



Workstation
Server
Enterprise

Installing and Configuring Remote Access Service (RAS)

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About Chapter 19

The focus of this chapter is on Remote Access Service (RAS), the Windows NT service that enables dial-up network connections between a RAS server and a Dial-Up Networking client computer.

First, the chapter explains the various RAS connection types, and the connection and transport protocols supported by RAS. The RAS NetBIOS gateway and RAS name resolution are also introduced.

Next, the steps to install and configure RAS are outlined. Then the chapter discusses how to use Remote Access Admin to manage a RAS server.

Next, Chapter 19 details how to configure Dial-Up Networking connections. Dial-Up Networking is the client/dial out component of RAS. Configuring Dial-Up Networking to connect to the Internet is also addressed.

Finally, Chapter 19 presents tips on troubleshooting common RAS problems.

This chapter includes a review activity that will give you practice troubleshooting RAS problems. It also includes a hands-on lab, during which you'll install and configure RAS on a Windows NT Server computer, and then install RAS and configure Dial-Up Networking on a Windows NT Workstation computer.

Chapter 19 is a "must read," no matter which of the three Windows NT 4.0 Microsoft Certified Professional exams you're preparing for. This chapter maps to the Dial-Up Networking objective for the Workstation exam, and to the RAS objectives for the Server and Enterprise exams.

RAS Overview

Remote Access Service (RAS) is a Windows NT service that enables dial-up network connections between a RAS server and a Dial-Up Networking client computer. RAS includes software components for both the RAS server and the Dial-Up Networking client in a single Windows NT service.



RAS is a complex topic. Even Administrators who manage RAS servers on a daily basis are well advised to study the details and nuances presented in this chapter before taking any of the three Windows NT exams. Become familiar with the various dialog boxes and configuration options. I recommend you review this chapter just prior to taking any of the NT exams.

RAS enables users of remote computers to use the network as though they were directly connected to it. Once the dial-up connection is established, there is no difference in network functionality, except the speed of the link is often much slower than a direct connection to the LAN.

RAS is an important networking function in light of today's highly mobile workforce. With RAS and Dial-Up Networking, users can connect to their company's network from home, from a hotel room, or from a client's remote office.

RAS can be installed on both Windows NT Server and Windows NT Workstation computers. On Windows NT Server computers, RAS can support up to 256 simultaneous dial in connections. On Windows NT Workstation computers, however, RAS only supports a single dial in connection. For this reason, a Windows NT Workstation computer is not typically used as a RAS server.

Client computers that run MS-DOS, Windows 3.1 *x*, Windows for Workgroups, Windows 95, and Windows NT can be configured as Dial-Up Networking or RAS client computers. These clients can all connect to a Windows NT RAS server.

RAS supports multiple connection types, connection protocols, and transport protocols. These features are discussed in the following sections.

RAS Connection Types

Dial-Up Networking client computers can connect to a RAS server by using a variety of connection types, including:

- a standard telephone line (also called a *Public Switched Telephone Network* or PSTN) and modem
- ISDN
- X.25
- Point-to-Point Tunneling Protocol (PPTP)

Probably the most common connection type is a standard analog telephone line (also called *plain old telephone service* or POTS) and modem. This service is inexpensive and widely available.

Many modems are supported by Windows NT. You can determine if your modem is supported by checking the *Windows NT Hardware Compatibility List* (HCL), or by trying to have Windows NT autodetect your modem. Unsupported modems can generally be used by adding an entry for that modem to the `Modem.inf` file in the

<Winntroot>\System32\Ras folder. (Instructions for adding a new entry to this file are contained in the file.)

Integrated Services Digital Network (ISDN) is a digital, dial-up telephone service that supports much faster data transmission rates than a standard analog telephone line. The standard ISDN connection is called an ISDN *Basic Rate Interface* (BRI) line. An ISDN BRI line consists of three separate data channels. Two of these channels (called *B channels*) support telephone or data communications at a rate of 64Kbps. The third channel is called a *D channel*, and is used to establish and maintain the connection. If both B channels are used together, data transmission rates of up to 128Kbps can be supported.

ISDN lines must be installed at both the dial-up server and Dial-Up Networking client locations. Additionally, an ISDN adapter card with either an internal or external network terminating unit (NT1) must be installed in the dial-up server and in the Dial-Up Networking client. (The ISDN adapter card takes the place of a modem.) Finally, you may need a *Service Provider Identification* (SPID) number to configure the ISDN adapter cards. If needed, you can obtain the SPID from the telephone company that provides your ISDN service.

X.25 is a packet-switching protocol that is used on dial-up or leased lines. X.25 is available in most countries. An X.25 connection requires a fair amount of hardware, including an X.25 adapter card, with either a built-in or external *Packet Assembler/Disassembler* (PAD) in the dial-up server and in the Dial-Up Networking client. Additionally, access to an X.25 packet-switched network is required at both the dial-up server and the Dial-Up Networking client locations.

Point-to-Point Tunneling Protocol (PPTP) is not a physical connection type. Rather, it is a virtual network connection that is “tunneled” inside of an existing TCP/IP network connection. RAS encryption can be used with PPTP to provide a secure, private connection over a public TCP/IP network, such as the Internet. Because PPTP uses an existing TCP/IP network connection, no additional hardware is required.

Connection Protocols Supported by RAS

RAS communications can be carried out over several connection protocols. These protocols provide the data-link connectivity for Dial-Up Networking in much the same way as Ethernet, ARCNET, or Token Ring provide the data-link connectivity on a local area network. Each of these protocols has different features and capabil-

ities. The connection protocols commonly used by RAS include: Serial Line Internet Protocol (SLIP), Point-to-Point Protocol (PPP), Point-to-Point Multilink Protocol, and Point-to-Point Tunneling Protocol (PPTP). These protocols are discussed in the following sections.

Serial Line Internet Protocol (SLIP)

The *Serial Line Internet Protocol* (SLIP) is an older connection protocol, commonly associated with UNIX computers, that only supports one transport protocol—TCP/IP. SLIP connections don't support NWLink IPX/SPX Compatible Transport or NetBEUI.

The version of SLIP supported by Windows NT 4.0 requires a static IP address configuration at the client computer—dynamic IP addressing is not supported. Additionally, password encryption is not supported by this version of SLIP. A script file is usually required to automate the connection process when SLIP is used.

Windows NT RAS can't be used as a SLIP server. Only the Dial-Up Networking portion of RAS (the client side) supports SLIP. This means that only dial out SLIP connections are supported—such as when a Dial-Up Networking client computer dials out to connect to a UNIX SLIP server. (The Dial-Up Networking client computer, in this case, can be either a Windows NT Server or Windows NT Workstation computer that has RAS installed on it.)

Point-to-Point Protocol (PPP)

Point-to-Point Protocol (PPP) is a newer connection protocol that was designed to overcome the limitations of SLIP. PPP is currently the industry standard remote connection protocol, and is recommended for use by Microsoft.

PPP connections support multiple transport protocols, including: TCP/IP, NWLink IPX/SPX Compatible Transport, and NetBEUI. Additionally, PPP supports dynamic server-based IP addressing (such as DHCP).

PPP supports password encryption, and the PPP connection process does not usually require a script file.

PPP is supported over both dial in and dial out connections. Windows NT computers that have RAS installed on them can function either as Dial-Up Networking clients or as RAS servers when using PPP.

Point-to-Point Multilink Protocol

Point-to-Point Multilink Protocol is an extension of PPP. Point-to-Point Multilink Protocol combines the bandwidth from multiple physical connections into a single logical connection. This means that multiple modem, ISDN, or X.25 connections can be bundled together to form a single logical connection with a much higher bandwidth than a single connection can support.

In order to implement Point-to-Point Multilink Protocol, multiple modems and telephone lines (or multiple ISDN adapter cards and lines; or multiple X.25 adapters, PADs, and connections) are required at *both* the RAS server and at the Dial-Up Networking client locations. Additionally, both sides of the connection must be configured to use Point-to-Point Multilink Protocol.

Point-to-Point Tunneling Protocol (PPTP)

Point-to-Point Tunneling Protocol (PPTP) permits a virtual private encrypted connection between two computers over an existing TCP/IP network connection. The existing TCP/IP network connection can be over a LAN or over a Dial-Up Networking TCP/IP connection (including the Internet). All standard transport protocols are supported within the PPTP connection, including NWLink IPX/SPX Compatible Transport, NetBEUI, and TCP/IP.

A primary reason for choosing to use PPTP is that it supports the RAS encryption feature over standard, unencrypted TCP/IP networks, such as the Internet.

Transport Protocols Supported by RAS

All Windows NT standard transport protocols are supported by RAS. Client computers can connect to a RAS server by using:

- NetBEUI
- TCP/IP
- IPX—Including NWLink IPX/SPX Compatible Transport

The DLC protocol is *not* supported by RAS.

Client computers can use one or more of these transport protocols on a RAS connection. For example, a client computer that needs to access a NetWare server and a UNIX host via a RAS server can use both NWLink IPX/SPX Compatible Transport and TCP/IP during a single RAS session.

A RAS server acts as a router for client computers that use TCP/IP or IPX, enabling these clients to access other computers on the network via the RAS server's routing functionality. Access to NetBIOS-based resources (such as shared folders and printers, Lotus Notes servers, SQL Servers, and SNA Servers) and protocol-specific resources (such as NetWare servers and World Wide Web servers) is possible because of the RAS server's routing capability. The RAS server can only route protocols that are installed on the RAS server. For example, if a client computer has NWLink IPX/SPX Compatible Transport installed, but the RAS server doesn't, the client computer won't be able to access IPX-based resources, such as a NetWare server.

A RAS server acts as a NetBIOS gateway for client computers that use the NetBEUI protocol.

RAS NetBIOS Gateway

The *RAS NetBIOS gateway* is a function of the RAS server. The RAS NetBIOS gateway enables client computers that use NetBEUI to access shared resources on other servers located on the RAS server's local network. These other servers can use TCP/IP, NWLink IPX/SPX Compatible Transport, or NetBEUI. In a nutshell, the RAS NetBIOS gateway performs protocol translation for the remote NetBEUI client computer so it can access shared resources on the RAS server's local network.

Only NetBIOS-based services (such as shared folders and printers, Lotus Notes servers, SQL Servers, and SNA Servers) can be accessed by NetBEUI client computers via the RAS NetBIOS gateway. Protocol-specific services (such as NetWare servers and World Wide Web servers) can't be accessed by NetBEUI client computers via the RAS NetBIOS gateway.

Even though RAS enables up to 256 simultaneous connections, the NetBIOS gateway has a maximum connection limit of 250 simultaneous connections. This is a NetBIOS limitation, not a RAS limitation.

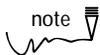
RAS Name Resolution

The same methods that are used for NetBIOS name resolution and browsing functionality on a Windows NT network are supported by RAS and are used by Dial-Up Networking client computers that connect to a RAS server. Supported NetBIOS name resolution methods include:

- NetBIOS broadcasts
- WINS servers
- DNS servers
- LMHOSTS files
- HOSTS files

Installing and Configuring RAS

Before installing RAS, you should install and configure all of the transport protocols you plan to use on the RAS server. Also, you should install and configure at least one connection device, such as a modem, ISDN adapter card, or X.25 adapter card in the Windows NT computer that you plan to install RAS on. Or, you can install the Point-to-Point Tunneling Protocol (PPTP).



note If you don't install a connection device or PPTP before installing RAS, the RAS installation program will prompt you to do so during installation.

The following sections explore the various steps involved in installing RAS, including configuring modems, ports, protocols, and encryption.

Installing RAS

This section explains how to install RAS on a Windows NT computer.

TO INSTALL RAS ON A WINDOWS NT COMPUTER, FOLLOW THESE STEPS:

1. Select Start > Settings > Control Panel.
2. In the Control Panel dialog box, double-click Network.
3. In the Network dialog box, click the Services tab.
4. On the Services tab, click the Add command button.
5. In the Select Network Service dialog box, highlight Remote Access Service, as shown in Figure 19-1. Click OK.

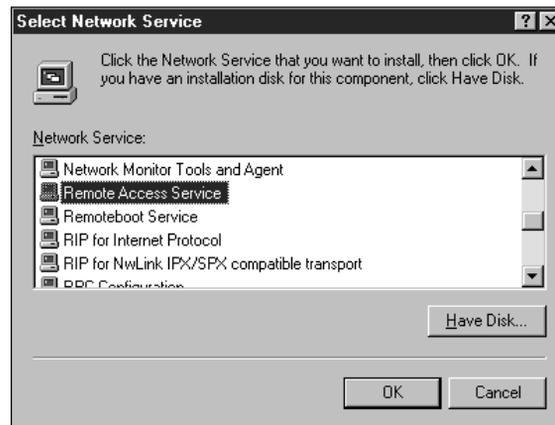


FIGURE 19-1 Installing RAS

6. A Windows NT Setup dialog box appears. Ensure the correct path to your Windows NT Server or Windows NT Workstation source files (usually the I386 folder on your Windows NT Server or Windows NT Workstation compact disc) is listed in the text box. Edit this text box if necessary. Click the Continue command button.
7. Windows NT copies source files.

After copying the RAS source files, Windows NT prompts you to configure modems and ports. These tasks are explained in the following section.

Configuring Modems and Ports

Configuring modems and ports is an integral part of the RAS installation and configuration process.

TO CONFIGURE MODEMS AND PORTS, FOLLOW THESE STEPS:

1. After Windows NT copies source files, the Add RAS Device dialog box appears, as shown in Figure 19-2. Notice that a Sportster modem is listed in the RAS Capable Devices drop-down list box. Select the modem, ISDN adapter card, X.25 adapter card, or PPTP virtual LAN connection that you installed prior to beginning the RAS installation from the RAS Capable Devices drop-down list box. Click OK.

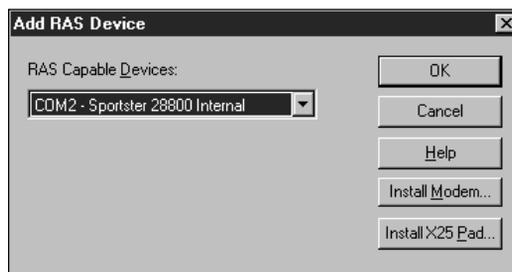


FIGURE 19-2 Adding a RAS device/port

2. The Remote Access Setup dialog box appears, as shown in Figure 19-3. To add additional RAS ports, click the Add command button. To remove a listed port, highlight the port and click the Remove command button. To configure a port's dial in/dial out properties, highlight the port and click the Configure command button.

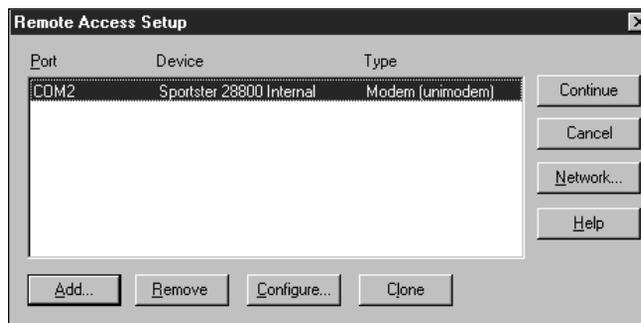


FIGURE 19-3 Managing a RAS port

3. The Configure Port Usage dialog box appears, as shown in Figure 19-4. Note the three port usage options available.

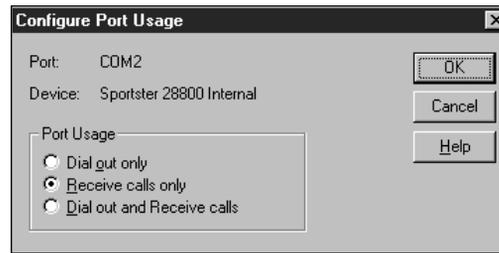
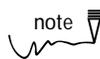


FIGURE 19-4 Configuring dial in/dial out port settings

Choose one of three options for the port:

- **Dial out only:** If you select the radio button next to “Dial out only,” the port will *only* be available for use by the Dial-Up Networking client. Selecting this radio button for *all* ports effectively selects a client-only role for this computer. This computer won’t be able to function as a RAS server if this radio button is selected for all ports.
- **Receive calls only:** If you select the radio button next to “Receive calls only,” the port will *only* be available for use by the RAS server. Selecting this radio button for *all* ports effectively selects a RAS server-only role for this computer. This computer won’t be able to function as a Dial-Up Networking client if this radio button is selected for all ports.
- **Dial out and Receive calls:** If you select the radio button next to “Dial out and Receive calls,” the port will be available for use by both the RAS server and the Dial-Up Networking client. This computer will be able to function both as a RAS server and as a Dial-Up Networking client.

Click OK.



note Each port is configured individually. If one port is configured to dial out only, another can be configured to receive calls only or to dial out and receive calls.

4. The Remote Access Setup dialog box reappears. Add and configure additional ports as desired.

When you are finished configuring ports, you are ready to configure the RAS network settings for both the RAS server and the Dial-Up Networking client. The next section explains how these network settings, including protocols and encryption, are configured.

Configuring Protocols and Encryption

The next part of the RAS installation/configuration process involves configuring protocols and encryption.

TO CONFIGURE PROTOCOLS AND ENCRYPTION, FOLLOW THESE STEPS:

1. After configuring RAS ports, the Remote Access Setup dialog box reappears. Click the Network command button.
2. The Network Configuration dialog box appears, as shown in Figure 19-5. Notice the Dial out Protocols and Server Settings sections.

This is the primary RAS configuration dialog box. In this dialog box, select dial out protocols (if you configured any ports for dial out usage), configure dial in protocols and RAS server settings (if you configured any ports for dial in usage), select RAS encryption features, and enable the RAS server side of Point-to-Point Multilink Protocol connections, if desired.

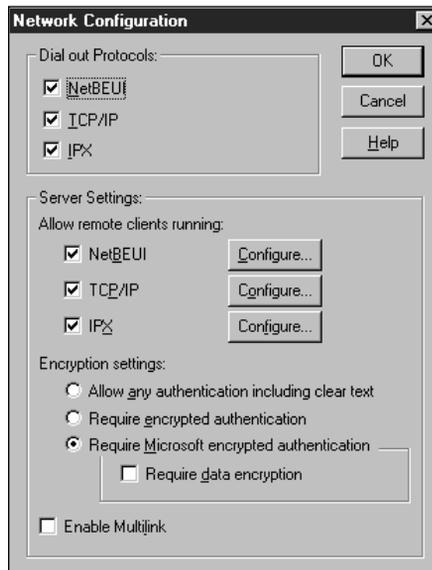


FIGURE 19-5 Configuring protocols and security



note

Configuration options selected in the Network Configuration dialog box are global settings that apply to *all* ports. No individual port protocol or encryption settings are available.

- Dial out Protocols:** If you configured any ports for dial out usage, you can select any or all of three dial out protocols: NetBEUI, TCP/IP, and/or IPX (NWLink IPX/SPX Compatible Transport). If you *didn't* configure any ports for dial out usage, these options are grayed out and not available. All installed protocols are selected by default.

- **Server Settings: Allow remote clients running:** If you configured any ports for dial in (RAS server) usage, you can select any or all of three dial in protocols: NetBEUI, TCP/IP, and/or IPX (NWLink IPX/SPX Compatible Transport). If you didn't configure any ports for dial in usage, the Server Settings configuration section is not displayed. All installed protocols are selected by default.

You can configure individual protocol-specific options for each of the three protocols in this section. (Configuring each of these protocols is discussed in detail later in this chapter.)

- **Server Settings: Encryption settings:** Select one of the three possible password authentication encryption options:
 - **Allow any authentication including clear text:** If you select the radio button next to "Allow any authentication including clear text," the RAS server will authenticate user passwords in clear text or in any encryption format supported by the RAS server. Selecting this radio button, in effect, enables the Dial-Up Networking client to determine the level of password encryption.
 - **Require encrypted authentication:** If you select the radio button next to "Require encrypted authentication," Dial-Up Networking clients will be required to send encrypted user passwords in any encryption format supported by the RAS server. The RAS server won't authenticate user passwords that are sent in clear text.
 - **Require Microsoft encrypted authentication:** If you select the radio button next to "Require Microsoft encrypted authentication," Dial-Up Networking clients must send user passwords that are encrypted using Microsoft encrypted authentication. The RAS server won't authenticate user passwords sent in clear text or in any encryption format other than Microsoft encrypted authentication. This is the most secure password authentication option, and is selected by default. If the "Require Microsoft encrypted authentication" radio button is selected, the "Require data encryption" check box is available.
 - **Require data encryption:** If you select this check box, in addition to requiring Microsoft encrypted password authentication, the RAS server requires that all data sent to the RAS server from the Dial-Up Networking client be transmitted in an encrypted format. This check box is not selected by default. Currently, only Windows NT Dial-Up Networking clients support data encryption. If you want to use the RAS server to establish secure, private PPTP connections, ensure that you select the radio button next to "Require Microsoft encrypted authentication" *and* the check box next to "Require data encryption."

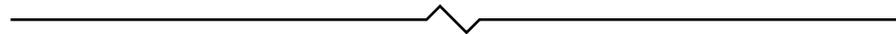
- **Server Settings: Enable Multilink:** Selecting the check box next to Enable Multilink enables the RAS server side of Point-to-Point Multilink Protocol connections. Selecting this check box enables the RAS server to support Multilink connections if requested to do so by the Dial-Up Networking client computer. This check box is not selected by default, and is not available on Windows NT Workstation computers. Don't click the OK command button just yet—you still need to configure the dial in protocol(s) you selected. Configuring these three dial in protocols (NetBEUI, TCP/IP, and IPX) is explained in detail in the next three sections.



Configuring NetBEUI

Once you have selected dial out protocol(s) in the Server Settings section of the Network Configuration dialog box, you are ready to configure the protocols.

If you selected NetBEUI as a dial out protocol, it must be configured.



TO CONFIGURE NETBEUI, FOLLOW THESE STEPS:

1. Click the Configure command button next to NetBEUI in the Server Settings section of the Network Configuration dialog box.
2. The RAS Server NetBEUI Configuration dialog box appears, as shown in Figure 19-6. Notice the two configuration options available.

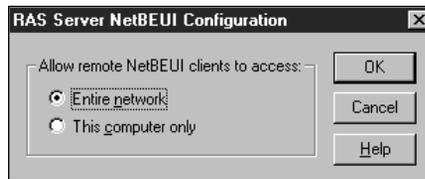


FIGURE 19-6 Configuring RAS server NetBEUI options

Choose one of the two possible NetBEUI configuration options:

- **Entire network:** If you select the radio button next to “Entire network,” the RAS server’s NetBIOS gateway will be enabled, and remote NetBEUI clients will be able to access shared resources on all servers on the RAS server’s local network, even servers that use TCP/IP or NWLink IPX/SPX Compatible Transport. This radio button is selected by default.

- **This computer only:** If you select the radio button next to "This computer only," the RAS server's NetBIOS gateway will be disabled, and remote NetBEUI clients will only be able to access shared resources located on the RAS server. This option is sometimes used in high security environments to prevent unauthorized access to other computers on the corporate network.



Selections made in this dialog box apply to *all* Dial-Up Networking client computers that access the RAS server using NetBEUI. You either choose to allow all remote NetBEUI client computers to access the entire network, or you choose to allow all remote NetBEUI client computers to access *only* the RAS server.

3. Click OK to return to the Network Configuration dialog box.

Configuring TCP/IP

If you selected TCP/IP as a dial out protocol, it must be configured.

TO CONFIGURE TCP/IP, FOLLOW THESE STEPS:

1. Click the Configure command button next to TCP/IP in the Server Settings section of the Network Configuration dialog box.
2. The RAS Server TCP/IP Configuration dialog box appears, as shown in Figure 19-7. Notice the options to configure IP address assignment for remote Dial-Up Networking clients.



Selections made in this dialog box apply to *all* Dial-Up Networking client computers that access the RAS server using TCP/IP.

In the Allow remote TCP/IP clients to access section, choose one of the two possible TCP/IP configuration options:

- **Entire network:** If you select the radio button next to "Entire network," the RAS server will function as a router for Dial-Up Networking client computers, and remote TCP/IP clients will be able to access resources on all servers that use TCP/IP on the RAS server's local network. This radio button is selected by default.

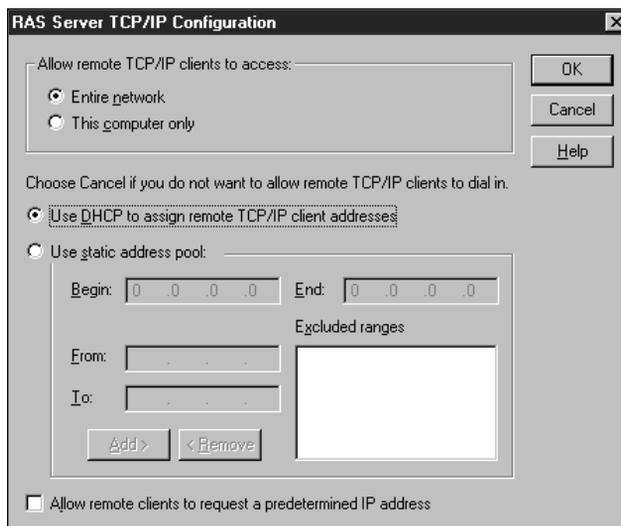
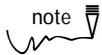


FIGURE 19-7 Configuring RAS server TCP/IP options

- **This computer only:** If you select the radio button next to “This computer only,” the RAS server will not function as a router for Dial-Up Networking client computers, and remote TCP/IP clients will only be able to access resources located on the RAS server. This option is sometimes used in high security environments to prevent unauthorized access to other computers on the corporate network.
3. The remainder of this dialog box is concerned with the assignment of IP addresses to remote Dial-Up Networking client computers that use TCP/IP. Choose one of the two primary IP address assignment options:
- **Use DHCP to assign remote TCP/IP client addresses:** If you select the radio button next to “Use DHCP to assign remote TCP/IP client addresses,” the RAS server will request an IP address for the remote TCP/IP client from the DHCP server on its local network when the remote TCP/IP client connects to the RAS server. This option should be selected if a DHCP server is available. This radio button is selected by default.
 - **Use static address pool:** If you select the radio button next to “Use static address pool,” the RAS server will assign an IP address to the remote TCP/IP client from the range of IP addresses specified in the Begin and End text boxes.

 Even though “Use DHCP to assign remote TCP/IP client addresses” is the default option, I recommend that you use a specific address pool for RAS IP address assignments. When you use DHCP, the IP address is assigned to a specific client for the length of the lease, whereas if you use an IP address pool, the IP address is only assigned to the client during the connection time period.

If you want to exclude specific IP addresses from the range, type the IP address (or range of IP addresses) you want to exclude in the From and To text boxes, and then click the Add command button. The excluded IP addresses will appear in the Excluded Ranges list box.

4. Select the “Allow remote clients to request a predetermined IP address” check box when remote TCP/IP clients have been configured so that their Dial-Up Networking software requests a specific IP address from the RAS server. This option is not selected by default, and is not commonly used.
5. Click OK to return to the Network Configuration dialog box.

Configuring IPX (NWLink IPX/SPX Compatible Transport)

If you selected IPX (NWLink IPX/SPX Compatible Transport) as a dial out protocol, it must be configured.

TO CONFIGURE IPX, FOLLOW THESE STEPS:

1. Click the Configure command button next to IPX in the Server Settings section of the Network Configuration dialog box.

 References to IPX in the various RAS configuration dialog boxes include NWLink IPX/SPX Compatible Transport and other versions of IPX.

2. The RAS Server IPX Configuration dialog box appears, as shown in Figure 19-8. Notice the network number configuration options.

 Selections made in this dialog box apply to *all* Dial-Up Networking client computers that access the RAS server by using IPX.

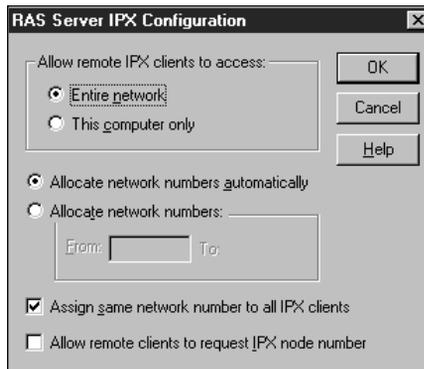


FIGURE 19-8 Configuring RAS server IPX options

In the "Allow remote IPX clients to access" section, choose one of the two possible configuration options:

- **Entire network:** If you select the radio button next to "Entire network," the RAS server will function as a router for Dial-Up Networking client computers, and remote IPX clients will be able to access resources on all servers that use IPX on the RAS server's local network. This radio button is selected by default.
 - **This computer only:** If you select the radio button next to "This computer only," the RAS server will not function as a router for Dial-Up Networking client computers, and remote IPX clients will only be able to access resources located on the RAS server. This option is sometimes used in high security environments to prevent unauthorized access to other computers on the corporate network.
3. The remainder of this dialog box concerns the assignment of network numbers and node numbers to remote IPX client computers. Select one of the two primary network number assignment options:
- **Allocate network numbers automatically:** If you select the radio button next to "Allocate network numbers automatically," the RAS server assigns a network number that is not currently in use to a remote IPX client computer when it connects to the RAS server. This radio button is selected by default.
 - **Allocate network numbers:** If you select the radio button next to "Allocate network numbers," the RAS server assigns a network number from the specified range of numbers listed in the From and To text boxes to a remote IPX client computer when it connects to the RAS server. You must specify a range of network numbers in the From and To text boxes if you select this radio button.

Two additional check boxes are available in this section, regardless of the network number allocation method you selected above:

- **Assign same network number to all IPX clients:** If you select the check box next to "Assign same network number to all IPX clients," the RAS server assigns the same network number to all remote IPX client computers. This check box is selected by default.
- **Allow remote clients to request IPX node number:** Select the check box next to "Allow remote clients to request IPX node number" when remote IPX clients have been configured so that their Dial-Up Networking software requests a specific IPX node number from the RAS server. This option is not selected by default, and is not commonly used.

4. Click OK to return to the Network Configuration dialog box.

Completing the RAS Installation

Once you have completed all configurations in the Network Configuration dialog box, you are ready to complete the RAS installation.

TO COMPLETE THE RAS INSTALLATION, FOLLOW THESE STEPS:

1. In the Network Configuration dialog box, click OK.
2. The Remote Access Setup dialog box reappears. Click the Continue command button.
3. Windows NT installs RAS. If you selected the IPX dial in protocol, the RIP for NWLink IPX Configuration dialog box appears, as shown in Figure 19-9.

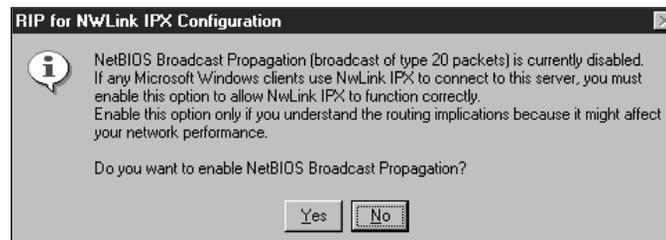


FIGURE 19-9 Configuring NetBIOS Broadcast Propagation

- Select the Yes command button if remote IPX clients will be accessing shared NetBIOS resources on servers (that use IPX) on the RAS server's local network. Selecting the Yes command button causes RAS to automatically forward NetBIOS broadcasts from IPX clients.
 - Select the No command button if remote IPX clients will only be accessing resources on the RAS server, and/or will only be accessing resources on NetWare servers on the RAS server's local network. Selecting the No command prevents the RAS server from automatically forwarding NetBIOS broadcasts from IPX clients.
4. A Setup Message is displayed, indicating that RAS has been successfully installed. Click OK.
 5. The Network dialog box reappears. Click the Close command button.
 6. Windows NT performs various bindings operations.
 7. A Network Settings Change dialog box appears, indicating that you must shut down and restart the computer in order for the new settings to take effect. Click the Yes command button to restart the computer.
-

Using Remote Access Admin to Manage the RAS Server

Remote Access Admin is a Windows NT administrative tool that is primarily used to start and stop the Remote Access Service (RAS), to assign the dialin permission to users, and to configure a call back security level for each user. Remote Access Admin can also be used to view COM port status and statistics, to disconnect users from individual ports, and to remotely manage RAS on other Windows NT computers.

Remote Access Admin is available on all Windows NT computers that have RAS installed, and is also available on Windows NT Workstation computers that have Windows NT Server Tools installed.

To access Remote Access Admin, select Start > Programs > Administrative Tools (Common) > Remote Access Admin.

When you start Remote Access Admin, the Remote Access Admin dialog box appears, as shown in Figure 19-10. Notice the RAS server condition and other information displayed.

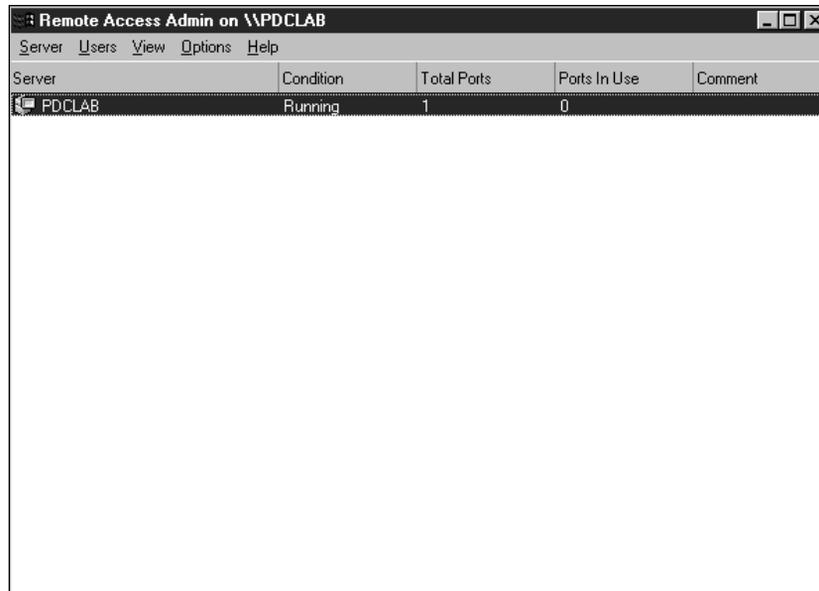


FIGURE 19-10 Starting Remote Access Admin

To start, stop, or pause RAS on a server, highlight the server in the Server list box and select the appropriate option from the Server menu, as shown in Figure 19-11.

In addition to starting, stopping, or pausing RAS, Remote Access Admin is also used to manage the assignment of the dialin permission and to configure call back security. These tasks are discussed in the next section.

Assigning Dialin Permission and Configuring Call Back Security

Before remote users can dial in and connect to a RAS server, they must be assigned the dialin permission. Until this permission is assigned to at least one user account, RAS connections and RAS functionality can't be established.

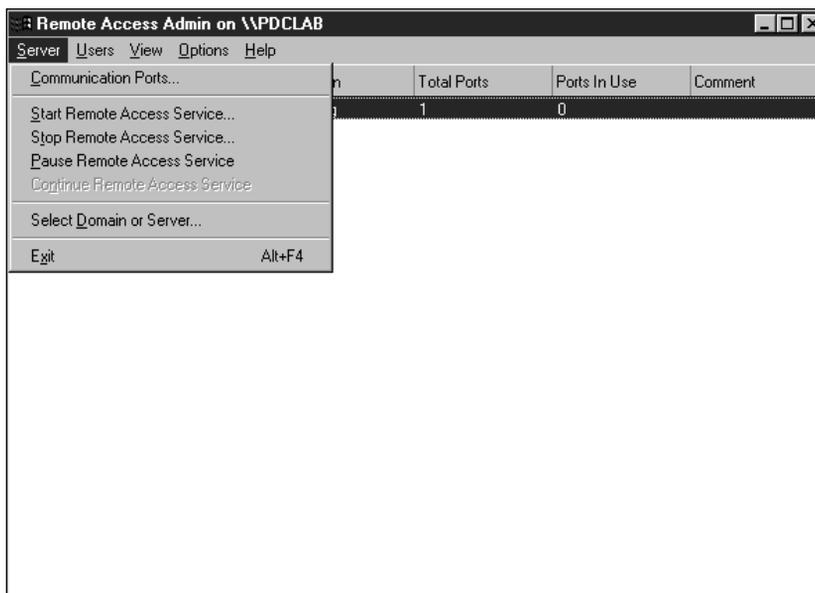
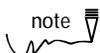


FIGURE 19-11 Starting, stopping, or pausing RAS

TO ASSIGN THE DIALIN PERMISSION TO USERS AND TO CONFIGURE CALL BACK SECURITY, FOLLOW THESE STEPS:

1. Select Start > Programs > Administrative Tools (Common) > Remote Access Admin to start Remote Access Admin. In the Remote Access Admin dialog box, select Users > Permissions.
2. The Remote Access Permissions dialog box appears, as shown in Figure 19-12. Notice the Grant All command button.
 - To assign the dialin permission to *all* users, click the Grant All command button.
 - To remove the dialin permission from *all* users, click the Revoke All command button.
 - To assign the dialin permission to an *individual* user account, highlight the user account in the Users list box, then select the check box next to Grant dialin permission to user.



note

The dialin permission and call back security can also be configured by selecting the Dialin command button in the User Properties dialog box in User Manager or User Manager for Domains. (See Chapter 7 to refresh yourself on how to use User Manager to manage the dialin permission for user accounts.)

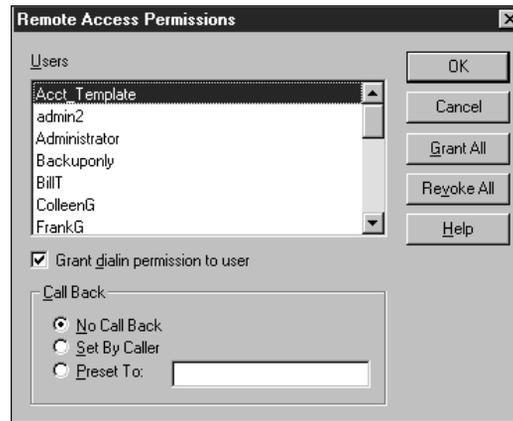


FIGURE 19-12 Assigning the dialin permission and configuring call back security

3. **Call back security** is configured on an individual user basis in the Remote Access Permissions dialog box. To configure call back security, highlight the user account, then select one of the following three options:
 - **No Call Back:** If you select the radio button next to No Call Back, the user can dial in to the RAS server, but the user can't request that the RAS server break the connection and call the user back. Selecting this option ensures that the user dialing in—not the server—is billed for any long-distance telephone charges. Selecting this option provides no security other than user account and password authentication. This radio button is selected by default.
 - **Set By Caller:** If you select the radio button next to Set By Caller, the RAS server prompts the remote user for a telephone number to dial back. The RAS server then breaks the connection and dials the user back at the number specified by the remote user. This setting is typically used when remote employees must make a long-distance call to connect to the RAS server. Selecting this radio button enables the company, rather than the remote employee, to incur the bulk of the long-distance telephone charges. There is no real security (other than user account and password authentication) provided when this option is selected, because the RAS server will dial back to *any* telephone number specified by a user, whether authorized or unauthorized.
 - **Preset To:** If you select the radio button next to Preset To, you must also specify a telephone number that the RAS server will always use to call back whenever this remote user dials in. This configuration provides the highest amount of call back security, because only a predetermined telephone number (such as an employee's home telephone number) will be used by the RAS server. Unauthorized remote users calling from a

different location, even if they can provide a valid user name and password, won't be able to maintain a connection, because the RAS server will break the connection and call back only the prespecified number.

4. When you have finished configuring call back security, click OK to return to the Remote Access Admin dialog box.
5. Exit Remote Access Admin.

Configuring Dial-Up Networking Connections

Dial-Up Networking is the client/dial out component of RAS. The Dial-Up Networking accessory is installed during the RAS installation. Dial-Up Networking enables Windows NT computers to connect to dial-up servers, and to establish network connections through those servers. Dial-up servers include: Windows NT RAS servers; UNIX computers that are configured as SLIP or PPP servers; and any other computers, routers, or front-end processors that are configured as SLIP or PPP servers.

Before the Dial-Up Networking functionality on a Windows NT computer can be used, RAS must be installed and configured, and at least one of the computer's RAS ports must be configured for dial out usage. Additionally, you must create at least one phonebook entry that contains various dialing information and instructions. Phonebook entries are created by using the Windows NT Dial-Up Networking accessory, and are explained in detail in the next section.

Configuring and Using Phonebook Entries

Phonebook entries contain all of the information and instructions required by Dial-Up Networking to connect to a dial-up server. You can select, create, or edit a phonebook entry by using the Dial-Up Networking accessory.

To access the Dial-Up Networking accessory, select Start > Programs > Accessories > Dial-Up Networking. Figure 19-13 shows the Dial-Up Networking dialog box.

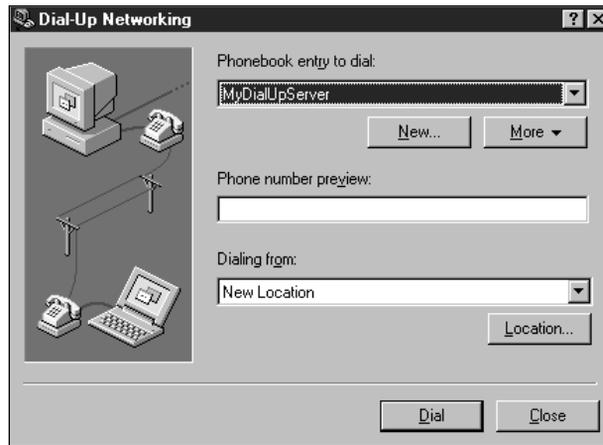


FIGURE 19-13 The Dial-Up Networking accessory main dialog box

To use an existing phonebook entry to connect to a dial-up server, select the phonebook entry you want to use from the “Phonebook entry to dial” drop-down list box. Then select your current location from the “Dialing from” drop-down list box. Then click the Dial command button.

To create a new phonebook entry, click the New command button in the Dial-Up Networking dialog box. The New Phonebook Entry dialog box appears, as shown in Figure 19-14. Notice the five configuration tabs in this dialog box: Basic, Server, Script, Security, and X.25.



tip To configure the Telephony settings for the location you are dialing from, use the Telephony application in Control Panel; or, click the Location command button in the Dial-Up Networking dialog box. (Telephony settings include your area code, country, number used to access an outside line, and calling card settings for each location that you configure.)

The Telephony application is decidedly more user friendly than the Location Settings dialog box in Dial-Up Networking.

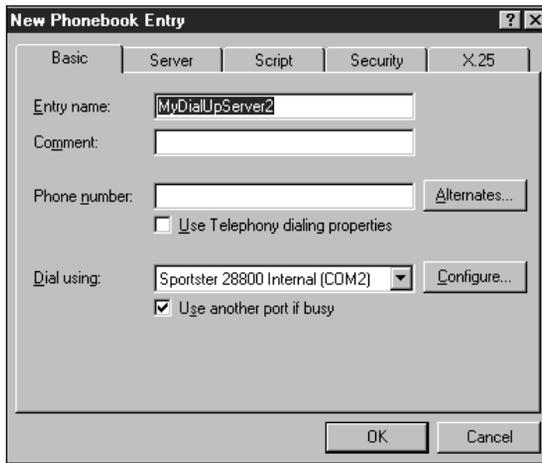


FIGURE 19-14 Creating a new phonebook entry

note The first time the you start Dial-Up Networking, a dialog box appears stating that the phonebook is empty.

To complete the new phonebook entry, select the appropriate configuration options on the various tabs in the New Phonebook Entry dialog box. Each of the five configuration tabs are discussed in detail in the following sections.

note If you are editing an existing phonebook entry (rather than creating a new phonebook entry) the five configuration tabs—Basic, Server, Script, Security, and X.25—are the same. The only difference is that the dialog box is titled Edit Phonebook Entry instead of New Phonebook Entry.

Configuring basic properties

The Basic tab in the New Phonebook Entry dialog box is used to configure the phonebook entry name, the phone number to be used, and the modem/port to be used to establish the connection to the dial-up server. The Basic tab contains several configurable options:

- **Entry name:** Type in a name that describes the connection in the “Entry name” text box. The default name is MyDialUpServer. Entry name is a mandatory setting.
- **Comment:** You can enter a comment about the phonebook entry in the Comment text box if you want to. This entry is optional.

- **Phone number:** Type in the phone number to be dialed to access the dial-up server in the “Phone number” text box. Alternate phone numbers for the dial-up server can be entered by clicking the Alternates command button. If this dial-up connection will use PPTP, enter the IP address of the RAS server in the “Phone number” text box instead of a phone number. (Remember, PPTP tunnels its connection *inside* of an existing TCP/IP network connection.)
- **Use Telephony dialing properties:** If you select the check box next to “Use Telephony dialing properties”, Dial-Up Networking will use your location telephony settings (area code, number to dial to get an outside line, and so on) when dialing the phone number entered in the “Phone number” text box to establish a connection. If you don’t select this check box, the location telephony settings won’t be used—only the phone number listed in the “Phone number” text box will be used. This check box is not selected by default.
- **Dial using:** Select the modem, other connection device, or PPTP RAS port you want to use for this connection from the “Dial using” drop-down list box. After you highlight your selection, click the Configure command button to configure the modem, device, or port. Modems can also be configured by using the Modems application in Control Panel.
- **Use another port if busy:** Select the check box next to “Use another port if busy” if you want Dial-Up Networking to use a different port to establish a connection if the primary port you selected is busy.

Configuring a Multilink connection

When you need more throughput than a single line can provide, you might consider using multiple lines to establish a Point-to-Point Multilink Protocol connection.

TO CONFIGURE A POINT-TO-POINT MULTILINK PROTOCOL CONNECTION, FOLLOW THESE STEPS:

1. Select the Multiple Lines option from the “Dial using” drop-down list box, as shown in Figure 19-15. Notice that the “Phone number” text box is grayed out when the Multiple Lines option is selected.

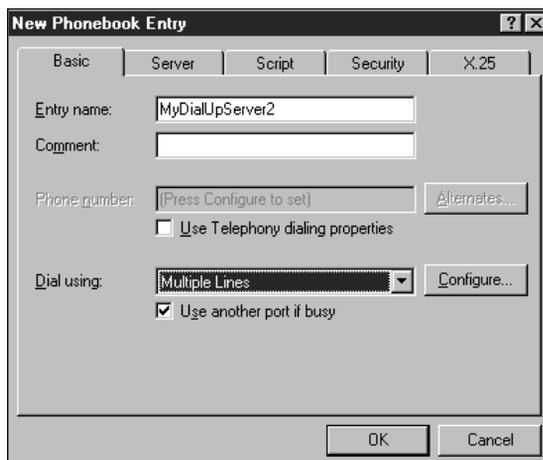


FIGURE 19-15 Configuring a Multilink connection

2. To configure the phone numbers to be dialed to establish the Multilink connection, click the Configure command button. The Multiple Line Configuration dialog box appears, as shown in Figure 19-16. Notice the text in the dialog box that indicates that multiple lines simultaneously connected to a PPP Multilink server behave like a single, faster connection.

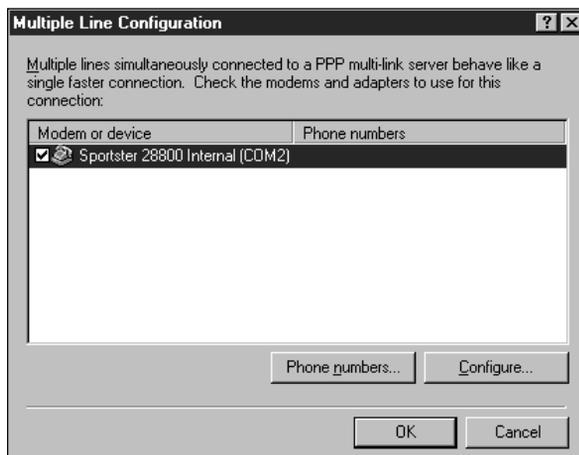
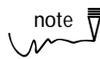


FIGURE 19-16 Selecting the modems, devices, or ports to be used in a Multilink connection

3. Select two or more modems, devices, or ports from those listed, and individually configure a phone number for each by highlighting the modem, device, or port and clicking the Phone numbers command button. Click OK when you are finished to return to the Basic tab in the New Phonebook Entry dialog box.



note

To establish a Multilink connection, both the Dial-Up Networking client and the RAS server must be configured to support Multilink. Both Windows NT Workstation and Windows NT Server Dial-Up Networking can support dial out Multilink connections. Only Windows NT Server (with RAS installed) can support dial in Multilink connections.



caution

Call back security should normally *not* be configured on RAS servers that support Multilink connections. The reason for this is that only one phone number can be stored in the call back configuration, and if the RAS server breaks the connection and calls this number back, only a single line will be used for the connection. This effectively eliminates any Multilink functionality.

Configuring server properties

To configure server properties, including dial-up server type and network protocols, click the Server tab in the New Phonebook Entry dialog box. The Server tab appears, as shown in Figure 19-17.

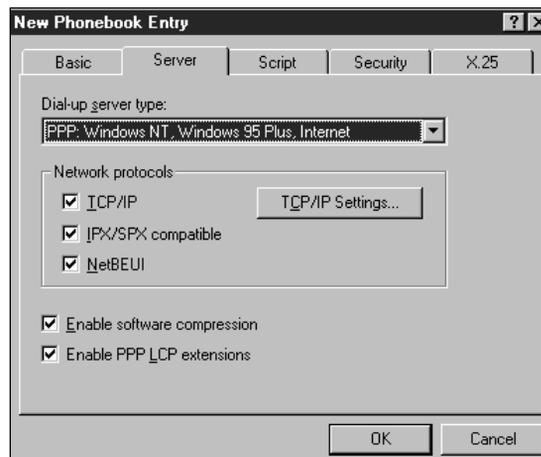


FIGURE 19-17 Configuring dial-up server type and network protocols

Select from the many options presented on the Server tab:

- **Dial-up server type:** Select the type of dial-up server you want to connect to from the “Dial-up server type” drop-down list box.
- **Network protocols:** Select the transport protocols that you want to use for this dial-up connection. Protocols available include TCP/IP, (NWLink) IPX/SPX Compatible (Transport), and NetBEUI. You can select more than one protocol. All installed protocols are selected by default.
- **TCP/IP Settings:** If you select TCP/IP, click the TCP/IP Settings command button to configure TCP/IP settings for this connection. The PPP TCP/IP Settings dialog box appears, as shown in Figure 19-18. Notice that you can either accept a server assigned IP address, or specify an IP address.

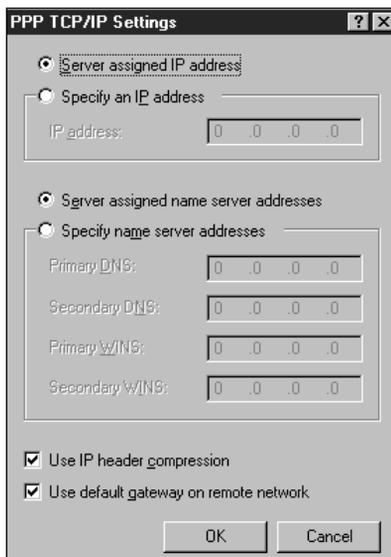


FIGURE 19-18 Configuring TCP/IP address assignment options

- **Enable software compression:** Select the check box next to “Enable software compression” if you want the Dial-Up Networking software to compress all data before it is transmitted to the RAS server. You should disable modem compression if you select this option. This check box is selected by default.

- **Enable PPP LCP extensions:** Select the check box next to “Enable PPP LCP extensions” if you want to enable the newer PPP features. Deselect this check box only if you are unable to connect with it selected. This check box is selected by default.

Configuring script properties

To configure script properties, click the Script tab in the New Phonebook Entry dialog box. The Script tab appears, as shown in Figure 19-19. Notice that only “After dialing” script options are shown. To configure script options that will be used prior to dialing, click the Before dialing command button.

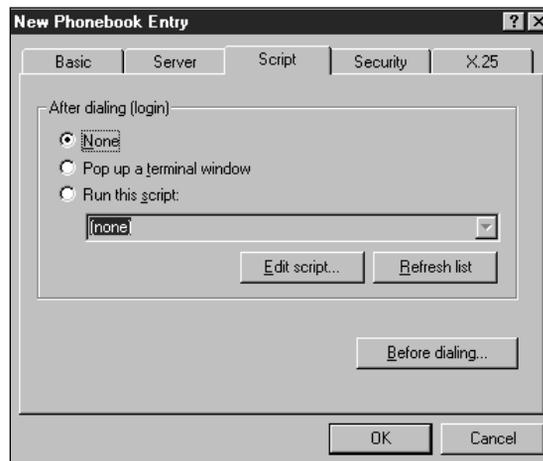


FIGURE 19-19 Configuring Dial-Up Networking scripts

Scripts are often used to connect to dial-up servers that require interactive logon sequences, and/or have special menu options that must be selected during the connection process. Scripts are typically associated with SLIP servers, or with servers that support both SLIP and PPP.

By default, this tab is configured so that Dial-Up Networking will *not* use a script. Unless you are connecting to a dial-up server that requires the use of a script, you do not need to configure this tab.

To configure script properties, select one of the three script options:

- **None:** If you select the radio button next to None, no script or pop-up terminal will be used. This option is selected by default.

- **Pop up a terminal window:** Select the radio button next to “Pop up a terminal window” if you don’t want to create or use a script, but you still need to make interactive selections during the logon process. Experienced users often select this option to determine which settings need to be placed in a script file.
- **Run this script:** Select the radio button next to “Run this script” to automate the connection process to a dial-up server that requires the use of a script. If you select this option, either select a script from the drop-down list box or click the Edit script command button to create a new script file. When you click the Edit script command button, a copy of the `Switch.inf` file is displayed by the Notepad text editor. The `Switch.inf` file includes instructions for creating new script files.

Configuring security properties

To configure security, including password authentication and encryption options, click the Security tab in the New Phonebook Entry dialog box. The Security tab appears, as shown in Figure 19-20. Notice that the authentication and encryption options are similar to the Server Settings that are configured for dial in connections during the installation of RAS.

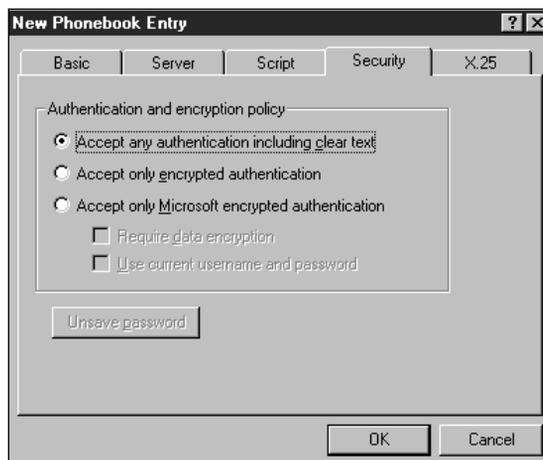


FIGURE 19-20 Configuring password authentication and encryption options

Options selected in this dialog box will be applied to the Dial-Up Networking client only, not to the RAS server.

Select one of the three authentication and encryption policy options:

- **Accept any authentication including clear text:** If you select the radio button next to “Accept any authentication including clear text”, Dial-Up Networking will connect to a dial-up server using the lowest password authentication option accepted by the server. For example, if the dial-up server is configured to enable any authentication including clear text, and this option is selected, Dial-Up Networking transmits the password to the dial-up server by using clear text. This option is selected by default.
- **Accept only encrypted authentication:** If you select the radio button next to “Accept only encrypted authentication”, Dial-Up Networking will not be able to connect to a dial-up server that does not support some form of encrypted authentication.
- **Accept only Microsoft encrypted authentication:** If you select the radio button next to “Accept only Microsoft encrypted authentication”, Dial-Up Networking will not be able to establish a connection with a dial-up server unless that server supports Microsoft encrypted authentication. You must select this option if you want to use data encryption. If you select this option, two additional check boxes are available:
 - **Require data encryption:** If you select the check box next to “Require data encryption”, the Dial-Up Networking client will encrypt all data sent over this connection. You should select this check box if you are configuring a PPTP connection. This check box is only available if you selected the radio button next to Accept only Microsoft encrypted authentication. This check box is not selected by default.
 - **Use current username and password:** If you select the check box next to “Use current username and password”, Dial-Up Networking will not prompt you for a user name or password when establishing a connection with the dial-up server. This check box is only available if you selected the radio button next to “Accept only Microsoft encrypted authentication”. This check box is not selected by default.

Configuring X.25 connection properties

To configure an X.25 connection, click the X.25 tab in the New Phonebook Entry dialog box. The X.25 tab appears, as shown in Figure 19-21.

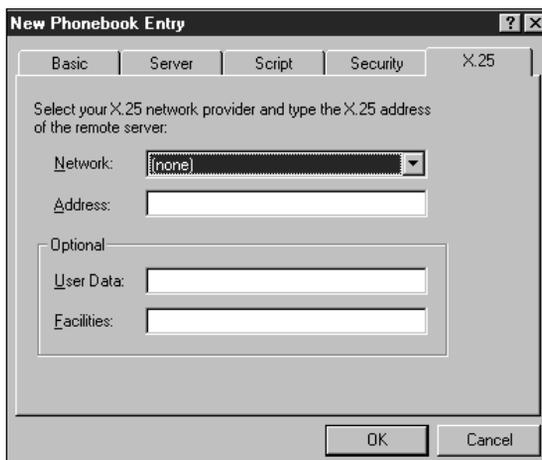


FIGURE 19-21 Configuring X.25 settings

Contact your X.25 provider to obtain the information you should use to configure this dialog box. You should obtain the network provider type (such as CompuServe, InfoNet, or Transpac), and X.25 address to be used.

Configuring Dial-Up Networking to Connect to the Internet

There are several circumstances when you might want to use Dial-Up Networking to connect your Windows NT computer to the Internet:

- When users need to access the Internet to perform research, browse Web pages, and so on.
- When you want to connect your Windows NT WWW server (that is also a Dial-Up Networking client) to the Internet, and you expect only a few concurrent users to access your WWW server.
- When you want to establish a TCP/IP connection to the Internet so that you can use PPTP to access a remote RAS server over the Internet.

To establish a Dial-Up Networking connection to the Internet, you normally need to use the services of an *Internet service provider* (ISP). The ISP has a local network connection directly to the Internet. The ISP uses dial-up servers, such as RAS servers, SLIP servers, or front-end processors to enable remote users to connect to the Internet via the ISP's network.

Before you can establish a connection to the Internet via your ISP, you need to know how to configure your Dial-Up Networking client so that it is compatible with the ISP's dial-up server. Configuration information you should obtain from your ISP includes:

- Type of dial-up server used by the ISP (SLIP or PPP connection protocol)
- Whether the ISP's dial-up server supports software compression
- Whether you will specify an IP address when you connect to the ISP, or the ISP's dial-up server will assign you an IP address
- Whether the ISP will provide the IP address of a DNS server during the connection process
- Whether the ISP's dial-up server uses IP header compression (IP header compression is also referred to as Van Jacobson header compression or VJ header compression)
- Type of modem you will be connecting to at the ISP and recommended settings that you should use for your modem
- The phone number you should use to connect to the ISP

Configuring PPTP Security

If your RAS server is connected to the Internet via a router and an ISP, and you want to allow only PPTP connections to your server, you can configure TCP/IP to only accept PPTP packets. To accomplish this, a TCP/IP PPTP option, called *PPTP filtering*, must be individually configured for each network adapter installed in the RAS server that has a routed connection to the Internet.

TO CONFIGURE PPTP FILTERING FOR A NETWORK ADAPTER, FOLLOW THESE STEPS:

1. Select Start > Settings > Control Panel.
2. In Control Panel, double-click the Network application.
3. In the Network dialog box, click the Protocols tab.
4. On the Protocols tab, double-click the TCP/IP Protocol in the Network Protocols list box.
5. In the Microsoft TCP/IP Properties dialog box, click the Advanced command button.
6. The Advanced IP Addressing dialog box appears, as shown in Figure 19-22. Notice the check box next to Enable PPTP Filtering. Select the network adapter you want to configure from the Adapter drop-down list box. Then select the check box next to Enable PPTP Filtering. Click OK.

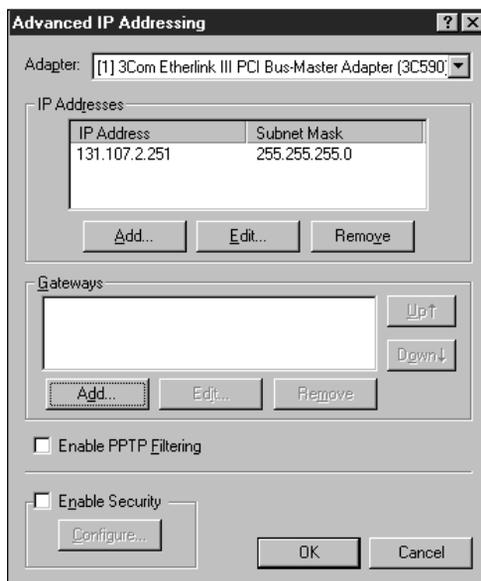


FIGURE 19-22 Enabling PPTP filtering for a network adapter

7. In the Microsoft TCP/IP Properties dialog box, click OK.
 8. In the Network dialog box, click the Close command button.
 9. A Network Settings Change dialog box appears, indicating that you must shut down and restart the computer in order for the new settings to take effect. Click the Yes command button to restart the computer.
-

Troubleshooting Common RAS Problems

Most common RAS problems reported by users involve an inability to connect to a RAS server, a third-party SLIP server, or a front-end processor from a Dial-Up Networking client computer.

Table 19-1 shows some common causes of RAS connection problems, and recommended solutions.

TABLE 19-1 COMMON CAUSES OF RAS PROBLEMS AND RECOMMENDED SOLUTIONS

<i>COMMON CAUSES OF RAS PROBLEMS</i>	<i>SUGGESTED/RECOMMENDED SOLUTIONS</i>
Modem configuration or compatibility problem	If you suspect that your modem is the problem, first determine the type of modem to which you are attempting to connect; and then reconfigure your modem settings to the most compatible option, or as recommended by your ISP. If you are using an unsupported modem (for example, one that is not on the HCL), verify that your settings in the <code>Modem.inf</code> file are appropriate for your modem. If you have selected RAS software compression, ensure that your modem is not configured to compress data. If you are still unable to connect, you can configure your modem to record a log file of all attempted connections. To configure a modem log file, use the Modems application in Control Panel to access your modem's Properties dialog box. Select the Connection tab and then the Advanced Connection Settings dialog box.
Password authentication problem	If you suspect a password authentication problem, configure Dial-Up Networking to accept any authentication including clear text, and/or configure the RAS server to enable any authentication including clear text. (Note: Clear text passwords are usually required by SLIP servers.)

COMMON CAUSES OF RAS PROBLEMS	SUGGESTED/RECOMMENDED SOLUTIONS
TCP/IP configuration problem	If you suspect a TCP/IP configuration problem, contact the manager of the dial-up server you are attempting to connect to and determine the dial-up server's TCP/IP configuration. Configure Dial-Up Networking so that the client's TCP/IP configuration settings match those of the dial-up server.
Dial-Up Networking configuration problem	Verify that you have chosen the appropriate dial-up server type (SLIP or PPP connection type) by contacting the manager of the dial-up server, if necessary.
Script problem	If you are using a script and your modem makes contact with the dial-up server, but you are <i>not</i> able to successfully complete a connection to the dial-up server, try editing your script file or try using a pop-up terminal window instead of the script file.

Key Point Summary

This chapter focused on *Remote Access Service (RAS)*—a Windows NT service that enables dial-up network connections between a RAS server and a Dial-Up Networking client computer.

- Dial-Up Networking client computers can connect to a RAS server by using a variety of connection types, including: a standard telephone line and modem, ISDN, X.25, and Point-to-Point Tunneling Protocol (PPTP).
 - The most common connection type is a standard analog telephone line and modem. This service is inexpensive and widely available.
 - ISDN is a digital, dial-up telephone service that supports faster data transmission rates than a standard telephone line. An ISDN Basic Rate Interface (BRI) line consists of two B channels and a D channel. If both B channels are used together, data can be transmitted at up to 128Kbps.

- X.25 is a packet-switching protocol that is used on dial-up or leased lines. This service is available in most countries, and requires a fair amount of hardware to implement.
- PPTP is not a physical connection type. Rather, it is a virtual network connection that is “tunneled” inside of an existing TCP/IP network connection. RAS encryption can be used with PPTP to provide a secure, private connection over a public TCP/IP network, such as the Internet.
- RAS communications can be carried out over several connection protocols, including: Serial Line Internet Protocol (SLIP), Point-to-Point Protocol (PPP), Point-to-Point Multilink Protocol (PPMP), and Point-to-Point Tunneling Protocol (PPTP).
 - *SLIP* is an older connection protocol, commonly associated with UNIX computers, that supports only the TCP/IP transport protocol.
 - PPP is a newer connection protocol designed to overcome the limitations of SLIP. *PPP* is currently the industry standard remote connection protocol, and is recommended for use by Microsoft. PPP supports password encryption, multiple transport protocols (including TCP/IP, NWLink IPX/SPX Compatible Transport, and NetBEUI), and dynamic, server-based IP addressing.
 - *Point-to-Point Multilink Protocol* combines the bandwidth from multiple physical connections into a single logical connection.
 - *PPTP* supports the RAS encryption feature over standard, unencrypted TCP/IP networks, such as the Internet. PPTP supports all standard transport protocols, including: NWLink IPX/SPX Compatible Transport, NetBEUI, and TCP/IP.
- All Windows NT standard transport protocols are supported by RAS. Client computers can connect to a RAS server by using: NetBEUI, TCP/IP, or NWLink IPX/SPX Compatible Transport. The DLC protocol is *not* supported by RAS. A RAS server acts as a router for client computers that use TCP/IP or NWLink IPX/SPX Compatible Transport, enabling these clients to access other computers on the network via the RAS server’s routing capability.

- The *RAS NetBIOS gateway* enables client computers that use NetBEUI to access shared resources on other servers located on the RAS server's local network. The RAS NetBIOS gateway performs protocol translation for the remote NetBEUI client computers. Only NetBIOS-based services (such as shared folders and printers, Lotus Notes servers, SQL Servers and SNA Servers) can be accessed by NetBEUI client computers via the RAS NetBIOS gateway. The NetBIOS gateway has a maximum connection limit of 250 simultaneous connections.
- RAS supports the following NetBIOS name resolution methods: NetBIOS broadcasts, WINS servers, DNS servers, LMHOSTS files, and HOSTS files.
- Before installing RAS, you should install and configure all of the transport protocols you plan to use, and you should also install and configure at least one connection device, such as a modem or ISDN adapter card.
- RAS is installed using the Services tab in the Network application in Control Panel. Many items are configured during the RAS installation, including: modems, ports, protocols, password encryption, and enabling Multilink. All settings in the Network Configuration dialog box are global settings that apply to all ports. When each protocol is configured, you must choose whether to allow remote clients connecting via that protocol access to all computers on the RAS server's local network (Entire network), or to limit remote clients' access to only the RAS server (This computer only).
- *Remote Access Admin* is a Windows NT administrative tool that is commonly used to start, stop, and pause RAS; to assign the dialin permission to users; and to configure call back security. Before remote users can establish a dial-up connection with a RAS server, they must be assigned the dialin permission. (The dialin permission can also be assigned by selecting the Dialin command button in the User Properties dialog box in User Manager or User Manager for Domains.) Call back security is configured on an individual user basis in Remote Access Admin. The Preset To configuration offers the highest level of call back security.
- *Dial-Up Networking* is the client/dial out component of RAS. The Dial-Up Networking accessory is installed during the RAS installation. Before Dial-Up Networking functionality on a Windows NT computer can be used, RAS must be installed and configured, and at least one of the computer's RAS ports must be configured for dial out usage. Additionally, you must create

at least one phonebook entry that contains dialing information and instructions. Phonebook entries are created, edited, and selected by using the Dial-Up Networking accessory.

- When a new phonebook entry is created (or an existing phonebook entry is edited) by using the Dial-Up Networking accessory, there are five tabs on which configurations can be made: Basic, Server, Script, Security, and X.25. The phonebook entry name, phone number to be used, and modem/port to be used are configured on the Basic tab. A Multilink connection can also be configured on the Basic tab. The dial-up server type and network protocols are configured on the Server tab. Scripts, which are typically associated with SLIP servers, are configured on the Script tab. Password authentication and encryption policy is configured on the Security tab. X.25 connection settings are configured on the X.25 tab.
- To establish a Dial-Up Networking connection to the Internet, you normally need to use the services of an Internet service provider (ISP). Configuration information you should obtain from your ISP includes the following:
 - Type of dial-up server used by the ISP (SLIP or PPP connection protocol)
 - Whether the ISP's dial-up server supports software compression
 - Whether you will specify an IP address when you connect to the ISP, or the ISP's dial-up server will assign you an IP address
 - Whether the ISP will provide the IP address of a DNS server during the connection process
 - Whether the ISP's dial-up server uses IP header compression (IP header compression is also referred to as Van Jacobson header compression or VJ header compression)
 - Type of modem to which you will be connecting at the ISP and recommended settings that you should use for your modem
 - The phone number you should use to connect to the ISP
- If your RAS server has a routed connection to the Internet, you can configure *PPTP filtering* so that TCP/IP will only accept PPTP packets. To accomplish this, use the Network application in Control Panel.

- Most common RAS problems reported by users involve an inability to connect to a RAS server, a third-party SLIP server, or a front-end processor from a Dial-Up Networking client computer. Common causes of RAS connection problems are: modem compatibility or configuration problems, password authentication problems, TCP/IP configuration problems, Dial-Up Networking configuration problems, and script problems.

Applying What You've Learned

Now it's time to regroup, review, and apply what you've learned in this chapter.

The questions in the Instant Assessment section that follows bring to mind key facts and concepts. In addition, the review activity gives you an opportunity to test your troubleshooting skills.

The hands-on lab exercise will really reinforce what you've learned, and give you an chance to practice some of the tasks tested by the Microsoft Certified Professional exams.

Instant Assessment

1. What is the "server component" of RAS called?
2. What is the "client component" of RAS called?
3. Up to how many simultaneous dial in connections can RAS support on a Windows NT Server computer?
4. How many simultaneous dial in connections can the RAS NetBIOS gateway support on a Windows NT Server computer?
5. List the four types of connection types that Dial-Up Networking client computers can use to connect to a RAS server.
6. List the four connection protocols that RAS communications can be carried out over.
7. Which connection protocol is older, commonly associated with scripts and with UNIX computers, and supports only the TCP/IP transport protocol?

8. Which connection protocol is newer, is currently the industry standard, and supports multiple transport protocols (including TCP/IP, NWLink IPX/SPX Compatible Transport, and NetBEUI)?
9. Describe the Point-to-Point Multilink Protocol.
10. What is PPTP?
11. Which transport protocols are supported by RAS?
12. What does the RAS NetBIOS gateway do?
13. Which NetBIOS name resolution methods does RAS support?
14. Assuming that RAS and Dial-Up Networking are installed and configured, what must be assigned before remote users can establish a dial-up connection with a RAS server?
15. What entries in Dial-Up Networking contain dialing information and instructions that are used to establish the connection to the dial-up server?
16. List three configuration information items you should obtain from your Internet service provider (ISP) before you establish a Dial-Up Networking connection to the Internet.
17. Which Windows NT tool should you use to configure RAS call back security, and which configuration option offers the highest level of security?



concept link

For answers to the Instant Assessment questions see Appendix D.

Review Activity



Server
Enterprise

The following activity gives you a chance to apply your RAS knowledge in two common real-life troubleshooting situations.

Troubleshooting common RAS problems

The purpose of this review activity is to give you experience in troubleshooting common RAS problems.

In each of the situations below, propose a solution to the reported problem.

Problem 1 A user reports that he can't establish a connection with the dial-up server from his Dial-Up Networking client computer. You suspect a modem problem.

Recommend a course of action to solve the reported problem:

Problem 2 A user reports that she is unable to connect to a SLIP server from her Dial-Up Networking client computer. The phonebook entry on the user's computer is configured as shown in Figure 19-23.

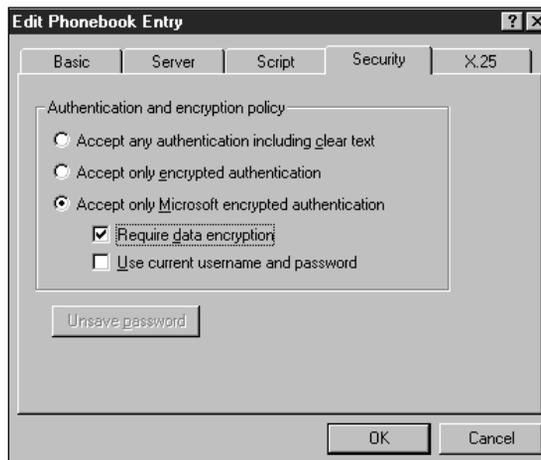


FIGURE 19-23 Password authentication configuration for Dial-Up Networking client computer in Problem 2

Recommend a course of action to solve the reported problem:



concept link

For answers to the Review Activity see Appendix D.

Hands-on Lab Exercise

The following hands-on lab exercise provides you with an opportunity to apply the RAS knowledge you've gained in this chapter.

Lab 19.32 *Installing and Configuring RAS and Dial-Up Networking*

Workstation
Server
Enterprise

The purpose of this lab is to give you hands-on experience in installing and configuring RAS on a Windows NT Server computer, and in installing RAS and configuring Dial-Up Networking on a Windows NT Workstation computer.

This lab consists of two parts:

Part 1: Installing and configuring RAS (on a Windows NT Server computer)

Part 2: Installing RAS and configuring Dial-Up Networking (on a Windows NT Workstation computer)

Begin this lab by booting your computer to Windows NT Server. Log on as Administrator. Place your Windows NT Server compact disc in your CD-ROM drive.

Follow the steps below carefully.

Part 1: Installing and configuring RAS (on a Windows NT Server computer)

In this section, you install and configure RAS on your Windows NT Server computer.

1. Select Start > Settings > Control Panel.
2. In the Control Panel dialog box, double-click Network.
3. In the Network dialog box, click the Services tab.
4. On the Services tab, click the Add command button.
5. In the Select Network Service dialog box, highlight Remote Access Service. Click OK.
6. A Windows NT Setup dialog box appears. Ensure that the correct path to your Windows NT Server source files (usually the i386 folder on your Windows NT Server compact disc) is listed in the text box. Edit this text box if necessary. Click the Continue command button.
7. Windows NT copies source files. The Add RAS Device dialog box appears. Select the modem that you installed in Lab 4.6 from the RAS Capable Devices drop-down list box. Click OK.
8. The Remote Access Setup dialog box appears. Click the Configure command button.
9. The Configure Port Usage dialog box appears. Select the radio button next to "Dial out and Receive calls". Click OK.
10. The Remote Access Setup dialog box reappears. Click the Network command button.

11. The Network Configuration dialog box appears. Select the check box next to Enable Multilink at the bottom of the dialog box. Click the Configure command button next to the TCP/IP option in the Server Settings section.
12. The RAS Server TCP/IP Configuration dialog box appears. Click the radio button next to "Use static address pool". In the Begin text box, enter an IP address of **192.168.58.1**, and in the End text box, enter an IP address of **192.168.58.255**. Click OK.
13. The Network Configuration dialog box reappears. Click the Configure command button next to the IPX option in the Server Settings section.
14. The RAS Server IPX Configuration dialog box appears. Notice that IPX clients are configured, by default, to access the entire network. Click OK.
15. The Network Configuration dialog box reappears. Click OK.
16. The Remote Access Setup dialog box reappears. Click the Continue command button.
17. Windows NT installs and configures RAS. If the RIP for NWLink IPX Configuration dialog box appears, asking if you want to enable NetBIOS Broadcast Propagation, click the Yes command button.
18. A Setup Message dialog box appears, indicating that RAS has been successfully installed. Click OK.
19. The Network dialog box reappears. Click the Close command button.
20. Windows NT performs various bindings operations.
21. A Network Settings Change dialog box appears, indicating that you must shut down and restart the computer in order for the new settings to take effect. Click the Yes command button to restart the computer.
22. Reboot your computer to Windows NT Server. Log on as Administrator. If the Control Panel dialog box appears, close it.
23. Select Start ► Programs ► Administrative Tools (Common) ► Remote Access Admin.
24. The Remote Access Admin dialog box appears. Notice that RAS is running on your server. Select Users ► Permissions.
25. The Remote Access Permissions dialog box appears. Click the Grant All command button to assign the dial in permission to all user accounts.
26. The Remote Access Admin warning dialog box appears, asking you to confirm that you want to grant the dialin permission to all users. Click the Yes command button.
27. The Remote Access Permissions dialog box reappears. Click OK.
28. The Remote Access Admin dialog box reappears. Close Remote Access Admin. Continue on to Part 2.

Part 2: Installing RAS and configuring Dial-Up Networking (on a Windows NT Workstation computer)

In this section, you install RAS and configure Dial-Up Networking on your Windows NT Workstation computer.

Begin this section by booting your computer to Windows NT Workstation. Log on as Administrator. Place your Windows NT Workstation compact disc in your CD-ROM drive.

1. Select Start > Settings > Control Panel.
2. In the Control Panel dialog box, double-click Network.
3. In the Network dialog box, click the Services tab.
4. On the Services tab, click the Add command button.
5. In the Select Network Service dialog box, highlight Remote Access Service. Click OK.
6. A Windows NT Setup dialog box appears. Ensure that the correct path to your Windows NT Workstation source files (usually the I386 folder on your Windows NT Workstation compact disc) is listed in the text box. Edit this text box if necessary. Click the Continue command button.
7. Windows NT copies source files. If you have already installed a modem using Windows NT Workstation, skip to Step 13.

If you haven't installed a modem, the Remote Access Setup dialog box appears, indicating that there are no RAS capable devices to add. Click the Yes command button to invoke the modem installer.
8. The Install New Modem dialog box appears. Select the check box next to "Don't detect my modem; I will select it from a list". Click the Next command button.
9. The Install New Modem dialog box appears. Ensure that (Standard Modem Types) is highlighted in the Manufacturers list box, and that Dial-Up Networking Serial Cable between 2 PCs is selected in the Models list box. Click the Next command button.
10. The next Install New Modem dialog box appears. Ensure that the radio button next to "Selected ports" is selected. Highlight a serial port from the list box (such as COM1 or COM2). Click the Next command button.
11. The Location Information dialog box appears. Type in your area code in the "What area (or city) code are you in now" text box. Click the Next command button.
12. Click the Finish command button in the Install New Modem dialog box.
13. The Add RAS Device dialog box appears. Select a modem from the RAS Capable Devices drop-down list box. Click OK.

14. The Remote Access Setup dialog box appears. Click the Configure command button.
15. The Configure Port Usage dialog box appears. Select the radio button next to "Dial out and Receive calls". Click OK.
16. The Remote Access Setup dialog box reappears. Click the Continue command button.
17. The RAS Server TCP/IP Configuration dialog box appears. Click the radio button next to "Use static address pool". In the Begin text box, enter an IP address of **192.168.58.1**, and in the End text box, enter an IP address of **192.168.58.255**. Click OK.
18. The RAS Server IPX Configuration dialog box appears. Click OK.
19. Windows NT installs and configures RAS. If the RIP for NWLink IPX Configuration dialog box appears, asking if you want to enable NetBIOS Broadcast Propagation, click the Yes command button.
20. A Setup Message dialog box appears, indicating that RAS has been successfully installed. Click OK.
21. The Network dialog box reappears. Click the Close command button.
22. Windows NT performs various bindings operations.
23. A Network Settings Change dialog box appears, indicating that you must shut down and restart the computer in order for the new settings to take effect. Click the Yes command button to restart the computer.
24. Reboot the computer to Windows NT Workstation. Log on as Administrator.
25. If the Control Panel dialog box appears, close it.
26. Select Start > Programs > Accessories > Dial-Up Networking.
27. A Dial-Up Networking dialog box appears, indicating that the phonebook is empty. Click OK.
28. The New Phonebook Entry Wizard appears. Accept the default of MyDialUpServer in the "Name the new phonebook entry" text box. Click the Next command button.
29. The Server dialog box appears. Select the check boxes next to "I am calling the Internet" and "Send my plain text password, if that's the only way to connect". Click the Next command button.
30. The Phone Number dialog box appears. Type **555-5425** in the "Phone number" text box. Click the Next command button.
31. Click the Finish command button in the New Phonebook Entry Wizard dialog box.
32. The Dial-Up Networking dialog box reappears. Exit Dial-Up Networking.

