

InterChangeVS™ 3000 Series

VS3000U and VS3000S

Installation and Configuration Guide

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Corporate Corporate Headquarters:

Internet URL: **www.comtrol.com**

email: **support@comtrol.com**

FTP site: **[ftp.comtrol.com](ftp://comtrol.com)**

FAX: (612) 631-8117

Phone: (612) 631-7654

Control Europe:

Internet URL: **www.comtrol.co.uk**

email: **support@comtrol.co.uk**

FAX: +44 (0) 1 869-323-211

Phone: +44 (0) 1 869-323-220

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Table of Contents

List of Tables	5
Introduction	7
Product Overview	7
Features	7
ISDN Service Standards Supported.....	8
Operating System Requirements	8
Connectivity Requirements	8
Installation Overview	9
Backup Server Overview	10
Backup Server Configuration and Hierarchy	10
Distributing the Workload	10
Returning Control to the Primary Server.....	11
Software or Document Updates	12
Control Corporate Headquarters.....	12
Control Europe	12
Installing VS-Link (Windows NT)	13
Removing Existing VS-Link Software	13
Installing the VS-Link Software	14
Extracting the Files.....	14
Software Installation.....	15
Primary and Backup Servers Explained.....	22
Installing Additional Virtual Servers	22
Changing SPIDs	23
Installing and Configuring RAS	24
Replacing Units in Service (“Hot-Swapping”)	34

Troubleshooting 35

 Problem Resolution Checklist 35

 Understanding the Ethernet LEDs 36

 Understanding the Port LEDs 37

 Obtaining Software and Document Updates 38

 Placing a Support Call 38

 Control Corporate Headquarters 40

 Control Europe 40

ISDN Cause Codes 41

Index 49

List of Tables

Table 1. Ethernet LED Descriptions	36
Table 2. Port LED Descriptions	37
Table 3. Support Call Information.....	38
Table 4. ISDN Cause Codes	41

Introduction

Product Overview

The Control™ InterChangeVS™ 3000 virtual remote access server is a rack-mountable or stackable “network appliance” that connects via Ethernet to a host Windows NT® or Novell® NetWare® server and terminates four Basic Rate Interface (BRI) ISDN lines. Each ISDN line (“port”) consists of two 64 Kbps B channels and one 16 Kbps D channel: each B channel can be used independently, for up to eight simultaneous 64 Kbps connections, or the B channels can be bonded, for connections of up to 512 Kbps. This bandwidth, along with the flexible data compression schemes that are supported, makes the VS3000 ideal for site-to-site file transfers and graphics-intensive Internet/intranet applications.

Features

- Supports both ISDN Datalink Layer ITU-T Q.921 and ITU-T Q.931 D-channel signaling.
- Supports both North American (VS3000U) and international (VS3000S) users with the same product family and software.
- Provides the performance and features of a standalone remote access server with reduced implementation and operating costs.
- Automatic backup server switching ensures that ISDN services stay available even if the primary server goes down.
- “Hot-swapping” lets you take VS3000 units in or out of service without downing the server or interrupting other network services.
- VS-Link software gives you direct and immediate control of the VS3000, including monitoring and diagnostic functions.
- Full support for Windows NT RAS, Novell NetWare MultiProtocol Router™, and Novell NetWare Connect™ functionality.

ISDN Service Standards Supported

The VS3000U is designed for North American use and is compatible with most ISDN service standards, including:

- AT&T, National ISDN-1 (NI-1), 5ESS Custom, and EuroISDN
- Nortel, NI-1, DMS-100 Proprietary (NTI), and EuroISDN
- Siemens, NI-1, and EuroISDN

The VS3000S is designed for international use, or North American use when connected to an NT1 terminating unit, and is compatible with most international ISDN service standards, including:

- European EuroISDN (ETSI NET-3)
- AT&T, National ISDN-1 (NI-1), 5ESS Custom, and EuroISDN
- Nortel, NI-1, DMS-100 Proprietary (NTI), and EuroISDN
- Siemens, NI-1, and EuroISDN

Operating System Requirements

The InterChangeVS 3000 requires at least one network server* running one of the following operating systems:

- Windows NT (3.51 or 4.0) with Remote Access Service (RAS or RRAS).

Note: *The Windows NT 4.0 operating system is required to support Multilink PPP.*

- Citrix® WinFrame® (1.7 or later)
- Novell NetWare (3.12, 4.11, or IntranetWare™)

Note: *Contact Novell Inc. for information regarding Multilink PPP support for NetWare.*

- * *Two or more network servers are required in order to use the automatic backup server feature.*

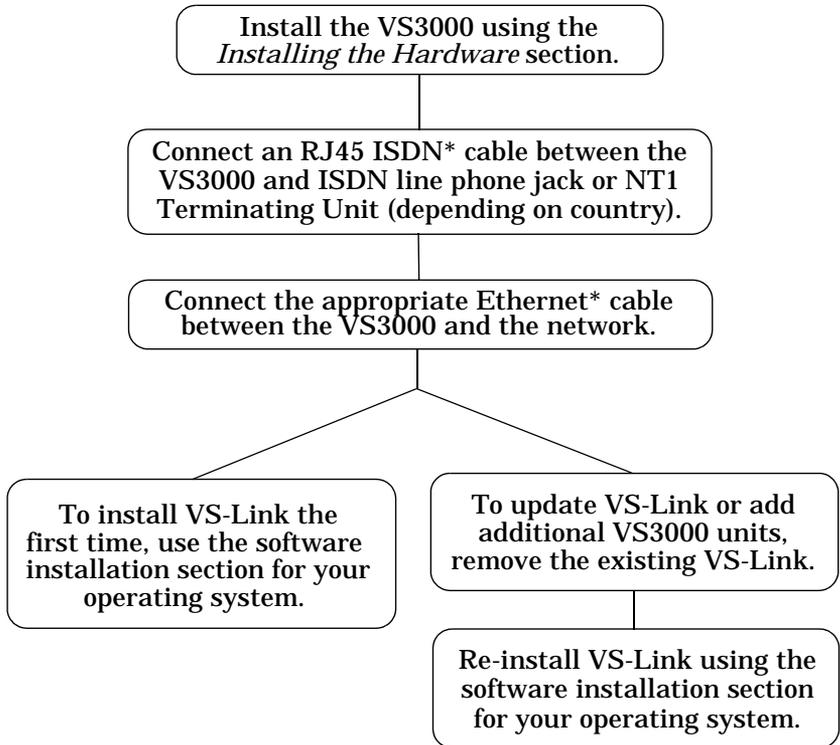
Connectivity Requirements

- One to four ISDN BRI telephone lines. (See *Working With The Phone Company*, elsewhere in this guide.)
- An Ethernet connection, either directly to a NIC card in the host server or to an Ethernet hub. (See *Installing the Hardware*, elsewhere in this guide.)

Installation Overview

The following figure illustrates the InterChangeVS 3000 hardware and software installation procedure.

Note: *The following procedure assumes that the ISDN line is already installed and operational. See the Working with the Phone Company section for more information.*



* *While ISDN and Ethernet cables may appear to be identical, they are not interchangeable. Make sure you are using the correct cable(s) in the correct locations.*

Backup Server Overview

Both the Windows NT and Novell versions of VS-Link support automatic backup server switching. If you have more than one NT or Novell server on a network, you can configure one server as the *primary* server for the VS3000, and one or more other servers as *backup* servers for the same VS3000.

Once configured, primary-to-backup server switching is automatic. In the event that the primary server goes offline, the backup server waits the amount of time you specified during setup. If the primary server does not come back online in that time, the backup server automatically resets the VS3000 (in the process terminating any calls in progress), then reloads the VS3000 using the configuration information stored on the backup server and restores ISDN service.

Backup Server Configuration and Hierarchy

To configure backup server operation, you must install the VS-Link software on the primary server and on every server that may be used as a backup server. Then, when you configure the software on a given server, you follow these steps:

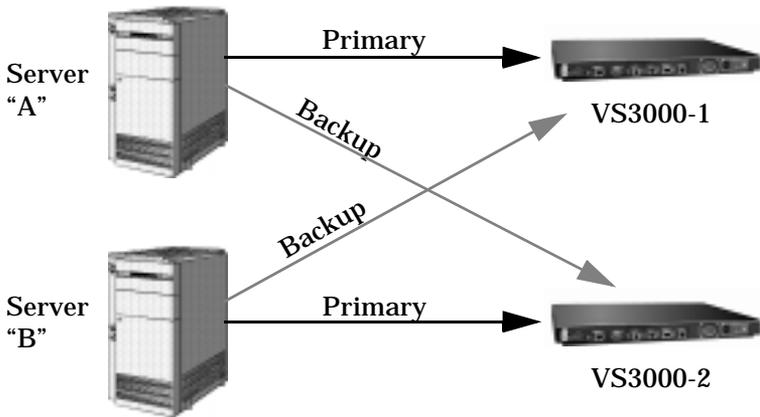
1. Select the specific VS3000 to be controlled by this server.
2. Select whether this server is the primary or backup server for the selected VS3000.
3. If a backup server, select the amount of time the server waits (Recover Time in Windows NT, Polling Time in Novell) before taking over from the primary server.

Each VS3000 must have one and only one primary server, but it can have multiple backup servers. Thus, by configuring each potential backup server with a different recover time, you can establish a hierarchy that determines which backup server to go to, and when.

Distributing the Workload

Note that primary/backup server configuration is set for *each* VS3000 on the network individually. This means that a given server can be the primary server for some of the VS3000 units on the network, and the backup server for others.

For example, in the following illustration, server “A” is the primary server for VS3000-1 and the backup server for VS3000-2, while server “B” is the primary server for VS3000-2 and the backup server for VS3000-1. Thus, the normal workload is distributed between the two servers, but if one of them goes down, the other takes over support of both VS3000 units.



Note: *VS-Link for Novell can support four VS3000 units (either primary, backup, or mixed) per Novell server. VS-Link for Windows NT can support thirty-two VS3000 units per NT server.*

Returning Control to the Primary Server

When the primary server comes back online after a service outage, backup-to-primary switching is not automatic. Instead, you must go to the primary server and perform a manual procedure to reassert control over the VS3000.

On Windows NT networks, access the **ISDN Monitor** program and use the **Reset** option.

On Novell networks, load the `vs3kcfg.nlm` utility and use the **Primary, Force Load** option.

Software or Document Updates

For information that is not in this *Guide*, see **README** and/or **Help** files on the installation media. In particular, the Windows NT version of VS-Link and the Windows NT ISDN Monitor program include significant online help.

Control manuals and other documents are available in electronic form on the Control web site. Driver software updates can be downloaded at no charge from the Control ftp site. Always check the web and ftp sites to make sure that you have the current driver and documentation.

The current released version of the software is stored in the **VS3000** directory. If a newer version has reached the beta testing stage, it can be found in the **BETA** directory. Beta software is made available on an **“as-is”** basis and users of beta software assume all risks and liabilities relating thereto.

Note: *Downloadable driver software files are stored in either zipped (filename.zip) or self-extracting zip (filename.exe) format. You must extract the zipped files before installing a downloaded file. For more information, see the appropriate section for your network operating system.*

Control Corporate Headquarters

Internet URL: **www.comtrol.com**

email: **support@comtrol.com**

FTP site: **ftp.comtrol.com**

FAX: (612) 631-8117

Phone: (612) 631-7654

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email: **support@comtrol.co.uk**

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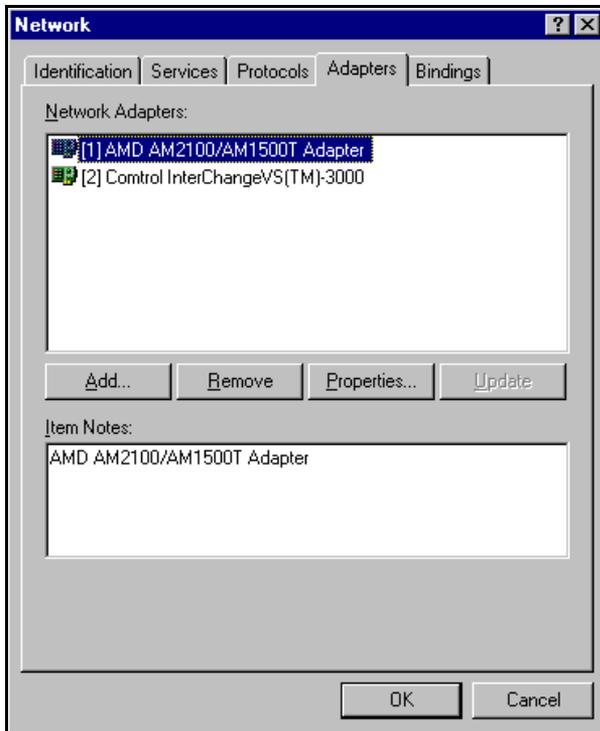
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Installing VS-Link (Windows NT)

Removing Existing VS-Link Software

Use the following procedure to remove any existing VS-Link software. If updating (not reconfiguring) VS-Link, make sure that you remove the existing version before installing the updated software.

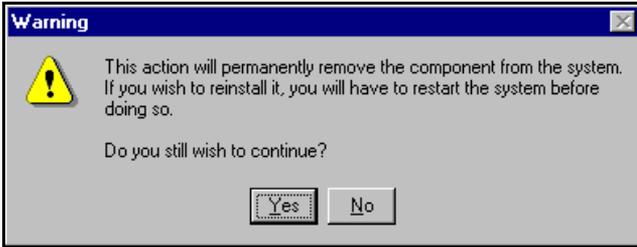
1. Open the Control Panel and start the Network applet, or right-click on the Network Neighborhood and select the **Properties** option.
2. If using Windows NT 4.0, select the **Adapters** tab.



3. Highlight **Control InterChangeVS(TM)-3000**.
4. Click the **Remove** button.

Note: The screens illustrated in this section are Windows NT 4.0 screens. Windows NT 3.51 and Citrix WinFrame screens are similar.

5. Reboot the system to complete the removal process.



After removing the existing VS-Link software, use the *Installing the VS-Link Software* discussion.

Installing the VS-Link Software

Use the following procedures to install VS-Link for the Windows NT 3.51 or 4.0 operating systems. If using Citrix WinFrame, follow the instructions for NT 3.51.

Note: If updating VS-Link, remove the existing version of VS-Link first. Do not use the Update option.

These procedures assume that you have already installed the hardware and determined that it is working properly. For information about the power-on diagnostic and understanding the LED status indicators, see *Installing the Hardware and Troubleshooting*.

Note: In a new installation, the lower 10BASE-T LED should be lit (if using a 10Base-T Ethernet connection) and the PORT 1 B1 light should be flashing (waiting for the control program to load).

Extracting the Files

VS-Link for Windows NT is shipped as a self-extracting zipped file. Before you can install the files, you must:

1. Locate the file **6623.exe** on the distribution media, or download it from the Control ftp site.
2. In Windows Explorer, double-click on **6623.exe**. The self-extractor utility is started.

The utility displays the default target drive and directory where the extracted files will be placed. (For example, c:\temp.)

3. Optionally, select a different target drive and/or directory.

4. Click the **Unzip** button.

The self-extractor utility creates a directory named `WinNT` on the target drive and directory and places the extracted VS-Link files in that directory. For example, if you use the default target directory `c:\temp`, then the extracted files are placed in `c:\temp\WinNT`.

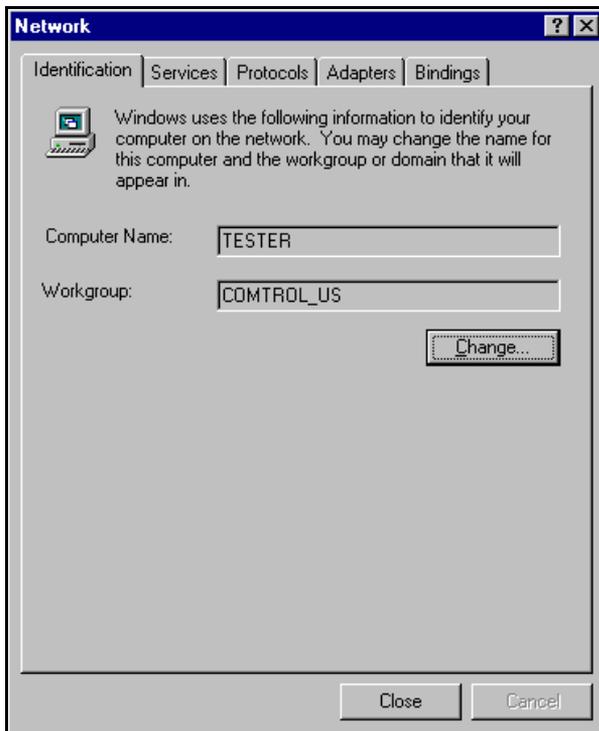
When the process is finished, a message is displayed, and you may close the self-extractor utility.

Software Installation

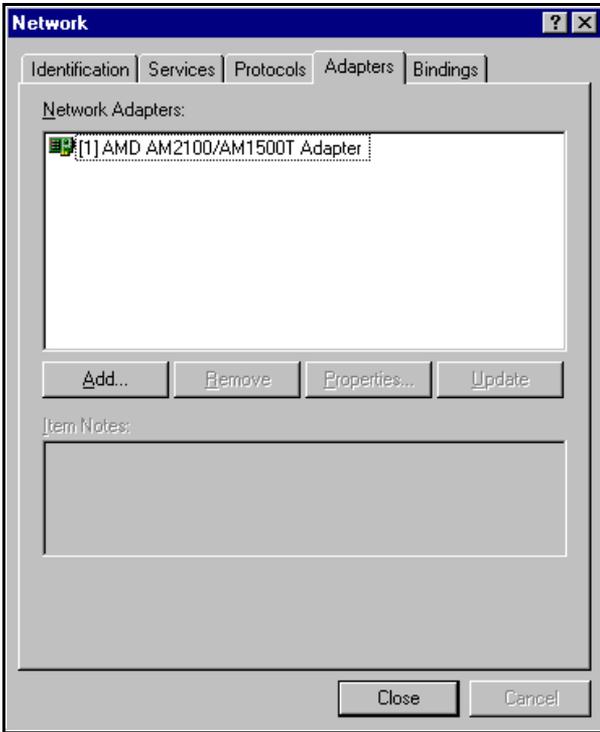
After you have extracted the VS-Link files, follow these steps:

1. Open the Control Panel and start the Network applet, or right-click on the Network Neighborhood and select **Properties**.

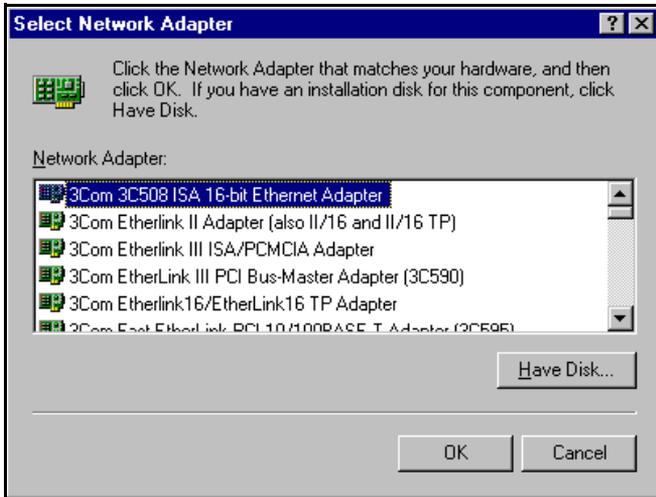
The Network Properties window is displayed:



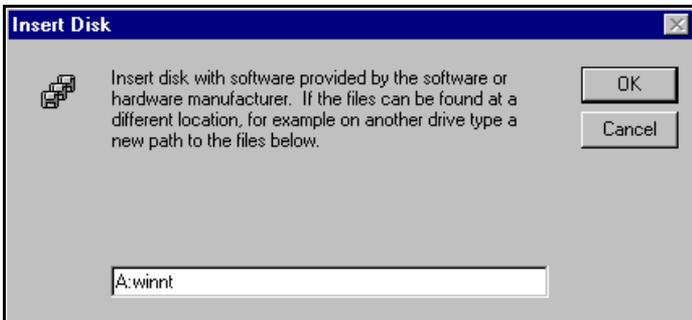
2. If Windows NT 4.0 select the **Adapters** tab and click the **Add** button. If Windows NT 3.51, select the **Add Adapter** button.



3. If Windows NT 4.0, select the **Have Disk** button. If Windows NT 3.51, scroll down to the bottom of the list, highlight the **Other** option, and select the **Continue** button.



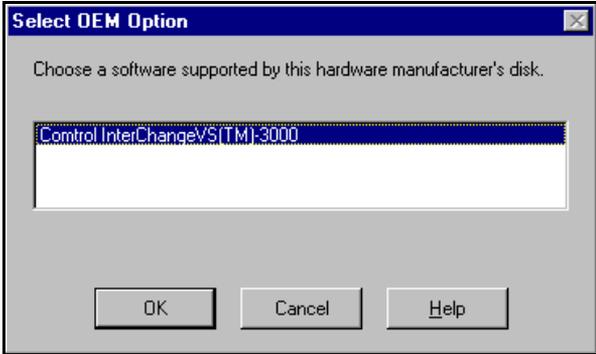
4. If installing from a diskette, insert the diskette in the drive.
5. Enter the drive and directory path to the installation files and click the **Ok** button.



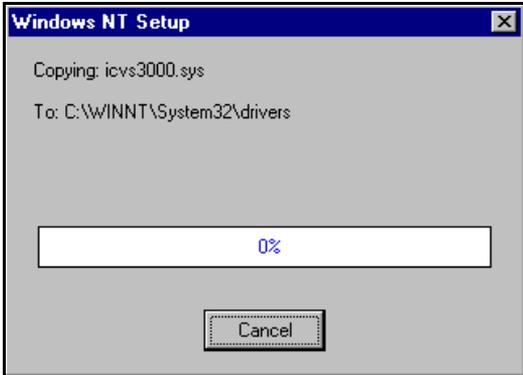
For example, if you used the self-extractor utility to create a `c:\temp\winnt` directory, enter:

`c:\temp\winnt`

- 6. Highlight **Control InterChangeVS(TM) 3000** and click the **OK** button.



VS-Link is copied to your system.



The VS3000 Setup screen is displayed. Online help is available for all fields on the screen.

Please note that under Windows NT, you set up each *port* (BRI line) on the VS3000 separately.

setup

INTERCHANGE
VIRTUAL SERVER

Port

Central Office Network Type

Primary
SPID
Directory Number

Secondary
SPID
Directory Number

Network Address (MAC)
00 C0 4E

Options
Backup Server
Recover Time

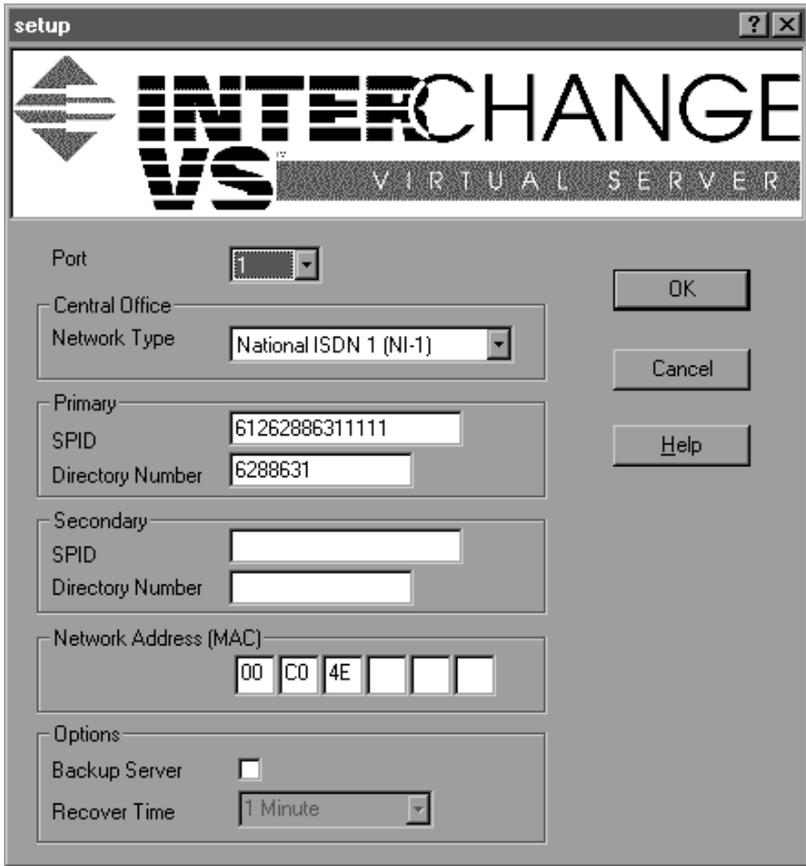
OK
Cancel
Help

7. Select the port number that you want to configure and press the **Tab** key.
8. Use the droplist to select the Central Office Network Type, and press the **Tab** key.
9. If necessary, enter the Primary SPID (up to 14 numerical, decimal digits) and press the **Tab** key.

Note: When entering SPIDs and directories, do not enter any dashes or spaces. The SPID, SPID suffix, and TID are often required in North American installations.

10. If necessary, fill in or verify the Primary Directory Number. The Directory Number is the 7-digit “local phone” number, not the phone number to which you plan on calling.

Note: If you entered a SPID number and pressed the Tab key, VS-Link automatically inserts the Directory Number.



11. Press the Tab key to move to the Secondary SPID field.
12. Optionally, enter the Secondary SPID and press the Tab key.
13. Verify the Secondary Directory Number, or change it if needed.
14. Press the Tab key to move to the Network (MAC) Address field.
15. Enter the remainder of the MAC address (Network Address). Press the Tab key between fields.

16. If setting up more than one port on this VS3000, repeat Steps 7 through 13 for each additional port. Use the **Tab** and **Shift-Tab** keys to move between entry fields.

17. If using this NT server as the *primary* server for this VS3000, leave the Backup Server checkbox empty and skip to step 18.

If using this NT server as the *backup* server for this VS3000 (in a multiple server network), click the **Backup Server** checkbox. Then use the **Recover Time** droplist to select the recovery time.

Note: For more information about backup servers, see "Primary and Backup Servers Explained," later in this chapter.

18. After all of the ports have been configured, click the **OK** button.

setup

INTERCHANGE
VS VIRTUAL SERVER

Port: [1] [v]

Central Office
Network Type: National ISDN 1 (NI-1) [v]

Primary
SPID: 61262886311111
Directory Number: 6288631

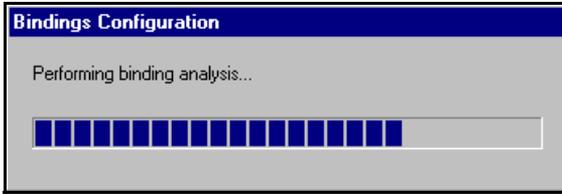
Secondary
SPID: 61262887131111
Directory Number: 6288713

Network Address (MAC)
00 C0 4E 01 00 26

Options
Backup Server:
Recover Time: 1 Minute [v]

OK
Cancel
Help

19. If Windows NT 4.0, select the Close button from the Network applet. If Windows NT 3.51, select the Continue button from the Network applet.



20. Reboot the server so that your changes take effect.

To complete installation, use the *Installing and Configuring RAS* subsection to configure remote access services for the VS3000.

Primary and Backup Servers Explained

Once configured, primary-to-backup server switching is automatic. In the event that the primary NT server goes offline, the backup server waits the amount of time specified in the Recover Time. If the primary NT server does not come back online in that time, the backup server resets the VS3000 (in the process terminating any calls in progress), then reloads the VS3000 using the configuration information set up on the backup server.

Thus, the backup server configuration *must* have the same MAC address as the primary server, and *should* have the same port, network, SPID, and directory information as the primary server. However, this is not required. It is also possible to set up several backup servers, each with different recover times, for the same VS3000, but each VS3000 must have only *one* primary server.

When the primary server comes back online after an outage, backup-to-primary switching is not automatic. Instead, use the *ISDN Monitor* program on the primary server to manually reassert control over the VS3000 and reload it with the configuration stored on the primary server, in the process terminating any calls in progress.

For more information regarding primary and backup servers, see the *VS3000 Setup* and *ISDN Monitor* online help files.

Installing Additional Virtual Servers

Follow these steps to add another VS3000 to an existing Windows NT server VS3000 installation.

1. Follow steps 1–6 in the *Software Installation* subsection. At step 6, a message appears indicating that an adapter of this type is already installed.

2. Click **OK** to continue. The VS3000 Setup window is displayed.
3. Enter the setup information for the new VS3000. Do not use the same Network Address or SPIDs as any previously installed unit.
4. Click the **OK** button to save your changes and exit this window.
5. Reboot the server so that the new VS3000 is recognized.
6. Use the *Installing and Configuring RAS* subsection to finish configuring the new VS3000 for use with RAS.

Changing SPIDs

1. To change SPID or Directory numbers, you must access the *VS3000 Setup* program. There are four ways to do this:
 - From the **Start** button menu, select **Programs, Control InterChange VS3000, Setup for VS3000**. (There will be a separate listing for each VS3000 configured on this server.)
 - In the *ISDN Monitor* program, select the VS3000 to work with, then click the **Setup** button.
 - From the desktop, right-click on the **Network Neighborhood** icon and select **Properties**. The Network applet is launched.
 - From the **Control Panel**, select the **Network** applet.
2. The first two options take you straight to setup. If you use the Network applet instead, click on the **Adapter** tab, then select **InterChangeVS(TM)-3000** and click the **Configure** button. The *VS3000 Setup* window displays.
3. Use the droplist to select the affected port.
4. Make the desired changes.
5. Click **OK** to save your changes and exit setup.
6. If necessary, exit the Network applet.

Your changes take effect immediately. You do not need to reboot the server.

It is also possible to change the network (MAC) address—for example, if it was entered incorrectly, or if you are replacing a VS3000 with another one. For more information, see *Replacing Units in Service ("Hot-Swapping")*, later in this chapter.

Installing and Configuring RAS

If you have not previously installed RAS or RRAS in your Windows NT server, use the following procedure.

Note: You must be logged on to the Windows NT computer with Administrative rights to perform any of these tasks.

1. Open the Control Panel and start the Network applet, or right-click on the Network Neighborhood and select Properties.

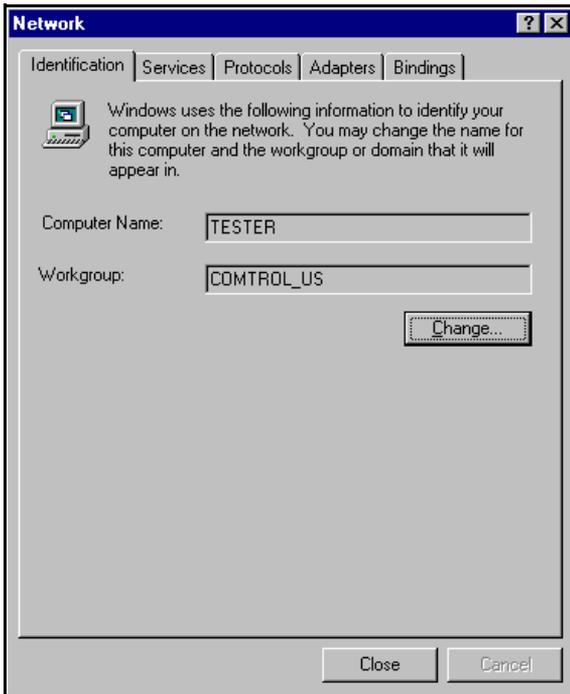
- If installing RAS or RRAS, go to Step 2.

Note: RRAS installation and configuration is similar to RAS. These screens illustrate RAS; see RRAS documentation if you need help.

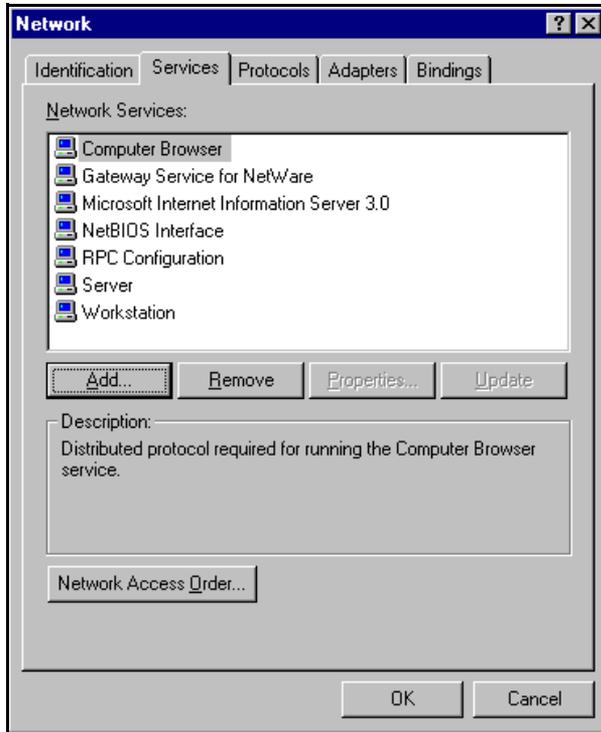
- If configuring the VS3000 in an existing RAS environment, go to Step 5.

Note: The screens illustrated in this section are Windows NT 4.0 screens. Windows NT 3.51 screens are similar.

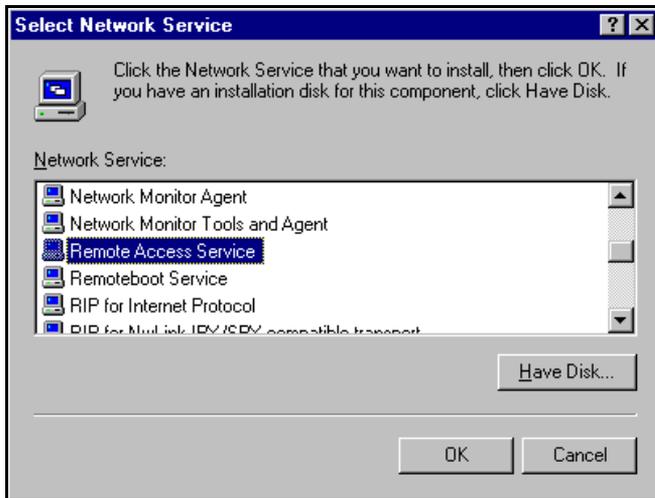
The following screen appears:



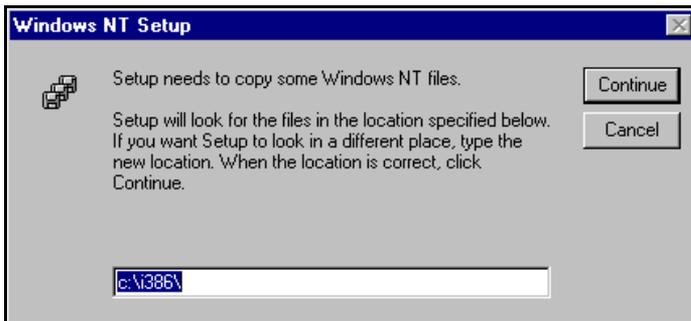
2. If Windows NT 3.51, highlight the **Remote Access Service** from the list and select the **Add Software** button. If Windows NT 4.0, select the **Services** tab and click the **Add** button.



The following screen appears:

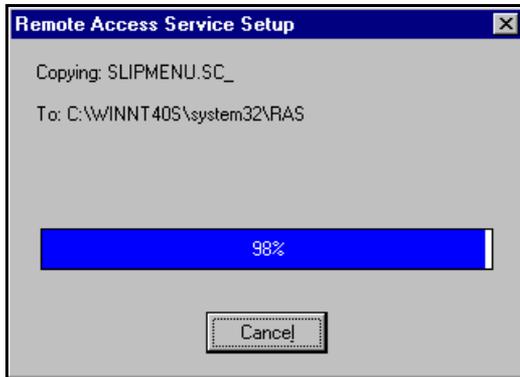


3. Highlight the **Remote Access Service** option and click the **Ok** button.

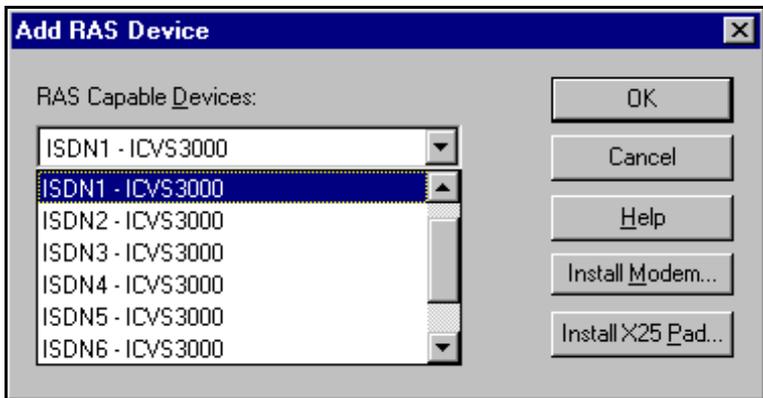


4. Enter the location of the Window NT files and press the **Continue** button. For example: **d:\i386.**

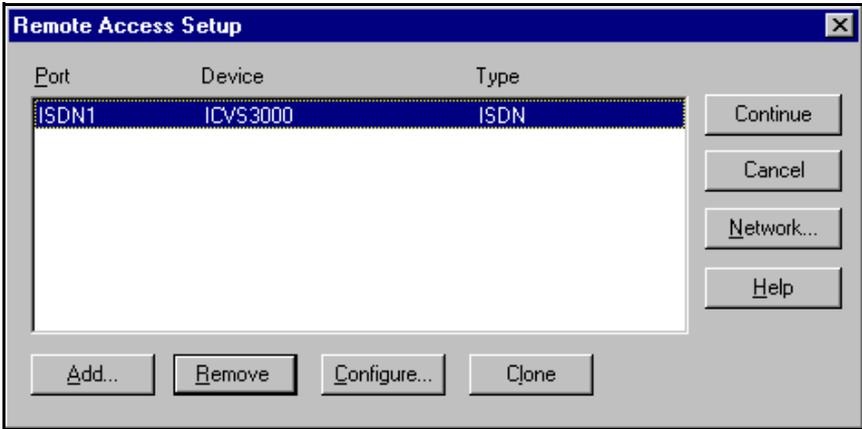
The appropriate files are loaded on to your hard drive.



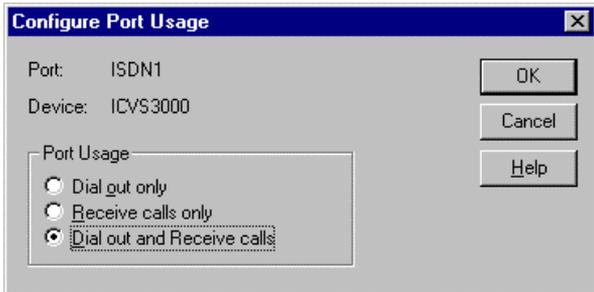
5. Select the ISDN1 - ICVS3000 from the drop-down list of RAS Capable Devices and press the Ok button.



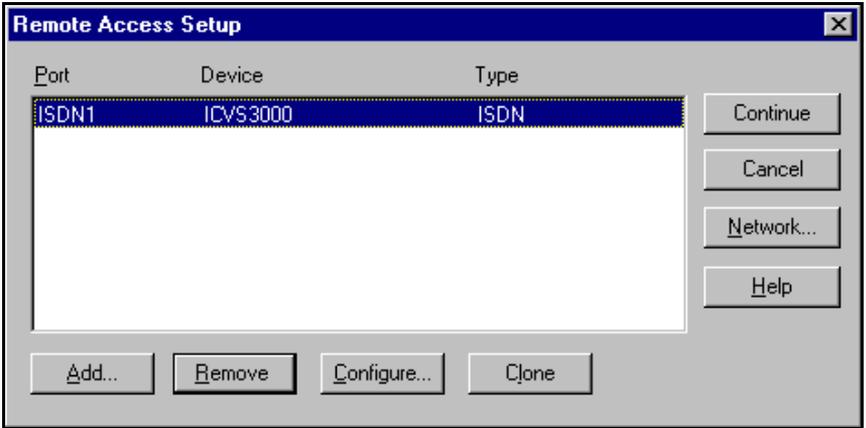
6. With the ISDN - ICVS3000 highlighted, click the **Configure** button.



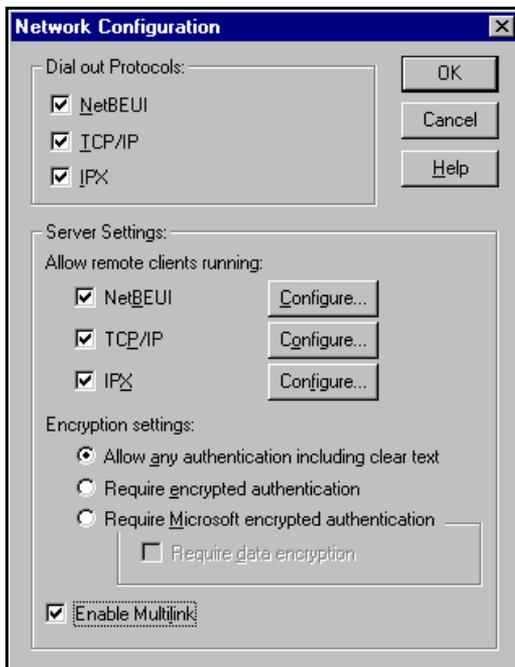
7. Select the appropriate radio button based on the role this port of the VS3000 will perform and press the **OK** button.



8. With the ISDN - ICVS3000 highlighted, click the Network button.



The following screen appears:

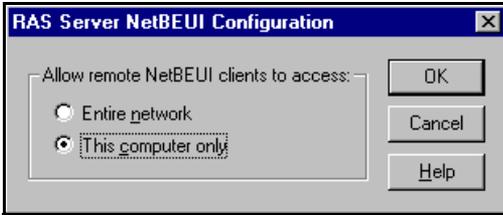


9. Optionally, select the required dial-out protocols. This is grayed out if you did not configure port usage for dial-out in Step 6.

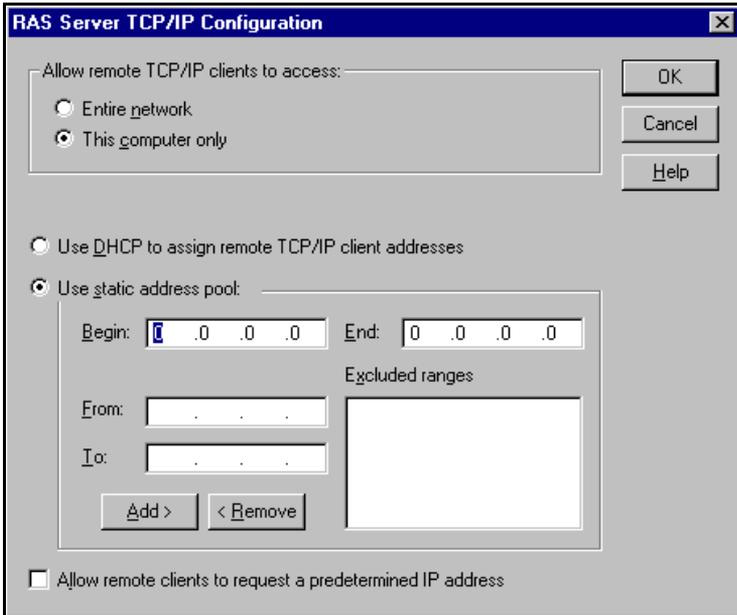
- 10. Select required dial-in protocols.
- 11. After placing a check in the checkbox for each dial-in protocol, click the **Configure** button for each required protocol.

Note: Only previously installed protocols are selectable. If you want to set up a protocol that is grayed out, you must first add it using the Protocol tab.

- a. If configuring NETBEUI, the configuration screen looks like this:

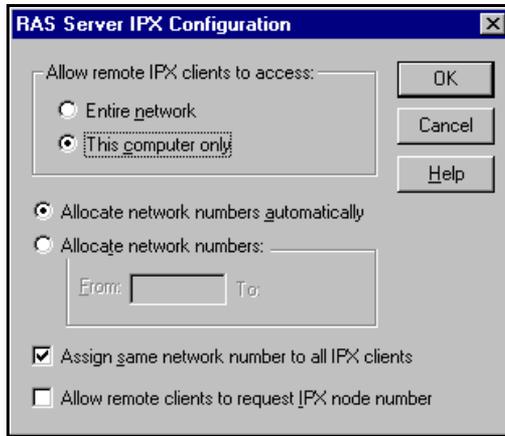


- b. If configuring TCP/IP, the configuration screen looks like this:

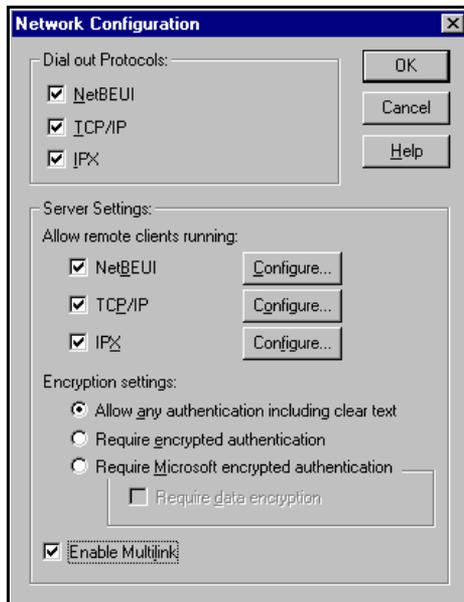


Note: For detailed information about the configuration screens, use the Help button or the Windows NT CD-ROM (Support/books/server.hlp file to locate information).

c. If configuring IPX, the screen looks like this:



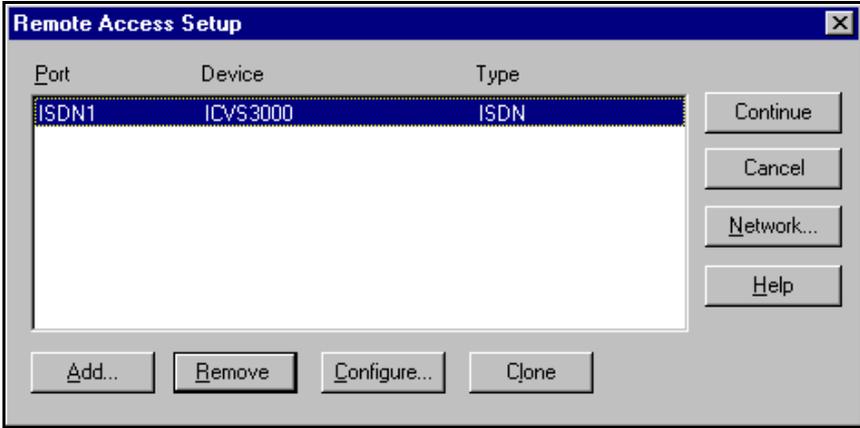
12. Select the authentication encryption levels for this port.



13. Optionally, select Enable Multilink if you want to bond channels.

Note: The Windows NT 3.51 operating system does not support Multilink PPP. To use Multilink PPP (bonding) with Windows NT 4.0, make sure that you check the Multilink PPP checkbox in the RAS Setup screen.

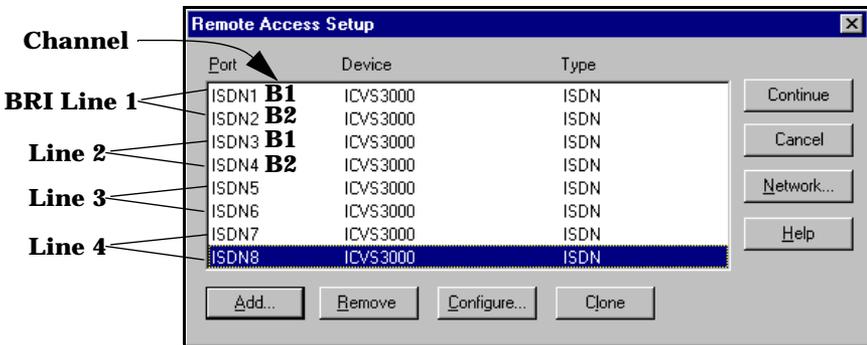
14. After completing the Network Configuration screen, click the OK key. The Remote Access Setup window is displayed again:



15. Select the Add button to configure additional ports on the VS3000. Repeat Steps 4 through 7 of this procedure to configure each port.

Note: Every ISDN Basic Rate Interface (BRI) line consists of two channels called B1 and B2. Each channel corresponds to a port description in Remote Access Service (RAS). In RAS, the ports are referred to as ISDN1, ISDN2, and so on. Therefore, when four ISDN BRI lines are installed, there are eight channels, and you must add and configure eight RAS ISDN ports.

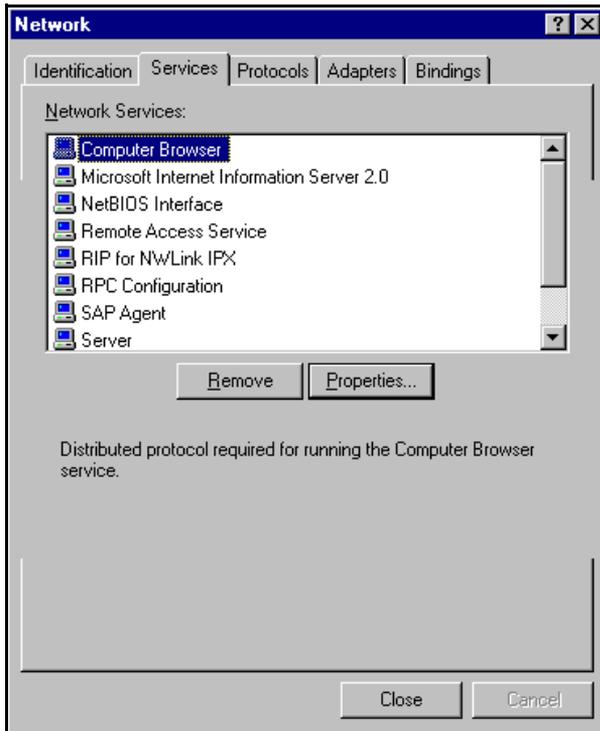
The illustration below is an example only. Actual assignment of B channels to RAS ISDN ports is made dynamically by the central office. For example, sometimes B2 is assigned to ISDN1.



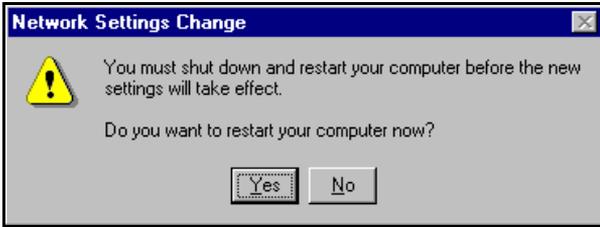
Note: When adding ports to RAS, configure the first ICVS3000 ISDN port for dialing and receiving calls. If you are running NT Server, all the ports (channels) may be configured this way.

If you are running Windows NT Workstation, you can only configure one dial in port.

16. After configuring the port and network options, click the **Continue** button on the Remote Access Setup screen to update binding information and copy further files needed to complete the RAS installation.
17. Click the **Close** button in the Network window to complete the RAS installation.



18. Click the Yes button when asked to reboot the computer.



Replacing Units in Service (“Hot-Swapping”)

In the event that a VS3000 needs to be removed from service, it is possible to replace it with another VS3000 without taking down the NT server. To do so, follow this procedure:

1. Connect the replacement VS3000 to power and Ethernet and verify that it passes the power-on diagnostics.
2. Terminate any calls in progress.
3. From the Control program group, select **ISDN Monitor**.
4. If you have more than one VS3000 already in service, use the **Open Device** option on the Device menu to select the VS3000 you want to swap out.
5. In the ISDN Monitor program, click the **Setup** button to launch the VS3000 Setup program. The Setup window is displayed.
6. Verify that the Network Address (MAC) shown is the address of the VS3000 you are taking out of service.
7. Enter the Network Address of the *replacement* VS3000.
8. Enter any other configuration changes needed at this time.
9. If you are using more than one port, repeat steps 6 through 8 for each port in use.
10. Click **OK** to save your changes, close the setup program, and return to the ISDN Monitor program.
11. Swap the ISDN cables from the old VS3000 to the replacement VS3000, if needed.
12. Click the **Reset** button to reinitialize VS-Link.
13. Power down the VS3000 you are removing from service and disconnect it from the network.

You may now resume normal operations.

Troubleshooting

This section discusses the following topics:

- Isolating and resolving problems
- Understanding the LED displays
- Obtaining software and/or document updates
- Placing a call to Control Technical Support

Problem Resolution Checklist

If installation fails or the VS3000 does not operate as expected, try the following before calling the Control technical support line:

- Check for proper cable connections. In particular, check to make sure that you have an *Ethernet* cable on the Ethernet port and *ISDN* cables on the ISDN ports. The two types of cables are easy to swap by accident.
- Turn the VS3000 on and off and watch for errors on the LEDs using the *Understanding the LEDs* subsections. (These are found on the following pages.)
- Check the VS-Link software to make sure that the Network Address (MAC) in the software matches the Network Address on the VS3000.
- Verify that you have the correct model (VS3000U or VS3000S) for your locale. The VS3000U is for North American use only. The VS3000S is for international use, but requires an NT1 terminating unit. For more information see *Installing the Hardware*.
- If you are operating in a multiple-server environment, check to make sure that you are controlling the VS3000 from its *primary* server, that there is only *one* primary server assigned to this particular VS3000, and that no backup server has pre-empted the primary server.

Note: *Backup-to-primary switching is not automatic. Once a backup server takes over control of a VS3000, you must follow a manual procedure to restore control to the primary server. This procedure differs depending on your network operating system. See the chapter for your operating system for more information.*

- If you are operating in a multiple-server environment and a backup server has taken over control of the VS3000, check (if possible) to make sure the backup server has the same Port, SPID, Directory Number, and MAC configuration as the primary server.
- If this is a Windows NT installation, use the **ISDN Monitor** program to trace and log the messages being passed between the NT server and the VS3000. Use the *ISDN Cause Codes* section of this manual to interpret the results. Also note that other error messages may be displayed in the **Event Log**.
- If this is a Novell installation, use the **vs3kcfg.nlm** utility to trace and log the messages between passed between the server and the VS3000. Use the *ISDN Cause Codes* section of this manual to interpret the results. Also note that other error messages may be displayed in the **Console Log**.
- If you have more than one VS3000, follow the *Replacing Units in Service* procedure for your operating system to “hot-swap” VS3000 units. If this corrects the problem, the VS3000 you have removed from service may be defective or need repair.
- When all else fails, remove and reinstall the VS-Link software.

Understanding the Ethernet LEDs

The following table describes Ethernet LED activity for the VS3000.

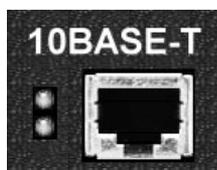


Table 1. Ethernet LED Descriptions

LED	Indicator	Description
10Base-T (Upper)	Flashing	Flashes briefly during transmissions from the unit as a general indicator of activity.
10Base-T (Lower)	On	VS3000 is correctly attached to the LAN by the RJ45 10Base-T connector.
10Base-T (Lower)	Off	Connected to the AUI connector or the 10Base-T connection is not connected to the LAN properly.

Understanding the Port LEDs

The following table describes PORT LED activity after:

- VS-Link is installed and configured.
- Operating system configuration is completed for the VS3000.



Table 2. Port LED Descriptions

Port LEDs	Status	Description
B1 or B2	Off	Normal standby state - no calls pending or established.
	Flashing	B1 or B2 selected for a call, but not yet connected. A call has been initiated and the CO has assigned the B1 or B2 channel as the channel that the call will connect on. If the call connects normally, this state may not even be seen because the connection happens so fast.
	On	Call connected on B1 or B2.
D	Off	Line disconnected or failed. Bad Line; layer 1 not up. This can occur if the VS3000 is not connected to the CO, or if there are hardware or software problems preventing synchronization with the CO.
	Flashing	Equipment failed or not configured properly. Bad SPID; layer 1 is activated, but Layer 2 is not up yet. Layer 2 is the LAPD layer that ensures a reliable data path to the CO. In Layer 2 there is polling going on between the CO and hardware all the time. This state could indicate configuration problems.
	On	Normal activity. The VS3000 is ready for use; layer 1 and 2 are up. In this state, both B channels are available for use.

Obtaining Software and Document Updates

For information that is not in this guide, see README and/or Help files on the installation media. In particular, the Windows NT version of VS-Link and the Windows NT ISDN Monitor program include significant online help.

Control manuals are available in electronic form on the Control web site. VS-Link software and manual updates can be downloaded at no charge from the Control ftp site. Always check the web and ftp sites to make sure that you have the current software and documentation.

The current released version of the software is stored in the VS3000 directory. If a newer version has reached the beta testing stage, it can be found in the BETA directory. Beta software is made available on an “as-is” basis and users of beta software assume all risks and liabilities relating thereto.

Note: *Downloadable driver software files are stored in either zipped (filename.zip) or self-extracting zip (filename.exe) format. You must extract the zipped files and create an installation diskette before installing a downloaded file. For more information, see the appropriate section for your network operating system.*

Placing a Support Call

Before you call Control technical support, please have the following information available. (Much of this information should already be in the ISDN Software Installation Information table in the *Working With The Phone Company* section of this guide.)

Table 3. Support Call Information

Item	Value
Operating System type and release number	
VS-Link release number	
Computer make and model	
ISDN Installation Type	<ul style="list-style-type: none">o EZ-ISDN1o 2B+D (without EKTS)o Other _____
ISDN Line Type	<ul style="list-style-type: none">o BRI
ISDN Help Desk Phone Number	
Circuit ID	

Table 3. Support Call Information

Item		Value
Switch Vendor (hardware type)		<ul style="list-style-type: none"> o ATT 5ESS o Nortel DMS-100 o Siemens (EuroISDN)
Network Type (software)		<ul style="list-style-type: none"> o National ISDN1 (NI-1) o ATT Custom o DMS-100 Proprietary (NI-1) o EuroISDN (NET3)
Windows NT	Novell	
Port 1	Primary SPID*	SPID 1*
	Primary Directory Number**	Directory Number** 1
	Secondary SPID	SPID 2
	Secondary Directory Number	Directory Number 2
Port 2	Primary SPID	SPID 3
	Primary Directory Number	Directory Number 3
	Secondary SPID	SPID 4
	Secondary Directory Number	Directory Number 4
Port 3	Primary SPID	SPID 5
	Primary Directory Number	Directory Number 5
	Secondary SPID	SPID 6
	Secondary Directory Number	Directory Number 6
Port 4	Primary SPID	SPID 7
	Primary Directory Number	Directory Number 7
	Secondary SPID	SPID 8
	Secondary Directory Number	Directory Number 8

- * *The SPID (Service Provide Identifier) is an up-to-14-digit number resembling a telephone number and consisting of the SPID, SPID suffix, and TID. In some cases, your phone company may also provide you with an ISDN sub-address for each SPID. SPIDs are required for North American installations only.*
- ** *The Directory Number (also known as the ISDN directory number or ISDN address) is the 7-digit "local phone number" portion of the SPID.*

After you have gathered this information, contact Control:

Control Corporate Headquarters

Internet URL: **www.comtrol.com**

email: **support@comtrol.com**

FTP site: **ftp.comtrol.com**

FAX: (612) 631-8117

Phone: (612) 631-7654

Control Europe

Internet URL: **www.comtrol.co.uk**

email: **support@comtrol.co.uk**

FAX: +44 (0) 1 869-323-211

Phone: +44 (0) 1 869-323-220

ISDN Cause Codes

This appendix lists ISDN cause codes and their definitions.

- Under Windows NT, ISDN cause codes are displayed and logged by the ISDN Monitor program, which is installed automatically when you install VS-Link. For more information about ISDN Monitor, see the *isdndiag* readme and ISDN Monitor help files.
- Under Novell NetWare, ISDN cause codes are sent to the console as part of driver event and error messages. For more information, see the *Novell Error Codes and Messages* section of this document.

The following table describes the ISDN cause codes in greater depth.

Table 4. ISDN Cause Codes

Decimal	Brief Description	Expanded Description
1	Unallocated (unassigned) number	The called party cannot be reached. (The number has a valid format but has not been assigned).
2	No route to specified transit network (national used)	The sending equipment has received a request to route the call through a transit network which it does not recognize, either because the network does not exist or because the network exists but does not serve the sending equipment.
3	No route to destination	The called party cannot be reached because the network does not serve the destination.
4	Send special information tone	The called party cannot be reached for reasons of a long-term nature. The "special information" tone is returned to the calling party.
5	Misdialed trunk prefix (national use)	Wrong trunk prefix in the called party number.
6	Channel unacceptable	The identified channel is not acceptable to the sending entity for use in this call.
7	Call awarded being delivered in an established channel	The incoming call is being connected to a channel already configured for that user (for example, packet-mode x.25 virtual calls).
8	Preemption	The call is being pre-empted.

Table 4. ISDN Cause Codes (Continued)

Decimal	Brief Description	Expanded Description
9	Preemption (circuit reserved for reuse)	The call is being pre-empted and the circuit is reserved for reuse by the pre-empting exchange.
16	Normal call clearing	The call is being cleared because one of the users participating in the call has requested that the call be cleared.
17	User busy	The called party is unable to accept another call because the user busy condition has been encountered (by the called user or by the network). If the user is busy, it is noted that the user equipment is compatible with the call.
18	No user responding	The called party does not respond to a call establishment message with either an alerting or connect indication within the allocated time period.
19	No answer from user (User alerted)	The called party has been alerted but does not respond with a connect indication within the allocated time period. This is not necessarily generated by Q.931 procedures but may be generated by internal network timers.
20	Subscriber absent	A mobile station has logged off, radio contact is not obtained with a mobile station, or a personal telecommunications user is temporarily not addressable at any user-network interface.
21	Call rejected	The equipment sending does not accept this call. The equipment is neither busy nor incompatible. This can be generated by the network, indicating that the call was cleared by a supplementary service constraint.
22	Number changed	The called-party number is no longer assigned. The new called-party number may be included in the diagnostic field.
26	Non-selected user clearing	The user has not been awarded the incoming call.
27	Destination out of order	The destination cannot be reached because the interface to the destination is not functioning. A signal message was not delivered to the remote party because of a physical layer or data link layer failure at the remote party, or the user equipment is off-line.

Table 4. ISDN Cause Codes (Continued)

Decimal	Brief Description	Expanded Description
28	Invalid number format (address incomplete)	The called party cannot be reached because the called number is not in a valid format or is not complete.
29	Facilities rejected	A requested supplementary service cannot be provided by the network.
30	Response to STATUS INQUIRY	This is a confirmation of the receipt of a STATUS INQUIRY.
31	Normal, unspecified	No other normal-class cause applies.
34	No circuit/channel available	There is no appropriate circuit/channel presently available to handle the call.
35	Call queued	The call has been queued at the central office (CO).
38	Network out of order	The network is not functioning for reasons of a long-term nature. Immediately re-placing the call is not likely to be successful.
39	Permanent frame mode connection out-of-service	Included in a STATUS message, indicating a permanently established frame mode connection is out-of-service due to equipment or section failure.
40	Permanent frame mode connection operational	The STATUS message indicates a permanently established frame mode connection is operational and capable of carrying user information.
41	Temporary failure	The network is not functioning for reasons of a short-term nature. You may attempt another call almost immediately.
42	Switching equipment congestion	The switching equipment generating this cause is experiencing a period of high traffic.
43	Access information discarded	The network could not deliver access information to the remote user as requested. That is, user-to-user information, low layer compatibility, high layer compatibility, or sub-address as indicated in the diagnostic.
44	Requested circuit/channel not available	The circuit or channel indicated by the requesting entity cannot be provided by the other side of the interface.
46	Precedence call blocked	There are no pre-emptable circuits or the called user is busy with a call of equal or higher pre-emptable level.

Table 4. ISDN Cause Codes (Continued)

Decimal	Brief Description	Expanded Description
47	Resource unavailable—unspecified	No other cause in the resource-unavailable class applies.
49	Quality of Service not available	The requested Quality of Service, as defined in the X.213 Recommendation cannot be provided (that is, throughput of transit delay cannot be supported).
50	Requested facility not subscribed	The user has requested a supplementary service which is implemented but which the user is not authorized to use. Wrong SPID.
52	Outgoing calls barred	Administratively prohibited calls.
53	Outgoing calls barred within CUG	The calling party is a member of the Closed User Group for the outgoing CUG call, but outgoing calls are not allowed for this member.
54	Incoming calls barred	No incoming calls possible; for example, a pay phone.
55	Incoming calls barred within CUG	The calling party is a member of the Closed User Group for the incoming CUG call, incoming calls are not allowed for this member.
57	Bearer capability not authorized	The user is not authorized to use the requested B channel.
58	Bearer capability not presently available	The user has requested an unavailable B channel.
62	Inconsistency in outgoing information element.	Inconsistency in the designated outgoing access information and subscriber class.
63	Service or option not available, unspecified	No other service- or option-not-available cause code applies.
65	Bearer capability not implemented	The sending equipment does not support the requested B channel.
66	Channel type not implemented	The sending equipment does not support the requested channel type.
69	Requested facility not implemented	The sending equipment does not support the requested supplementary services.
70	Only restricted digital information bearer capability is available (national use)	The calling party requested an unrestricted B channel (UDI @ 64kbps) service but the sending equipment only supports the restricted (RDI @ 56kbps) B channel version.

Table 4. ISDN Cause Codes (Continued)

Decimal	Brief Description	Expanded Description
79	Service or option not implemented, unspecified	No other service- or option-not-available cause code applies.
81	Invalid call reference value	The sending equipment has received a message with a call reference not currently in use on the user-network interface.
82	Identified channel does not exist	The sending equipment has received a request to use a channel not activated on the interface for a call. For example, if a user has subscribed to those channels on a primary rate interface numbered from 1 to 12 and the user equipment or the network attempts to use channels 13 through 23.
83	A suspended call exists, but this call identity does not	A call-resume has been attempted with a call identity that differs from that in use for any presently suspended call(s).
84	Call identity in use	The network has received a call-suspended request containing a call identity (including the null call identity) that is already in use.
85	No call suspended	The network has received a call-resume request containing a call identity element that does not indicate any suspended call within the domain of interfaces.
86	Call having the requested call identity has been cleared	The network has received a call-resume request containing a call identity information element indicating a suspended call that has in the meantime been cleared while suspended; either by the network time-out or the remote user.
87	User not a member of CUG	The called user for the incoming Closed User Group call is not a member of the specified CUG or the calling user is an ordinary subscriber calling a CUG subscriber.
88	Incompatible destination	The sending equipment has received a request to establish a call that has low/high layer compatibility or other compatibility attributes (for example, data rate) that cannot be accommodated. Another possibility is sending a DISPLAY to a station with no display feature.
90	Non-existent CUG	The specified CUG does not exist.

Table 4. ISDN Cause Codes (Continued)

Decimal	Brief Description	Expanded Description
91	Invalid transit network selection (national use)	The transit network identification is in an incorrect format as defined in Annex C/Q.931.
95	Invalid message, unspecified	No other invalid-message cause code applies.
96	Mandatory information element is missing	The information element is wrong. Typically, the switch software type has been defined incorrectly.
97*	Message type non-existent or not implemented	The sending equipment has received a message with a message type it does not recognize. Either this message is not defined or defined but not implemented.
98*	Message not compatible with call state or message type non-existent	The sending equipment received a message such that the procedures do not indicate that this is a permissible message to receive while in the call state, or a STATUS message was received indicating an incompatible call state.
99*	Information element/parameter non-existent or not implemented	The sending equipment received a message that includes information elements or parameters not recognized. The information was discarded. The information element is not required to be present in the message in order for the sending equipment to process the message.
100*	Invalid information element contents	The sending equipment received an information element that it has implemented; however, one or more fields in the I.E. are coded but not implemented. Usually indicates a wrong switch type in customer premises equipment.
101	Message not compatible with call state	A message has been received that is incompatible with the call state.
102	Recovery on timer expire	A procedure has been initiated by the termination of a timer in association with error handling procedures.

Table 4. ISDN Cause Codes (Continued)

Decimal	Brief Description	Expanded Description
103	Parameter non-existent or not implemented - passed on (national use)	The sending equipment received a message including parameters not recognized, either because they are not defined or because they are defined but not implemented. The parameters were ignored—except if the equipment sending this cause is an intermediate point, in which case the parameters pass unchanged.
110	Message with unrecognized parameter discarded	The sending equipment discarded a received message that includes a parameter that is not recognized.
111	Protocol error, unspecified	No other cause in the protocol error class applies.
127	Interworking, unspecified	An interworking call (usually a call to SW56 service) has ended.

* The switch is programmed wrong for Cause Codes 97 through 100.

Index

Numerics

- 10Base-T
 - connector **36**
 - LEDs explanation of **36**
- 5ESS **8**

A

- adding a device **27**
- AUI port LEDs **36**

B

- B channel
 - description of **7**
- backup server **7, 10–11, 21, 22**
- bonding channels
 - Novell NetWare **8**
 - Windows NT **31**
- BRI lines
 - explanation of **32**
 - in Windows NT **18**

C

- cables
 - Ethernet and ISDN **9**
 - needed for installation **8**
 - shipped with VS3000 **8**
- cause codes **41–47**
- channel
 - B description of **7**
 - D description of **7**
- channels
 - bonding (Novell) **8**
 - bonding (Windows NT) **31**
- Citrix **8, 14**
- Control
 - how to contact **40**

- configuring
 - Windows NT RAS **24**

D

- D channel
 - description of **7**
- DMS-100 **8**

E

- errors
 - ISDN error codes **41**
 - LEDs **36, 37**
- Ethernet **36**
 - LEDs **36**
- ETSI NET-3 **8**
- EuroISDN **8**
- Europe
 - how to contact Control **40**
 - technical support **12**

H

- hardware
 - installation overview **9**
- help files
 - ISDN Monitor **38**
 - Novell **38**
 - Windows NT **22, 30, 38**
- hot-swapping **7, 34, 36**

I

- installation
 - additional units in Windows
 - NT **22**
 - Ethernet requirements **8**
 - extracting installation files **14**
 - flowchart **9**
 - ISDN requirements **8**

operating system
 requirements **8**
overview of **9**
RAS **24**
removing VS-Link software **13**
VS-Link for Windows NT **14–22**
Windows NT path **17**
ISDN **37**
 BRI lines explained **32**
 cause codes **41**
 connector **37**
 RAS **27**
 standards supported **8**
ISDN Monitor program **22, 23, 34, 36, 41**
ITU-T Q.921 **7**
ITU-T Q.931 **7**

L

LEDs
 Ethernet explanation of **36**
 explanation of **36**
 ISDN explanation of **37**
 PORT explanation of **37**

M

MAC address **20**
multilink PPP
 Novell NetWare **8**
 Windows NT 4.0 **8, 31**

N

network address (MAC) **20**
NI-1 **8**
Nortel **8**
notices
 legal **4**
 trademark **4**
NT1 terminating unit **8, 35**

P

PORT LEDs **37**
power-on diagnostics **36, 37**
problems
 resolving **35–40**
product
 overview **7**

R

RAS
 adding a device **27**
 channel definition **32**
 installation and configuration
 for VS3000 **24**
 reconfiguring VS-Link
 Windows NT **23**
Remote Access Service (RAS)
 Windows NT **24**
removing VS-Link software **13**

S

Siemens **8**
software
 how to get updates **12**
 installation overview **9**
SPID
 changing under Windows
 NT **23**

T

technical support
 contacting **4, 12, 38**
 downloading driver files **38**
 electronic user guide **38**
 obtaining software updates **38**
troubleshooting **35–40**
 backup servers **35**
 checklist **35**
 downloaded driver files **12**
 Ethernet and ISDN cables **35**

-
- extracting installation files **14**
 - extracting the installation files **12, 38**
 - hot-swapping VS3000 units **36**
 - ISDN cause codes **41**
 - ISDN Monitor program **36**
 - network address (MAC) **35**
 - Novell NetWare **36**
 - obtaining software updates **12**
 - returning control to primary server **11**
 - swapping out units in service **34**
 - vs3kcfg.nlm **36**
 - Windows NT **36**
- U**
- U.K.
 - how to contact Control **40**
 - technical support **12**
 - U.S.A.
 - technical support **12**
 - uninstall **13**
 - updates
 - how to obtain **12**
 - user guide
 - electronic **12**
- V**
- VS3000
 - installing additional units in Windows NT **22**
 - installing RAS **24**
 - product overview **7**
 - vs3kcfg.nlm **36**
 - VS-Link
 - installation path (Windows NT) **17**
 - removing the software **13**
- Windows NT
 - changing SPIDs **23**
- W**
- Windows NT
 - adding a RAS device **27**
 - backup server **21, 22**
 - bonding channels **31**
 - CD-ROM Help Files **30**
 - central office network type **19**
 - changing SPIDs **23**
 - extracting the installation files **14**
 - hot-swapping **34**
 - installation path **17**
 - installing additional units **22**
 - installing VS-Link **14**
 - ISDN Monitor program **22**
 - network address (MAC) **20**
 - primary directory number **20**
 - primary SPID **19**
 - RAS installation and configuration **24**
 - recover time **21**
 - removing VS-Link software **13–14**
 - secondary directory number **20**
 - secondary SPID **20**
 - software installation **14–22**
 - WinFrame **8, 14**
-

