



403971 / 25MP

IBM System i™

Session:

# System i5 Access for Windows: Security and Communications Tips

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System i5 Access Development

*i want stress-free IT.*

*i want control.*

*i want an **i**.*

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# Agenda

- Connections with System i5 Access for Windows
  - Connection types supported
  - Configuration
  - Troubleshooting
- Using System i5 Access in an Internet Environment
  - Firewalls
    - Includes information on Windows XP SP2
  - NAT
  - VPNs
  - Other Security Considerations
- Using System i5 Access with Terminal Services
  - Functions supported
  - System i5 Access restrictions
  - Windows 2000 considerations
- Appendix A: Example of terminal services install and config
- Appendix B: Example of internet connection through firewall

# Connection Types Supported

# System i5 Access for Windows Connectivity

- Windows 2000/XP/2003/Vista TCP/IP
  - LAN
  - PPP
  - SLIP
  - Twinax (requires separate TCP/IP driver)
- Any 32-bit Winsock 2.x or higher provider

Note: Windows XP support requires V5R1M0 of Client Access Express and service pack SI01907. See Info APAR II12900 for information on restrictions

Note: Windows 2003 requires V5R2M0 of System i5 Access for Windows and service pack SI07765 (for 32-bit) or SI08894 (for 64-bit). See Info APAR II13465 for information on restrictions.

Note: Windows Vista requires V5R4M0 of System i5 Access for Windows and service pack SI25949.

# Configuring and Managing Connections

# Managing Connections

- Managing of connections is integrated into System i5 Navigator
- System i5 Navigator can be used to create, delete, and change properties of connections.
- Connections can also be created by simply specifying the System i5 system name in the desired applications.



# System i5 Navigator Main Windows

- Left Window shows active environment and configured systems.
- Right Window shows contents of current selection.

The screenshot displays the iSeries Navigator application window. The title bar reads "iSeries Navigator" and includes standard window controls. Below the title bar is a menu bar with "File", "Edit", "View", and "Help". A toolbar contains various icons for file operations, and a status indicator shows "3 minutes old".

The main workspace is divided into two panes:

- Left Pane:** Titled "Environment: My Connections", it shows a tree view. The root is "Management Central (System1)", which contains "My Connections". Under "My Connections", there are two sub-items: "System1" and "System2".
- Right Pane:** Titled "My Connections", it displays a table with the following data:

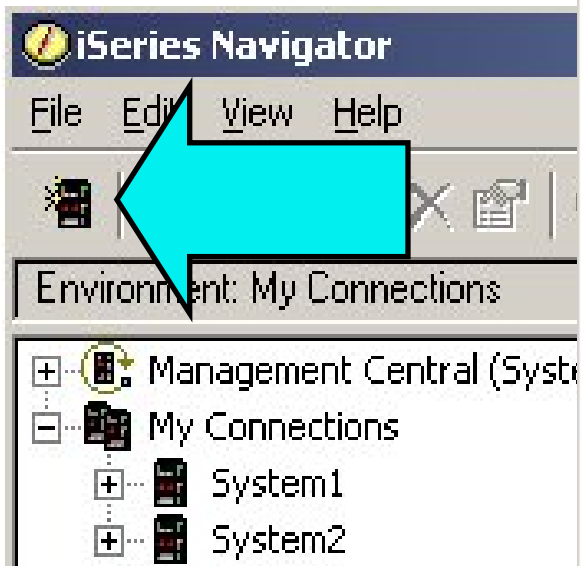
Name	Signed On User	Description
System1		Manage this server.
System2		Manage this server.

Below the table is a horizontal scrollbar. At the bottom of the window, there is a "My Tasks" section on the left and an "Environment tasks" section on the right. The "Environment tasks" section is currently selected and shows a list of tasks: "Add a connection", "Change all of your server passwords", "Install additional components", "Install plug-ins", "Open iSeries Navigator service tools", and "Help for related tasks".

At the bottom left of the window, it says "For Help, press F1".

# Creating a new connection

- Adding a new connection
  - Click on "Add Connection" icon on toolbar



**Enter System  
Name or IP  
address**


The image shows the "Add Connection - Welcome" dialog box. The title bar reads "Add Connection - Welcome". The dialog contains a blue background image of a server rack connected to a desktop computer. The text reads: "Welcome to the iSeries Navigator Add Connection wizard." Below this, it asks: "What is the name of the server to which you want to connect?". There are three input fields: "Server:" with the text "System2", "Description:" with the text "Accounting system", and "Environment:" with a dropdown menu showing "My Connections". At the bottom, there are three buttons: "< Back", "Next >", and "Cancel".



# Sign-on Options

- Enter appropriate signon option

**Add Connection - Signon Information**



What user ID do you want to use to sign on to 'Server2'?

Use Windows user name and password, no prompting  
JJVAN

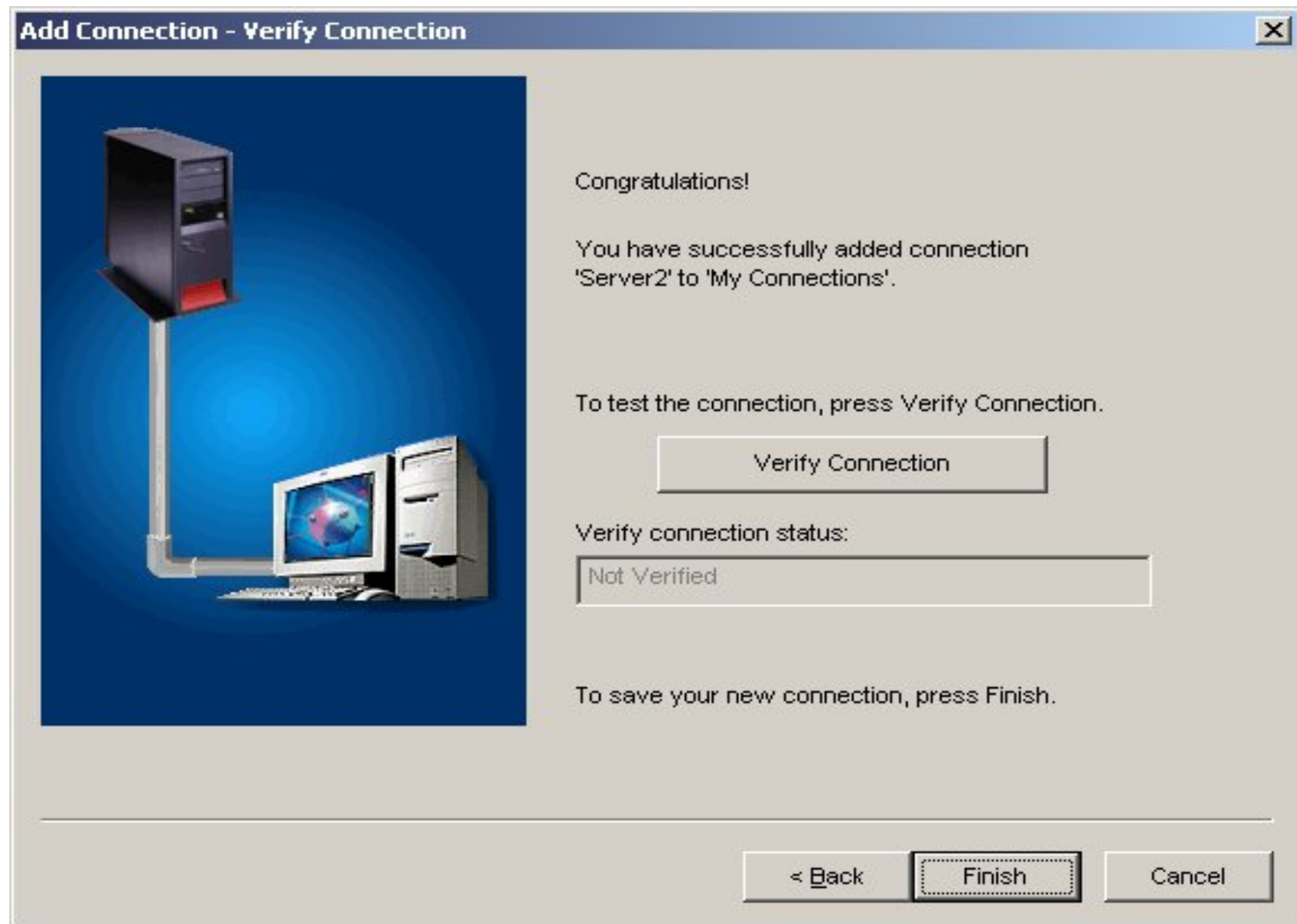
Use default user ID, prompt as needed  
JEFFV

Prompt every time

Use Kerberos principal name, no prompting

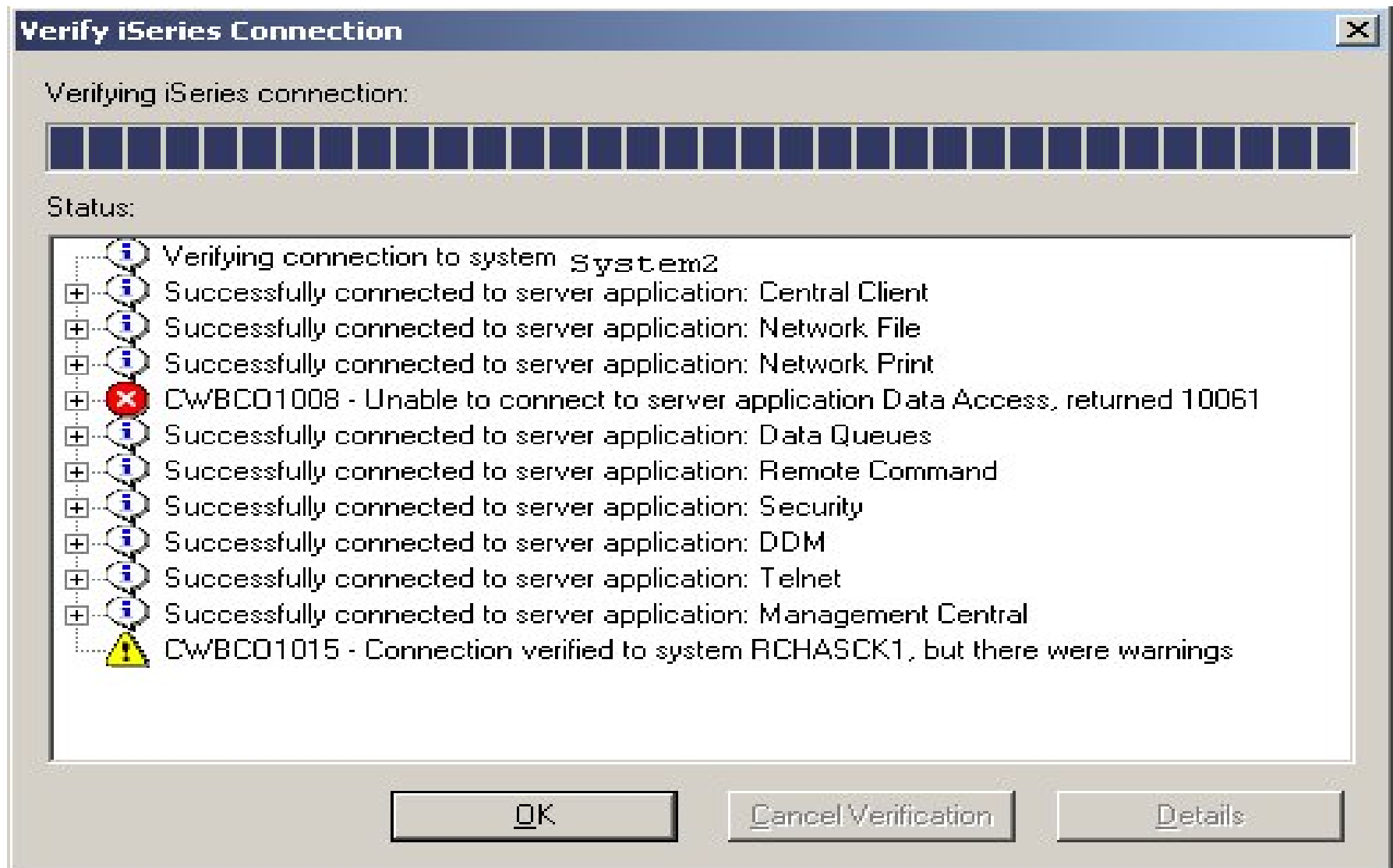
< Back    Next >    Cancel

# Verify Connection



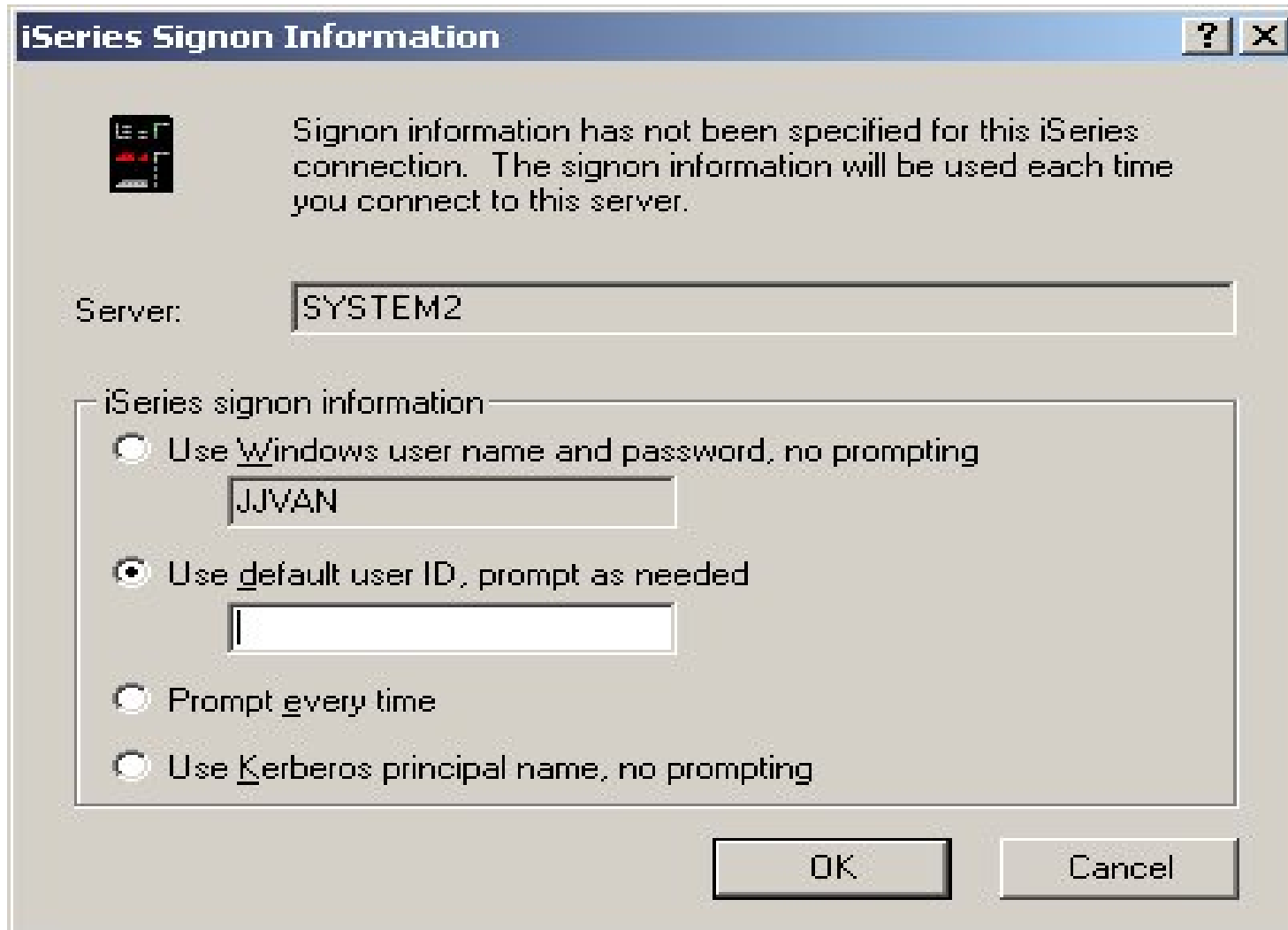
# Verification

- Verification screen allows detailed messages to be displayed when the "+" is clicked on.



# Config-free connection

- Simply start up an application (like Data Transfer), specify a new system name, and you'll be prompted for signon option.



The screenshot shows a dialog box titled "iSeries Signon Information". It contains a message: "Signon information has not been specified for this iSeries connection. The signon information will be used each time you connect to this server." Below the message is a "Server:" label and a text box containing "SYSTEM2". Underneath is a section titled "iSeries signon information" with four radio button options: "Use Windows user name and password, no prompting" (with a text box containing "JJVAN"), "Use default user ID, prompt as needed" (selected), "Prompt every time", and "Use Kerberos principal name, no prompting". At the bottom are "OK" and "Cancel" buttons.

**iSeries Signon Information**

Signon information has not been specified for this iSeries connection. The signon information will be used each time you connect to this server.

Server:

iSeries signon information

Use Windows user name and password, no prompting

Use default user ID, prompt as needed

Prompt every time

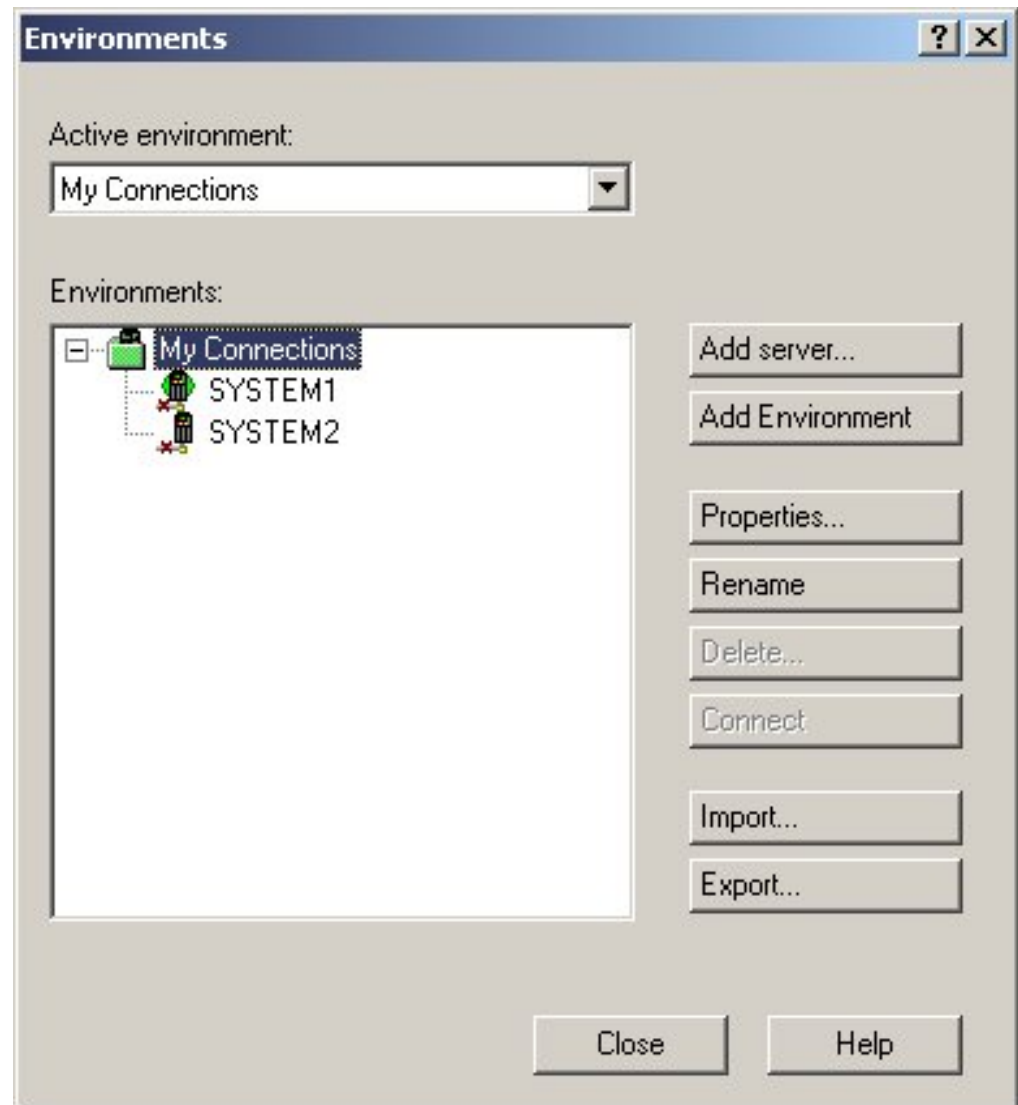
Use Kerberos principal name, no prompting

# Managing Environments & Connections

The Environments View offers a lot more interaction with the environments and connections.

The Environments View is opened from Operations Navigator by selecting [Connections to Servers - >Environments](#) from the File menu.

This will bring up the screen shown, which allows the user to manage all defined environments and System i5 connections. One can also define new ones.



# Importing & Exporting Environments

The Export option allows the user to save the environment definition, including all connections it contains.

The environment will save the environment as a \*.ENV file. The default name of the file will be the name of the environment.

Then the Import option can be used to restore the environment, and the connections.

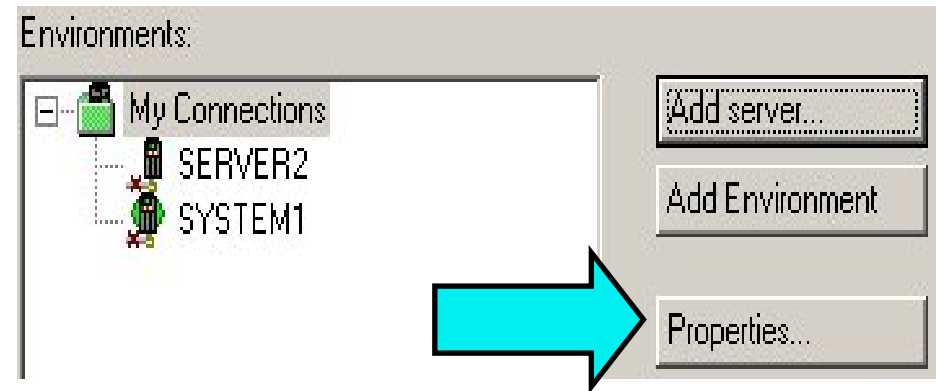
This can be useful to distribute common connection definitions to several PCs. The connections can be defined on one PC and then exported to a location where the other PCs can import the environment.



# Importing & Exporting Environments

Even though System i5 Access for Windows allows environments to be created with names that contain the characters \ / : \* ? " < > and |, the Windows operating systems will not accept these characters as part of a file name. So environments that contain these characters will not be able to be exported or imported.

# Properties



Selecting the Properties button allows the user to view or change the properties of either connections or environments.

Whatever connection or environment that is highlighted when the Properties button is selected will be displayed.

The only property of an environment is the default system.

- The default system will specify which of the connections within the environment will be used to download a language conversion table from if the table isn't on the PC, if this environment is set to the active environment.
- The default system will also be the default system name presented when configuring a new PC5250 or Data Transfer session.

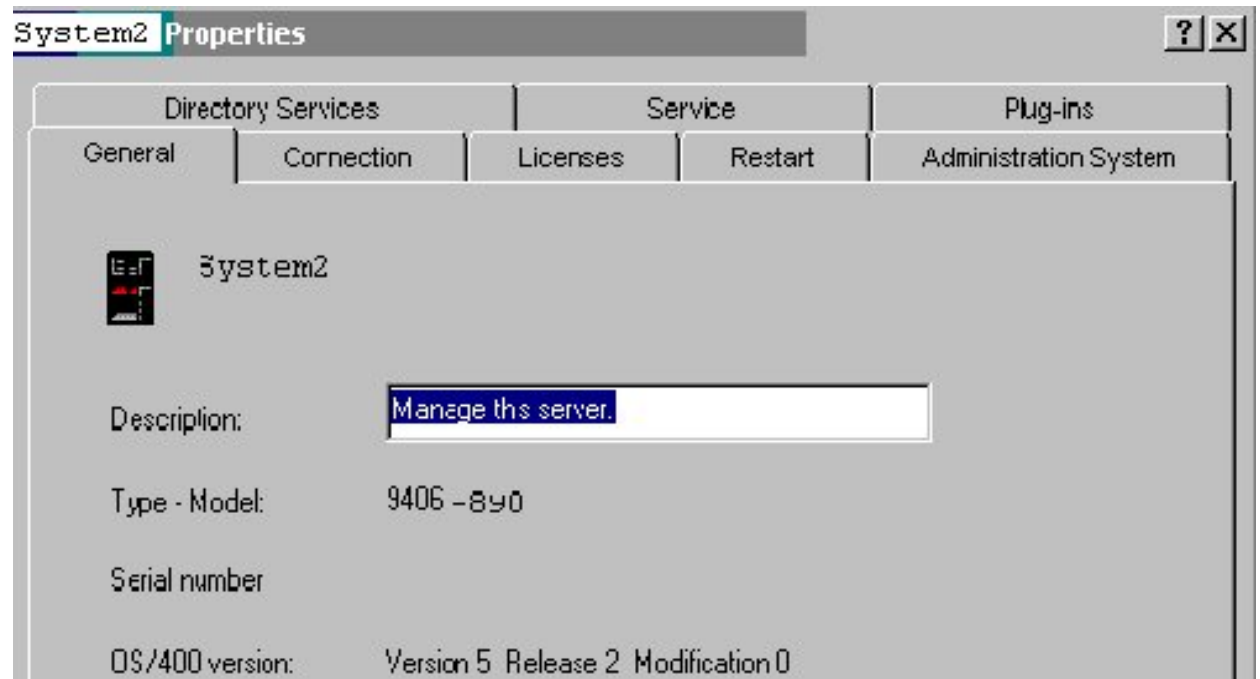


# System Connection Properties

# Properties

The properties of a connection display a lot more information.  
The following property tabs are available.

- General
- Connection
- Secure Sockets
- Licenses
- Restart
- Directory Services
- Plug-ins



Some of these properties will not be able to be interacted with if the connection isn't currently active. So the user might be prompted to signon to the system while interacting with the properties.

Note: Properties can also be accessed by right-clicking on the system name in System i5 Navigator

# More on Properties

- Changing Connection and Secure Sockets properties does not change active connections ( including the System i5 Navigator session in which they were changed ).
- After changing any properties, end any applications that are using a connection to that System i5. Or Logoff to be sure.
- Individual System i5 Access applications ( Data Transfer, PC5250, ODBC ) each can set their own connection properties, which may take precedence over the global properties set in System i5 Navigator.

# Connection Properties

- The Connection tab allows the user to modify the System i5 Signon Information and Performance preferences of the connection. Each of these will be discussed.

The screenshot shows the 'System1 Properties' dialog box with the 'Connection' tab selected. The 'Signon information' section has four radio buttons: 'Use Windows user name and password, no prompting' (unselected), 'Use default user ID, prompt as needed' (selected), 'Prompt every time' (unselected), and 'Use Kerberos principal name, no prompting' (unselected). Below these are two text boxes: the first contains 'jjvan' and the second contains 'JJVAN'. The 'Time-out for signon:' is set to '30' seconds. The 'Performance' section has three dropdown menus: 'IP address lookup frequency' set to 'Always', 'IP address' set to '9 . 9 . 9 . 9', and 'Where to lookup remote port' set to 'Server'. A note at the bottom states: 'Note: These values are used as defaults by other applications connecting from this PC to this server.' The dialog has 'OK', 'Cancel', and 'Help' buttons at the bottom right.

**System1 Properties**

General | **Connection** | Licenses | Restart | Directory Services | Service | Plug-ins

Signon information

Use Windows user name and password, no prompting

Use default user ID, prompt as needed

Prompt every time

Use Kerberos principal name, no prompting

Time-out for signon:

30 seconds (1-3600)

Performance

IP address lookup frequency: Always

IP address: 9 . 9 . 9 . 9

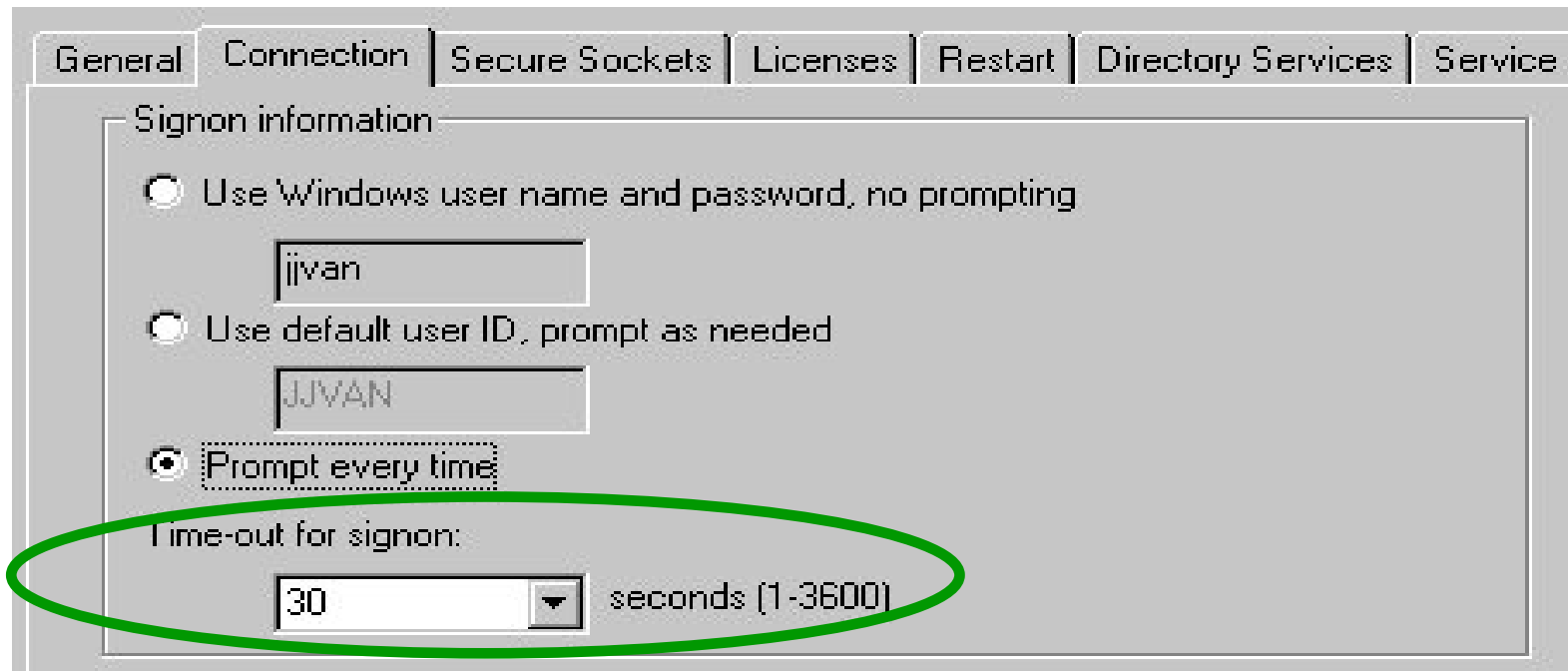
Where to lookup remote port: Server

Note: These values are used as defaults by other applications connecting from this PC to this server.

OK Cancel Help

# Connection Timeout Value -

- Rather than wait for a significant number of minutes for a connection attempt to timeout, shorten the timeout period for this PC.
- If the network is slow, you can give yourself a longer period of time to connect.
- The default is 30 seconds. If you have a slow connection, try increasing this value if you have trouble connecting.



# Performance Properties

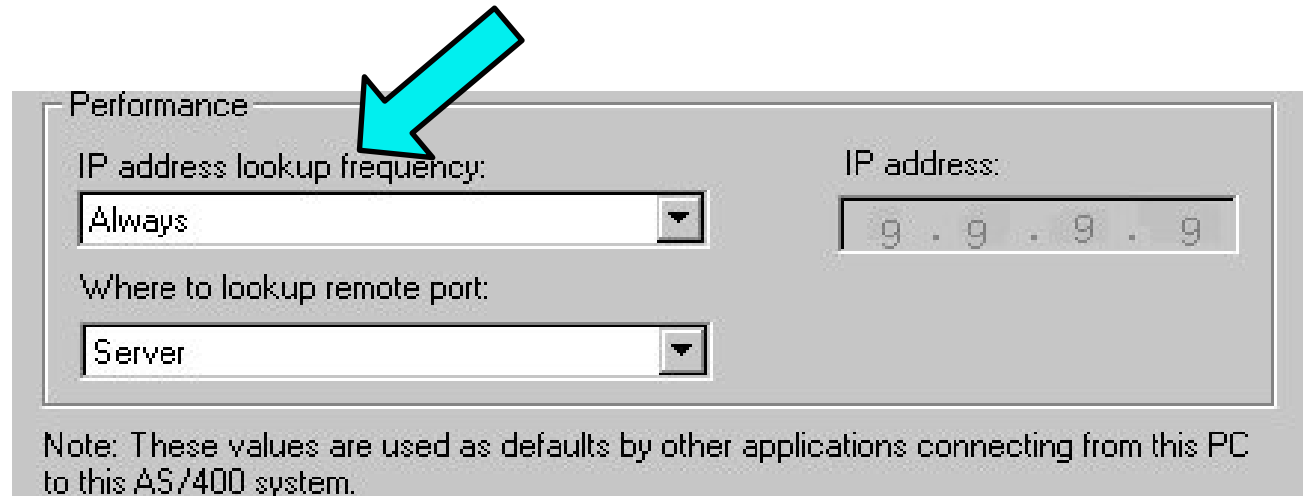
- IP address lookup options

- Always
- One hour
- One day
- One week
- Never - Specify an IP address (host file entry needed for PC5250)
- After startup of PC

- Depending on your network, IP address resolution may take several seconds.

- Less frequent lookups improve performance.

- If IP address given as system name, no lookup occurs and no host file entry needed for PC5250



Performance

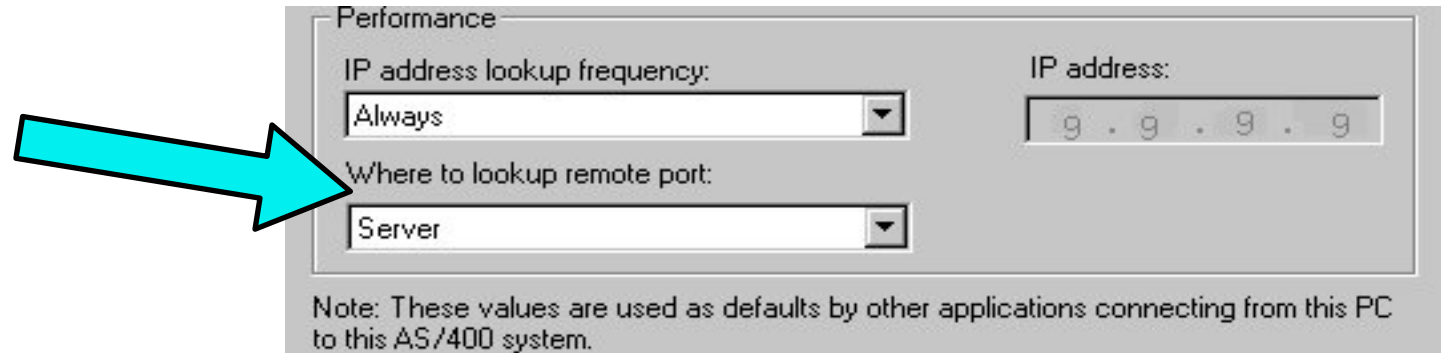
IP address lookup frequency: Always

IP address: 9 . 9 . 9 . 9

Where to lookup remote port: Server

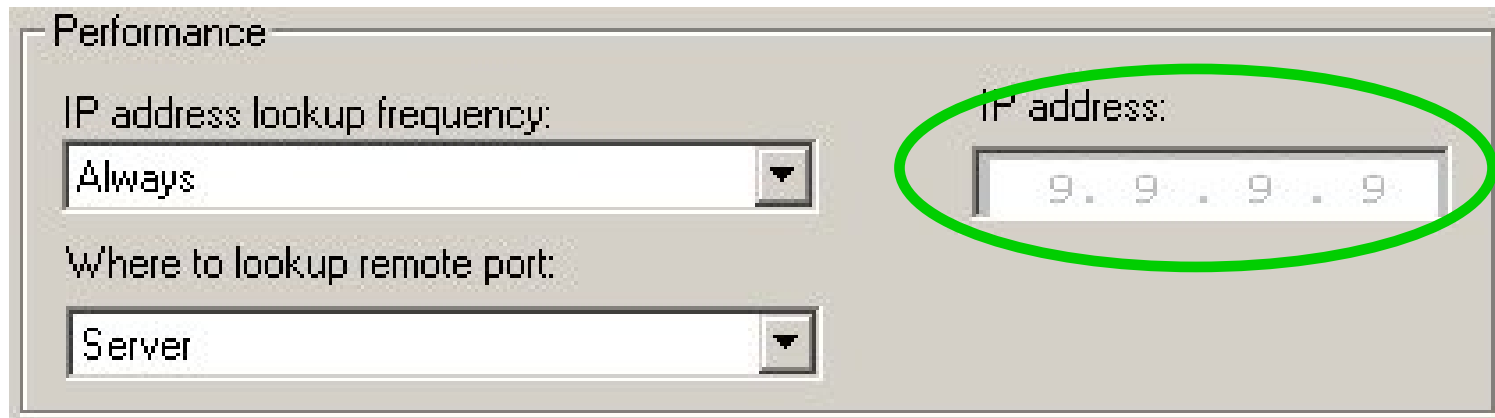
Note: These values are used as defaults by other applications connecting from this PC to this AS/400 system.

# Performance Properties



- "Where to lookup remote port" options
  - Server
    - Server mapper is always used for port resolution
  - Local
    - Use the local Services file on PC to resolve. Note: All System i5 Access servers must then be added manually into this file.
  - Standard
    - Always use the default port, no lookup
- Local and Standard will result in better performance, since server mapper does not have to be contacted first.

# Performance properties



Performance

IP address lookup frequency:  
Always

Where to lookup remote port:  
Server

IP address:  
9.9.9.9

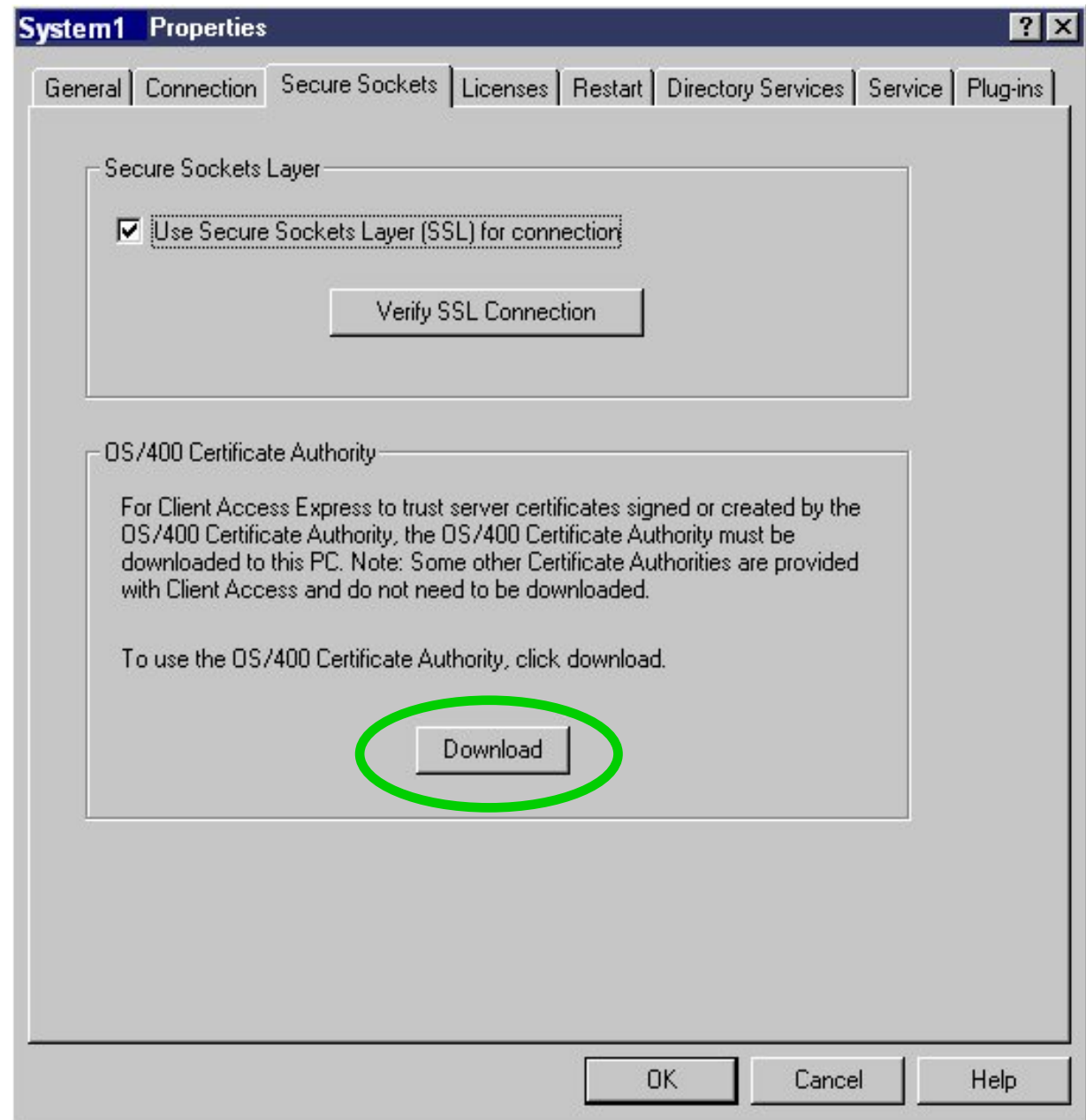
- IP Address
  - Lists last IP address used to access this System i5
  - Cannot be changed from properties page, unless IP address lookup is changed to "Never".
- Note: System i5 Access for Windows does not update the Hosts file on your PC.



# Secure Sockets Properties and Support

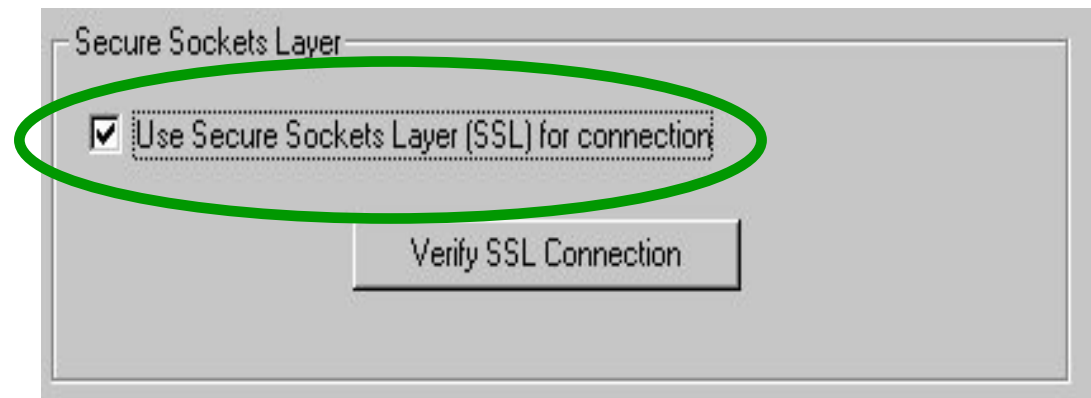
# SSL Properties

- Secure Sockets
  - Enable/Disable SSL
  - Verify SSL Connections
  - Download Certificate Authority certificate



# Security Properties

- Specify if SSL should be used or not.
- SSL stands for Secure Sockets Layer, and specifies that encryption will be used for the sessions.
- Only SSL server authentication is supported. The exception is that client authentication has been added for PC5250 only in V5R1 and later.
- This option will be greyed out unless the 5769-CE1, CE2, or CE3 LPP is installed on the System i5 and the PC. The user must have access to: QIBM/ProdData/CA400/Express/SSL/SSLxxx, where xxx is 40, 56, or 128.
  - CE1 = 40-bit encryption (**no longer available in V5R1**)
  - CE2 = 56-bit encryption (**no longer available in V5R2**)
  - CE3 = 128-bit encryption
- SSL shipped with V5R4



# SSL Information



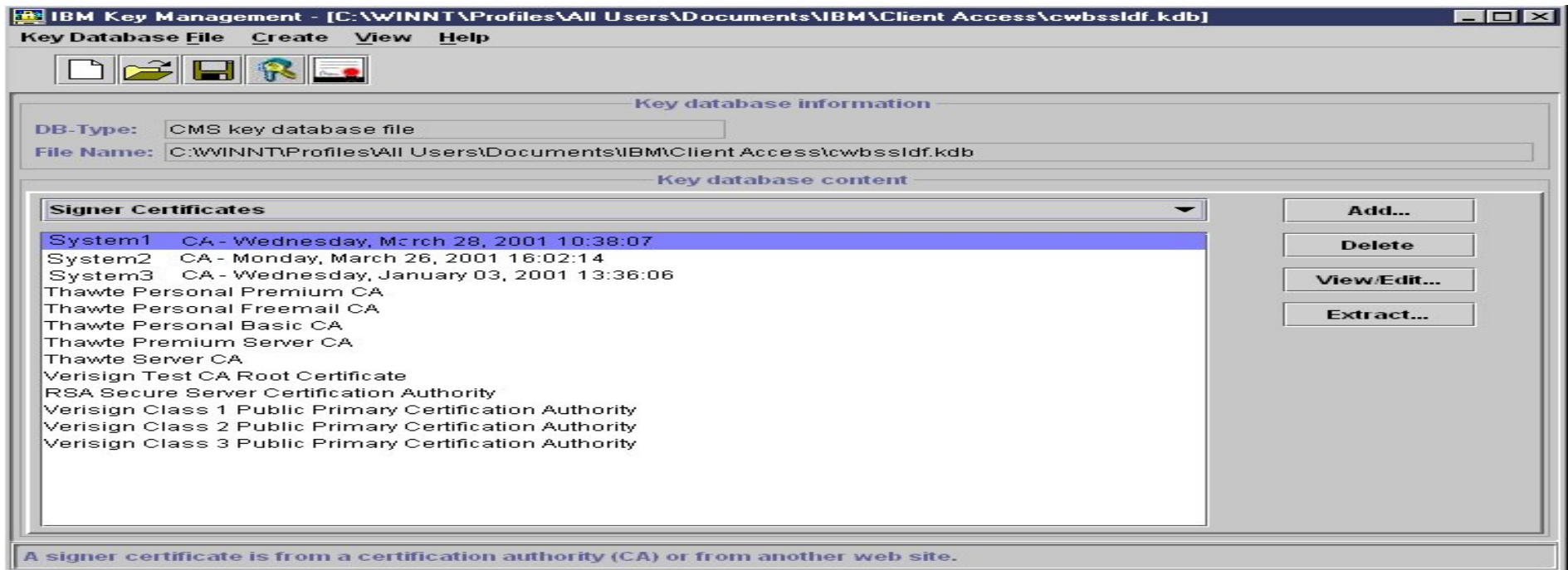
- SSL is the current standard for World Wide Web security.
- When it is turned on, all data flows are encrypted, with the exception of the port mapper handshake.
- When it is turned off, all data flows unencrypted, with the exception of the connection password. If the PC5250 emulator is being used, the password does flow in the clear as part of the telnet session (unless bypass signon is used).
- Always use encryption (SSL, VPN, IPSec, ...) when communicating via the Internet to your System i5.

# SSL Information

- Before making an SSL connection to an System i5, the following must be true:
  - 5769-AC1, AC2, or AC3 must be installed on the System i5 (this is the System i5 side of SSL).
    - The encryption level (40, 56, or 128-bit) will be negotiated between the PC and the System i5 to the highest level supported by both.
  - A certificate must be available on the System i5, and assigned to the System i5 Access Servers through the System i5 Digital Certificate Manager (DCM).
    - Note: Once certificate is available and assigned in DCM, host servers will automatically be SSL enabled.
  - The matching public part of the signer certificate or Certificate Authority must be available on the PC.

# Certificate Management

- IBM Key Management utility is included as part of installing CE1,2, or 3 on the PC.
- Can be accessed through Control Panel, under System i5 Access for Windows properties for Secure Sockets
- Recommend that a certificate by a well-known certificate authority (such as VeriSign) be used.
- A number of well-known certificate authorities are already stored in the key database.
- Using any other type of certificate will require transferring certificate authorities from other sources.



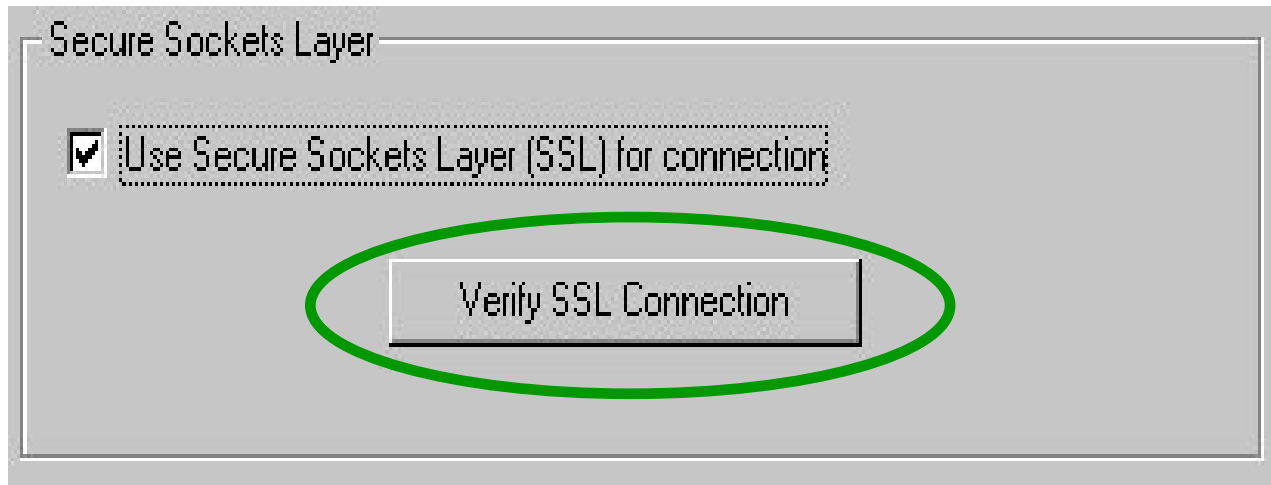
# Downloading Certificate Authorities

- Button is available to download Certificate Authority (CA) from the System i5
- The CA is automatically imported into the System i5 Access key database and the Java key database (required by System i5 Navigator).
- Previously, a separately downloadable utility had to be downloaded from the web to do this.



# Verify SSL Connections

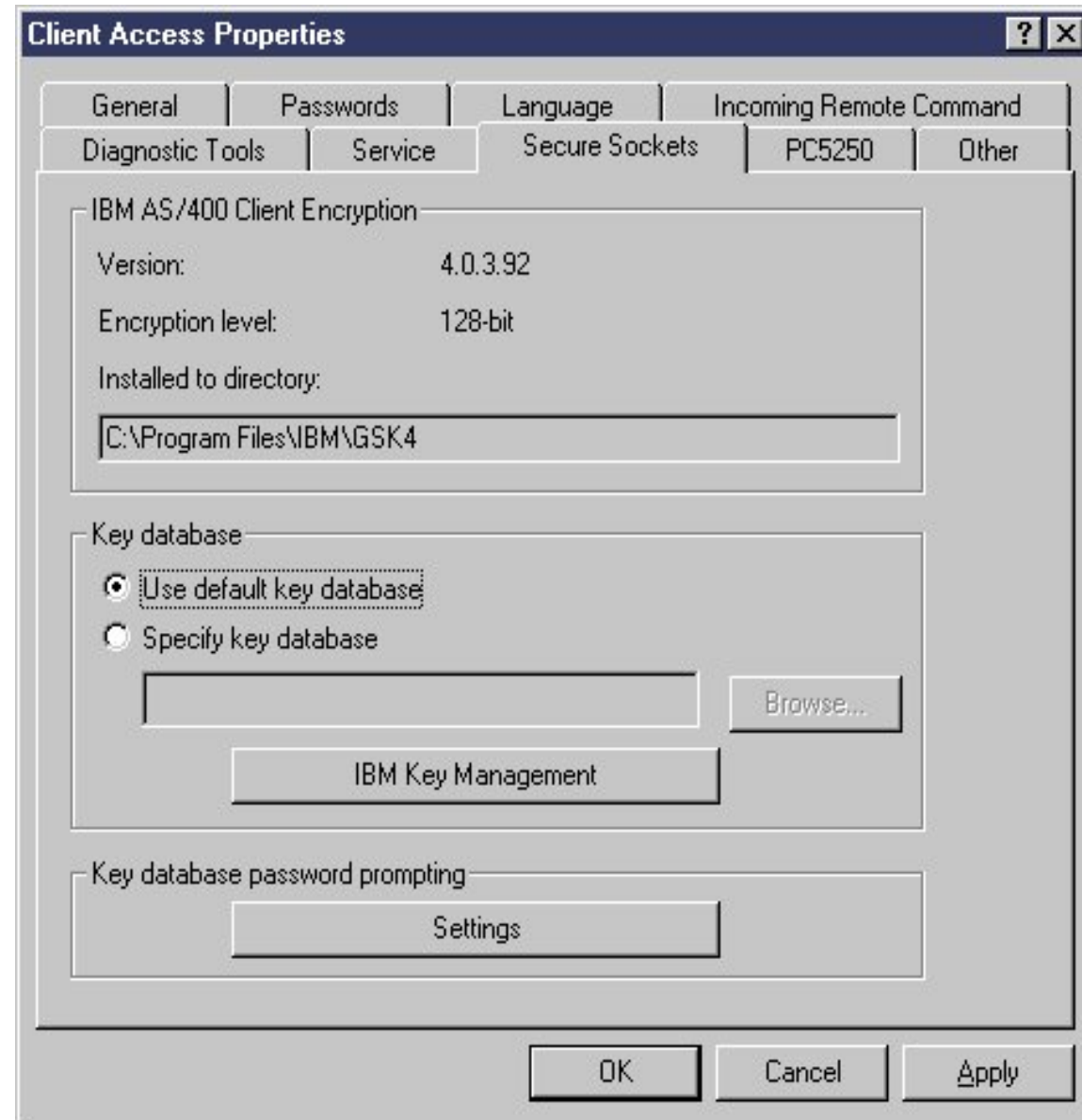
- A verify button is included on the Secure Sockets properties page.
- This allow you to check if the System i5 Access servers are enabled for SSL.





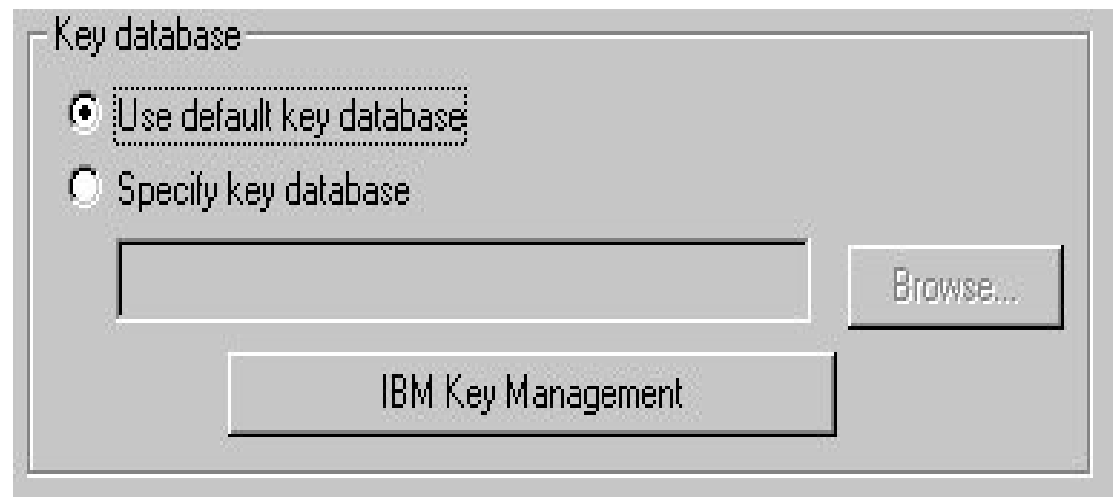
# PC5250 Client Authentication

- SSL client authentication can be enabled for the OS/400 Telnet server.
- System i5 Access for Windows PC5250 support has been enhanced to take advantage of this.
- SSL server authentication must always be configured before client authentication will work.
- No settings are required on the client to enable client authentication, but some preferences can be set.



# Key Database Selection

- User can select which key database to use on their PC.
- For most users, keeping the default key database selection selected is fine.
- The IBM Key Management Utility can also be invoked from here to view the contents of key databases on your PC.



The screenshot shows a dialog box titled "Key database" with the following elements:

- Two radio buttons: the first is selected and labeled "Use default key database"; the second is unselected and labeled "Specify key database".
- A text input field below the "Specify key database" option, which is currently empty.
- A "Browse..." button to the right of the text input field.
- An "IBM Key Management" button at the bottom center of the dialog.

# Client Authentication Prompting modes

- Users can choose how often they are prompted for access to the key database.
- Its important to authenticate that the user has access to the key database before the certificate is sent up to the System i5. Otherwise, someone could simply move the key database file to another PC and have access to the certificate.



Note: A policy can be used by an administrator to force one of these.



# Certificate Selection

- PC5250 configuration allows user to choose if they want to be prompted with a list of certificates to choose from to send to System i5.

**Configure PC5250**

System name: System1

Workstation ID:

Use Computer name

Use Windows user name

Specify workstation ID

Add prefix to indicate printer or display

Avoid duplicate names on this workstation

Avoid duplicate names with other workstations

**Connection**

User ID signon information

Use Operations Navigator default

User ID:

Security

Current security: Not secured

Use Operations Navigator default

Not secured

Use Secured Sockets Layer (SSL)

Client certificate to use:

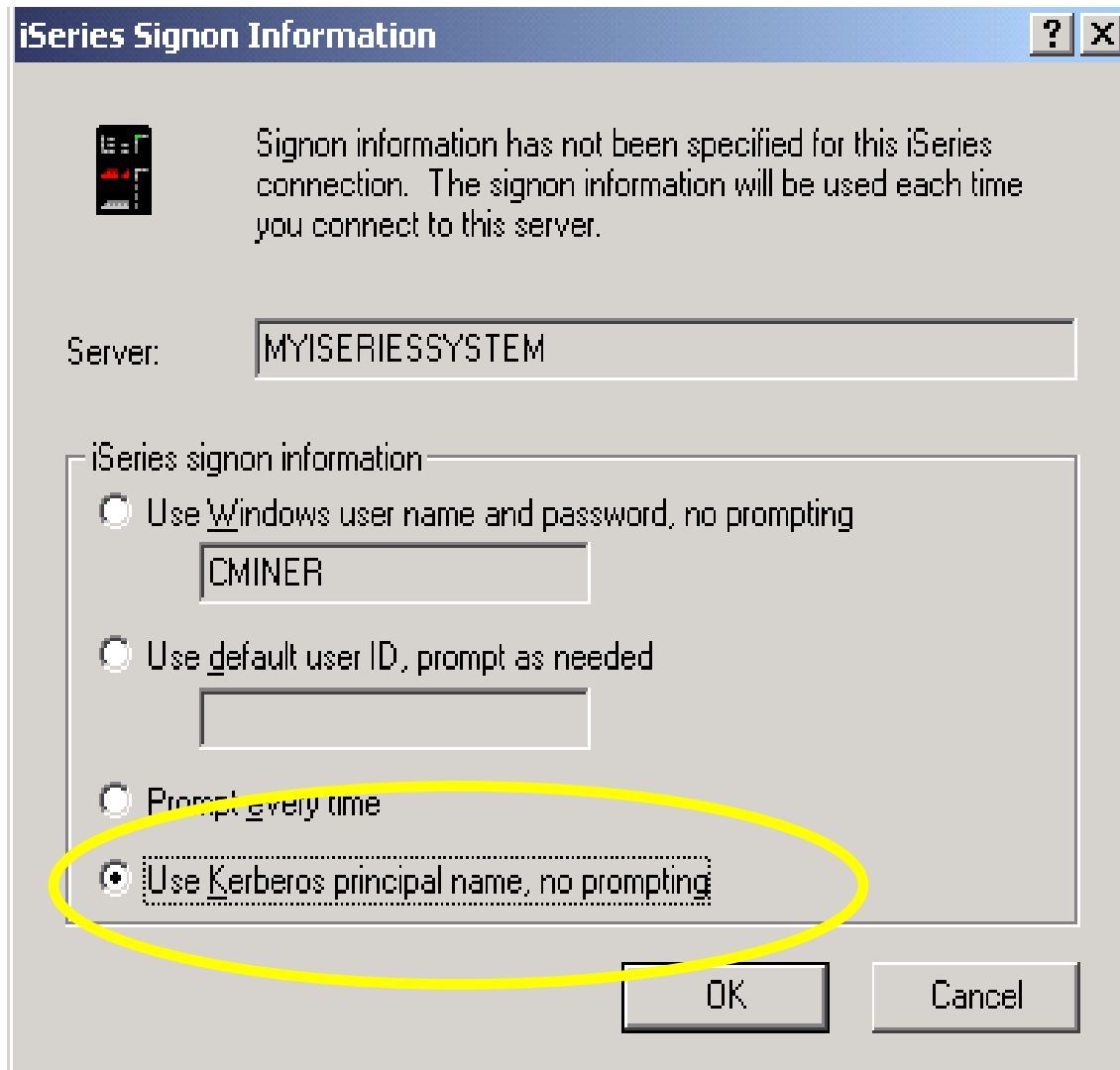
Select certificate when connecting

Use default

OK Cancel Help

Recommend just using the default, no need to change.

# Kerberos added to V5R2 version



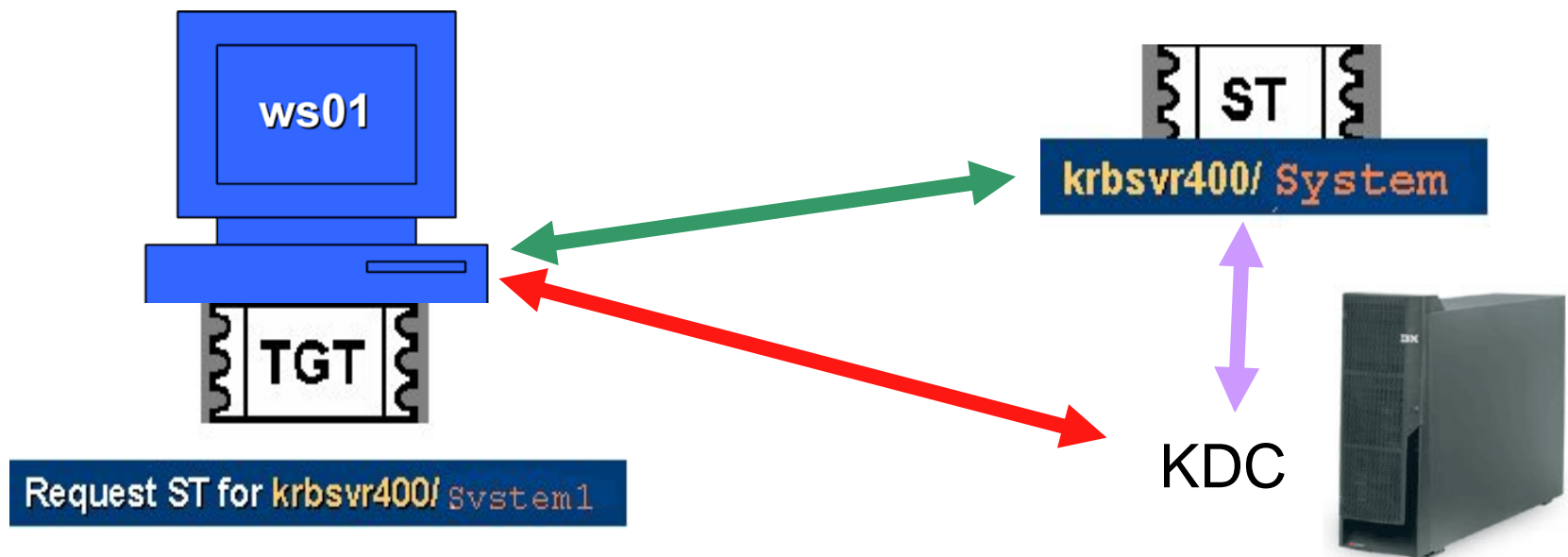
- Support for Kerberos authentication of users
  - Kerberos ticket can replace the sending of userid and password from a PC to the System i5.
  - Kerberos authentication as a new connection property to select

# Kerberos role in Single Sign-on

- Uses Kerberos protocol for authentication.
  - Network authentication protocol invented by MIT.
  - Freely available from MIT.
  - Ticket based, third party authentication scheme.
- Uses System i5 EIM (Enterprise Identity Mapping) to manage users in an enterprise.
  - Uses LDAP technology to keep track of who users are in an enterprise.
  - Maps Kerberos names to System i5 user profiles.

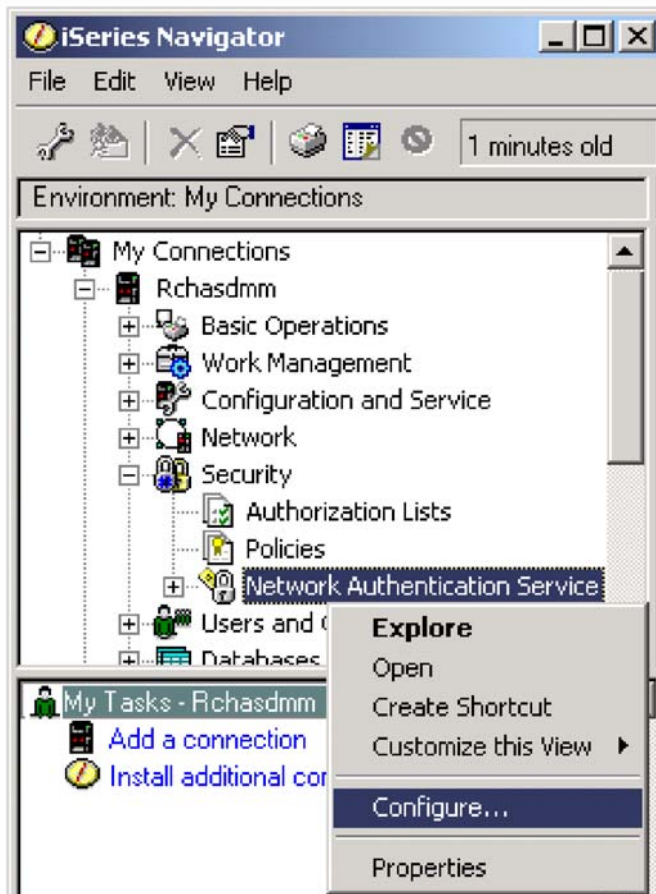
# Overview of Kerberos signon process

- **Windows domain login.** When you authenticate using Kerberos you get a Ticket-Granting-Ticket (**TGT**) from the Kerberos Key Distribution Center (**KDC**)
- **System i5 Connection request.** Obtain an appropriate Service-Ticket (**ST**) for that System i5 **krbsvr400/<host name>**
- **System i5 validation.** The System i5 server validates the **ST** with the **KDC**
- **System i5 profile mapping.** Using **EIM**, an System i5 user profile is mapped to the user

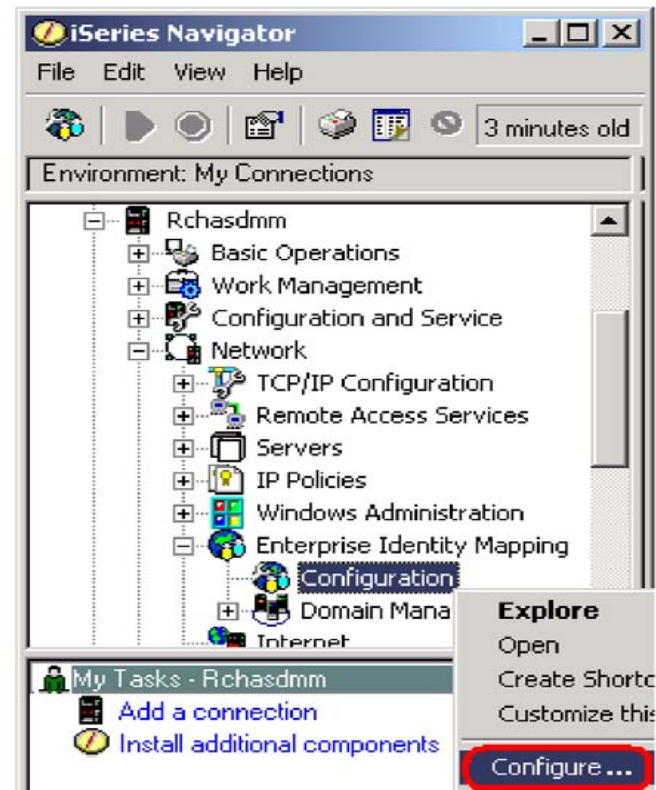


# Wizards available for configuring both Kerberos and EIM

## 1. Launch point



## Launch Point for EIM wizard





# Troubleshooting

# Problem Diagnosis

If the connection fails to one of the servers with the message CWBCO1003 rc=10061, that is most likely because the server isn't active or a firewall got in the way.

This can be verified from the NETSTAT \*CNN screen on the System i5 system to verify the server is in a \*Listen status. The server names are listed in the table on the next page.

If a server isn't listed the STRHOSTSVR command should be ran.

All TCPIP connection messages to System i5 Access for Windows will be displayed using the CWBCO1003 message. Check the online help message file for the meaning of the return codes associated with the message. This will be the same for SSL communications, which will display its return codes with the CWBCO1034 message.

# Tools for Troubleshooting

- **CWBPING**
  - Checks to see if System i5 can be connected to.
  - Checks to see if host servers are up.
  - If problems, messages indicate what is wrong.
- **CWBCOTRC**
  - Traces communications flows. Output can be sent into IBM Service personnel.
- **Detail Trace**
  - Traces internal component flows. Output can be sent into IBM Service personnel.
- ***CWBSVGET***
  - Gathers all traces and general client information into a single file

# CWBCOSSL tool

- One-stop shop for working with SSL, see Help button for Advanced Tips
  - CWBCOSSL.EXE is installed into System i5 Access install directory.
- Makes it easier to debug problems with SSL connections.



# System i5 Access in an Internet Environment

- Getting through firewalls
- NAT
- VPNs (vs. SSL)
- Other security tips

# Firewalls with System i5 Access

- Firewalls selectively filter TCP/IP traffic
- System i5 Access for Windows creates a challenge for firewalls.
- Different ports on the System i5 are used depending on what System i5 Access function is being used.
- Although all firewalls are different, what they have in common is that they can be configured to allow traffic through specific ports.

# Servers and ports used

The following servers are used by System i5 Access for Windows. In addition to the servers listed, the Port Mapper (Port 449) is also used by all functions. However, if the user changes the Connection properties for an System i5 connection so that "Where to look up Remote Port" is set to 'Standard' or 'Local', then the Port Mapper will not be used. In addition, if a DNS server is to be accessed, Port 53 should be made available to the client.

Servers	Ports	Description
Port Mapper	449	Port mapper returns the port number for the requested server
Sign-on	8476 (9476)	Sign-on server is used for every System i5 Access connection to authenticate users and to change passwords
Central	8470 (9470)	Central server is used when an System i5 Access license is required, and also for downloading translation tables
Data Queue	8472 (9472)	Data Queue server allows access to the OS/400 data queues, used for passing data between applications
Database	8471 (9471)	Database server is used for accessing the OS/400 database
Remote Command	8475 (9475)	Remote command server is used to send commands from a PC to an System i5 and for program calls
File	8473 (9473)	File Server is used for accessing any part of the OS/400 file system
Print	8474 (9474)	Print Server is used to access printers known to the System i5

# Servers and Ports Used (continued)

Servers	Ports	Description
Web Admin	2001 (2010)	Used to access web applications served by the System i5
DDM	446 (448)	DDM server is used to access data via DRDA and for record level access
Telnet	23 (992)	Telnet server is used to access 5250 emulation
Netserver	137, 138, 139, 8474	System i5 Netserver allows access to System i5 integrated file system from Windows PCs
USF	8480	Ultimedia services is used for multimedia data
LDAP	389 (636)	Provides a network directory service
Mgmt Central	5555 5544 5577 (5566)	Management Central server is used to manage multiple System i5 in a network



# Notes on ports and servers

Note 1: the port number in parenthesis is the one used to connect to the server via SSL (encrypted session).

Note 2: Ports 449, 8xxx, and 9xxx can be started with the STRHOSTSVR \*ALL command. The others need to be started individually, or can be set to autostart when TCP/IP is started (as can 449, 8xxx, and 9xxx).

Note 3: Although 8474 is listed next to Netserver, it is only used internally, so does not have to be set in your firewall IP filtering. However, that server (Print server) must be started for Netserver to work properly.

Note 4: If any applications are registered under Application Administration, then the remote command server will be required in addition to what is listed below.

# Servers used by specific functions

<u>System i5 Access Function</u>	<u>Servers Used</u>
PC5250 display and printer emulation	Sign-on, Central, Telnet, Remote Command
Data Transfer	Sign-on, Central, Database, Remote Command
Base System i5 Navigator support	Sign-on, Remote Command
All Operations Navigator functions	Sign-on, Remote Command, File, Print, Database, Web Admin, Mgmt Central, USF, Net Server, LDAP, Data Queue
ODBC	Sign-on, Database, Remote Command
OLE DB	Sign-on, Database, DDM, Remote Command, Data Queue
AFP Viewer	Sign-on, Print
System i5 Access Install	Net Server
Incoming Remote Command	Uses no specific server, and System i5 port will vary. PC-side port is 512.
Fax support	Sign-on, Print

# Firewalls and Windows XP Service Pack 2

- By default, once Windows XP SP2 is installed, the Windows Firewall is automatically configured to prevent some incoming connections into the PC. This can affect the following System i5 Access for Windows functions:
  - Incoming Remote Commands
  - Operations Console
  - Management Central
- If you are using these functions, and they stop working once Windows XP SP2 is installed, here are steps you can take...

# Incoming Remote Command

- This uses port 512 by default
- Typical error messages would be:
  - CPE3447 "A remote host did not respond within the timeout period"
  - rexec:connect:Connection timed out
  - rexec: can't establish connection
- Solution:
  - Configure a port exception to allow incoming TCP connections on port 512:

```
C:\> netsh firewall add portopening TCP 512 "rexecd server (exec service, port 512)"
```

- OR -

Configure an application exception to allow the System i5 Access for Windows Remote Command service (cwbrxd.exe) to accept any incoming connection, regardless of port number or protocol:

```
C:\> netsh firewall add allowedprogram %windir%\cwbrxd.exe "System i5 Access Incoming Remote Command server"
```

# Operations Console

- Use ports 67 and 2112 for local (async and LAN) connections
- Can use any one of a number of different ports for RCS -> LCS connections
- Typical failures are:
  - When connecting an LCS (local connection), the status may not progress beyond "connecting console".
  - When connecting an RCS (remote connection) to an LCS that has not had all needed firewall exceptions configured, it may fail to connect; or it may connect, but fail to authenticate. The failure reason noted at the RCS may be that the local system is not configured to receive calls.

# Operations Console Continued

- Steps to correct:
- Configure a port exception to allow incoming UDP connections on port 67:
  - C:\> netsh firewall add portopening UDP 67 "bootp server (bootps service, port 67)"
- Configure a port exception to allow incoming TCP connections on port 2112 from the local PC (127.0.0.1) only:
  - C:\> netsh firewall add portopening TCP 2112 "Internal Op Console worker server (port 2112)" ENABLE CUSTOM 127.0.0.1
- Configure an application exception to allow the Operations Console program to accept any incoming connection, regardless of port number or protocol:
  - C:\> netsh firewall add allowedprogram <INSTALL>\cwbopcon.exe "System i5 Access Operations Console (cwbopcon)"

# Management Central

- Refer to:
- For V5R3:  
<http://publib.boulder.ibm.com/infocenter/iserics/v5r3/ic2924/info/experience/mcfirewall.pdf>
- For V5R2:  
<http://publib.boulder.ibm.com/iserics/v5r2/ic2924/info/experience/mcfirewall.pdf>

# Info on Web

- The preceding information on Windows XP SP2 is also available on the web at:
  - <http://www-1.ibm.com/servers/eserver/series/access/supportedos.htm>
  - Then click on the appropriate link in the Windows XP Professional section

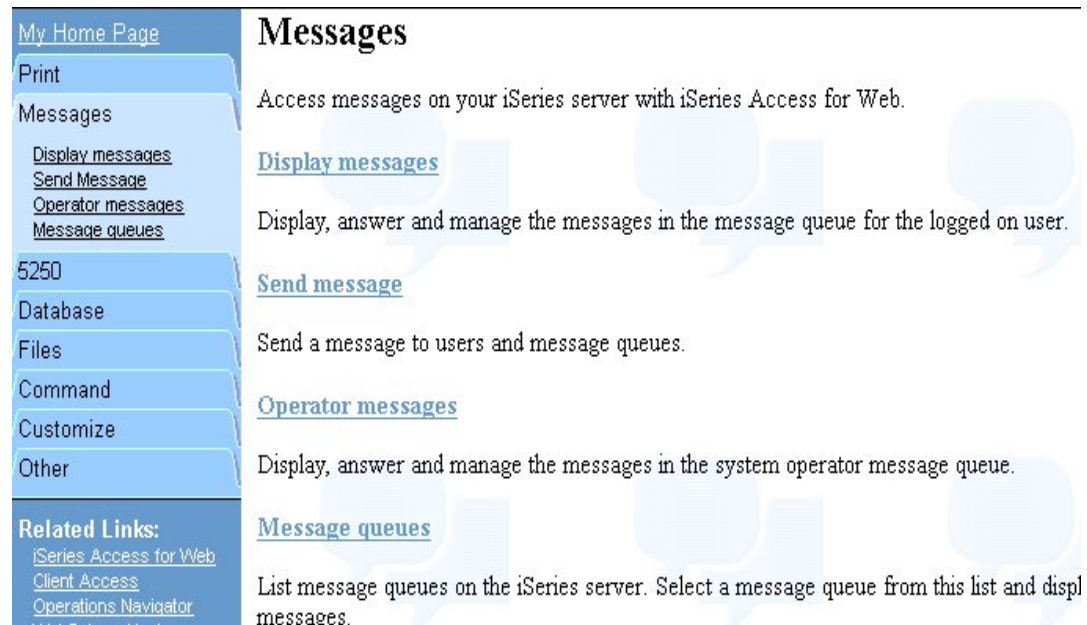


# The System i5 Access for Web Alternative

Depending on your needs, if you don't want to mess with all the ports, System i5 Access for Web may be a solution:

- All traffic goes through a single HTTP port.
- SSL will also work using a single HTTPS port.
- All functions run as servlets on the System i5
- No code to download to the client
- Good set of functions designed for end users:

- Database access
- File/Share access
- printer and print output access
- Messages
- 5250 support
- Customizable user interface
- Commands



The screenshot displays the System i5 Access for Web interface. On the left is a navigation menu with the following items: My Home Page, Print, Messages (with sub-links: Display messages, Send Message, Operator messages, Message queues), 5250, Database, Files, Command, Customize, and Other. Below the menu is a 'Related Links' section with links to iSeries Access for Web, Client Access, and Operations Navigator. The main content area is titled 'Messages' and contains the following text: 'Access messages on your iSeries server with iSeries Access for Web.' Below this are four sections: 'Display messages' (with description: 'Display, answer and manage the messages in the message queue for the logged on user.'), 'Send message' (with description: 'Send a message to users and message queues.'), 'Operator messages' (with description: 'Display, answer and manage the messages in the system operator message queue.'), and 'Message queues' (with description: 'List message queues on the iSeries server. Select a message queue from this list and display messages.').

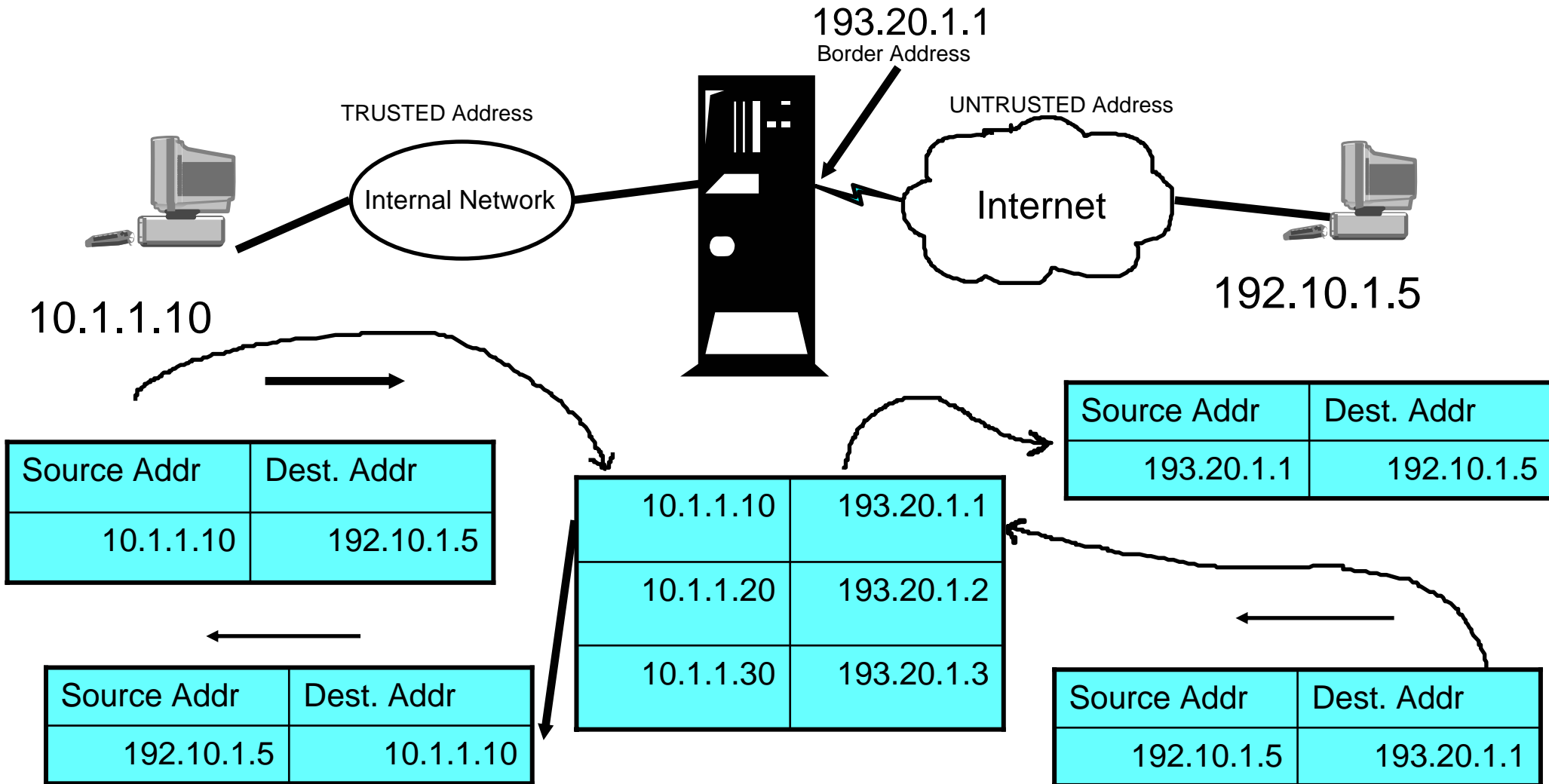
# NAT (Network Address Translation)

- Configured through System i5 Navigator
  - Using the same interface used for setting IP packet filtering
- Primary use is to hide addresses when the System i5 is acting as the security gateway (no firewall).
- 3 forms of implementation on the System i5
  - Masquerade or Hide
  - Static or Mapped
  - Masquerade or Hide "port-mapped"



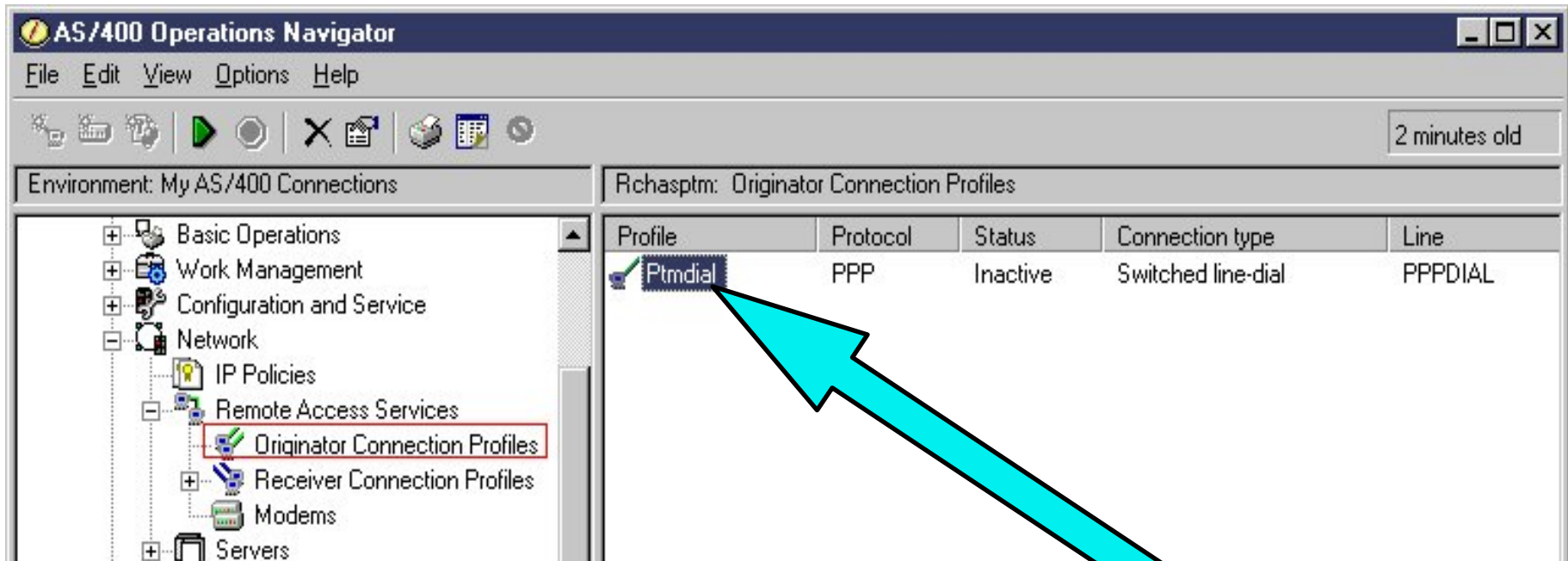
# Static NAT

- Used to enable systems on the internet to access servers in your internal network by translating actual internal server address to a public address.



# Configuring NAT

- All configuration is done using System i5 Navigator



Right-click here and go to properties

# Configuring NAT

**Ptmdial - System1**

General | Connection | Authentication | TCP/IP Settings | DNS | Other

Local IP address

- Assigned by remote system
- Use fixed IP address: 1.2.4.5

Remote IP address

- Assigned by remote system
- Use fixed IP address:

Routing

- No additional routing is required
- Add remote system as the default route
- Define additional static routes

Routes

Hide addresses (full masquerading)

Advanced

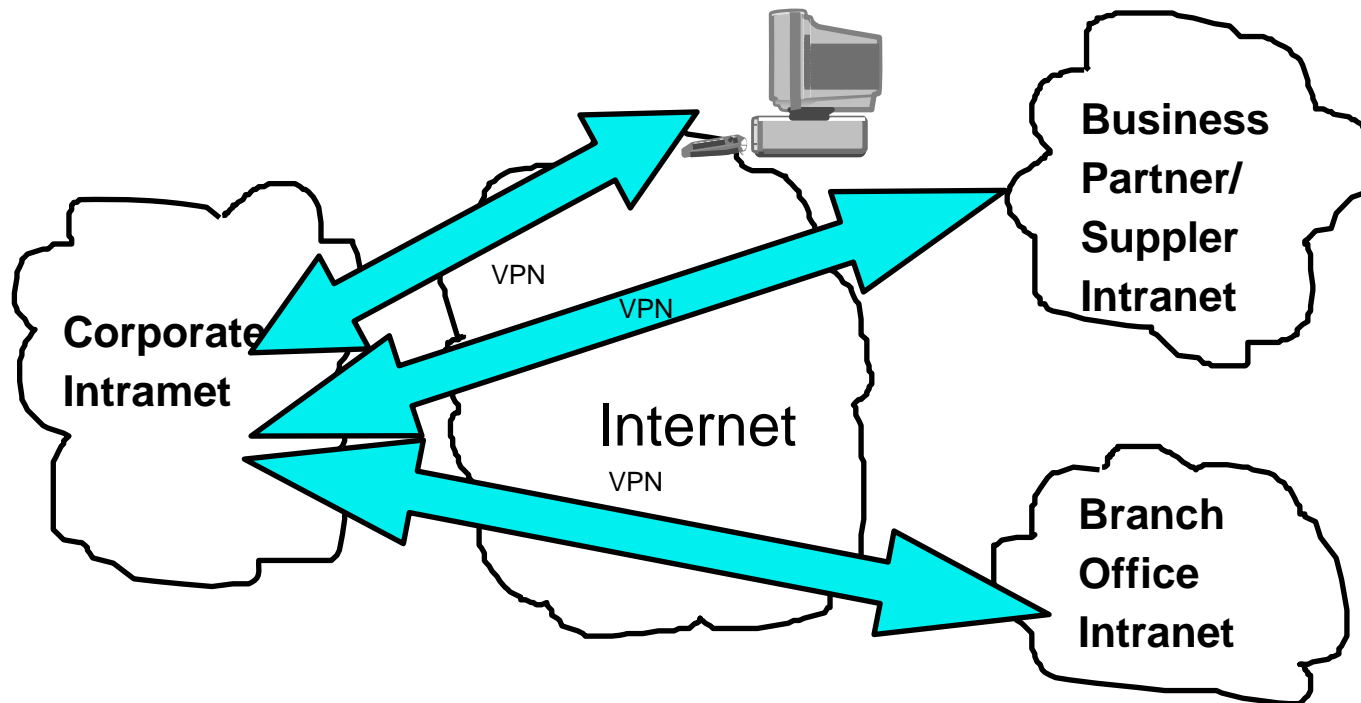
OK Cancel Help

Click here to turn on hiding

# VPN Support

# VPNs (Virtual Private Networks)

- VPNs use a combination of a tunneling protocol and encryption to ensure secure communications from a specific client to a specific server.
- A dedicated "pipe" is assigned for all client/server communications.



# VPN and encryption

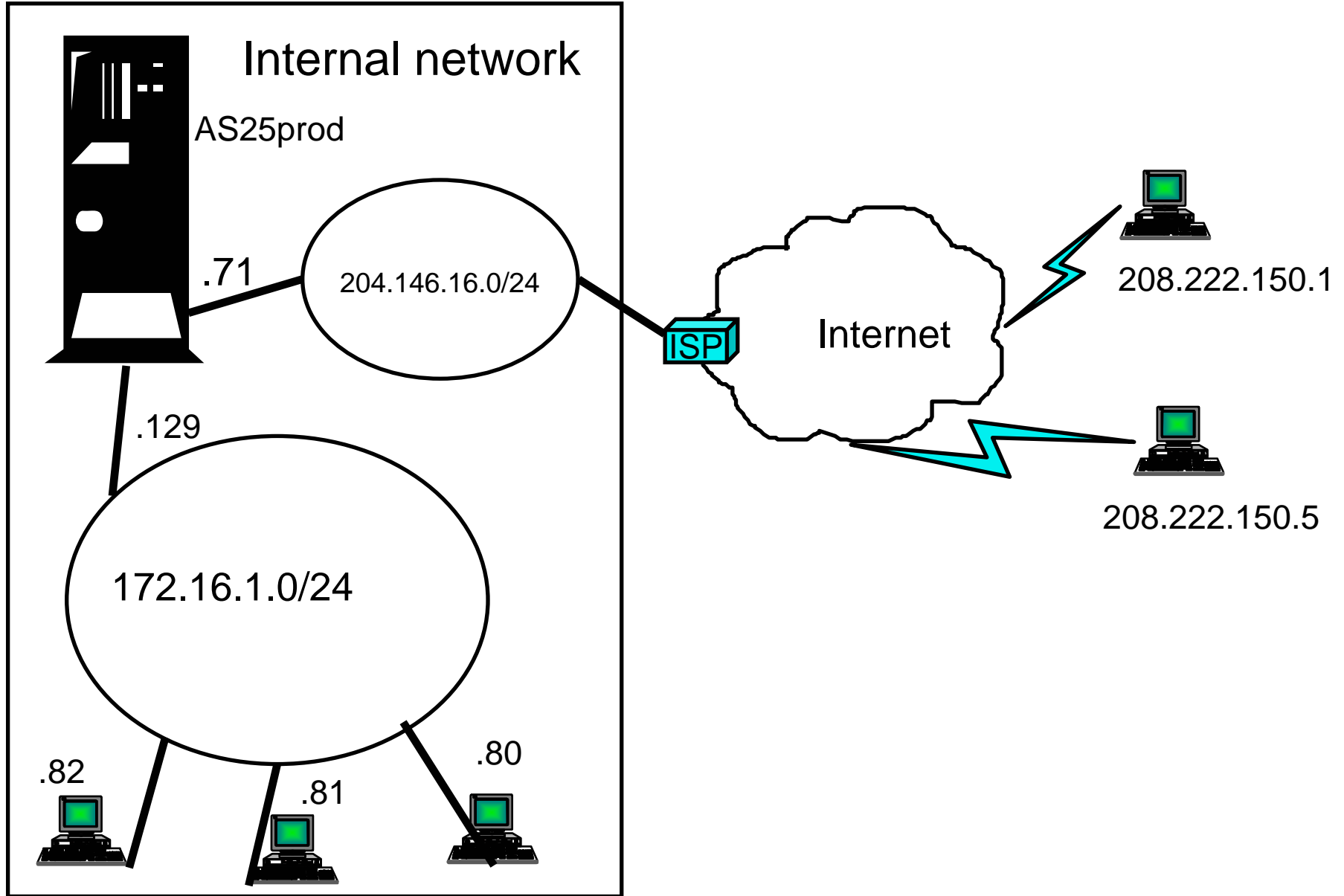
- IPSec is the standard encryption used by VPN.
- The IPSec support is usually built into the VPN client support, which is a separately purchasable and installable program. It is built into Windows 2000 and XP
- Secure Sockets Layer could also be used.



# Windows 2000 VPN Support

- Windows 2000, 2003 and XP have IPSec and L2TP built-in
- RSA signature mode authentication uses digital certificates rather than preshared keys (passwords) for IKE authentication. RSA Signature mode authentication allows us to support Windows 2000/XP clients with dynamically assigned IP addresses.

# Windows 2000 VPN Example



# Windows 2000: Implementation tasks

1. Verifying the IP connectivity
2. Assigning the Certificate Authority (CA) trust to the OS/400 VPN Key Manager using the OS/400 Digital Certificate Manager (DCM)
3. Creating a server certificate using DCM
4. Creating a VPN connection using the VPN connection wizard
5. Verifying the system-wide responding policy
6. Creating an L2TP Receiver Connection Profile for the System i5
7. Reviewing the IP packet rules created by System i5 Navigator
8. Obtaining the certificates for the Windows 2000 workstation
9. Configuring the IP Security Architecture for Microsoft Windows 2000
10. Configuring L2TP for Microsoft Windows 2000
11. Start the VPN connection
12. Verifying connectivity on the Windows 2000 workstation
13. Verifying connectivity on the System i5 system

# VPN comparison to SSL

Feature	SSL	VPN
Data Confidentiality	Yes	Yes
Authentication	Server Mandatory. Client Optionally	Yes (VPN Server)
Requires application support	Yes, but could use SSL tunnel	No
Requires host support	Yes	Yes
Services	SSL-enabled servers and clients	All
Client Configuration	Required for each application	Required for VPN server.
Filter Configuration	Individual filter by service (more complex)	IKE+IPSec filters (simpler configuration)
Availability for Windows clients	<b>Most System i5 SSL-enabled servers have a corresponding SSL-enabled SSL client</b>	Standard in Windows 2000  Lack of support on 95/98/NT

# Other Security Tips

# General Security Tips

- Only start the TCP/IP servers that are really needed
- Use non-routable private IP addresses in internal network
- Prevent application from using well-known ports
- Turn IP Source Routing off
- Allow IP datagram forwarding only when needed
- Do not leave PPP or SLIP line waiting in answer state.
- Use IP packet filtering on your System i5
- Use NAT if possible
- Prevent unauthorized use of well-known ports by preventing the users that can use the ports.
- Use System i5 auditing and journaling
- Use exit programs to control access to servers

# Telnet security considerations

- Use some form of encryption (SSL, SSH, VPN, ...)
- Limit the number of signon attempts (QMAXSIGN system value)
- Set QAUTOVRT to automatically create enough virtual devices. Then set QAUTOVRT to 0.
- Use inactivity time-out (INACTTIMO) parameter on the Telnet configuration to reduce the exposure when a user leaves a telnet session unattended.
- Restrict powerful user profiles from access a telnet session
- Verify QRMTSIGN is set up correctly

# Terminal Server Environment

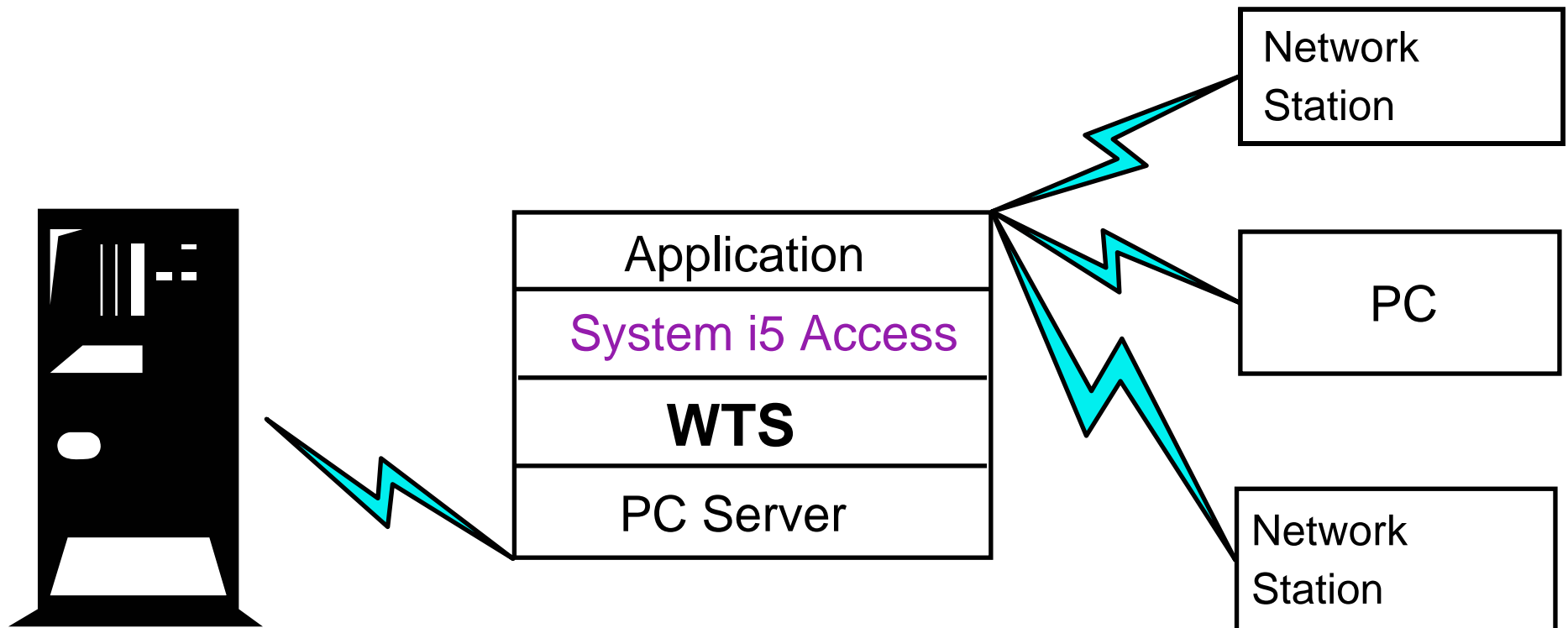


# What is Terminal Server<sub>R</sub>?

- A multi-user version of NT 4.0, Windows 2000, and Windows 2003
- Allows multiple, simultaneous client sessions to be run on a single server
- End-users can use Windows<sub>R</sub>, DOS<sub>R</sub>, network stations, Unix, or Macs<sub>R</sub>.
- Follow-on from NCD's WinCenter<sub>R</sub> and Citrix's WinFrame<sub>R</sub> from NT 3.51<sub>R</sub>.
- Most standard Windows-based applications don't need modification to run on Terminal Server.

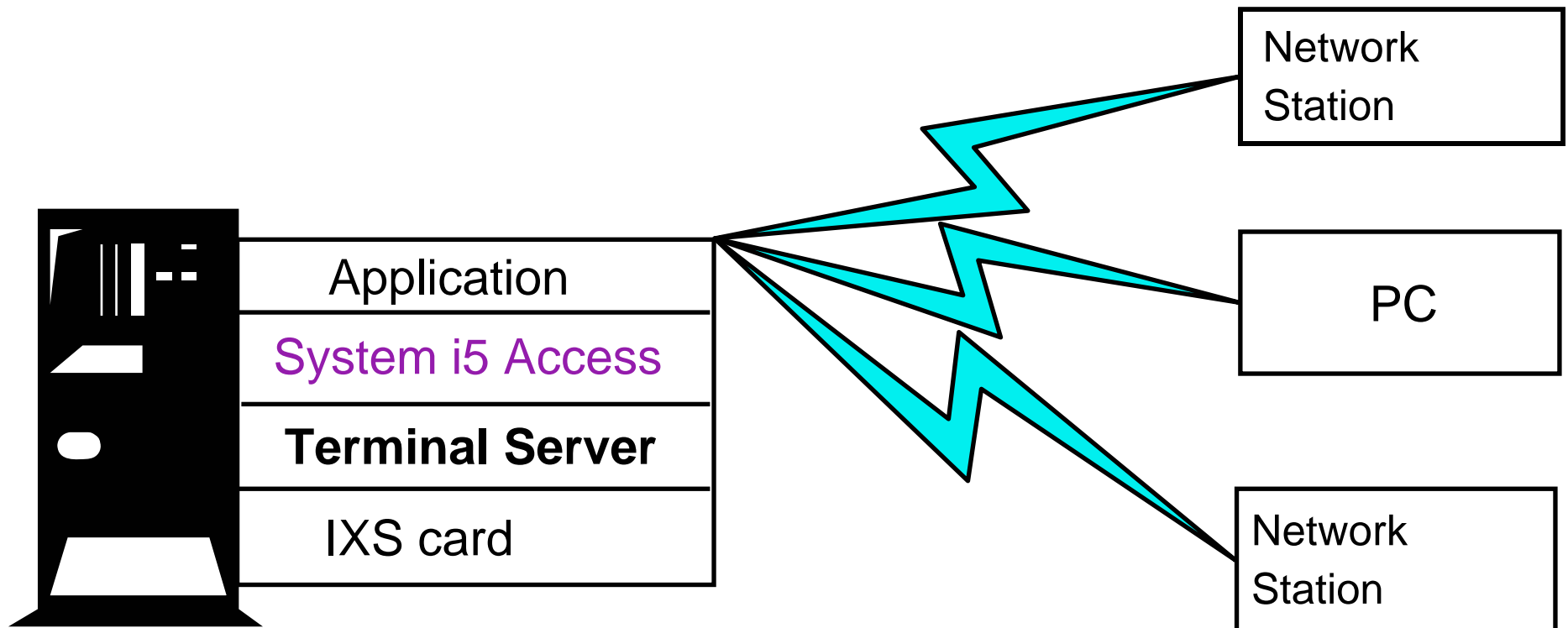
# Where System i5 Access fits in

- System i5 AccessR for Windows can run on Terminal Server, either on a standalone server.....



# Where System i5 Access fits in

- Or on an Integrated XSeries Server card in the System i5



# Citrix Metaframe

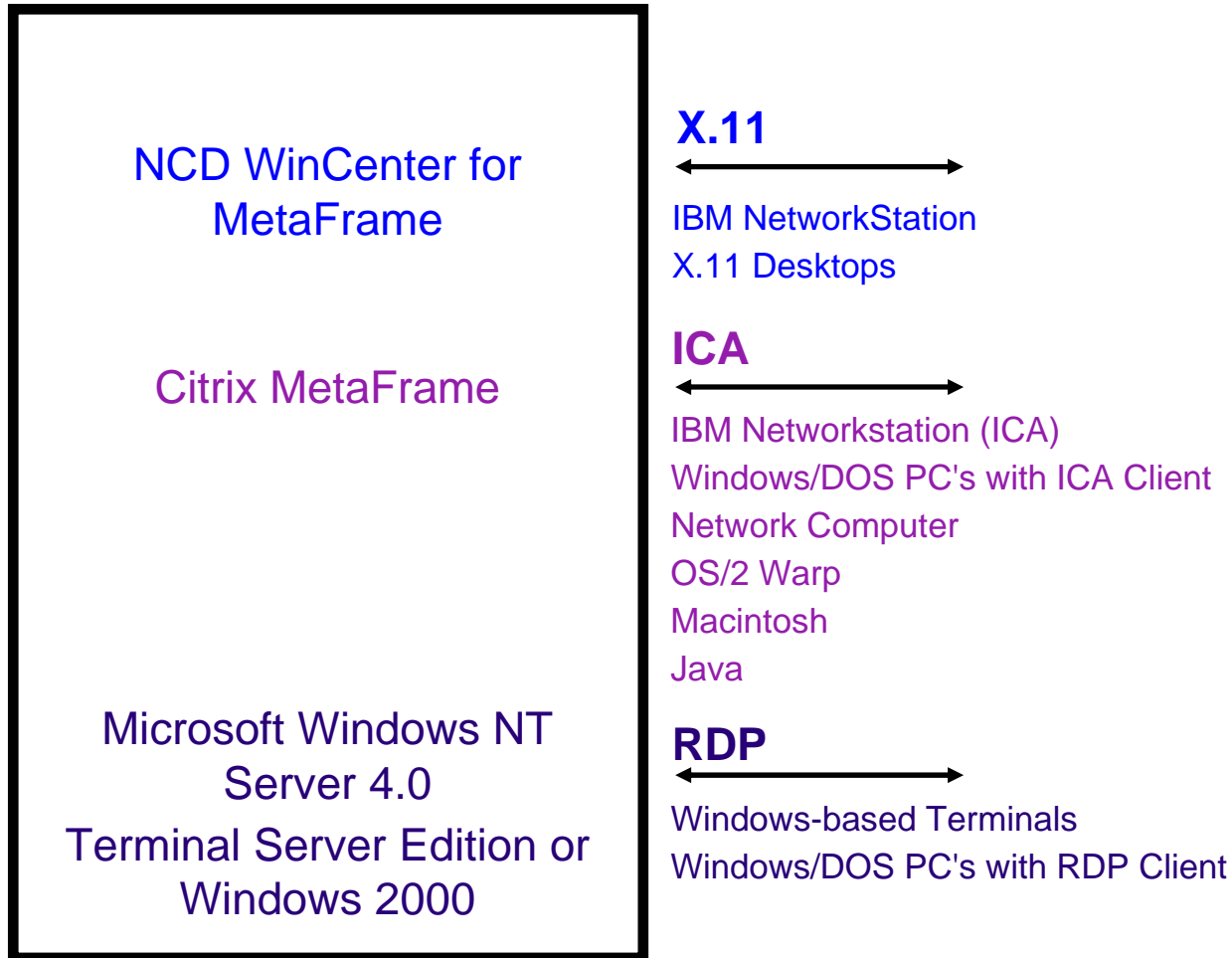
*Metaframe Application Server for Windows*

- Thin-Client/Server Computing
  - Applications are deployed, managed, supported, and executed completely on a server
  - Requirements
    - Multi-user operating system
    - Remote presentation services (MetaFrame = ICA)
    - Centralized applications and client management

# Metaframe Heterogeneous Computing Environment Extensions

- Clients
  - Hardware
    - Intel 286,386,486, Pentium
    - Windows-based Terminals
    - Network Computers
    - Through OEM Partners:
    - X.11 based devices
  - Operating Systems
    - Windows 3.1
    - Windows for Workgroups 3.11
    - Windows 95/98
    - Windows NT 3.51/4.0
    - Windows 2000/XP/2003
    - Windows CE
    - DOS
    - UNIX
    - OS/2 Warp
    - Macintosh
    - Java
    - Browser client
- Network Protocol
  - TCP/IP
  - IPX/SPX
  - NetBIOS / NetBEUI
  - SLIP/PPP
  - Direct Asynch

# Multi-User NT Summary



# System i5 Access for Windows Installation

- Use the Add/Remove Programs applet in the control panel to invoke the System i5 Access for Windows Setup program.
- Switch to Install Mode using the chgusr command (`chgusr /install`) prior to invoking setup from the command line. After completing the install, switch back to execute mode using chgusr (`chgusr /execute`).

# Support Position with System i5 Access for Windows

- Client Access Express and System i5 Access have been tested with most of its functions.
- Functions are supported on Windows clients thru Remote Desktop Protocol (RDP) as well as through Citrix Metaframe.
- Functions include:
  - PC5250 display and print emulation
  - ODBC
  - System i5 Navigator
  - Data Transfer
  - Data Queue
  - Remote Command
  - Policies



# Non-support of Incoming Remote Command

- This function, which allows PC commands to be initiated by the System i5, is not supported on Terminal Server.
- The current implementation does not allow the routing of the PC command to the proper client workstation.

# Summary



# Summary

- System i5 Access for Windows is supported in a number of different TCP/IP environments
- Can be configured for improved performance and security.
- Access through firewalls requires ports to be opened.
- VPNs are supported on Windows 2000, XP, and 2003 clients
- There are other methods of improving security of your connections
- Terminal Server environment is supported

# References

- System i5 Access
  - <http://www.ibm.com/servers/eserver/series/access/>
- Toolbox for Java
  - <http://www.ibm.com/servers/eserver/series/toolbox/>
- System i5 Access Information Center
  - <http://publib.boulder.ibm.com/infocenter/series/v5r4/index.jsp>
- IBM Redbooks
  - <http://www.redbooks.ibm.com/>
- IBM System i5 Support
  - <http://www.ibm.com/servers/eserver/series/support>
- OpenOffice
  - <http://www.openoffice.org>

# System i Access for Web Sessions/LABs

22CC	409136		Get to the Web Fast with System i Access for Web
25LA	520027		LAB: Getting Started with System i Access for Web
32MI	409160		Database Access with System i Access for Web
33MI	500121		System i Access for Web – Security Considerations
35MI	410068		System i Access for Web – Setup and Configuration
36MF	440281		Run 5250 through a Browser using System i Access for Web
41LA	450047		LAB: System i Access for Web: Installation and Configuration
42LA	450047		LAB: System i Access for Web: Installation and Configuration
44MN	420016		Build a Home Page to i5/OS using System i Access for Web
45MN	420015		Tips and Techniques for System i Access for Web
53LA	420063		LAB: Test Drive System i Access for Web
55MM	470021		System i Access for Web runs in a Portal
56MM	480144		Programming with System i Access for Web



Voted "Best Traditional Lab" at Spring and Fall 2005 COMMON

# Try out Access for Web for yourself!

Start your browser and connect to the following web site:

<http://iseriesd.dfw.ibm.com/webaccess/iWAHome> (case sensitive)

<b>User ID = WUSER</b>  <b>Password = DEMO2PWD</b>	<b>This shows the basic look of Access for Web as we ship it. You can try various functions -- including working with printer output, creating database requests, etc. Click on the 5250 tab, sign onto the iSeries, then start an RPG application called BOATS and run it.</b>
<b>User ID = BOATADMIN</b>  <b>Password = DEMO2PWD</b>	<b>This is an example of how a customer might design a web page for their use. You will see that an end user could start the same BOATS application by clicking on the 5250 session -- or they could have used WebFacing to run the application. You will also see other links that would let a user work with spoolfile information, work with IFS, run database requests, etc..</b>

## System i Access for Windows sessions:

- |              |               |   |
|--------------|---------------|---|
| <b>21CA</b>  | <b>420017</b> | <b>System i Access for Windows: What's New in V5R4</b>                  |
| <b>22CA</b>  | <b>409159</b> | <b>System i Access for Windows Data Transfer: Tips &amp; Techniques</b> |
| <b>26CC</b>  | <b>403971</b> | <b>System i Access for Windows: Security &amp; Communications Tips</b>  |
| <b>31CA</b>  | <b>406172</b> | <b>PC5250 Emulation: Everything You Need To Know</b>                    |
| <b>32CA</b>  | <b>401918</b> | <b>Performance Tune System i Access ODBC</b>                            |
| <b>33CA</b>  | <b>420219</b> | <b>System i Access in the .NET World</b>                                |
| <b>35LA/</b> | <b>410160</b> | <b>OPEN LAB: System i Access for Windows with the</b>                   |
| <b>36LA</b>  |               | <b>Experts</b>  |
| <b>52CB</b>  | <b>402066</b> | <b>Administration of System i Access for Windows</b>                    |

## System i Access for Linux session:

- |             |               |  |
|-------------|---------------|--|
| <b>25CA</b> | <b>480144</b> | <b>Creating the System i Linux Desktop</b> |
|-------------|---------------|--|

# Appendix: Firewall/NAT example with System i5 Access



# Firewall Configuration Example

- The following information shows how IP Forwarding can be used to configure an System i5 Access connection to an iSeries through a firewall.
- Shows how to permit mobile users on the Internet to access your System i5 behind the Firewall using System i5 Access and Telnet. Since the users are mobile, their IP address is unknown.
- IP filtering is used.
- Assume:
  - 192.168.2.1 is your System i5 Server's IP address
  - 5.5.5.5 is the public IP address that represents your System i5 on the Internet.

# Example - Using NAT to map System i5 address

- From a client behind the firewall, point a web browser at the System i5, port 2001. For example, if the System i5 is named myas400.priv.abc.com then point the web browser at
  - http://myas400.priv.abc.com:2001
  - Select the "IBM Firewall for AS/400" link
  - Select "Configuration" in the left frame
  - To configure the NAT settings, select "NAT" in the right frame
  - Click on the "Insert" button
  - Choose "MAP" from the list of actions, and then click on the OK button
  - After configuring the NAT settings (as shown below), select "Configuration" in the left frame
  - To configure the filter rules (settings), select "Filters" in the right frame
  - After configuring the filter settings, select "Administration" in the left frame
  - Select "Status" in the right frame
  - Restart both NAT and Filters
- If 5.5.5.5 is NOT the non-secure IP address of your Firewall, then you can do this with 1 simple NAT setting:
  - MAP 192.168.2.1 0 5.5.5.5 0

# Using NAT (continued)

- MAP 192.168.2.1 23 5.5.5.5 23 (For telnet)
  - MAP 192.168.2.1 449 5.5.5.5 449 (Port Mapper)
  - MAP 192.168.2.1 8470 5.5.5.5 8470 (Central server - Needed whenever PC5250 or Data Transfer is used)
  - MAP 192.168.2.1 8471 5.5.5.5 8471 (Database server)
  - MAP 192.168.2.1 8472 5.5.5.5 8472 (DataQueues server)
  - MAP 192.168.2.1 8473 5.5.5.5 8473 (File server)
  - MAP 192.168.2.1 8474 5.5.5.5 8474 (Print server)
  - MAP 192.168.2.1 8475 5.5.5.5 8475 (Remote command server)
  - MAP 192.168.2.1 8476 5.5.5.5 8476 (Signon server)
  - MAP 192.168.2.1 8480 5.5.5.5 8480 (Ultimedia server)
  - MAP 192.168.2.1 9480 5.5.5.5 9480 (Ultimedia server with SSL on)
  - MAP 192.168.2.1 5555 5.5.5.5 5555 (Management Central server)
  - MAP 192.168.2.1 5556 5.5.5.5 5556 (Management Central server with SSL on)
- 
- MAP 192.168.2.1 446 5.5.5.5 446 (DDM server - Sometimes used by System i5 Access OLE DB support)
  - MAP 192.168.2.1 448 5.5.5.5 448 (DDM server with SSL on)
  - MAP 192.168.2.1 5110 5.5.5.5 5110 (MAPI server - Needed if these Mail APIs are being used)
  - MAP 192.168.2.1 992 5.5.5.5 992 (Telnet with SSL on)
  - MAP 192.168.2.1 9470 5.5.5.5 9470 (Central Server with SSL on)
  - MAP 192.168.2.1 9471 5.5.5.5 9471 (Database Server with SSL on)
  - MAP 192.168.2.1 9472 5.5.5.5 9472 (Dataqueues server with SSL on)
  - MAP 192.168.2.1 9473 5.5.5.5 9473 (File Server with SSL on)
  - MAP 192.168.2.1 9474 5.5.5.5 9474 (Print Server with SSL on)
  - MAP 192.168.2.1 9475 5.5.5.5 9475 (Remote command server with SSL on)
  - MAP 192.168.2.1 9476 5.5.5.5 9476 (Signon server with SSL on)

If 5.5.5.5 is the non-secure IP address of your Firewall, then you will need to add these NAT settings. In addition, your router must be configured so that all traffic destined to 5.5.5.5 with subnet mask 255.255.255.255 is routed to the non-secure IP address of your firewall.

# More port info

- The only required ports are 8476 and 449. The other ports will only need to be opened if you are using a function that they support. Most users will want to open 23, 449, and 8470 thru 8476.
- Also, be aware that parts of System i5 Navigator, which is part of System i5 Access, also use port 2001 (and 2010 for SSL) to access the Web Admin server. A mapping rule like those above for the scenario when 5.5.5.5 is the non-secure IP address cannot be used for those 2 ports, since this would cause the firewall not to work (it uses those ports). If you need to use those functions of System i5 Navigator from outside of the firewall, then you need to set up your network so that 5.5.5.5 is NOT the non-secure IP address of your Firewall.
- This means acquiring an additional publicly registered IP address that is NOT the same as the firewall's public IP address.
- Then, add the following Filter settings:

# Filter settings - non-secure side



```
#####
### Both side settings
#####
permit 192.168.2.1 255.255.255.255 0.0.0.0 0.0.0.0 tcp any 0 any 0 both both both f=y l=n t=0 # Permit AS/400 replies
#####
### Non-Secure side settings (add filter settings only for the ports you are using (see port descriptions above)
#####
permit 0.0.0.0 0.0.0.0 5.5.5.5 255.255.255.255 tcp ge 1024 eq 23 non-secure both inbound f=y l=n t=0 # Permit Telnet access to AS/400
permit 0.0.0.0 0.0.0.0 5.5.5.5 255.255.255.255 tcp ge 1024 eq 449 non-secure both inbound f=y l=n t=0 # Permit System i5 Access to AS/400
permit 0.0.0.0 0.0.0.0 5.5.5.5 255.255.255.255 tcp ge 1024 eq 8470 non-secure both inbound f=y l=n t=0 # Permit System i5 Access to AS/400
permit 0.0.0.0 0.0.0.0 5.5.5.5 255.255.255.255 tcp ge 1024 eq 8471 non-secure both inbound f=y l=n t=0 # Permit System i5 Access to AS/400
permit 0.0.0.0 0.0.0.0 5.5.5.5 255.255.255.255 tcp ge 1024 eq 8472 non-secure both inbound f=y l=n t=0 # Permit System i5 Access to AS/400
permit 0.0.0.0 0.0.0.0 5.5.5.5 255.255.255.255 tcp ge 1024 eq 8474 non-secure both inbound f=y l=n t=0 # Permit System i5 Access to AS/400
permit 0.0.0.0 0.0.0.0 5.5.5.5 255.255.255.255 tcp ge 1024 eq 8475 non-secure both inbound f=y l=n t=0 # Permit System i5 Access to AS/400
permit 0.0.0.0 0.0.0.0 5.5.5.5 255.255.255.255 tcp ge 1024 eq 8476 non-secure both inbound f=y l=n t=0 # Permit System i5 Access to AS/400
permit 0.0.0.0 0.0.0.0 5.5.5.5 255.255.255.255 tcp ge 1024 eq 8480 non-secure both inbound f=y l=n t=0 # Permit System i5 Access to AS/400
permit 0.0.0.0 0.0.0.0 5.5.5.5 255.255.255.255 tcp ge 1024 eq 9480 non-secure both inbound f=y l=n t=0 # Permit System i5 Access to AS/400
permit 0.0.0.0 0.0.0.0 5.5.5.5 255.255.255.255 tcp ge 1024 eq 5555 non-secure both inbound f=y l=n t=0 # Permit System i5 Access to AS/400
permit 0.0.0.0 0.0.0.0 5.5.5.5 255.255.255.255 tcp ge 1024 eq 5556 non-secure both inbound f=y l=n t=0 # Permit System i5 Access to AS/400
permit 0.0.0.0 0.0.0.0 5.5.5.5 255.255.255.255 tcp ge 1024 eq 446 non-secure both inbound f=y l=n t=0 # Permit System i5 Access to AS/400
permit 0.0.0.0 0.0.0.0 5.5.5.5 255.255.255.255 tcp ge 1024 eq 448 non-secure both inbound f=y l=n t=0 # Permit System i5 Access to AS/400
permit 0.0.0.0 0.0.0.0 5.5.5.5 255.255.255.255 tcp ge 1024 eq 5110 non-secure both inbound f=y l=n t=0 # Permit System i5 Access to AS/400
permit 0.0.0.0 0.0.0.0 5.5.5.5 255.255.255.255 tcp ge 1024 eq 992 non-secure both inbound f=y l=n t=0 # Permit System i5 Access to AS/400
permit 0.0.0.0 0.0.0.0 5.5.5.5 255.255.255.255 tcp ge 1024 eq 9470 non-secure both inbound f=y l=n t=0 # Permit System i5 Access to AS/400
permit 0.0.0.0 0.0.0.0 5.5.5.5 255.255.255.255 tcp ge 1024 eq 9471 non-secure both inbound f=y l=n t=0 # Permit System i5 Access to AS/400
permit 0.0.0.0 0.0.0.0 5.5.5.5 255.255.255.255 tcp ge 1024 eq 9472 non-secure both inbound f=y l=n t=0 # Permit System i5 Access to AS/400
permit 0.0.0.0 0.0.0.0 5.5.5.5 255.255.255.255 tcp ge 1024 eq 9473 non-secure both inbound f=y l=n t=0 # Permit System i5 Access to AS/400
permit 0.0.0.0 0.0.0.0 5.5.5.5 255.255.255.255 tcp ge 1024 eq 9474 non-secure both inbound f=y l=n t=0 # Permit System i5 Access to AS/400
permit 0.0.0.0 0.0.0.0 5.5.5.5 255.255.255.255 tcp ge 1024 eq 9475 non-secure both inbound f=y l=n t=0 # Permit System i5 Access to AS/400
permit 0.0.0.0 0.0.0.0 5.5.5.5 255.255.255.255 tcp ge 1024 eq 9476 non-secure both inbound f=y l=n t=0 # Permit System i5 Access to AS/400
```

# Filter settings - Secure side

```
#####  
### Secure side settings (add filter settings only for the ports you are using (see port descriptions above))  
#####  
permit 0.0.0.0 0.0.0.0 192.168.2.1 255.255.255.255 tcp ge 1024 eq 23 secure both outbound f=y l=n t=0 # Permit Telnet access to AS/400  
permit 0.0.0.0 0.0.0.0 192.168.2.1 255.255.255.255 tcp ge 1024 eq 449 secure both outbound f=y l=n t=0 # Permit System i5 Access to AS/400  
permit 0.0.0.0 0.0.0.0 192.168.2.1 255.255.255.255 tcp ge 1024 eq 8470 secure both outbound f=y l=n t=0 # Permit System i5 Access to AS/400  
permit 0.0.0.0 0.0.0.0 192.168.2.1 255.255.255.255 tcp ge 1024 eq 8471 secure both outbound f=y l=n t=0 # Permit System i5 Access to AS/400  
permit 0.0.0.0 0.0.0.0 192.168.2.1 255.255.255.255 tcp ge 1024 eq 8472 secure both outbound f=y l=n t=0 # Permit System i5 Access to AS/400  
permit 0.0.0.0 0.0.0.0 192.168.2.1 255.255.255.255 tcp ge 1024 eq 8473 secure both outbound f=y l=n t=0 # Permit System i5 Access to AS/400  
permit 0.0.0.0 0.0.0.0 192.168.2.1 255.255.255.255 tcp ge 1024 eq 8474 secure both outbound f=y l=n t=0 # Permit System i5 Access to AS/400  
permit 0.0.0.0 0.0.0.0 192.168.2.1 255.255.255.255 tcp ge 1024 eq 8475 secure both outbound f=y l=n t=0 # Permit System i5 Access to AS/400  
permit 0.0.0.0 0.0.0.0 192.168.2.1 255.255.255.255 tcp ge 1024 eq 8476 secure both outbound f=y l=n t=0 # Permit System i5 Access to AS/400  
permit 0.0.0.0 0.0.0.0 192.168.2.1 255.255.255.255 tcp ge 1024 eq 8480 secure both outbound f=y l=n t=0 # Permit System i5 Access to AS/400  
permit 0.0.0.0 0.0.0.0 192.168.2.1 255.255.255.255 tcp ge 1024 eq 9480 secure both outbound f=y l=n t=0 # Permit System i5 Access to AS/400  
permit 0.0.0.0 0.0.0.0 192.168.2.1 255.255.255.255 tcp ge 1024 eq 5555 secure both outbound f=y l=n t=0 # Permit System i5 Access to AS/400  
permit 0.0.0.0 0.0.0.0 192.168.2.1 255.255.255.255 tcp ge 1024 eq 5556 secure both outbound f=y l=n t=0 # Permit System i5 Access to AS/400  
permit 0.0.0.0 0.0.0.0 192.168.2.1 255.255.255.255 tcp ge 1024 eq 446 secure both outbound f=y l=n t=0 # Permit System i5 Access to AS/400  
permit 0.0.0.0 0.0.0.0 192.168.2.1 255.255.255.255 tcp ge 1024 eq 448 secure both outbound f=y l=n t=0 # Permit System i5 Access to AS/400  
permit 0.0.0.0 0.0.0.0 192.168.2.1 255.255.255.255 tcp ge 1024 eq 5110 secure both outbound f=y l=n t=0 # Permit System i5 Access to AS/400  
permit 0.0.0.0 0.0.0.0 192.168.2.1 255.255.255.255 tcp ge 1024 eq 992 secure both outbound f=y l=n t=0 # Permit System i5 Access to AS/400  
permit 0.0.0.0 0.0.0.0 192.168.2.1 255.255.255.255 tcp ge 1024 eq 9470 secure both outbound f=y l=n t=0 # Permit System i5 Access to AS/400  
permit 0.0.0.0 0.0.0.0 192.168.2.1 255.255.255.255 tcp ge 1024 eq 9471 secure both outbound f=y l=n t=0 # Permit System i5 Access to AS/400  
permit 0.0.0.0 0.0.0.0 192.168.2.1 255.255.255.255 tcp ge 1024 eq 9472 secure both outbound f=y l=n t=0 # Permit System i5 Access to AS/400  
permit 0.0.0.0 0.0.0.0 192.168.2.1 255.255.255.255 tcp ge 1024 eq 9473 secure both outbound f=y l=n t=0 # Permit System i5 Access to AS/400  
permit 0.0.0.0 0.0.0.0 192.168.2.1 255.255.255.255 tcp ge 1024 eq 9474 secure both outbound f=y l=n t=0 # Permit System i5 Access to AS/400  
permit 0.0.0.0 0.0.0.0 192.168.2.1 255.255.255.255 tcp ge 1024 eq 9475 secure both outbound f=y l=n t=0 # Permit System i5 Access to AS/400  
permit 0.0.0.0 0.0.0.0 192.168.2.1 255.255.255.255 tcp ge 1024 eq 9476 secure both outbound f=y l=n t=0 # Permit System i5 Access to AS/400
```

# Example of setting filter rules

**0010: action(permit) from(1.2.3.\*) to (10.10.10.\*) protocol(all any 23/any 23)**

	Action:	<input type="text" value="permit"/>		
<a href="#">Configuration</a>	From Address	<input type="text" value="10.10.10.0"/>	From Mask:	<input type="text" value="255.255.255.0"/>
	To Address	<input type="text" value="1.2.3.0"/>	To Mask:	<input type="text" value="255.255.255.0"/>
<a href="#">Administration</a>	Protocol:	<input type="text" value="all"/>		
	From Operation	<input type="text" value="any"/>	Port/ICMP Type:	<input type="text" value="23"/>
	To Operation	<input type="text" value="any"/>	Port/ICMP Code:	<input type="text" value="23"/>
	Interface:	<input type="text" value="both"/>	Routing:	<input type="text" value="both"/>
	Direction:	<input type="text" value="both"/>		
	IP Fragments:	<input type="text" value="(y) Match all"/>	IP Packet Logging	<input type="text" value="no"/>
	VPN	<input type="text" value="0"/>		
	Description:	<input type="text" value="telnet"/>		

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  - All “other” System Group platforms
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