RISC Router 3500R Installation Guide

RISC Router 3500R Installation Guide, Version 2.0
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Part number: A00-1345

FCC Notice: This product has been certified to comply with the limits for a Class A computing device, pursuant to Subpart J of Part 15 of FCC Rules. It is designed to provide reasonable protection against radio or television communication interference in a commercial environment. Operation of this equipment in a residential area could cause interference with radio or television communication.

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Chapter 1 - Introduction

About the RISC Router 3500R

Congratulations on your purchase of the RISC Router 3500R multiport wide area router. The RISC Router 3500R supports the IP, IPX, Apple-Talk, and DECnet network protocols, with dial-on-demand and leased-line operation using the PPP, Frame Relay and/or SMDS wide area protocols, and tunnels IP, IPX and AppleTalk over the Internet.

A Note About On-Demand Internetworking

The RISC Router 3500R can be configured to provide cost effective on-demand connections over a wide area communications link (typically a voice phone line, a switched 56 line, or an ISDN line). Your network traffic and the configuration you place in the router will determine how often and for how long such a link is connected.

THE SHIPPING CONFIGURATION IN YOUR RISC ROUTER 3500R DOES NOT PROVIDE AUTOMATIC ON-DEMAND INTER-NETWORKING. YOU MUST FIRST PROGRAM YOUR ROUTER TO WORK IN THIS ROLE ON YOUR NETWORK.

YOU SHOULD CAREFULLY MONITOR PHONE LINE USAGE TO BE SURE THAT YOUR ROUTER CONFIGURATION IS ALLOWING THE ROUTER TO DROP THE COMMUNICATIONS LINK WHEN IT ISN'T NEEDED.

RISC Router 3500R Installation Overview

This manual will help you install the RISC Router 3500R to connect a local Ethernet to up to 4 remote networks and/or remote PPP client computers. These connections can be made to other Compatible Systems routers, routers from other vendors, or PPP compliant dial-in software packages running on a variety of computers. The wide-area interfaces on the RISC Router 3500R may be used to interconnect your network with other corporate networks, and to make your network's resources available to dial-in clients.

In short, the installation steps are:

1. **Install** the RISC Router hardware and connect it to one or more line communication devices (including 56K CSU/DSU's, ISDN Terminal Adapters, and fractional or full T1/E1 CSU/DSU's).

2. **Select** the management method you wish to use with the router. If you want to use the CompatiView management software, you must install the software on a Windows PC which is connected to your network.

3. **Configure** the RISC Router LAN and WAN parameters using the management method you have chosen.

If you have any difficulties during the installation or use of the RISC Router that are not answered by this guide, please visit the technical support section of our Web site (http://www.compatible.com). There you will find the latest versions of product documentation in addition to technical notes and white papers, detailed setup guides for specific protocols, and a series of FAQ's. You can also request technical support by filling out a brief form. Technical support requests received via the Web form will receive expedited treatment. You may also call Compatible Systems Corporation or your RISC Router 3500R reseller. Compatible Systems' phone number is listed on the front of this guide. We will be happy to help you.

The manual is divided into several sections that should provide you with the basic information you will need to use the RISC Router 3500R on your network.

Chapter 2 - Getting Started

This part of the manual describes the contents of the RISC Router 3500R package and emphasizes the preparation and equipment you will need to install the router.

Chapter 3 - Hardware Installation

This part of the manual includes step-by-step instructions on how to physically install the RISC Router 3500R and connect it to your local Ethernet and your wide area network(s). Instructions are included for twisted-pair Ethernet environments as well as 56K CSU/DSU's, ISDN terminal adapters, and fractional or full T1/E1 CSU/DSU's.

Chapter 4 - CompatiView Software Installation

This part of the manual describes how to install CompatiView, Compatible Systems' GUI (Graphical User Interface) management software which is included with your router.

Chapter 5 - Command Line Preparation

This part of the manual provides basic instructions on setting up command line management and text-based configuration.

Chapter 6 - Basic Configuration Guide

This part of the manual provides a list of parameters that must be entered into a router for proper operation.

Appendices

This part of the manual includes additional information that might be of interest to you such as technical specifications, default settings (including the default factory password) and instructions for downloading current software.

Chapter 2 - Getting Started

A Few Notes

Please Read The Manuals

The manuals included with your RISC Router 3500R contain some very important information about the RISC Router 3500R and local and wide area networking in general. Please read this manual thoroughly, and refer to the management reference guides as required. It's worth the few minutes it will take.

Also, please fill out the warranty registration card and return it to us today. This will help us keep you informed of updates to the RISC Router 3500R and future products available from Compatible Systems. You can also register on the web at http://www.compatible.com. If you'd like to be notified via e-mail about new products and receive important news from Compatible Systems, please join our email list on the web.

Warranty and Service

The RISC Router 3500R is covered by the Compatible Systems Integrated Support Package, which includes a lifetime hardware warranty, a twenty-four hour advanced replacement program, unlimited technical support, and software upgrades for the life of the product.

Compatible Systems maintains copies of current software updates on the Internet. For more information on downloading software, see the appendices for this manual.

Getting Help With the RISC Router 3500R

If you have a question about the RISC Router 3500R and can't find the answer in one of the manuals included with the product, please visit the technical support section of our Web site (http://www.compatible.com). This site includes extensive technical resources which may answer many of your questions. You can also request technical support by filling out a brief form. Technical support requests received via the Web form will receive expedited treatment. You may also call Compatible Systems Corporation or send support questions via e-mail to *support@compatible.com*. Compatible Systems' phone number is listed on the front of this guide. We will be happy to help you.

What You Will Need To Get Started

Before connecting the RISC Router 3500R, please check the list below to make sure that you have received all of the items that are supplied with the RISC Router 3500R package.

You should also make sure you have any additional items that are necessary to connect the router to your network.

Supplied with the RISC Router 3500R

Please check your shipping package for the following items:

- RISC Router 3500R unit

- Power cord

- One Din-8 to DB-25 auxiliary interface cable

- Four DB-26 to V.35 data cables

- CD-ROM including:
    ‣ CompatiView software
    ‣ Operating software
    ‣ HTML versions of product documentation (which can be viewed with your favorite web browser)

- *CompatiView Management Software Reference Guide*

- *Text-Based Configuration and Command Line Management Reference Guide*

- Warranty registration card

Needed For Installation

Before connecting the RISC Router 3500R to your network, you need to make sure that you have the necessary equipment for connecting to the local Ethernet and the wide area transmission device(s) (56K CSU/ DSU, ISDN terminal adapter, T1/E1 CSU/DSU).

Ethernet Connection Requirements

The RISC Router 3500R's Ethernet interface directly supports thick and 10BaseT twisted-pair Ethernet. Switching between media types is automatic -- simply plug the proper Ethernet connector into its matching port. Other Ethernet cabling types (such as thin Ethernet, fiber optic cabling or pre-10BaseT twisted-pair) can be supported using adapters which connect to the thick Ethernet port.

Thick Ethernet

To connect the router's Ethernet interface to a standard (thick) Ethernet cable you will need a transceiver cable connection at the correct location on your Ethernet cable. The transceiver cable will attach directly to the DB-15 connector on the router.

10BaseT Twisted-Pair Ethernet

To connect the router's Ethernet interface to twisted-pair Ethernet cabling you will need an unshielded twisted-pair station cable that is connected to a 10BaseT-compatible twisted-pair hub.

❖ **Note:** *Ethernet cables and cable connectors are not supplied with the RISC Router product. Please contact your reseller or your Compatible Systems representative for information on obtaining the correct Ethernet cabling supplies.*

Telco Line Connection Requirements

The RISC Router 3500R is not a line communications device. In order to connect to a wide area transmission line, you must use a 56K CSU/DSU, ISDN Terminal Adapter, or T1/E1 CSU/DSU. Which of these devices you use depends on the type of telco line to which you are connecting one of the router's wide area interfaces.

❖ **Note**: *Before attempting to connect the RISC Router 3500R to a leased telco line, use the loopback features of your CSU/DSU to check the line. This can save you a considerable amount of time, since the more equipment you have on the line, the more difficult it becomes to determine where a problem is occurring.*

The RISC Router 3500R provides four high-speed V.35 synchronous interfaces, each of which can be independently configured for PPP, Frame Relay or SMDS operation. The V.35 interfaces are capable of communicating to another router or a PPP client machine over a 56K CSU/DSU, an ISDN Terminal Adapter, or a T1/E1 CSU/DSU.

V.35 Interface

The RISC Router 3500R includes four V.35 cables. These cables terminate in a male V.35 connector, which fits the female V.35 connector supplied by virtually all V.35 line communications devices. The pinouts for this cable are shown in Appendix B.

❖ **Note**: *Please use only the supplied cables when connecting your V.35 line communication device to the RISC Router 3500R's interfaces. The cables provided with other equipment will generally not have the same internal connections.*

❖ **Note**: *For international applications, V.11 cables are available from Compatible Systems or your reseller.*

Chapter 3 - Hardware Installation
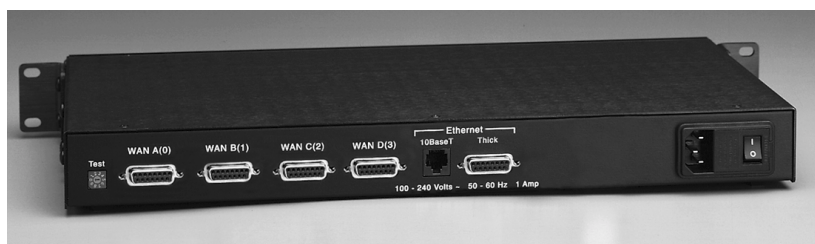
RISC Router 3500R Back Panel

This section of the manual describes how to connect the RISC Router 3500R to your Ethernet network and your wide area communications device(s). In summary, the steps for installation are:

1. Make sure the router is powered down and not connected to any power source.
2. Connect the router to the Ethernet network.
3. Connect the router to the wide area line communications device(s).
4. Power up the line communication devices.
5. Plug in the power cable and power up the router.

Mounting the Router

The RISC Router 3500R can be mounted in a variety of different ways, or can be left standalone on a desktop or equipment table.

❖ **Note**: *When stacking other equipment on the RISC Router 3500R, do not exceed 25 pounds of evenly distributed weight on top of the router. Additional weight may bend the case.*

A rack/wall mounting kit is included with the router.

19" Rack Front Mount

Install the rack-mount ears on the sides of the case towards the front using the screws provided. Position the ears so that they are flush with the front of the case. The slotted holes in the ears will mate with the mounting holes in a standard 19" rack.

❖ **Note**: *The RISC Router 3500R is 1U high when its bottom-mounted rubber feet are removed. If you intend to mount the unit in a 1U space, make sure your equipment rack is well ventilated. Otherwise, thermal problems may occur.*

19" Rack Center Mount

Install the rack-mount ears using the mounting holes midway along the sides of the case, using the screws provided. The slotted holes in the ears will mate with the mounting holes in a standard 19" rack.

Wall Mount

Install the rack-mount ears on the middle of the case, using the screws provided. Position the ears so that they are flush with the bottom of the case. The slotted holes in the ears will mate with wood screws or other attachment methods.

❖ **Note**: *Wood screws are not provided with the rack-mount kit.*

Connecting the Router to the Ethernet

For thick Ethernet networks, you should have installed your Ethernet cabling before you install the RISC Router 3500R.

If you are installing a twisted-pair connection, and the twisted-pair hub is already in place, you can connect the router to an active network without interrupting network activity.

Connecting to Thick Ethernet

To connect the router to a thick Ethernet network, simply plug one end of a transceiver cable into the DB-15 transceiver connector located on the back panel of the unit. Then, plug the other end of the transceiver cable into the transceiver which should already be attached to the thick Ethernet cable.

Connecting to Twisted-Pair Ethernet

Before connecting the router to twisted-pair cabling you need an unshielded twisted-pair cable that is already connected to your 10BaseT-compatible twisted-pair hub.

To connect the router to the twisted-pair network, simply plug the twisted-pair cable into the RJ-45 connector on the back of the unit.

Connecting a Line Device to the RISC Router 3500R

The RISC Router 3500R supports high-speed synchronous operation over the included V.35 cables, or V.11 with a special cable available from Compatible Systems.

The RISC Router 3500R independently supports the PPP, Frame Relay and SMDS link protocols on each WAN interface.

Connecting Devices to the V.35 Interfaces

These interfaces can be used to connect to a wide variety of line communications devices, including those which support either leased or dialed operation. Examples include leased 56K CSU/DSU's, switched 56K CSU/DSU's, fractional T1 CSU/DSU's, ISDN terminal adapters, and full T1/E1 rate CSU/DSU's.

You may select either dial-on-demand, redial if down ("always up" mode), or leased line operation. This interface may also be set to receive ISDN or switched 56 incoming calls.

To connect a device, first make sure that both units are powered off. Then, simply connect a V.35 cable between the router and the device.

Connecting an Out-of-Band Management Console

If you wish to connect an out-of-band management console, use the supplied DIN-8command line cable and connect to the AUX/Console interface on the front of the RISC Router 3500R. You can use a dumb terminal or a computer equipped with VT100 terminal emulation.

The default baud rate for the AUX/Console interface is 9600.

Powering Up the Router

Power up all CSU/DSUs and TA's <u>before</u> powering up the router. This allows the router to immediately sense which of its interfaces are connected. At power-up, the router will take approximately one minute to become visible to CompatiView.

❖ **Note**: *If you want to use Telnet as a management method, you must first configure an IP address into the router with an out-of-band console, with CompatiView, or reconfigure the IP address on an IP host or workstation on the same Ethernet segment as the router. See* Chapter 5 - Command Line Management *for more information.*

Chapter 4 - CompatiView Software Installation

All of the routers in Compatible Systems' internetworking and VPN families, including all RISC Router and MicroRouter models, can be managed from a single GUI management platform called Compati-View. CompatiView for Windows is included on the CD-ROM which was shipped with your RISC Router 3500R.

❖ **Note:** *An older version of CompatiView for Mac OS was included on the CD-ROM shipped with your router, but does not contain some of the features of the newest Windows version.*

CompatiView for Windows

CompatiView for Windows allows you to manage the RISC Router 3500R from an IBM-compatible PC running Windows 95/98 or Windows NT. The PC can either be configured as an IPX client on a Novell NetWare internet, or as an IP WinSock client on an IP internet.

System Requirements

In order to successfully run CompatiView for Windows, you need:

- Microsoft Windows 95/98, or Windows NT installed
- VGA or better monitor
- IP - A WinSock-compatible transport stack
  - and/or -
- IPX - A Netware or Microsoft Client installation

❖ **Note:** *To choose the active transport protocol on a Windows machine which has both IPX and IP installed, select "Options" from the Database menu and click the General tab. Then select the appropriate radio button under "Transport."*

Installation and Operation

The Windows version of the CompatiView program can be found in the Network Management/CompatiView/Windows directory on the CD-ROM that was included with your RISC Router 3500R.

Run the auto-installation program (CV5x file) by double-clicking on it. The installation program will ask you to select (or create) a directory in which it should locate CompatiView and its associated files and data-

base subdirectory.

Once the installation is complete, double-click on the CompatiView icon to open the program. For further information on using CompatiView, see the *CompatiView Management Software Reference Guide* included with your router.

❖ **Note:** *For an up-to-date description of the changes (if any) made to Windows system files by the installation program, see the README.TXT file located in the CompatiView installation directory.*

Transport Protocols and CompatiView

CompatiView will be able to use the transport protocol (IP or IPX) you have selected to access Compatible Systems products anywhere on your internetwork. Depending on your security setup, you may also be able to use the IP transport option to manage devices across the Internet.

The IP protocol does not provide a method for CompatiView to automatically discover the router. To initially contact the router over IP using CompatiView, you must first enter a valid IP address into the router. You can do this either on a console directly connected to the router or by setting a workstation's IP address to 198.41.12.2 with a Class C subnet mask (255.255.255.0) so that it can communicate over Ethernet with 198.41.12.1 (the shipping default of Ethernet 0). After setting the router's IP address, be sure to change the workstation's configuration back to its original settings.

The IPX protocol <u>does</u> allow CompatiView to automatically discover the router. Compatible Systems devices are configured to autoseed the two most common IPX frame types upon startup (802.2 and 802.3 (raw)). If CompatiView has the IPX/SPX protocol selected as its transport, it will be necessary to either powerup the router before powering up the workstation, or reboot the workstation after the router has completed its boot sequence. This process will ensure that the workstation and the router have the proper IPX network bindings for communication.

Chapter 5 - Command Line Management

The command line interface allows you to configure and monitor the router in-band via Telnet or out-of-band with a terminal connected to the RISC Router 3500R's AUX/Console interface.

❖ **Note:** *Proper syntax is vital to effective operation of command line management. Case is not significant – you may enter commands in upper case, lower case, or a combination of the two.*

Out-of-Band Command Line Management

You can use command line management and text-based configuration out-of-band as a permanent management tool, or only temporarily in order to set the router's IP parameters to allow in-band Telnet access.

In order to access the command line out-of-band, do the following:

1. Set a terminal or a PC equipped with VT100 terminal emulation to a baud rate of 9600, 8 bits, no parity, 1 stop bit and no Flow Control.

2. Connect it to the router's Console interface using the cable which was supplied with the RISC Router 3500R.

3. Press the <Return> key one or two times.

4. Enter the default password ***letmein*** at the password prompt. The command line interface prompt will appear on the screen.

If you plan to use out-of-band access for ongoing management of your router, you can find further information on configuring your router in *Chapter 6 - Basic Configuration Guide*. Otherwise, see the section later in this chapter on Setting Up Telnet Operation for information on setting the router to allow Telnet access from hosts on its network.

Temporarily Reconfiguring a Host for Command Line Management

You can temporarily reconfigure an IP host in order to set the router's IP parameters to allow in-band Telnet access.

If you wish to set the router's basic IP parameters in this fashion, the host must be on the same Ethernet segment as one of the router's Ethernet interfaces. You can then do the following:

1. Set the host's IP address to 198.41.12.2, with a Class C subnet mask (255.255.255.0) and then Telnet to 198.41.12.1.

2. Enter the default password *letmein* at the password prompt. The command line interface prompt will appear on the screen.

3. Use the **configure** command and set the **IPAddress**, **SubnetMask**, and **IPBroadcast** keywords in the **IP Ethernet 0** section.

4. Use the **save** command to save the changes to the device's Flash ROM.

5. Change the host's configuration back to its original settings

See the next section (Setting Up Telnet Operation) for information on setting the router to allow Telnet access from hosts on its network.

Setting Up Telnet Operation

Telnet is a remote terminal communications protocol based on TCP/IP. With Telnet you can log into and manage the RISC Router 3500R from anywhere on your IP internetwork, including across the Internet if your security setup allows it. To manage the router with Telnet, you must:

1. Run Telnet client software on your local computer, which will communicate with the Telnet server built into the RISC Router 3500R.

2. You must also set some basic IP parameters in the router. The required parameters for Telnet access to an interface are the IP address, IP subnet mask, and IP broadcast address. There are several ways to set them.

    •   You may set them using text-based configuration either out-of-band via the Console interface or in-band via a reconfigured IP host. Instructions for setting up these two methods were given earlier in this chapter. Once you have set up the command line interface, do the following:

        A. Use the **configure** command and set the **IPAddress**, **SubnetMask**, and **IPBroadcast** keywords in the **IP Ethernet 0** section.

B. Use the **save** command to save the changes to the device's Flash ROM.

• You may also use CompatiView from a reconfigured IP host (if using the IP transport protocol), or anywhere on your network (if using the IPX transport protocol). Instructions for these two methods are given in *Chapter 4 - CompatiView Software Installation*.

With CompatiView, basic IP parameters can be set using the TCP/IP Routing: Ethernet 0 Dialog Box. Use the Save to/ Device option under the File menu to save the changes.

After you have set these IP parameters and saved the changes, you can use Telnet to access the router from any node on your IP network. Invoke the Telnet client on your local host with the IP address of the router you wish to manage.

Chapter 6 - Basic Configuration Guide

This chapter briefly discusses the major parameters that must be set in order to use the router.

Detailed information on the meaning of the router's parameters is provided in the *CompatiView Management Software Reference Guide* and the *Text-Based Configuration and Command Line Management Reference Guide*. You should use this list as a starting point to look up more specific information in the other documents.

If you need more general information on IP, IPX, AppleTalk or wide area protocols, see the Appendices in the *CompatiView Management Software Reference Guide*.

There are a number of parameter settings which are optional, in the sense that they are not required for all installations. These settings are not covered in this chapter.

In this chapter:

    CV = CompatiView

    TB = Text-Based Configuration

In order to successfully connect to an Internet Service Provider (ISP), you must use router configuration parameters which will be provided by the technical staff of the ISP. These parameters must include all IP addresses, WAN settings, and any applicable authorization routines. Please check with your ISP **before** configuring or changing the configuration of you RISC Router 3500R.

❖ **Note:** *This Basic Configuration Guide does not include information on setting up packet filters for using the router as a Firewall. See the* **CompatiView Management Software Reference Guide** *or* **Text-Based Configuration and Command Line Management Reference Guide** *regarding IP packet filters for more information.*

Ethernet Interface Configuration

Ethernet interfaces are considerably easier to set up than wide area interfaces since there are no choices that need to be made regarding line communications devices and their parameters. We recommend that you begin by configuring any Ethernet interface parameters before proceeding to configure WAN interface parameters.

IP Protocol

Required for IP

These parameters set the basic address characteristics of the interface. They provide enough information for another IP node to find the interface (such as a Telnet client), but not enough information for routing to take place.

- IP address
- IP subnet mask
- IP broadcast address

CV: Use the TCP/IP Routing: Ethernet Dialog Box to set these parameters.

TB: Use the **configure** command and the **IPAddress**, **SubnetMask**, and **IPBroadcast** keywords in the **IP Ethernet 0** section.

Suggested for IP

These parameters help supply information about the segment that the interface is connected to. With this information, routing can take place.

- Set IP RIP 1, IP RIP 2 or OSPF (Open Shortest Path First)
- IP static routes

CV: Use the TCP/IP Routing: Ethernet Dialog Box to set RIP, and the IP Static Routing Dialog Box (under Global/IP Static Routes) to set static routes. OSPF can only be configured using text-based configuration.

TB: Use **configure** and the **RIPVersion** keyword for the **IP Ethernet 0** section. Use **edit config** and add static routes in the **IP Static** section.

IPX Protocol

Required for IPX

There are generally no required changes from the shipping Ethernet configuration for IPX. The Ethernet interface will autoconfigure to use the two most common IPX frame types, and will autoadapt to conditions on the Ethernet.

Suggested for IPX

You may want to set your own network numbers, rather than using the autoconfigured values. You may also want to turn off unused frame types.

CV: Use the IPX Routing: Ethernet 0 Dialog Box.

TB: Use **configure** and set keywords in the **IPX Ethernet 0** section.

AppleTalk Protocol

Required for AppleTalk

There are generally no required changes from the shipping Ethernet configuration for AppleTalk. The Ethernet interface will autoconfigure to use AppleTalk Phase 2, and will autoadapt to conditions on the Ethernet.

Suggested for AppleTalk

You may want to set your own network numbers, rather than using the autoconfigured values. You may also want to use more meaningful zone names.

CV: Use the AppleTalk Routing: Ethernet 0 Dialog Box.

TB: Use **configure** and set keywords in the **AppleTalk Phase 2 Ethernet 0** section.

DECnet Protocol

Required for DECnet

The router's shipping configuration does not have DECnet turned on. You must turn it on and set several DECnet parameters.

- Set DECnet on (globally, and for this port)
- Set DECnet area
- Set DECnet node

CV: Use the DECnet Routing Dialog Box (under Global/DECnet Routing) and the DECnet: Ethernet Dialog Box.

TB: Use **configure** and set the **Enabled**, **Area**, and **Node** keywords in the **DECnet Global** section.

❖ **Note:** *Setting DECnet on for any port with the command line also sets DECnet on globally. In CompatiView you must set a global parameter and a port-specific parameter.*

Suggested for DECnet

Setting the parameters above should be adequate for most installations.

WAN Interface Configuration

This section covers the settings required for PPP (point-to-point) protocol operation of the RISC Router 3500R WAN interfaces. In general, the parameters listed here should be set for each WAN interface on which you plan to use PPP. Note that some WAN interfaces can be running PPP while others are running Frame Relay.

The V.35 interface can only be run synchronously, at rates up to 2 Mbps per second.

Physical Communications Settings

You may need to set the baud rate, sync/async operation, and other physical communications parameters for the WAN interface. These parameters will depend on the line communications device you are using.

CV: Use the Physical Configuration: WAN 0 Dialog Box.

TB: Use **configure** and the **V.35 Interface WAN 0** (and/or other port numbers you wish to configure) section.

PPP Configuration

This section covers the settings required for PPP (point-to-point) protocol operation of the WAN interfaces. In general, the parameters listed here should be set for each WAN interface on which you plan to use SMDS. Note that some WAN interfaces can be running PPP while others are running SMDS or Frame Relay.

Link Configuration

Required for Dedicated/Leased Line Operation

Dedicated line operation is the simplest to set up.

- Set Dedicated connection
- Set PPP connection

CV: Use the Link Configuration: WAN Dialog Box.

TB: Use **configure** and then set the **Mode** and **ConnectMode**
keywords in the **Link Config WAN 0** (and/or other port numbers
you wish to configure) section.

Suggested for Dedicated/Leased Line Operation

Dedicated line operation generally does not require additional parameters for operation.

Required for Dial-On-Demand Operation

Incoming dial-on-demand operation requires only slightly more information than dedicated line setup. Outgoing dial-on-demand requires additional information (see the suggested settings below).

- Set dial-up connection
- Set PPP connection
- Set to allow dial-in and/or dial-out

CV: Use the Link Configuration: WAN Dialog Box.

TB: Use **configure** and then set the **Mode**, **ConnectMode**, **DialIn**, and
DialOut keywords in the **Link Config WAN 0** (and/or other port
numbers you wish to configure) section.

Suggested for Dial-On-Demand Operation

Outgoing dial-on-demand requires some additional information.

- Set dialing method
- Create dial-out script
- Set dial-out script to be used
- Set inactivity time

CV: Use the Link Configuration: WAN 1 Dialog Box to set the dialing method and to select a chat script (once you have created one). Use the WAN Chat Scripts Dialog Box (under Global/WAN Chat Scripts) to create your chat script.

TB: Use **configure** and then set the **Dialing**, **DialOutScript**, and **DropInact** keywords in the **Link Config WAN 0** (and/or other port numbers you wish to configure) section. Use **edit config** and create a **Chat** section to contain your dialing script.

IP Protocol

Required for IP

WAN interfaces which are set for PPP operation do not generally use an IP address. They are set to act as an "unnumbered interface." In this mode of operation, there are no required settings.

Suggested for IP

These parameters help supply information about the segment that the interface is connected to. With this information, routing can take place.

- Set IP RIP 1, IP RIP 2, OSPF (Open Shortest Path First) or BGP (Border Gateway Protocol)
- Set IP static routes

CV: Use the TCP/IP Routing: WAN Dialog Box to set RIP, and the IP Static Routing Dialog Box (under Global/IP Static Routes) to set static routes. OSPF and BGP can only be configured using text-based configuration.

TB: Use **configure** and set the **RIPversion** keyword in the **IP WAN 0** (and/or other port numbers you wish to configure) section. Use **edit config** and add static routes in the **IP Static** section.

❖ **Note:** *If you set RIP to "on" for a dial-on-demand link, you must also set the **update** method to **triggered** to avoid the link being brought up by transmission of RIP information. You should only use triggered*

operation when you are connecting to another Compatible Systems router at the other end of the link.

❖ **Note:** *Due to the complexity of BGP, configuration parameters for BGP are not given here. Compatible Systems has posted a BGP configuration guide in the Technical Support section of our Web site at: http://www.compatible.com/.*

IPX Protocol

Required for IPX

WAN interfaces which are set for PPP operation do not generally use an IPX address. They are set to act as an "unnumbered interface." In this mode of operation, there are no required settings.

Suggested for IPX

If you plan to use dial-on-demand for this link, you should set the update method "triggered" to avoid the link being brought up by transmission of IPX RIP information. You should only use triggered operation when you are connecting to another Compatible Systems router at the other end.

When you set up an on-demand link with IPX, you should carefully monitor link usage to determine whether the link is being activated only when it is needed. Additional router configuration will be required for many networks in order to achieve optimal link usage.

• Set update method

CV: Use the IPX Routing: WAN Dialog Box.

TB: Use **configure** and set the **Updates** keyword in the **IPX WAN 0** (and/or other port numbers you wish to configure) section.

AppleTalk Protocol

Required for AppleTalk

WAN interfaces which are set for PPP operation do not generally use an AppleTalk address. They are set to act as an "unnumbered interface." In this mode of operation, there are no required settings.

Suggested for AppleTalk

If you plan to use dial-on-demand for this link, you should set the update method to triggered to avoid the link being brought up by transmission of AppleTalk RTMP information. You should only use trig-

gered operation when you are connecting to another Compatible Systems router at the other end.

When you set up an on-demand link with AppleTalk, you should carefully monitor link usage to determine whether the link is being activated only when it is needed. Additional router configuration will be required for many networks in order to achieve optimal link usage.

- Set update method

CV: Use the AppleTalk Routing: WAN Dialog Box.

TB: Use **configure** and set the **Updates** keyword in the **AppleTalk WAN 0** (and/or other port numbers you wish to configure) section.

DECnet Protocol

Required for DECnet

The router's shipping configuration does not have DECnet turned on. In order to be used, DECnet must be turned on both globally and for a particular port.

WAN interfaces which are set for PPP dial-on-demand operation should have their DECnet hello timers and DECnet routing timers set for a fairly long period, since the link will be brought up when this information is transmitted.

Because of the need to regularly bring the link up to exchange routing information, on-demand operation using DECnet is not recommended.

- Set DECnet on (globally, and for this port)
- Set DECnet area
- Set DECnet node
- Set hello timer
- Set routing timer

CV: Use the DECnet Routing Dialog Box (under Global/DECnet Routing) and the DECnet: WAN Dialog Box.

TB: Use **configure** and set the **HelloTimer** and **Mode** keywords in the **DECnet WAN 0** (and/or other port numbers you wish to configure) section. Use **configure** and set the **Enabled**, **Area**, and **Node** keywords in the **DECnet Global** section.

❖ **Note:** *Setting DECnet on for any port with the command line also sets DECnet on globally. In CompatiView you must set a global parameter and a port-specific parameter.*

Suggested for DECnet

Setting the parameters above should be adequate for most installations.

Frame Relay Configuration

This section covers the settings required for Frame Relay operation of the RISC Router 3500R WAN interfaces. In general, the parameters listed here should be set for each WAN interface on which you plan to use Frame Relay. Note that some WAN interfaces can be running Frame Relay while others are running PPP or SMDS.

The V.35 interfaces can only be run synchronously, at rates up to 2 Mbps per second.

Link Configuration

Frame Relay is presently supported in the RISC Router 3500R only via synchronous dedicated line operation.

- Set Dedicated connection
- Set Frame Relay connection

CV: Use the Link Configuration: WAN 0 Dialog Box.

TB: Use **configure** to set the **Mode** and **ConnectMode** keywords in the **Link Config WAN 0** (and/or other port numbers you wish to configure) section.

Suggested for Dedicated/Leased Line Operation

Dedicated line operation generally does not require additional parameters for operation.

Frame Relay DLCI Mappings

If you are connecting to another Compatible Systems router, this information is not required for Frame Relay operation. Compatible Systems uses IARP (Inverse Address Resolution Protocol) to dynamically generate this information. To connect to other vendors' routers which do not support IARP, you must provide DLCI-to-protocol mapping information.

❖ **Note**: *Many Internet Service Providers (ISP's) do not support IARP as a default. If one of your RISC Router 3500R interfaces will be connected to an ISP via Frame Relay, check with your ISP technical staff on whether you must manually enter DLCI information or not.*

CV: Use the DLCI Mapping Database Dialog Box (under WAN/Link Configuration/DLCI button).

TB: Use **configure** and set the **DLCI** keyword in the **Frame Relay WAN 0** (and/or other port numbers you wish to configure) section.

IP Protocol

Required for IP

There are two ways to set up Frame Relay. One is to set the WAN interface as a "numbered interface." This means that the interface (and thus the Frame Relay network) will have an IP address, subnet mask, etc. The other is to set it as an unnumbered interface and specify that the link is point-to-point Frame Relay and set the local DLCI. Unnumbered Frame Relay can only be configured using text-based configuration. Instructions are provided for both options.

Required for IP Numbered Interface

- IP numbered interface
- IP address
- IP subnet mask
- IP broadcast address

CV: Use the TCP/IP Routing: WAN Dialog Box.

TB: Use the **configure** command and the **Numbered**, **IPAddress**, **SubnetMask**, and **IPBroadcast** keywords in the **IP WAN 0** (and/ or other port numbers you wish to configure) section.

Required for IP Unnumbered Interface

- IP unnumbered interface
- Point-to-Point Frame Relay
- Local DLCI

TB: Unnumbered Frame Relay can only be configured using text-based configuration. Use the **configure** command and the **Numbered**, **PointToPointFrame**, and **InterfaceDLCI** keywords in the **IP WAN 0** (and/or other port numbers you wish to configure) section.

Suggested for IP

These parameters help supply information about the segment that the interface is connected to. With this information, routing can take place.

- Set IP RIP 1, IP RIP 2, OSPF (Open Shortest Path First) or BGP (Border Gateway Protocol)
- IP static routes

CV: Use the TCP/IP Routing: WAN Dialog Box to set RIP, and the IP Static Routing Dialog Box (under Global/IP Static Routes) to set static routes. OSPF and BGP can only be configured using text-based configuration.

TB: Use **configure** and set either the **RIPVersion** keyword or the **OSPFEnabled** keyword in the **IP WAN 0** (and/or other port numbers you wish to configure) section. Add static routes and a default router using the **edit config IP Static** command.

❖ **Note:** *Due to the complexity of BGP, configuration parameters for BGP are not given here. Compatible Systems has posted a BGP config-uration guide in the Technical Support section of our Web site at: http://www.compatible.com/.*

IPX Protocol

Required for IPX

Frame Relay operation requires that the WAN interface is set to be a "numbered interface." This means that the interface (and thus the Frame Relay network) must have an IPX network number.

- IPX numbered interface
- IPX network number

CV: Use the IPX Routing: WAN Dialog Box.

TB: Use **configure** and set the **Numbered** and **Net** keywords in the **IPX WAN 0** (and/or other port numbers you wish to configure) section.

Suggested for IPX

The settings above are all that is generally required for IPX operation over Frame Relay.

AppleTalk Protocol

Required for AppleTalk

Frame Relay operation requires that the WAN interface is set to be a "numbered interface." This means that the interface (and thus the Frame Relay network) must have an AppleTalk network and node number and an AppleTalk zone name.

- • AppleTalk numbered interface
- • AppleTalk network number
- • AppleTalk node number
- • AppleTalk zone name

CV: Use the AppleTalk Routing: WAN Dialog Box.

TB: Use **configure** and set the **Numbered**, **NetLower**, and **DefZone** keywords in the **AppleTalk WAN 0** (and/or other port numbers you wish to configure) section.

Suggested for AppleTalk

The settings above are all that is generally required for AppleTalk operation over Frame Relay.

DECnet Protocol

Required for DECnet

DECnet must be turned on globally, and turned on for a particular port, in order to be used.

WAN interfaces which are set for Frame Relay operation do not need any additional parameters set in order to function.

- • Set DECnet on (globally, and for this port)

CV: Use the DECnet Routing Dialog Box (under Global/DECnet Routing) and the DECnet: WAN Dialog Box.

TB: Use **configure** and set the **Mode** keyword in the **DECnet WAN 0** (and/or other port numbers you wish to configure) section.

❖ **Note:** *Setting DECnet on for any port with the command line also sets DECnet on globally. In CompatiView you must set a global parameter and a port-specific parameter.*

SMDS Configuration

This section covers the settings required for SMDS (Switched Multi-megabit Data Service) operation of the RISC Router 3500R WAN inter-faces. SMDS is a connectionless, packet-switched service that offers LAN-to-LAN connectivity across a wide area at up to 1.544 Mbps. In general, the parameters listed here should be set for each WAN interface on which you plan to use SMDS. Note that some WAN interfaces can be running SMDS while others are running PPP or Frame Relay.

❖ **Note:** *The IP protocol settings and the physical communication settings are the same as they would be for Frame Relay operation. The only parameters which should be set differently for SMDS are the Link Configuration and the SMDS addressing section.*

Link Configuration

SMDS is presently supported in the RISC Router 3500R only via synchronous dedicated line operation. It can only be set using text-based configuration.

- Set Dedicated connection
- Set SMDS connection

TB: Use **configure** and then set the **Mode** and **ConnectMode** keywords in the **Link Config WAN 0** (and/or other port numbers you wish to configure) section.

SMDS Addressing

SMDS addresses and other parameters can only be set using the command line interface. Many of these parameters will be given to you by your service provider.

TB: Use **configure** and set the **StationAddress**, **IPMulticast** and **PollingFrequency** keywords in the **SMDS WAN 0** (and/or other port numbers you wish to configure) section.

Saving a Configuration File to Flash ROM

Once a configuration is complete, you can save it to the router's Flash ROM. Until saved, all changes are made in a separate buffer and the actual router interfaces run as before the changes were made.

CV: Use the Save to/Device option from the File menu.

TB: Use the **save** command.

Appendix A - Shipping Defaults

Default Password

- letmein

Ethernet Interface

IP Routing Defaults

- On
- Address: 198.41.12.1
- Subnet Mask: 255.255.255.0
- Broadcast Address: 198.41.12.255
- IP RIP off

IPX Routing Defaults

- 802.3 on, autoseeding
- 802.2 on, autoseeding
- Type II off
- 802.2 SNAP off

AppleTalk Routing Defaults

- Phase I off
- Phase II on

DECnet Defaults

- Off

WAN Interfaces

IP Defaults

- On
- Unnumbered interface
- RIP off
- Van Jacobsen compression off

IPX Defaults

- On
- Unnumbered interface

AppleTalk Defaults

- On
- Unnumbered interface

DECnet Defaults

- Off

V.35 Link & Physical Defaults

- PPP
- Dedicated
- Sync, external clock

Appendix B - Connector and Cable Pin Outs

Pin Outs for DB-26 to V.35 Male Cable

DB-26	V.35		Signal
25	A	↔	Chassis Ground
26	B	↔	Signal Ground
19	C	→	Request to Send
20	D	←	Clear to Send
21	E	←	Data Set Ready
23	F	←	Receive Line Signal Detect
22	H	→	Data Terminal Ready
1	P	→	Tx Data
4	R	←	Rx Data
10	S	→	Tx Data
13	T	←	Rx Data
6	U	→	Tx Clock Out
5	V	←	Rx Clock In
15	W	→	Tx Clock Out
14	X	←	Rx Clock In
3	Y	←	Tx Clock In
12	AA	←	Tx Clock In

❖ **Note:** *V.11 operation is selected with a specially wired cable. V.35 operation is the default.*

Pin Outs for DIN-8 to RS-232 Console Cable (DTE/Female)

DIN-8 (DTE) RS-232C	Signal		DB-25 Data (DTE/Female) RS-232C	Signal
1	RTS	→	5	CTS
2	CTS	←	4	RTS
3	Tx Data	→	3	Rx Data
4	Ground	↔	7	Ground
5	Rx Data	←	2	Tx Data
6	Tx Clock	↔	17	Tx Clock
7	DCD	←	8	DCD
8	Rx Clock	←	15	Rx Clock
Shield		↔	Shield	

❖ **Note:** *This cable is a null-modem DTE-to-DTE cable.*

Appendix C - LED Patterns and Test Switch Settings

RISC Router 3500R LED Patterns

The RISC Router 3500R uses a number of light patterns on its front LED bars to indicate operating conditions.

Power On, No Traffic

The router will scan through the left (Ethernet) LED bar, from left to right, illuminating one element at a time.

❖ **Note**: *Lights 1 and 10 on the Ethernet bar are directly connected to the router's 10BaseT interface and indicate 10BaseT link (1) and 10BaseT polarity (10).*

Traffic Indicators (Ethernet LED Bar)

Scan from 2 to 5: Ethernet transmit packet

Scan from 9 to 6: Ethernet receive packet

Other Indicators (on All LED Bars)

Transmit and receive packets - per WAN interface as marked on front label.

5,6 flashing: Router stacks starting up

3,4 & 7,8 flashing: No OS loaded. Running from ROM.

5,6 on solid, 2 (bar 1) and 9 (bar 2) flashing: Erasing OS in Flash ROM

4,5,6,7 on solid, 2 (bar 1) and 9 (bar 2) flashing: Erasing config in Flash ROM

Scanning from 2 to 9 (bar 1), and scanning from 9 to 2 (bar 2): Flash ROM erase due to switch setting five or six is complete. Set switch to zero and cycle power.

❖ **Note**: *Any continuous flashing pattern not noted in this chapter may be caused by a hardware failure. Please call Compatible Systems Technical Support if your router shows a hardware failure.*

RISC Router 3500R Switch Settings

0	**Normal Operation**
1	Unused*
2	Unused*
3	**Run Boot ROM Downloader**
4	Unused*
5	**Erase Flash ROM (OS and Configuration)**
6	**Erase Flash ROM (Configuration Only)**
7	Unused*
8	Unused*
9	**Allow** *letmein* **password for 5 minutes after powerup**

♠⁑ **Caution:** *Settings marked with an asterisk may erase your Flash ROM. Please do not use these settings without **first** contacting Compatible Systems Technical Support.*

Appendix D - Downloading Software From Compatible Systems

We make the latest versions of operating software for all Compatible Systems products available at our Web site. The latest version of CompatiView management software is also available.

To download software, follow the instructions below.

1. Use your browser to access http://www.compatible.com/, and find the link on our home page to "Software Downloads."

2. Select the product and software version you want, and click on the appropriate file to download it.

❖ **Note:** *Uncompressed downloads (suitable for TFTP and CompatiView Windows downloading) are stored as .DLD files. Self-extracting Windows compatible style files (and CompatiView for Windows itself) are stored as .EXE files. Self-extracting Macintosh style files are stored as .sea.bin (MacBinary format) and/or .sea.hqx files.*

❖ **Note:** *These files are also accessible directly via Anonymous FTP at* **ftp.compatible.com/files/**.

Appendix E - Terms and Conditions

Compatible Systems Corporation (Compatible Systems) offers to sell only on the condition that Customer's acceptance is expressly limited to Compatible Systems' terms and conditions of sale. Compatible Systems' acceptance of any order from Customer is expressly made conditional on assent to these terms and conditions of sale unless otherwise specifically agreed to in writing by Compatible Systems. In the absence of such agreement, commencement of performance or delivery shall be for Customer's convenience only and shall not be construed as an acceptance of Compatible Systems' terms and conditions. If a contract is not earlier formed by mutual agreement in writing, Customer's acceptance of any goods or services shall be deemed acceptance of the terms and conditions stated herein.

1. **Warranty**. Compatible Systems warrants to the Customer and to all persons who purchase Products from the Customer during the Warranty terms ("subsequent purchasers"), that, for an unlimited period from the date (the "shipping date") on which Compatible Systems ships the Products to the Customer: (a) the Product meets, in all material respects, all specifications published by Compatible Systems for such Products as of the shipping date; (b) the Products are free from all material defects in materials and workmanship under normal use and service; and (c) that as a result of the purchase of the Products from Compatible Systems, the Customer will have good title to the Products, free and clear of all liens and encumbrances.

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To obtain service under this Warranty, the Customer (or subsequent purchaser, if applicable) must follow the procedures outlined below, under "Product Return Policy."

THE WARRANTIES SET FORTH IN THESE TERMS AND CONDI-
TIONS ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED
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PARTICULAR PURPOSE).

2. **Shipments**. All delivery indications are estimated and are dependent in
part upon prompt receipt of all necessary information to service an order.
Compatible Systems shall not be liable for any premium transportation or
other costs or losses incurred by Customer as a result of Compatible Systems
inability to deliver Product in accordance with Customer's requested deliv-
ery dates. All shipments by Compatible Systems are made F.O.B. factory
(Boulder, Colorado); risk of loss shall pass to Customer at point of shipment.
Unless specified by the Customer, Compatible Systems will select the mode
of transportation for each order. Compatible Systems reserves the right to
make deliveries in installments. Partial shipments are subject to the terms of
payment noted below. Compatible Systems reserves the right to allocate
inventory and production if such allocation becomes necessary.

3. **Payment Terms**. Payment shall be made prior to shipment or upon
delivery, unless otherwise agreed to in writing. Payment shall not constitute
acceptance of the goods.

4. **Force Majeure**. All orders accepted by Compatible Systems are subject
to postponement or cancellation for any cause beyond the reasonable control
of Compatible Systems, including without limitation: inability to obtain
necessary materials and components; strikes, labor disturbances, and other
unavailability of workers; fire, flood, and other acts of God; war, riot, civil
insurrection, and other disturbances; production or engineering difficulties;
and governmental regulations, orders, directives, and restrictions.

5. **Product Return Policy**. Prior to shipping any Product to Compatible
Systems, the Customer must contact Compatible Systems Technical Support
(by letter or telephone) with the following information: (a) reason for return;
(b) quantity, description, and model number, and (if applicable) serial num-
ber of each item being returned; (c) original Compatible Systems Sales
Agreement number; and (d) any special instructions. Upon receipt of this
information, Compatible Systems will issue an RMA ("Return Material
Authorization") number and any required U.S. Customs identification to
assure correct identification of the Customer and to insure prompt and accu-
rate processing.

6. **Limitation of Remedies**. Compatible Systems' liability for all claims
brought pursuant to or in connection with this agreement, including the pur-
ported breach hereof, shall be limited: (a) in the case of claims for breach of
warranty, to compliance with the repair or replacement provisions of the
warranty, and (b) in all other cases (including any claim that the warranty
failed of its essential purpose), to actual damages of the Customer (or, if
appropriate, of the subsequent purchaser). IN NO EVENT SHALL COM-

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TIAL, OR INCIDENTAL DAMAGES ARISING OUT OF THE SALE,
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WHETHER A CLAIM IS BASED ON STRICT LIABILITY, BREACH OF
WARRANTY, NEGLIGENCE, OR ANY OTHER CAUSE WHATSO-
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apply even if Compatible Systems is advised of the possibility and nature of
any special, consequential, or incidental damages.

7. **Governing Law; Merger**. This agreement and all Terms and Conditions
hereof shall be governed by, and construed in accordance with the internal
laws of the State of Colorado. Except as superseded by a separate written
contract signed by both Compatible Systems and the Customer, superseding
all prior negotiations or offers, written or oral, this agreement may be
amended only in writing, signed by an authorized officer of Compatible Sys-
tems.