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Remote Access Service (RAS)

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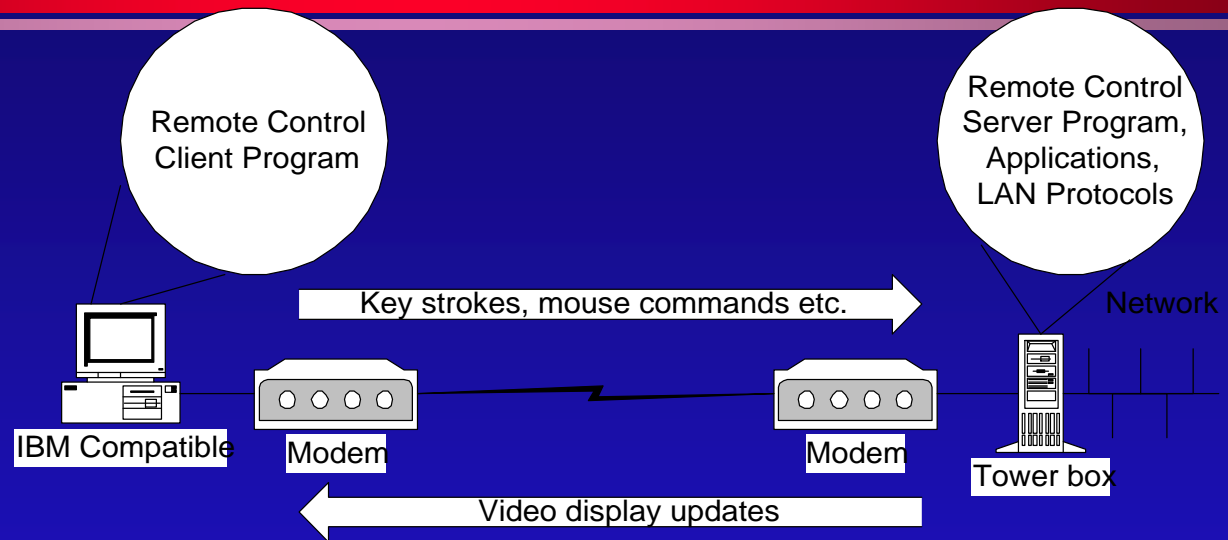
Remote Access Models

There are two models for accessing LANs over
over telephone lines using MODEMs

- Remote Control
 - » e.g. PC Anywhere, Carbon Copy
- Remote Node
 - » e.g. Microsoft® Remote Access Service

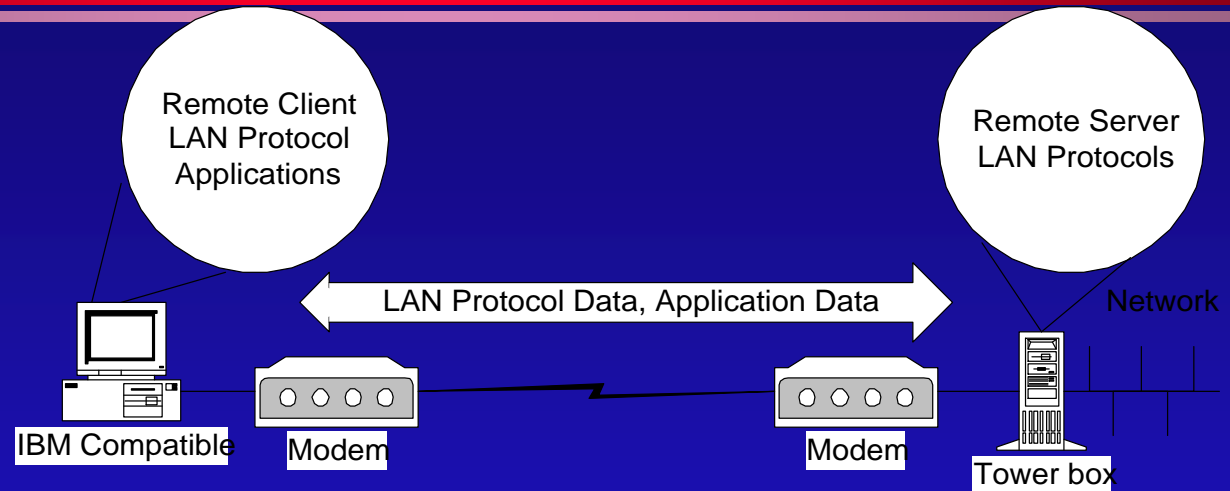
(VPN) Virtual Private Network is a special case of
remote node, in which insecure Internet is used
as

Remote Control



- Can run applications from LAN server
- Performs well with large data files
- Requires a dedicated LAN computer per remote user
- Users need to learn new communication software

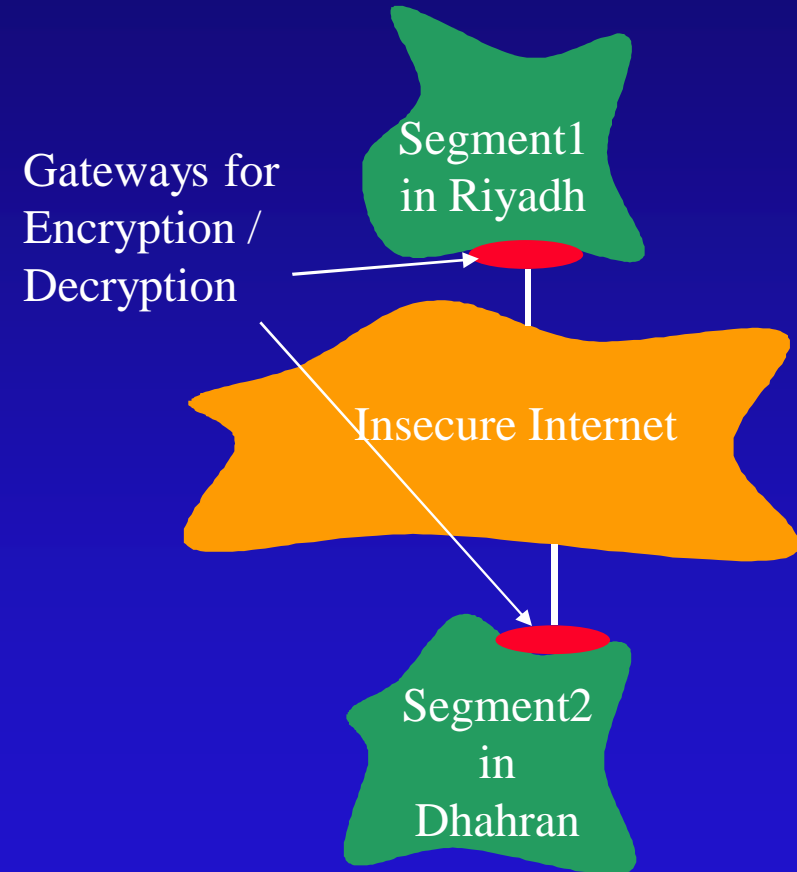
Remote Node



- All applications required by user are loaded on remote PC
- Works well when Data transfer volumes are low
- A single server can support multiple MODEM connections
- Microsoft's RAS uses remote node model, it uses PPP to support NetBEUI, IPX and IP packets

Virtual Private Network (VPN)

- VPN is a special case of remote node, in which insecure Internet is used as the intermediate connecting network.
- Security is provided by encrypting all datagrams at the source and decrypting them at the gateway in the destination network
- Windows NT supports RSA security



Installation & Configuration RAS

- MODEM Configuration
- RAS Server / Client Configuration
 - » Protocols used and their configuration
- Terminal Access HyperTerm

Microsoft's PPP based RAS

- Users in remote sites can use the network as if their computers were directly connected to the network.
- After installing RAS, you can use RAS phone book to maintain the telephone numbers of remote networks, and to connect to and disconnect from these remote networks.
- You administer Windows NT Remote Access servers using Remote Access Admin.

RAS Uses

- Running Applications from Network Servers is NOT a good idea.

E.g. Excel and Word are both > 5MB. It will take more than 20 min to download only the executable at 33Kbps.

$$\frac{5 \times 10^6 \times 8}{33 \times 10^3} \approx 1200 \text{ sec} \approx 20 \text{ min.}$$

RAS Uses (contd.)

- Microsoft's My Briefcase utility
- My Briefcase helps you keep files up-to-date when you use two computers, such as your office computer and your home computer.

Protocols Supported by RAS

Built in support for

- TCP/IP
- IPX/SPX
- NetBEUI

Both computers **MUST** use same protocol for
communication

NetBIOS Gateway

When the RAS server is configured with NetBEUI, it also acts as a NetBIOS gateway between NetBEUI and other NetBIOS-compatible protocols on the gateway. The NetBIOS gateway allows NetBEUI clients access to the NetBIOS names of resources used on the network, even though the network may be configured to use NetBIOS over TCP/IP or IPX

HyperTerminal

- HyperTerminal is a program can be used to connect (terminal access) to a remote computer, a bulletin board, or an online service.
- To get to HyperTerminal, click Start, Programs, and then Accessories.
- Uses MODEM protocols such as Zmodem, Xmodem. and Kermit to connect to a terminal server.


To access files and printers on a LAN computer running Windows, use Dial-Up Networking rather than HyperTerminal.

- MODEM Installation
 - » Configuration of IRQ, port, and DMA
 - » Installing the MODEM driver
- MODEMs at the two ends must use the same standard and protocol e.g.
 - » CCITT standard V.32 bis (14.4K) or V.34 bis (28.8K)
 - » Same number of data bits and same parity scheme

MODEM Configuration


InterCOM_Net 33600bps Internal MODEM V.34+ P... ? X

General | Connection | Options

 InterCOM_Net 33600bps Internal MODEM V.

Port: COM2

Speaker volume

Off  High

Maximum speed

115200

Only connect at this speed

OK Cancel

MODEM Configuration (contd.)

InterCOM_Net 33600bps Internal MODEM V.34+ P... ? X

General | Connection | Options

Connection preferences

Data bits: 8

Parity: None

Stop bits: 1

Call preferences

Wait for dial tone before dialing

Cancel the call if not connected within 55 secs

Disconnect a call if idle for more than 30 mins

Advanced...

OK Cancel

MODEM Configuration (contd.)

Advanced Connection Settings [?] [X]

<input type="checkbox"/> Use error control	<input checked="" type="checkbox"/> Use flow control
<input type="checkbox"/> Required to connect	<input checked="" type="radio"/> Hardware (RTS/CTS)
<input type="checkbox"/> Compress data	<input type="radio"/> Software (XON/XOFF)
<input type="checkbox"/> Use cellular protocol	

Modulation type
Standard

Extra settings

Record a log file

OK Cancel

MODEM Configuration (contd.)

InterCOM_Net 33600bps Internal MODEM V.34+ P... ? X

General | Connection | Options

Connection control

- Bring up terminal window before dialing
- Bring up terminal window after dialing

Dial control

- Operator assisted or manual dial

Wait for credit card tone: 8 seconds

Status control

- Display modem status

OK Cancel

Installation of RAS Server / Client --- LAB

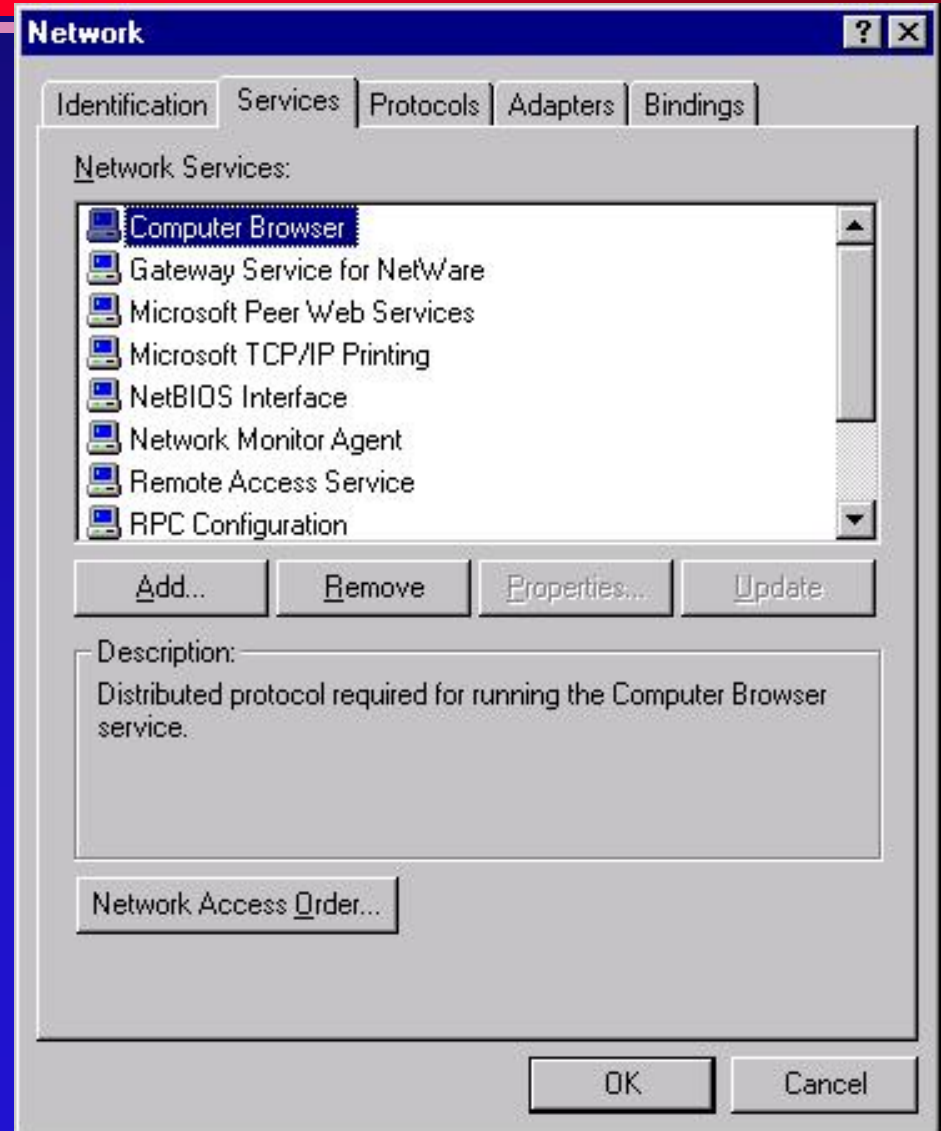
RAS server installation varies depending on the network protocols that you install. You must install all protocols that you wish to use with RAS e.g. IPX or TCP/IP, and configure them before installing RAS.

Ensure that you have the appropriate modem, multi-port, X25 smart card, or ISDN card connected to the RAS server, before installing RAS,

This same procedure can also be used as a guideline for configuring RAS clients as well. To install the RAS software, perform the following steps:

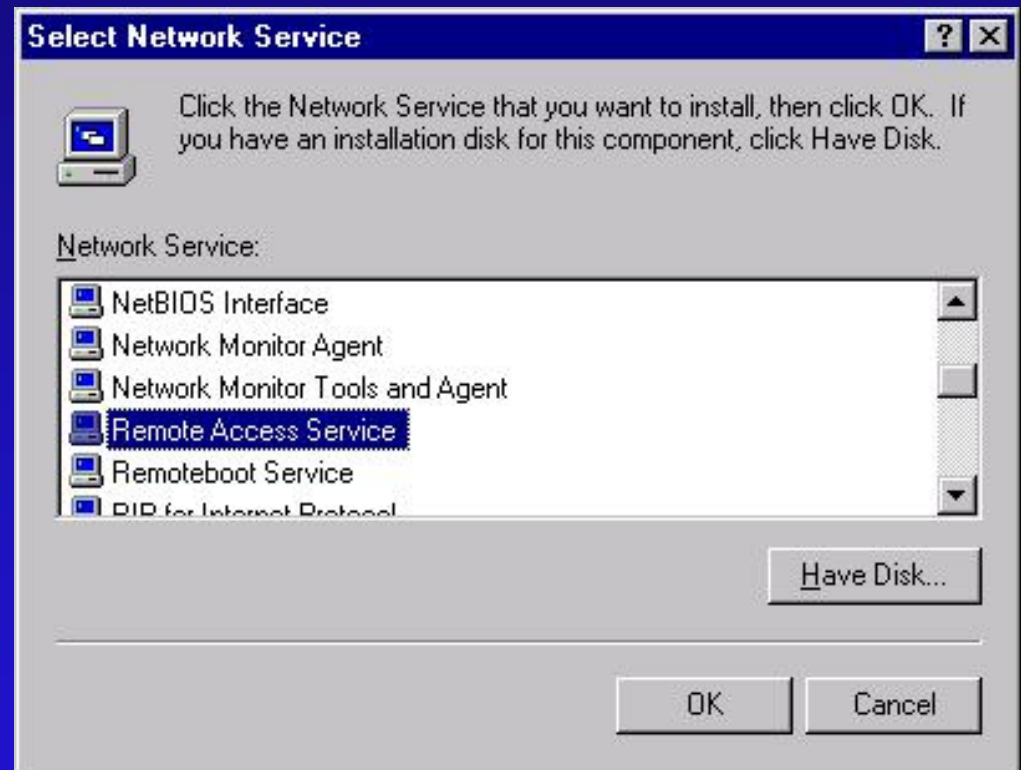
Installation of RAS Server / Client (contd.) : RAS Service

- 1. You must log on as administrator to the Windows NT server.
- 2. Start the Network option in the Control Panel. You should see the Network dialog box. In the Network dialog choose services tab.
- Figure : The Network Services Tab



Installation of RAS Server / Client (contd.) : RAS Service

- 3. In the Network Services tab, choose the, Add button to invoke the Select Network Service dialog box.
- Figure : The Select Network Service dialog box
- 4. In the Select Network Service dialog box, select Remote Access Service and then choose the OK button.



Installation of RAS Server / Client (contd.) : RAS Service

- 5. Enter the path for the distribution files and choose the Continue button.
- 6. You should see a status of the files as they are copied to the server computer.
- 7. The Add RAS Device dialog box (see fig.) displays a list of RAS-capable devices on your system. Click on the arrow button to display the list. If a modem is installed on your system, it should appear in the list of RAS-capable devices. After you choose the device you want to use, click on OK. To install a new modem, click on the Install Modem button, which launches the Install New Modem wizard.

Installation of RAS Server / Client (contd.) : RAS Service

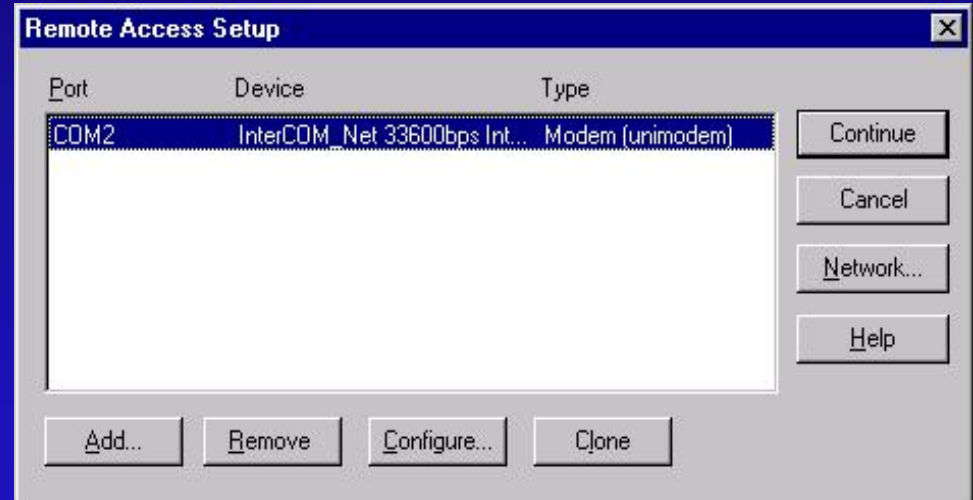
To install an X25 PAD, click on the Install X25 Pad button. Before you can install an X.25 PAD, the PAD device must be present on your system. Consult your X.25 provider if you want to configure Remote Access Service for X25.

- Figure : The Add RAS Device dialog box.



Installation of RAS Server / Client (contd.)

- 8. The Remote Access Setup dialog box (see fig.) shows the device (or devices) to be included in your RAS configuration. To add a new device, click on the Add button. (The Add button sends you back to the Add RAS Device dialog box shown in previous figure, but now the devices you already selected for RAS don't appear in the list.)
- Figure : The Remote Access Setup box



tion of RAS Server / Client (contd.)

- 9. In the Remote Access Setup dialog box, click on the Configure button to open the Configure Port Usage dialog box (see figs.). In the configure Port Usage dialog box, select whether RAS will use the port for dial-out connections, dial-in connections, or both.

(If the protocols are not already configured RAS setup prompts you to configure each protocol)

Configuration of RAS Server / Client (contd.)

- Select the option Dial Out only to set the computer up to be a RAS client only.
- Select the option Receive calls only to set the computer up to be a RAS server only.
- Select the option Dial out and Receive calls to set the computer up as a RAS client or server. The computer cannot be a client and a server simultaneously, however.
- After you choose a port usage option, click on OK.
- Figure : The Configure Port Usage dialog box.



tion of RAS Server / Client (contd.)

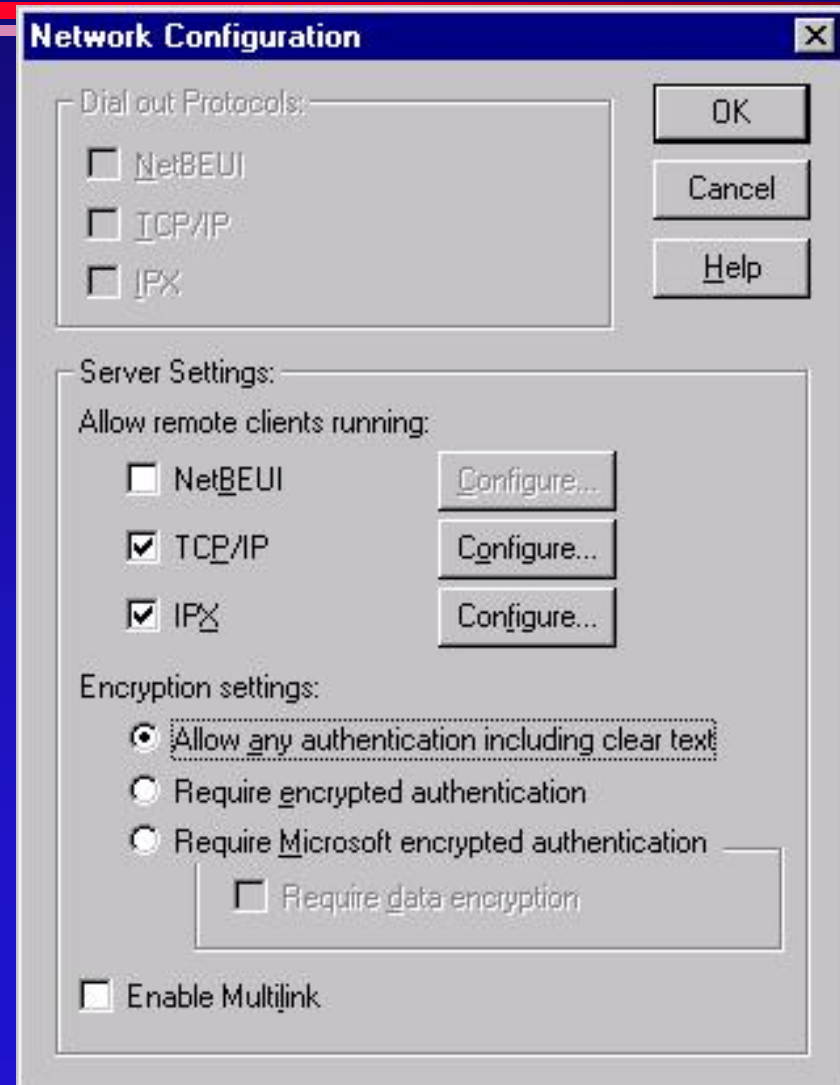
- 10. If you want to copy a modem setup from one modem to another, choose the Clone button in the Remote Access Setup dialog box.
- 11. To configure network settings such as network protocols and encryption options, choose the Network button to open the Network Configuration dialog box (see fig. On next slide).

Configuration of RAS Server / Client (contd.)

The choices for the Network settings are discussed in a separate procedure titled, [Configuring RAS To Use Individual LAN Protocols.](#)

Figure : The Network Configuration dialog box

After you finish making changes to the Network Configuration dialog box, click on OK. After you finish making changes to the Remote Access Setup dialog box, click on the Continue button.



Installation of RAS Server / Client (contd.)

- 12. You will see the dialog boxes for the protocols to be used with RAS. Complete the steps listed in the procedure, "**Configuring RAS To Use Individual LAN Protocols.**"
- 13. After you finish making changes to the Remote Access Setup dialog box, click on the Continue button. Setup completes the installation.
- 14. Restart the computer to make the changes effective.

Configuring RAS To Use Individual LAN Protocols

- If LAN protocols, such as NetBEUI, IPX, and TCP/IP, are already installed in the LAN server, they automatically get enabled for RAS use when the RAS server is installed.
- If the network protocols are installed after RAS is installed, or if you want to change the configuration for an already installed protocol, you must explicitly configure these protocols for RAS usage.
- The following slides describe the procedures for configuring the individual protocols. There is a common part which must be followed for each protocol, and then this must be followed for the specific part for each particular protocol.

Common Procedure for Configuring all LAN Protocols

- 1. Log on as Administrator and start the Network option in the Control Panel.
- 2. From the Network dialog box, select the Services tab and choose Remote Access Service. Click on the Properties button.
- 3. You should see the Remote Access Setup dialog box (refer to slides in Installation of RAS Server / Client).
- Choose the Network button. You should see the Network Configuration dialog box (refer to slides in Installation of RAS Server / Client).

Installation Procedure for Config. LAN Protocols (contd.)

- 4. In the Dial out Protocols section, select the protocols, that you want the computer to use for dialing out. The choices are NetBEUI, TCP/IP, and IPX. If you do not select a protocol in this box, you can select that protocol when you configure the phone book for dialing out.

Note: You can select Dial out protocols only if you have configured a port; otherwise, the choices are grayed out.

- 5. In the Server Settings box of Network Configuration dialog box (refer to slides in Installation of RAS Server / Client), select the encryption method to use. (On a RAS client, you don't see the Server Settings box).
 - » Enable Allow any authentication including clear text option to support any authentication the RAS client uses. Useful if you have different types of RAS clients but is least secure of all the options.

Configuration Procedure for Config. LAN Protocols (contd.)

- » Select Require encrypted authentication option to support any authentication used by the RAS client except PAP.
- » Select Require Microsoft encrypted authentication option to permit authentication using Microsoft's CHAP only.
- Select Require data encryption option if all data sent on the RAS link is to be encrypted.
- 6. Enable the Enable Multilink check box to activate the 'Windows NT Server 4 Multilink option. Multilink allows you to increase your remote-access bandwidth by using two or more communications links for a single connection.

Installation Procedure for Config. LAN Protocols (contd.)

- 7. For RAS Server, in the Server Settings box of Network Configuration dialog box (refer to slides in Installation of RAS Server / Client), select the protocols for the computer to use for servicing calls received from remote Clients. Your choices are NetBEUI, TCP/IP, and IPX. Select the Configure button next to each of these protocols to configure them. The steps for protocol configuration are described in the following slides under, **“Configuring NetBEUI for RAS,”** **“Configuring TCP/IP for RAS,”** and **“Configuring IPX for RAS”**

Authentication Schemes Supported by RAS

- RAS supports PAP, CHAP, MD5-CHAP, DES, and SPAP.
 - » PAP = Password Authentication Protocol
 - » CHAP = Challenge Handshake Authentication Protocol
 - » DES = Data Encryption Standard
 - » SPAP = Shiva Password Authentication Protocol
- PAP uses plain-text password authentication and isn't a very secure authentication protocol. (PAP is useful if you have different types of RAS clients, and also for supporting third-party clients that work with PAP only.) Microsoft's CHAP implementation is based on the Message Digest 5 (MD5) encryption. It has speed, is simple, and small code size. DES has been designed by the National Bureau of Standards (NBS). SPAP has been implemented by the company Shiva, Inc. Use of SPAP protocol provides compatibility with Shiva clients. Unlike PAP, SPAP does not send clear-Text password and is therefore more secure.
- Suggestion : Use PAP when first configuring RAS, to avoid problems, later change to the authentication scheme you like.

Configuring NetBEUI for RAS

Since NetBEUI addressing is based on NetBIOS computer names, no additional addresses need to be configured. To configure the **RAS server** to use NetBEUI follow these steps:

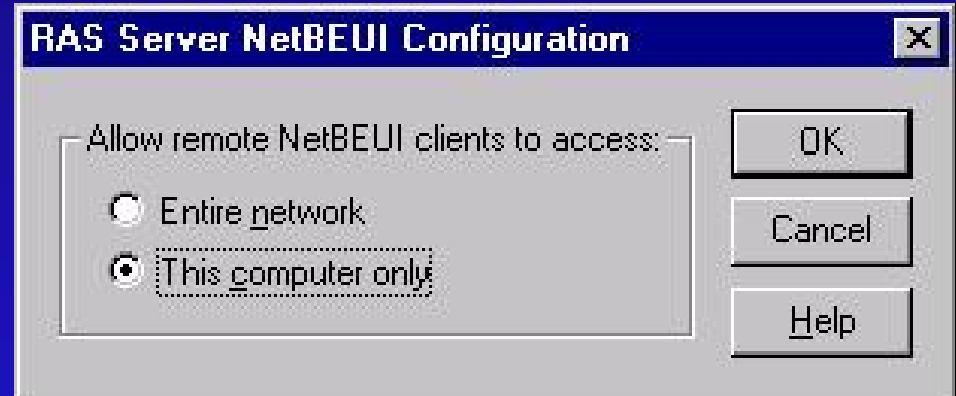
- 1. Log on as Administrator and start the Network option in the Control Panel.
- 2. From the Network dialog box, select Services tab and choose Remote Access Service. Click on the Properties button.
- 3. You should see the Remote Access Setup dialog box (refer to slides in Installation of RAS Server / Client).

Choose the Network button. You should see the Network Configuration dialog box (refer to slides in Installation of RAS Server / Client).

Configuring NetBEUI for RAS (contd.)

- 4. In the Server Settings box, choose the Configure button next to the NetBEUI protocol. You should see the RAS Server NetBEUI configuration dialog box (see fig.).

Figure : The RAS Server NetBEUI Configuration dialog box.



- 5. Select the Entire network option if you want RAS NetBEUI clients to access the entire network. This is the default.

uring NetBEUI for RAS (contd.)

- 6. Select This computer only if you want to to limit access to the network.
- 7. Choose OK in successive dialog boxes after completing any additional configuration steps. Then restart the computer for the changes to take effect.

Configuring TCP/IP for RAS

- If RAS clients need to use TCP/IP for communication then the RAS server must have TCP/IP installed and configured on it. In addition, the RAS server must also be configured to supply IP addresses to RAS clients.

RAS clients that use TCP/IP require a unique IP address. If the client does not have an IP address already assigned to it when it connects with the RAS server, then the RAS server must assign an IP address to the client. You can also configure the RAS server to use DHCP to assign IP addresses to the clients. The IP addresses assigned by RAS server to the clients must be valid to access the local subnet. To configure TCP/IP on the RAS server follow these steps:

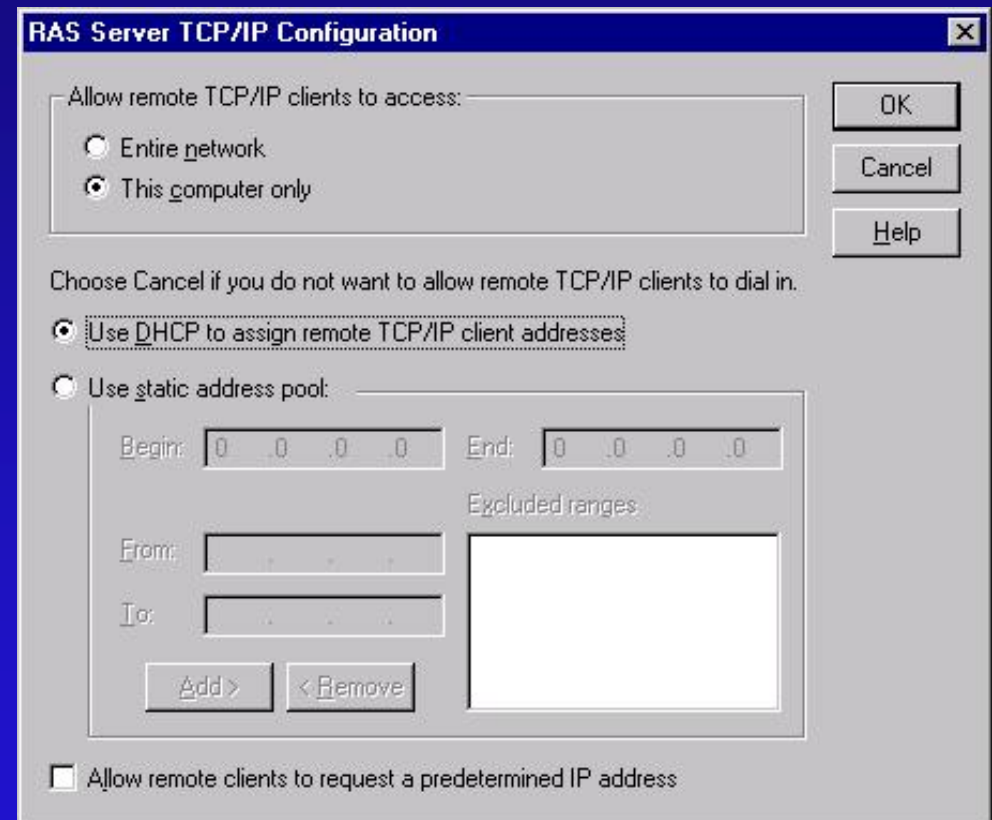
Configuring TCP/IP for RAS (contd.)

- 1. Log on as administrator and start the Network option in the Control Panel.
- 2. From the Network dialog box, choose the Services tab and select Remote Access Service. Click on the Properties button.
- 3. You should see the Remote Access Setup dialog box (refer to slides in Installation of RAS Server / Client). Choose the Network button. You should see the Network Configuration dialog box (refer to slides in Installation of RAS Server / Client).
- 4. In the Server Settings box, choose the Configure button next to the TCP/IP Protocol.

You should see the RAS Server TCP/IP Configuration dialog box (see fig.).

Configuring TCP/IP for RAS (contd.)

- Figure : RAS Server TCPIIP Configuration dialog box.
- 5. Select Entire network option if you want the RAS TCP/IP clients to access the entire network. (This is the default Choice). Or select This computer only option if you want to restrict RAS TCP/IP clients to this computer only.
- 6. Enable the Use DHCP to assign remote TCP/IP client addresses option if you have configured a DHCP server to be used for allocating IPaddresses.



RAS Server TCP/IP Configuration

Allow remote TCP/IP clients to access:

Entire network
 This computer only

Choose Cancel if you do not want to allow remote TCP/IP clients to dial in.

Use DHCP to assign remote TCP/IP client addresses
 Use static address pool:

Begin: 0 . 0 . 0 . 0 End: 0 . 0 . 0 . 0

From:
To:

Excluded ranges

Add> <Remove

Allow remote clients to request a predetermined IP address

OK
Cancel
Help

Configuring TCP/IP for RAS (contd.)

- 7. If you are not using a DHCP server, you can use the Use static address pool box to configure the IP addresses to be allocated to RAS clients.

In the Begin and End fields, enter the range of IP addresses that will be used. The Begin field contains the first number in the range and the End field contain the last number in the range.

You may also specify a range of IP addresses to be excluded from the range specified in the Begin and End fields, you can enter the excluded range in the From and To fields, and then choose the Add button. The specified range will be listed in the Excluded ranges box.

Configuring TCP/IP for RAS (contd.)

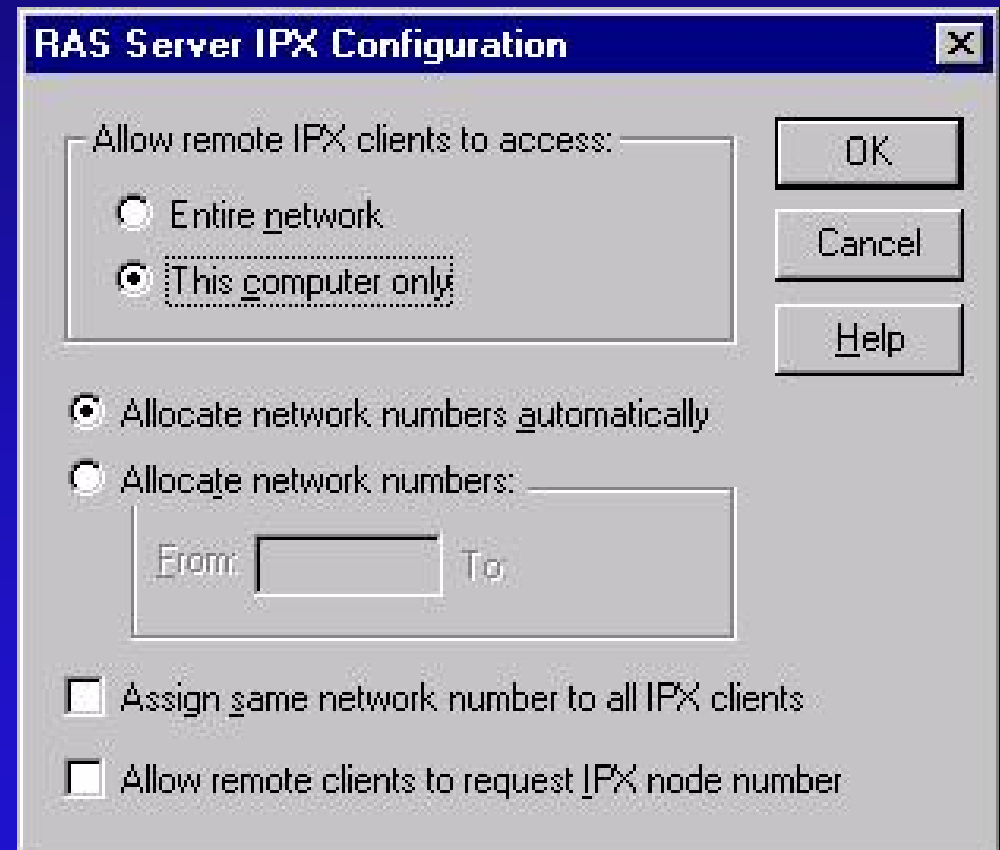
- 8. If RAS clients are configured with an IP address, you can enable the Allow remote clients to request a predetermined IP address option. However, the predetermined IP address used by the client must be compatible with the subnet that the RAS server connects to, or this could cause IP routing problems.
- 9. Choose OK in the RAS Server TCP/IP Configuration dialog box, and in successive dialog boxes after completing any additional configuration steps.
- 10. Restart the RAS computer for changes to take effect.

Configuring IPX for RAS

- For RAS clients to access NetWare servers on the network, IPX must be configured on the RAS server. To configure IPX follow these steps:
- 1. Log on as administrator and start the Network option in the Control Panel.
- 2. From the Network dialog box, choose the Services tab and select Remote Access Service. Click on the Properties button.
- 3. You should see the Remote Access Setup dialog box (refer to slides in Installation of RAS Server / Client). Choose the Network button. You should see the Network Configuration dialog box (refer to slides in Installation of RAS Server / Client).
- 4. In the Server Settings box, choose the Configure button next to the IPX Protocol. You should see the RAS Server IPX Configuration dialog box (see fig.).

Configuring IPX for RAS (contd.)

- Figure RAS Server IPX Configuration.
- 5. Select Entire network if you want RAS IPX clients to access the entire network (default). Select This computer only option if you want RAS IPX clients to access only this computer (limiting network access).
- 6. Select the Allocate network numbers automatically, if you want the RAS server software to obtain the IPX network number by querying an IPX router, using the RIP protocol (for IPX).



The screenshot shows the 'RAS Server IPX Configuration' dialog box. It has a title bar with a close button (X). The dialog contains several options:

- 'Allow remote IPX clients to access:' with two radio buttons: 'Entire network' (unselected) and 'This computer only' (selected).
- 'Allocate network numbers automatically' (selected).
- 'Allocate network numbers:' with a sub-dialog for 'From:' and 'To:' (both empty).
- 'Assign same network number to all IPX clients' (unchecked).
- 'Allow remote clients to request IPX node number' (unchecked).

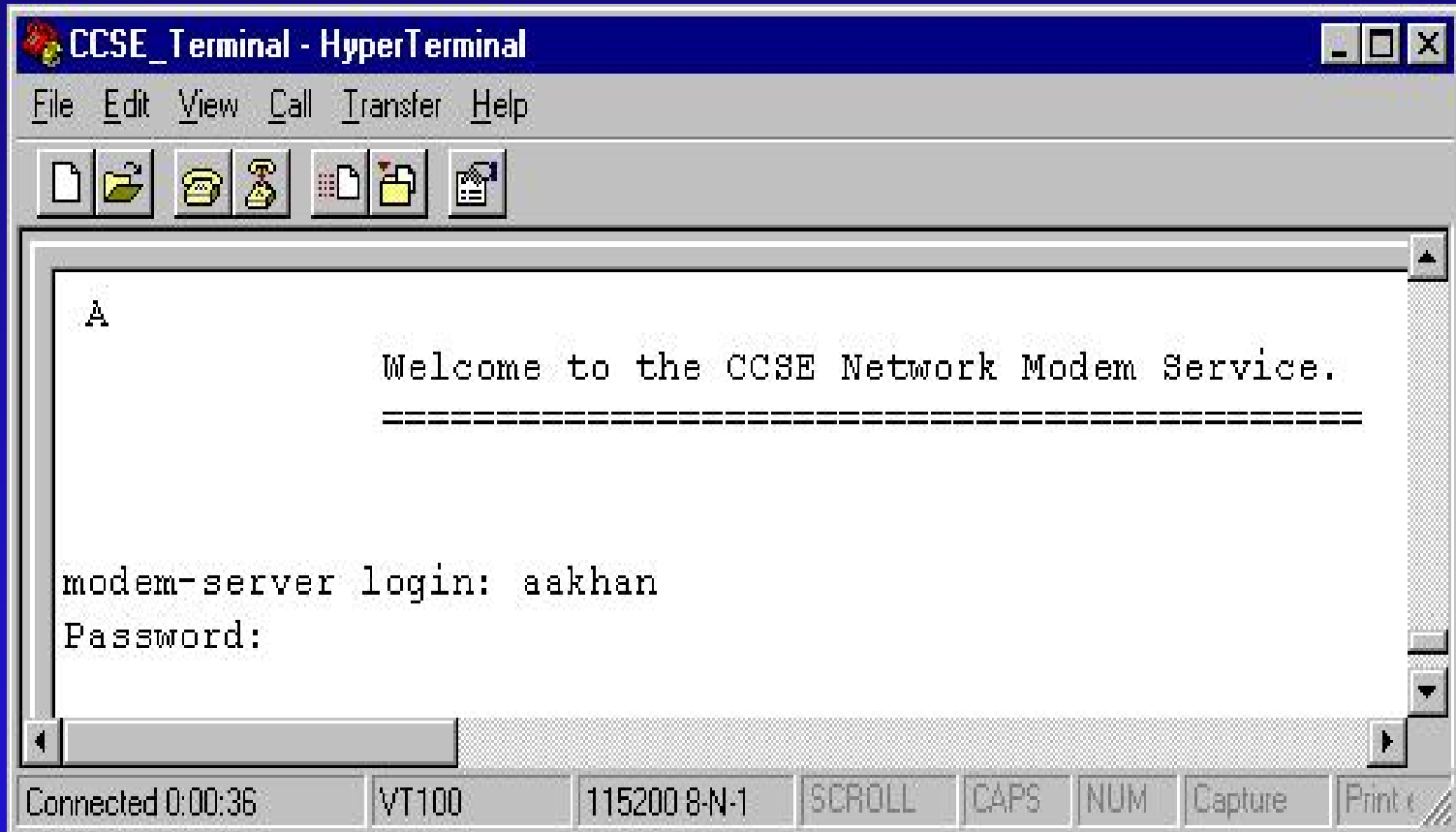
Buttons for 'OK', 'Cancel', and 'Help' are on the right side.

Configuring IPX for RAS (contd.)

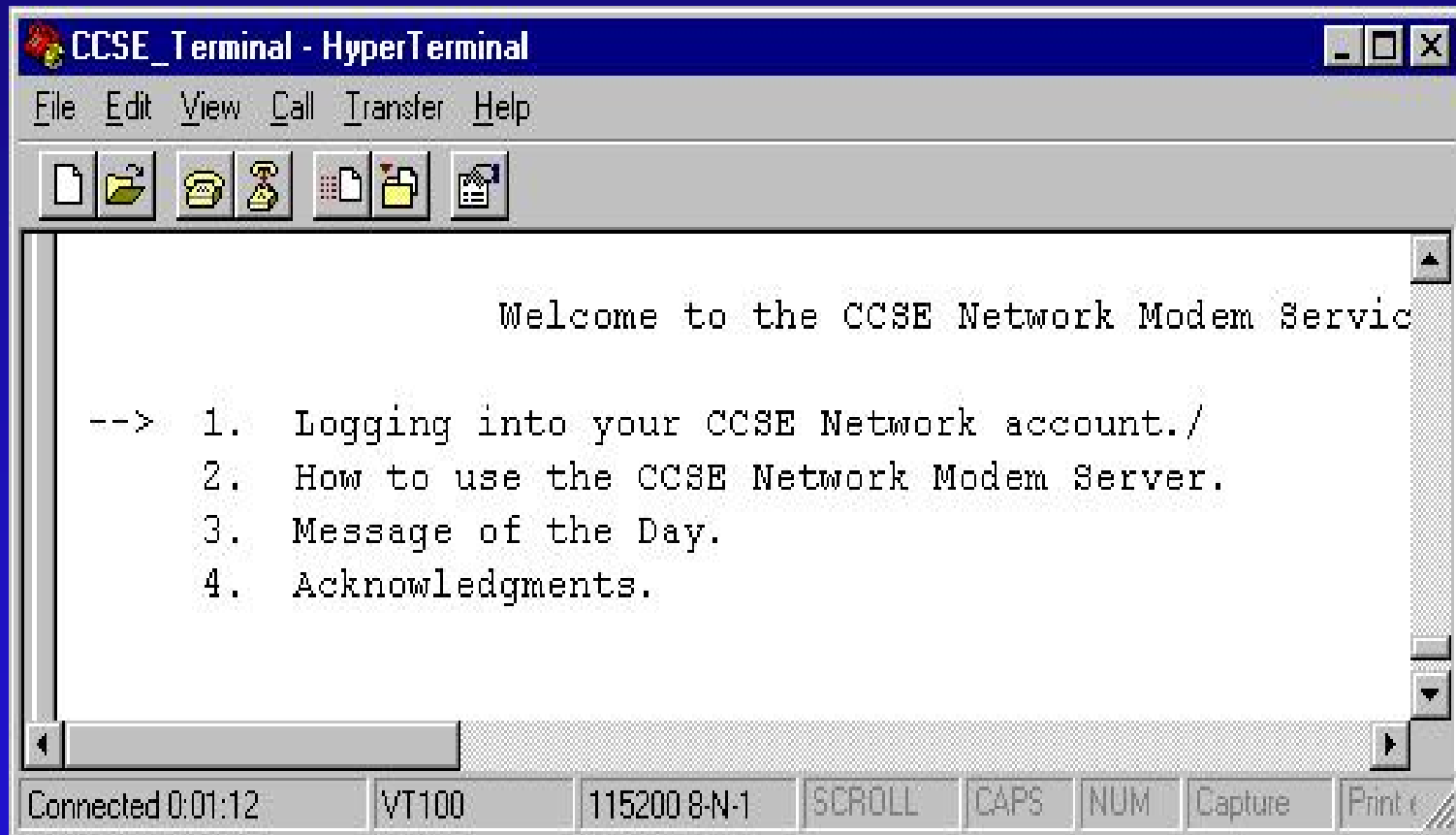
The IPX network number obtained is then assigned to the RAS client.

- 7. Select Allocate network numbers option if you want the network numbers to be assigned from the specified range. RAS assigns one network number for each port starting from the value in the From field. It automatically fills in the ending network number in the To field. Select this option if you want to treat the RAS IPX clients as if they belong to different IPX networks. In this case the RAS server must perform IPX routing to reach other IPX networks.
- 8. Select the Assign same network number to all IPX clients option if you want to treat RAS IPX clients as belonging to the same IPX network. This option can be used in conjunction with automatic assignment of IPX network numbers or manual assignment of IPX network numbers.
- 9. Select (or deselect) Allow remote clients to request IPX node number. Choose OK in successive dialog boxes after completing any additional configuration steps. Restart computer.

HyperTerminal




HyperTerminal



HyperTerminal Configuration

CCSE_Terminal Properties

Connect To | Settings

 CCSE_Terminal Change Icon...

Country code: Saudi Arabia (966)

Enter the area code without the long-distance prefix.

Area code: 03

Phone number: 185

Connect using: InterCOM_Net 33600bps Internal

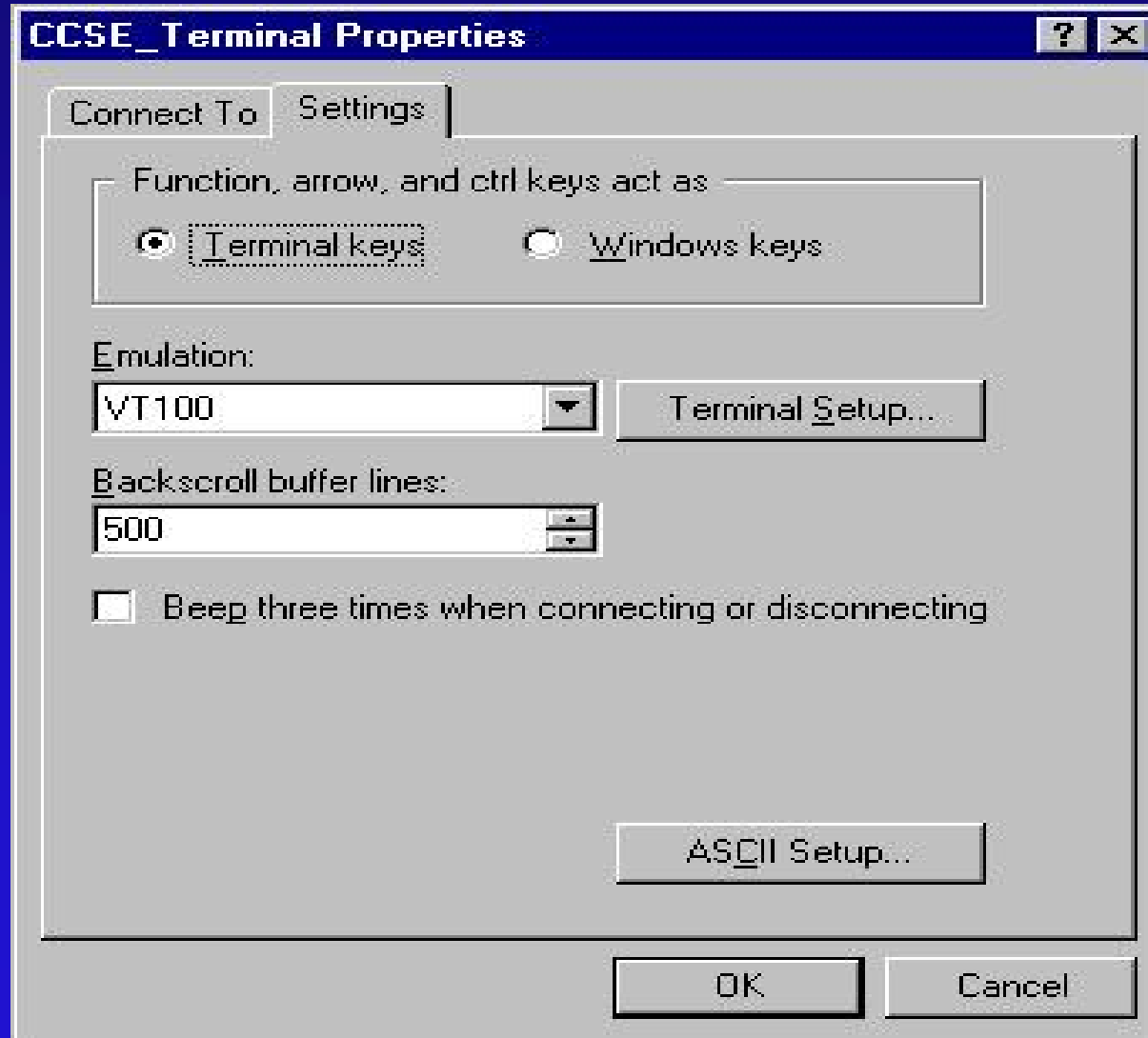
Configure...

Use country code and area code

Redial on busy

OK Cancel

HyperTerminal Configuration (contd.)



The screenshot shows the 'CCSE_Terminal Properties' dialog box with the 'Settings' tab selected. The 'Connect To' tab is also visible. The 'Settings' tab contains the following options:

- Function, arrow, and ctrl keys act as:
 - Terminal keys
 - Windows keys
- Emulation: VT100 (dropdown menu) with a 'Terminal Setup...' button.
- Backscroll buffer lines: 500 (spin box).
- Beep three times when connecting or disconnecting.
- ASCII Setup... button.
- OK and Cancel buttons.

HyperTerminal Configuration (contd.)

Terminal Settings [?] [X]

Cursor

Block Underline Blink

Terminal Modes

Keypad application mode
 Cursor keypad mode
 132 column mode

Character set:
ASCII

OK Cancel

HyperTerminal Configuration (contd.)

ASCII Setup [?] [X]

ASCII Sending

- Send line ends with line feeds
- Echo typed characters locally

Line delay: milliseconds.

Charakter delay: milliseconds.

ASCII Receiving

- Append line feeds to incoming line ends
- Force incoming data to 7-bit ASCII
- Wrap lines that exceed terminal width