for example. However, enrolled users have more automated access to the servers in your network and do not have to worry about changing their passwords on multiple systems.

To enroll iSeries users on NetWare, you need a QNETWARE user profile on iSeries *and* on all NDS servers that you manage from iSeries. The installation automatically creates the QNETWARE user on iSeries. You need to create the QNETWARE users on your NetWare servers. The QNETWARE user profile must have ADMIN authority in each NDS tree on which you want to enroll users. If you do not want to enroll iSeries users on your NetWare servers, go to Restart iSeries.

Enable iSeries to automatically start authenticated connections

By default, iSeries is set to not store passwords for remote systems. Therefore, enrollment for group profiles and user profiles is delayed until the iSeries can access the profile's password. Without stored

passwords, the system cannot automatically start authenticated connections to NetWare servers. You must start a connection manually each time you sign on and want to connect to a specific server.

If you want the iSeries to automatically start authenticated connections to NetWare, you must enable the system to save password information with authentication entries. You do this by changing the QRETSVRSEC system value from its default of 0 to the value 1. Doing this speeds up user access. If you have an authentication entry, you only need to specify the NetWare server to start a connection. There are security implications to storing passwords, however. A trusted user who has ALLOBJ authority and access to service tools such as SST and DST could find the passwords on your server and decrypt them. If you choose not to let iSeries store passwords, you can still enroll iSeries users on NetWare.

To change the QRETSVRSEC system value:
1. On the iSeries command line, type WRKSYSVAL SYSVAL(QRETSVRSEC).
2. When the Work with System Values display appears, use option 2 to change the system value to 1.

Set up authentication entries

If you want to automate connections to the appropriate servers in your network, you need authentication entries for each iSeries user that uses the NetWare Enhanced Integration support.
- For information about authentication entries, you can refer to "Manage NetWare server connections and authentication" on page 13.
- For information about automatically creating authentication entries, you can refer to "Create authentication entries" on page 15.

Restart iSeries after installing NetWare Enhanced Integration

You can restart your iSeries any time after installing the licensed program for NetWare Enhanced Integration. Wait until now if you want to complete the previous configuration steps before running the PWRDWNSYS command. To restart the iSeries, follow these steps:
1. On the iSeries command line, enter the PWRDWNSYS command and specify *YES for the RESTART parameter. Doing this activates the QNetWare file system that NetWare Enhanced Integration uses.
2. To verify that the QNetWare file system is mounted, wait until the system restarts. Then enter:

   DSPMSG QSYSOPR

   Look for the message CPCA08C that says:

   /QNetWare file system mounted

Verify communications to the NLMs

Enter the PING command to verify that iSeries can communicate with the server. Communication between the server and iSeries should enable NetWare Enhanced Integration to work.

Define network server attributes

If you have primarily NetWare servers on your network, you can simplify working with those servers by changing default values on a system-wide basis. Many network server commands, such as DSPNWSUSR and WRKNWSSTS, allow you to specify *NWSA for a given parameter to indicate that iSeries should use information from the network server attributes.

For example, if you plan to enroll most of your iSeries users on the same set of NDS trees, you can simplify enrollment by first defining a default list of those trees. Then when you enroll users, you can refer to that list of default attributes by specifying *NWSA on the appropriate command parameters. Adding or removing network servers is also simpler because you change the default server list instead of manually changing all the profiles that refer to it.

When you are running TCP/IP, you must use the CHGNWSA command to add the TCP/IP names of the NetWare servers. Enhanced Integration for Novell NetWare uses this list of names to find the TCP/IP

NetWare servers. (This is the only place that iSeries uses the TCP/IP name of the NetWare server. After identifying NetWare servers from this list, NetWare Enhanced Integration knows the servers by their NetWare server names, not their TCP/IP names.)

In addition, you can change the default value of the TCP/IP port from 20199 to some other value. If you change the default port value, you must load the NetWare Enhanced Integration NLM with the parameter /tcp=nnnn, where nnnn is the new port value. If you decide to change this value after loading the NLM, you must unload and reload the NLM with the new value.

To set these attributes on an individual user profile basis instead, you can use the CHGNWSUSRA command.

Network server attributes are saved by the Save System (SAVSYS) command. Network server attributes are restored to the system when the operating system is installed.

To define network server attributes, enter the Change Network Server Attributes (CHGNWSA) command:
1. On the iSeries command line, type CHGNWSA and press F4. The Change NWS Attributes display appears.
2. Fill in the values you want for your system defaults. Here are suggestions:
   - The original default *ALL for Prompt control shows all the parameters. To have iSeries show only parameters that are relevant to NetWare, you can change this value to *NETWARE.
   - If NetWare is the predominant server type in your network, change the value for the Default server type field to *NETWARE.
   - For the NDS tree, specify the tree that your iSeries uses most often when accessing the network.
   - Specify the complete path name for that NDS tree in the NDS context field. Defining the context here enables you to use *NWSA on other CL commands that have an NDS context parameter. If you do not set an NDS context, iSeries defaults the context to *ROOT.
   - To connect to NetWare servers over TCP/IP, you must specify values for the TCP/IP port and NetWare IP server list fields.
   - The NDS Tree list field has the default tree list for user enrollment. "Manage NetWare users from iSeries" on page 17 has information about this parameter.

Unlink and delete NetWare NWSDs when you upgrade the release level

If you are upgrading to Version 4, Release 5 and above, and previously had NetWare Integration installed on an Integrated xSeries Server, you can save space by deleting unnecessary files. To remove links and delete storage spaces that remain from before your reinstallation, use the Work with Network Server Storage Spaces (WRKNWSSTG) command.

To unlink and delete leftover network server descriptions (NWSDs), do this:
1. On an iSeries command line, type WRKNWSSTG and press Enter.
2. Look for *NETWARE in the Format column to identify network server descriptions that you want to delete.
3. Check for a server name in the Server column that is associated with that network server description. If a server name appears, you must first unlink the NWSD before deleting it.

   To remove a link, type 11 in the Option space before the NWSD name.
4. Once the NWSD has no links, you can delete it by typing 4 in the Option space before the NWSD name.
5. Repeat these steps for each NetWare NWSD in the list.

Note: These are the only command options still available for your NetWare NWSDs for V4R5.

Manage NetWare server connections and authentication

Most administrative, printing, and file system functions require that you have an authenticated connection from iSeries to a NetWare server that runs the NetWare Enhanced Integration NLM. You can think of this as the iSeries user's logging on to the server.

To make this connection, you must have a NetWare user name and password. In most cases the NetWare user name and the iSeries user profile should be the same. When they are different, you identify the NetWare user name that you want to use for the connection in one of these ways:
* By specifying it when you manually start the connection.
* By specifying it in the NetWare authentication entry.

You can establish connections in these three ways:
* Directly by manually starting a connection with the STRNTWCNN command. This connection is active only until the user signs off (whereas setting up an authentication entry automates this process). Use this method when you need to specify:
  - The iSeries user profile authorized to use the connection (for example, when the NetWare user name and the iSeries user profile are different).

    Only jobs running under the specified iSeries user profile name can use the connection.
  - The job that is authorized to use the connection.

    The connection can be used by either the current job or by any job running under the specified user profile name.
  - The type of authentication to be performed.

    For example, NetWare backup services require a separate authentication in addition to a normal user login.
* Indirectly by creating an authentication entry for the NetWare Directory Service (NDS) tree that the server is in. Once you create an authentication entry, iSeries automatically starts a connection when necessary. Using authentication entries greatly enhances usability.
* Indirectly by using iSeries user enrollment, which has iSeries automatically create the authentication entries. Again the authentication entry enables iSeries to start connections automatically.

You can also display and work with connections and authentication entries in these ways:
* If you want to display or end a connection, see "Work with NetWare connections" on page 16.
* To add, change, delete, or display authentication entries for a specific iSeries profile, see "iSeries authentication entry commands" on page 16.
* Once you have established a connection to a NetWare server, you can work with that server from your iSeries console.

Authenticated connections process

When you enter a request to an NDS tree, iSeries searches for an authentication entry for that tree or server. If it finds an authentication entry, or when you use the STRNTWCNN command, iSeries attempts to start an authenticated connection to the server. The NetWare server receives the connection request and authenticates your access by verifying that the NetWare user name and password are valid. If they are valid, iSeries starts the connection and forwards your administrative, printing, and file system requests to NetWare.

If iSeries finds an authentication entry but the password is not stored with it, you only need to specify the server to which you want to connect and the NetWare user password on the STRNTWCNN command. iSeries uses the other information in the authentication entry, such as the NetWare user name, to issue the connection request to NetWare.

Manually start a connection to the NetWare server

If you do not have an authentication entry for a NetWare server, you can manually start a connection to the server. You do this by using the Start NetWare Connection (STRNTWCNN) command. If you are using the connection for batch jobs, first read that topic for special considerations.

To start a connection to a NetWare server, do this:
1. On an iSeries command line, type STRNTWCNN and Press F4. (You can also start a connection by typing WRKNWSSTS at the command line and pressing Enter. Then page down to the server and type 10 (start connection).)
2. In the Server field, specify the name of the NetWare server to which you want to connect.

   You can start connections to any server within an NDS tree by using the *ANY value. You can specify *ALL to start connections to all servers within the tree you specify on this command. If multiple connections exist, operations that do not require a specific server will use the first connection that was started.
3. In the Server type field, specify either:
   - *SERVER for iSeries to determine the type of the target server

     If you specify *ANY or *ALL in the Server field, you cannot specify *SERVER here.
   - *NDS for a NetWare 4.1, NetWare 5.x, or Netware 6 server
4. Specify the name of the user. Only jobs running under this iSeries user profile can use the connection. To start a connection for another user profile, you need *USE authority to that user profile.
5. If the user profile has no authentication entry or you want to use different authentication information than the user profile contains, enter values for the rest of the fields. If the user profile has an authentication entry, that entry identifies these values:
   - The server or NDS tree
   - The user name for each server or NDS tree that you want to access
   - Optionally, the password that is used to log in to the server or tree.

   To have iSeries retrieve these values from the authentication entry, use the special value, *AUTE. If you did not set up iSeries to save passwords, specify the NetWare password.
6. In the Authorized job field:
   - If you want the connection to be available only to the current job (necessary to access the file system), use the default (*). Connections that are limited to the current job end during end job processing. Because ending connections requires communication with the server, jobs take longer to end (possibly several minutes, depending on the state of the server).
   - If you want to make the connection available to any job, change the value to *ANY. Use this value to run batch jobs and for printing to a NetWare print server when a connection cannot be started by using an authentication entry.
7. Page down to see additional parameters.
8. In the Connection type field, specify whether the connection is:
   - A normal user sign-on (*USER). Specifying *USER for the connection type establishes a connection that is similar to logging in from a NetWare client. You need a *USER connection to access files and directories on the server and to perform server administration tasks such as creating volumes or submitting console commands.
   - A connection to the NetWare Storage Management Services (SMS) NLMs (a *SAVRST connection).

     A *SAVRST connection requires that these NLMs be present on the server, either already loaded or in the server's search path:

     ```
     NetWare 5 -- SMDR.NLM, TSANDS.NLM, TSA500.NLM
     Netware 6 -- SMDR.NLM, TSANDS.NLM, TSA600.NLM
     ```

     The *SAVRST connection must use the same user name and password as are used to start the *USER connection.
9. You can use the Connection idle time field to do this:
   - Force a connection to remain active indefinitely. You might want to use this (along with *ANY in the Authorized job field) for batch jobs that will run later. See "Details: Connections in a batch job or printing" on page 15.

- Allow the system to automatically close connections that have not been used for a specified period of time, possibly to reduce the number of active connections. This value defaults to 15 minutes.
10. Press Enter to start the connection.

If you have trouble starting the connection, see the topic on troubleshooting authentication errors.

Details: Connections in a batch job or printing

You can use connections in a batch job or for printing. However, doing this involves special considerations:

- Whether or not an authentication entry for the wanted tree or server exists for the iSeries user profile under which the job will run.
- Whether or not there is a password.
- Whether or not QNetWare file system access is required.

If an authentication entry exists for the iSeries user profile under which the job will run, and the profile contains the correct NetWare user name and password, the system can start the necessary connections. No special action is required.

If no authentication entry exists, or there is no password in the authentication entry, you must start a connection manually in one authentication entry. To start this connection manually, you have two options:

1. From an interactive job, use the STRNTWCNN command, specifying the batch job's iSeries user profile and an authorized job value of *ANY. For example:

```
STRNTWCNN SERVER(X) AUTUSR(batch-usrprf) AUTJOB(*ANY)
         PASSWORD(XXX)
```

   or

```
STRNTWCNN SERVER(X) AUTUSR(batch-usrprf) AUTJOB(*ANY)
         NDSCTX(XXX) NTWUSER(XXX) PASSWORD(XXX)
```

2. Have the batch job start the connection, but specifying AUTUSR(*CURRENT) and AUTJOB(*) (these are the command defaults). For example:

```
STRNTWCNN SERVER(X) NTWUSER(XXX) PASSWORD(XXX)
```

The QNetWare file system requires a connection for the current job (AUTJOB(*)). This means that to access the QNetWare file system from a batch job, you must either:

- Have an authentication entry in the batch user profile that contains the correct password. (This requires you to enable iSeries to save passwords (see "Enable iSeries to automatically start authenticated connections" on page 10))
- Have the batch job start the connection, specifying AUTJOB(*) as described above.

Create authentication entries

Before starting a requested connection to a NetWare server, iSeries searches for an authentication entry for that server. You can create authentication entries to store the user name and password for each NDS tree to which users require connections in two ways:

- Manually by using the Add NetWare Authentication Entry (ADDNTWAUTE) command to create an authentication entry.
- Automatically by "Enroll iSeries users on NetWare" on page 23. When you create authentication entries automatically, the name of the iSeries profile and NetWare object and the passwords must match on iSeries and all the NetWare servers to which you want to connect.

Note: Although iSeries users can have multiple NetWare user objects, they can have only one authentication entry for an iSeries profile per NDS tree. Therefore, create the authentication entry to access the NetWare user object that they use most often.

To create an authentication entry manually, do this:

1. If you want iSeries to save password information with the authentication entry to automatically start authenticated connections to NetWare, first change the QRETSVRSEC system value.
2. On an iSeries command line, type ADDNTWAUTE and press F4.
3. In the Server type field, specify *NDS and press Enter.
4. To access NetWare with a different user profile than the one you are using on iSeries, specify that user profile in the NetWare user field.

"iSeries authentication entry commands" shows the commands to add, change, delete, or display authentication entries for an iSeries user profile.

NetWare Directory Services

NetWare Directory Services (NDS) is a relational database that is distributed across a NetWare network. NDS treats network resources as objects in a distributed database that is called the Directory tree and controls access to those objects according to the rights granted to users.

iSeries authentication entry commands

To display the authentication entries for an iSeries profile, use the Work with NetWare Authentication Entries (WRKNTWAUTE) command. Just type WRKNTWAUTE on an iSeries command line and press Enter. You can use this command to add, change, or delete authentication entries for a specific iSeries profile by selecting the option you want. You can also use these commands:
- ADDNTWAUTE
- CHGNTWAUTE
- VFYNTWAUTE
- RMVNTWAUTE
- DSPNTWAUTE

For cleanup purposes only, the RMVNTWAUTE and DSPNTWAUTE commands are the only commands allowed to work with NetWare 3.x.

Work with NetWare connections

Once you establish a connection to a NetWare server, you can use the Work with NetWare Connection (WRKNTWCNN) command to work with that connection. This command enables you to do this:
- End the connection to the server. This is equivalent to CLEAR STATION in NetWare.

  Be careful when you end connections. Ending a connection while in the middle of a transaction or file update can cause incorrect data to be saved.
- Display connection information for:
  – All connections between this iSeries system and a NetWare server
  – All connections on the NetWare server
- Print the connection information that appears on the Display NetWare Connection screen.
- Work with the iSeries job that is associated with the connection.

To work with your NetWare connections, follow these steps:
1. On an iSeries command line, type WRKNTWCNN and press F4.
2. Specify the server you want.
3. In the Category field, specify whether you want to work with the local connection (from iSeries to the server) or connections on the server. Press Enter.

   If you typically want to work with *SERVER category connections rather than with local connections, you can change the command default. Use the CHGCMDDFT command to change the category (CGY) default:

   ```
   CHGCMDDFT CMD(WRKNTWCNN) NEWDFT('CGY(*SERVER)')
   ```

The object name displayed on the *SERVER display is relative to the current context of the job (which you set by using the CHGNDSCTX command or permanently by using the CHGNWSA or CHGNWSUSRA commands). You can find more information about user context in "iSeries user profiles in NetWare" on page 20.

4. Select the option you want and press Enter.

Alternatively, you can use these commands:
1. Type WRKNWSSTS, select option 11, press F4, and specify *SERVER.
2. ENDNTWCNN
3. DSPNTWCNN

You can also work with server connections by selecting option 11 from the WRKNWSSTS display, then pressing F4. Specify *SERVER.

Work with your NetWare servers from iSeries

After you establish a connection to a NetWare server, NetWare Enhanced Integration enables you to work with that server from your iSeries console. You can display information about the servers, such as whether they are active, and work with connections, volumes, and user enrollment.

To do this, use the Work with Network Server Status (WRKNWSSTS) command:
1. On an iSeries command line, type WRKNWSSTS SVRTYPE(*NETWARE) and press Enter. iSeries shows a list of servers, lets you know whether they are active, and provides options for working with them.

   Note: If you defined network server attributes to have iSeries show only NetWare servers by default instead of all servers, you need to type only WRKNWSSTS.
2. Type the appropriate number for the action you want to take by the server name and press Enter.

Manage NetWare users from iSeries

NetWare Enhanced Integration includes support that enables you to enroll iSeries group and user profiles on one or more NDS trees. User enrollment enables you to easily manage NetWare users from a centralized location and simplifies access to NetWare servers.

This support is not intended to completely replace your use of NetWare administration tools, such as SYSCON and NetWare Administrator (NWADMIN). However, it has certain advantages.

To take advantage of this integration, do this:
1. First read "User enrollment" on page 18. These topics describe the process of user enrollment and discuss some considerations to keep in mind as you plan for user enrollment and management of NetWare users from iSeries.
2. Set up your NetWare servers for user enrollment.
3. Set up your iSeries for user enrollment.
4. Create iSeries group and user profiles for the users that you want to enroll.
5. Enroll those users on NetWare. This page includes example command strings that you can use.
6. After you enroll users, you can do this:
   • Check their enrollment status.
   • Use these commands to extend profile changes from iSeries to NetWare.
   • Use these commands to work with user profiles.

If you have trouble with user enrollment, see "Troubleshoot NetWare Enhanced Integration" on page 56.

Advantages of managing NetWare users from iSeries

Managing NetWare users from iSeries gives you these advantages:
• Central user ID administration

You can manage enrollment of iSeries and PC users on NetWare from a single iSeries. You can add, remove, or change users or groups on selected NDS trees by making changes from iSeries. You can also display information on iSeries that shows which users are enrolled and on which NDS trees.

* Automatic extension of iSeries user profile attributes

If a password for an iSeries user profile changes, that change automatically spreads to the corresponding user object on all of the NDS trees that you specify. This function is especially helpful when managing users who are defined on several NetWare servers.

Other user profile attributes extended to NetWare include the text field, profile login script, password expiration interval and expiration date, and login expiration date.

* Automatic creation of NetWare group and user objects

You can automatically create NetWare objects by enrolling iSeries users and groups on NetWare. When you enroll a group, you can also enroll all of its members. The new NetWare group and user objects are created with the same name as their iSeries profiles.

* Automatic creation of NetWare authentication entries

When you enroll users on NetWare, iSeries automatically creates an authentication entry associated with the users' iSeries profile to allow easy access to NetWare services. iSeries uses the authentication entry to verify authorization to NetWare when starting a connection to a NetWare server.

User enrollment

When you plan for user enrollment and management of NetWare users from iSeries, you might find the information in these topics helpful. These topics describe the process of user enrollment and discuss considerations to keep in mind:

* "QNETWARE user profile" tells how iSeries uses this profile that you create for your NetWare servers.
* "Network server user attributes" on page 19 tells how network server user attributes preserve network information for a group or user profile.
* "Profile characteristics" on page 19 describes the ways iSeries and NetWare treat group profiles differently, provides tips on using group profiles, and tells which profile attributes extend to NetWare.
* "NetWare object rights and attributes" on page 21 discusses options for creating groups and defining their security rights.
* "Use of multiple iSeries systems to enroll users" on page 21 tells why you should use completely separate user profile sets when you enroll a user to multiple iSeries systems.

QNETWARE user profile

The QNETWARE user profile on iSeries and NetWare enables iSeries user enrollment to NetWare. Therefore, you must create a QNETWARE user object in the bindery in each NDS tree that you want to manage from iSeries. The QNETWARE user object must have ADMIN authority to be able to create objects and to manage passwords in the network. Although doing so is not prohibited, you should not use the QNETWARE user object to log in to NetWare from a client workstation.

When you install NetWare Enhanced Integration, iSeries automatically creates the QNETWARE user profile in the disabled state. It is not allowed to run iSeries jobs; QNETWARE's only purpose is to enroll iSeries users and to extend iSeries profile information to NetWare.

iSeries uses the QNETWARE user profile to log on to each NetWare server, as in the figure below. iSeries then communicates with the NetWare Enhanced Integration NLM, sending the commands necessary to enroll iSeries users and to update group and user profile information in the network.

QNETWARE

iSeries

QNETWARE   QNETWARE

AS4NWnnn. NLM   AS4NWnnn. NLM

RV3D677-3
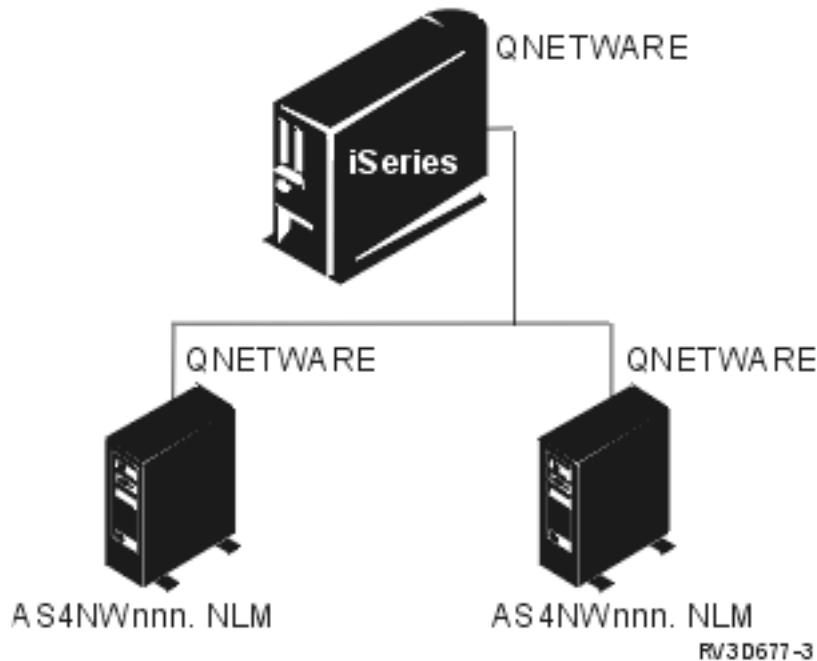
Network server user attributes

The iSeries network server user attributes preserve network information for a group or user profile. Many of the administrative commands use some of this information, such as the default server type, default context, and default NDS tree. The network server user attributes also contain a list of NDS trees (and associated user information) that are used by the user enrollment support to enroll the user or group on NetWare.

You can set defaults for this same information on a system-wide basis by using the Change Network Server Attribute (CHGNWSA) command (described in "Define network server attributes" on page 11.

To specify these attributes on an individual or group profile basis and enroll iSeries users to NetWare servers, you use the CHGNWSUSRA command (described in "Enroll iSeries users on NetWare" on page 23). You use these attributes to specify the NDS trees on which you want to enroll iSeries users.

Profile characteristics

On iSeries, a user profile can be used as either a user or a group profile. That means someone can sign on to iSeries with a group ID and do work on the system as a user. However, in NetWare, only user objects can be used to log in and run applications. Groups are separate object types that are used only to combine and then manage individual user objects as one entity. For example, you can specify file access rights on a group object basis, and the users belonging to those groups inherit those file rights.

You can define an iSeries profile as a user object in one NDS tree and as a group object in a *different* NDS tree. However, you cannot define an iSeries profile as both a group and a user in the same NDS tree.

You can define iSeries group profiles as user objects on NetWare. However, group members in these profiles are not automatically enrolled on NetWare.

Defining iSeries user profiles as group objects on NetWare has these **advantages**:
• Using groups reduces the number of profiles that you must individually enroll in your network. When you enroll an iSeries group profile and its members to a NetWare server, the user profiles that belong to the group enroll automatically.

- Using groups also reduces the number of profiles for which you need to define NetWare security. You can set rights and attributes for a group object, and the group members inherit those rights and attributes.
- You can also use groups to better manage access to your network resources. For example, if you install financial applications and data on a NetWare server, you can grant access for that server to only the FINANCE group.

When you enroll iSeries group and user profiles on NetWare servers, iSeries sends only the information in the group and user profiles that applies to NetWare. The profile information that you specify for those iSeries attributes overwrites the corresponding NetWare attributes. Thus any changes that NetWare users make to these attributes are overwritten when you propagate the iSeries profile changes.

You can add additional NetWare group and user attributes, such as user properties for a telephone number, fax number, and last name, from the NetWare NWADMIN utility.

iSeries group profiles in NetWare: When you enroll an iSeries group profile as a group object in NetWare, these iSeries attributes are propagated:

Profile name
> The name of the iSeries group profile, which corresponds to the name of the group object in NetWare.

Text   The text description field on an iSeries group profile, which corresponds to a text description of the group object in NetWare.

> You can define this with the `Text` parameter by using either the Create User Profile (CRTUSRPRF) or Change User Profile (CHGUSRPRF) command.

NDS context
> The context of the NDS tree in which the iSeries group profile is to be placed as a NetWare group object.

> You can define this with the CHGNWSA command (described in "Define network server attributes" on page 11) or the CHGNWSUSRA command (described in "Enroll iSeries users on NetWare" on page 23).

iSeries user profiles in NetWare: When you enroll an iSeries user profile as a user object in NetWare, you can propagate these iSeries attributes. The fields shown in bold italics are updated on NetWare every time the iSeries profile changes.

Profile name
> The name of the user object in NetWare, which corresponds to the iSeries profile name.

NDS context
> The context of the NDS tree in which the user profile is to be placed as a NetWare user object. Specify the NDS context with the CHGNWSA command (described in "Define network server attributes" on page 11) or the CHGNWSUSRA command (described in "Enroll iSeries users on NetWare" on page 23).
> - If you enroll an iSeries group and all its members, the context for each member is the same as the group context.
> - If you enroll a user as a member of multiple groups, and more than one of those groups is enrolled in an NDS tree, the user object has the same NDS context as the first group to which it was enrolled.
>   - If you enroll the main group to which a user belongs, the user object has the same NDS context as this group.
>   - If you do not enroll the main group to which a user belongs, but you do enroll one or more of the supplementary groups, the user object has the same NDS context as the first supplementary group to which it was enrolled.

Profile login script
> The name of a login script that is run for a profile when the user logs in to the NetWare server or NDS tree.

You can define this with the `Profile object` field of the `NDS tree list` parameter by using the CHGNWSUSRA command (described in "Enroll iSeries users on NetWare" on page 23).

Password
> The iSeries password is used to set the user password on the NetWare servers. This corresponds to the PASSWORD parameter on either the CRTUSRPRF or CHGUSRPRF command.

Password required
> If the iSeries system value QSECURITY is 10, the NetWare user objects that are created do not require a password to sign on to the server. All other iSeries QSECURITY levels require that a user object log in with a password.

Unique password
> If the system value QPWDRQDDIF is 0, the new password does not have to be unique when it is changed. Any other value for QPWDRQDDIF forces the user to supply a new password that is unique.

Password expiration interval
> The number of days a user object's password is valid. This corresponds to the password expiration interval (PWDEXPITV parameter) on the CRTUSRPRF or CHGUSRPRF command. If this value indicates to use the system value QPWDEXPITV, iSeries uses the system value to set the expiration interval.

Password expiration date
> You can use the `Set password to expired` field on the CRTUSRPRF or CHGUSRPRF command to indicate that a password has expired. If you change this field to *YES for an iSeries user profile, iSeries changes the `Password expiration date` to the day before. For example, if you change the `Set password to expired` field to *YES on 4/17/97, iSeries sets the password expiration date on NetWare to 4/16/97.

Login grace limit
> User objects are allowed 6 more logins after a password has expired. This is the default.

Account disabled
> The Status field on the CRTUSRPRF or CHGUSRPRF command is used to indicate whether the user can log into the NetWare server or NDS tree.

Text
> The Text description field on an iSeries user profile, which corresponds to a text description of the user object in NetWare.
>
> You can define this with the `Text` parameter using either the CRTUSRPRF or CHGUSRPRF command.

NetWare object rights and attributes

If you plan to enroll iSeries groups and all of their members, you can either:
* Create the group objects first on NetWare and then define their security rights. Then you can enroll iSeries group members without overwriting the NetWare security information.
* Have the group objects created on NetWare during user enrollment and then define their security rights.

With either method, the users that are enrolled into these groups will belong to a NetWare group that already has its security rights set. The user objects inherit the same rights that are already set for the group object.

Whether you enroll iSeries user profiles individually or as group members, the corresponding NetWare user objects might be added to the NetWare EVERYONE group when they are created. NetWare adds user objects to the EVERYONE group only if it already exists in the same container where the user object is being created. All users added to EVERYONE inherit the security rights that are defined for that group.

Use of multiple iSeries systems to enroll users

iSeries user enrollment from a single iSeries works independently of any other iSeries system. Although you can enroll users on the same NDS tree, this is not recommended.

If you want to enroll iSeries users from more than one iSeries, consider having completely separate user profile sets. Otherwise, you could encounter undesirable enrollment situations.

For example, MARLA is enrolled on NetWare SERVER1 from iSeries **A**. MARLA is then enrolled on the same server from iSeries **B** with a different password than the one used on iSeries **A**. Now MARLA's password on iSeries **A** no longer matches the password on SERVER1 and she cannot start connections to SERVER1 automatically from iSeries **A**.

Set up your NetWare servers for user enrollment

Before you can enroll iSeries users on your NetWare servers, you need to set up those NetWare servers for user enrollment. To set up your servers for user enrollment, do this:

1. Ensure that you installed the NetWare Enhanced Integration NLM on each NetWare server during the installation process.
2. Create a QNETWARE user profile on each NDS tree on which you want to enroll iSeries users. iSeries uses the QNETWARE user profile to log on to the server and enroll users. The QNETWARE user profile must have enough authority to create, change, and delete user and group objects. This could include:
   - Properly positioning QNETWARE in an NDS tree
   - Granting QNETWARE ADMINISTRATOR authority
   - Making the security for QNETWARE equivalent to the security of an existing user object that has the necessary authority

   Generally, you should use the same password for QNETWARE on each server. If the password is different, you must create a QNETWARE authentication entry for each NetWare tree or server you enroll to, as described in "Set up iSeries for user enrollment."

   To set up your NetWare servers for user enrollment, use the NetWare SYSCON, NETADMIN, or NWADMIN utility to create the QNETWARE user object and to define its security. Refer to your NetWare documentation for information about using these utilities.

Set up iSeries for user enrollment

When you install NetWare Enhanced Integration, a default QNETWARE user profile is created with *NONE for a password. You need to change the QNETWARE profile so it can log in to the NDS trees on which iSeries users are to be enrolled.

To set up your iSeries system for user enrollment:
- If you did not already do so (described in "Enable iSeries to automatically start authenticated connections" on page 10), set the Retain Server Security (QRETSVRSEC) system value to 1. This speeds up user access by having iSeries retain security information such as passwords, which are needed to authenticate users' access to NetWare. However, if you choose not to let iSeries store passwords, you can still enroll iSeries users on NetWare.
- Set the password for QNETWARE on iSeries.

  If you used the same password for the QNETWARE user objects on most or all of the NDS trees, use the same password for QNETWARE on iSeries.

  To set the password for the QNETWARE profile, enter:

  ```
  CHGUSRPRF USRPRF(QNETWARE) PASSWORD(password)
  ```

  Note that you cannot enable the QNETWARE profile; iSeries intercepts and ignores attempts to change the profile to an enabled state. If QNETWARE is enrolled on NetWare, you also cannot set the password for QNETWARE to *NONE. If you do, the QNETWARE user profile automatically disables the QNETWARE user object on NetWare; then user enrollment cannot proceed.
- To extend QNETWARE profile changes, including passwords, to the NDS trees on which you enroll iSeries users, use the CHGNWSUSRA command (described in "Enroll iSeries users on NetWare" on page 23). Specify the NDS trees that should receive the profile changes or use the value *NWSA to refer to network server attributes that you defined.
- If you want to enroll iSeries users on NDS trees to which the QNETWARE profile changes were not propagated in the previous step, use the ADDNTWAUTE command. Use this command to create authentication entries for the QNETWARE profile on those NDS trees.

You also might choose this option if you want to have different passwords for QNETWARE on the various NDS trees.

To create an authentication entry for the QNETWARE user profile that has a password of OWNER in NDS tree TREE1 in NDS context MAIN, you would enter:

```
ADDNTWAUTE SVRTYPE(*NDS) NDSTREE(TREE1)
USRPRF(QNETWARE) PASSWORD(OWNER)
 NDSCTX(MAIN)
```

To create a NetWare authentication entry for the QNETWARE user object, which has a password of OWNER in SERVER1, you would enter:

```
ADDNTWAUTE SVRTYPE(*NETWARE3) SERVER(SERVER1)
USRPRF(QNETWARE) PASSWORD(OWNER)
```

For more information, see "Manage NetWare server connections and authentication" on page 13.

Create iSeries group and user profiles for NetWare servers

If you do not have iSeries profiles that represent the structure you want in your NetWare network, you need to create iSeries group and user profiles. (You might want to first read "NetWare object rights and attributes" on page 21.) If your iSeries is already set up with group and user profiles that you can propagate to NetWare, go to "Enroll iSeries users on NetWare."

To create user or group profiles for users on iSeries that need to access NetWare servers, use the Create User Profile (CRTUSRPRF) command.

For example, to create a group profile that you name FINANCE for a group of users that needs to access a NetWare server for a specific financial application, enter:

```
CRTUSRPRF USRPRF(FINANCE)
```

To create a user profile named TOM and add it to the FINANCE group profile, enter:

```
CRTUSRPRF USRPRF(TOM) GRPPRF(FINANCE)
```

A user profile must have a primary group before you can specify a supplementary group. NetWare does not distinguish between a primary group and a supplementary group. After you create the iSeries profiles, you can enroll them on NDS trees.

Enroll iSeries users on NetWare

You can automatically create NetWare user objects by enrolling iSeries users on one or more NDS trees. This means that certain iSeries profile information automatically propagates to NetWare. Before you begin enrolling iSeries users on NetWare, read about "User enrollment" on page 18.

If you plan to enroll most of your iSeries users on the same set of NDS trees, you can simplify enrollment by first defining a default list of those servers and trees. (See the configuration topic on defining network server attributes.) If you did not set your iSeries to store passwords, see also "Enroll users when iSeries does not store passwords" on page 26.

To enroll iSeries users on NetWare, you need to specify the NDS trees on which you want to enroll them. You do this by using the Change Network Server User Attributes (CHGNWSUSRA) command.
1. On the iSeries command line, type CHGNWSUSRA and press F4 to see the Change NWS User Attributes (CHGNWSUSRA) display.
2. In the User profile field, specify the name of the user or group.
3. When you enroll group profiles, specify the Profile type as *GROUP. You can also specify Propagate group members (PRPGRPMBR) as *ALL if you want to enroll all the group members. The default of *NONE specifies that group members are not to be enrolled.
4. You can use the NDS tree and NDS context fields to set the default location for the current job.
5. Page down to specify the NDS tree list to which you want to enroll users.

6. In the `NDS tree list` field, specify a list of NDS trees OR *NWSA (to refer to a default list that you defined as a network server attribute). Use this information to fill in the `NDS tree list` fields:

NDS tree parameter
   The NDS tree in which the iSeries group or user is to be enrolled.

User object context
   The location in the NDS tree where the NDS group or user object is to be created during enrollment.

Default server
   The default server in the NDS tree that is to be used to enroll the iSeries profiles. You can improve performance by specifying a server rather than using the default *ANY. If the specified server is not active when iSeries attempts to connect to NetWare, iSeries searches the NDS tree for other active servers.

Profile object
   The distinguished name of the default NDS profile object that contains the login script that the NetWare object is to use when logging into the network.

"Examples: Specify an NDS tree list" on page 25 shows examples of enrolling either a group profile or a user profile in an NDS tree.

Specify the default list of NDS trees

If you define your NetWare servers and NDS trees in the network server attributes, you can simplify enrollment by first defining a default list of those servers and trees. Then when you enroll users, you can refer to that list of default attributes by specifying *NWSA on the appropriate CHGNWSUSRA command parameters.

When you specify the NDS tree list (NDSTREELST) parameter as *NWSA, you avoid having to change iSeries group or user profiles when you add or remove NetWare servers from your network. Changes to any user or group profiles that you define to use the *NWSA value extend automatically to new servers that you add to the network server attributes. Refer to "Examples: Specify *NWSA" on page 25 for examples that show how to enroll a group profile or a user profile to the system-default list of NetWare servers and NDS trees.

To see what your NWSA values are, use the Display NWS Attributes (DSPNWSA) command with OPTION(*NETWARE).

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Examples: Specify *NWSA:

Note: Read the "Code disclaimer information" on page 1 for important legal information.

These examples show how to enroll either a group profile or a user profile to the system-default list of NetWare servers and NDS trees.

Group Profile:

To enroll the group profile FINANCE and all its group members on the NDS trees that are defined in the network server attributes (NWSA), enter:

```
CHGNWSUSRA USRPRF(FINANCE) PRFTYPE(*GROUP) PRPGRPMBR(*ALL)
NDSTREELST(*NWSA)
```

All the FINANCE group members, including JOHN (whose user profile was created according to the directions in "Create iSeries group and user profiles for NetWare servers" on page 23), are now enrolled on NetWare. Future changes to the FINANCE profile, or any user profiles for members of FINANCE, will be propagated to NetWare.

User Profile:

To enroll user profile JOHN on the NDS trees that are defined in the network server attributes (NWSA), enter:

```
CHGNWSUSRA USRPRF(JOHN) PRFTYPE(*USER)
NDSTREELST(*NWSA)
```

Notes:

1. You cannot specify *NWSA as the NDS tree list if you want to specify additional servers that were not defined in the network server attributes.

   To enroll an iSeries group or user profile on servers other than those defined as network server attributes, you must use the CHGNWSUSRA command. Specify all the NDS trees for that profile, even if most of them are defined in the network server attributes.

2. You might not want to specify *NWSA if your NetWare authorization differs from one NDS context to another and you want to enroll iSeries users in the context that matches the wanted authorization.

Examples: Specify an NDS tree list:

Note: Read the "Code disclaimer information" on page 1 for important legal information.

These examples show how to enroll either a group profile or a user profile in NDS tree XYZ.

Group Profile:

To enroll group profile FINANCE and all of its group members in context O=MAIN in NDS tree XYZ, enter:

```
CHGNWSUSRA USRPRF(FINANCE) PRFTYPE(*GROUP)  PRPGRPMBR(*ALL)
NDSTREELST((XYZ 'O=MAIN' PUBSRV1 NWLOGIN))
```

The FINANCE group object and user objects corresponding to the iSeries group members are created in the NDS tree. From now on, users added to or removed from iSeries FINANCE group profile are added or removed from NDS tree XYZ.

User Profile:

To enroll user profile MIKE in context MAIN.PERSONNEL in NDS tree XYZ, enter:

```
CHGNWSUSRA USRPRF(MIKE) PRFTYPE(*USER)
NDSTREELST((XYZ '.PERSONNEL.MAIN' PUBSRV1 NWLOGIN))
```

The MIKE user object is created in NDS tree `XYZ` and will use `NWLOGIN` as his login script.

Enroll users when iSeries does not store passwords

By default iSeries has a system value set that prevents storing passwords with authentication entries. You can change this system value to enable iSeries to keep passwords (as described in "Enable iSeries to automatically start authenticated connections" on page 10). If you prefer not to have iSeries store passwords for security reasons, you can still enroll iSeries users to NetWare.

To enroll users when iSeries does not store passwords:
1. Make sure that QNETWARE has a NetWare authentication entry for each NDS tree on which you want to enroll iSeries users.
2. Define the NDS trees on which to enroll the iSeries profile by using the CHGNWSUSRA command (described in Enrolling users.)

   Enrollment delays until iSeries temporarily accesses the profile's password.
3. To start enrollment, do one of the following:
   - Have the iSeries user sign on to iSeries.
   - Have an iSeries user with *SECADM authority set the profile's password by using the CHGUSRPRF command.
   - Have the iSeries user change the profile's password by using the CHGPWD command.

   The iSeries profile attributes are propagated to NetWare. If a NetWare object with this name does not exist, one is created with the same name as the iSeries profile. If a NetWare object with this name does exist, it is updated with iSeries profile changes. An authentication entry is not created.

Propagate profile changes to NetWare

After you enroll iSeries users on NetWare, profile changes for those users go automatically to NetWare and overwrite the corresponding NetWare attributes. iSeries sends only information in the group or user profile that applies to NetWare. Only those iSeries profiles that you enroll are affected when you make these changes:
- Change network server attributes by using the CHGNWSA command (if you specified *NWSA for the NDS tree list parameters on the CHGNWSUSRA command).
- Change the list of NDS trees to which iSeries sends profile changes for a particular iSeries profile by using the CHGNWSUSRA command.
- Change the password of a user profile by using the CHGPWD or CHGUSRPRF command.
- Use the CHGUSRPRF command to do this:
  - Change the `set password to expired` field of an iSeries user profile.
  - Change the text (description) of an iSeries group or user profile.
  - Change the status of an iSeries group or user profile to `*ENABLED` or `*DISABLED`.
  - Add an iSeries user profile to an iSeries group that you are enrolling.
  - Remove an iSeries user profile from an iSeries group that you are enrolling.

    Note: Be careful about removing a user profile if **all** these conditions are true:
    - The user profile was enrolled only as a group member with the PRPGRPMBR(*ALL) parameter
    - The user profile does not belong to any other groups that were enrolled
    - You remove that user profile from the group

    In this situation, the NetWare user object with the same name is deleted on all NDS trees that you specify with the CHGNWSUSRA command.
  - Add an iSeries user profile to an enrolled iSeries group by using the CRTUSRPRF command.
  - Delete an iSeries profile by using the DLTUSRPRF command.
  - Sign on to iSeries and use one of the preceding commands when iSeries does not store passwords. In this case, propagation delays until you sign on so iSeries can obtain the password.

If you decide you no longer want iSeries to send profile changes for a particular user or group to your NetWare servers, you can end user enrollment.

Check iSeries user enrollment status

After you enroll iSeries group and user profiles on NetWare, you can use the Work with NWS User Enrollment (WRKNWSENR) command to determine their status.

You can obtain enrollment status by user profile, profile type, and server type:
1. On the iSeries command line, type WRKNWSENR and press F4.
2. If you want to display enrollment status for groups, change the Profile type field to *GROUP instead of the default, which is by USER.
3. If you defined network user attributes, you can use the default for server type. Otherwise, make sure that the Server type field has *NETWARE.
4. Press Enter, and iSeries displays the additional parameters: NDS tree and Server. If you specify *NWSA for the NDS tree and Server parameters, iSeries displays those groups and users that are being enrolled into the NDS trees defined in the network server attributes.
5. Press Enter to view all the NetWare servers and NDS trees on which groups are to be enrolled.

   This Work with NWS User Enrollment display shows a list of NetWare servers and NDS trees and the current enrollment status of each group.

```
                    Work with NWS User Enrollment
                                              System:    SYSTEM1
 Type options, press Enter.
   2=Change user profile   4=Remove entry   5=Display user profile   6=Retry entry
   14=Change network user attributes   15=Display network user attributes
   16=Display error details

    Entry                    Enrollment   Error
 Opt   Profile          Type        status      code     Text
 __   IBM_TREE1         *NDSTREE
 __     GROUP1          *GROUP     *CURRENT             Scott and Marla
 __     PUBS            *GROUP     *CURRENT             Edith and Merry
 __   RCHHJA50          *NTW3SVR
 __     FELLOWSHIP      *GROUP     *UPDPND              Dennis and Lee




                                                            Bottom
 Parameters or command
 ===>
 F3=Exit   F4=Prompt   F5=Refresh   F6=Print list   F9=Retrieve
 F10=Display users     F12=Cancel   F17=Position to
```

6. If the iSeries profile is not enrolled on NetWare, use option 6 to retry the enrollment request even if the status is *CURRENT and there are no error codes.
7. If error codes appear, use option 16 to view error details and refer to "User enrollment error codes" on page 58.

User enrollment and authentication commands

Use the following commands to work with NetWare user enrollment on iSeries.

Table 1. User Enrollment Commands

Enter this iSeries command	to...
ADDNTWAUTE	Add a NetWare authentication entry to an iSeries profile that contains the NetWare user name and password used to connect to a NetWare server.
CHGNWSA	Define the NDS context and a default set of NetWare servers and NDS trees on which iSeries users can be enrolled.
CHGNWSUSRA	Enroll iSeries group and user profiles on NetWare.
	If you specify NDSTREELST(*NONE) and NTW3SVRLST(*NONE), the profile is **not** enrolled on NetWare.

Table 1. User Enrollment Commands (continued)

Enter this iSeries command	to...
CHGPWD	Change the password of a iSeries user profile. If the user profile was enrolled on NetWare, the password of the NetWare user object with the same name is also changed.
CHGUSRPRF	Change attributes such as the description of an iSeries group or user profile. If the iSeries profile was enrolled on NetWare, the attributes of the NetWare group or user object with the same name are also changed.
CRTUSRPRF	Create a iSeries user profile that can be enrolled on NetWare.
DLTUSRPRF	Delete a NetWare group or user object if the iSeries profile with the same name was enrolled on NetWare.
WRKNTWAUTE	Create, change, display, or remove a NetWare authentication entry.
WRKNWSENR	Check the status of iSeries profiles being enrolled on NetWare. You can also change or display iSeries profiles, change or display network user attributes, try the enrollment request again, remove entries for enrollment requests in a delete state, or display error details for iSeries profiles being enrolled on NetWare.

End user enrollment

You can unenroll an enrolled iSeries user or group from one or more NDS trees or NetWare servers in one of these ways:

- To unenroll an iSeries profile from all NDS trees and NetWare servers, change the NDS tree list to *NONE for that profile:
    1. On the iSeries command line, type CHGNWSUSRA and press F4. The Change Network Server User Attributes display appears.
    2. In the User profile field, specify the name of the user or group that you want to unenroll from your NetWare servers.
    3. When you unenroll group profiles, specify the Profile type as *GROUP.
    4. Specify *NONE for the NDS tree list field and press Enter. iSeries attempts to remove the NetWare object with the same name as the iSeries profile from the NDS trees and NetWare servers on which it was enrolled.
- For iSeries profiles that list NDS trees, rather than using *NWSA to refer to network server attributes, you can remove a specific tree or server from the profile:
    1. On the iSeries command line, type CHGNWSUSRA and press F4. The Change Network Server User Attributes display appears.
    2. In the User profile field, specify the name of the user or group that you want to unenroll from a particular NDS tree.
    3. When you unenroll group profiles, specify the Profile type as *GROUP.
    4. Remove the NDS tree from the NDS tree list for this profile and press Enter. iSeries attempts to delete the NetWare user or group object with the same name as the iSeries profile from the removed trees or servers.
- Unenroll iSeries user profiles that were enrolled only as members of a group by directing iSeries to not propagate group member information for that group. To do this, use the CHGNWSUSRA command to change the PRPGRPMBR parameter from *ALL to *NONE for the iSeries group profile. iSeries attempts to delete the NetWare user or group object with the same name as the iSeries profile from the NDS trees in which the group was enrolled.
- Remove NDS trees from the network server attributes by using the CHGNWSA command (described in "Define network server attributes" on page 11). Doing this causes iSeries to delete those users and groups that specify *NWSA from the removed trees or servers.
- Remove an iSeries user profile from an iSeries group that was enrolled by using the CHGUSRPRF command.

    iSeries attempts to delete the NetWare user object with the same name from all NDS trees in which the group was enrolled if:
    - The user profile was enrolled only as a group member with the PRPGRPMBR(*ALL) parameter **and**

- The user profile does not belong to any other groups that were enrolled **and**
- You remove that user profile from the group
- Delete an iSeries profile by using the DLTUSRPRF command.

If iSeries can no longer access a NetWare server, it cannot complete these commands to remove an iSeries profile from that server. In this case, the Work with NWS User Enrollment display shows the status of the iSeries profile as either *DLTPND, *DLTRCYPND, or *DLTFAIL. To view an explanation of these status values, put the cursor on the `Enrollment status` column and press F1 and then F2.

If one of these status values appears, you can remove the entry from the display by using Option 4. iSeries processes the entry as though the delete request completed successfully. If you use option 4 to remove the entry, you must delete the NetWare object from the NDS tree by using the NetWare NETADMIN, NWADMIN, or SYSCON utility.

Manage NetWare volumes from iSeries

NetWare Enhanced Integration enables you to manage NetWare volumes from iSeries. These volumes contain your users' directories and files. Before you can work with NetWare volumes, you must have an authenticated connection to the server and *IOSYSCFG authority. The Work with NetWare Volumes (WRKNTWVOL) command shows the current volumes on the network. You can use this display by typing WRKNTWVOL on the iSeries command line, or you can use specific commands to change, delete, and display or print information about the NetWare volumes.
- Access NetWare volumes
- Create NetWare volumes
- Change NetWare volumes
- Display or print NetWare volume information
- Delete NetWare volumes

About NetWare volumes

A NetWare volume is the highest level in the NetWare file system. It consists of up to 32 segments, which NetWare automatically numbers from 0 to 31. When you create a volume, the volume consists of one segment that is the size you specify. To increase the size of the volume, you add additional segments to the volume. The size of the volume increases by the size of the segments that you add.

NetWare volumes on a PC server can spread across multiple disks.

Access files in your NetWare volumes from iSeries

You can access the files on your NetWare volumes in the QNetWare file system on the iSeries from either the iSeries Navigator interface or the command line interface.

Use iSeries Navigator:
1. Start iSeries Navigator as your 5250 emulator from your personal computer when you connect to your iSeries system.
2. Expand your iSeries server —> **File systems** —> **Integrated File System**.
3. Double-click on **QNetWare** to open the QNetWare file system. Your files should appear in the right pane.

Use the command line:

To display or access all the NetWare volumes in your network, you can use the Work with Object Links (WRKLNK) or Display Object Links (DSPLNK) command and use the i5/OS menus. You can also use this method to determine the path name for the MOUNT command. To improve performance, use the DETAIL(*NAME) parameter to show only the name of the link.
1. On the iSeries command line, type WRKLNK and press Enter. The Work with Object Links display appears.

2. Type 5 next to QNetWare and press Enter. iSeries displays the QNetWare directory.
3. Type 5 next to the NetWare server on which you want to access files (*NTWSERV.SVR* in this example) and press Enter.

```
                          Work with Object Links

Directory  . . . . :    /QNetWare

Type options, press Enter.
  2=Edit  3=Copy   4=Remove   5=Display   7=Rename   8=Display attributes
  11=Change current directory ...

Opt   Object link          Type     Attribute    Text
      RCHHJA19.SVR          DDIR
      CT_TREE.TRE           DDIR
5     NTWSERV.SVR           DDIR
      IBM_TREE1.TRE         DDIR
      ITSOM02_TREE.TRE      DDIR
      LONG_TREE_NAME_THA >  DDIR
      LONGPATH_WITH_ENOU >  DDIR
      MENG536.SVR           DDIR
      NETSRV.SVR            DDIR
                                                          More...
Parameters or command
===>
F3=Exit   F4=Prompt   F5=Refresh   F9=Retrieve   F12=Cancel   F17=Position to
F22=Display entire field          F23=More options
```

Figure 1. Work with Object Links, QNetWare Directory

4. On the next screen that appears, type 5 next to your document directory and press Enter.

Now you should be able to access the information in that directory. You can also determine the correct path by using the path shown in the Directory field and the name of the object to which you are linking.

Create a NetWare volume

The easiest way to create a NetWare volume from iSeries is to use the Create NetWare Volume (CRTNTWVOL) command:
1. On the iSeries command line, type CRTNTWVOL and press F4.
2. In the Volume field, specify a name for the new volume.
3. In the Server field, specify the NetWare server name.
4. In the Size of volume field, either specify a specific size or use the default to create the volume with the maximum available size.
5. Specify a device number for the NetWare server. (To find out the device number and available free space on the server, follow steps 1 on page 31 through 3 on page 31 of the procedure to increase volume size.)
6. In the segment number field, either specify a valid segment number or allow the default *ANY.
7. In the Block size field, specify a size or use the default.
8. If you set data compression or block suballocation on, you cannot turn it off after mounting the volume for the first time.
9. The text is held in an NDS object that corresponds to the volume.
10. Press Enter to create the volume. iSeries creates the volume by using either the specified segment or the first free segment on the device that satisfies (or most closely matches) the requested size.

Change a NetWare volume

With NetWare Enhanced Integration you can change NetWare volumes from your iSeries.

From the iSeries command line, you can use the Change NetWare Volume (CHGNTWVOL) command, or the Work with NetWare Volumes (WRKNTWVOL) command, option 2 to do this:
- Increase the size
- Mount or remove the volume
- Change associated text
- Add (but not remove) data compression by changing the value in the Data compression field from *NO to *YES
- Add (but not remove) block suballocation by changing the value in the Block suballocation field from *NO to *YES

Increase NetWare volume size

NetWare Enhanced Integration enables you to increase the size of NetWare volumes from your iSeries. You can increase volume size by specifying the new size and the segment from which you want the additional size to be used.

To **increase volume size**, do this:
1. On the iSeries command line, type WRKNTWVOL and press F4.
2. Specify the NetWare server name.
3. Press F10 to show segments that are available on the NetWare server. Note the device number and size of free space on the *FREE entries.

   Segments that appear as *FREE have not been assigned to a volume. You can assign this free space to any other volume on any other disk device under these conditions:
   - That disk device does not already contain 8 segments that are assigned to volumes.
   - The volume that you want to increase has fewer than 32 segments from this and other disk devices.
4. Type 2 (change) by the volume that you want to increase and press Enter.
5. Specify a device number that has a *FREE segment.
6. In the Size field, specify the new **total** size that you want the volume to be (not exceeding the available free space). For example, if you have a volume that is currently 50MB and you want to increase it by 30MB, specify 80MB for the size. iSeries uses 30MB from the device number that you specify.
7. Press Enter, and iSeries increases the size of the volume.

Note: Changes to a segment or device number are only recognized if you increase the size. To **decrease volume size**, you must first delete the volume and then re-create it with the new size.

Mount and remove NetWare volumes

NetWare Enhanced Integration enables you to mount and remove NetWare volumes from your iSeries.

To mount or remove a NetWare volume, do this:
1. On an iSeries command line, type WRKNTWVOL and press F4.
2. Specify the NetWare server name.
3. Either specify the volume that you want to change or use the default *ALL to have iSeries show all the volumes on that server.
4. Type 2 (change) by the volume that you want to change. iSeries shows information for that volume.
5. Change the value in the Mount field.
   - To **mount** the volume, change the value in the Mount field to *YES.
   - To **remove** the volume, change the value in the Mount field to *NO.
6. Press Enter to run the command.

Display NetWare volumes

With NetWare Enhanced Integration you can display information about NetWare volumes on your iSeries. You can display information about volume segments and file system contents.

To display the volume segments on a NetWare volume, do this:

1. On the iSeries command line, type DSPNTWVOL and press F4 (or select option 5 from the Work with NetWare volumes display).
2. Specify the names of the volume and server in the appropriate fields and press Enter. The Display NetWare Volume Display appears.

```
                         Display NetWare Volume
                                                System:    SYSTEMA
 Volume . . . . . . . . . . . . . :   SYS
 Server . . . . . . . . . . . . . :   SERVER01

 Current context . . . . . . . . . :   ROOT



 NDS volume name . . . . . . . . . :   SERVER01_SYS.PROG.ROCH.IBM   1
 Size in megabytes . . . . . . . . :   200
 Number of segments . . . . . . . :   1
 Percent used  . . . . . . . . . . :   20
 Mounted . . . . . . . . . . . . . :   *YES
 Data compression  . . . . . . . . :   *YES
 Block suballocation . . . . . . . :   *YES
                                                         More...
 Press Enter to continue.

 F3=Exit   F6=Print   F12=Cancel
```

Notice in this example of the first display screen that the NDS volume name **1** appears with a name relative to your context in the NDS tree. If you change context (by using the Change NDS Context (CHGNDSCTX) command), then reenter the DSPNTWVOL command, this display changes to reflect the new position. For example this command:

CHGNDSCTX NDSCTX('.PROG.ROCH.IBM') NDSTREE(BASE_TREE)

changes the context and volume displayed to:

    Current context . . . . :   PROG.ROCH.IBM
    NDS volume name . . . . :   SERVER01_SYS

3. Page down for information on block size and specific volume segments.

To display the file system contents of a volume, do this:
1. On the iSeries command line, type WRKLNK OBJ(*NDS_volume_name*) and press Enter. iSeries shows you a list of files in the volume and provides options for performing actions on those files.

Delete a NetWare volume

NetWare Enhanced Integration enables you to delete NetWare volumes from your iSeries. To delete a NetWare volume, do this:
1. On the iSeries command line, type DLTNTWVOL and press F4.
2. In the Volume field, specify the name of the volume that you want to delete.
3. In the Server field, specify the name of the NetWare server on which the volume is located.
4. In the Dismount field, specify *YES.
5. Press Enter, and iSeries deletes the volume.

You can also use the WRKNTWVOL command and take option 4.

Manage NetWare files from iSeries with QNetWare file system

With NetWare Enhanced Integration, you can manage NetWare files, directories, and NetWare Directory Services (NDS) objects from iSeries. You do this by using the QNetWare file system, which is part of the integrated file system. If you are unfamiliar with the integrated file system, you might first want to

browse through the topics in the Integrated file system articles. . Then come back here for information about the QNETWARE file system itself and directions for these tasks:

- "Authorize users to files and directories" on page 35
- "Change file or directory ownership" on page 38
- "Mount NetWare file systems" on page 38
- "Display information about particular file systems" on page 39
- "Copy objects" on page 39
- "Considerations for using integrated file system APIs on the QNetWare file system" on page 49

You can also read about considerations that you should be aware of if you plan to use integrated file system APIs with the QNETWARE file system.

If you have problems when you work with your NetWare files from iSeries, refer to "Troubleshoot QNETWARE file system problems" on page 61.

QNetWare directory structure

QNetWare file system provides a hierarchical directory structure that allows users and application programs to access objects in the QNetWare directory on iSeries. Like other file systems, the QNetWare file system uses directories and subdirectories to store data. You can access this data through iSeries Navigator and through the command line interface.

The QNetWare directory is at the root of the QNetWare file system. The QNetWare directory appears after you install NetWare Enhanced Integration and perform an IPL. You can create and manipulate NetWare files and directories that use QNetWare as the root directory through application programming interfaces (APIs). APIs allow application programming and data sharing between workstations.

The /QNetWare directory structure represents multiple distinct file systems.
- The structure represents Novell NetWare servers and volumes out in the network in this form:

  /QNetWare/SERVER.SVR/VOLUME

  The extension .SVR is used to represent a Novell NetWare server.
- When you access a volume under a server through either the integrated file system menus, commands, or APIs, iSeries automatically mounts the root directory of the NetWare volume on the VOLUME directory under /QNetWare.
- QNetWare represents NDS trees on the network in this form:

  /QNetWare/CORP_TREE.TRE/USA.C/ORG.O/ORG_UNIT.OU/SVR1_VOL.CN

  The extensions .TRE, .C, .O, .OU, and .CN represent NDS trees, countries, organizations, organizational units, and common names, in that order. If you access a Novell NetWare volume through the NDS path through a volume object, iSeries also automatically mounts its root directory on the NDS object.

This illustration shows the QNetWare file system and its associated servers and trees. The QNetWare subdirectory contains entries for each NetWare server that is connected to iSeries.
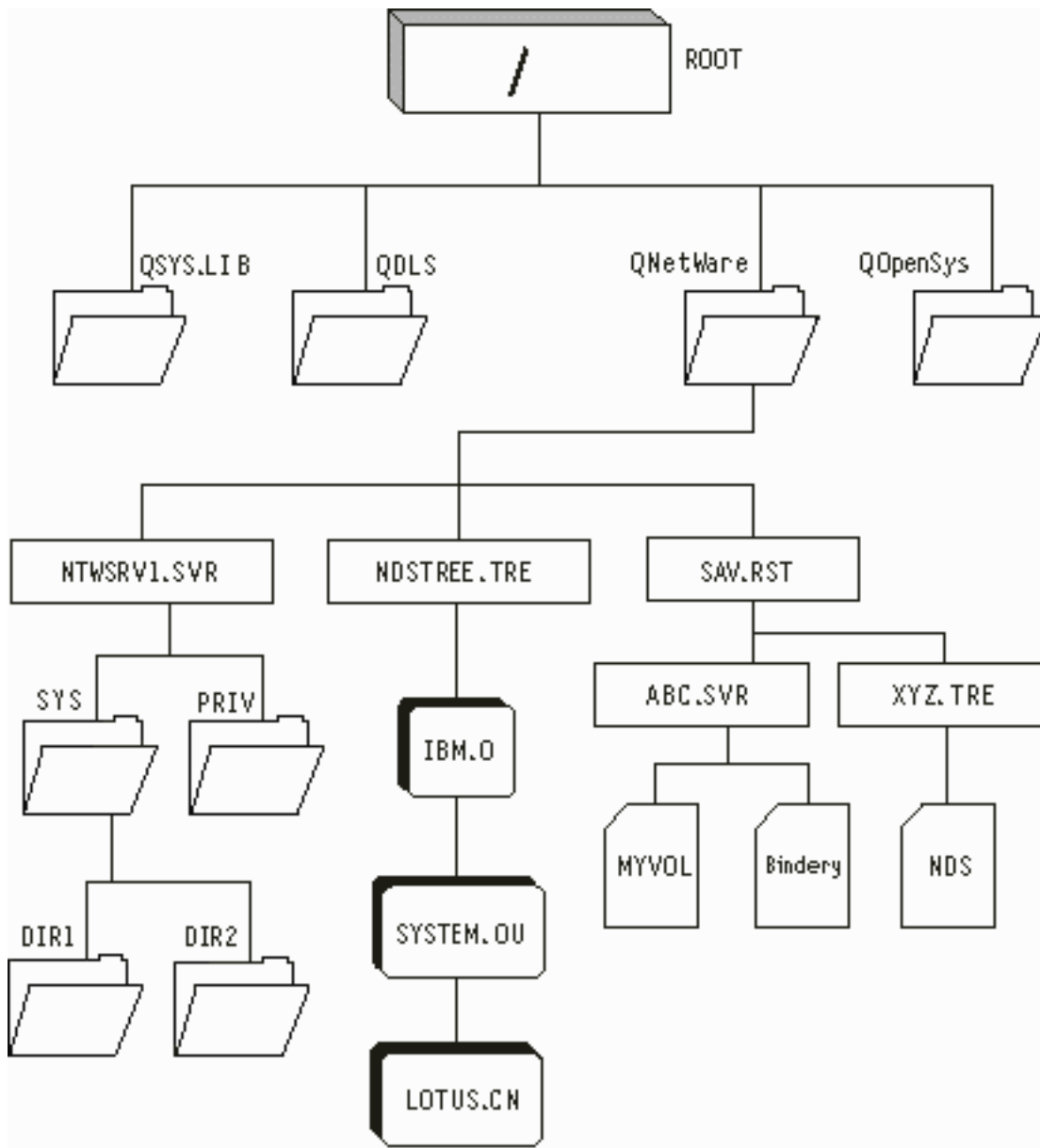
For more information about file, directory, and path names; some restricted directories; and how the QNetWare file system supports links, read "Details: QNetWare file system."

Details: QNetWare file system

When you are working with the QNetWare file system, keep these guidelines in mind:

- **Links:** The QNetWare file system supports **only one link** to an object. You cannot create or store symbolic links in QNetWare. However, you can create symbolic links in the "root" (/) or QOpenSys directories that point to a QNetWare file or directory.
- **File and directory names:** The QNetWare file system does not preserve the case in which files or directories are entered in a command or API. All names are set to upper case in transmission to the NetWare server. Novell NetWare also supports the namespaces of multiple platforms, such as DOS, OS/2®, Apple® Macintosh®, and NFS. Even though NetWare supports these namespaces, it also requires unique DOS names on all NetWare volumes. For consistency, the QNetWare file system displays all files and directories by using their DOS name.

- **Path names:** A path name tells the system how to locate an object. You express path names as a sequence of directory names followed by the name of the object. You can separate individual directories and the object names by **either** a slash (/) or backslash (\) character.
- **Restricted directories:** Certain directories within the QNetWare file system represent resources, such as servers, volumes, and NDS trees within the network. These directories change when the system administrator changes the network by adding or removing a volume, for example, or by bringing a server online. You cannot directly add or remove files or subdirectories from these directories:

Directory	Description
QNetWare	Contains servers and NDS trees
QNetWare/<server.svr>	Contains volumes on active NetWare servers
QNetWare/<tree>	Contains NDS objects on active NetWare 4.1, 4.2, or 5.0 servers. You can remove NDS objects but you cannot create new NDS objects through integrated file system interfaces.

Authorize users to files and directories

NetWare Enhanced Integration fully puts into effect NetWare security and authenticates each user before allowing access to NetWare data. After installing NetWare Enhanced Integration, you must add authentication entries for each user, or each user must start a connection to the NetWare server before using the file system.

When authorizing users to NetWare files and directories, consider that users inherit rights from parent directories and that a specific right overrides an inherited right. Typically it is easier to authorize a user to a high-level parent directory and control which authorities you allow to flow down to lower level directories by using NetWare Inherited Rights Filters.

To authorize users to files and directories (or change their authority), you use the Work with Authority (WRKAUT) or Change Authority (CHGAUT) commands. To authorize a user to an object with the CHGAUT command, do this:
1. On the iSeries command line, type CHGAUT and press F4.
2. In the Object field, specify the name of the object to which you want to give the user authority.
3. Specify the new data and object authorities that you want the user to have and press Enter to run the command.

The QNetWare file system changes the authority on the NetWare server; it does not maintain its own copy. "NetWare authority and ownership" on page 36 has information about these topics:
- NetWare authorities and object rights
- How the iSeries authorities that you assign are mapped to NetWare rights

The authority to write, delete, or rename a file is also controlled by NetWare file attributes. "NetWare file mode support" on page 37 provides more information.

Inherited Rights Filter and effective rights

The NetWare Inherited Rights Filter is a list of rights that is created for every file, directory, and object. It controls which rights trustees can inherit from parent directories and container objects. For more

information, refer to Novell product documentation for NetWare. You can set the NetWare Inherited Rights Filter from iSeries by using the *NTWIRF special value on the WRKAUT command. To display your effective rights, use the DSPAUT command. Your effective rights are shown under special value, *NTWEFF.

```
                      Work with Authority

Object . . . . . . . . . . . . :     /QNetWare/ntwserv.svr/vol1/lotus
Owner  . . . . . . . . . . . . :     KYLE
Primary group  . . . . . . . . :     *NONE
Authorization list . . . . . . :     *NONE


Type options, press Enter.
  1=Add user    2=Change user authority    4=Remove user


                    Data      --Object Authorities--
Opt  User          Authority  Exist  Mgt  Alter  Ref

  _   _____    _____
  _    *NTWIRF      *RWX              X    X     X
  _    *NTWEFF      *RWX              X    X     X
  _    MERRY        *R                X    X     X

                                                          Bottom
Parameters or command
===>
F3=Exit   F4=Prompt   F5=Refresh      F9=Retrieve
F11=Display detail data authorities   F12=Cancel    F24=More keys
(C) COPYRIGHT IBM CORP. 1980, 1996.
```

NetWare authority and ownership

Files and directories in QNetWare are stored and managed by Novell NetWare servers. When you authorize users, the QNetWare file system changes the authority on the NetWare server; it does not maintain its own copy. User authorities that you set or retrieve are mapped between iSeries authorities and NetWare rights.

When you display or change the authorities of owners or users, QNetWare maps NetWare users to iSeries users based on the user's name. Trustee assignments for users that do not have an iSeries user profile are also mapped unless the NetWare name exceeds 10 characters. Where an owner's name does not map to a valid iSeries owner, QDFTOWN is assigned.

Trustee assignments for files and directories on the NetWare server are mapped to iSeries. This includes trustee assignments for groups, especially the group EVERYONE. The group EVERYONE is mapped as user *PUBLIC on iSeries.
* "iSeries authorities and NetWare rights" describes NetWare rights and maps iSeries authorities those NetWare rights.
* "NetWare file mode support" on page 37 shows which file attributes are set for owner permissions.
* "iSeries authorities and NDS object rights" on page 37 maps iSeries authorities to NDS rights.

iSeries authorities and NetWare rights: NetWare files and directories are protected by these rights:

Right	Description
Supervisor	The right to all rights
Read	Open, read, and run a file
Write	Open and write to a file or directory
Create	For directories, the right to create files and subdirectories. For files, the right to salvage a file after it has been deleted.
Erase	Delete a file or directory
Modify	Rename or change attributes
File Scan	File Scan
Access control	Change access rights

The authority to write, delete, or rename a file is also controlled by NetWare file attributes. "NetWare file mode support" on page 37 has more information.

iSeries authorities map to these NetWare rights, as follows:

iSeries Authorities	None	Supr	Read	Write	File Scan	Create	Erase	Modify	Access Control
					NetWare Rights				
*OBJOPR			*	*	*	*	*		
*OBJMGT									X
*OBJALTER								X	
*OBJREF		X							
*OBJEXIST									
*EXCLUDE	X								
*AUTL									
*READ (*R)			X						
*ADD (*W)						X			
*UPD (*W)				X					
*DLT (*W)							X		
*EXECUTE (*X)					X				

Notes:

- Supr is Supervisor authority
- The iSeries *OBJOPR authority bit is turned on when a user has any data authority (*READ, *ADD, *UPD, *DLT, or *EXECUTE), but is not mapped explicitly to any specific NetWare right or rights.
- The NetWare right of None is equivalent to iSeries *EXCLUDE authority.
- The CHGAUT command does not allow you to set *ADD, *UPD, and *DLT authorities individually. Instead, you must set them all by specifying *W. However, the DSPAUT command displays the *ADD, *UPD, and *DLT authorities individually if a subset of them are granted to a trustee from a NetWare interface such as NWADMIN, NETADMIN, or FILER.

NetWare file mode support: NetWare uses file attributes to emulate file modes. This table shows which attributes are set for owner permissions. NetWare ignores Group and Others permissions.

Table 2. NetWare file attributes for owner permissions

Mode	Delete inhibited	Hidden	Rename inhibited	Read only	System file	Run only
None	X		X		X	X
R	X		X	X		
W	X	X	X			
X						X
RW						
RX	X		X	X		
WX	X	X	X			
RWX						

iSeries authorities and NDS object rights: NetWare Directory Services (NDS) objects are protected by these rights:

Browse
> Grants the trustee the right to see the object's name in the NDS tree.

Create Grants the trustee the right to create a new directory services object within the container.

Delete Grants the trustee the right to delete an object.

Rename
> Grants the trustee the right to change the Name property for an object.

Supervisor
> Grants all possible rights to the user object.

Attribute rights are not mapped. These rights can exist for each attribute of an object and might differ for different attributes. This prevents the iSeries from working with attribute rights of NDS objects. Storage Management Services (SMS) rights, which control a user's right to save and restore a file, directory, NDS object, or other NetWare resource, are not mapped either. These rights are architected by Novell but have not yet been put into effect.

iSeries authorities map to NDS rights, as follows:

Table 3. iSeries Authorities and NDS Rights

iSeries Authorities	NDS Rights					
	None	Browse	Create	Delete	Rename	Supervisor
*EXCLUDE	X					
*OBJOPR		*	*	*	*	
*OBJMGT						
*OBJALTER						
*OBJREF						X
*OBJEXIST						
*AUTLMGT						
*READ		X				
*ADD			X			
*UPD					X	
*DLT				X		
*EXECUTE		X				

Note: The iSeries *OBJOPR authority bit is turned on when a user has any data authority (*READ, *ADD, *UPD, *DLT, or *EXECUTE), but is not mapped explicitly to any specific NetWare right or rights.

Change file or directory ownership

You can change the owner of a file or directory by using either iSeries Navigator or the command line interface.

From iSeries Navigator
1. Expand your iSeries server —> **File Systems** —> **Integrated File System** —> **QNetWare** —> the name of the NetWare server.
2. Right-click on the directory or file and select **Permissions**.
3. Click on the **Owner** button.
4. Expand the list of **All Users**, select the new owner from that list, and click OK.

From the iSeries command line, use the CHGOWN command. For example, this command transfers the ownership of `myfile` from the current owner to `NEWOWNER`:

```
CHGOWN OBJ('/QNetWare/server.svr/sys/myfile') NEWOWN(NEWOWNER)
```

Mount NetWare file systems

To simplify access and improve performance, you might want to mount NetWare file systems that are located on NetWare servers on the "root" (/), QOpenSys, and other file systems instead of working with

them under the /QNetWare directory. Otherwise, if you step through the QNetWare menus, iSeries searches every NetWare server on the network. Depending on the size of your network, this can be a slow process.

Mounting file systems also allows you to take advantage of the options on the Add Mounted File System (ADDMFS) or MOUNT command. For example, you can as mount a read-write file system as read-only. (You must have *IOSYSCFG authority to use the ADDMFS or MOUNT command.)

You can mount NetWare file systems by using an NDS path or by specifying a NetWare path in the form of SERVER/VOLUME:directory/directory. For example, to mount the directory NOTES, located in volume LOTUS on server OFFICE, you would use this syntax:

OFFICE/LOTUS:NOTES

This path syntax is very similar to the NetWare MAP command syntax.

NDS paths can be used to specify a path to a NetWare directory but cannot themselves be mounted. You can mount by using NDS volume objects and directory map objects.

Display information about particular file systems

You can display information about a specific file system. For example, you might want to find out if it is mounted over or display information such as the file type, block size, caching values, and server code page. To display this information, you can use the Display Mounted File System Information (DSPMFSINF) command. You can also use iSeries Navigator.

To display file system information with iSeries Navigator, do this:
1. In iSeries Navigator, expand your iSeries server, then **File Systems** —>**Integrated File System** —>**QNetWare** —> the NetWare server.
2. For information about a directory, click on the directory in the left pane to select it, right-click and select **Properties** from the drop-down menu.
3. To display the files in that directory, double-click on it.
4. For information about a file, click on the file to select it; then right-click and select **Properties** from the drop-down menu.

Copy objects

You can copy objects to and from the QNetWare file system by using iSeries Navigator or by using integrated file system copy commands. You can copy QNetWare file system objects into other file systems that support stream files (for example, "root", QOpenSys or QDLS). However, because no conversion is done, the resulting file in the QNetWare file system may not be useful. You can also copy objects within the QNetWare file system; that is, from one server to another.

When you copy files between other file systems and QNetWare, the authorizations are also copied, if possible. Because a trustee assignment on a file or directory overrides any inherited rights, the result might be more or less authority than wanted. After you perform a CPY or MOV, check the resulting authority by using the Display Authority (DSPAUT) command. You can find a complete list of integrated file system commands in the Integrated file system articles.

You can see these examples:
- Copying a file that needs no conversion.
- Copying a database file that has packed decimal fields that you must convert.
- Copying and converting a database file by using an ILE C for iSeries program..

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Example: Copying a file to the QNetWare file system

Note: Read the "Code disclaimer information" on page 1 for important legal information.

To copy a file to the QNetWare file system, you can use either iSeries Navigator or the CPY command. However, because no conversion is done, the resulting file in the QNetWare file system may not be useful. You can see an example of copying an iSeries database file that requires conversion from the packed decimal format.

Copying a file from iSeries Navigator:
1. In iSeries Navigator, expand your iSeries server —>**File Systems** —>**Integrated File System** —> the file system that contains the file you want to copy to QNetWare.
2. Click on the file you want to copy to select it; then right-click and select **Copy** from the drop-down menu.
3. Expand the QNetWare file system, then the NetWare server.
4. Click on the directory into which you want to copy the file to select it; then right-click and select **Paste** from the drop-down menu.

Copying a file with the COPY (or CPY) command:

To copy source physical file FILE1 in library LIBRARY1 with member MEMBER1 to the SYS: volume on NetWare server SERVER1 in directory DTA, you would use this command:

```
CPY OBJ('/QSYS.LIB/LIBRARY1.LIB/FILE1.FILE/MEMBER1.MBR')
    TOOBJ('/QNETWARE/SERVER1.SVR/SYS/DTA/MEMBER1.DAT')
    TOCODEPAGE(437)
    DTAFMT(*TEXT)
```

Example: Copying an iSeries database file that has packed decimal fields to the QNetWare file system

Note: Read the "Code disclaimer information" on page 1 for important legal information.

Suppose you want to make an iSeries database file available to all NetWare users. If the database file is externally defined (using DDS) and has packed decimal fields, you cannot copy it directly to a file in QNetWare file system. You need to first copy it to a physical file; then you can copy it to a file in QNetWare. If fields are in packed decimal format, you need to create a logical file to convert the packed decimal fields to zoned decimal fields. The following example shows how to copy and convert a file that contains packed decimal fields. You can also see an example of how you might do this with an ILE C for iSeries program.

The file in this example is in library DATALIB and has the name CUSTCDT. You can refer to these example displays:
- "Example: DDS for iSeries database file CUSTCDT" on page 42 shows the DDS description of this example file, which has packed decimal fields.
- If you are unfamiliar with DDS definitions, you can refer to "Example: DSPFFD of iSeries database file CUSTCDT" on page 43, which shows the output of the DSPFFD CUSTCDT command.
- "Example: Content of CUSTCDT database file display that Query for iSeries creates" on page 44.
- "Example: DDS for logical file CUSTCDTL" on page 45.

To copy the CUSTCDT database file to the QNetWare file system, you would follow these steps:

1. Create a directory in the QNetWare file system to use for storing iSeries database files. For example, to create a directory on server SRVNW0A, you would enter:

   ```
   MKDIR DIR('/QNetWare/SRVNW0A.SVR/SYS/DTA')
   DTAAUT(*INDIR) OBJAUT(*INDIR) CRTOBJAUD(*NONE)
   ```

2. To convert packed decimal fields to zoned decimal:
   a. Create a logical file CUSTCDTL over CUSTCDT:

   ```
   CRTLF FILE(DATALIB/CUSTCDTL) SRCFILE(DATALIB/QDDSSRC)
   ```

   CUSTCDTL is the name of the logical file, and DATALIB/QDDSSRC is the source physical file that contains the member CUSTCDTL. "Example: DDS for logical file CUSTCDTL" on page 45 shows the DDS definition of such a logical file.

   Optionally, you can select a subset of fields you want to copy to QNetWare. Just put the fields you need into the logical file. You can also specify an ordering sequence on the logical file.
   b. To redefine packed decimal fields as zoned decimal, specify S for the data type for those fields.

   There is no need to specify other field definitions. The logical file is built over the physical file and copies all the field definitions from it.

3. After you create the logical file, you can use it to copy the data to a program-described physical file. But first you must create the program-described physical file. To do that, you must know the record length of the logical file, because the program-described file must have the same record length. You can find the record length of the logical file by using the command:

   ```
   DSPFD FILE(CUSTCDTL) TYPE(*RCDFMT)
   ```

   The resulting display for the example logical file CUSTCDTL shows that it has a record length of 60:

   ```
                       Record  Format Level
      Format      Fields  Length  Identifier
      CUSREC          11      60  3B84438D4C428
        Text . . . . . . . . . . . . . . . . . . :
      Total number of formats . . . . . . . . . . :          1
      Total number of fields . . . . . . . . . . . :         11
      Total record length  . . . . . . . . . . . . :         60
   ```

4. Create the program-described physical file:

   ```
   CRTPF DATALIB/CUSTSTMF RCDLEN(60)
   ```

5. Copy the logical file CUSTCDTL to the program-described physical file CUSTSTMF:

   ```
   CPYF FROMFILE(CUSTCDTL) TOFILE(CUSTSTMF) MBROPT(*ADD) FMTOPT(*NOCHK)
   ```

   FMTOPT(*NOCHK) is required because the record formats of the database files are different.

6. Copy the program-described file CUSTSTMF into the QNetWare/SRVNW0A.SVR/SYS/DTA directory of the QNetWare file system that you created in step 1:
   a. On the iSeries command line, type CPYTOSTMF and press F4. The Copy to Stream File (CPYTOSTMF) display appears, as in this example:

```
                        Copy To Stream File (CPYTOSTMF)

 Type choices, press Enter.

 From database file member  . .  1  > '/QSYS.LIB/DATALIB.LIB/CUSTSTMF.FILE
/CUSTSTMF.MBR'
 To stream file . . . . . . . .  2  > '/QNetWare/SRVNW0A.SVR/SYS/DTA/CUSTCDT.DAT'

 Copy options . . . . . . . . . .   *NONE          *NONE, *ADD, *REPLACE
 Data conversion options  . . .  3     *AUTO        *AUTO, *TBL, *NONE
 Database file CCSID  . . . . .  4   > 37           1-65533, *FILE
 Stream file codepage . . . . .  5   > 850          1-32767, *STMF
 End of line characters . . . . .   *CRLF          *CRLF, *LF, *CR, *LFCR...




                                                           Bottom
 F3=Exit    F4=Prompt    F5=Refresh    F12=Cancel    F13=How to use this display
 F24=More keys
```

b. In the `From database file member` field, specify the path name of the CUSTSTMF program-described database file 1 .
c. In the `To stream file` field, specify the path name of the stream file 2 .

   In this case you would use the drive letter as a link to CUSTCDT.DAT.
d. The default value for the `Data conversion option` causes iSeries to use the coded character set identifier (CCSID) equivalent of the stream file data code page and the database file CCSID to convert the data during the copy operation. To use your own translation table object instead, specify *TBL* and enter the table name into the TBL parameter. 3
e. If your database file has a CCSID of 65535, you must enter a valid CCSID code in the `Database file CCSID` field for your data to be correctly converted to ASCII. The values 0, 65534, and 65535 are not valid to use with this command. 4
f. In the `Stream file code page` field, specify the ASCII code page of the NetWare server to convert the data. To obtain the code page of server SRVNW0A, you would enter:

   ```
   DSPMFSINF OBJ('/QNetWare/SRVNW0A.SVR/SYS/DTA')
   ```

   This example converts the database file data from CCSID 37 to ASCII code page 850. 5

7. Now you can access the data from a NetWare workstation. Map a drive to the SYS volume of server SRVNW0A and then change into the DTA directory of the mapped drive.
8. You can now look at the data in CUSTCDT.DAT (use any DOS editor), and you will see that the file no longer contains any field information. The application that accesses the data must know the record structure. To put more field information into the stream file (such as a field separator character), you must write your own program.

Example: DDS for iSeries database file CUSTCDT:

Note: Read the "Code disclaimer information" on page 1 for important legal information.

The file in this example is in library DATALIB and has the name CUSTCDT. The DDS description of the file CUSTCDT shows that the fields CUSNUM, ZIPCOD, CDTLMT, CHGCOD, BALDUE, and CDTDUE are of type packed decimal. All other fields are of type character.

```
A          R CUSREC
A            CUSNUM       6P 0      COLHDG('Customer number')
A            LSTNAM       8A        COLHDG('Last name')
A            INIT         3A        COLHDG('First/middle initial')
A            STREET      13A        COLHDG('Street address')
A            CITY         6A        COLHDG('City')
A            STATE        2A        COLHDG('State abbreviation')
A            ZIPCOD       5P 0      COLHDG('Zip code')
A            CDTLMT       4P 0      COLHDG('Credit limit')
A            CHGCOD       1P 0      COLHDG('Charge code')
A            BALDUE       6P 2      COLHDG('Balance due')
A            CDTDUE       6P 2      COLHDG('Credit due')
```

If you are not familiar with DDS definitions, you can refer to "Example: DSPFFD of iSeries database file CUSTCDT" for the output of the DSPFFD CUSTCDT command. "Example: Content of CUSTCDT database file display that Query for iSeries creates" on page 44 shows the content of the CUSTCDT file which was created using an iSeries query.

Example: DSPFFD of iSeries database file CUSTCDT:

Note: Read the "Code disclaimer information" on page 1 for important legal information.

```
                    Display File Field Description
Input parameters
  File  . . . . . . . . . . . . .  . . . . . . :  CUSTCDT
    Library . . . . . . . . . . . . .  . . . . :  *LIBL
File Information
  File  . . . . . . . . . . . . .  . . . . . . :  CUSTCDT
    Library . . . . . . . . . . . .  . . . . . :  DATALIB
  File location . . . . . . . . . . .  . . . . :  *LCL
  Externally described  . . . . . . . . . . . :  Yes
  Number of record formats  . . . . . . . . . :  1
  Type of file  . . . . . . . . . . .  . . . . :  Physical
  File creation date  . . . . . . . . . . . . :  08/22/94
  Text 'description'  . . . . . . . . . . . . :  Customer data
Record Format Information
  Record format . . . . . . . . . . . .  . . . :  CUSREC
  Format level identifier . . . . . . . . . . :  39C301DBCB10B
  Number of fields  . . . . . . . . . . . . . :  11
  Record length   . . . . . . . . . . . . . . :  51
Field Level Information
            Data      Field  Buffer   Buffer     Field    Column
  Field     Type     Length  Length  Position    Usage    Heading
  CUSNUM    PACKED     6  0     4        1         Both     Customer number
    Field text  . . . . . . . . . . . . . . . :  Customer number
  LSTNAM    CHAR       8        8        5         Both     Last name
    Field text  . . . . . . . . . . . . . . . :  Last name
    Coded Character Set Identifier . . . . . :  37
  INIT      CHAR       3        3        13        Both     First/middle initial
    Field text  . . . . . . . . . . . . . . . :  First/middle initial
    Coded Character Set Identifier . . . . . :  37
  STREET    CHAR       13       13       16        Both     Street address
    Field text  . . . . . . . . . . . . . . . :  Street address
    Coded Character Set Identifier . . . . . :  37
  CITY      CHAR       6        6        29        Both     City
    Field text  . . . . . . . . . . . . . . . :  City
    Coded Character Set Identifier . . . . . :  37
  STATE     CHAR       2        2        35        Both     State abbreviation
    Field text  . . . . . . . . . . . . . . . :  State abbreviation
    Coded Character Set Identifier . . . . . :  37
  ZIPCOD    PACKED     5  0     3        37        Both     Zip code
    Field text  . . . . . . . . . . . . . . . :  Zip code
  CDTLMT    PACKED     4  0     3        40        Both     Credit limit
    Field text  . . . . . . . . . . . . . . . :  Credit limit
  CHGCOD    PACKED     1  0     1        43        Both     Charge code
    Field text  . . . . . . . . . . . . . . . :  Charge code
  BALDUE    PACKED     6  2     4        44        Both     Balance due
    Field text  . . . . . . . . . . . . . . . :  Balance due
  CDTDUE    PACKED     6  2     4        48        Both     Credit due
    Field text  . . . . . . . . . . . . . . . :  Credit due
```

Example: Content of CUSTCDT database file display that Query for iSeries creates:

Note: Read the "Code disclaimer information" on page 1 for important legal information.

```
                Display Report
                                               REPORT WIDTH . . . . . :      96
Position to line  . . . . . __                 Shift to column  . . . . . . __
Line    ....+....1....+....2....+....3+....4....+....5....+....6....+....7....+....8....+....9....+.
        Customer Last name Init. Street address  City   State  Zip Credit  Charge  Balance due  Credit due
        number                                                     limit   code

 000001  938472  Henning   G K  4859 Elm Ave    Dallas  TX  75217  5,000      3         37.00        .00
 000002  839283  Jones     B D  21B NW 135 St   Clay    NY  13041    400      1        100.00        .00
 000003  392859  Vine      S S  PO Box 79       Broton  VT  05046    700      1        439.00        .00
 000004  938485  Johnson   J A  3 Alpine Way    Helen   GA  30545  9,999      2      3,987.50      33.50
 000005  397267  Tyron     W E  13 Myrtle Dr    Hector  NY  14841  1,000      1           .00        .00
 000006  389572  Stevens   K L  208 Snow Pass   Denver  CO  80226    400      1         58.75       1.50
 000007  846283  Alison    J S  787 Lake Dr     Isle    MN  56342  5,000      3         10.00        .00
 000008  475938  Doe       J W  59 Archer Rd    Sutter  CA  95685    700      2        250.00     100.00
 000009  693829  Thomas    A N  3 Dove Circle   Casper  WY  82609  9,999      2           .00        .00
 000010  593029  Williams  E D  485 SE 2 Ave    Dallas  TX  75218    200      1         25.00        .00
 000011  192837  Lee       F L  5963 Oak St     Hector  NY  14841    700      2        489.50        .50
 000012  583990  Abraham   M T  392 Mill St     Isle    MN  56342  9,999      3        500.00        .00
 ******  ********  End of report   ********




                                                                                       Bottom
 F3=Exit      F12=Cancel      F19=Left      F20=Right      F21=Split      F22=Width 80
```

Example: DDS for logical file CUSTCDTL:

Note: Read the "Code disclaimer information" on page 1 for important legal information.

```
A          R CUSREC                   PFILE(CUSTCDT)
A            CUSNUM       S
A            LSTNAM
A            INIT
A            STREET
A            CITY
A            STATE
A            ZIPCOD       S
A            CDTLMT       S
A            CHGCOD       S
A            BALDUE       S
A            CDTDUE       S
```

Example: ILE C for iSeries program to copy an iSeries database file to QNetWare File System

Note: Read the "Code disclaimer information" on page 1 for important legal information.

Suppose you have a customer file that you want to make available to all NetWare users, and that file contains fields that need conversion from packed decimal format. Example: Copying an iSeries database file shows you how to copy and convert that file with a series of integrated file system commands. You can also copy and convert the necessary field by using an ILE C for iSeries program. Before you use integrated file system APIs on the QNetWare file system, you should be aware of some considerations.

This sample program is not restricted to the QNetWare file system. You can use it to copy an iSeries database file into other file systems that the integrated file system supports. For example, you could change the hard-coded name of the stream file path to be the current directory: ./CUST.DAT. Before you run the program, use the CHGCURDIR command to change to the directory in which you want to create the stream file. However, you cannot copy this file into the QSYS.LIB file system because CUST.DAT is not a valid name for the QSYS.LIB file system.

The file in this example is in library DATALIB and has the name CUSTCDT. You can refer to these example displays:

- "Example: DDS for iSeries database file CUSTCDT" on page 42 shows the DDS description of this example file, which has packed decimal fields.
- If you are unfamiliar with DDS definitions, you can refer to "Example: DSPFFD of iSeries database file CUSTCDT" on page 43, which shows the output of the DSPFFD CUSTCDT command.
- "Example: Content of CUSTCDT database file display that Query for iSeries creates" on page 44.

The following ILE C for iSeries program, NWCUST, uses the external description of CUSTCDT. To convert the data from EBCDIC to ASCII, it uses the system APIs from the service program QTQICONV. This service program provides APIs to convert a buffer of characters from one coded character set identifier (CCSID) into another CCSID. To create the stream file CUST.DAT, it uses the **open()**, **write()** and **close()** integrated file system APIs.

Note: Read the "Code disclaimer information" on page 1 for important legal information.

To create the ILE C for iSeries module and bind it to the QTQICONV service program to create the NWCUST program, you would use these commands:

```
CRTCMOD MODULE(NWCUST) SRCFILE(QCSRC) OUTPUT(*PRINT) OPTION(*SHOWUSR)
CRTPGM PGM(NWCUST) BNDSRVPGM(QTQICONV)
```

1. Open the stream file with the integrated file system **open()** API. Refer to **1** in Figure 2 on page 47.

   This function opens the stream file for write only (*O_WRONLY* flag). If the file does not exist, it is created (*O_CREAT* flag). If it exists, it is truncated to 0 bytes length (*O_TRUNC* flag). This ensures that the stream file is replaced every time the program runs.

   S_IRWXU sets file authority bits.

   S_IRWXU
   > Read, write, and search or execute for the file owner.

   The open() API requires authority bits to be set when the O_CREAT flag is set.

   S_IRWU is used to let you read and write to the file. "NetWare file mode support" on page 37 has information about which attributes NetWare sets for owner permission.

2. Build the buffer for the stream file record. Add a comma as the field delimiter **2**.

   The sprintf() function converts all packed decimal data fields from the database file into characters and formats them correctly with the format-string, for example: "D(6.2)".

3. Convert stream file buffer from CCSID 37 to CCSID 850 **3**.

   Function iconv() converts the stream file buffer to ASCII code page 850. Use the code page of your NetWare server. To determine the code page of the server, use the DSPMFSINF command. For example, to obtain the code page of directory SYSTEM in volume SYS of server NTWSERV1, enter:

   ```
   DSPMFSINF OBJ('/QNetWare/NTWSERV1.SVR/SYS/SYSTEM')
   ```

4. Add ASCII carriage return and line feed as a record delimiter to the stream file buffer **4**. The character string "\15\12" represents hex x'0D0A' in octal form.

5. Write the stream file buffer to the file using the Integrated File System **write()** API **5**. The library DATALIB, where the CUSTCDT database file is, has to be in the library list of the job from which you run the program.

Here is the source listing for the example program:

```
                              * * * * *   S O U R C E   * * * * *
Line  STMT                                                                                      SEQNBR  INCNO
            *...+.....1.....+.....2.....+.....3.....+.....4.....+.....5.....+.....6.....+.....7.....+.....8.....+.....9.....+.....
   1        /* This program copies the AS/400 database file CUSTCDT to a          */              1
   2        /* stream file in the QNetWare file system. It uses Integrated File System APIs to    */        2
   3        /* create and write the file. It converts the data from CCSID 37      */              3
   4        /* to ASCII codepage 850 using the QTQICONV system API.               */              4
   5                                                                                                5
   6        #include <stdio.h>                                                                     6
   7        #include <recio.h>                                                                     7
   8        #include <stdlib.h>                                                                    8
   9        #include <string.h>                                                                    9
  10        #include <decimal.h>                                                                  10
  11        #include <fcntl.h>                                                                    11
  12        #include <unistd.h>                                                                   12
  13        #include <qtqiconv.h>                                                                 13
  14                                                                                              14
  15        /* Include the external definition of the database file CUSTCDT.     */               15
  16                                                                                              16
  17        #pragma mapinc("custmf","CUSTCDT(cusrec)","input","_P")                               17
  18        #include "custmf"                                                                     18
   1        /* -------------------------------------------------------------------*/              19     19
   2        /* PHYSICAL FILE: DATALIB/CUSTCDT                                     */              20     19
   3        /* FILE CREATION DATE: 94/08/22                                      */              21     19
   4        /* RECORD FORMAT: CUSREC                                            */              22     19
   5        /* FORMAT LEVEL IDENTIFIER: 39C301DBCB10B                           */              23     19
   6        /* -------------------------------------------------------------------*/              24     19
   7        typedef _Packed struct {                                                             25     19
   8          decimal( 6, 0) CUSNUM;              /*  Customer number             */              26     19
   9                                              /*  PACKED SPECIFIED IN DDS     */              27     19
  10          char LSTNAM[8];                     /*  Last name                   */              28     19
  11          char INIT[3];                       /*  First/middle initial        */              29     19
  12          char STREET[13];                    /*  Street address              */              30     19
  13          char CITY[6];                       /*  City                        */              31     19
  14          char STATE[2];                      /*  State abbreviation          */              32     19
  15          decimal( 5, 0) ZIPCOD;              /*  Zip code                    */              33     19
  16                                              /*  PACKED SPECIFIED IN DDS     */              34     19
  17          decimal( 4, 0) CDTLMT;              /*  Credit limit                */              35     19
  18                                              /*  PACKED SPECIFIED IN DDS     */              36     19
  19          decimal( 1, 0) CHGCOD;              /*  Charge code                 */              37     19
  20                                              /*  PACKED SPECIFIED IN DDS     */              38     19
  21          decimal( 6, 2) BALDUE;              /*  Balance due                 */              39     19
  22                                              /*  PACKED SPECIFIED IN DDS     */              40     19
  23          decimal( 6, 2) CDTDUE;              /*  Credit due                  */              41     19
  24                                              /*  PACKED SPECIFIED IN DDS     */              42     19
  25        }DATALIB_CUSTCDT_CUSREC_i_t;                                                          43     19
  26                                                                                              44     19
  19        #define _RCDLEN 100                                                                   45
  20                                                                                              46
  21        int main(void)                                                                        47
  22        {                                                                                     48
  23         /* Declare rcd, dta of data structure type DATALIB_CUSTCDT_CUSREC_i_t. */            49
  24         /* The data structure type was defined from the DDS specified.        */            50
  25                                                                                              51
  26         DATALIB_CUSTCDT_CUSREC_i_t rcd, *dta = &rcd;                                          52
  27         _RFILE        *in;                                                                    53
  28         _RIOFB_T      *fb;                                                                    54
  29         char          dbrcd[_RCDLEN];                                                         55
  30         char          stmrcd[_RCDLEN];                                                        56
  31         char          *dbfile  = "CUSTCDT";                                                   57
  32         char          *stmfile = "QNetWare/SERVER.SVR/VOLUME/DATA/CUST.DAT";                  58
  33         int           fildes, stmlen;                                                         59
  34                                                                                              60
```

Figure 2. Example: ILE C for iSeries program using integrated file system APIs (Part 1 of 3)

```
35          /* Declare necessary variables for code conversion CCSID 37 to 850. */              61
36                                                                                                62
37          char        fromcode[32] = "IBMCCSID000370000000";                                    63
38          char        tocode[32]  = "IBMCCSID00850";                                            64
39          char        *ibuf, *obuf;                                                             65
40          iconv_t     cd;                                                                       66
41          size_t      ilen, olen;                                                               67
42                                                                                                68
43          /* Open and create the stream file using the open() Integrated File System API.  */   69
44                                                                                                70
45      1   fildes = open( stmfile, O_WRONLY|O_CREAT|O_TRUNC, S_IRWXU );              1            71
46      2   if (fildes == -1)                                                                     72
47          {                                                                                     73
48      3       printf ( "Open to stream file %s failed\n", stmfile );                            74
49      4       exit ( 1 );                                                                       75
50          }                                                                                     76
51          else                                                                                  77
52          {                                                                                     78
53              /* Open the database file for processing in arrival sequence.    */               79
54                                                                                                80
55      5       if (( in = _Ropen( dbfile, "rr, arrseq=Y" )) == NULL )                            81
56              {                                                                                 82
57      6           printf ( "Open to database file %s failed\n", dbfile );                       83
58      7           exit ( 1 );                                                                   84
59              }                                                                                 85
60              else                                                                              86
61              {                                                                                 87
62                  /* Open a code conversion descriptor for CCSID 37 to 850      */              88
63                  /* conversion.                                                */              89
64                                                                                                90
65      8           cd = iconv_open( tocode, fromcode );                                          91
66                                                                                                92
67      9           fb = _Rreadn( in, dta, in->buf_length, __DFT );                               93
68      10          while ( fb->num_bytes != EOF )                                                94
69                  {                                                                             95
70                   /* Create the buffer for the stream file. Each field will be    */          96
71                   /* separated by a comma.                                        */          97
72                                                                                                98
73      11              ilen  = sprintf( dbrcd,      "%D(6,0),", rcd.CUSNUM );        2            99
74      12              ilen += sprintf( dbrcd+ilen, "%8.8s,",    rcd.LSTNAM );                   100
75      13              ilen += sprintf( dbrcd+ilen, "%3.3s,",    rcd.INIT   );                   101
76      14              ilen += sprintf( dbrcd+ilen, "%13.13s,", rcd.STREET );                    102
77      15              ilen += sprintf( dbrcd+ilen, "%6.6s,",    rcd.CITY  );                    103
78      16              ilen += sprintf( dbrcd+ilen, "%2.2s,",    rcd.STATE );                    104
79      17              ilen += sprintf( dbrcd+ilen, "%D(5,0),", rcd.ZIPCOD );                    105
80      18              ilen += sprintf( dbrcd+ilen, "%D(4,0),", rcd.CDTLMT );                    106
81      19              ilen += sprintf( dbrcd+ilen, "%D(1,0),", rcd.CHGCOD );                    107
82      20              ilen += sprintf( dbrcd+ilen, "%D(6,2),", rcd.BALDUE );                    108
83      21              ilen += sprintf( dbrcd+ilen, "%D(6,2)", rcd.CDTDUE );                     109
84                                                                                               110
85              /* Set pointers for CCSID 37 to CCSID 850 conversion.          */               111
86              /* Use the iconv() function to convert the data.               */               112
87                                                                                               113
88      22              stmlen = olen = ilen;                                                    114
89      23              ibuf = &dbrcd[0];                                                        115
90      24              obuf = &stmrcd[0];                                                       116
91      25              iconv( cd, &ibuf, &ilen, &obuf, &olen );               3                 117
92                                                                                               118
93              /* Add ASCII carriage return and line feed.                   */                119
94                                                                                               120
95      26              stmlen += sprintf( stmrcd+stmlen, "\15\12" );          4                 121
96                                                                                               122
```

Figure 2. Example: ILE C for iSeries program using integrated file system APIs (Part 2 of 3)

```
97                  /* Write the buffer to the stream file using the Integrated File System write() API.*/  123
98                                                                                                124
99      27              if (( write( fildes, stmrcd, stmlen )) == -1 )              5              125
100                     {                                                                         126
101     28                  printf ( "Write to stream file %s failed\n", stmfile );               127
102     29                  exit ( 1 );                                                           128
103     30              };                                                                        129
104     31              fb = _Rreadn( in, dta, in->buf_length, __DFT );                           130
105     32          };                                                                            131
106     33          iconv_close( cd );     /* Close data conversion descriptor. */                132
107     34          _Rclose( in );         /* Close the database file.          */                133
108     35      };                                                                                134
109     36      close( fildes );               /* Close the streamfile.          */               135
110     37  };                                                                                    136
111     }                                                                                         137
                        * * * * *  E N D   O F   S O U R C E   * * * * *
```

Figure 2. Example: ILE C for iSeries program using integrated file system APIs (Part 3 of 3)

Figure 3 shows the contents of the stream file CUST.DAT after the NWCUST program has run and created it.

```
[C:\]type \\J:cust.dat
938472,Henning ,G K,4859 Elm Ave ,Dallas,TX,75217,5000,3,37.00,0.00
839283,Jones   ,B D,21B NW 135 St,Clay  ,NY,13041,400,1,100.00,0.00
392859,Vine    ,S S,PO Box 79    ,Broton,VT,5046,700,1,439.00,0.00
938485,Johnson ,J A,3 Alpine Way ,Helen ,GA,30545,9999,2,3987.50,33.50
397267,Tyron   ,W E,13 Myrtle Dr ,Hector,NY,14841,1000,1,0.00,0.00
389572,Stevens ,K L,208 Snow Pass,Denver,CO,80226,400,1,58.75,1.50
846283,Alison  ,J S,787 Lake Dr  ,Isle  ,MN,56342,5000,3,10.00,0.00
475938,Doe     ,J W,59 Archer Rd ,Sutter,CA,95685,700,2,250.00,100.00
693829,Thomas  ,A N,3 Dove Circle,Casper,WY,82609,9999,2,0.00,0.00
593029,Williams,E D,485 SE 2 Ave ,Dallas,TX,75218,200,1,25.00,0.00
192837,Lee     ,F L,5963 Oak St  ,Hector,NY,14841,700,2,489.50,0.50
583990,Abraham ,M T,392 Mill St  ,Isle  ,MN,56342,9999,3,500.00,0.00

[C:\]
```

Figure 3. Content of CUST.DAT from a for DOS or OS/2 TYPE command

In this example, the J: drive was mapped to `SERVER:VOLUME\DATA` using the NetWare client.

Because the fields in CUST.DAT are separated by a comma, it is very easy to incorporate the file into a spreadsheet application.

Considerations for using integrated file system APIs on the QNetWare file system

In addition to the Integrated File System commands and menus, i5/OS provides APIs that enable ILE C for iSeries programs to perform functions on files and directories in all file systems. The Integrated File System APIs are very useful for integrating the iSeries database with NetWare Enhanced Integration data.

You can find information about ILE and ILE C for iSeries in the book ILE Concepts, SC41-5606 .

When you use Integrated File System APIs on the QNetWare file system, you need to know that these C language functions are not supported on the QNetWare file system:

APIs	Description
givedescriptor()	Give file access to another job
link()	Create link to file
readlink()	Read value of symbolic link
symlink()	Make symbolic link
takedescriptor()	Take file access from another job

In addition to the previous APIs, you cannot use the following APIs against NDS objects, servers, or volumes:

APIs	Description
chmod()	Change file authorizations
chown()	Change owner and group of file
create()	Create new file or rewrite existing file
fchmod()	Change file authorizations by descriptor
fchown()	Change owner and group of file by descriptor
fcntl()	Perform file control action
ftruncate()	Truncate file
lseek()	Set file read/write offset

APIs	Description
mkdir()	Make directory
read()	Read from file
readv()	Read from file (vector)
unmask()	Set authorization mask for job
write()	Write to file
writev()	Write to file (vector)

You can see an example program that copies an iSeries database file to QNetWare File System.

Save and restore NetWare data from the QNetWare directory

You can save and restore individual NetWare objects such as volumes, directories, or files in the QNetWare directory, or you can save the entire QNetWare directory. You can also save resources that are located in the SAV.RST directory.

If you save NetWare volumes, files, and directories from NetWare servers or NDS trees in QNetWare, you can selectively restore NetWare data to the same location or to a different location. However, you cannot restore compressed objects to a NetWare volume that either does not specify data compression or does not support data compression. If you save resources in SAV.RST, you cannot restore data selectively or to a different location from which the data was backed up.

You can find information about saving and restoring your NetWare data in these topics:
- Saving NetWare data tells you how to save your NetWare data to a file.
- Restoring NetWare data tells you how to restore the data from that file.
- Backup, recovery, and availability provides information about backing up your applications on iSeries.

- More information about recovering your system is available in the book Backup and Recovery .

Save NetWare data through the QNetWare directory

You can save NetWare volumes, directories, or files in the QNetWare directory. You can also save NDS objects, such as organizations and organizational units. To save NetWare objects in the QNetWare directory, do this:
1. If you are saving NetWare objects to a file, create one or more files for storing the NetWare objects that you plan to back up. To do this, on an iSeries command line, type CRTSAVF FILE(mylib/mysave) TEXT('My Save/Restore File') and press Enter.

   In this example, *mylib* is the name of the library in which your save file will be created and *mysave* is the name of your save file.
2. If you have an authentication entry, skip to step 4. Otherwise, start an authenticated connection to the NetWare server that has the objects you want to save by entering:

   ```
   STRNTWCNN SERVER('docserv') CNNTYPE(*SAVRST)
   ```

   If your NetWare user name does not match your iSeries profile, you must also specify the NTWUSER and PASSWORD parameters.
3. When iSeries starts the connection to NetWare, you can press F10 to see the types of connections started:

   ```
   Started *USER connection 1 to server docserv.
   Started *SAVRST connection 1 to server docserv.
   Started connection to server docserv.
   ```

   Note that you must have a *SAVRST connection to the server before you can save or restore NetWare objects.
4. Type SAV and press F4 to see the Save Object display shown here.

   In this example, iSeries will save volume myvol on NetWare server docserv.

```
                        Save Object (SAV)

Type choices, press Enter.

  Device . . . . . . . . . . . . . .   'qsys.lib/mylib.lib/mysave.file'
  _____
                   + for more values   _____

 Objects:
  Name . . . . . . . . . . . . .   _   'qnetware/docserv.svr/myvol'
  _____
   Include or omit  . . . . . . .   *INCLUDE      *INCLUDE, *OMIT
                   + for more values  _
 Directory subtree  . . . . . . .   *ALL          *ALL, *DIR, *NONE, *OBJ
 Save active  . . . . . . . . . .   *NO           *NO, *YES, *SYNC




                                                            Bottom
 F3=Exit   F4=Prompt   F5=Refresh   F10=Additional parameters   F12=Cancel
 F13=How to use this display      F24=More keys

 MA    a              MW                                      10/037
```
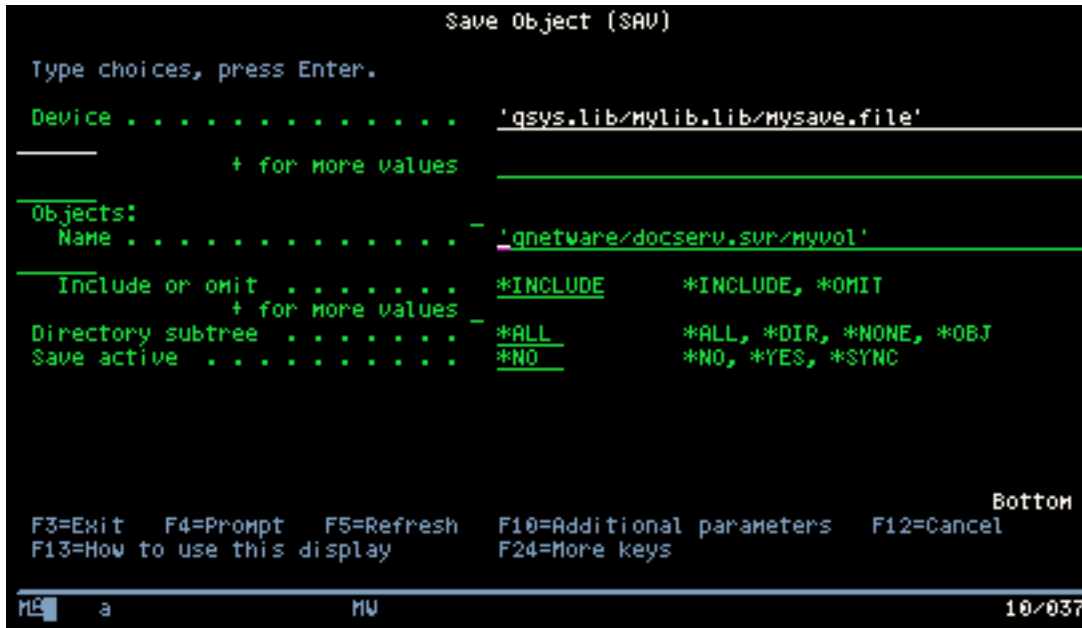
Figure 4. Save Object display

- If you want to save specific directories or files in the volume, just add them to the path. For example, to save all files and directories that start with the characters JEAN, type the following for the Name parameter:

  'qnetware/docserv.svr/myvol/jean*'

  Note: If you use pattern-matching characters and the beginning of a directory name matches these characters, iSeries saves both the directory and all the files in that directory.
- If you want to save NetWare resources such as NetWare volumes or all NDS objects in a NetWare 4.x, 5.x, or 6.x tree, use SAV.RST in the path. For example, to save myvol, you would type this for the Name parameter:

  'qnetware/sav.rst/abc.svr/myvol/'

5. Press F10 to see additional parameters and then press Page Down.
6. Change the Clear parameter to *ALL. This ensures that iSeries overwrites any existing data in the save file during the save operation.

To display the save file after iSeries backs up the NetWare objects, type DSPSAVF FILE(mylib/mysave) and press Enter.

Use option 5 to display the objects that were saved to the file.

Restoring NetWare data through the QNetWare directory

You restore NetWare objects very much as you saved them. For example, if you saved NetWare objects to a save file, you will restore the objects from the save file.

1. Start an authenticated connection to the NetWare server on which you need to restore NetWare objects by typing STRNTWCNN SERVER('docserv') CNNTYPE(*SAVRST) and pressing Enter.

   If your NetWare user name does not match your iSeries profile, you must also specify the NTWUSER and PASSWORD parameters.

2. Type RST and press F4 to see the Restore Object display.

   In this example, iSeries will restore volume myvol on NetWare server docserv.

```
                         Restore Object (RST)

 Type choices, press Enter.

   Device . . . . . . . . . . . . . .   'qsys.lib/mylib.lib/mysave.file'
                                        _____
  ____          + for more values      _____

  Objects:
    Name . . . . . . . . . . . .   _  'gnetware/docserv.svr/myvol'
                                       _____
  ____
    Include or omit  . . . . . . .   *INCLUDE      *INCLUDE, *OMIT
    New object name  . . . . . . .   *SAME
                                       _____
  ____          + for more values  _
  Directory subtree  . . . . . . .   *ALL          *ALL, *DIR, *NONE, *OBJ
  Output . . . . . . . . . . . . .   *NONE
  ____

                                                                  Bottom
  F3=Exit    F4=Prompt    F5=Refresh   F10=Additional parameters   F12=Cancel
  F13=How to use this display          F24=More keys

 MA          a              MW                                       10/037
```

Figure 5. Restore Object display

The time to restore the NetWare objects varies, depending on whether you saved storage spaces or individual files and directories. If you want to monitor the restore process, use the NetWare Monitor utility at the server console.

Print from iSeries to NetWare printers

When you have NetWare Enhanced Integration installed, you can print from iSeries to a NetWare printer that uses the standard NetWare print support and an iSeries remote output queue and remote writer. (You cannot print from a NetWare server to an iSeries printer. However, other features are available to provide this support, such as HostPrint/400.) For conceptual information about how this printing environment works, refer to "iSeries-to-NetWare printing environment."

To enable printing to NetWare printers, do this:
1. Set up NetWare print support.
2. Start the print server function.
3. Also see how you can use multiple NetWare print queues.
4. Create an output queue on iSeries. If you do not direct iSeries to automatically start writers to the output queue when you create it, you also need to start a writer.

iSeries-to-NetWare printing environment

When you print from iSeries to a remote NetWare printer, you use the standard NetWare print support and an iSeries remote output queue and remote writer.

As the following example shows, NetWare uses a print queue, a print server, and a printer to allow workstations to print to a network printer. The **print queue** is the object that temporarily holds the print job file until the job prints. The **print server** provides the service of sending the print job to the printer. The print server monitors the print queue and the printer.
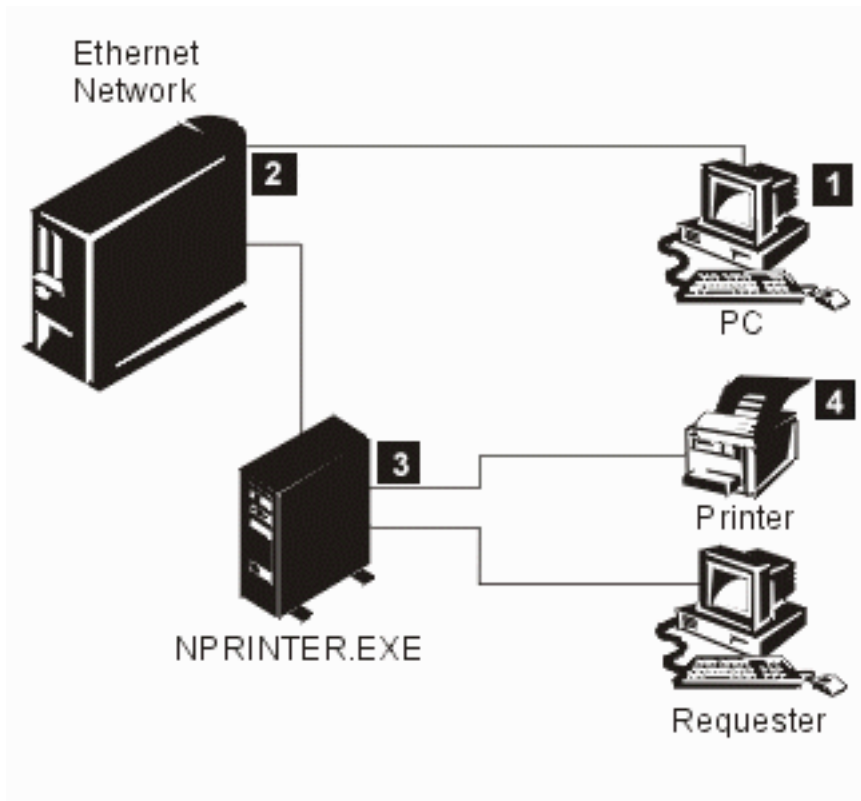
Figure 6. iSeries-to-NetWare Printing Environment

In this environment, an iSeries user (**1**) requests print services from the NetWare server. The print job file goes to the iSeries remote output queue (**2**). The Remote Writer for that output queue then sends data to the NetWare print queue (**3**). The NetWare server acts as the print server and monitors the print queue as well as the printer. When the printer can process the job, the server sends the print job to the assigned printer (**4**).

As each user's spool job is processed on the output queue, iSeries authenticates a connection for the user to the appropriate server. Each user must either have a NetWare authentication entry (described in "Manage NetWare server connections and authentication" on page 13) or use the STRNTWCNN command to start a NetWare connection manually.

Ideally, users have an authentication entry that authorizes them to the specified NetWare print queue. The easiest way to set this up for your users is with user enrollment. You can automatically set up your iSeries users in the NDS tree where the print queue object is.

If users do not have an authentication entry, they must specify AUTJOB(*ANY) on the STRNTWCNN command when they start a connection to NetWare. The writer job uses that connection to print the file on NetWare.

Set up NetWare print support

To set up NetWare print support, you need to create a print server, printer, and print queue on the NetWare server. To do this, you use the NWADMIN utility:

1. Log in to the NetWare server as user ADMIN.
2. Double-click the **NetWare Administrator** icon to get to the NetWare Administrator window.
3. Click the organization or organizational unit where you want to create the printer, print queue, and print server objects. (For example, the organizational unit could be the integrated file system.)

Create the print queue.

4. Click **Object** from the menu and then click **Create...**
5. Scroll down the list and then double-click **Print Queue** to see the Create Print Queue display.
6. Click the radio button to refer to a bindery queue.
7. Type the Print Queue Name and the Print Queue Volume. You can click the box next to the Print Queue Volume field to list valid volumes. Click **CREATE** to create the queue.

Create the printer object.

8. Click **Object** from the menu and then click **Create...**
9. Scroll down the list and then double-click **Printer** to see the Create Printer display.
10. Type the printer name, select **Define Additional Properties**, then click **CREATE**.
11. Select **Assignments**; then click **ADD** for list of available queues. Select queue; then double-click or select OK. Select OK again to create the printer object.

Create the print server.

12. Once again, click **Object** from the menu; then click **Create...**
13. Scroll down the list and then double-click **Print Server** to get the Create Print Server display.
14. Type the print server name, select **Define Additional Properties**, and then click **CREATE**.
15. Click **ADD** for list of available printers. Select printer; then double-click or select OK to confirm your selection.

Once you have created a print server, printer, and print queue, you need to start the print server function. If you want to use multiple print queues on the NetWare server, read how to create additional print queues.

Start the print server function

After you set up print support, you need to start the print server function:
1. Load the PSERVER.NLM on the server and specify the print server object name in the correct context. For example, Enter: LOAD PSERVER .CN=PRTSERVER.OU=AS400.O=NW, where NW is the organization, iSeries is the organizational unit, and the print server object name is PRTSERVER.
2. Start the NPRINTER.EXE on the workstation that owns the printer. For example, enter: NPRINTER .CN=PRINTER1.OU=AS400.O=NW.

Once you have started the print server function, you are ready to create an output queue on iSeries.

Use multiple NetWare print queues

If you want to use more than one print queue on the NetWare server, you can create additional queues. You do this after using the NWADMIN utility to set up printing.

To create additional print queues:
1. Select **Print Queues** from the NetWare Print Console display.
2. Press **Insert** on the Print Queue display.
3. Specify a new print queue name and volume.
4. Press Enter to view the print queue information, as this example shows:

```
NetWare Print Console 4.10          Saturday December 11.1997 15:27
Context:  nw

    ┌─────────────────────┐
    │   Print Queues      │
    ├─────────────────────┤──────────────┬────────────────────────┐
    │  myq                │vailable Optio│ Print Queue Information│
    │  myq2               │              │                        │
    │  q                  │Print Queues  │ Print Jobs             │
    │                     │Printers      │ Status                 │
    │                     │Print Servers │ Attached Print Servers │
    │                     │Information   │ Information            │
    │                     │Quick Setup   │ User                   │
    │                     │Change Context│ Operations             │
    │                     │              │ Print Server           │
    │                     │              │                        │
    │                     │              │                        │
    │                     │              │                        │
    └─────────────────────┘              └────────────────────────┘

 Press Enter to view a list of print servers assigned to service
 this print queue.
```

5. Press Enter to view the list of print servers. Then press **Insert** to select a print server to add. Selecting a print server makes a link between the queue and the server.
6. If you want to grant rights to users for this print server, select **Users** from the Print Queue Information. For more information on granting users rights, see the *Novell NetWare Print Services* book.
7. From the Available Options menu, select **Print Servers**, select the print server, then select **Printers**.
8. From the **Serviced Printers** display, select a printer and press Enter.
9. Move your selection cursor to the **Print Queues assigned** field and press Enter.
10. Press **Insert** to select the additional queue to add.

If your print server is active, the additional queue you added does not appear. You must select the queue. For more information on printing, see the Novell NetWare 4.1 books, *Print Services*, 74G1439, and *Workstation Basics and Installation*, 74G1442.

Create an output queue on iSeries for NetWare printers

Before you can print from iSeries to NetWare printers, you must create an output queue on iSeries. To do this, you use the Create Output Queue (CRTOUTQ) command:

1. On the iSeries command line, type CRTOUTQ and press F4. The Create Output Queue display appears.
2. In the Output queue field, specify a name for your queue.
3. In the Remote system field, specify the NDS tree name.

    If you defined network server attributes, you can use the special value *NWSA to have iSeries retrieve the tree value you defined. (The command DSPNWSA OPTION(*NETWARE) shows you this value.)

4. In the Remote printer queue field, specify the NetWare printer queue name. This value can be a distinguished name that begins with a period.

    If you defined network server attributes, you can also use a partial name (that does not begin with a period). iSeries uses it in conjunction with the NDS context attribute to form the distinguished name of the NetWare print queue.

5. Page Down to display the next page.
6. In the `Connection type` field, specify *IP.
7. In the `Destination type` field, specify NetWare 5.0 or 6. The value for the destination type should be *NDS.
8. Change the `Manufacturer type and model` to match your printer.
9. You might want to select one of these `destination options`:

   *NOWAIT

   > Select this option if you want the spool file to be removed from the iSeries output queue as soon as the entire file goes to the NetWare queue. Otherwise, the spool file remains in the iSeries output queue as long as it is in the NetWare queue (until the file prints or is deleted with a NetWare utility). The owner of the spooled file must be enrolled as a NetWare user.

   *BANNER='*text*'

   > You can specify up to 12 characters that you want to print on a NetWare banner page. The banner page, which precedes the NetWare print job, also prints the user name.

   > **Note:** You must type *BANNER in uppercase letters, enclose the text in single quotes, and make sure that there are no spaces before or after the equal sign.

10. You might also want to specify a value other than *NONE in the `Autostart writer` field to have iSeries automatically start writers to this output queue. Valid values range from 1 to 10. Otherwise you must manually start writers after creating the output queue.
11. Change any other values that you want or use the defaults. Then press Enter to create the remote output queue.

Unless you are starting writers manually, you should be ready to print from iSeries to a NetWare printer. iSeries sends spooled files to the remote printer queue on the NetWare network.

The NetWare server receives the files in a print queue. For information on how to print jobs from

NetWare print queues, refer to Novell NetWare documentation .

Start writers to the output queue

If you did not direct iSeries to automatically start remote writers to the output queue when you created it, you need to take one additional step. To begin sending spooled files from your remote output queue, enter the Start Remote Writer (STRRMTWTR) command:
1. On the iSeries command line, type `STRRMTWTR` and press F4 (prompt).
2. Specify the name of your remote print queue in the `Output queue` field.

Now you should be ready to print from iSeries to a NetWare printer. iSeries sends spooled files to the remote printer queue on the NetWare network.

The NetWare server receives the files in a print queue. For information on how to print jobs from

NetWare print queues, refer to Novell product documentation for NetWare .

Troubleshoot NetWare Enhanced Integration

When you run NetWare Enhanced Integration, you are most likely to have trouble either enrolling users and getting them successfully connected to a NetWare server or working with the QNETWARE file system.

Troubleshooting user enrollment problems:

If your have trouble with user enrollment, you can find helpful information in the QNETWARE and QPRFSYNCH job logs and in error codes. You can find helpful information in these topics:
- "View job logs to analyze problems" on page 57.
- "User enrollment error codes" on page 58 lists error codes and suggests solutions to the problem.

- "Troubleshoot connection problems" on page 60.
- "Troubleshoot system operator rights problems" on page 60.
- "Troubleshoot communication problems" on page 61.

Troubleshooting QNETWARE file system problems:

If you have problems with the QNETWARE file system, see the topic "Troubleshoot QNETWARE file system problems" on page 61.

View job logs to analyze problems

When you are analyzing problems with NetWare Enhanced Integration, you will find the QNETWARE and QPRFSYNCH job logs helpful.

QNETWARE job log:

The QNETWARE job handles the NetWare profile enrollment requests. The QNETWARE job, which runs in the QSYSWRK subsystem under the QSYS profile, logs error messages received during all profile enrollment operations. Most errors are written to the QNETWARE job log; more severe errors are written to the QSYSOPR message queue.

To view the status of the QNETWARE job, and to obtain a list of previous QNETWARE jobs:
1. On the iSeries command line, type WRKJOB QNETWARE and press Enter.
2. Specify option 1 (Select) next to the active QNETWARE job.

   Note: QNETWARE jobs that have previously ended are included in this display only if the QGPL/QBATCH *JOBD specifies LOG(4 00 *SECLVL).
3. When the Work with Job display appears, select option 10 to view the job log.

This job runs when you install NetWare Enhanced Integration. Even if iSeries user profiles are not enrolled, the QNETWARE job runs to handle periodic requests for the QNetWare file system. "Details: Events that start the QNETWARE and QPRFSYNCH jobs" on page 58 has details about events that start the QNETWARE job.

QPRFSYNCH job log:

The QPRFSYNCH job (program QSYS/QFPAPRFJ) is used to evaluate user profile create or change requests, and to determine if the requests require enrollment on any NetWare servers. If enrollment is required, this job notifies the QNETWARE job of the necessary work to be done.

This job runs in these situations:
- When you define iSeries group or user profiles to enroll them on NetWare (or other) servers
- When you install NetWare Enhanced Integration

Even if iSeries group or user profiles are not enrolled, the QPRFSYNCH job runs to handle periodic requests for the QNetWare file system.

To view the status of the QPRFSYNCH job, and to obtain a list of previous QPRFSYNCH jobs:
1. On the iSeries command line, type WRKJOB QPRFSYNCH and press Enter.
2. Specify option 1 (Select) next to the active QPRFSYNCH job.
3. When the Work with Job display appears, select option 10 to view the job log.

"Details: Events that start the QNETWARE and QPRFSYNCH jobs" on page 58 has details about events that start the QPRFSYNCH job.

Details: Events that start the QNETWARE and QPRFSYNCH jobs

When the QSYSWRK subsystem starts, an autostart job (QFSIOPJOB) runs and submits both the QNETWARE and QPRFSYNCH jobs to run in this subsystem if needed.

If either job ends, it restarts automatically when one of these actions occurs:
- You start the QSYSWRK subsystem and install NetWare Enhanced Integration or enroll iSeries group or user profiles.
- You use option 6 (Retry entry) for any group or user profile on the Work with NWS User Enrollment display. The entry can be in a *CURRENT state or any other pending or failed state.
- You change the enrollment of a group or user profile on NetWare (by using the CHGNWSA or CHGNWSUSRA command).
- You set or change one of these values for a user or group that is enrolled to NetWare (by using the CRTUSRPRF, CHGUSRPRF, or RSTURSPRF command):
  - Password
  - Password expiration date
  - Password expiration interval
  - Status (enabled or disabled)
  - Text description

    Note: Password information does not apply to group profiles.
- You change the password (with the CHGPWD command) for a user profile that is enrolled on NetWare.
- You delete a user profile (with the DLTUSRPRF command) that was previously enrolled on NetWare.

The QNETWARE and QPRFSYNCH jobs remain active while the QSYSWRK subsystem is active. There are no user interfaces (other than the ENDJOB and ENDSBS commands) to end these functions. Their role is to remain active in these situations:
- When any profile enrollment requests are active or pending
- When you install NetWare Enhanced Integration even though you are not enrolling profiles

User enrollment error codes

If an error code appears, use option 16 to view the error message that is associated with the error code. Although the message text associated with the error appears, substitution text, such as the server name, does not. However, when the message goes to the QNETWARE job log, the substitution text does appear.

Some error codes have a one-to-one relationship with an associated error message. Many of the NetWare-specific messages, however, show only the NetWare error code, then a generic message that indicates an error occurred while calling a NetWare function. In this case, the error message has some explanatory text for some of the common NetWare errors. Not all errors, however, are described in the message text.

These error codes might appear:

Negative error code
> These error codes generally indicate some sort of communication error while trying to send requests to a NetWare server. Generally, only the final error appears. If you know that a server is inactive, this probably explains the error. If you think that a server is running properly, look in the QNETWARE job log for related error messages that might help isolate the problem.

0-999 Error codes returned from NetWare function calls.

> **216** The password is too short. Change the password on iSeries to a longer value.

> **220** The account is disabled. Re-enable the QNETWARE profile on the NDS tree.

> **238** Another object already exists with the same name as the profile that you are propagating. Either end propagation of the profile from the iSeries side, or rename the matching object from a NetWare client.

242-254

The QNETWARE profile on the NDS tree does not have sufficient access rights to make the necessary user or group object changes. From a NetWare client, make sure that the QNETWARE profile has the authority to process user and group objects. You can do this by making the object an ADMIN user or the security equivalent to an ADMIN user.

333   Indicates that a connection failure has occurred. If this error occurs, end the QNETWARE job. Then restart it by issuing a Retry entry option from the WRKNWSENR status display for the failing profile.

601   This normally indicates that you specified an incorrect NDS context. Check for the profile in error by looking at the NDS context field of the CHGNWSUSRA command. If you specified *NWSA in the CHGNWSUSRA command, check the NDS context field in the CHGNWSA command.

606   Another object already exists in the NDS tree with the same name as the profile you are propagating. Either end propagation of the profile from the iSeries side, or rename the matching object from a NetWare client.

611   You specified an incorrect container name. Check the NDS context field for the failing group or user profile.

637   You are attempting an update or delete operation to a user or group profile that has a move in progress. Typically this means that replication of an NDS tree has not yet completed. If the operation changes to an *UPDFAIL or *DLTFAIL status, use the Retry entry option on the WRKNWSENR status display for the failing profile.

654   A NetWare partition is busy. If the operation goes to a status of *UPDFAIL or *DLTFAIL before the error clears, retry the operation. Use the Retry entry option on the WRKNWSENR status display for the failing entry.

668   You specified an incorrect container name. Check the NDS context field for the failing group or user profile.

669   The password is not correct.

672   The QNETWARE profile on the NDS tree does not have sufficient access rights to make object changes to the group or user. From a NetWare client, make sure that the QNETWARE profile has the authority to process group and user objects. Do this by making the object an ADMIN user or the security equivalent to an ADMIN user.

6000   Occurs when trying to send a request to an NDS tree. It indicates that the context for the QNETWARE profile in the tree cannot be determined. To correct the error, either use the ADDNTWAUTE command to create a NetWare authentication entry for the QNETWARE profile in the tree, or use the CHGNWSUSRA command to define such a context.

6001   There is no QNETWARE profile on iSeries. Use the CRTUSRPRF command to create the profile. This profile is automatically created when NetWare Enhanced Integration is installed, but a system administrator might have deleted it.

6002   An error occurred while trying to access the QNETWARE profile enrollment information. The profile object is either locked by another job or damaged. If the profile object is damaged, create the QNETWARE user profile again.

6003   The user enrollment task could not contact the requested server in an NDS tree. Either the servers are inactive, or they are not running the NetWare Enhanced Integration NLM. To recover, start the inactive servers or load the NetWare Enhanced Integration NLM.

6004   An authentication error occurred while trying to log in the QNETWARE user to a server. Either the QNETWARE profile does not exist on the tree or server, or the iSeries password information does not match that currently on the NetWare server or NDS tree. Either change the iSeries password information to match the server, or change the QNETWARE password from a NetWare utility such as NWADMIN.

6005   An unexpected communication error occurred while trying to connect to a NetWare server. Look in the QNETWARE job log for more detailed errors that might help diagnose the problem.

6006 An error occurred while trying to get the QNETWARE authentication information. Use the ADDNTWAUTE command to add an authentication entry for the QNETWARE profile. If one already exists, there may be some damage, so delete and re-create the QNETWARE profile.

6007 An error occurred trying to retrieve user or group profile enrollment information. Try the operation again. If the error persists, the profile may be damaged. Either create the user profile again, or restore the profile from a saved version.

6008 An error occurred while trying to create an authentication entry for an iSeries profile. Try the operation again. If the error persists, look in the QNETWARE job log for any related errors that might indicate the source of the problem.

6009 An error occurred while trying to update the status of a profile on a server. Try the operation again. If the problem persists, either delete and then re-create the profile or restore the profile from a saved version.

6011 No password is available for the user profile. This error occurs when the QRETSVRSEC system value is set to 0, meaning that iSeries does not keep security information. In this situation, passwords can only be retrieved when the password is actually changed, or the user signs on to the system.

For example, this error might occur if you create a new group profile to enroll all the group members on a NetWare server. If the QRETSVRSEC system value is set to 0, passwords for the group members are not immediately available, so the 6011 error appears for all the group members. If one of them signs on to iSeries, the system automatically captures the password information and resolves the 6011 error. Until the user signs on, or the password is changed using the CHGPWD or CHGUSRPRF command, this profile remains in a pending state.

This error can also occur if the user password has not changed since you set the QRETSVRSEC system value to 1. To resolve the error, either have the user sign on to iSeries, or change the password by using the CHGPWD or CHGUSRPRF command.

6012 A profile update request was sent to a server, but no response was returned within 10 minutes. The iSeries tries again. If the error persists for a particular user, check the detailed error messages in the QNETWARE job log for more information.

Troubleshoot connection problems

Message FPE0232 - User not connected to server

If you get this message, read the second level online help. Typically the problem is that there is not an authentication entry in the user profile for the specified server. To confirm this, look at the previous messages.
* If the previous diagnostic error is FPE0215, an authentication entry does not exist. You need to create an authentication entry.
* If the previous diagnostic error is FPE0234, an authentication entry exists, but the password in the authentication entry is *STRNTWCNN. This can happen if it is purposely set this way or if iSeries remains set to not store passwords in the authentication entry. To establish a connection, you can either:
  – Enable iSeries to automatically start authenticated connections by changing the QRETSVRSEC system value to save passwords. After doing this, you need to update the authentication entries with the correct password by using the WRKNTWAUTE command.
  – Manually start a connection and specify the password. This is only active for the current session.

Troubleshoot system operator rights problems

Some errors indicate that a user without operator rights to the NetWare server is trying to run a command that requires those rights.
* Error FPE023F indicates that the user needs operator rights to enter the End NetWare Connection (ENDNTWCNN) command.
* Error CPFA448 indicates that the user needs operator rights to enter the Submit Network Server Command (SBMNWSCMD) command.

To give the user the rights to do this function, you must add the user to the system object in the NDS tree.

Troubleshoot communication problems

Request to server failed with communication error

If you have trouble communicating with a NetWare server from iSeries and get this error message, read the second level help text. If the reason code is not documented, the server is most likely not active. Use the documented recovery actions.
- To verify this:
  - You loaded the NLM on the server with the /TCP option.
  - You can PING the server from iSeries.
  - You used CHGNWSA to add the server's TCP/IP name to the network server attributes.

Cannot access the NetWare Enhanced Integration NLM

If commands that access the NetWare Enhanced Integration NLM on a server get no response, the problem could be that the NLM is not installed and loaded. Try these steps to solve the problem:
- If you have not installed the NLM on the server, see "Install the NetWare Enhanced Integration NLM on servers" on page 7. This page also explains how to automatically have the NLM loaded whenever you restart the server.
- To see if the AS4NW410 is loaded, you can also do this:
  1. Bring up RCONSOLE.
  2. On the RCONSOLE display, select and log in to the NetWare server.
  3. Enter the NetWare command MODULES and press F10 to see the output.
  4. If the NLM is not loaded, you can then load it by using this command:

```
SBMNWSCMD CMD('LOAD SYS:AS4NW\AS4NW410') SERVER(server_name)
              SVRTYPE(*NETWARE) CMDTYPE(*LCLNTW)
```

Troubleshoot QNETWARE file system problems

This topic describes various problems that you might encounter when you work with the QNetWare file system and solutions to those problems.

Server does not show up under /QNetWare:
1. Make sure that the NetWare Enhanced Integration NLM is loaded on the server.
2. Use the PING command to check the connection to the server.
3. For better performance, the list of servers is only updated periodically. To force the entire list of servers to be updated, enter CALL QFPNTWE/QFPZCTL PARM(*UPDSRVL).
4. If you are using TCP/IP, make sure that you defined network server attributes.

Users cannot see below the server volumes:

Make sure that the user either has a connection started to the NetWare server or has an authentication entry for the NetWare server or NDS tree.
- **To see if the user has a connection started, do this:**
  1. On the iSeries command line, type WRKNTWCNN and press Enter.
  2. Specify the name of the NetWare server.
  3. Specify the name of the user, and press Enter.
- **To see if the user has an authentication entry, do this:**
  1. On the iSeries command line, type WRKNTWAUTE and press Enter.
  2. Type 5 on the line by the server or NDS tree to display authentication entries.
  3. If you need to add an authentication entry, do this:
     a. Specify both a server or NDS tree name and the server type in the blank fields.
     b. Type 1 to add an authentication entry for that server or NDS tree; press Enter.
     c. Fill in the remaining fields to create an authentication entry for that user.

Users cannot be authorized to a file or directory:

If you get a message that says `Information passed to this operation was not valid` when you try to access a NetWare file or directory, ensure that the user exists in the NDS tree and that the NDS context is correct. Either the user's context must be set to the context the user exists in or to the job context, or the system context must be set to the correct context. (Use the NetWare NWADMIN command.)

Users cannot make a directory with MKDIR command:

One of these messages appears:
- `Function not supported by file system.`

  QNetWare does not support auditing, so you need to specify `CRTOBJAUD(*NONE)`.
- If you get a message that says `Information passed to this operation was not valid` when you try to make a directory, try one of these solutions:
  – Specify no *PUBLIC authority:

    `DTAAUT(*NONE) OBJAUT(*NONE)`

    If error CPFA0BC occurs when you use the MKDIR command with `DTAAUT(*NONE) OBJAUT(*NONE)`, use `DTAAUT(*INDIR) OBJAUT(*INDIR)` instead.
  – Make sure NetWare group EVERYONE was created in your NDS tree and that your job or system NDS context is set to the context that EVERYONE is in.

  Users cannot move a file with the MOV command.

  If you get a message that says `Information passed to this operation was not valid` when you try to move a file with the MOV command, do this:
  – For NetWare 4.1 and NetWare 5, ensure that the file owner and each user authorized to the file exist in the NDS tree. Also ensure that either their NDS context is correctly set to the context they exist in or to the job context, or that the system context is correctly set.
  – To display the authorized users and owner of a file, you can use the DSPAUT command:
    1. On the iSeries command line, type `DSPAUT` and press F4.
    2. In the `Object` field, specify the name of the file; press Enter. iSeries displays authorized users and owners of the file that you specified.

Files that you create by using iSeries Access or an ILE C for iSeries program are always created as read-only.

File modes control how file attributes are set when you create a file. "NetWare file mode support" on page 37 shows how NetWare sets these attributes.

Checking the NDS context:

You may want to check the NDS context if you experience problems when authorizing other users to files or directories or moving a file with the MOV command. To display or change the current context, use one of the following commands:

	Display	Change
User	DSPNWSUSRA	CHGNWSUSRA
Job	DSPNDSCTX	CHGNDSCTX
System	DSPNWSA	CHGNWSA

Additional information about NDS contexts:

Requests for network resources or services require identification of the NDS object context in order to locate or create the object. The current context is the position of the NetWare object in the NDS tree. The current context remains in effect until the job ends or until you change it by using the CHGNDSCTX command. The current context changes only for the job in which the command is run.

To identify NDS objects, list the current context and the path from the object to the current position in the NDS tree.

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