

28 Non-ThinManager Components

Microsoft Terminal Servers play an important role in the ThinManager system. It is recommended that you become familiar with the documentation provided by Microsoft about their server. The following information is provided as an aid to understanding terminal services and is not a substitute for Microsoft documentation.

Microsoft Terminal Services requires a license, either a TS CAL (Terminal Services Client Access License) on a 2003 Server or a RDS CAL (Remote Desktop Services Client Access License) on a 2008 Server.

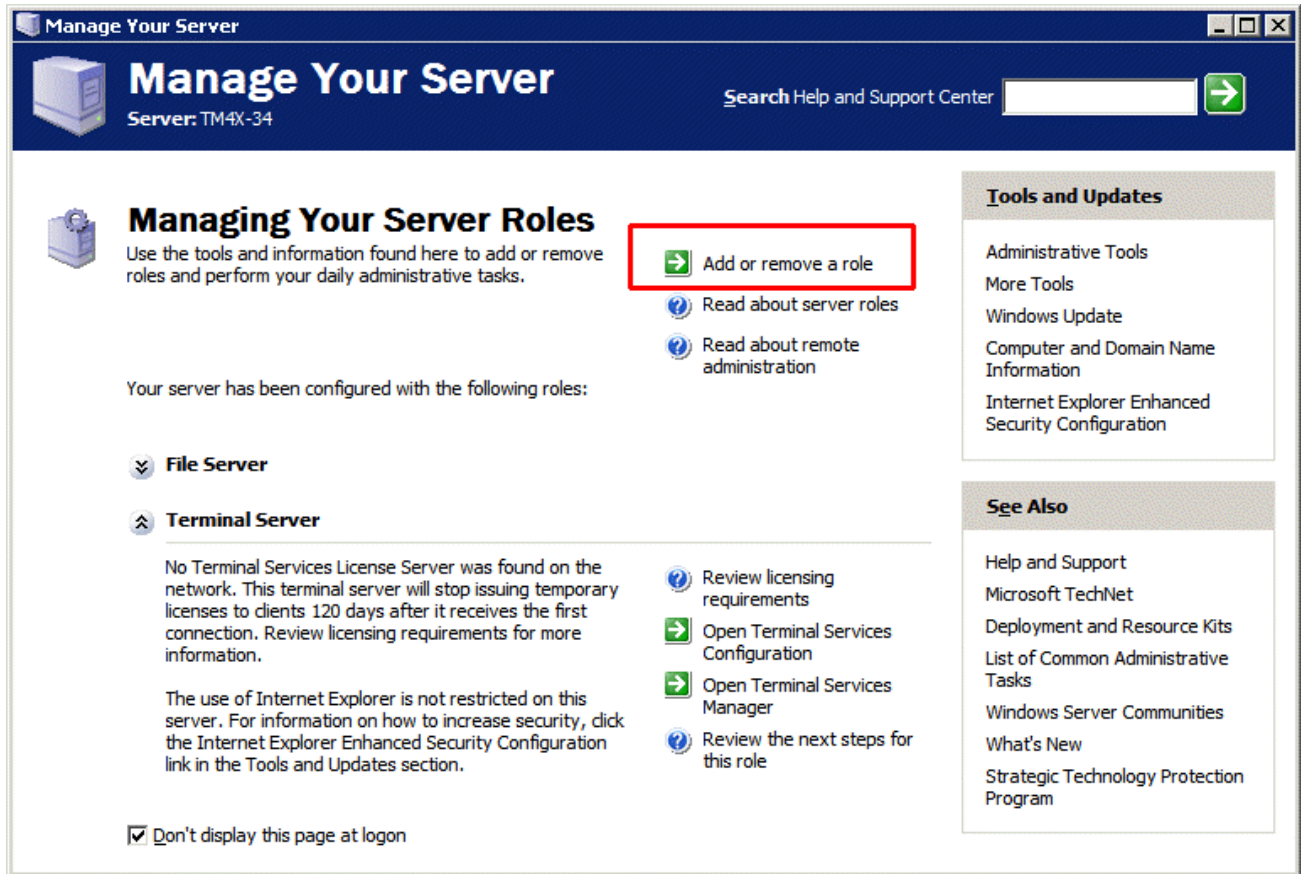
This section covers:

- Server 2003
- Server 2008
- DHCP (Dynamic Host Configuration Protocol) Servers
- Terminal Services Licensing

28.1 Server 2003

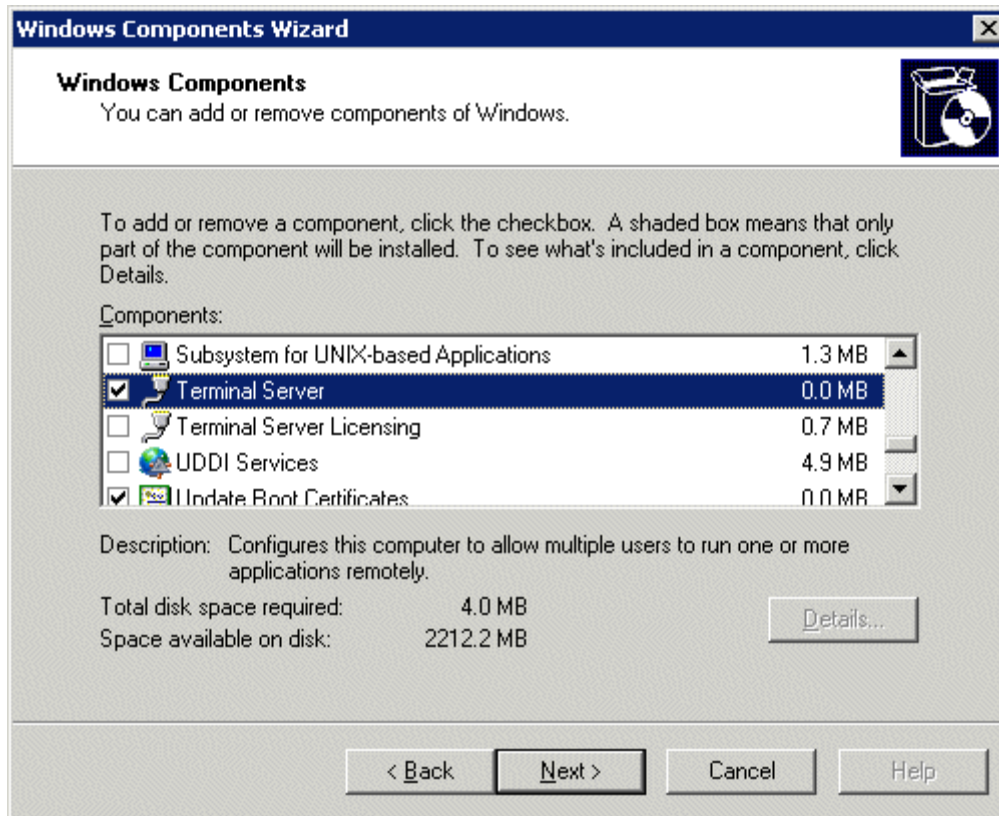
28.1.1 Installing Terminal Services

A Windows 2003 Server can be made a terminal server by installing the Terminal Services role. This can be done with either the **Manage Your Server** or through the **Add/Remove Programs > Add/Remove Windows Components**.



Manager Your Server

Select the **Add or remove a role** link on the **Manager Your Server** splash screen to install the Terminal Services role and/or the Terminal Services License Server role.



Windows Component Wizard

Terminal Services can be installed by selecting the **Terminal Server** checkbox in the **Windows Component Wizard**.

The **Windows Component Wizard** is launched by selecting the **Add/Remove Windows Component** button on **Control Panel > Add/Remove Programs**.

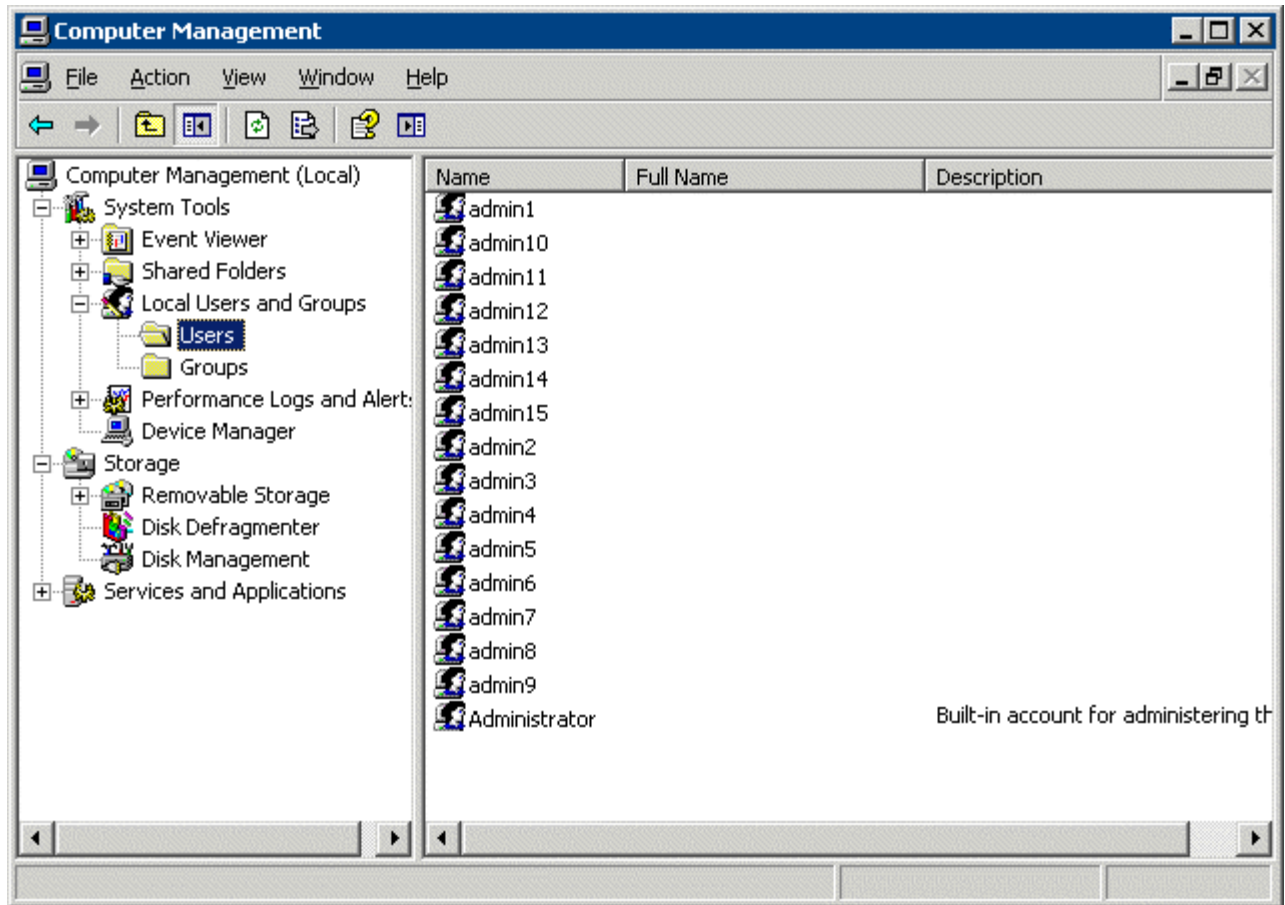
Each Microsoft terminal server system will need a Microsoft Terminal Server Licensing server install. This doesn't have to be a separate computer but is a program installed on an existing computer. It is installed by selecting the **Terminal Server Licensing** checkbox on the **Windows Component Wizard**.

See Microsoft Licenses for details.

28.2 Creating Microsoft User Profiles

A terminal needs a valid Windows User Profiles to log onto a terminal server.

Open the **Computer Management Console** by selecting **Start > Administrative Tools > Computer Management** in Windows 2003/2008 to create a user profile.



Computer Management Console

Highlight the **User** sub-folder of Local Users and Groups in the Computer Management tree pane. Select **Action > New User**. This will launch a New User dialog box.

The image shows a 'New User' dialog box with the following fields and options:

- User name: [Text Field]
- Full name: [Text Field]
- Description: [Text Field]
- Password: [Text Field]
- Confirm password: [Text Field]
- User must change password at next logon
- User cannot change password
- Password never expires
- Account is disabled
- Buttons: Create, Close

New User Dialog

Enter the user name for the user in the **User name** field.

Enter a password in the **Password** field.

Re-enter the password in the **Confirm password** field.

The **User must change password at next logon** check box forces the user to change the password.

Select the **Create** button to finish the profile.

Select the **Close** button to return to the Computer Management Console.

Note: Users need to be added to the **Remote Desktop Users** group or the **Administrators** group to be allowed to connect to a terminal server.

28.3 Software Installation On Windows 2003

Microsoft Windows 2003/Server requires that software be added in the “**Install Mode**” through the **Control Panel > Add/Remove Programs**.

Select **Start > Settings > Control Panel > Add/Remove Programs** to launch the **Add/Remove Programs** dialog box.

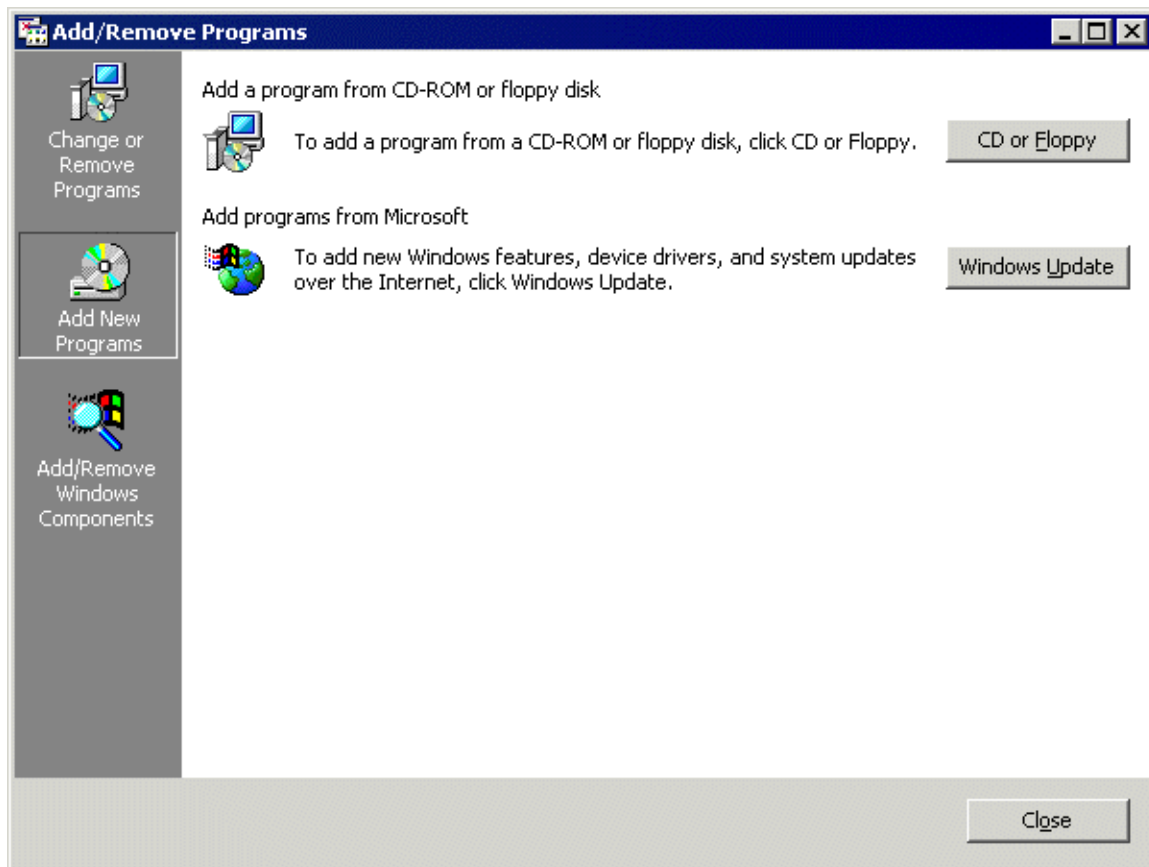
Note: Some software, especially downloaded software, doesn't allow the installer to install it through the Add/Remove Programs tools. To manually put the machine into the install mode open a command prompt and type:

```
change user /install
```

This command sets the machine to install mode. When finished, type:

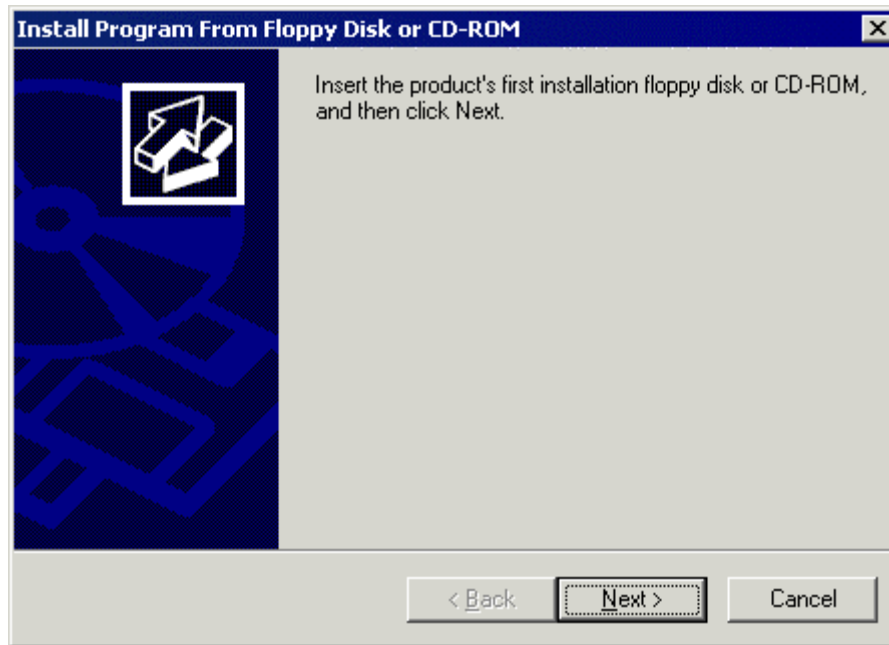
change user /execute

This command returns the machine to the normal run mode.



Add/Remove Programs

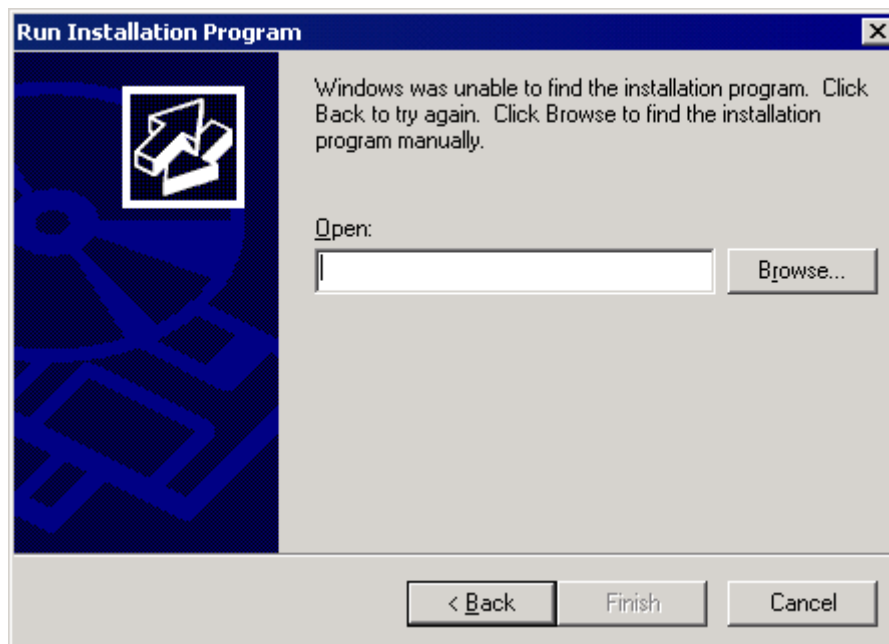
Select the **CD or Floppy** button on the **Add/Remove Programs** dialog box to open the Installation wizard.



Install Program Window

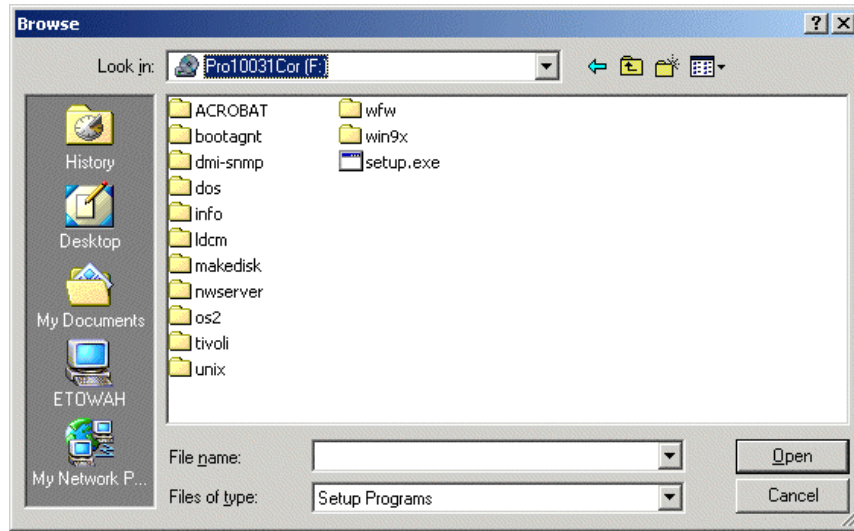
The wizard will prompt for the installation of the software disk. Select **Next** to display the **Run Installation Program** dialog box.

Note: If the new program starts in **autorun** and proceeds without going through the following procedures, either stop the **autorun** and use the wizard to initiate the installation, or use the **change user /install** command to place the machine in the install mode. Use the **change user /execute** command when finished to return the machine to the Run mode.



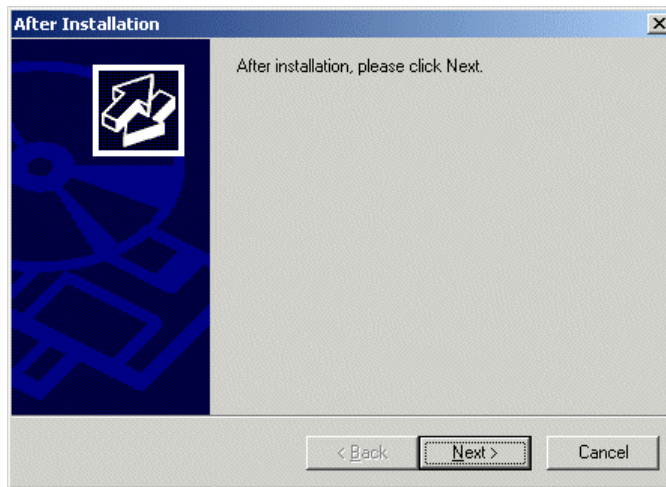
Run Installation Program

Enter the command line of the installation program and select **Finish**, or select the **Browse** button to select the installation file.



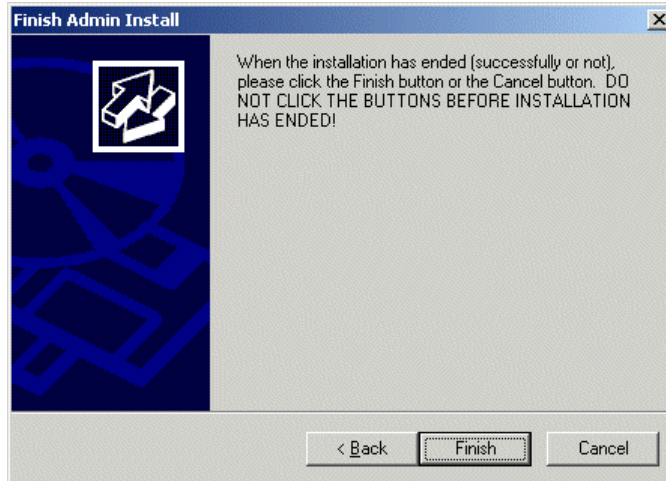
Browse File Window

Selecting the **Browse** button on the **Run Installation** dialog box will launch a **Browse File** window. Highlight the installation file and select **Open**. This will begin the application setup.



After Installation Window

As the installation begins, an **After Installation** dialog box is displayed. It requests that the **Next** button be selected when the installation is finished. When this button is selected a second confirmation window is displayed.



Finish Install Window

Select the **Finish** button when the installation is finished.

Note: If a choice is given to **Reboot Now** or **Reboot Later**, choose to reboot later once the entire setup is completed and the dialog boxes are cleared.

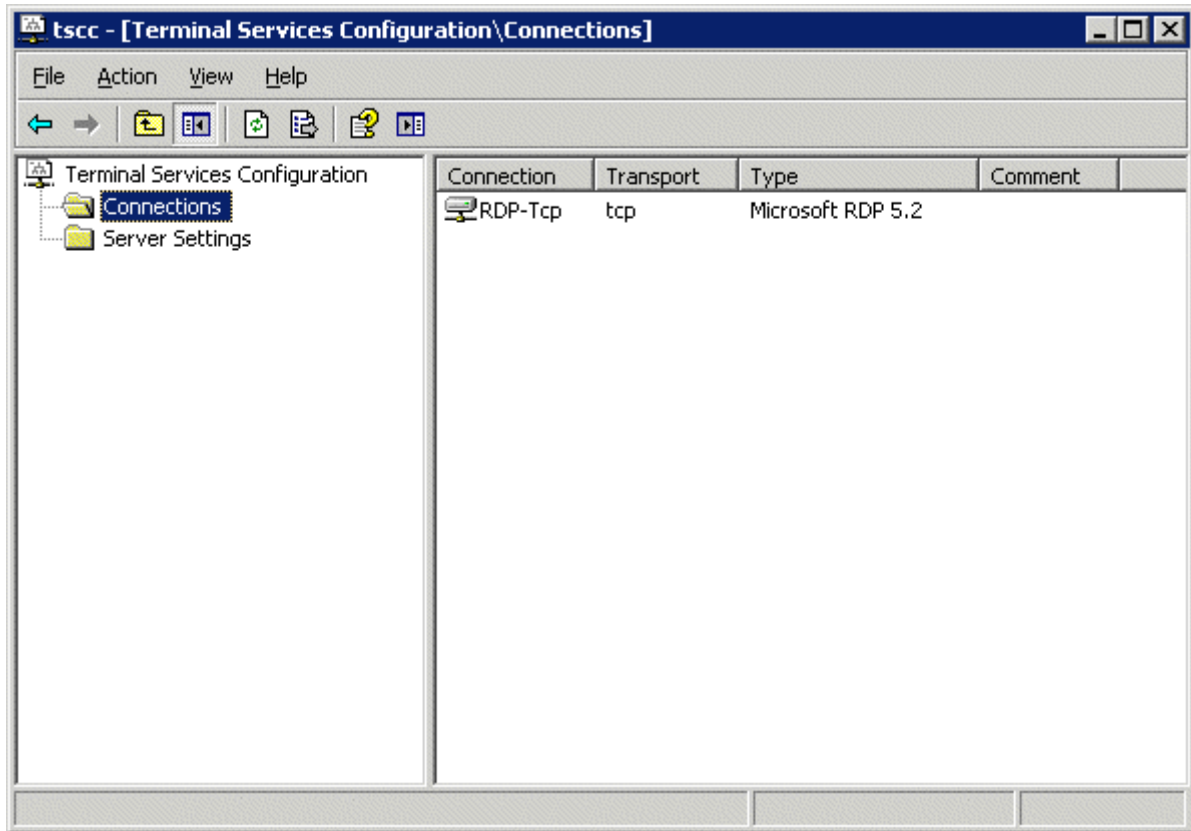
28.3.1 Terminal Services Configuration

Microsoft provides the **Terminal Services Configuration** interface to configure how terminal services is handled on each terminal server.

Select **Start > Programs > Administrative Tools > Terminal Services Configuration** to launch the **Terminal Services Configuration Console**. There are two folders, **Connections** and **Server Settings**.

28.3.2 Terminal Services Connections

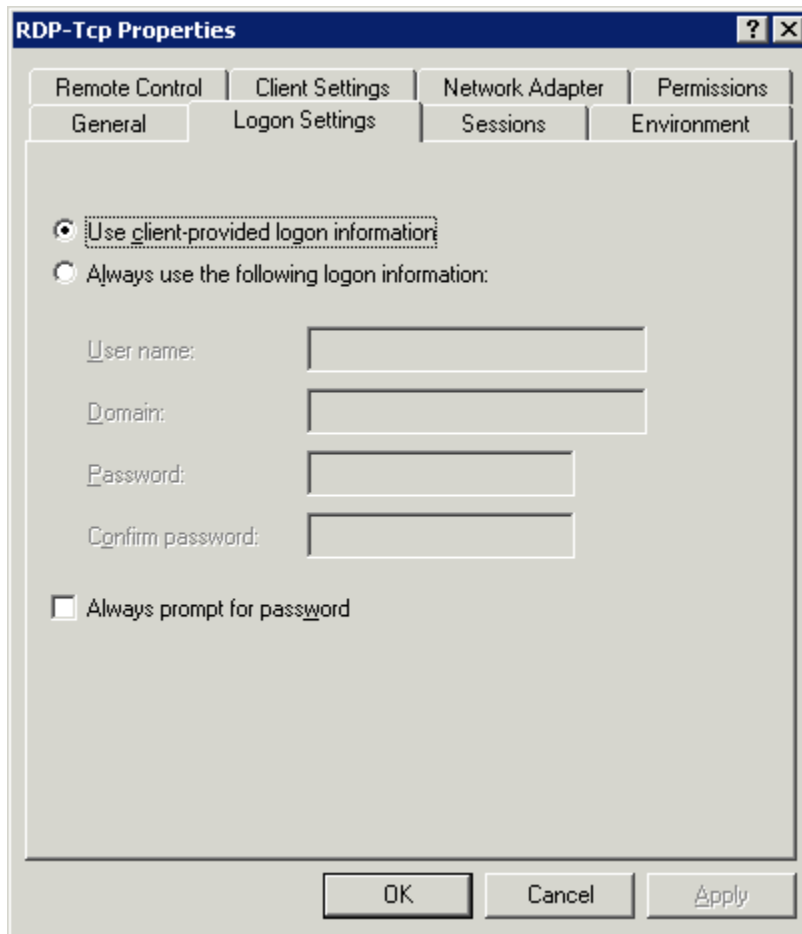
The **Terminal Services Configuration** tree has a **Connections** folder. Highlighting this folder will display the installed client communication protocols.



Terminal Services Configuration\Connections Console - Connections

Double clicking on the RDP-tcp icon on the right will launch the RDP-tcp Properties

28.3.2.1 RDP-tcp Login Settings

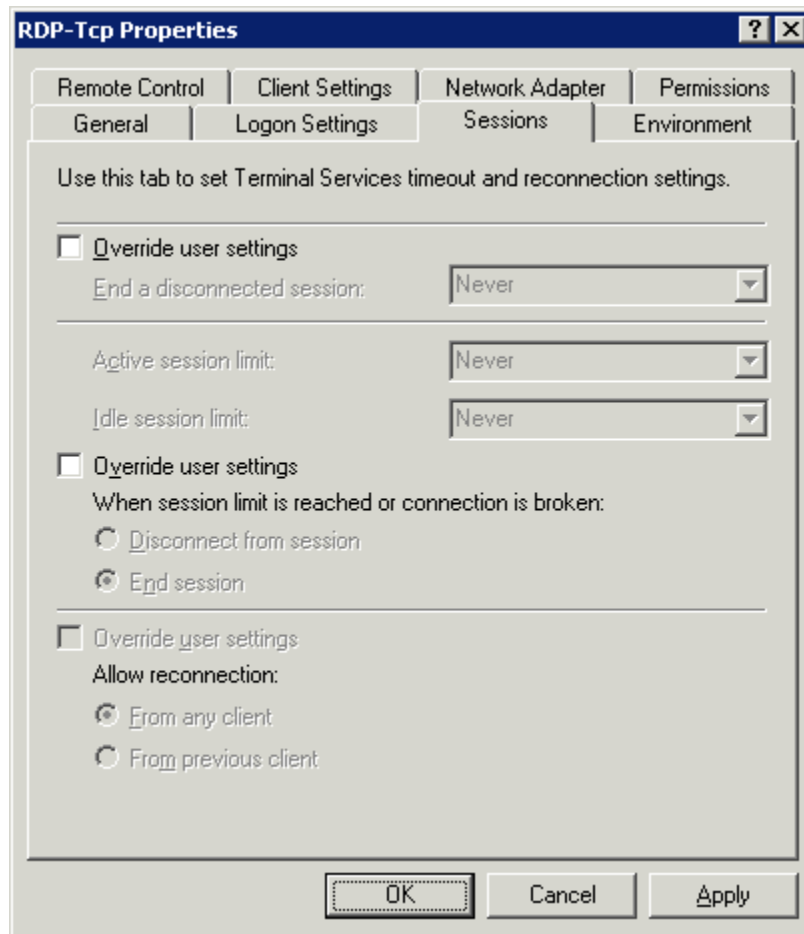


RDP-tcp Login Settings

The **Logon Settings** should use the **Use client-provided logon information** radio button so that each user will login with a unique account.

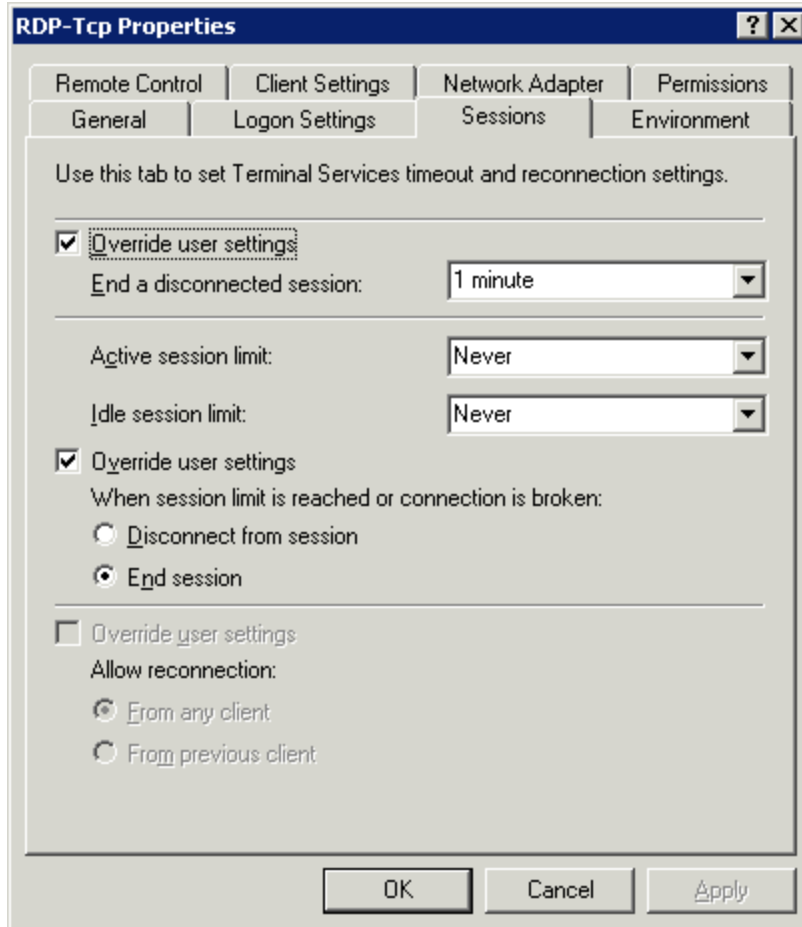
The **Always prompt for password** should be unselected to allow auto-logins.

28.3.2.2 RDP-tcp Sessions Settings



Individual User Account Sessions Configuration

Each user account can be configured individually in the Computer Management interface. These can be set to end a disconnected session or an idle session after a period of time. The **Terminal Services Configuration Console** allows these settings to be made for every user of the terminal server, speeding configuration time.

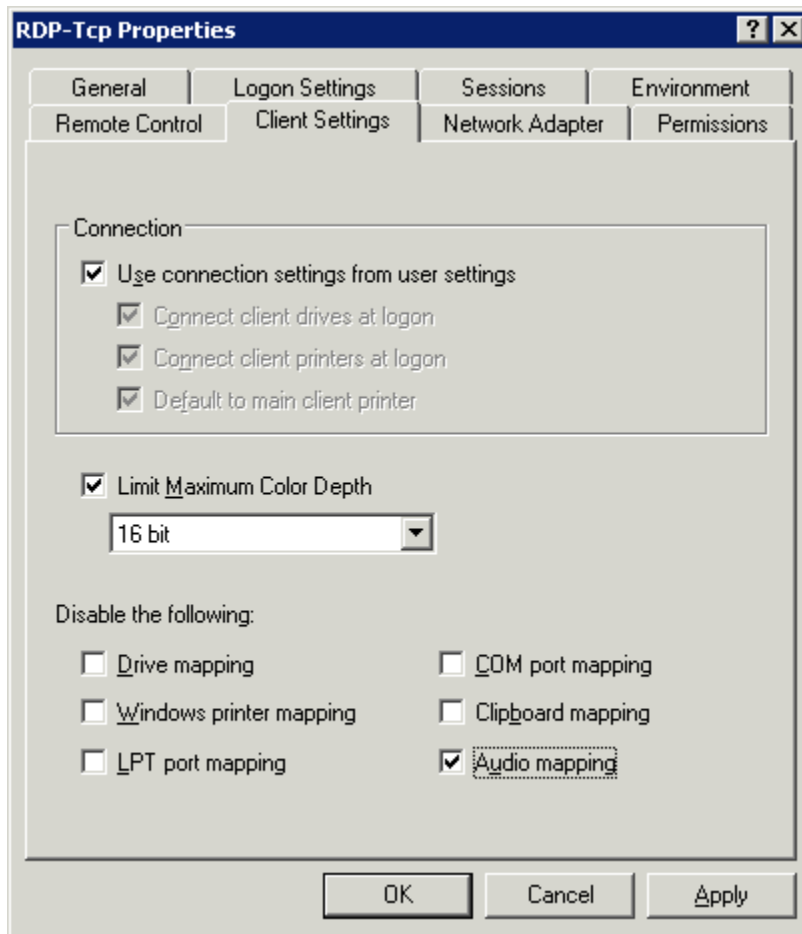


RDP-tcp Sessions Settings

The **Sessions** tab of the **RDP-tcp Properties** allows all users to be configured with a consistent disconnect policy by selecting the **Override user settings** checkbox.

Selecting **End Session** setting for the **When session limit is reached or connection is broken** and selecting the **Override user settings** will cause a new session to be created when a terminal disconnects and reconnects.

28.3.2.3 RDP-tcp Client Settings



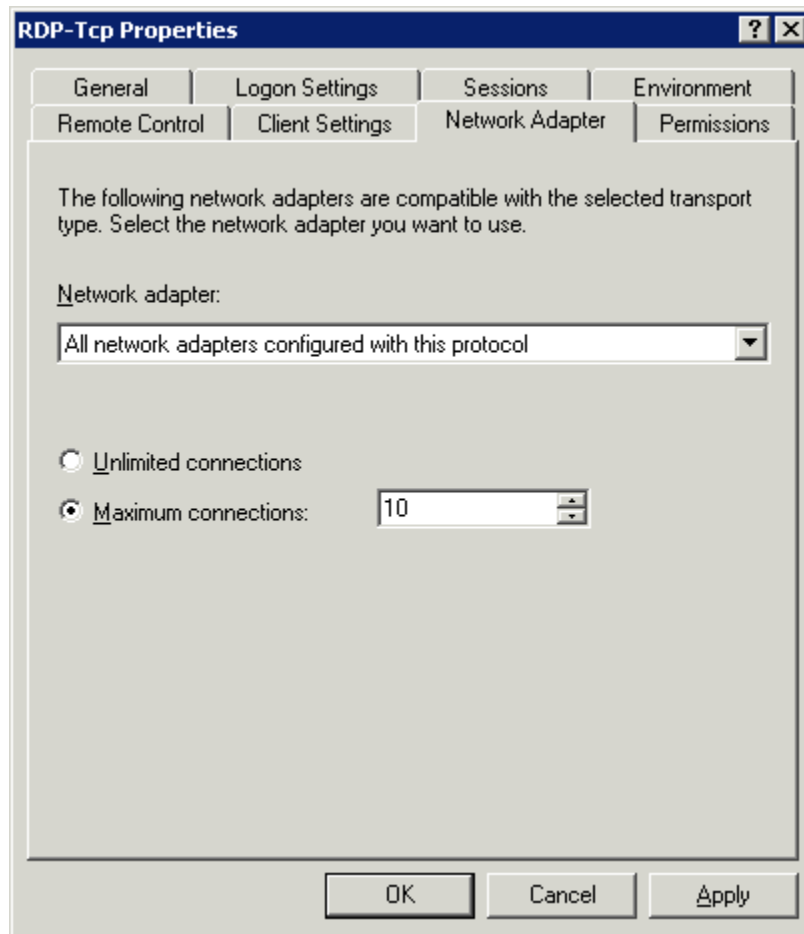
RDP-tcp Client Settings

The **Client Settings** tab of the **RDP-tcp Properties** allows the color depth to be set in the Limit Maximum Color Depth drop-down.

Drive mapping, LPT port mapping, COM port mapping, and audio mapping are allowed if the appropriate **Disable the following** checkboxes are un-selected.

Audio mapping is disabled by default. You need to uncheck the **Audio mapping** checkbox to allow a thin client to play sound.

28.3.2.4 RDP-tcp Network Adapter Settings

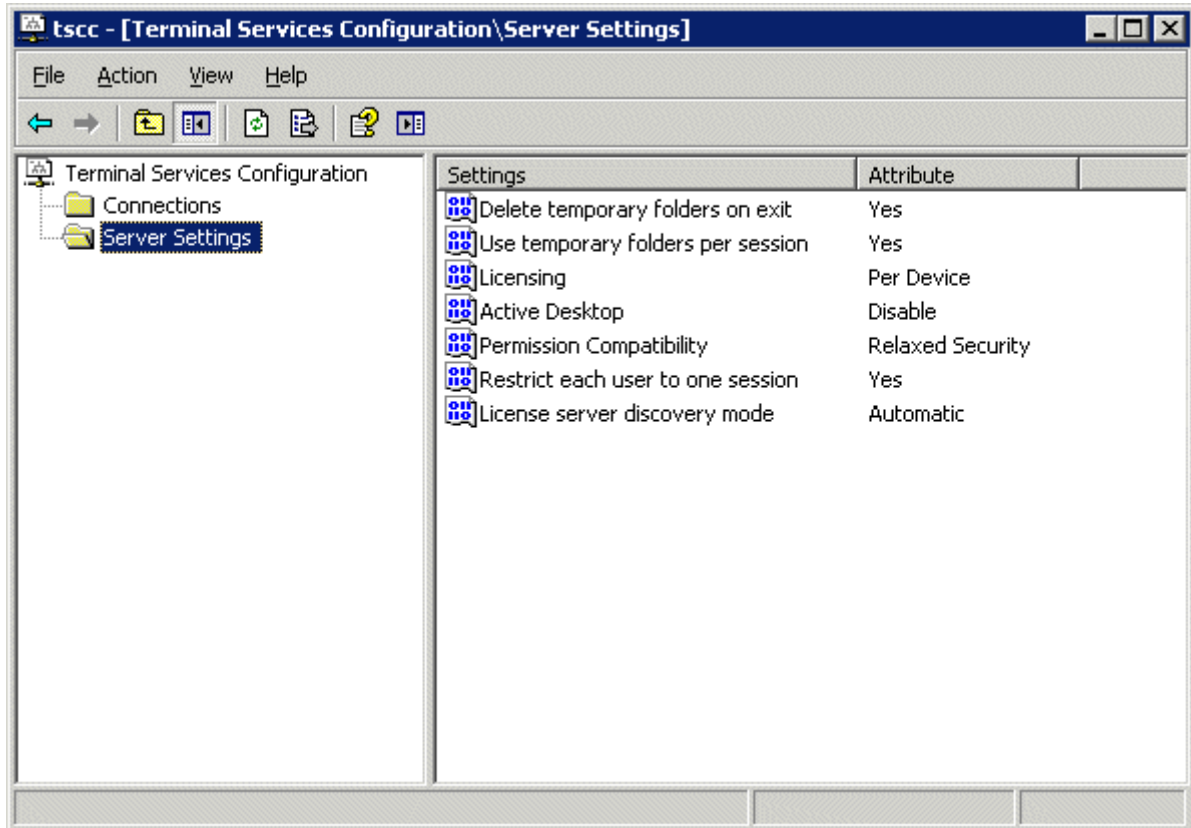


RDP-tcp Network Adapter Settings

The **Network Adapter** tab of the **RDP-tcp Properties** can be used to limit the number of active users to aid in application licensing compliance.

28.3.3 Terminal Services Connections

The **Terminal Services Configuration** tree has a **Connections** folder. Highlighting this folder will display the installed client communication protocols.



Terminal Services Configuration\Connections Console - Connections

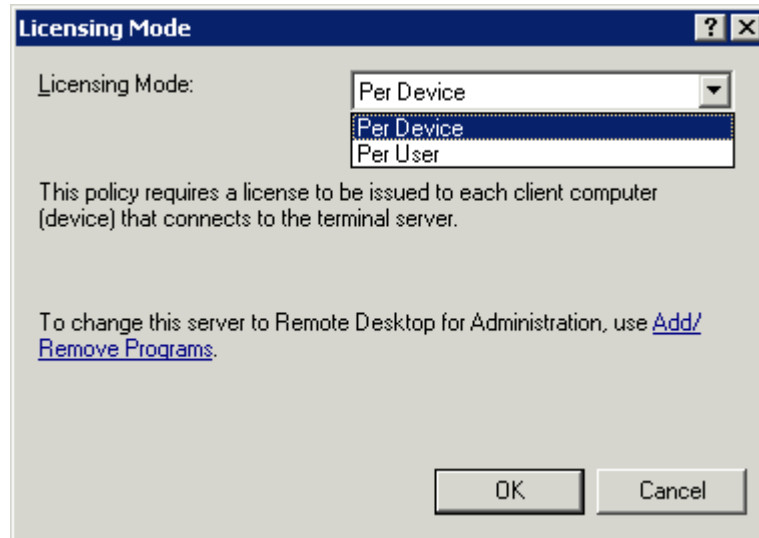
The **Server Settings** have several settings that can control the terminal services experience.

28.3.4 Licensing Mode

Microsoft expanded the Terminal Services Client Access License (TS CAL) program in Windows 2003. TS CALs are available in two types, TS Device CALs and TS User CALs.

- The TS Device CAL licenses one device to connect to any Microsoft Terminal Servers as any user. This functions like the previous Windows 2000 TS CAL.
- The TS User CAL licenses one user for any device to connect to any Microsoft Terminal Servers.

To change between the **Per Device** licensing and **Per User** licensing, double-click **Licensing** to launch the **Licensing Mode** window.

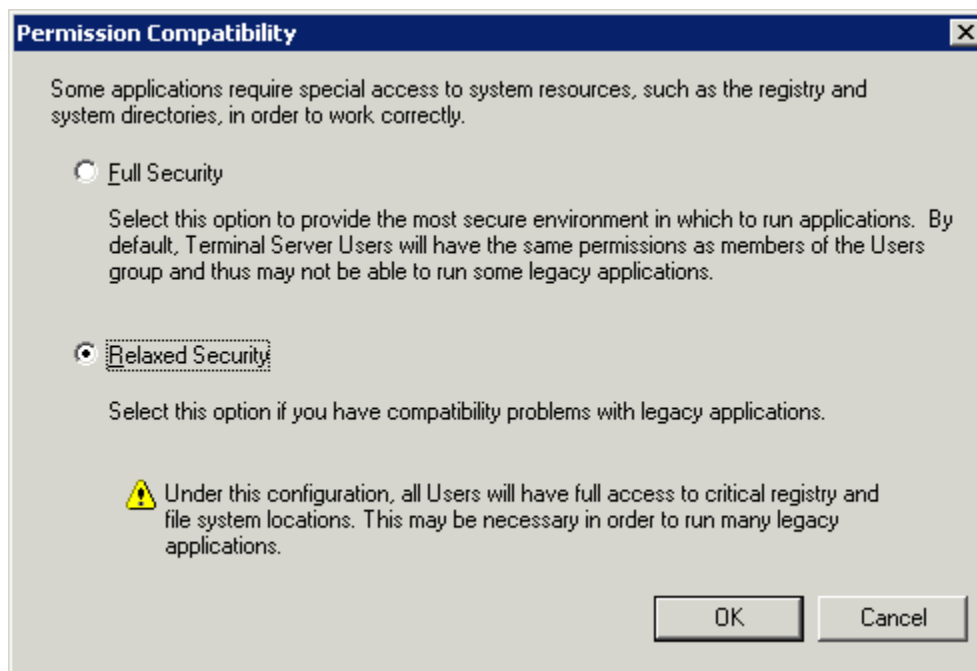


Terminal Services Configuration Console- Licensing Mode

Select the desired mode from the **Licensing Mode** dropdown box and click **OK**.

28.3.5 Permission Compatibility

Microsoft has increased the security in each successive release of its terminal server software. These new policies prevent users from accessing the system folder, *.ini files, the registry, and other resources. Some programs such as HMI, SCADA, database, and control software need access to these resources to function. Instead of making all the users administrators, the security can be set to the less strenuous Windows NT 4.0-style security.



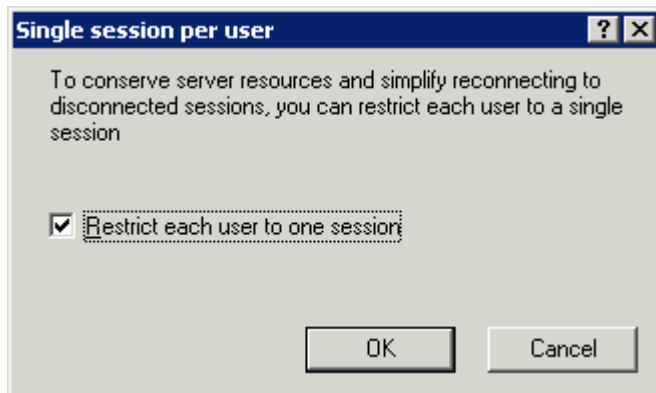
Terminal Services Configuration Console- Permission Compatibility

Launch the **Permission Compatibility** window by double-clicking on the **Permission Compatibility** setting. Select the **Relaxed Security** radio button and select the **OK** button.

28.3.6 Restrict Each User to a Single Session

The **Restrict Each User to a Single Session** setting prevents duplicate and orphaned sessions by limiting each user to a single login.

Double-clicking the setting will launch a settings window.



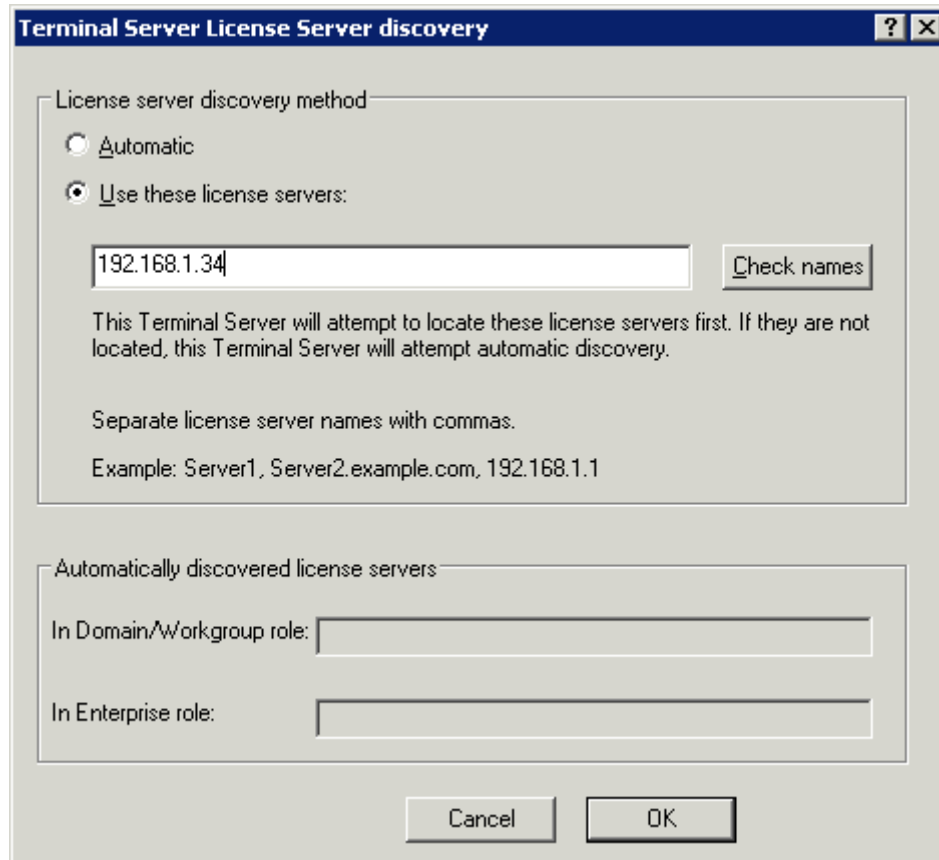
Terminal Services Configuration Console- Single Session Per User

The **Restrict each user to one session** checkbox is selected by default in Windows 2003.

Note: Keep this setting selected. MultiSession will still work as long as each session is using a different AppLink program.

28.3.7 License Server Discovery Mode

A new feature in Windows 2003, Service Pack 1 and later, is a setting to point the terminal server to a specific Terminal Server Licensing Server. This is the **License server discovery mode** setting in **Terminal Services Configuration**. This is easier than hard coding the license server into the registry.



Terminal Server License Server Discovery Window

Launch the Terminal Server License Server Discovery Window by double-clicking the **License server discovery mode** setting in **Terminal Services Configuration** window.

Entering a valid Microsoft Terminal Server Licensing Server name in the **Use these license servers** field will force the terminal server to use the defined server as the license server. This keeps the terminal server from getting confused when there are multiple license servers.

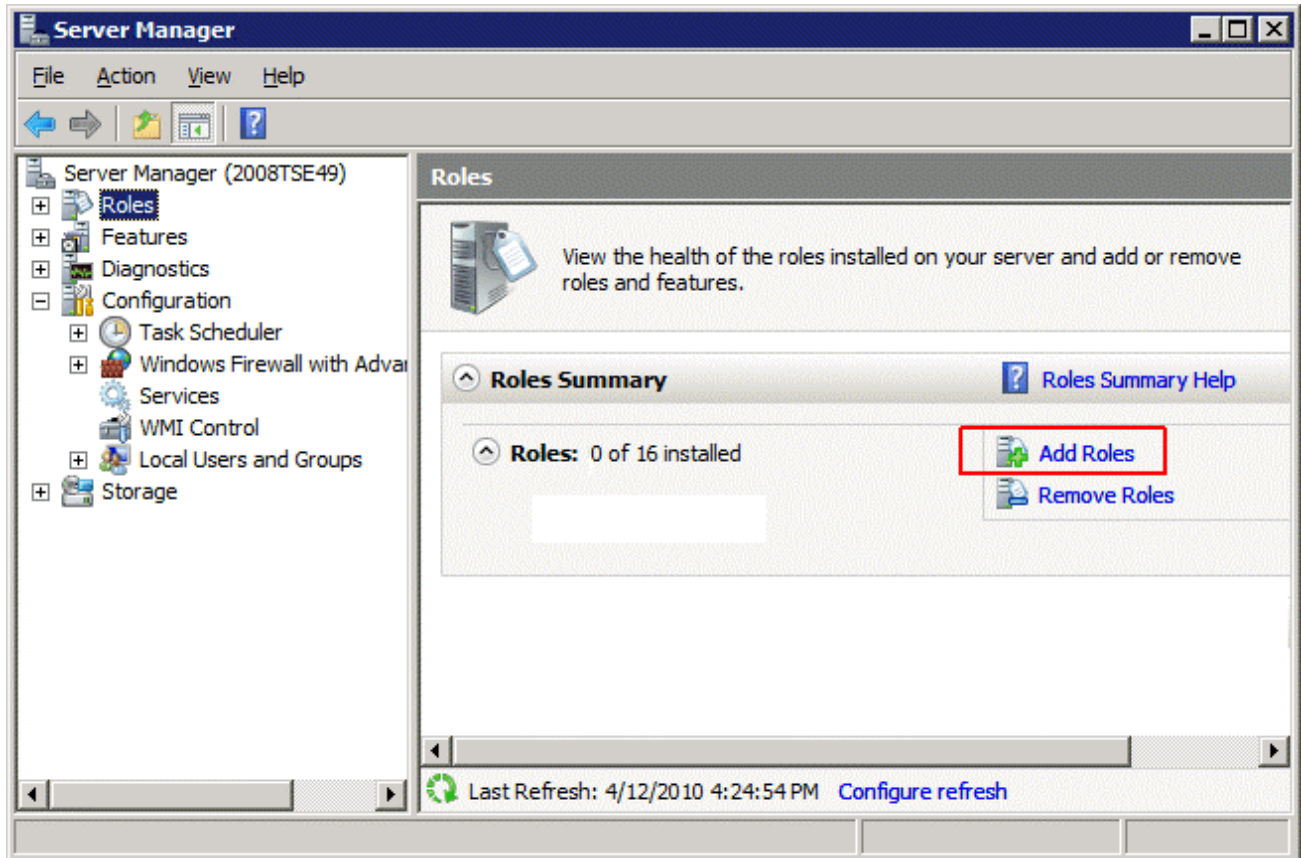
The **Automatically discovered license servers** field would be automatically populated with license servers found by the terminal server and can be used as a reference. The **Check names** button will check the validation of the name in the **Use these license servers** field.

28.4 Windows 2008 Server

28.4.1 Adding Terminal Server Role

Windows 2008 Server, like Windows 2003 Server, allows two RDP connections for administrative purposes. To make the Windows 2008 Server a terminal server where many people can access applications requires adding the Terminal Services Role.

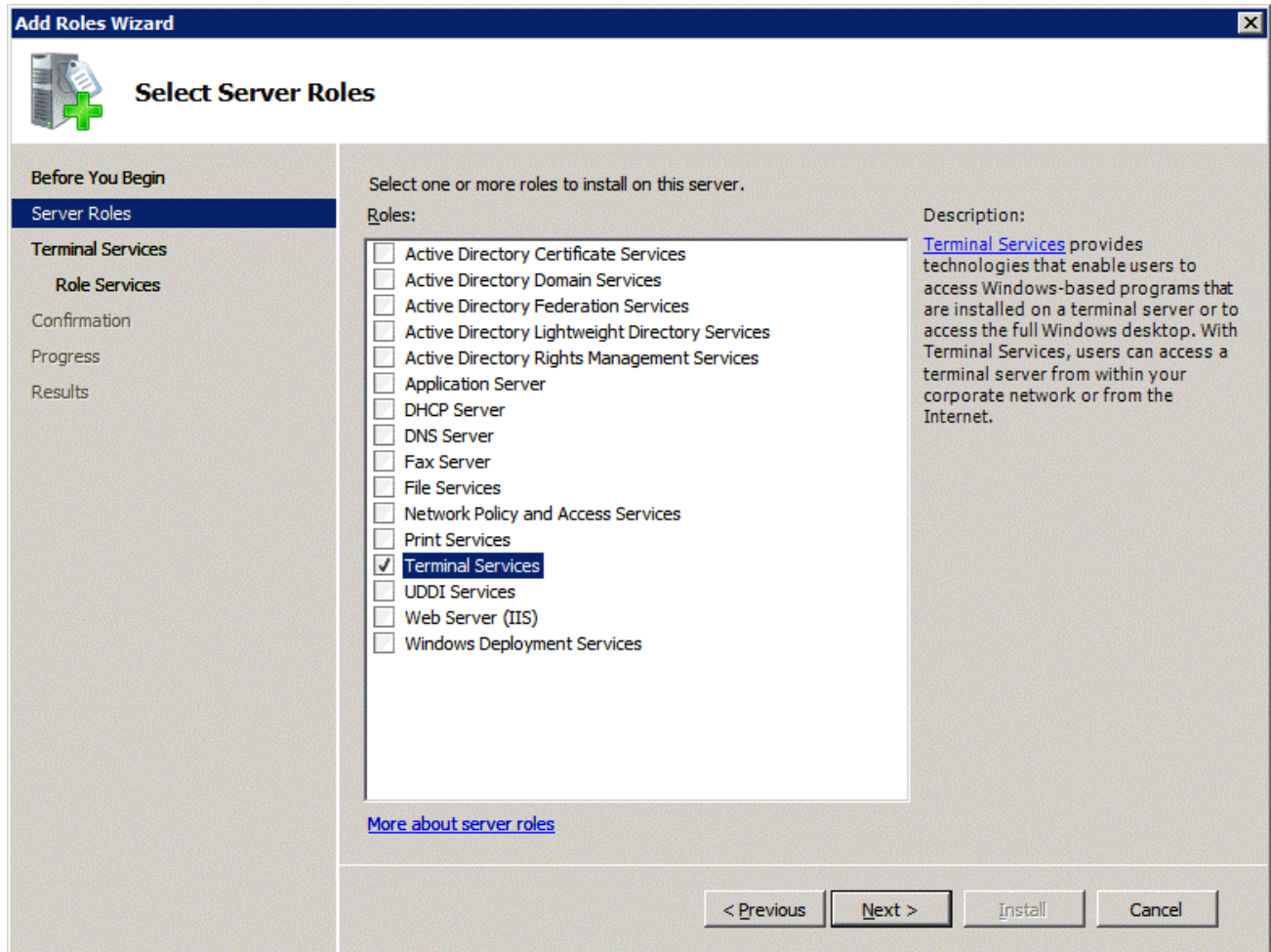
Open the **Server Manager** window.



Server Manager Window

Highlight **Roles** in the tree and select **Add Roles** in the right pane. A wizard will launch allowing you to add Terminal Services as a role.

Highlights of the **Role Wizard** include:

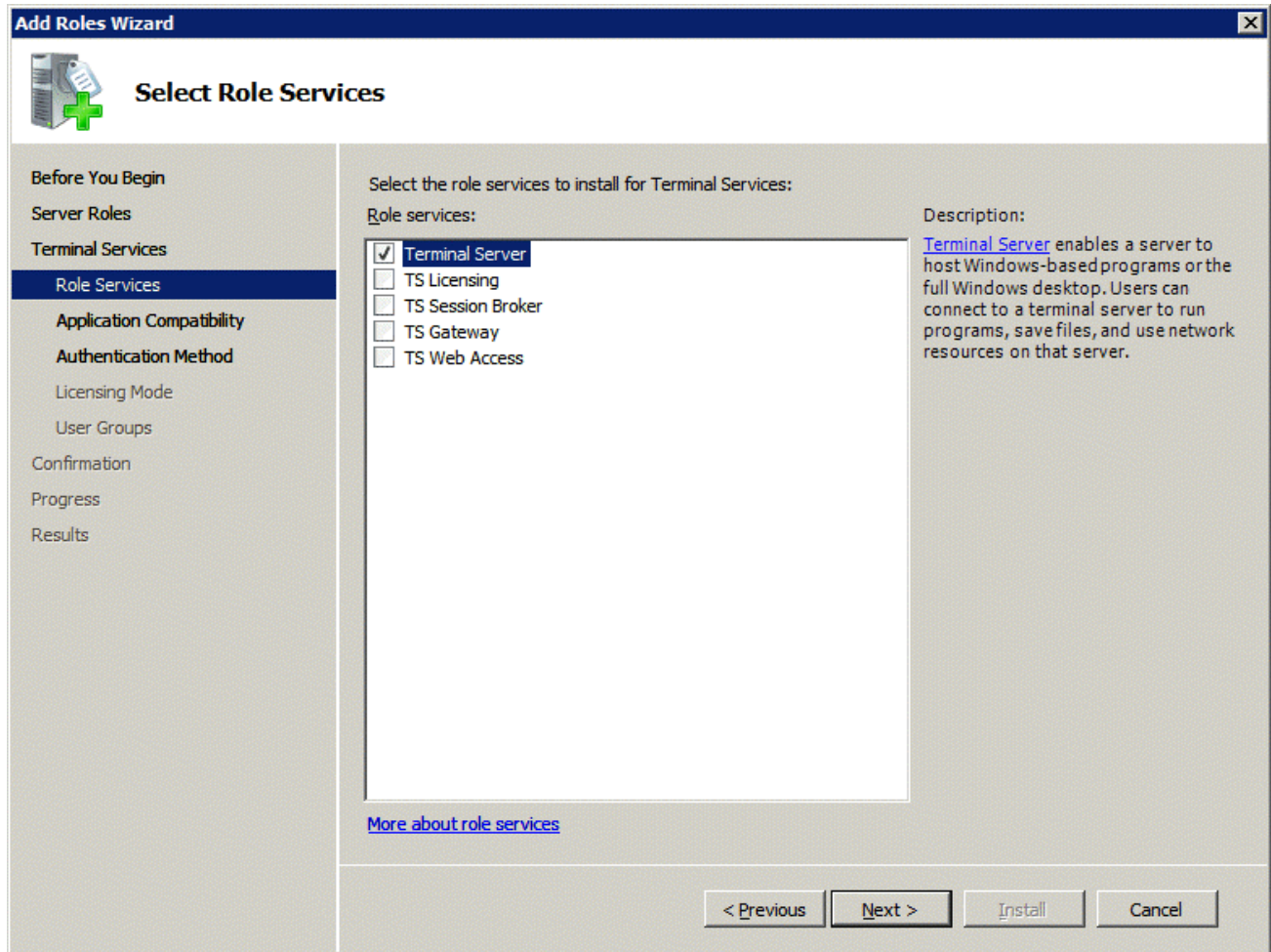


Role Wizard - Select Server Roles

The **Role Wizard** lists a dozen roles that are available.

Check the **Terminal Services** checkbox and any other roles desired.

Select **Next** to continue.

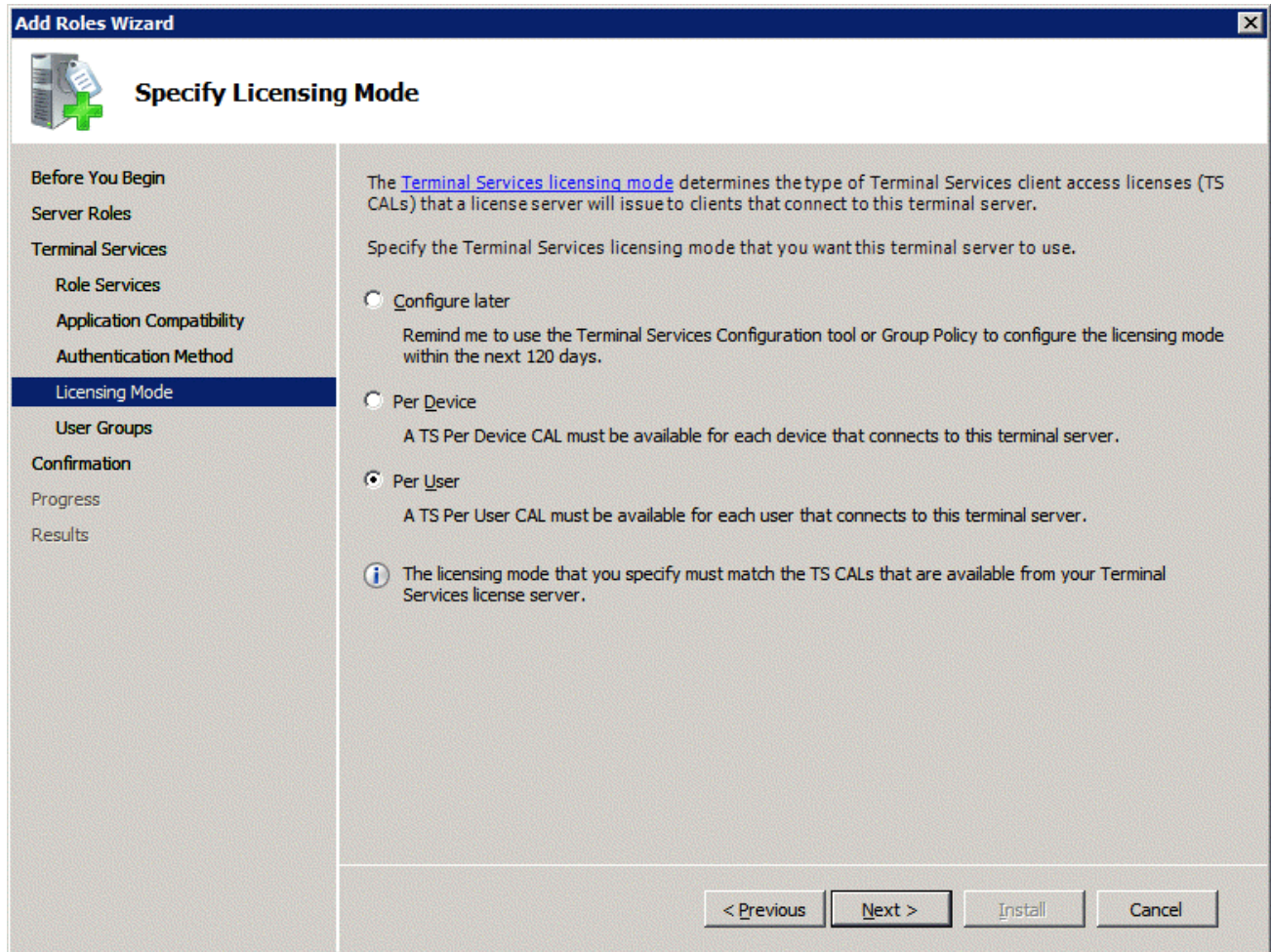


Role Wizard –Select Role Services

Terminal Services has several options:

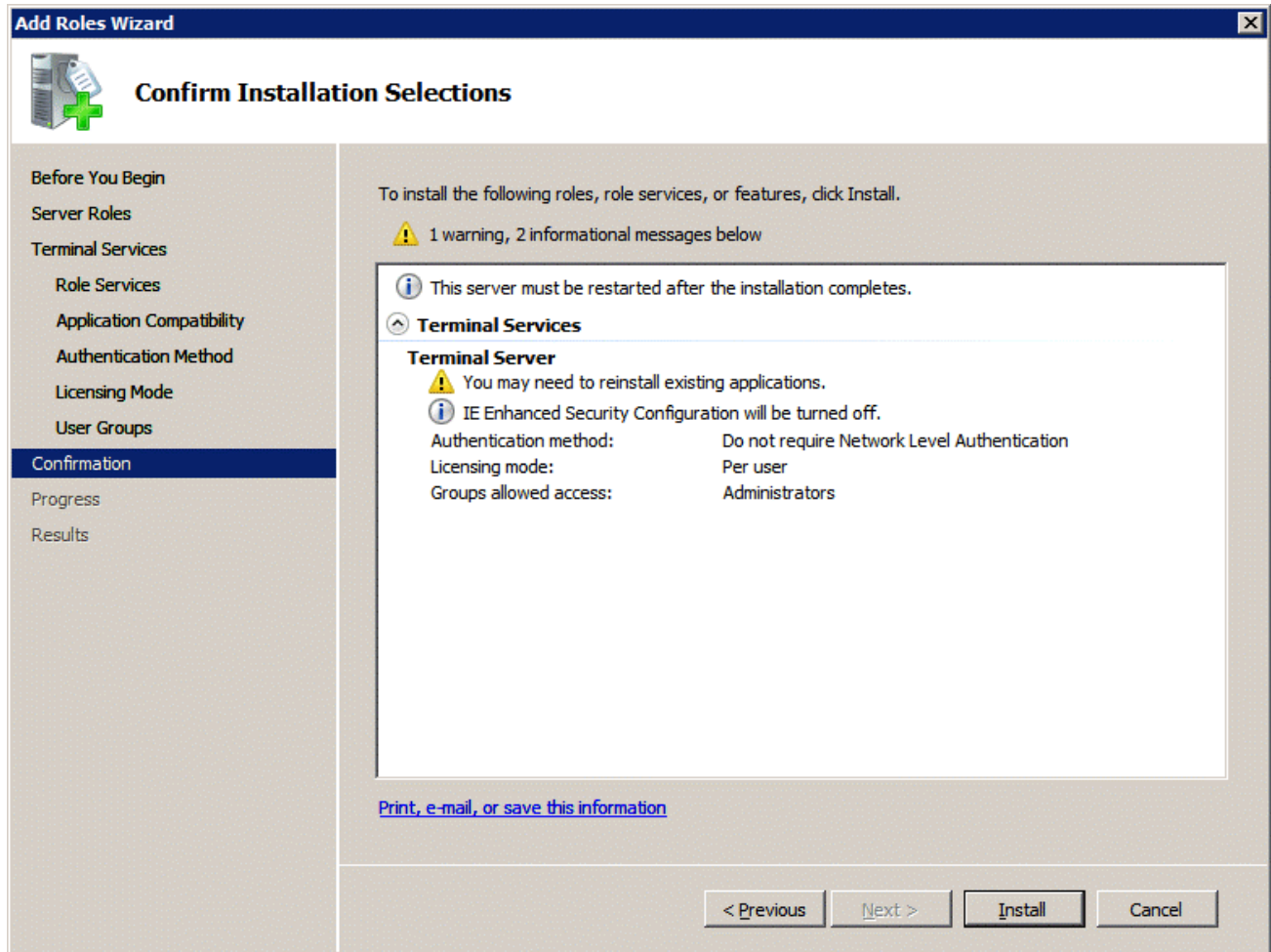
- **Terminal Server** – the basic terminal services option. Check this option
- **TS Licensing** – This makes the server a 2008 License Server. You need a 2008 License Server and 2008 Terminal Services Client Access Licenses (TS CALs) to operate. Select this if this server will be your Terminal Services License Server.

Select **Next** to continue.



Role Wizard – Specify Licensing Mode

Windows 2008 TS CALs, like Windows 2003 TS CALs, are available as **Per Device** or **Per User**. The terminal server should match the mode that the license server is using. Select **Next** to continue.



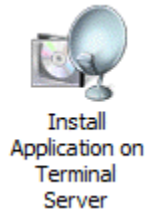
Role Wizard – Confirm Installation Selections

The **Add Roles Wizard** will end with a list of the configurations that will be installed.

Select ***Install*** to add the role(s). Once the wizard is finished it will assume the role of a terminal server.

28.4.2 Adding Applications in Windows 2008

Applications on terminal servers need to be installed in the **Install Mode**. Open the Control Panel and click on the **Install Application on Terminal Server** icon to start the installation wizard.



Install Application on Terminal Server Icon

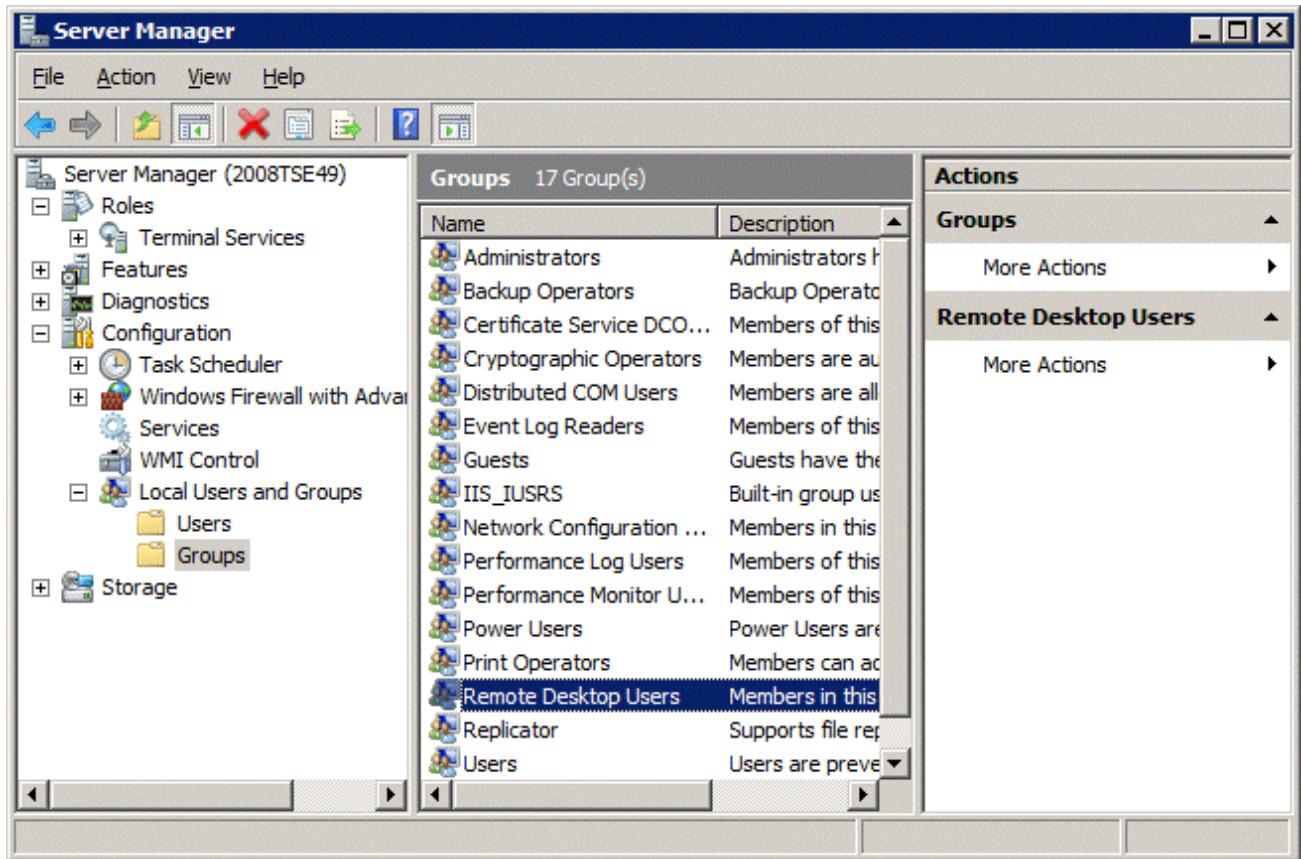
A wizard will run that allows the installation of the application.

The **Install Mode** can also be entered by typing **change user /install** at a command prompt. You can then run the **setup.exe** to install your application.

Type **change user /execute** when finished installing to leave the Install Mode.

28.4.3 Create Users

Users management is located in the **Server Manager** console.



Server Manager – Local Users and Groups

Users need to be members of the **Remote Desktop Users** group to access the terminal server.

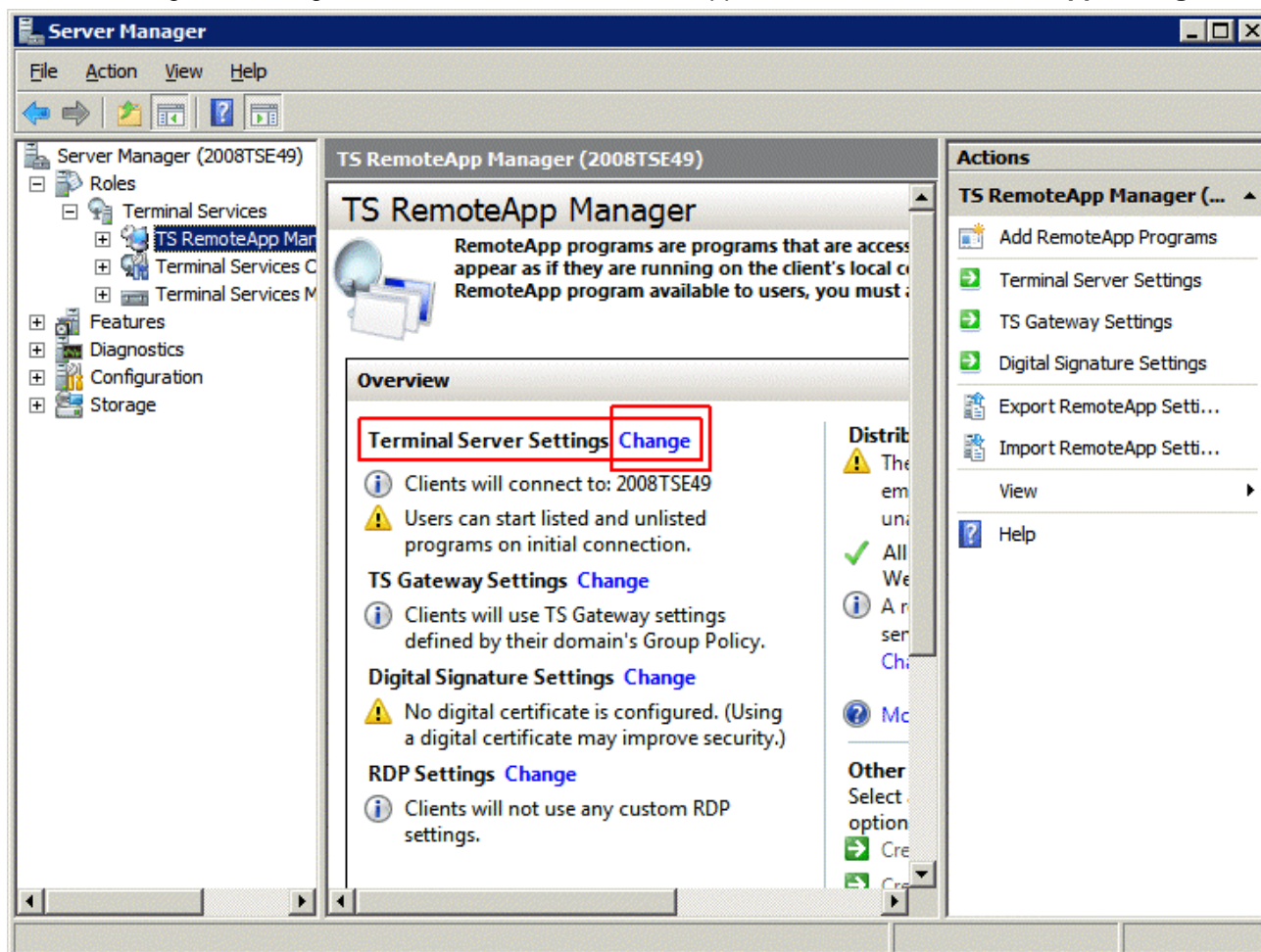
28.4.4 Allowing Application Access

Applications installed on a terminal server are not available to remote users unless the Terminal Server Settings are changed to allow access to the applications. You can either allow access to all applications or allow access to specific applications in the **TS RemoteApp Manager**.

28.4.4.1 Allowing Application Access – All Applications

Applications installed on a terminal server are not available to remote users unless the Terminal Server Settings are changed to allow access to the applications.

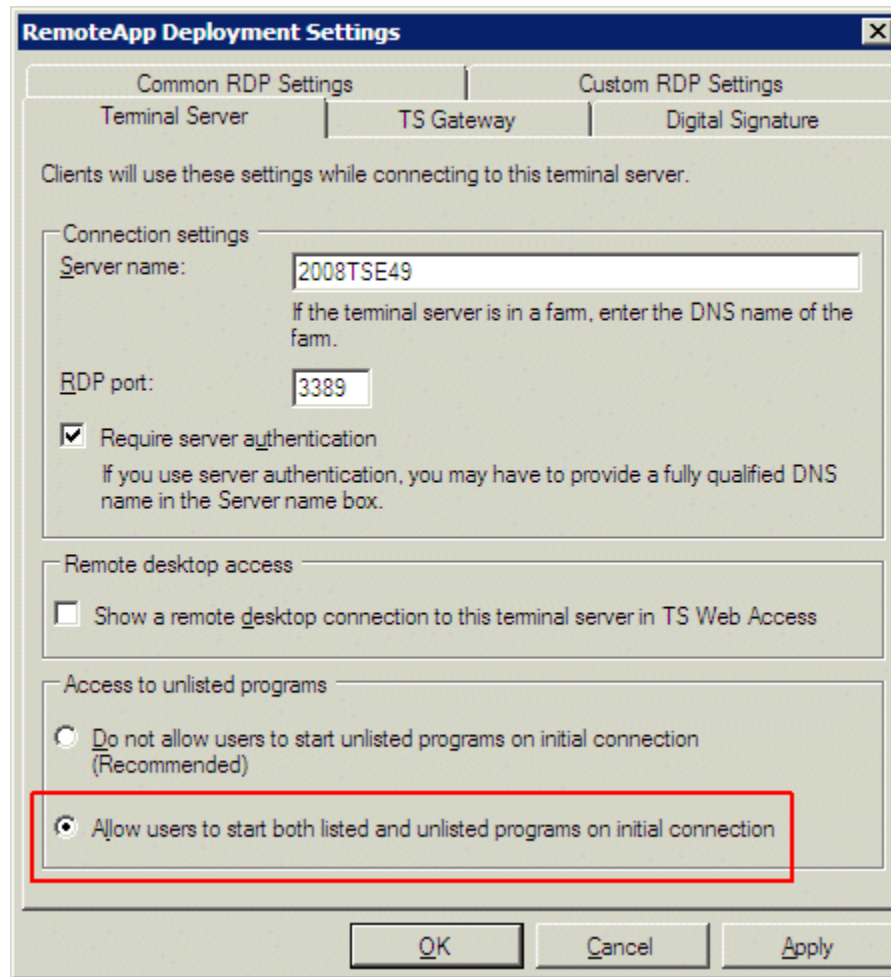
You can change the settings to allow access to all installed applications in the **TS RemoteApp Manager**.



TS RemoteApp Manager

Highlight **TS RemoteApp Manager** under the **Terminal Services** branch of the **Server Manager** tree.

Select the **Change** link for the **Terminal Server Settings** to launch the **RemoteApp Deployment Settings** page.



RemoteApp Deployment Settings

Select the Terminal Server tab of the **RemoteApp Deployment Settings** page.

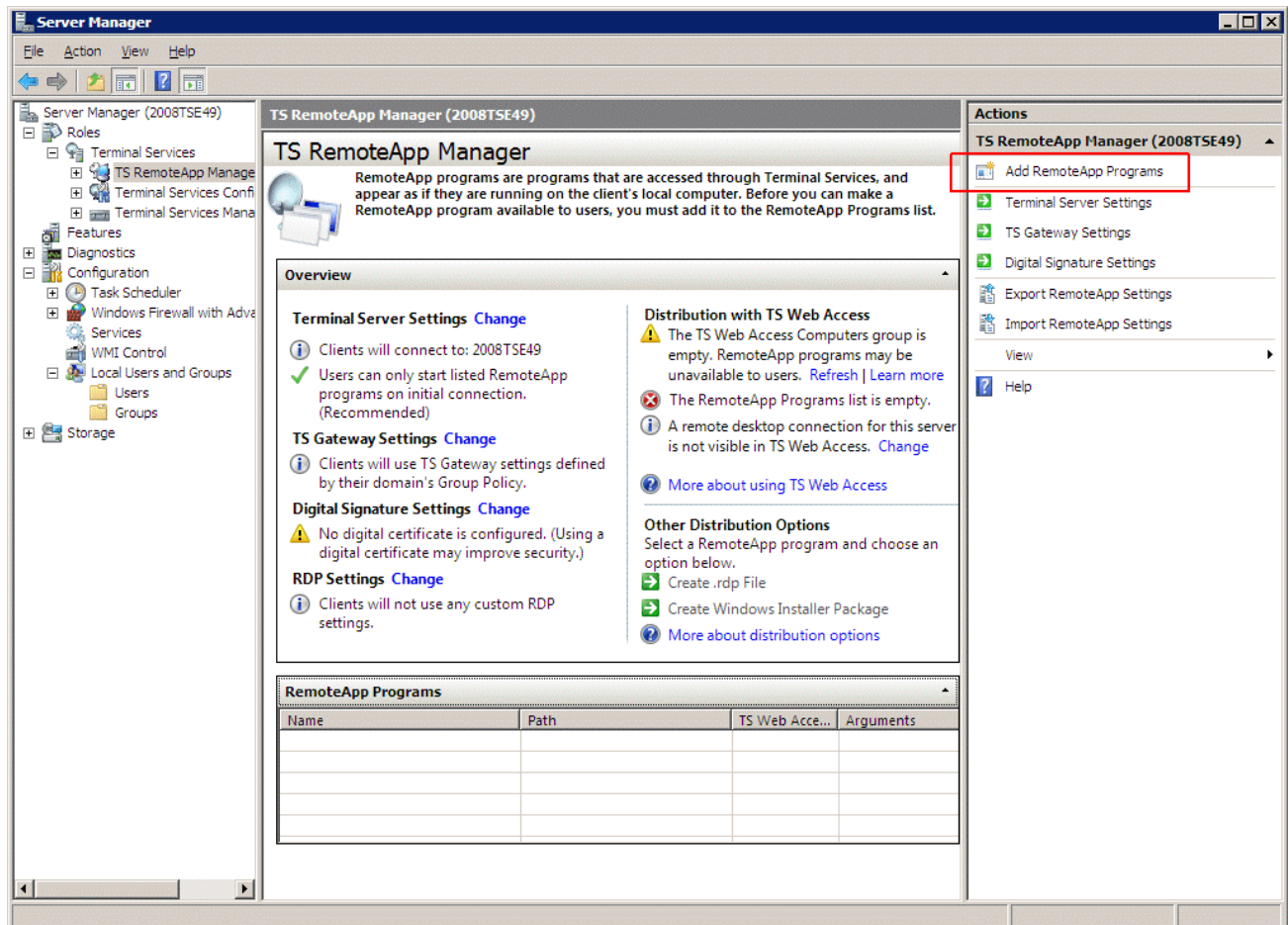
Select the **Allow users to start both listed and unlisted programs on initial connection** radio button in the **Access to unlisted programs** section.

This will allow any program to be run by an authorized user.

You can also select and define specific applications that can be run by configuring them in the **TS RemoteApp Manager**.

28.4.4.2 Allowing Application Access – Specific Applications

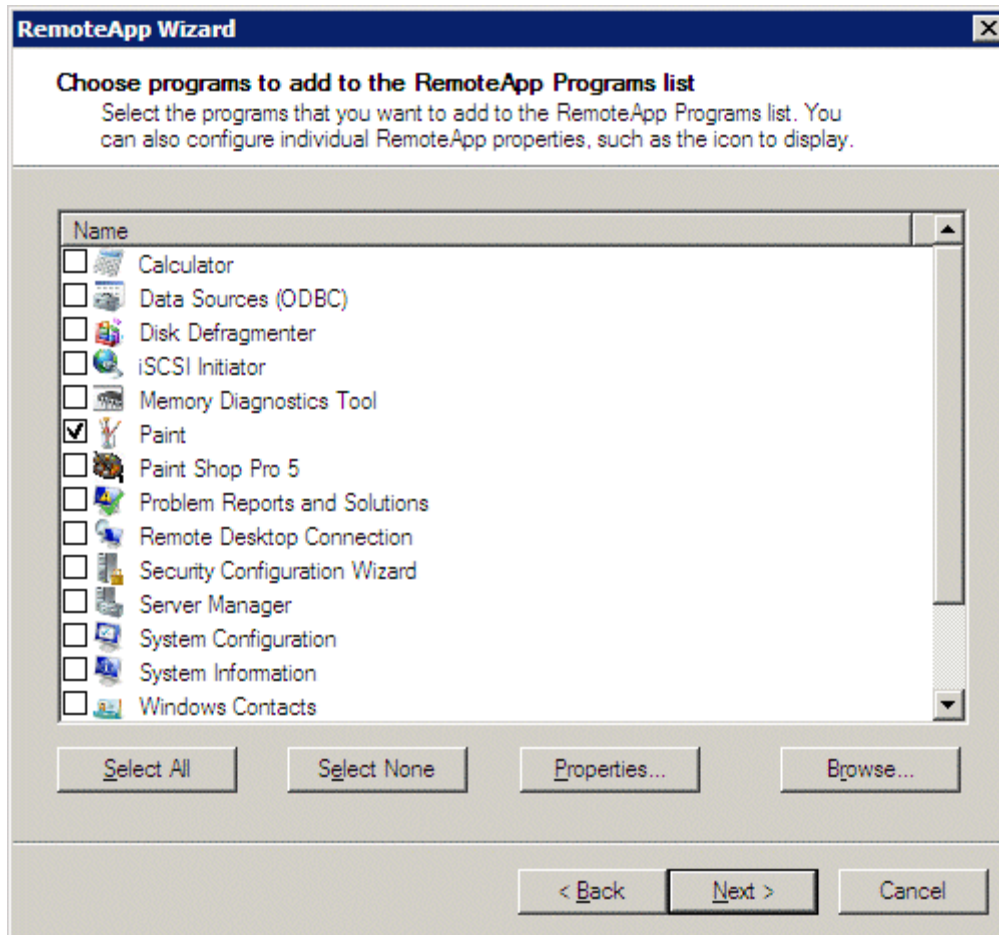
You can control application access on Windows 2008 Server by only allowing access to specific applications.



TS RemoteApp Manager

Highlight **TS RemoteApp Manager** under the **Terminal Services** branch of the **Server Manager** tree.

Select the **Add RemoteApp Programs** link in the **Actions** column on the right of the screen to launch the **RemoteApp Wizard**.



RemoteApp Wizard

The **RemoteApp Wizard** shows a list of applications installed on the Windows 2008 Server.

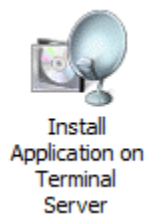
Select the checkbox for each application that you want available for deployment as a ThinManager Display Client.

Select **Next** to complete the wizard. A remote user can run any checked application.

28.4.5 Installing ThinManager

It is a common practice to install ThinManager on a terminal server but ThinManager is independent of terminal services and doesn't need to be installed on a terminal server.

Applications on terminal servers need to be installed in the **Install Mode**. Open the Control Panel and click on the **Install Application on Terminal Server** icon to start the installation wizard.



Install Application on Terminal Server Icon

Once the wizard begins navigate to the ThinManager setup.exe program and continue with the wizard. See Installation of ThinManager for details.

The Install Mode can also be entered by typing **change user /install** at a command prompt. You can then run the **setup.exe** to install ThinManager.

Type **change user /execute** when finished installing to leave the Install Mode.

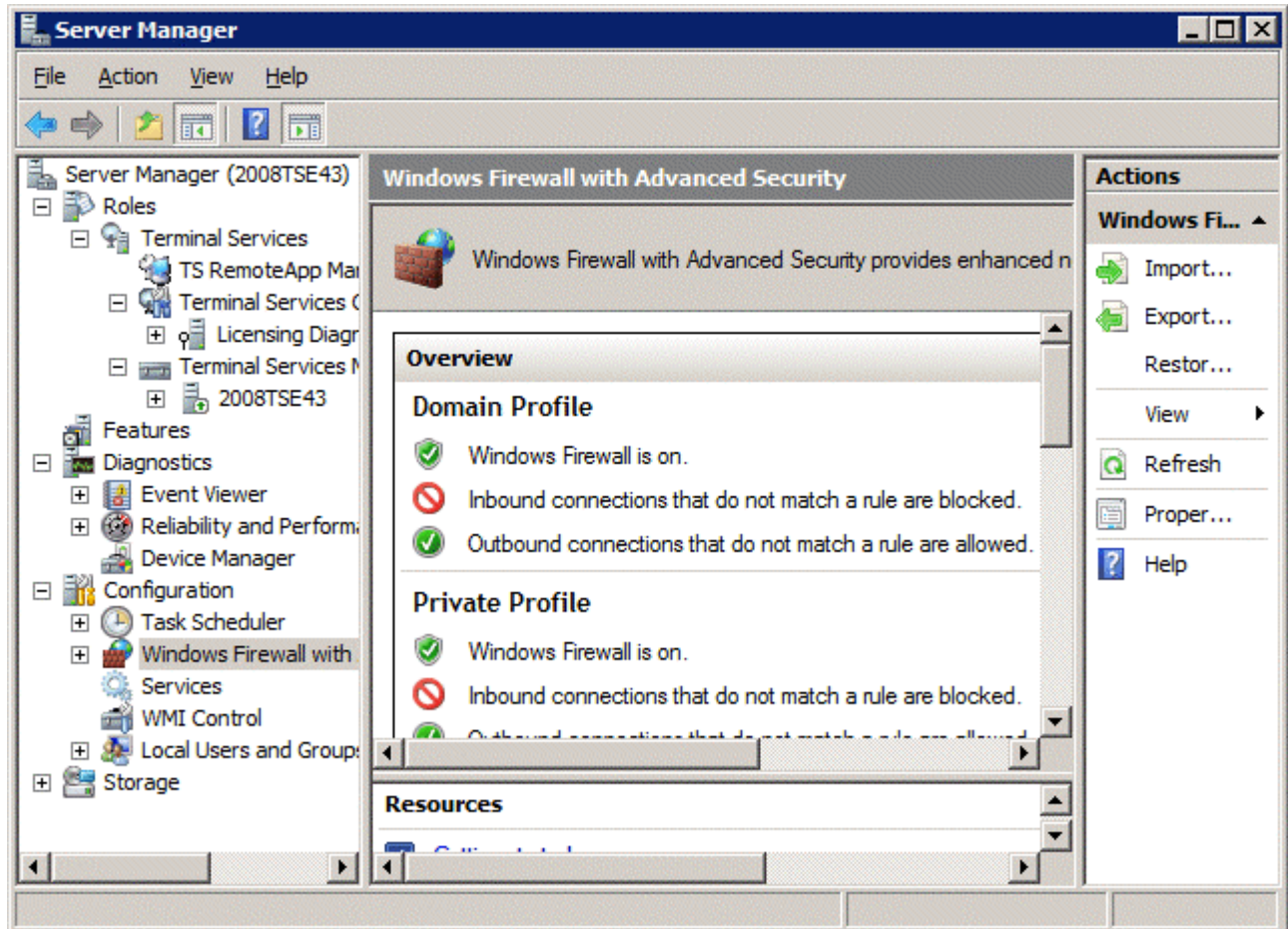
28.4.6 Allow Inbound Traffic to Firewall

ThinManager requires communications to the thin clients. This communication is blocked by default in the firewall and needs to be allowed.

You can either open the firewall to all traffic or open the specific ports needed.

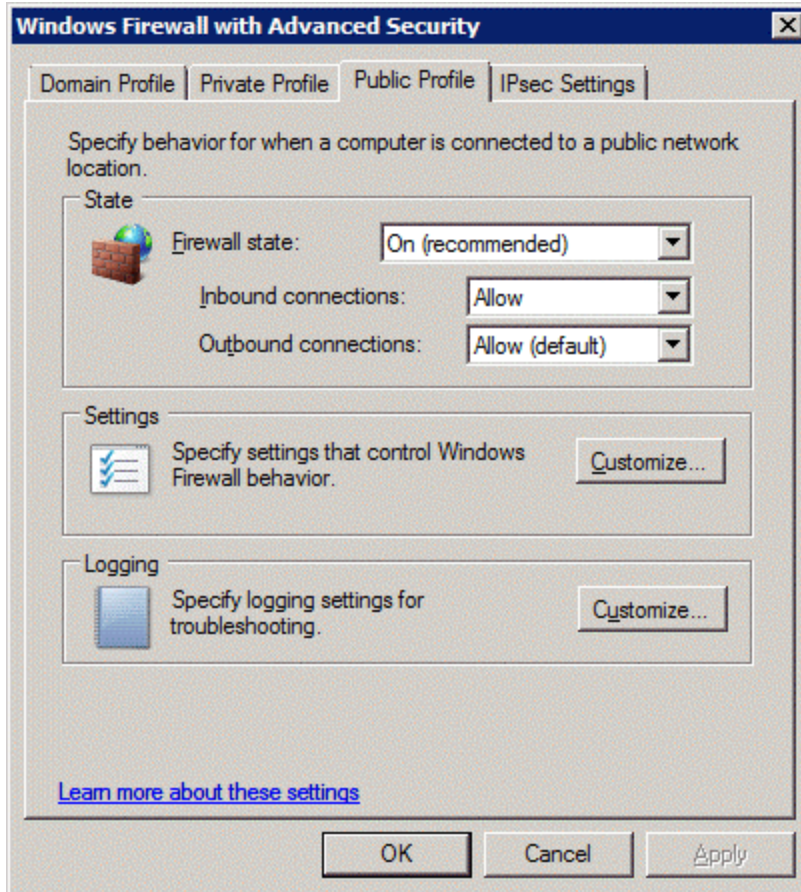
28.4.6.1 Allow All Inbound Traffic

You can configure the firewall by selecting **Windows Firewall with Advanced Security** in the **Server Manager** tree.



Windows Firewall with Advanced Security

Highlight **Windows Firewall with Advanced Security** in the **Server Manager** tree. Right click and select **Properties** to launch the **Properties** window.



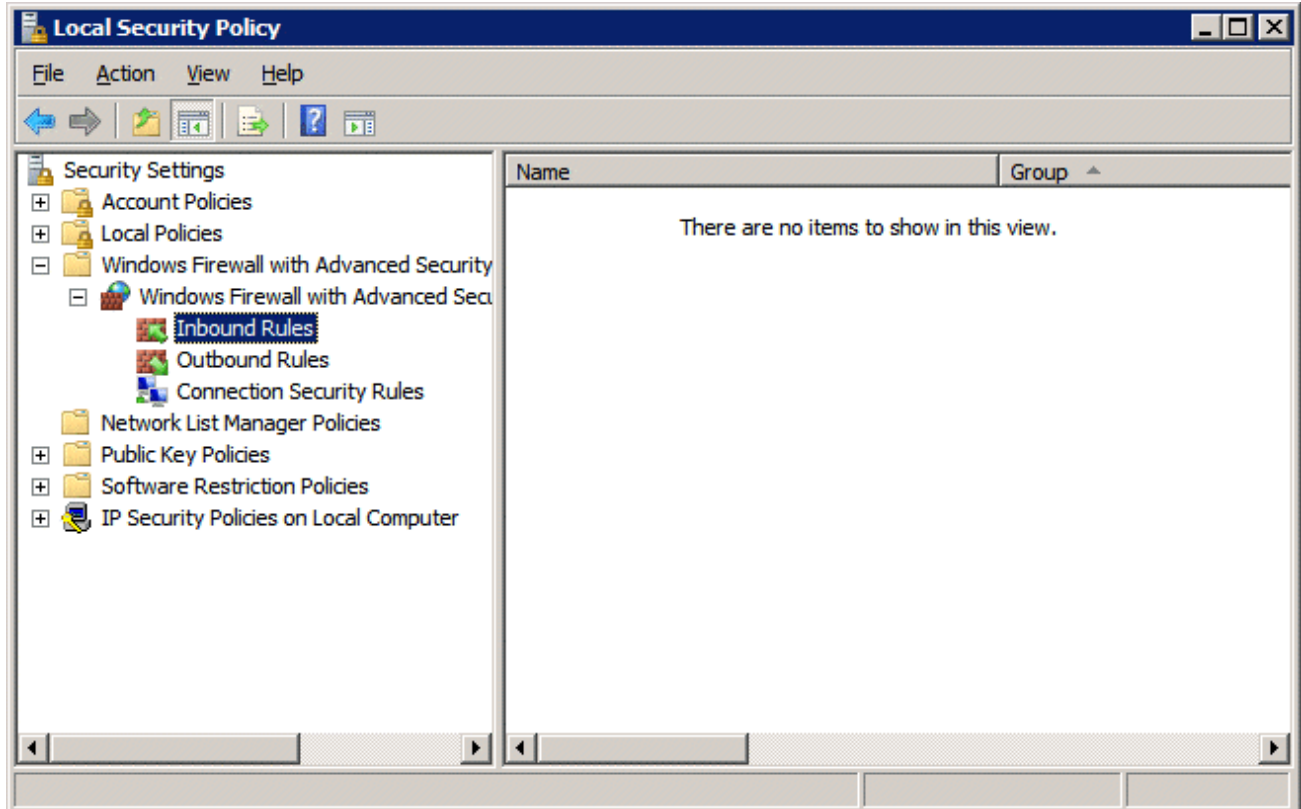
Windows Firewall with Advanced Security Properties

Select the profile tab that matches the type of network you are using, **Domain**, **Private**, or **Public** profile. Change the **Inbound connections** to **Allow** and select **OK** to accept the change. This will allow the thin clients to connect to ThinManager through the firewall.

28.4.6.2 Open Ports in Firewall

You can open specific ports in the Windows 2008 Server firewall instead of allowing all inbound connections if you prefer.

Open the **Local Security Policy** by selecting the **Start > Administrative Tools > Local Security Policy**.

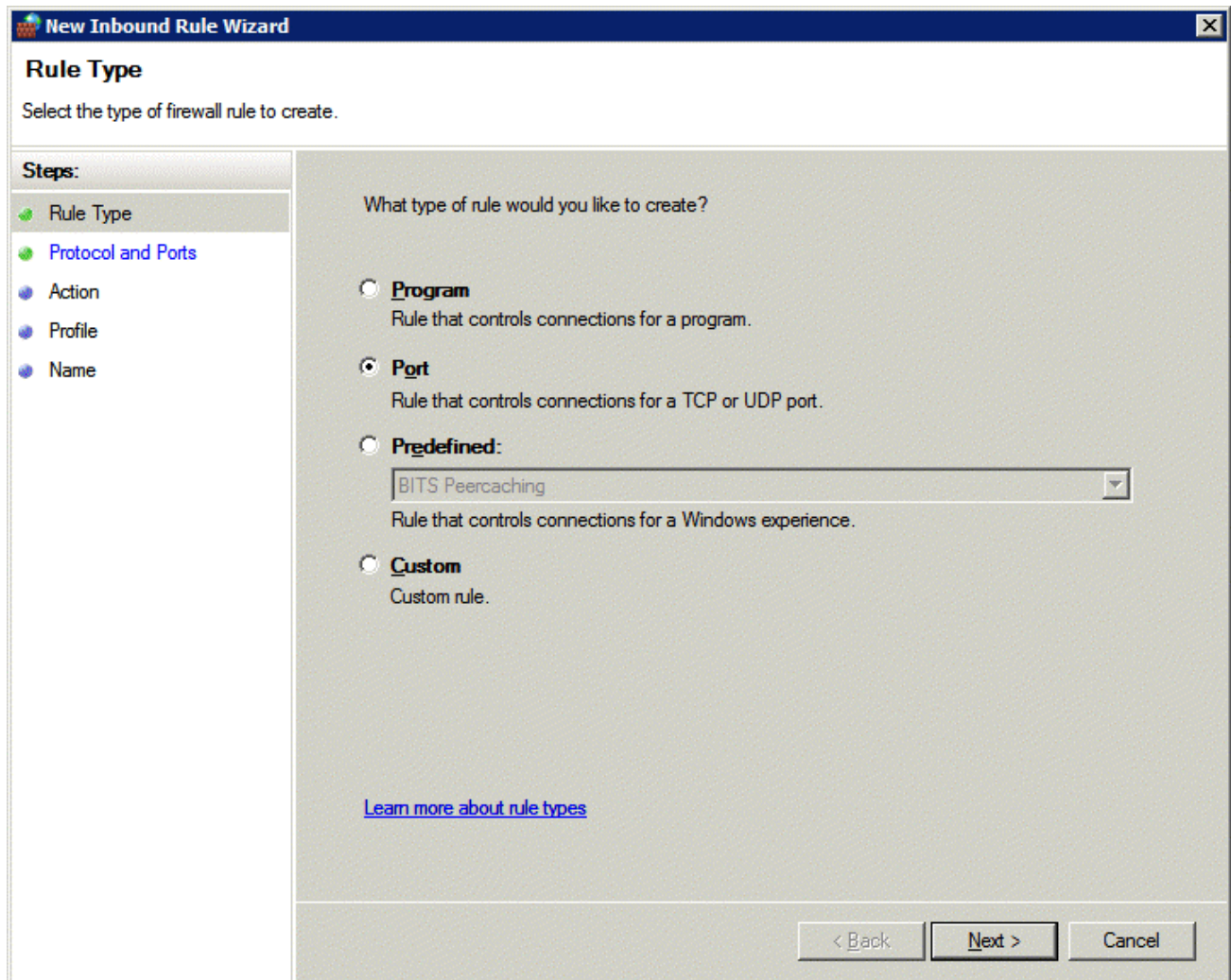


Local Security Policy

Expand the **Windows Firewall with Advanced Security** to show the **Inbound Rules**.

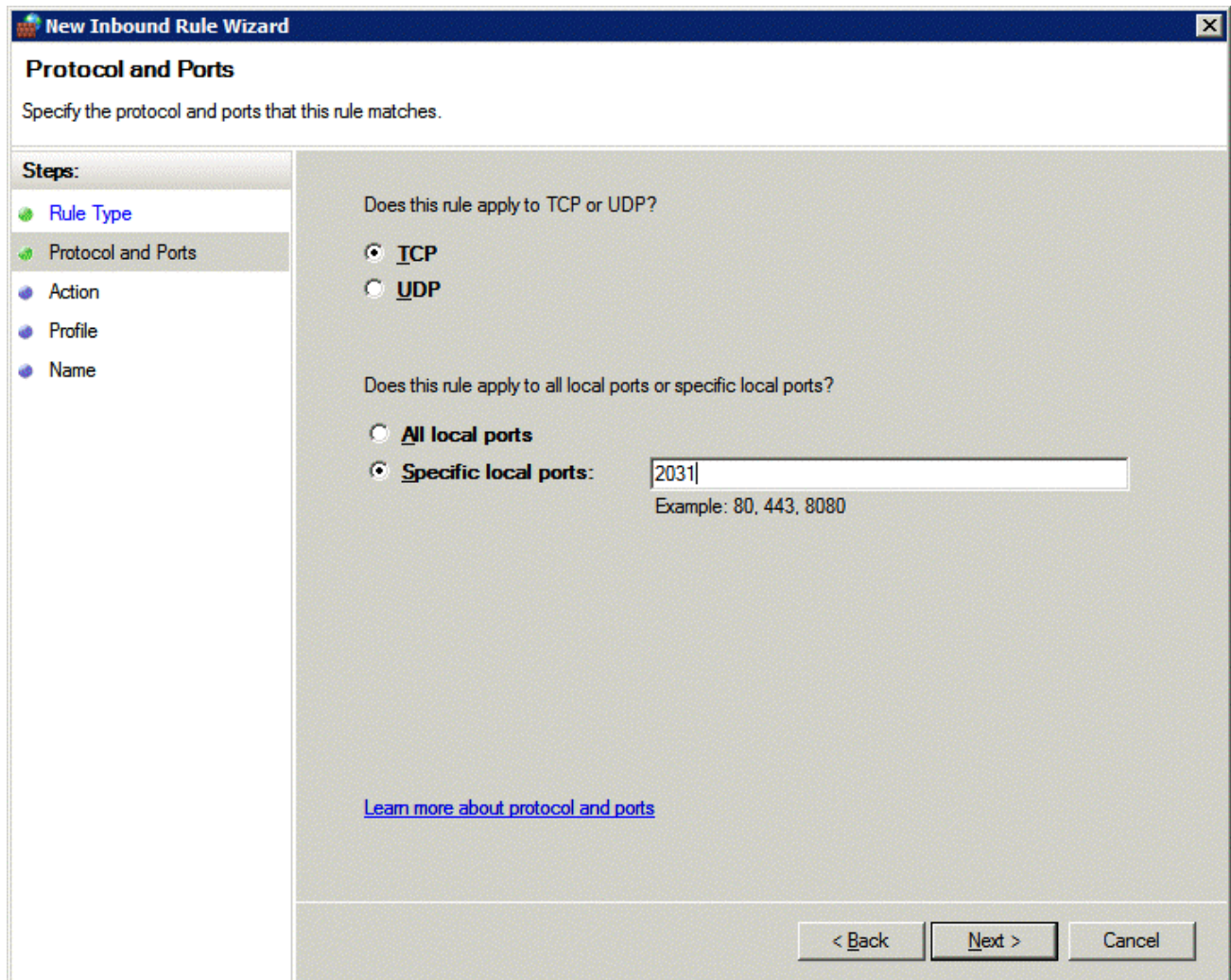
Right click on the **Inbound Rules** and select **New Rule**. A wizard will launch that allows configuration of a new port.

You need to run the wizard twice, once to allow **UDP 4900** and once to allow **TCP 2031**.



Rule Wizard – Rule Type

Select **Port** as the rule you are configuring and select **Next** to continue.

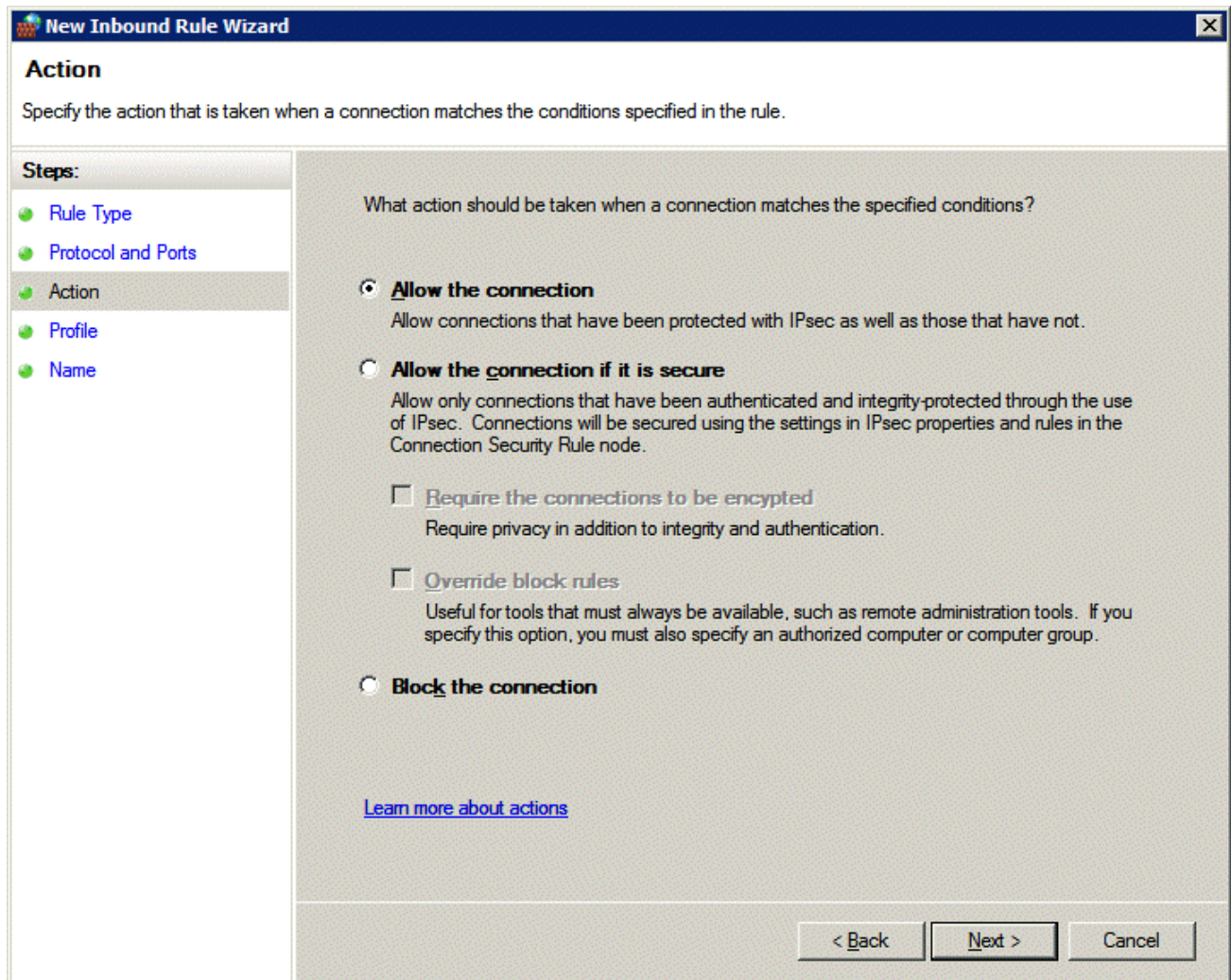


Rule Wizard – Protocols and Ports

You will need to select the protocol and port for each rule. You will need to run the wizard once for UDP 4900 and once for TCP 2031.

Select the protocol and enter the port as shown in *Rule Wizard – Protocols and Ports*.

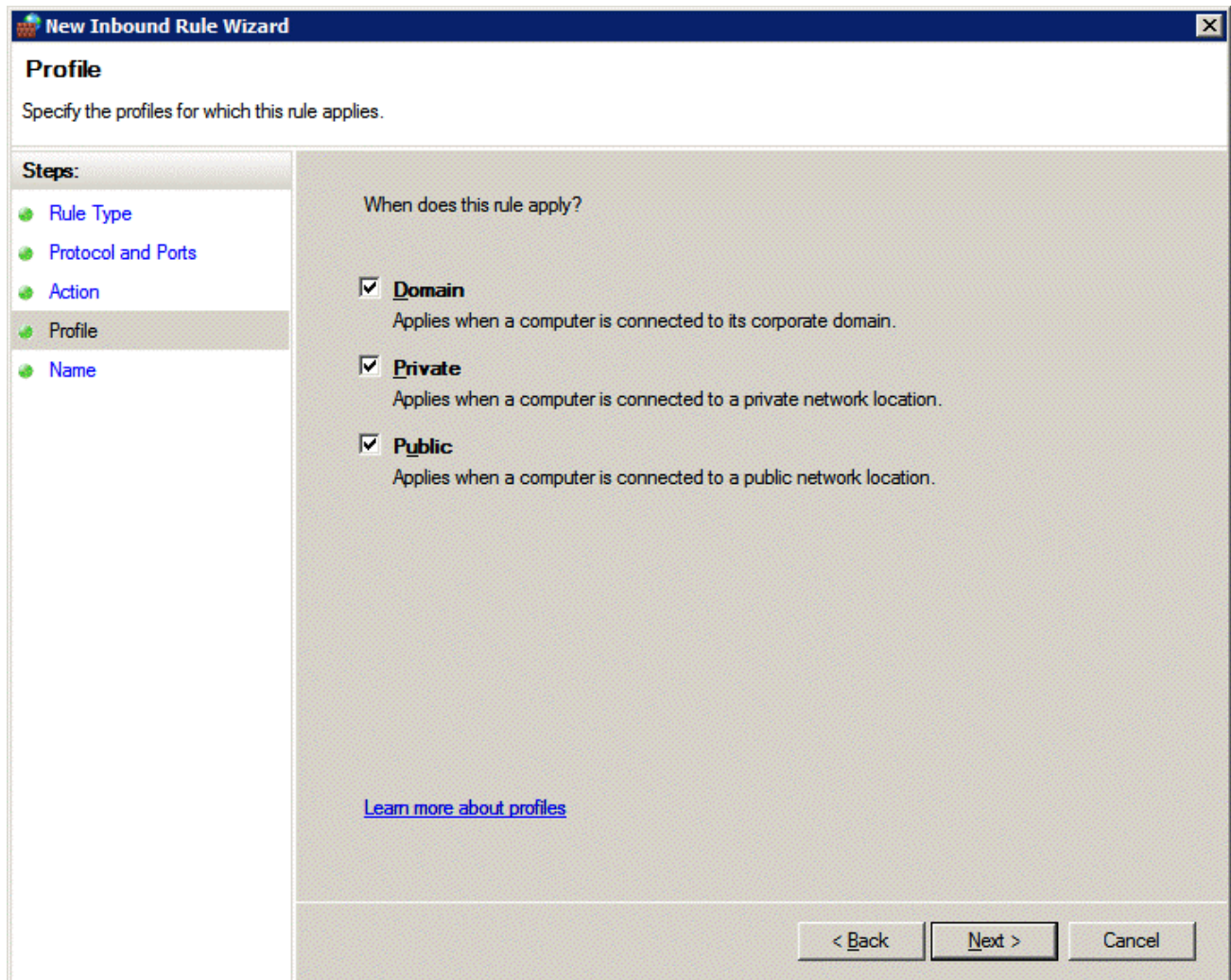
Select **Next** to continue.



Rule Wizard – Action

Select **Allow the Connection**.

Select **Next** to continue.



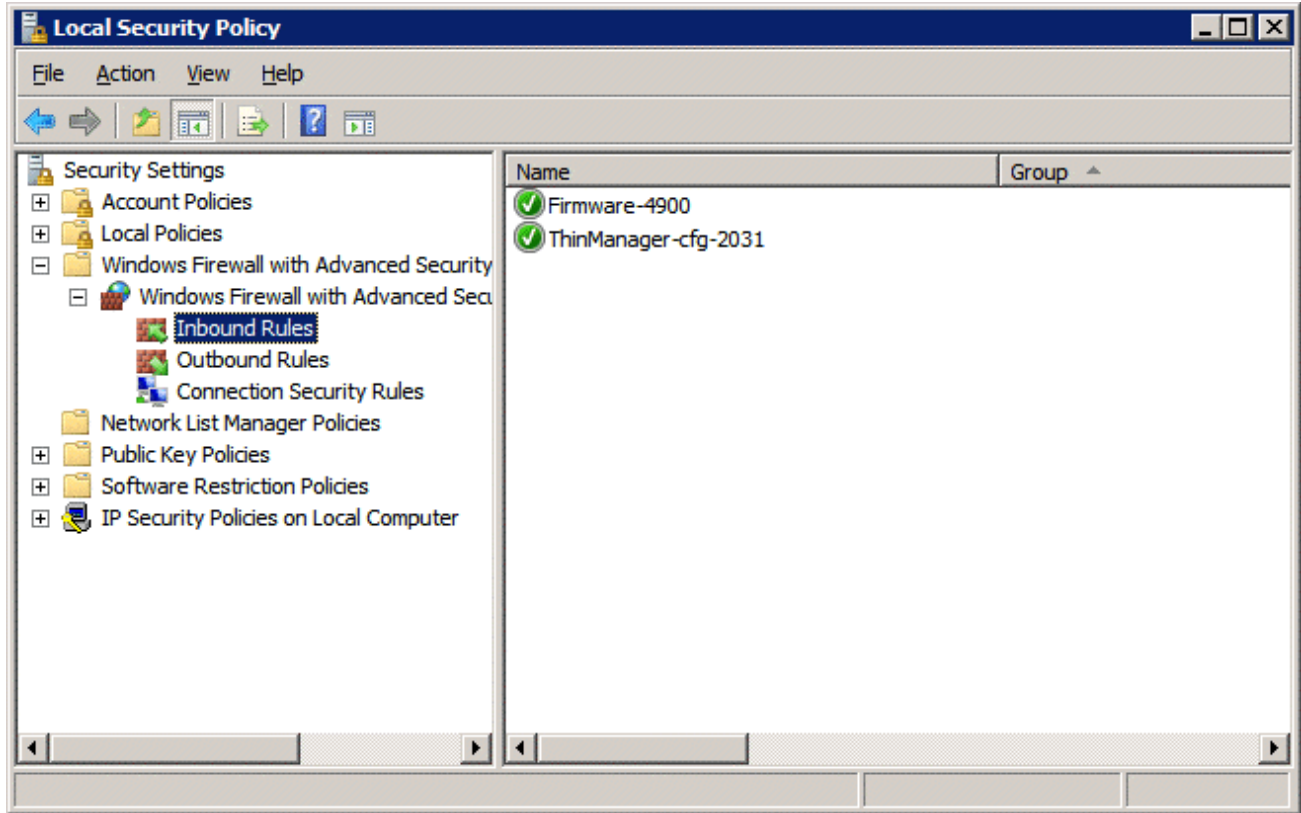
Rule Wizard – Profile

Select the network(s) that the rule will apply to.

Select **Next** to continue.

A **Name** page will allow you to name the rule and add a description for management and organizational purposes.

Select **Finish** to save and apply the rule.



Applied Rules

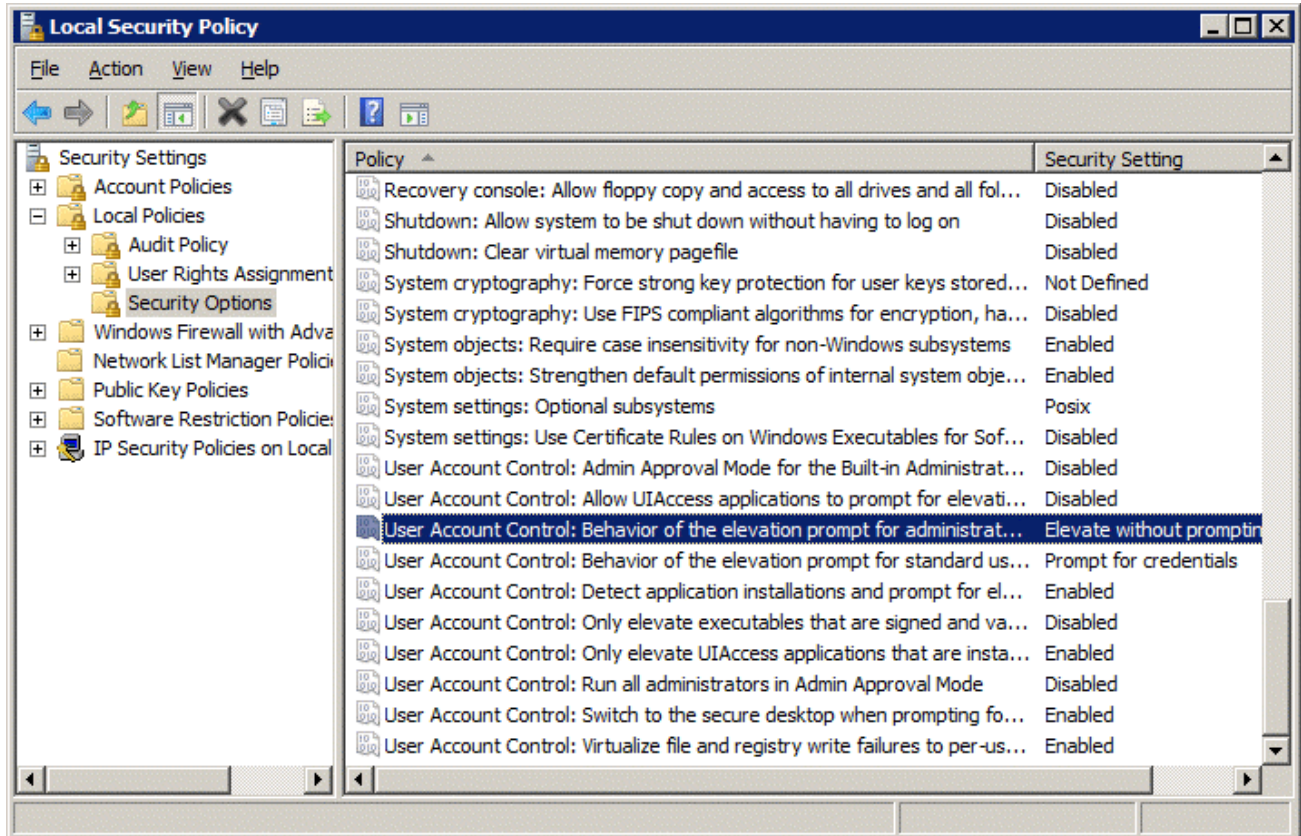
Repeat for **UDP 4900** or **TCP 2031**.

This will allow thin clients to use port 4900 to download the firmware and allow the thin client to use port 2031 to download the configuration but will keep other ports closed on the firewall.

28.4.7 Local Security Policy – User Access Controls

You may need to go to the Local Security Policy and change the **User Account Control: Behavior of the elevation prompt for administrators in Admin Approval Mode** to *Elevate without prompting* for ThinManager to run properly.

Open the **Local Security Policy** by selecting the **Start > Administrative Tools > Local Security Policy**.



Local Security Policy – User Account Controls

Highlight **Local Policies > Security Options** in the tree.

Browse to **User Account Control: Behavior of the elevation prompt for administrators in Admin Approval Mode** and change the setting to *Elevate without prompting*.

This may be needed to run ThinManager as a non-administrator.

28.5 Command Prompt

Terminal Services has several commands that aid in managing the terminal server. Some useful ones are:

Command	Action
change logon	Temporarily disables logons to a Terminal Server
change port	Changes COM port mappings for MS-DOS program compatibility
change user /install	Puts the server into "Install Mode"
change user /execute	Removes the server from "Install Mode"
Ipconfig	Displays the IP addresses of the network card
Logoff	Logs off a user from a session and deletes the session from the server
net send <i>username</i> " <i>message</i> "	Sends a message to a user. <i>username</i> is the NT/2000 user name that the person or terminal is logged in as. " <i>message</i> " is the text of the message. Quotation marks are needed for any messages containing a space.
query process	Displays information about processes running on a Terminal server
query session	Displays information about sessions on a Terminal server
query termserver	Displays a list of all Terminal servers on the network
query user	Displays information about user sessions on a Terminal server
reset session	Resets a session to known initial values
Shadow	Monitors another user's session
Tsdiscon	Disconnects a client from a terminal server session
Tsshutdn	Shuts down the terminal server in an orderly manner

See the Windows online help for additional commands and parameters.

Other useful commands include:

Command	Action
gpedit.msc	Launches the Group Policy Editor
tscc.msc	Launches the Terminal Services Configuration Console
tsadmin	Launches the Terminal Services Manager

28.6 Alternative Terminal Keystrokes

Certain keystrokes are not available in a terminal session. Microsoft has provided these alternatives.

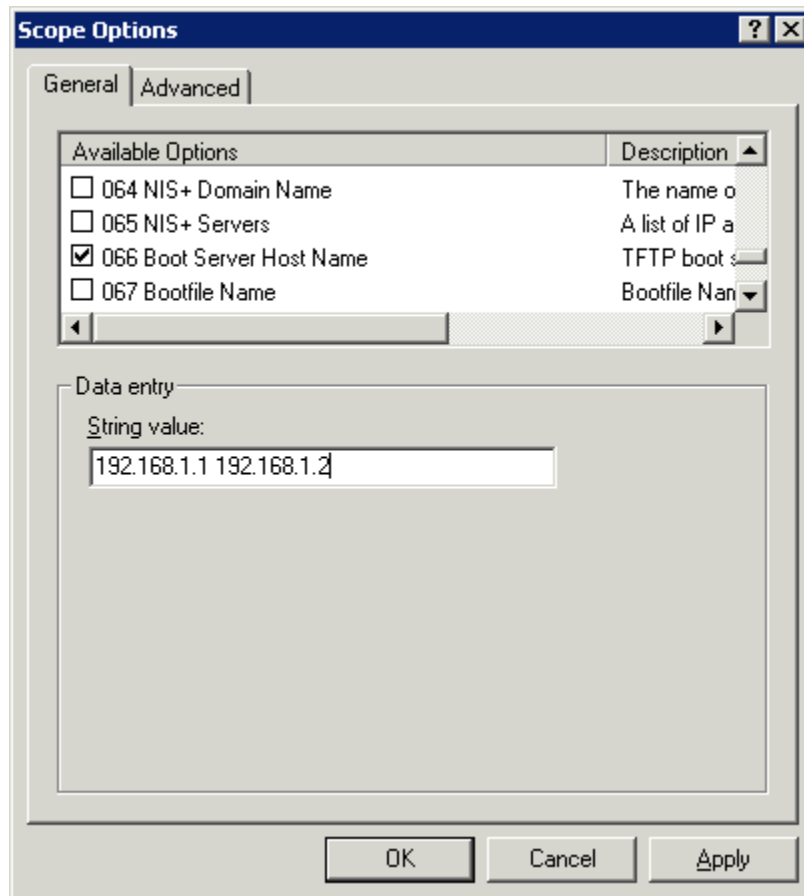
Keystroke	Function
ALT+PAGE UP	Switches between programs from left to right.
ALT+PAGE DOWN	Switches between programs from right to left.
ALT+INSERT	Cycles through the programs in the order they were started.
ALT+HOME	Displays the Start menu.
CTRL+ALT+BREAK	Switches the client between a window and full screen.
CTRL+ALT+END	Brings up the Windows 2000 Security dialog box.
ALT+DELETE	Displays the Windows menu.
CTRL+ALT+Minus (-) symbol on the numeric keypad	Places a snapshot of the active window, within the client, on the Terminal server clipboard (provides the same functionality as pressing PrintScrn on a local computer.)
CTRL+ALT+Plus (+) symbol on the numeric keypad	Places a snapshot of the entire client window area on the Terminal server clipboard (provides the same functionality as pressing ALT+PrintScrn on a local computer.)

28.7 DHCP Server Setup

Dynamic Host Configuration Protocol (DHCP) is a program that assigns IP addresses to devices on a network. DHCP server can be used to provide IP addresses to thin clients. It can also be configured to point the thin clients to the ThinManager Servers with **Option 66, Boot Server Host Name**.

28.7.1.1 Scope Options

The DHCP Server needs **Option 066** configured before it will provide the ThinManager Server IP address that the terminal needs to boot.



Boot Server Host Name

The **Boot Server Host Name, Option 066**, assigns a ThinManager server to the terminal.

Open the Scope Options dialog box by highlighting the **Scope Option** folder in the tree pane of the Computer Management Console under the **Services and Application > DHCP** folder and selecting **Action > Configure Options**.

Scroll through the list window and check the **Option 066** check box.

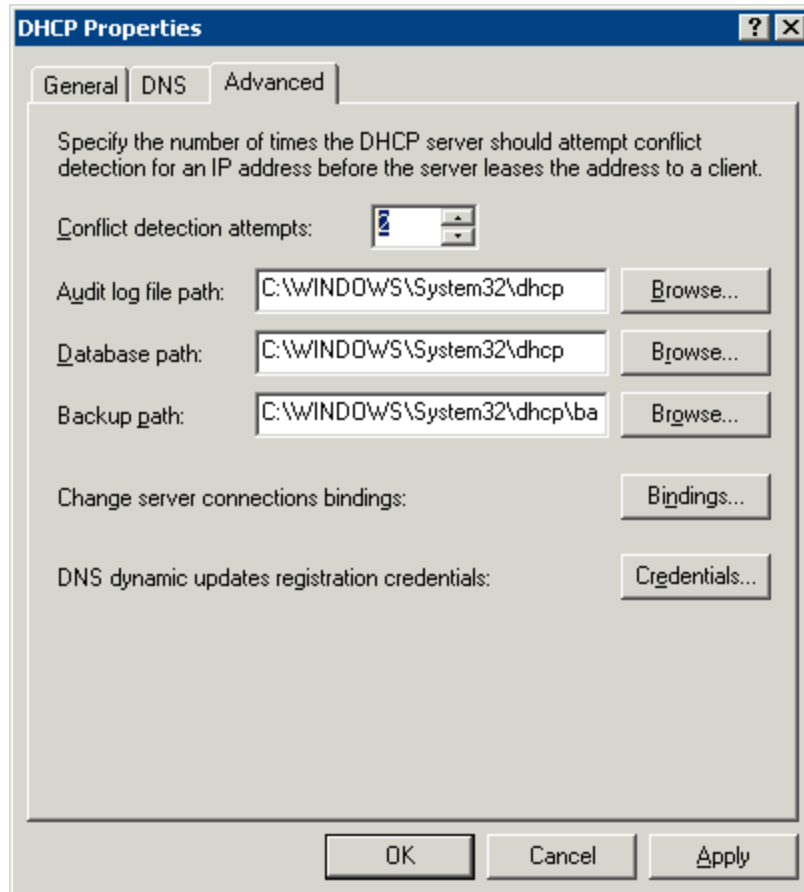
Enter the IP address of the desired ThinManager server in the **String Value** field.

The DHCP Server can issue the IP address for a Primary ThinManager Server and a Secondary ThinManager Server by listing the IP addresses of both, separated with a space.

28.7.1.2 DHCP Properties

The DHCP Server can be configured to check for duplicate IP addresses before issuing a new address. This is a good feature to use.

Highlight **DHCP** under **Services and Applications** in the **Computer Management** tree and select **Action > Properties**, or right-click on **DHCP** and select **Properties**. The **DHCP Properties** window will launch.



DHCP Properties – Advanced Tab

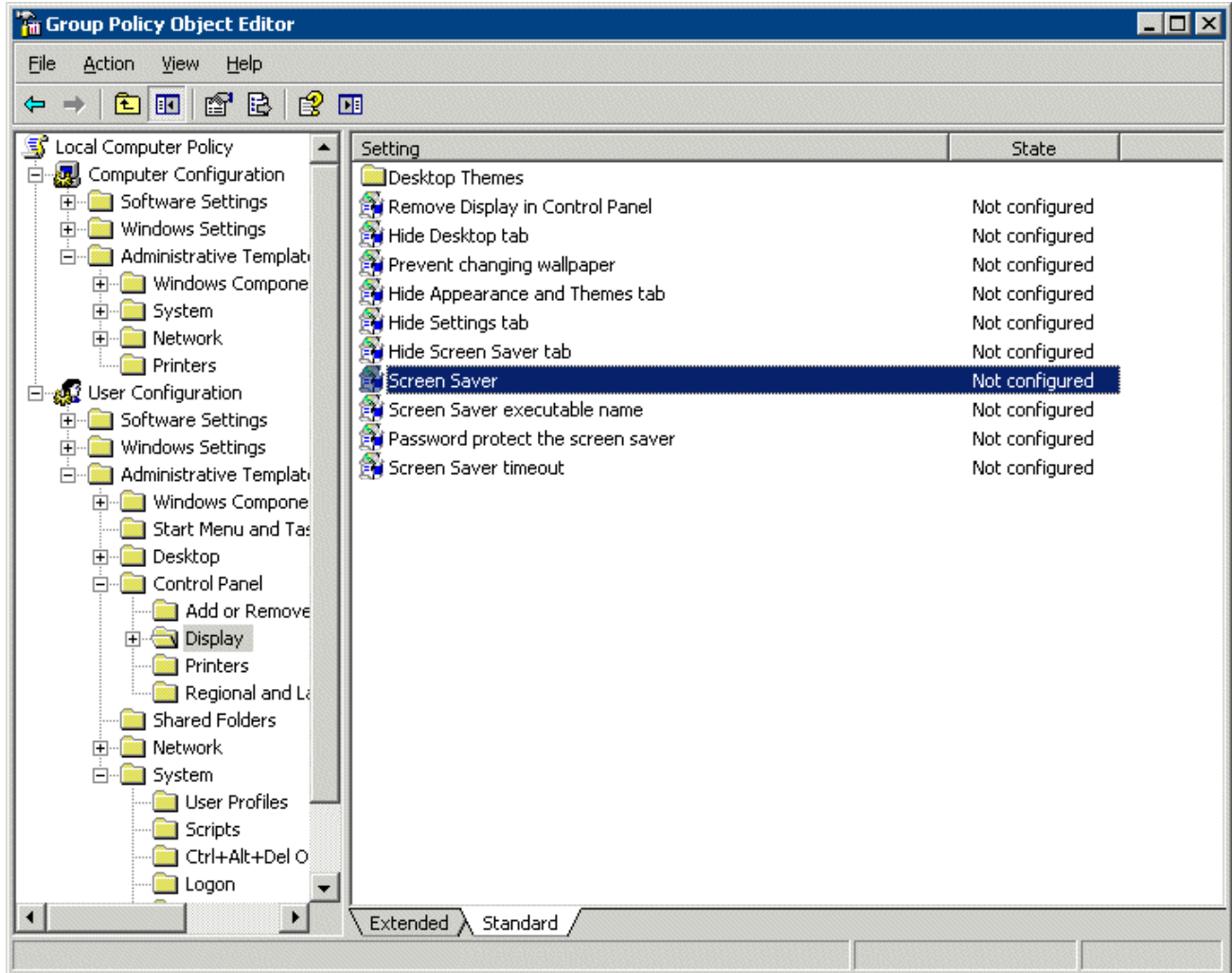
Select the **Advanced** tab. Replace the zero in the **Conflict detection attempts** field with an integer. This will prompt the DHCP Server to check for duplicate IP addresses before assigning an IP address.

Select **OK** when finished.

28.8 Group Policy

Windows has a number of features that can be allowed or prevented with a Group Policy. Group Policy is configured in the Group Policy Object Editor snap-in to the Microsoft Management Console.

Access the Group Policy Editor by typing **gpedit.msc** at a command prompt to launch the Microsoft Group Policy Editor.



Group Policy Settings

Expanding the tree will show Group Policy settings that can affect the terminal server experience.

Please refer to Microsoft documentation for information on using these features.

28.9 Microsoft Licenses

28.9.1 Microsoft Client Access Licenses (CALs)

Thin Clients require a terminal server with **Windows 2003** or **2008 Server** with **Terminal Services** enabled as an operating system.

Each of these operating systems requires a standard Microsoft Client Access License (CAL) for each connection to the server. These are based on concurrent use; a 5-pack would allow more than five users to access server resources, but only five users at a time.

28.9.2 Microsoft Terminal Server Licenses

Terminals, such as thin clients and fat clients, require a license to access terminal services in addition to the standard Microsoft Client Access License (CAL). This is called the **Microsoft Terminal Services Client Access License (TS CAL)** in Windows 2003 and is called the **Remote Desktop Services Client Access License (RDS CAL)** in Windows 2008.

Windows 2003 terminal servers require Windows 2003 TS CALs and Windows 2008 terminal servers require Windows 2008 RDS CALs.

Note: This document will refer to all terminal services CALs as a TS/RDS CALs.

. This licensing is **per seat**; ten terminals would require ten TS/RDS CALs, even if only two were connected at a time.

These can be installed as Per Device or Per User.

- The TS/RDS Device CAL licenses one device to connect to any Microsoft Terminal Servers as any user. This functions like the previous Windows 2000 TS CAL.
- The TS/RDS User CAL licenses one user for any device to connect to any Microsoft Terminal Servers.

All TS/RDS CALs are installed on a **Terminal Services Licensing Server**. This acts as a repository for all TS/RDS CALs. The terminal servers request TS/RDS CAL authentication from the Terminal Services Licensing Server as terminals attach to terminal servers.

Note: The Terminal Server Licensing Server does not need to be a separate computer. It is a program that can be installed on any existing server.

The Terminal Services Licensing server is activated through the Internet by connecting to the Microsoft Certificate Authority and License Clearinghouse.

Windows 2003 and 2008 Servers with Terminal Services enabled will issue 90-day or 120-day temporary licenses while the Terminal Services Licensing server is being setup and activated. If this period has elapsed, the terminal will not connect to the terminal server and will display an "Error Number 50" message box.

Windows Server is not normally sold with TS CALs. These need to be purchased separately and installed on the Terminal Services License server.

28.9.3 Microsoft Terminal Server Licensing Activation

In Windows 2003 and 2008, all the TS CALs are installed on a single Terminal Server Licensing Server. This allows a single site for management and authentication of terminal server connections. A server becomes a Terminal Server Licensing Server by selection of the option during the installation phase or by selecting **Add/Remove Programs > Add/Remove Windows Components** from the Control Panel and selecting the Terminal Services Licensing.

The licensing of the Microsoft components of a Windows 2003 or 2008 terminal server is a two-step process; one must first authorize the Terminal Server Licensing Server, then one must activate the licenses. The license activation will be repeated for each license pack.