

IP-Series Router Family User's Guide

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Firmware Version 2.x

FCC Statement

This device complies with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

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Version 2.x

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RoHS

Some versions of this product is available in RoHS versions.



Models: IP-6690R, IP-6601, IP-6620, IP-6604 are available in 6/6 RoHS Telecom Product exemption versions.

Models: IP-6600 and models not listed are available in either non-RoHS or 5/6 RoHS versions. For the latest information on RoHS versions of those models, please contact Data Comm for Business.

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Chapter 1

Introduction

This chapter provides an overview of the EtherSeries Router's features and capabilities.

Congratulations on the purchase of your new EtherSeries Router.

This is a simple, easily configured router containing (depending upon individual model) interfaces for 10/100BaseT Ethernet, 10BaseT Ethernet, synchronous RS-232 serial interfaces, and asynchronous RS-232 serial interfaces. Some models contain other interfaces or firmware options. Routing may be enabled between any of the interfaces.

The routers connect using standard asynchronous or synchronous serial PPP or Frame Relay via any appropriate WAN media such as digital radios, DSUs, satellite, wireless modems or wired modems.

The EtherSeries router includes network address translation (NAT), IP routing, multiple routes, firewall filtering on port numbers, virtual servers, port forwarding, address filtering, link fail-over, and many other features.

When used in its simplest mode, there is minimal configuration required. The router is easily configured using any web browser connection via the Ethernet ports or the PPP ports. It maintains port traffic statistics and status.

EtherSeries Router Applications

The router connects multiple LAN segments by using standard IP routing between subnets. It is commonly used to connect a remote LAN to a central LAN when using a PPP or frame relay link between the two segments. In this application, NAT is not normally used and firewalling may or may not be in use.

The router is also used as a dial-up router connecting a single location to an Internet ISP. In this application, NAT and firewalling features are normally implemented.

Another application would be using the ethernet ports simply for firewall filtering, network address translation, and port forwarding.

In any installation using an asynchronous serial port connection, the router may be configured to auto-dial upon demand. In this mode, it will dial a remote router through a connected modem whenever it senses that a packet needs to be sent off the local LAN segment. It may be configured to dial upon power-up, and disconnect upon inactivity timers.

An auto-answer modem may be used to allow dial-in on a remote LAN segment. Dial-in and Dial-on-demand may be used on the same router port. This is often used to allow laptop computers to dial into the LAN segment.

The router may be configured for ISP failover, which forces a dial on one serial port when a primary ISP WAN link fails. The backup link may be a dial-modem, wireless modem, cell phone, or radio link.

Other Features

Multi-port Version

The router is available in various versions containing asynchronous ports, synchronous ports, and 10BaseT, 10/100BaseT, or Gigabit ethernet ports.

Serial Ports

Asynchronous serial port speeds may be any asynchronous speed between 300 bps and 230.4 Kbps. Synchronous port speed may range from 9.6 Kbps to T1 speeds.

IP Protocol

The router uses the IP protocol. It does not pass or use IPX, AppleTalk, or other non-routable protocols. It does not bridge. The serial connections may use synchronous PPP, asynchronous PPP, or Frame Relay.

DHCP Protocol

The router supports the DHCP protocol as either a client or a server.

Upgradeable Firmware

Firmware upgrades may be installed from any web browser through the local ethernet interface or the PPP link, a feature that allows remote updating.

Security and Firewall Features

The router supports a number of security and firewall options. NAT, "exposed computer", port forwarding, password protected configuration, PPP user authentication, port and address filtering, and others.

On-board Tools

The router contains diagnostic tools such as traceroute, ping, and a simple packet sniffer to aid in network troubleshooting.

EtherPoll® Functionality

Special UPD terminal server functionality compatible with the DCB *EtherPoll*® products is available on the IP-6600 and IP-6690 models.

APS-01 Remote Power Control Compatible

Most models of IP router integrate with the APS-01 remote power controller to provide 120/240 VAC power control for other devices using the serial ports.

Package Contents

You should find the following items packaged with your EtherSeries Router:

- The Router Unit
- Power Adapter
- This User's Guide CDRom
- Short cable with RJ-45 connectors
- 9-pin PC-direct adapter
- 9-pin Remote-PC adapter

- 25-pin modem adapter

If any of the above are missing, contact your dealer immediately.

Software Requirements

The router supports IP and associated protocols such as UDP, ICMP, serial PPP, DHCP, multi-cast, and any protocol built upon IP or TCP/IP. The initial IP address may be entered using any terminal or terminal emulation software on a PC.

Any standard web browser may be used for configuration once the router is configured with a valid IP address appropriate for your network. The default IP address for port A is 192.168.0.1, for port B; the default address is 192.168.2.1

The router will link with any other router that uses standard serial PPP or Frame Relay.

IP-6600 Specific 2-Serial Ports, 2-Ethernet Ports

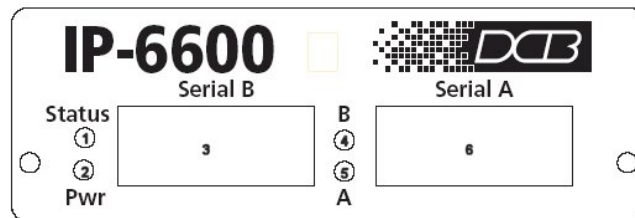
Introduction

The IP-6600 model router contains two serial ports and two ethernet ports (one 10BaseT, one 10/100BaseT). The IP-6600 and IP-6690 serial ports may be configured with *EtherPoll*® functionality. This is similar to a UDP terminal port server with broadcast functionality. For more details on EtherPoll functionality, please reference the DCB EtherPoll product user's guide. That manual is available on the DCB web site at <http://www.dcbnet.com>.

Front Panel

The IP-6600 model front panel is shown below.

Some units do not contain all ports shown. Some units contain an internal modem in the place of Serial B.



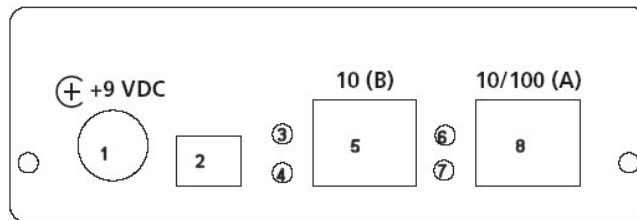
IP-6600 Bridge Front Panel

1 Red LED	Status Indicator
2 Red LED	Power Indicator
3 DE-9P	Serial Port B
4 Red LED	Port B Activity
5 Red LED	Port A Activity
6 DE-9P	Serial Port A

Front Panel LED Indicators

Rear Panel

The IP-6600 rear panel is shown below. Some units do not contain all ports shown.



IP-6600 Rear Panel

1 Power port	Connect the power adapter here.
2 Switch Bank	Configuration Switches
3 Red LED	LAN B Activity Indicator
4 Red LED	LAN B Link Indicator.
5 Ethernet Port B	10BaseT Ethernet Port
6 Red LED	LAN A Activity Indicator
7 Red LED	LAN A Link Indicator.
8 Ethernet Port A	10/100BaseT Ethernet Port

Rear Panel Indicators

IP-6600 Configuration Switches

The rear panel contains four small switches, numbered one through four (left to right). These are used for configuration.

The normal position for all switches is DOWN.

Switch 1

This switch immediately resets the unit. When placed in the UP position, it resets the router just as if it had been power cycled.

Switch 2

This switch places the router in basic configuration mode. It is used to provide a terminal interface for initial configuration. Powering up the router with this switch UP provides a terminal attached to the Serial-A port with a login prompt and the ability to manage the router with a command line. This method is used to install an initial IP address in the router.

Default using Switch 2 and 4

This model may be forced to power up using defaults without using the serial port. If the unit is powered up with both switch 2 and switch 4 in the up position, the unit will start up without reading the configuration file. The user can then access the unit using the default IP address of 192.168.0.1. The user can then make changes and store a new configuration. The old setting will not be overwritten until the user stores a configuration.

Switch 3 & 4

Factory use only.

LED Indicators

There are two red LED indicators on the rear panel adjacent to each LAN connector and four red LED indicators on the front panel near each 9-pin serial connector.

Rear Panel LED Indicators

- The lower red LED is the Ethernet Status indicator. It is lit when there is a valid Ethernet connection
- The upper red LED is a LAN activity indicator. This LED flashes with activity on the Ethernet (even if the activity isn't directly to this unit).

Front Panel LED Indicators

- Lower Left LED is a power indicator.
- Upper Left LED is a status indicator. It should be on.
- Upper right LED flickers with activity on Serial Port B.
- Lower right LED flickers with activity on Serial Port A.

IP-6690 Specific -Internal Modem

The IP-6600 family consists of various models with different internal hardware or firmware options. The IP-6690 includes an internal V.92 modem.

Introduction

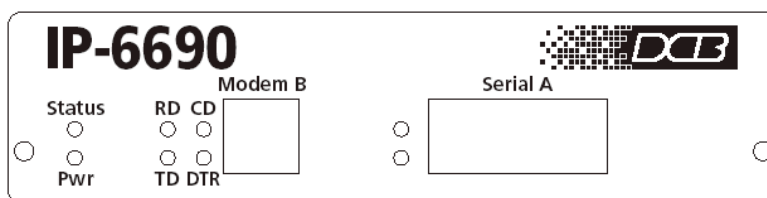
The IP-6690 model router contains an internal V.92 modem and one serial port along with two Ethernet ports (one 10BaseT, one 10/100BaseT). The configuration is similar to the IP-6600 model with the following changes.

Configuration Differences

The internal modem conforms to V.92 specifications. Serial B Operating Modes are either PPP or Disabled. Modem configuration string options may be changed to suit your environment, however the default value of “Internal Modem” is recommended.

IP-6690 Front Panel

The front panel contains modem indicator LEDs for RD, CD, TD, and DTR along with an RJ-11 telephone line jack. Any standard RJ-11 telephone cable may be used for the phone line connection.



IP-6690 Front Panel

Label	Name	Operation
RD	Receive Data	Flickers along with data received from the telephone line
TD	Transmit Data	Flickers along with data transmitted to the telephone line
CD	Carrier Detect	Indicates carrier is received from another modem
DTR	Data Terminal Ready	Indicates the router has raised the internal DTR signal

LED Indicators



Model IP-6690R meets RoHS Telecom Product exemption specifications.

IP-9600 Specific –Synchronous, Asynchronous, Ethernet

The IP family consists of various models with different internal hardware or firmware options. The IP-9600 includes four serial ports (two asynchronous, two sync/async) and two ethernet ports.

Introduction

The IP-9600 model router contains two ethernet ports, two asynchronous ports, and two ports that may be configured as either synchronous or asynchronous. The configuration is similar to the IP-6600 model with the following changes.

Configuration Differences

Serial Operating Modes may be configured as synchronous PPP, asynchronous PPP, or Frame Relay (including CISCO Frame Relay). Synchronous port configuration screens, shown in the configuration section, are specific to this model. There are internal jumpers that set clock source, and balanced/unbalanced operation for port 1. The serial set-up port is port 3.

IP-9600 Front Panel



IP-9600 Router Front Panel

1 Status LED	Status Indicator
2 Pwr LED	Power Indicator
3 LED 1	Status Port 1 Indicator
4 LED 2	Status Port 2 Indicator
5 LED 3	Status Port 3 Indicator
6 LED 4	Status Port 4 Indicator

Rear Panel

The rear panel includes the configuration switches, power input connector, one 10BaseT interface and one auto switching 10/100BaseT interface.

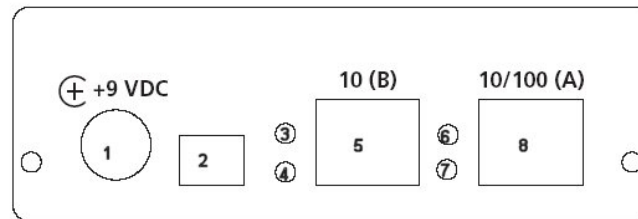


Figure 1: EtherSeries Router Rear Panel

1 Power port	Connect the power adapter here.
2 Switch Bank	Configuration Switches
3 Red LED	LAN B Activity Indicator
4 Red LED	LAN B Link Indicator.
5 Ethernet Port B	10BaseT Ethernet Port
6 Red LED	LAN A Activity Indicator
7 Red LED	LAN A Link Indicator.
8 Ethernet Port A	10/100BaseT Ethernet Port

Configuration Switches

The rear panel contains four small switches, numbered 1 through four (left to right). These are used for configuration.

The normal position for all switches is DOWN.

Switch 1

This switch immediately resets the unit. When placed in the UP position, it resets the router just as if it had been power cycled.

Switch 2

This switch places the router in basic configuration mode. It is used to provide a terminal interface for initial configuration. Powering up the router with this switch UP provides a terminal attached to the Serial-A port with a login prompt and the ability to manage the router with a command line. This method is used to install an initial IP address in the router.

Switch 3

Factory use only.

Switch 4

Factory use only.

LED Indicators

There are two red LED indicators on the rear panel adjacent to each LAN connector and four red LED indicators on the front panel near each RJ-48 serial connector.

Rear Panel LED Indicators

- The lower red LED is the Ethernet Status indicator. It is lit when there is a valid Ethernet connection
- The upper red LED is a LAN activity indicator. This LED flashes with activity on the Ethernet (even if the activity isn't directly to this unit).

Front Panel LED Indicators

- Lower Left LED is a power indicator.
- Upper Left LED is a status indicator. It should be on.
- Port LEDs flicker with activity on the Serial Port

IP-6601 Specific – Three Ethernet Ports

The IP family consists of various models with different internal hardware or firmware options. The IP-6601 includes two Ethernet ports.

Introduction

The IP-6601 model router contains three Ethernet ports and is designed for operation with a broadband or direct Ethernet WAN connection using a public network, DSL modem, or Cable modem. The configuration is similar to the IP-6604 or 6620 models with the following changes.

Configuration Differences

This model contains a single serial interface which may be used in initial setup if needed. IF the default IP address scheme is not appropriate for your LAN, complete the serial setup to configure valid IP addressing for the Lan ports. Once a compatible IP address is available, the router may be configured using a browser from a workstation connected to LAN-2. The browser setup screens are much easier to use than the serial setup.



IP-6601 Router

IP-6601 Rear Panel

- Power connector
- Three Ethernet 10/100BaseT connectors labeled LAN1, LAN2, and LAN3
- One DE-9P (9-pin PC type COM port) for serial configuration
- Optionally, two USB connectors. These are unused on most models of the IP-6601.

IP-6601 Front Panel LED Indicators

- Upper LED is a power indicator.
- Lower LED is a virtual hard drive status indicator. It may flicker with internal activity
- LAN(1-3) each display an upper link LED which indicates a valid ethernet connection
- LAN(1-3) each display a lower activity LED which will flicker with ethernet activity..

IP-6601 Initial configuration

The IP-6601 factory default configuration is designed for easy plug and play operation in many locations. Each of the three LAN ports is pre-configured to allow operation with a DHCP workstation connected to LAN 1 and an uplink DHCP server connected to LAN2.

LAN1 is initially configured for 192.168.0.1 Subnet=255.255.255.0 . It is configured as a DHCP server, serving addresses in the range from 192.168.0.101 through 192.168.0.199 . Simply connect a computer configured with DHCP to this port through a hub, switch, or cross-over cable, and it will be able to communicate with the web setup screens by addressing the web browser to 192.168.0.1 .

LAN2 and LAN3 are configured as DHCP clients. These ports may be connected to an uplink router or DSL/CABLE modem and will acquire valid addresses and routing information from the uplink DHCP server.

If the above scheme doesn't fit your network, configure the ET-6601's IP address using the serial configuration method described below.

The COM port on the ET-6601 may be used to reset the configuration to default and to set the IP addresses for all three LAN interfaces. To do so, you will need a terminal or a terminal emulation program, such as HyperTerm, running on a PC. Connect the terminal to the ET-6601's COM port using a null modem cable. A DE-9 to DE-9 null modem cable was provided with the unit. Configure the terminal for 9600 baud, 8 data bits, 1 stop bit, no parity, and no flow control.

To enter serial setup mode, power up the ET-6601 and listen for the beeps. Approximately 5 seconds after power up, you will hear a single beep. At this point, do nothing. Approximately 15 seconds later, you will hear two beeps. At this point, press the <esc> key. If all goes well, you will immediately hear three beeps and about 1 second later you should see a login prompt on your terminal screen. If instead, you hear a single beep, you have missed the setup window and will have to try again. If you fail to enter setup, verify your serial cable connection and your terminal configuration.

At the login prompt, enter the word “*setup*”. Follow the prompts to reset the configuration and to setup the LAN interfaces.

NOTE: The IP-6601 serial configuration differs from the example shown in Chapter 2. Follow the on-screen prompts to complete serial configuration.



Model IP-6601 meets RoHS Telecom Product exemption specifications.

IP-6620/6604 Specific – Two High Performance Ethernet Ports

The IP family consists of various models with different internal hardware or firmware options. The IP-6620/6604 includes two 10/100/1000BaseT High Performance Ethernet ports.

Introduction

The IP-6620 model bridge contains two gigabit Ethernet ports and is normally used in applications that require higher performance than the other IP models. The configuration is similar to the other IP models with the following changes.

The IP-6604 differs from the IP-6620 only in the internal processor and memory. Other than performance, it is identical to the IP-6620

Configuration Differences

This model contains a single serial interface to be used in initial setup (if needed). If the default IP address is not appropriate for your LAN, then press the setup switch to the left of the LEDs and follow the command line setup instructions. Once a compatible IP address is available, the browser setup screens are much easier to use.



IP-6620

IP-6620 Front Panel

The front panel contains LED indicators and two 10/100/1000BaseT auto-switching Ethernet ports.

IP-6620 Front Panel LED Indicators

The front panel contains LEDs for Status and Power, over-temperature alarm, and drive activity. There is also a LAN activity LED, and two status LEDs for each Ethernet port.



Models IP-6620 and IP-6640 meet RoHS Telecom Product exemption specifications.

Chapter 2

Installation

This Chapter details the LAN installation process for the EtherSeries Router.

Overview

The router is configured using a web browser directed to its IP address. If the default address of 192.168.0.1 is appropriate for your network, then plug it in and simply direct your web browser to the router and continue with configuration. If this address is not appropriate for your network, the router's IP address must be configured using the initial terminal method below.

Quick Start

Quick start instructions are below. Installation is an easy process, but you must have a thorough understanding of IP networking, subnetting, and routing. You should have a network diagram illustrating IP addresses, subnetting, and all IP routing that you intend to use prior to installing the router.

Installation and Quick Start

1. Configure the Router's IP address

This requires several steps. **If the router's default address (192.168.0.1) is appropriate for your network, skip to "Step 2, Connect the Ethernet".**

1. Place configuration switch 2 in the UP position with all other switches DOWN. Or, if there is a single "setup" button, press the Setup button once.
2. Attach a terminal device to serial port A. The terminal should be configured for 9600 bps, 8 data bits, 1 stop bit, and no parity. Parts required for this connection are provided with the router. Use the "REMOTE PC" adapter on one end of the provided cable and the "PC-DIRECT" adapter on the other end of that cable. Connect the cable between serial port A and your PC's COM: port. Either end may be used to connect to the PC.
3. Power up the router. After about 5 seconds, a login screen will appear on the terminal screen.

```
Welcome to the IP-9600.  
  
To start the Serial Setup Program, login with the name:  
setup  
  
Localhost login: setup
```

Login Screen

4. The Router will boot up pausing at a login screen. For initial setup, enter the login name "setup" in lower case letters. No password is required.

5. You will then be asked if you wish to set ALL parameters to factory defaults. If you have previously changed any values and want to return to the factory defaults, answer “Y”; otherwise answer “N”.

```
---- Welcome to the IP-9600 Serial Setup Program ----
This setup program is intended to get the IP-9600 into a
known state so that you can configure it via a Web Browser.
It will allow you to enable Ethernet-A and set the IP address
and subnet mask. It will also allow you to clear any critical
parameters that may be blocking access to the Web Server.

Set ALL parameters to default (y/[n])? y
```

Default Screen

6. You are then asked if you wish to use the router as a DHCP client. If you want the router to pick up a DHCP address from a local DHCP server connected to ethernet A, answer “y”, otherwise answer “n”.

```
Should Ethernet-A use DHCP to get an IP address (y/[n])? n
```

DHCP Screen

7. If you answered no to that question, you will be prompted to enter the unit’s IP address and subnet mask. Enter the values for the Ethernet A interface (for example 11.22.33.44).

8. The router will now compress these values and save the configuration to flash memory. Do not cycle power during this time or the unit may be rendered inoperable.

9. Return switch 2 to the down position. The Final Screen shows the URL to use when configuring the router.

```
Saving Configuration. Do not cycle power...
Erasing flash sector 0x10fc0000
Storing file [config.tar.gz], size 2294 bytes
Store complete
Setup complete.
After rebooting the system, you will be able to configure
the unit from a Web Browser. Use the URL
http://11.22.33.44
Return Switch 2 to the off (down) position
press <enter> to reboot system...
```

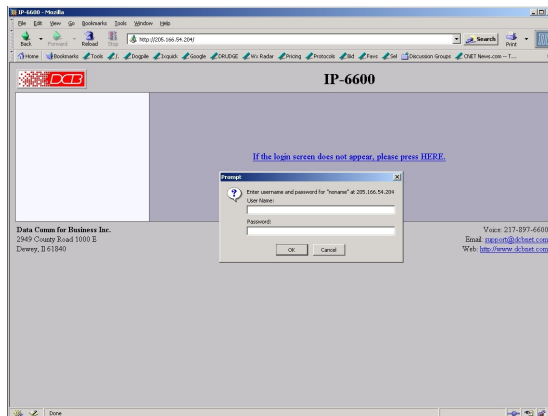
The router will now reboot.

2. Connect the Ethernet Cable

Connect a 10BaseT or 100Base T LAN cable to Ethernet Port A (or 1000BaseT if it 100BaseT is supported on your model). Reboot the router with a power cycle or the reset switch. The router will now be available to any web browser on the same LAN segment. If your web browser does not see the router, verify that you do not have a proxy server configured in the browser. If so, properly configure the browser to bypass the proxy server for this URL.

3. Verify the IP Address Configuration

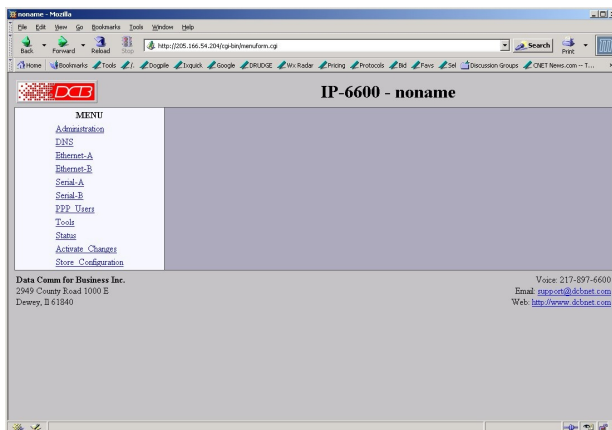
Enter the URL from step 1.7 (or <http://192.168.0.1>) into your web browser. The login screen below should be displayed.



Login Screen

Log in using the user name “admin” and no password (blank field). If this screen doesn't display, check the Troubleshooting Section in Chapter 6.

4. Enter Your Configuration



Initial Main Menu

From this index screen, you can select a section on the left and will be taken to configuration screens for each router subsystem.

5. Minimum Configuration

The minimum configuration items required for basic LAN-to-LAN routing via an asynchronous serial link are:

1. IP address for one ethernet port (usually ethernet A).
2. Serial port configuration.
3. PPP or Frame Relay configuration.
4. Routing (at least a default route).

Configure these items and the router is ready for use. Of course, you need to perform a similar installation for the companion router on the other LAN so it can do useful work.

Help Screens and Field Edits

The field names on all configuration screens are hyperlinks to context sensitive help screens. Simply click on the field name to bring up a second window with the help information. Close that window to return to your entry screen.

Entries are always tested for valid values. However, there are many “valid” values that are not appropriate for any given configuration. So, “appropriateness” isn’t tested. For example, an IP address of 300.400.500.256 will not be accepted, but the field will accept an IP address that is not appropriate for *your* installation.

Chapter 3

The Configuration Process

This Chapter describes configuration management process on the EtherSeries router using a Web Browser.

Overview

The router contains a quite flexible configuration management system. By using this system correctly, one may remotely configure the router, save copies of that configuration to a PC, make configuration changes for later activation, and remotely transfer firmware upgrades to the router.

There may be up to three configuration “images” in use at any time.

1. The **active** configuration. Normally, this is the configuration that was loaded from memory when the router was last booted. However it may have been changed since boot time as described below. This is the configuration that is currently running the router.
2. The **pending** configuration: This is the current configuration that was loaded from memory when the router was last booted WITH any changes made by using the configuration screens. This configuration is NOT the configuration running the router at present.
3. The **stored** configuration. This is the configuration that was last written to the router's non-volatile RAM. The next time the router boots, it will start running this configuration.

Note that any configuration transfer (with the Administration Configuration Transfer screen) is the *working* configuration. You can load a configuration file from the PC, then either activate it to test it, or save it without activation if you don't want to change the currently running configuration.

Using the Configuration Flexibility

When the router starts from a power-off condition, it loads an active configuration from its non-volatile memory. This active configuration is also copied to the active configuration currently running the router.

Whenever the configuration screens are used to change values, only the *pending* configuration is changed... not the *active* configuration.

Using the configuration screens will change the pending configuration. You may change the active configuration by copying the pending configuration over it. This change is performed using the “Activate Configuration” screen. Going to this screen activates the pending configuration by copying the pending configuration over the top of the active configuration. This does not store the configuration in non-volatile memory. When the router is next reset or powered up, it will begin using the old stored configuration from before the changes and activate command unless the configuration was stored using the “Store Configuration” screen.

Using the store configuration screen will copy the pending configuration into Non-volatile memory. It will not cause this configuration to begin running the router. However, upon the next reset or power cycle, the router will begin using the stored configuration.

It is possible to activate the pending configuration using the Activate Configuration screen and then store the configuration using the Store Configuration screen. This two step process will cause all three configurations to be identical.

Configuration Process Examples

Make configuration changes, test them with Activate, then save them with Save.

This is the most commonly used method for changing the router configuration. It allows you to test the configuration prior to saving it. If, during the testing, you notice an abnormality, you can reset the router to return to the last good configuration.

Make configuration changes, save them, reset the router to activate the changes.

This method allows one to configure the router via a router link that will not work using the new configuration. Make the changes to the pending configuration and save them. Your current session will not be affected, but when the router is reset, it will begin using the new configuration. This method is useful when you are configuring a router to use a new LAN address range while it is on the old LAN. It's also used when a dial-up PPP connection is the management path, and the new configuration will not allow that PPP connection.

Transfer a saved configuration to the router, save it, reset the router to activate the changes.

It is useful to transfer an existing router configuration to a PC text file for future use. Then if the router must be replaced, simply transfer that stored configuration to the new router.

If the PC is in the default IP address range of the new router (192.168.0.x subnet), then a new, out-of-the-box router is easily configured using this method. Start the router, transfer a stored configuration file, and store it. When the router is restarted, it will have the proper configuration.

Notes regarding saved configurations

The saved configuration file is a simply formatted raw text file. Advanced users may wish to edit this file using an appropriate text editor, then transfer the changed configuration to a router.

Use care when performing configuration with this technique as the text configuration file must be in the proper format.

This method is ideal for automating the configuration of many routers in a large corporate environment.

Chapter 4

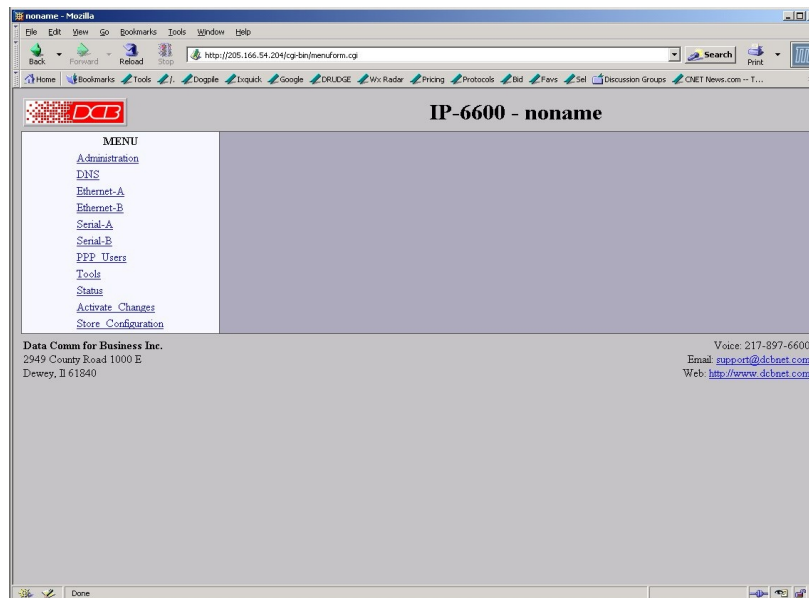
Configuration

This Chapter describes configuration screens and some configuration hints for the EtherSeries router Router

Overview

The EtherSeries router is configured using forms displayed on a web browser. In this chapter, we illustrate all entry forms, and describe their use. This is not a tutorial on IP routing. Familiarity with IP routing is required before you can configure any router.

All configuration screens are accessed from the main index screen shown below. They are divided into sections with only one layer of screens below the top level.

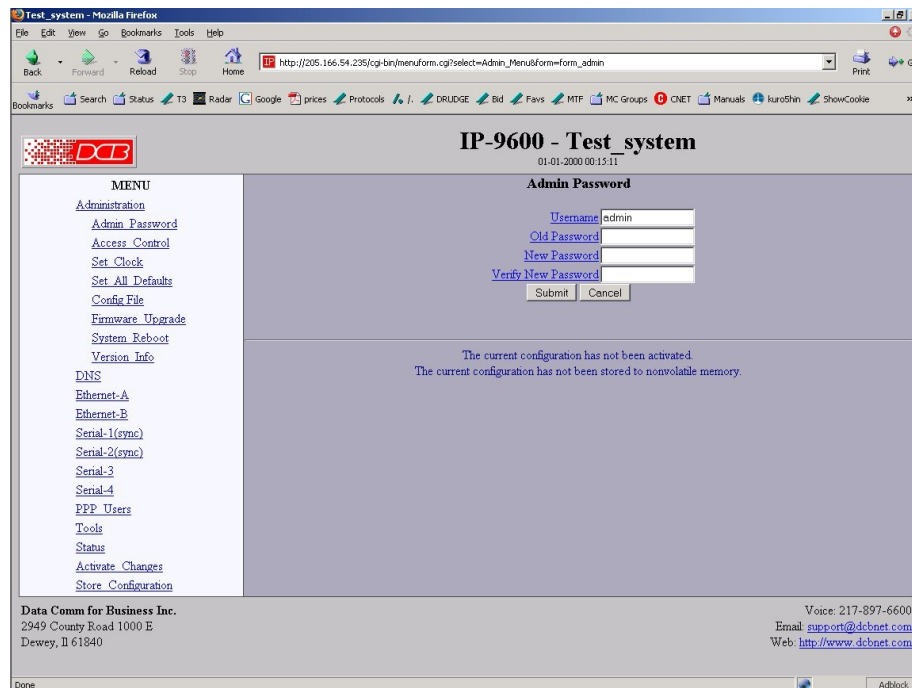


From this index, click on a menu keyword to open the appropriate screen. In this manual, screens are discussed in the order shown on the index screen. Some models of the router will not contain all the screens illustrated. For example, a router that doesn't contain serial ports will not display the serial port configuration screens.

Administration

The Administration section contains eight screens used to configure system-wide settings and perform a few high level operations.

Admin Password



Admin Password Screen

Access to the IP-9600's Web Server is protected by HTTP Basic Authentication. This is a simple methodology where the Web Server will require a Web Browser to provide a username and password for each page requested. The Web Browser will typically ask the user to enter the username and password once, then will remember it for the duration that the Web Browser is running.

The Administration screen allows you to change the user name and password for the router administrator. This is the only user allowed to configure the router. If you forget the administrator name or password, the router can only be configured by returning it to factory defaults as described in the quick start chapter.

Fields

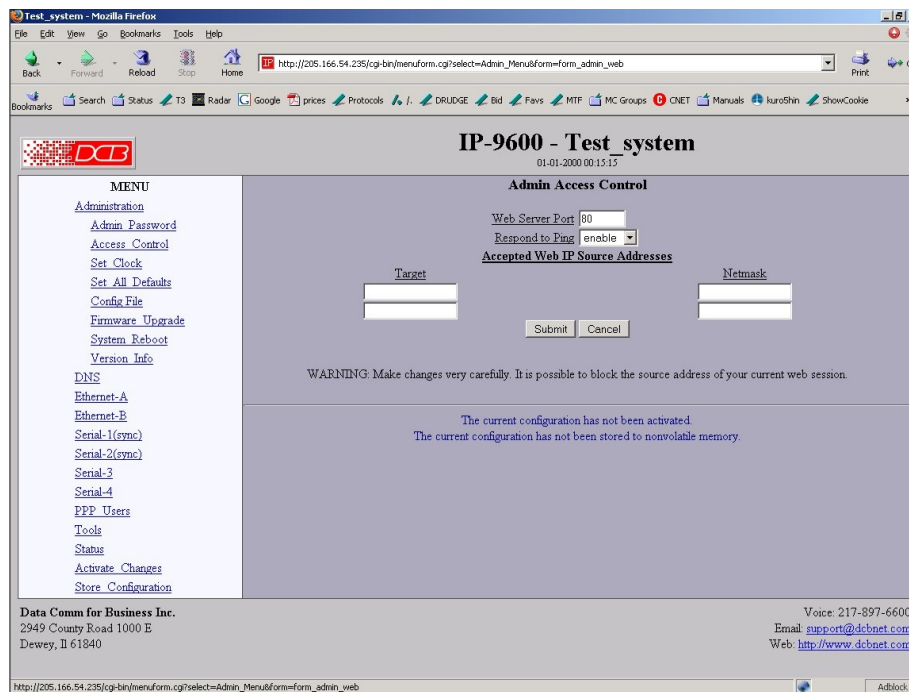
- **User Name**
This field may be a string of 0 to 15 printable characters. Do not use space or control characters. If you leave this field blank, you will need to enter a blank username during authentication.
- **Old Password**
In order to change the username and password, you must know the old password. When making a change, enter the current password in this field.
- **New Password**
When changing the username and password, this field provides the new password. It may be a string of

0 to 15 characters. If you leave this field blank, you will need to enter a blank password during authentication.

Notes

- If you forget your username or password, you can use the Serial Port Setup to erase the current settings.
- Security Note: HTTP Basic Authentication may be easily hacked if the attacker has the ability to sniff network packets. The username is transmitted in the clear and the password is transmitted in an obfuscated but easily reversed format.

Admin Access Control



Administrative Access Control Screen

Access Control allows you to place further restrictions on access to the router's internal web server.

Fields

- **Web Server Port**
This is the TCP Port to use for the IP-9600's internal Web Server. Typically it is set to port 80. However you may set it to any value between 1 and 65535.

There are several reasons that you may want to change the web server port. First, by changing it to a non-standard value, you reduce the chance that a random attacker will find the router's web interface and attempt to break in. Second, if you are using the Port Forwarding or Virtual Server feature of the router to forward web packets to another host, you will have to change the web server port number in order to maintain access to the router.

If you change the web server port number to any value other than 80, remember that you will have to include the port number in your URL. For example, <http://192.168.0.1:7995>

- **Respond to Ping**
This item allows you to block ping requests to the router. Ping is a valuable tool for diagnosing network problems, but can also become a security problem. Disabling ping causes the router to not respond to ping requests for one of its IP addresses. It has no effect on the router's routing of ping request and responses.
- **Accepted Web IP Source Address**
This table allows you to control what hosts or networks have access to the router's web server. If empty, any host may access the router.

Entries are made by specifying a Target and Netmask. For example, if you want to allow only the host 192.168.10.16 access, you would enter:

Target: 192.168.10.16 Netmask:255.255.255.255.

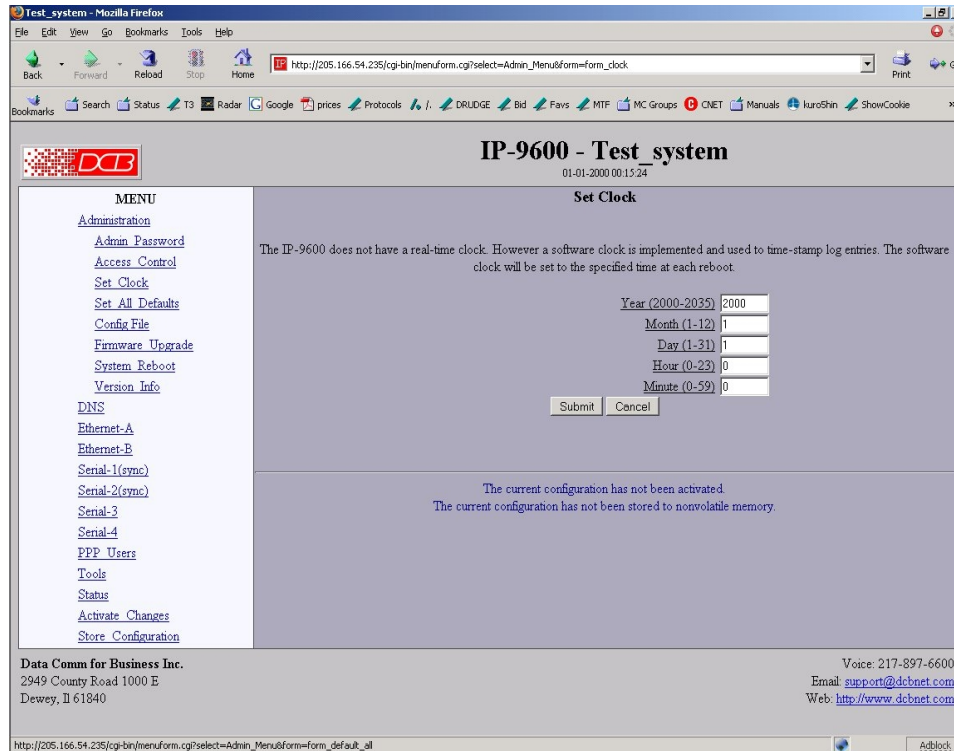
If you wanted to allow access to all hosts in the range 192.168.10.1 to 192.168.10.255, you would enter:

Target: 192.168.10.0 Netmask: 255.255.255.0

- **Target**
Host or Network address.
- **Netmask**
If blank or set to 255.255.255.255, target is assumed to be a host address. Otherwise, target is treated as a network address.

Notes

Set Clock



Set Clock Screen

This form allows you to set the router's software clock. The setting will take effect when you "Activate Changes".

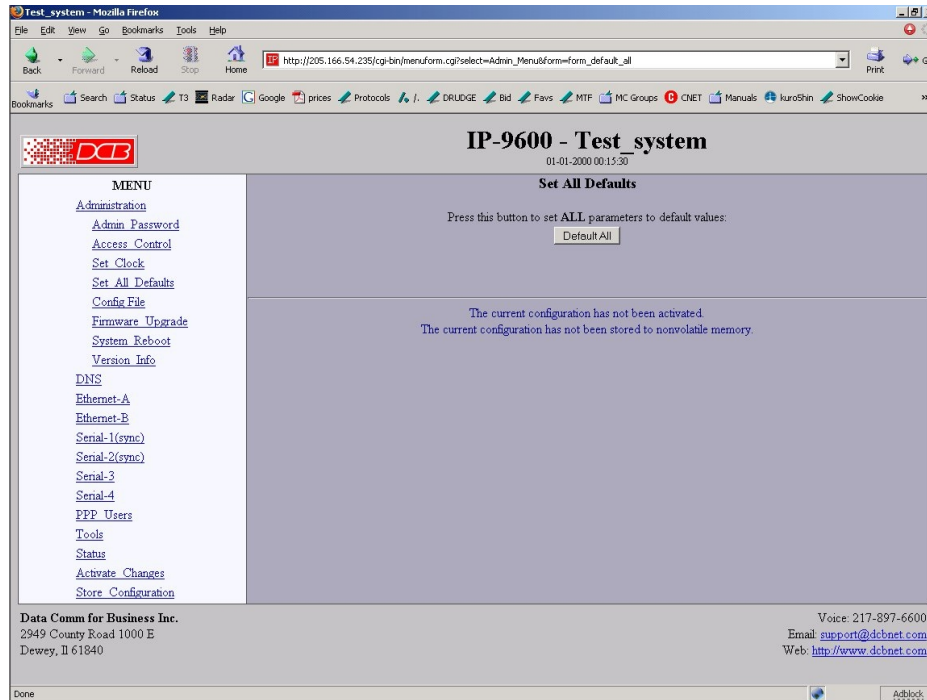
Fields

- | | |
|-----------|--|
| 1. Year | Year in the range 2000 to 2035. |
| 2. Month | Numeric value of month in the range 1 to 12. |
| 3. Day | Day of month in the range 1 to 31. |
| 4. Hour | Hour of the day in the range 0 to 23. |
| 5. Minute | Minutes in the range 0 to 59. |

Notes

- If you save the time to non-volatile memory, the clock will be set to the specified time at each reboot.
- The router does may not contain a real-time hardware clock, nor have the ability to remember the current time across reboots. The software clock is used for time stamping log entries.
- The default values shown on this screen are the “boot” values... not the current time.

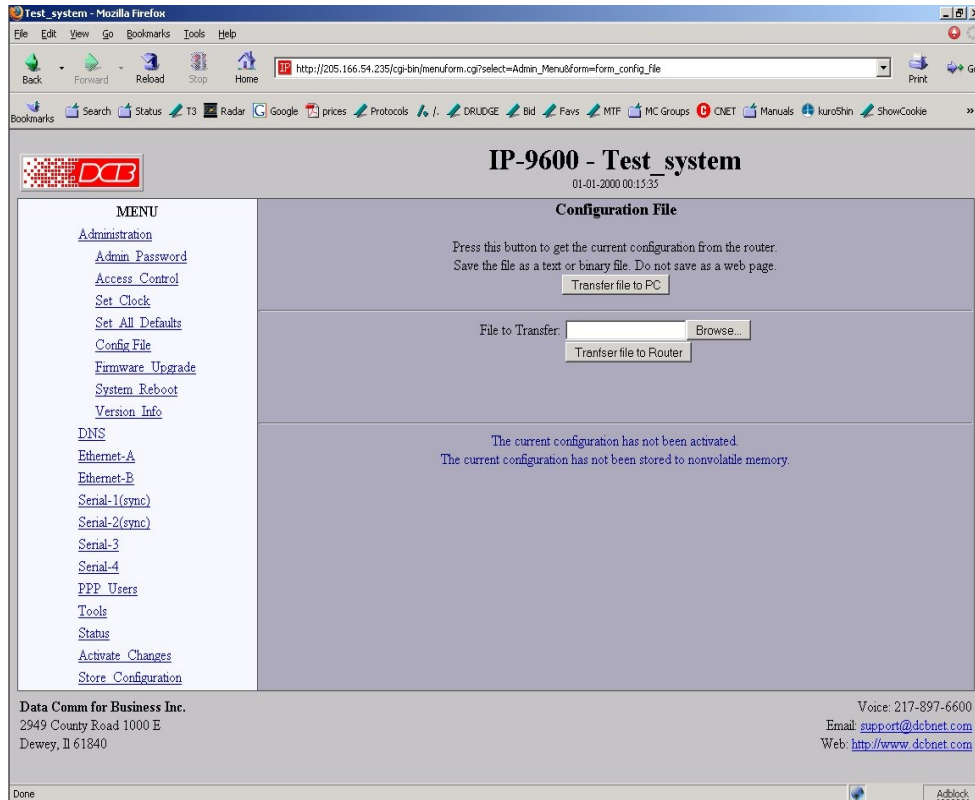
Set All Defaults



Set All Defaults Screen

This form will allow you to set all router parameters to their default value. Before you "Activate Changes", you should configure the interface that you are using to access the router. Otherwise, all interfaces except Ethernet-A will be disabled and Ethernet-A will be configured with the IP address of 192.168.0.1.

Configuration File



Configuration File Screen

This form will allow you to copy the router's configuration to a file on your PC. You can also use the form to transfer a configuration file from your PC to the router.

Fields

- File to Transfer
This is the name of the configuration file on your PC to be transferred to or from the router.
- Transfer file to PC (action)
Transfers the current router configuration file to this PC.
- Transfer file to Router (action)
Transfers the named file to the router.

Notes

- The configuration file is a specially formatted text file. It may be edited with any text editor.
- You may save multiple configuration files on the PC by using different names for them.
- After transferring a configuration file to the router, you may either activate the changes (with the activate screen), or store the changes (with the store configuration screen). If you activate the changes, the router will immediately begin using the new configuration. If the changes are stored, the router will use the new configuration only after a reboot or reset.

- Be sure that you can access the router using its new configuration if you activate the new configuration. Otherwise, it may be necessary to return to the old stored configuration with a reset.

Firmware Upgrade



Firmware Upgrade Screen

This form will allow you to load new firmware into the router. The firmware will be saved to non-volatile memory, replacing the current firmware.

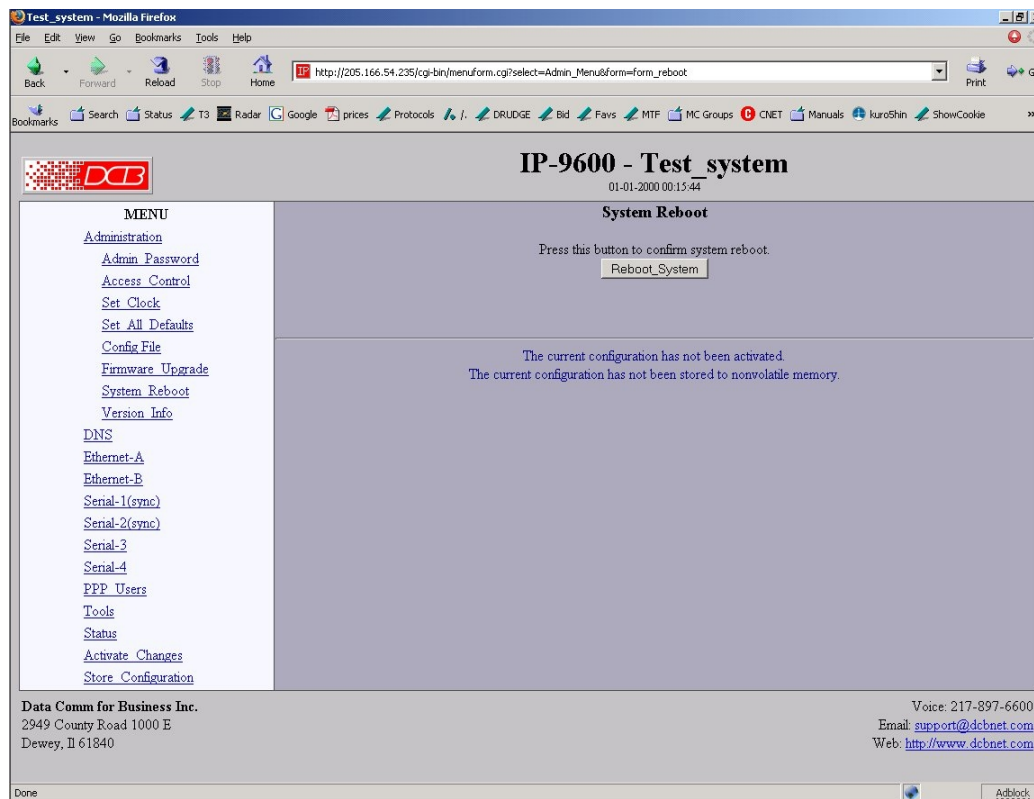
Fields

- File Name
This is the name of the firmware image file to be transferred to the router.
- Upgrade Firmware (action)
Pressing this button transfers the firmware image to the router and upgrades it.

Notes

You should only use a firmware image obtained from DCB.

System Reboot



System Reboot Screen

This form will allow you to reboot the router. If you have configuration changes that have not been saved to non-volatile memory, they will be lost.

This is a way to revert back to your previously stored configuration.

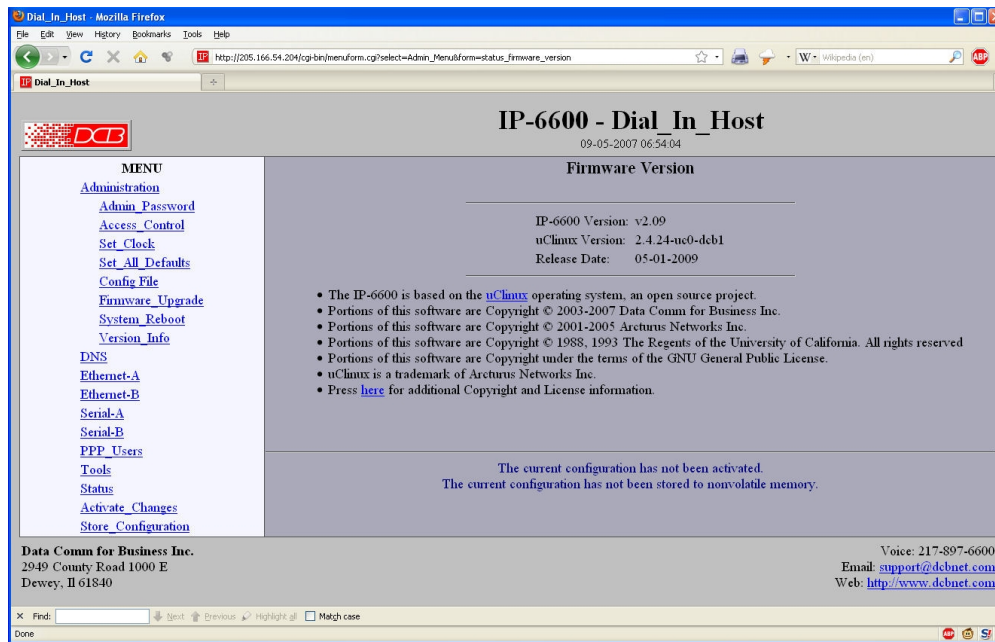
Fields

- Reboot System (action)
This causes the router to reboot and use its stored configuration.

Notes

- The current configuration is not retained unless it has been previously stored.

Version Information Screen



Version Information Screen

This screen displays current firmware and hardware version information as well as some copyright notices.

DNS

DNS Screen

The Domain Name System, DNS, is a distributed database used by applications to map between IP addresses and hostnames. The router has support for the client side of DNS. It does not act as a true DNS server, but will proxy DNS requests. The DNS settings are passed to remote PPP users and DHCP clients. Use of DNS is optional.

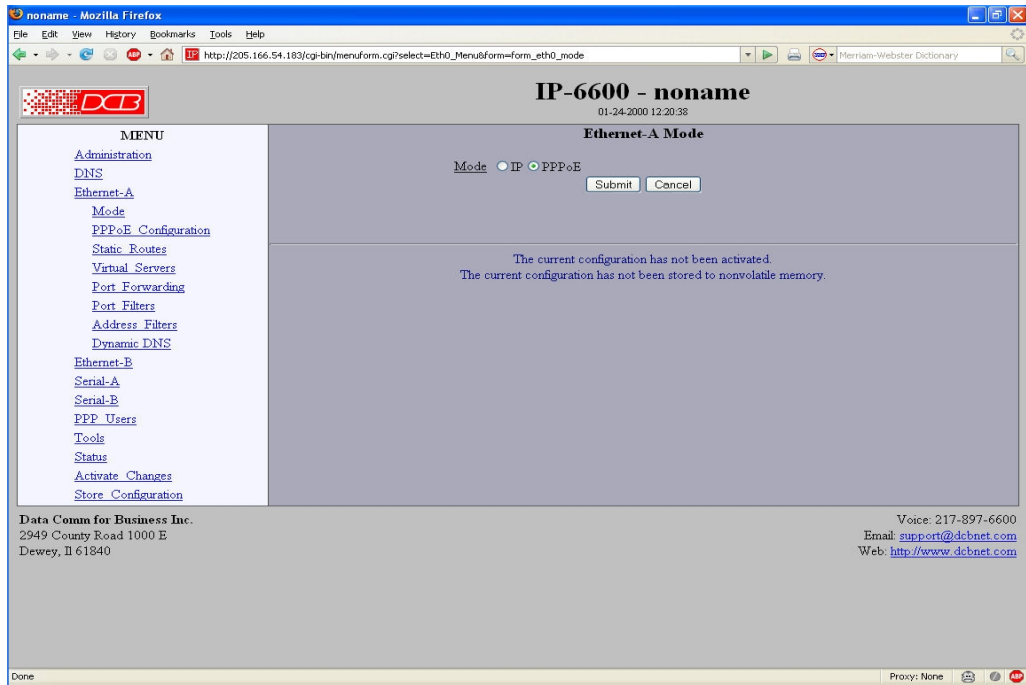
Fields

- **Host Name**
The name given to the router. If you enter a name, it will be displayed on the title of the web pages.
- **Domain**
The name of the local domain. For example: widgets.com
- **Primary DNS Server**
The IP address of the primary DNS server. This value will be provided to DHCP clients and to remote PPP users during option negotiation.
- **Secondary DNS Server**
The IP address of the secondary DNS server. This value will be provided to DHCP clients and to remote PPP users during negotiation.

Notes

- The router does not act as a DNS server.
- The DNS settings are passed to remote PPP users and DHCP clients.
- Use of DNS is optional.

Ethernet Mode



Ethernet Mode Screen

This option sets the operating mode of the interface, either *IP* or *PPPoE*.

Fields

- Mode Sets the ethernet port mode to standard IP or PPPoE.

Notes

PPPoE Configuration

The screenshot shows a web browser window titled "noname - Mozilla Firefox" displaying the "IP-6600 - noname" configuration page. The page is dated "01-24-2000 12:20:17". The main content area is titled "Ethernet-A PPPoE Configuration" and contains the following fields and options:

- Ethernet-A**: disable enable
- IP Sharing**: disable enable
- User Name**: [Text input field]
- Password**: [Text input field]
- Service Name**: [Text input field]
- Access Concentrator**: [Text input field]
- Frame Type**: [Text input field]
- Local IP**: [Text input field]
- Remote IP**: [Text input field]
- Idle Disconnect Time**: [Text input field]
- Max Connect Time**: [Text input field]
- DNS Addresses**: none request
- Max Transmit Unit**: 1492
- Echo Test Link**: disable enable
- Logging**: basic detailed

At the bottom of the configuration area, there are "Submit" and "Cancel" buttons. Below the configuration area, a message states: "The current configuration has not been activated. The current configuration has not been stored to nonvolatile memory."

The footer of the page includes contact information for Data Comm for Business Inc. (2949 County Road 1000 E, Dewey, IL 61840) and support@dcbnet.com, along with a voice number (217-897-6600) and a website URL (http://www.dcbnet.com).

PPPoE Configuration Screen

This screen is used to configure PPPoE (Point to Point Protocol Over Ethernet). Field values are determined by your ISP, and the ISP should be consulted before beginning configuration.

Fields

- **User Name** This is the user-name to use when authenticating to a PPPoE Server. In other words, this is the user-name sent to the remote server. The user-name may be a string of 1 to 39 printable characters. No space or control characters.
- **Password** This is the password to use when authenticating to a PPPoE Server. In other words, this is the password sent to the remote server. The password may be a string of 1 to 39 printable characters. No space or control characters.
- **Service Name** This is an optional field that specifies the desired service name. If set, PPPoE will only initiate sessions with access concentrators which can provide the specified service. Only set this field if instructed to by your ISP.
- **Access Concentrator** This is an optional field that specifies the name of the desired access concentrator. If set, PPPoE will only initiate sessions with the named access concentrator. Only set this field if instructed to by your ISP.
- **Field Type** This is an optional field that sets the Ethernet frame type for PPPoE discovery and session frames. This field is only used if your ISP uses non-standard PPPoE frame types. The frame types are specified as hexadecimal numbers separated by a colon. For example: 8863:8864. Only set this field if instructed to by your ISP.
- **Local IP** Each side of a PPP connection will have an IP address. This is the IP address to use for the local PPP device. With PPPoE, you will normally leave this field blank. The PPPoE server will automatically assign an IP address upon connection.

If you leave this field blank when connecting on-demand, the router will temporarily assign a local address to the interface. When the actual PPP connection is brought up, the router will request a new address from the peer.

- **Remote IP** Each side of a PPP connection will have an IP address. This is the IP address to assign to the remote PPP device. With PPPoE, you will normally leave this field blank. The PPPoE server will report the IP address upon connection.
- **Idle Disconnect Time** Setting an *Idle Disconnect Time* will enable connecting on-demand. The PPPoE connection will come up where there is IP traffic to route out the PPP link and will terminate when the link is idle for the specified amount of time (in minutes).

This feature is typically used when your ISP charges for service based on connect time. Do not use this feature if you running servers behind your router as there is no way to bring up the link based on in-bound traffic.

- **Max Connect Time** Setting *Max Connect Time* will cause the PPPoE connection to terminate when the time limit has been reached, regardless of activity. The time is set in minutes.

This feature is normally not needed and only used as a workaround for various ISP problems. D

- **NS Addresses** When set to *request*, the local router will request DNS addresses from the PPPoE Server during PPP option negotiation. When set to *none*, the local router not request DNS addresses, and will use the static DNS configuration.
- **MTU** This selects the maximum transmit unit and maximum receive unit for the PPPoE interface. Outgoing network packets will be limited to the specified size. The peer will be asked to limit its MTU to this size. The peer may negotiate a smaller size. The value may be between 128 to 1500. For PPPoE, the recommended setting is 1492.
- **Echo Test Link** When enabled, an LCP level echo request will be sent periodically (30 seconds) to the PPPoE Server. If the server fails to respond to 4 consecutive requests (2 minutes), the link will be taken down and reestablished.
- **Logging** This selects the level of information placed in the PPP log file.

Notes

-

RIPv2 Configuration

noname - Mozilla Firefox
http://205.166.54.183/cgi-bin/menuform.cgi?select=Tools_Menu&form=form_rip

IP-6600 - noname
01-24-2000 12:21:51

RIPv2

RIP disable enable
Authentication none simple
Password
Default GW disable enable

The current configuration has not been activated.
The current configuration has not been stored to nonvolatile memory.

MENU
[Administration](#)
[DNS](#)
[Ethernet-A](#)
[Ethernet-B](#)
[Serial-A](#)
[Serial-B](#)
[PPP Users](#)
Tools
[Ping](#)
[Traceroute](#)
[Packet Sniffer](#)
[Dial Tools](#)
[ISP Failover](#)
[RIPv2](#)
[Status](#)
[Activate Changes](#)
[Store Configuration](#)

Data Comm for Business Inc.
2949 County Road 1000 E
Dewey, IL 61840

Voice: 217-897-6600
Email: support@dcbnet.com
Web: <http://www.dcbnet.com>

Done Proxy: None

RIPv2 Configuration Screen

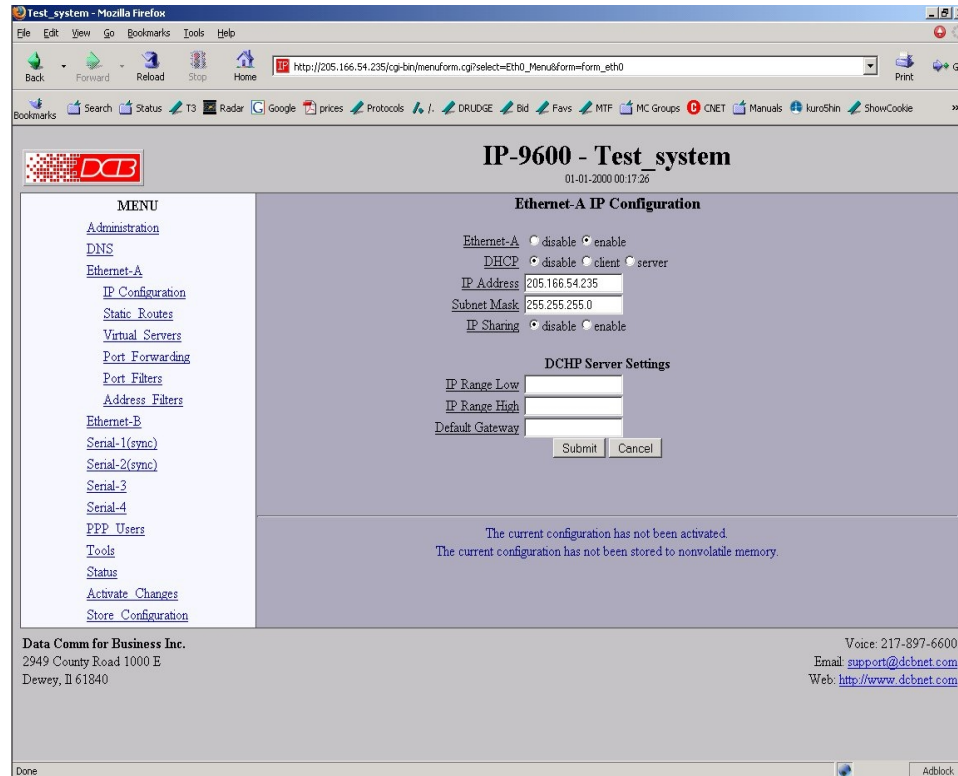
This screen is used to configure RIP values if RIPv2 is to be used.

Fields

- RIP Enable or Disable RIPv2
- Authentication may be SIMPLE or NONE
- Password used for simple authentication
- Default Gateway enabled or disabled

Notes

Ethernet A/B Configuration



Ethernet Configuration Screen

The router may contain two or more Ethernet interfaces. Each may be independently configured allowing the router to perform Ethernet to Ethernet routing in addition to Ethernet to serial routing. This screen is used to configure both IP parameters and DHCP server parameters (if the DHCP server function is used).

Fields

- **Enable/Disable**
Each interface may be individually enabled or disabled. If you do not plan to use an interface, it is a good idea to disable it. Doing so will free up system resources.
- **DHCP Fields**
Dynamic Host Configuration Protocol, DHCP, is a client/server protocol automating the configuration of systems using TCP/IP. Client systems will broadcast a request asking for configuration. Server systems will respond, assigning the client system an IP address and providing other related configuration information such as subnet mask, DNS, and gateway addresses.

The router supports both DHCP Client and Server functionality, independently on each Ethernet interface. When the router is used in an Ethernet WAN to Ethernet LAN routing application, it is common to enable DHCP client on the WAN interface and DHCP server on the LAN interface.

The router's DHCP Server is a minimal implementation, providing clients with an IP address, subnet mask, gateway, and DNS server. Leases are fixed at 1 day. Because the router does not have a disk drive, it cannot remember lease assignments across reboots. Before assigning an address, it does check the network to make sure the address is not already in use.

When DHCP Client is enabled, the IP Address and Netmask fields are ignored.

- **IP Address**
An IP address is a numeric identifier given to an interface. It consists of four 8-bit numbers and is represented in a dotted notation. An example of an IP address is "192.168.0.10". An Ethernet IP address must be unique within your network. If you are directly connected to the Internet, it must globally unique.

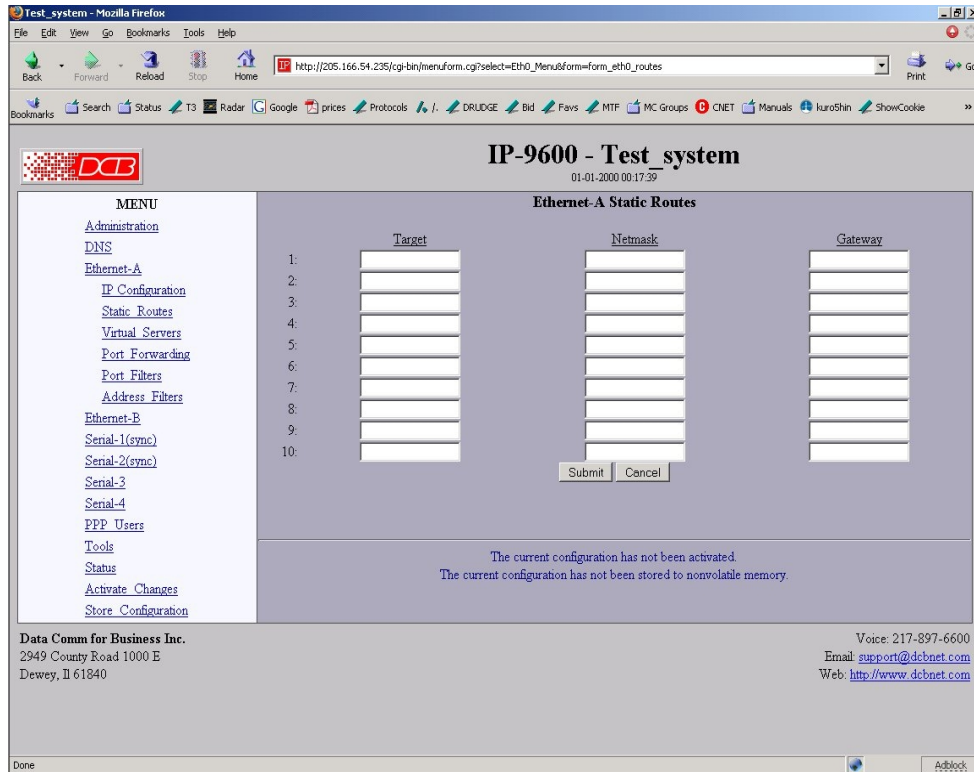
This field is not used if DHCP Client has been enabled. The DHCP server will assign the IP address.
- **Subnet Mask**
A subnet mask is a bit mask applied against the IP address. It specifies which portion of the IP address is the subnet identifier and which portion is the host identifier. For example, many subnets have a mask of 255.255.255.0. This means the first 24 bits of the address is the subnet identifier and the last 8 bits is the host identifier.

This field is not used if DHCP Client has been enabled. The subnet mask will be assigned by the DHCP server.
- **IP Sharing (Source NAT)**
IP Sharing goes by several names. It is also known as Source Network Address Translation (Source NAT) and IP Masquerading. It is a process where a router will transparently substitute the IP address in outbound packets with its own address for the purpose of sharing a single IP address over a group of machines. This is usually set on the "outside world" interface.
- **DHCP Server Settings**
If you have enabled the DHCP Server on an Ethernet Interface, you must define a range of addresses for it to administer. You should also specify the address of a default gateway.
- **IP Range Low**
See IP Range High description below.
- **IP Range High**
IP Range Low and IP Range High define an inclusive range of IP addresses to administer. The router will dynamically assign these addresses to DHCP clients as requests are received. These addresses must be valid for the interface's subnet. For example, if the interface has an IP address of 192.168.0.1 and a netmask of 255.255.255.0, then the range of IP addresses must be on the 192.168.0 subnet.
- **Default Gateway**
This is the default gateway address to be given to the DHCP client. Typically, it would be the IP address of this router. However, if you have multiple routers on your subnet, you may wish to specify a different router.

Notes

- If DHCP client mode is used, the IP address fields are ignored.
- If DHCP server mode is not used, the DHCP server settings are ignored.
- IP Sharing is normally configured ONLY on a gateway interface (the interface to the world).

Static Routes Screen



Static Routes Screen

The router maintains multiple tables of Static Routes. There is one for each possible interface, namely Ethernet-A, Ethernet-B, Serial-1 through Serial-4. The routes defined in the associated table are applied when an interface comes up and are removed when an interface goes down. It is important that routes be placed in the correct table. **The rule-of-thumb is to apply a route to the interface that the routed packet should go out.** For example, if you want your default route to go out the PPP link on Serial-A, you would add the default routing entry to Serial-A's static routing table. If you want packets to address 192.168.10.54 to go out Ethernet-A, you would add a routing entry to Ethernet-A's table.

The router will automatically create a route for each interface. For Ethernet, this will be a network entry based on the IP address and netmask of the interface. For PPP links, this will be a host entry for the IP address of the remote PPP device. You can view that Active Routing Table from the Status Menu/Routing Table.

Fields

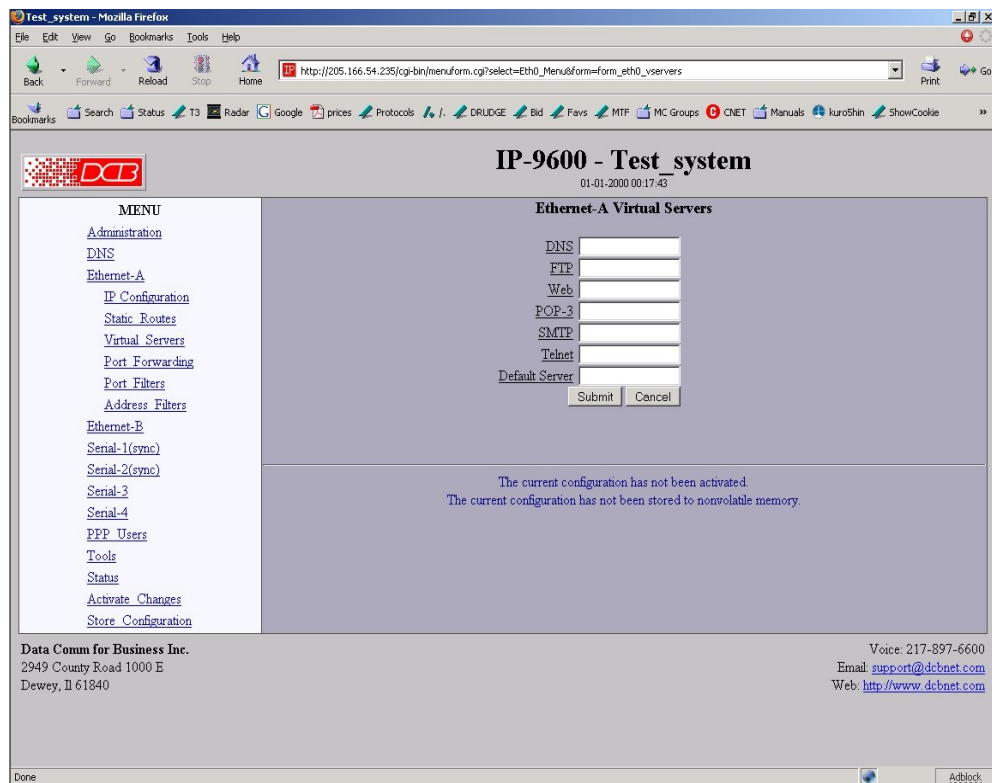
- Target
Destination Host or Network address. Use a target address of 0.0.0.0 to specify a default route.
- Netmask
If left blank or set to 255.255.255.255, the target is assumed to be a host address. Otherwise, the target is assumed to be a network address and the netmask specifies which address bits are significant.

- Gateway
The IP address of where to forward packets to. The Gateway field is only available for Ethernet interfaces. If you leave it blank, the router will assume the target is on the local network segment.

Notes

- Use a netmask of 0.0.0.0 to specify a default route.
- PPP links do not need a gateway address, as the remote PPP device is the only possible gateway.

Virtual Servers Screen



Virtual Servers Screen

Virtual Servers is a simplified version of Port Forwarding. Both are also referred to as Destination Network Address Translation (Destination NAT). It is a process where incoming server requests are redirected to the specified IP address regardless of the destination IP address. It is commonly used when you have IP sharing enabled to allow servers on your internal network to appear on the external network.

You may configure Virtual Servers individually for each Ethernet and Serial interface. It will apply only to packets being received on the associated interface.

Fields

- **DNS**
The IP address of where to direct DNS (UDP port 53) requests to.
- **FTP**
The IP address of where to direct FTP (TCP port 20 and 21) requests to.
- **Web**
The IP address of where to direct HTTP (TCP port 80) requests to.

CAUTION: Keep in mind that this will prevent access to the router's internal web server through the associated interface. You can get around this situation if you change the **router's** web server port number to a value other than 80. Alternately you can create a Port Forwarding entry to redirect an unused port number to the router's port 80.

- POP-3
The IP address of where to direct POP-3 (TCP port 110) requests to.
- SMTP
The IP address of where to direct SMTP (TCP port 25) requests to.
- Telnet
The IP address of where to direct Telnet (TCP port 23) requests to.
- Default Server
The IP address of where to direct any TCP or UDP requests, not redirected by any other Virtual Server or Port forwarding entries to. This host becomes the "catch all" for all other requests.

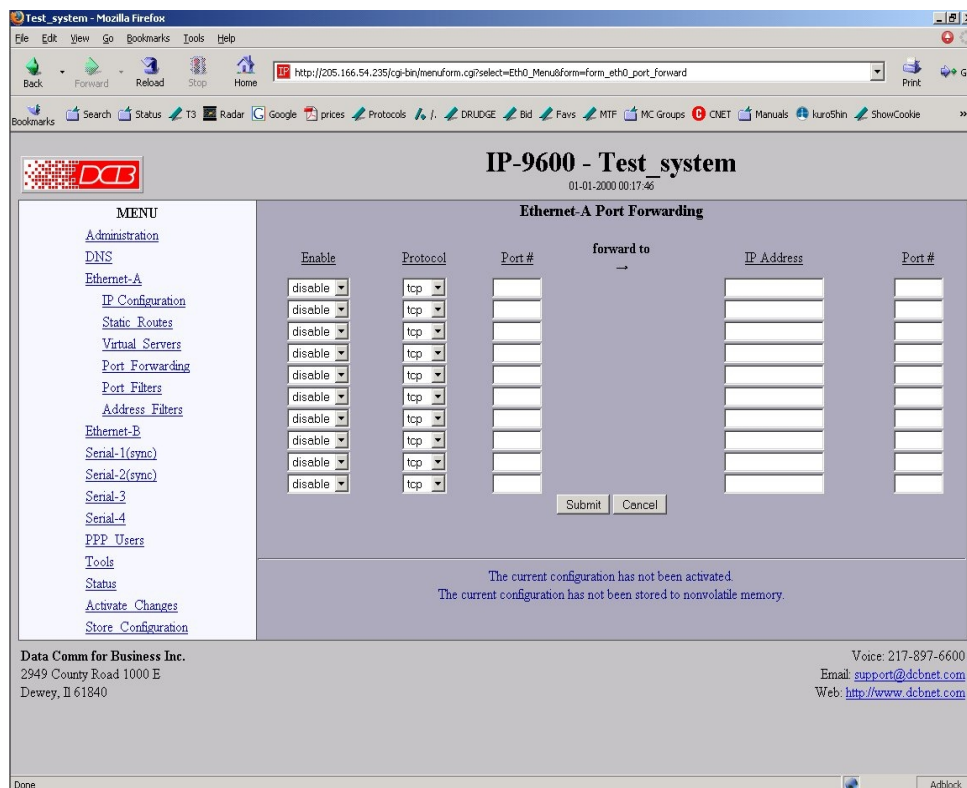
Notes

CAUTION: Keep in mind that this will prevent access to the router's internal web server through the associated interface. You can get around this situation if you set the Virtual Web Server to the router's address, or if you create a Port Forwarding entry for the router's web server.

CAUTION: You may prevent access to the router's internal web server through the associated interface with virtual servers. You can get around this situation if you set the Virtual Web Server to the router's address, or if you create a Port Forwarding entry for the router's web server.

CAUTION: If a default server is specified, ALL incoming packets will be forwarded to that server, possibly blocking other intended uses of the router.

Port Forwarding Screen



Port Forwarding Screen

Port Forwarding, also known as Destination Network Address Translation (Destination NAT), is a process where incoming server requests are redirected to an alternate server address regardless of the original destination IP address. It is commonly used when IP sharing is enabled to allow servers on your internal network to appear on the external network.

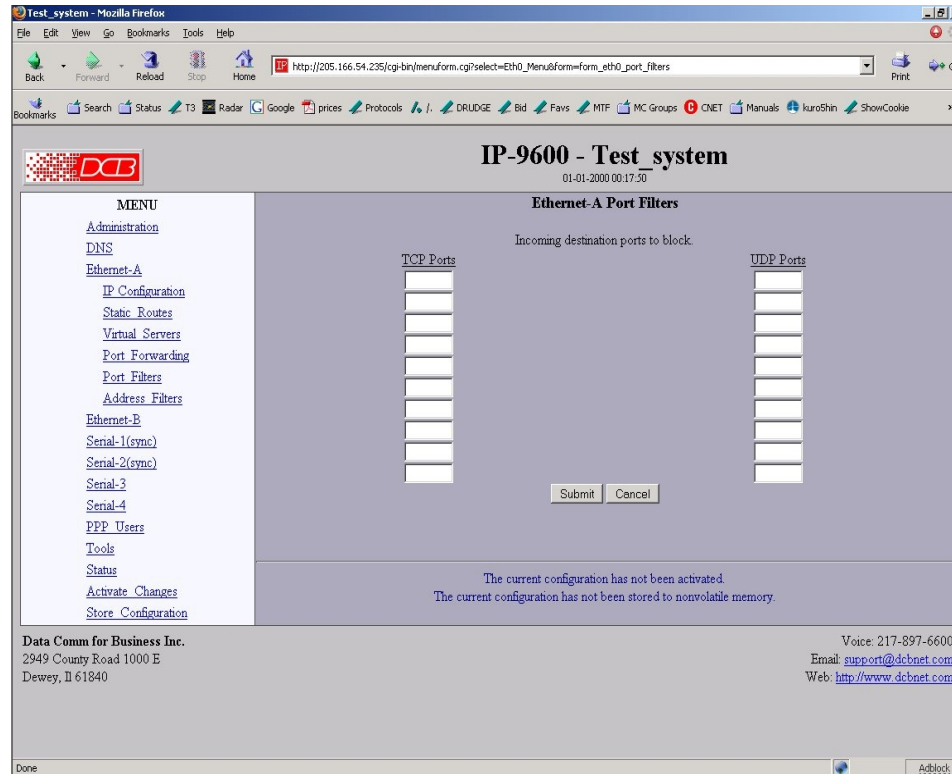
Port Forwarding is configured individually for each Ethernet and Serial interface. It will apply only to packets being **received** on the associated interface.

Fields

- **Enable**
Enable/Disable this entry in the Port Forwarding Table.
- **Protocol**
The Protocol type, TCP or UDP, of the service you wish to forward. For example, Telnet is a TCP protocol. TFTP is a UDP protocol.
- **Port #**
The Port Number, 1 - 65535, of the service you wish to forward. For example, Telnet is port number 23. TFTP is port number 69.
- **(forward to)IP Address**
The IP address to forward these server requests to.
- **(forward to)Port #**
The Port number to use when forwarding these requests. If this field is left blank, the original port number is used.
- **Submit (Action)**
Submit these changes to the router and insert them into the current configuration.
- **Cancel (Action)**
Ignore any changes made to this screen.

Notes

Port Filters Screen



Port Filters Screen

The router may be configured to block specific TCP and UDP ports. This is done separately for each interface and is performed by analyzing packets as they are **received**. Apply the filter to the port that is receiving the packets inbound.

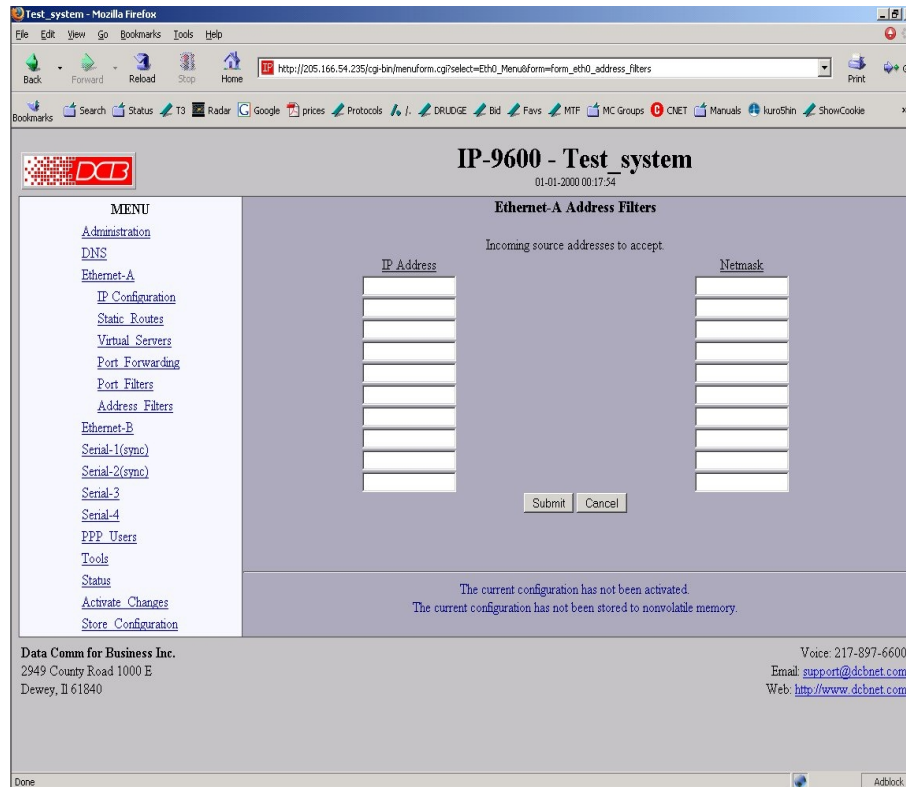
As an example, let's say Ethernet-A is the local network and Serial-B as a dial-up link to the Internet. To dis-allow Telnet connections to come in from the Internet, but be able to Telnet out to the Internet from inside the router, put an entry of TCP port 23 in Serial-B's list of port filters.

Fields

- **TCP Ports**
TCP Port Number to block, 1 - 65535. For example, if you wanted to block Telnet access you would enter a 23.
- **UDP Ports**
UDP Port Number to block, 1 - 65535. For example, if you wanted to block TFTP access you would enter a 69.

Notes

Address Filters Screen



Address Filters Screen

The router can be configured to drop all packets except those with an approved source address. This is configured separately for each interface and occurs as packets are **received** on the interface.

If all entries in the table are blank, all addresses are accepted.

Fields

- IP Address
Host or Network source IP address to allow.
- Netmask
If the Netmask is blank or 255.255.255.255, the IP address is treated as a host address. Otherwise the IP address is treated as a network address and the netmask indicates the significant bits.

Notes

Synchronous Serial Port Operating Mode Screen

The screenshot shows a web browser window titled "Test_system - Mozilla Firefox" with the URL http://205.166.54.235/cgi-bin/menuform.cgi?select=HDC0_Menu&form=form_hdc0. The page content is as follows:

IP-9600 - Test_system
01-01-2000 00:18:05

MENU

- [Administration](#)
- [DNS](#)
- [Ethernet-A](#)
- [Ethernet-B](#)
- [Serial-1\(sync\)](#)
- [Operating Mode](#)
- [Frame Relay](#)
- [Static Routes](#)
- [Advanced](#)
- [Serial-2\(sync\)](#)
- [Serial-3](#)
- [Serial-4](#)
- [PPP Users](#)
- [Tools](#)
- [Status](#)
- [Activate Changes](#)
- [Store Configuration](#)

Serial-1 Operating Mode

Serial-1 disable enable

Protocol frame-relay sync-ppp

Sync Mode Clock Source external internal TX-internal

Internal Clock Rate: 56000

The current configuration has not been activated.
The current configuration has not been stored to nonvolatile memory.

Data Comm for Business Inc.
2949 County Road 1000 E
Dewey, IL 61840

Voice: 217-897-6600
Email: support@dcbn.net
Web: <http://www.dcbn.net>

Synchronous Serial Port Operating Mode Screen

This form sets the operating mode and parameters for the serial ports. Each port is configured separately.

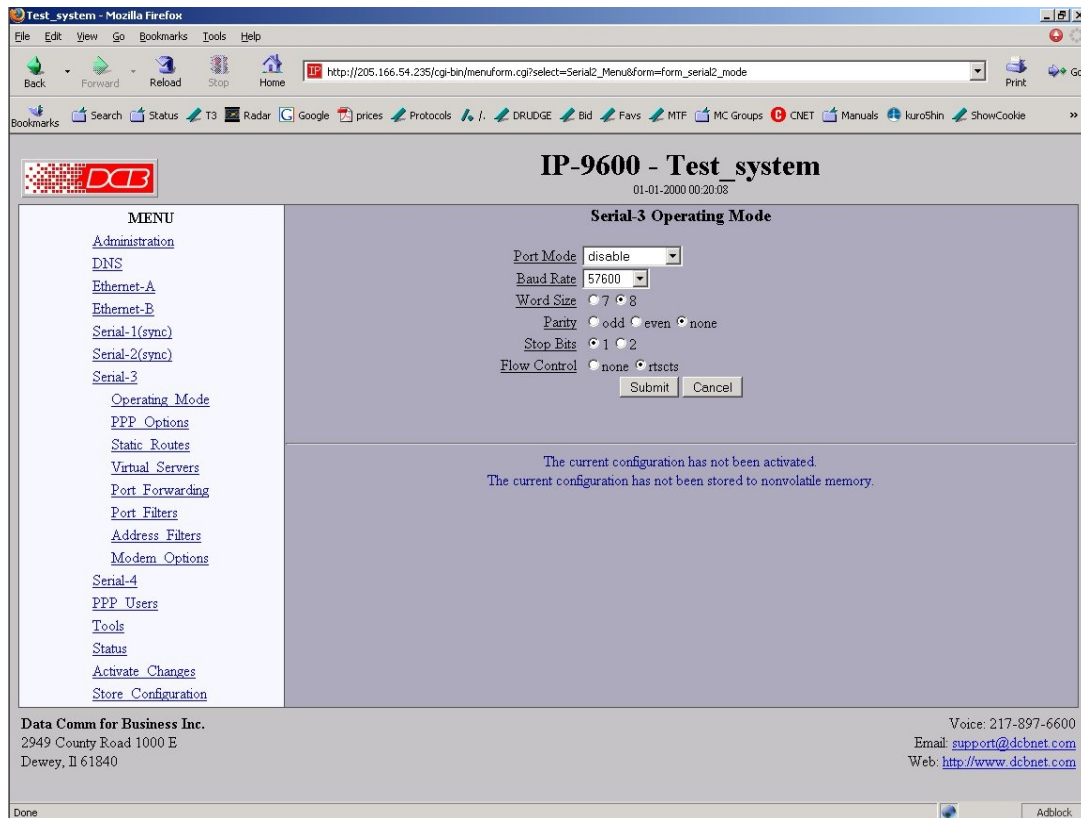
Fields

- Enabled**
Sets the operating mode of the port. The port should be disabled if it is not being used. This will free up system resources.
- Protocol**
Synchronous or Frame Relay. If set to Frame Relay, additional information should be configured.
- Sync Mode Clock Source**
Specifies the source for clocking. External is the most common setting. The attached device provides the clock source. The internal setting forces the router to provide clocking for the external device. The TX Internal setting configures the transmit clock to be provided by the router and the RX clock is provided by the external device.
- Internal Clock Rate**
Only used when the clock is provided by the router using the Internal setting above. When clocked by the attached device, the port is self-clocking and no rate is set.

Notes

- Serial ports should be disabled if not being used to free up system resources.
- If configured to Frame Relay, additional settings are required on the Frame Relay screen.
- The IP-9600 includes one port (The lowest numbered port) that may be hardware configured as a balanced port. See the Appendix for information concerning this hardware setting and interface pinout. The balanced port may be used with a V.35 or RS-422 interface. Physical interface adapters are available.

Asynchronous Serial Port Operating Mode Screen



Serial Port Operating Mode Screen

This form sets the operating mode and parameters for the serial ports. Each port is configured separately.

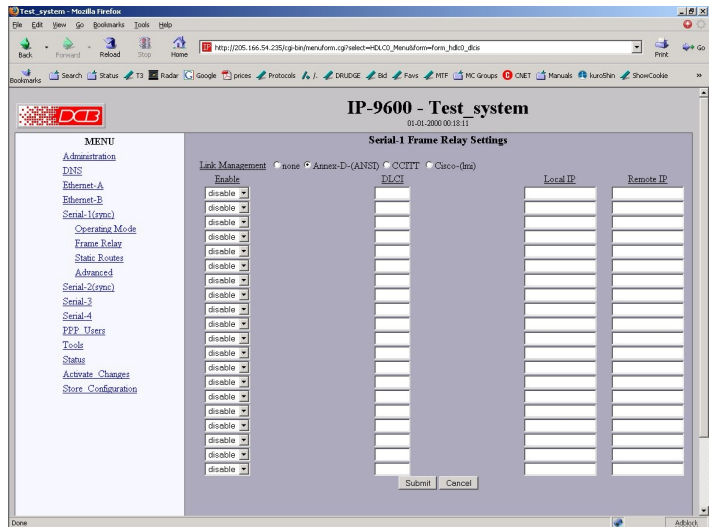
Fields

- **Mode**
Sets the operating mode of the port. Currently PPP is the only mode supported. The port should be disabled if it is not being used. This will free up system resources.
- **Baud Rate**
Serial port asynchronous port speed.
- **Word Size**
Number of data bits in each character. For PPP, this field is ignored and the number of bits is set to 8.
- **Parity**
Enable parity generation and testing.
- **Stop Bits**
Select 1 or 2. The router does not support 1.5 stop bits.
- **Flow Control**
Hardware flow control enable. The router uses the RTS and CTS signals for hardware flow control. RTS is an output from the router. It will be asserted when the router is ready to receive data and de-asserted when the router is not ready to receive data. CTS is an input to the router. The router will monitor CTS and will only transmit data when CTS is asserted.

Notes

- Serial ports should be disabled if not being used to free up system resources.
- If configuring PPP parameters while using the PPP link, the link will be dropped when the parameters are activated.

Synchronous Serial Port Frame Relay Screen



Serial Port Frame Relay Setup Screen

This form sets the operating mode and parameters for the frame relay PVC (private virtual circuits) associated with this serial port. Each PVC is configured separately.

Fields

- **Link Management**
Link management may be set for None – no link management is used when two frame relay devices are connected back-to-back and neither requires management; ANNEX D (ANSI), the most commonly used management system in North America, Cisco (LMI) the other common method used in North America, and CCITT, the most commonly used method in Europe.
- **Enable/Disabled**
Whether this virtual circuit is enabled on the router. If the other fields on this configuration line are blank, this field should remain disabled.
- **DLCI**
The DLCI (Data Link Control Identifier) number for this PVC (Private Virtual Connection). DLCI numbers are provided by the Frame Relay carrier. All packets transferred on a frame relay interface are associated with a specific DLCI.
- **Local IP**
The local IP address associated with this PVC DLCI. Routing is usually associated with IP addresses, so this is the IP address that will be used for some routing entries.
- **Remote IP**
The IP address associated with the device at the other end of this PVC.

Notes

- Serial ports should be disabled if not being used to free up system resources.
- It may take as long as a minute or two at startup for a frame relay link to be established with the device at the other end of the circuit.

Asynchronous Serial Port PPP Options Screen

The screenshot shows a web browser window titled 'Test_system - Mozilla Firefox' with the URL 'http://205.166.54.235/cgi-bin/menufom.cgi?select=Serial2_Menu&form=form_serial2_ppp_options'. The page content includes a 'MENU' on the left with links to various system settings. The main area is for 'Serial-3 PPP Options' and includes the following fields and options:

- Connection Type:** direct modem
- Dial-in:** no yes
- Dial-out:** no yes on-demand
- Phone Number:** [Text input field]
- Proxy Arp:** disable enable
- IP Sharing:** disable enable
- Local IP:** [Text input field]
- Remote IP:** [Text input field]
- Force Remote IP:** disable enable
- User Name:** [Text input field]
- Password:** [Text input field]
- Authentication:** none pap chap
- DNS Addresses:** none request provide
- Idle Disconnect Time:** [Text input field]
- Max Connect Time:** [Text input field]
- Max Transmit Unit:** 1500
- Modem Re-init Time:** [Text input field]
- Echo Test Link:** disable enable
- Logging:** basic detailed

Buttons: [Submit] [Cancel]

Message: The current configuration has not been activated. The current configuration has not been stored to nonvolatile memory.

Asynchronous Serial Port PPP Options Screen

This form is used to configure the PPP options for the serial interface

Fields

- This option effectively enables and disables the modem dialing options
When set to direct, the router assumes a hard-wired connection and directly attempts to establish a PPP connection. Modem related options are ignored.
- Dial-IN
When set to yes, the modem is configured to answer incoming calls. The PPP session will be established when the serial port's DCD (data carrier detect) signal goes active. This feature may be used in conjunction with dial-out on-demand. YES.
- Dial-OUT
When set to yes, the router will immediately try to establish a PPP session by dialing the phone. When set to on-demand, the router will create a pseudo PPP session and wait for outbound traffic. When traffic is detected, it will attempt to dial-out and establish a real PPP session.

Note: When on-demand is selected, you must set Local IP and Remote IP addresses. You also need to set at least one entry in Static Routes for the remote network. This is the information needed by router to determine outbound traffic.

- Phone Number
This is the phone number to use when making a dial-out call. This field is not only limited to phone

numbers. If necessary, you may embed modem commands. This field is simply appended to the Modem Options - Dial field when making an outgoing call.

- **Proxy ARP**
When Proxy ARP is enabled, the router will respond to ARP requests for the remote system's IP address. This has the effect of making the remote system appear to be on the local Ethernet. For Proxy ARP to work, the remote system's IP address must be in the subnet range of one of the Ethernet interfaces.

For example, if Ethernet-A were configured with an IP address of 192.168.0.1 and a subnet mask of 255.255.255.0, the remote IP address would need to be on the 192.168.0 subnet.

If the serial port uses an IP address that is in the range covered by the Ethernet A or B subnet, then Proxy ARP should be turned on.

- **IP Sharing**
IP Sharing goes by several names. It is also known as Source Network Address Translation (Source NAT) and IP Masquerading. It is a process where a router will transparently substitute the IP address in outbound packets with its own address for the purpose of sharing a single IP address over a group of machines.

IP Sharing is typically used when sharing a PPP dial-up to an ISP.

- **Local IP**
Each side of a PPP connection must have an IP address. This is the IP address to use for the local PPP device. You can leave this field blank, but the remote PPP device must be configured to assign an address.

With this router, it is permissible to borrow the IP address of one of the Ethernet interfaces for the Local IP address. This is sometimes referred to as unnumbered mode. It prevents you from having to create a separate subnet for the PPP connection.

When Dial-out on-demand is enabled, you must specify a Local IP. This may pose a problem when dialing an ISP that dynamically assigns the local address. To get around it, set the Local IP address to the address of one of the Ethernet interfaces. The router will switch to the server assigned PPP address when the connection is established.

- **Remote IP**
Each side of a PPP connection must have an IP address. This is the IP address to assign to the remote PPP device. You can leave this field blank, but the remote PPP device must be configured with a Local IP address.

When Dial-out on-demand is enabled, you must specify a Remote IP. This may pose a problem when dialing an ISP where you don't know what the address of the remote device will be. In reality, you don't have to know the exact address. Something close will do. Choose the address of a device on the remote network such as a next-hop router, DNS server, or mail server. When the real PPP connection is established, the router will switch to the server's real IP address.

- **UserName**
This is the user-name to use when authenticating to a remote system. In other words, this is the user-name sent to the remote system. This field is optional. If the remote system does not require authentication, you may leave this field blank. The user-name may be a string of 1 to 15 printable characters. No space or control characters.
- **Password**
This is the password to use when authenticating to the remote system. In other words, this is the password sent to the remote system. This field is optional. If the remote system does not require

authentication, you may leave this field blank. The password may be a string of 1 to 15 printable characters. No space or control characters.

- **Authentication**
When set to pap or chap the remote system must provide a user-name and password in order to connect to the local system. The list of valid user-names and passwords are entered in the PPP Users table. When pap is selected, the remote system must use the Password Authentication Protocol (PAP).

When chap is selected, the remote system must use the Challenge Handshake Authentication Protocol (CHAP). This includes MSCHAP V1 and V2

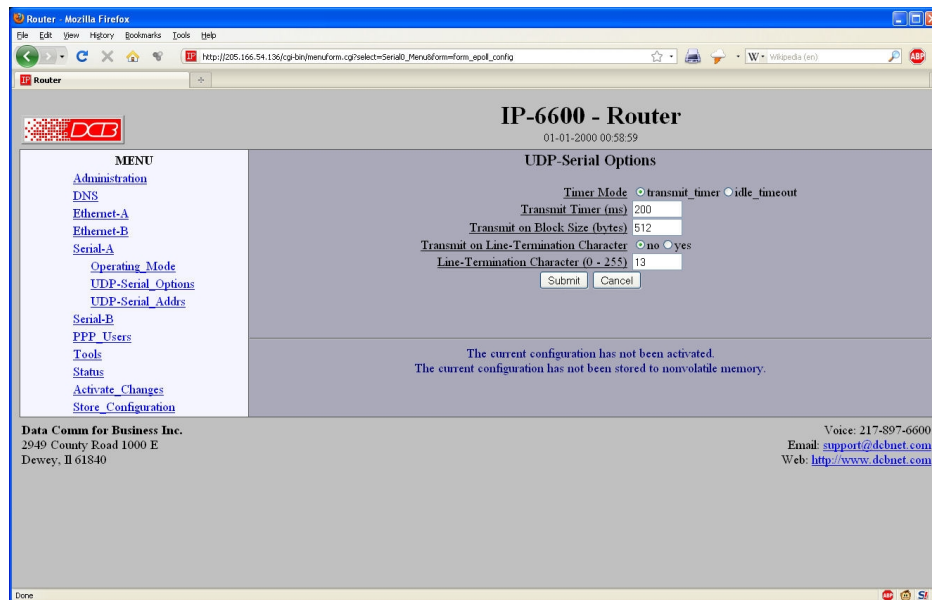
Note: CHAP is considered the better of the two authentication methods.

- **Idle Disconnect Time**
If there is no IP traffic across the PPP link for this amount of time (in minutes), the link will be terminated.
- **Max Connect Time**
This is the maximum amount of time (in minutes) to allow a PPP connection to exist. The link will be taken down regardless of activity.
- **MTU**
This selects the maximum transmit unit and maximum receive unit for the interface. Outgoing network packets will be limited to the specified size. The peer will be asked to limit its MTU to this size. The peer may negotiate a smaller size. The value may be between 128 and 1500.
- **Logging**
This selects the level of information placed in the serial log file. Options are BASIC and DETAILED.

Notes

- Serial ports should be disabled if not being used to free up system resources.
- If configuring PPP parameters while using the PPP link, the link will be dropped when the parameters are activated.

IP-6600 / 6690 EtherPoll Functionality- UDP Serial Options



Asynchronous Serial Port UDP EtherPoll Options Screen

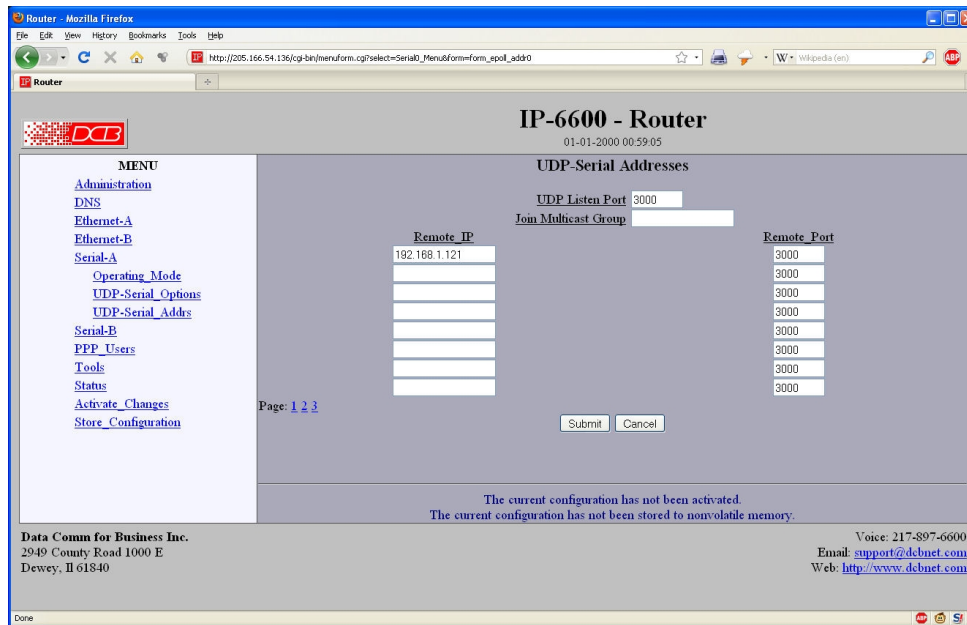
The serial ports on some models may be used as simple UDP port servers, having some of the functionality of the DCB EtherPoll products. This form is used to configure the EtherPoll (UDP) functionality options for the serial interface.

Fields

- This option effectively enables and disables the modem dialing options
When set to direct, the router assumes a hard-wired connection and directly attempts to establish a PPP connection. Modem related options are ignored.
- Timer Mode
This field selects the method in which serial input data is pushed out as a UDP packet. In *Transmit-Timer* mode, data is pushed out at a periodic rate. In *Idle-Timeout* mode, data is pushed out when no new data arrives.
- Transmit Timer
When Timer Mode is set to *Transmit-Timer*, this is the time between transmit bursts. When Timer Mode is set to *Idle-Timeout*, any buffered data will be transmitted if no new data arrives within this period. Valid range is 5ms to 10,000ms. Due to system overhead, the actual time may be greater than the specified value, especially for settings below 20ms.
- Transmit on Block Size
This field sets the serial input buffer threshold level. If the number of bytes in the serial input buffer reaches this level, it will force a UDP transmit, even if the Transmit Timer has not expired.
- Transmit on Line Termination Character
Enable/disable Transmit on Line-Termination character. As serial data is received, it is scanned for a Line-Termination character. If one is detected, it will force a UDP transmit of the serial buffer, even if the Transmit Timer has not expired.

- **Line Termination Character**
This field sets the Line-Termination Character. It is entered as the decimal value of the character (0 - 255).

IP-6600 / 6690 EtherPoll Functionality- UDP Serial Addresses



Asynchronous Serial Port UDP EtherPoll Serial Addresses Screen

The serial ports on some models may be used as simple UDP port servers, having some of the functionality of the DCB EtherPoll products. This form is used to configure the EtherPoll (UDP) functionality option remote addresses for the serial interface.

Fields

- UDP Listen Port**
 This field specifies the UDP Port that the unit will receive UDP-Serial datagrams. It also specifies the source UDP port when sending UDP-Serial datagrams. Valid range 1 - 65535.
- Join Multicast Group**
This field is optional and will be blank in the normal configuration. If a multicast group is specified, the unit will join the multicast group and receive any datagrams sent to that group. A multicast group is an IP address in the range 224.0.0.0 through 239.255.255.255.

If this field is blank, the unit will not listen to any multicast groups.

When choosing a multicast group address make sure to choose one that is not already in use on your network. The range 224.0.0.0 through 224.0.0.255 is typically in use by routers.

In order to use multicast, you must set a multicast route in one of the static routing tables. A multicast route will have a target of 224.0.0.0 and a netmask of 240.0.0.0. No gateway is specified. The interface with the multicast route will then be able to send and receive multicast datagrams.

- Remote IP, Remote Port**
 This table specifies the IP address and port number of where UDP-serial datagrams should be sent. The serial input data will be copied and sent to every host in the table. Also, the unit will only accept UDP-serial datagrams from hosts in this table.

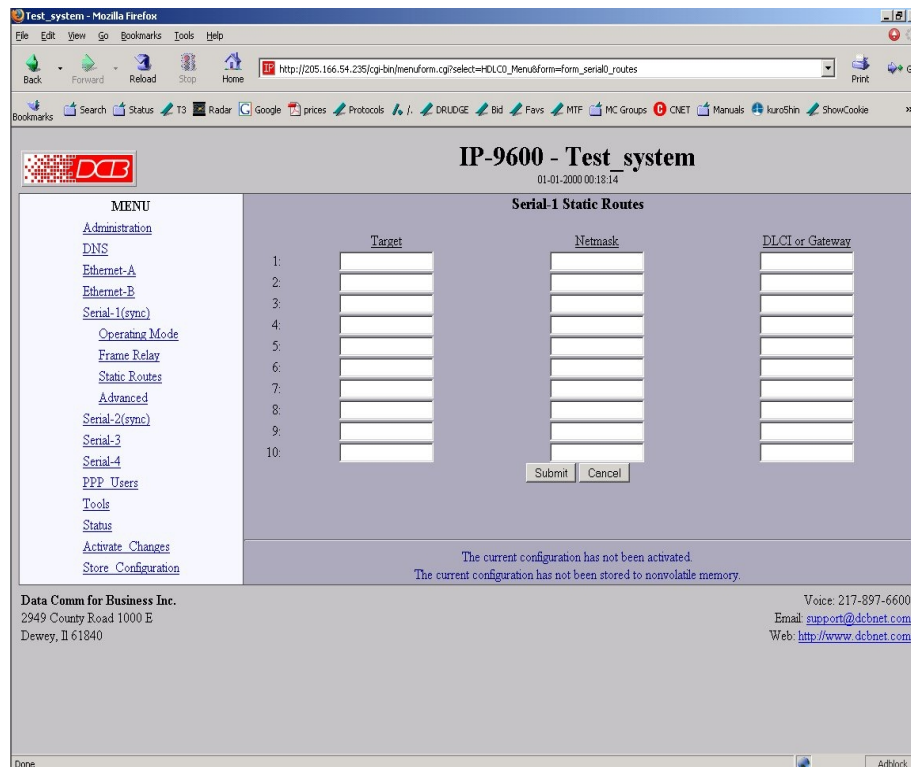
If there are no hosts in this table, the unit will accept datagrams from any host. It will remember the IP

address of the last host to send a datagram and will send any incoming serial data back to that same host.

Notes

- For more information on the EtherPoll UDP terminal server functionality, please reference the DCB EtherPoll User's Guide. That manual can be downloaded from the DCB website at <http://www.dcbnet.com>.

Serial Port Static Routes Screen



Serial Port Operating Mode Screen

The router maintains four tables of Static Routes. There is one table for each possible interface. The routes defined in the associated table are applied when an interface comes up and are removed when an interface goes down. It is important that routes be placed in the correct table. The rule-of-thumb is to apply a route to the interface that the routed packet should go out. For example, if you want your default route to go out the PPP link on Serial-A, you would add the default routing entry to Serial-A's static routing table. If you want packets to address 192.168.10.54 to go out Ethernet-A, you would add a routing entry to Ethernet-A's table.

Fields

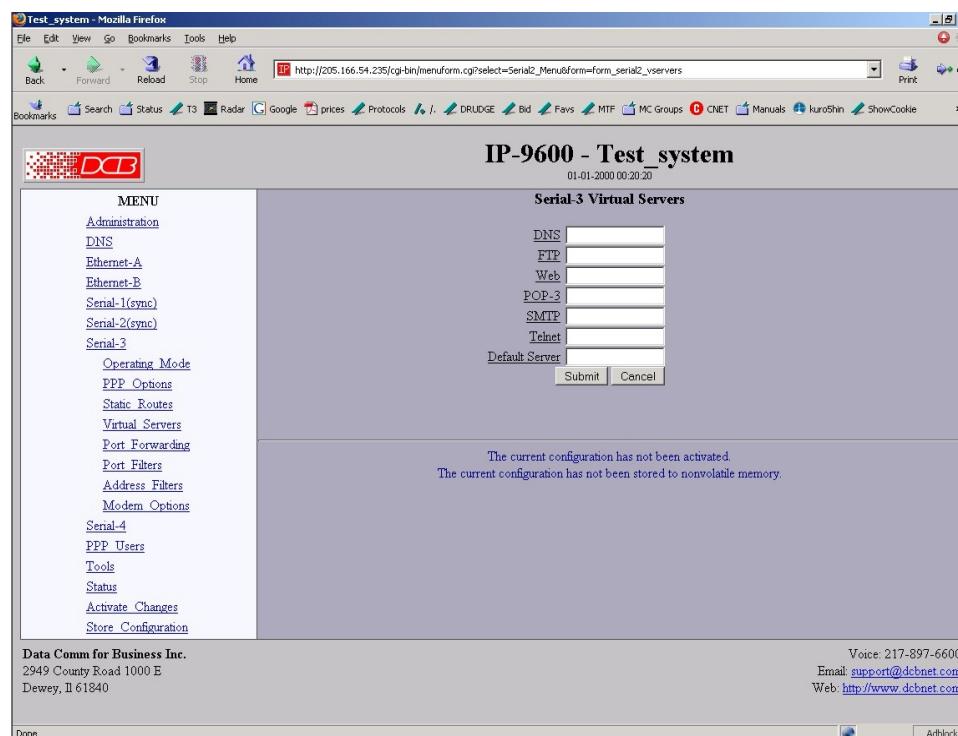
- Target**
Destination Host or Network address. Use a target address of 0.0.0.0 to specify a default route.

- Netmask
If left blank or set to 255.255.255.255, the target is assumed to be a host address. Otherwise, the target is assumed to be a network address and the netmask specifies which address bits are significant. Use a netmask of 0.0.0.0 to specify a default route
- DLCI or Gateway
For synchronous ports, the gateway may be specified as either the frame relay DLCI or gateway IP address that the packets are destined for. This field is not displayed for PPP ports as all packets are routed to the node at the other end of the PPP link.

Notes

- The router will automatically create a route for each interface. For Ethernet, this will be a network entry based on the IP address and netmask of the interface. For PPP links, this will be a host entry for the IP address of the remote PPP device.
- You can view that Active Routing Table from the Status Menu/Routing Table.
- There is no gateway field for asynchronous links as all routes terminate at the other end of the serial link.

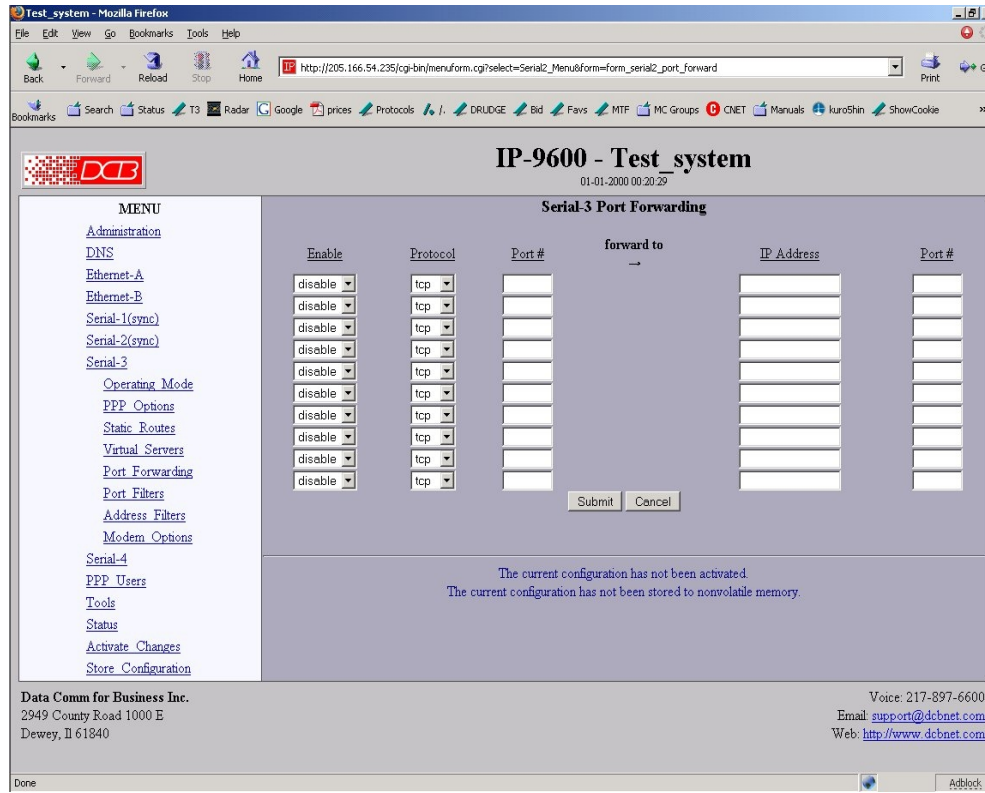
Serial Port Virtual Servers Screen



Serial Port Operating Mode Screen

This configuration screen is identical to the Ethernet port Virtual Servers Screen. See that section for details.

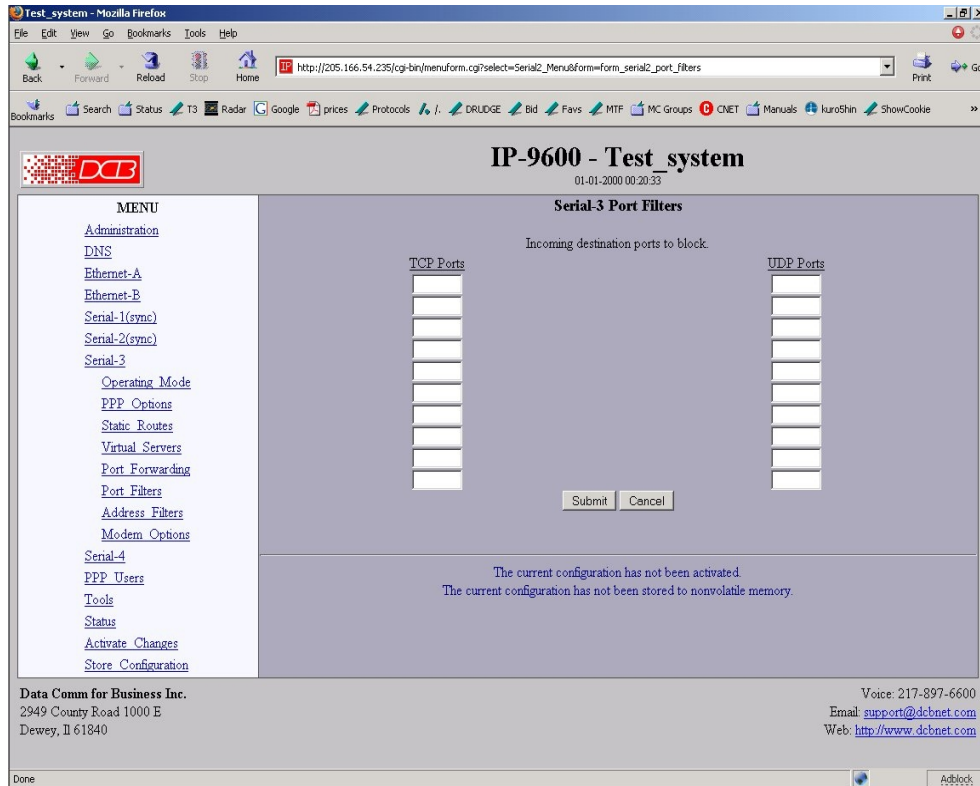
Serial Port- Port Forwarding Screen



Serial Port Forwarding Screen

The Port Forwarding screen is identical to the Ethernet Port Forwarding screen. See that section for details.

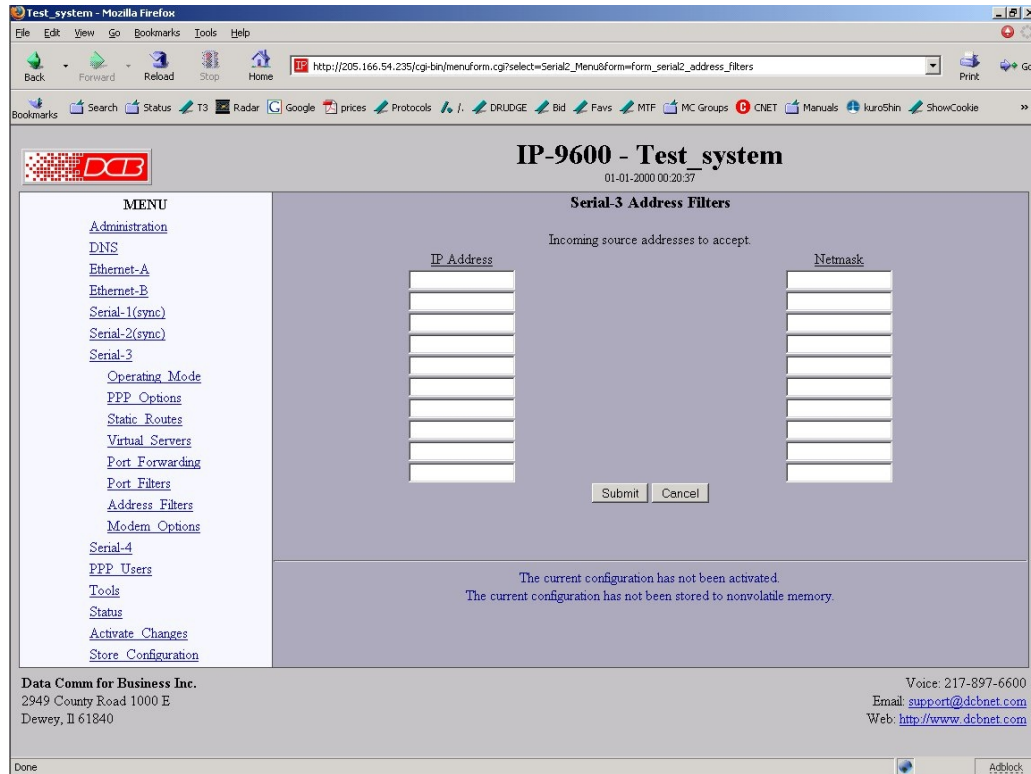
Serial Port- Port Filters Screen



Serial Port Filters Screen

The Port Filters screen is identical to the Ethernet Port Filters screen. See that section for details.

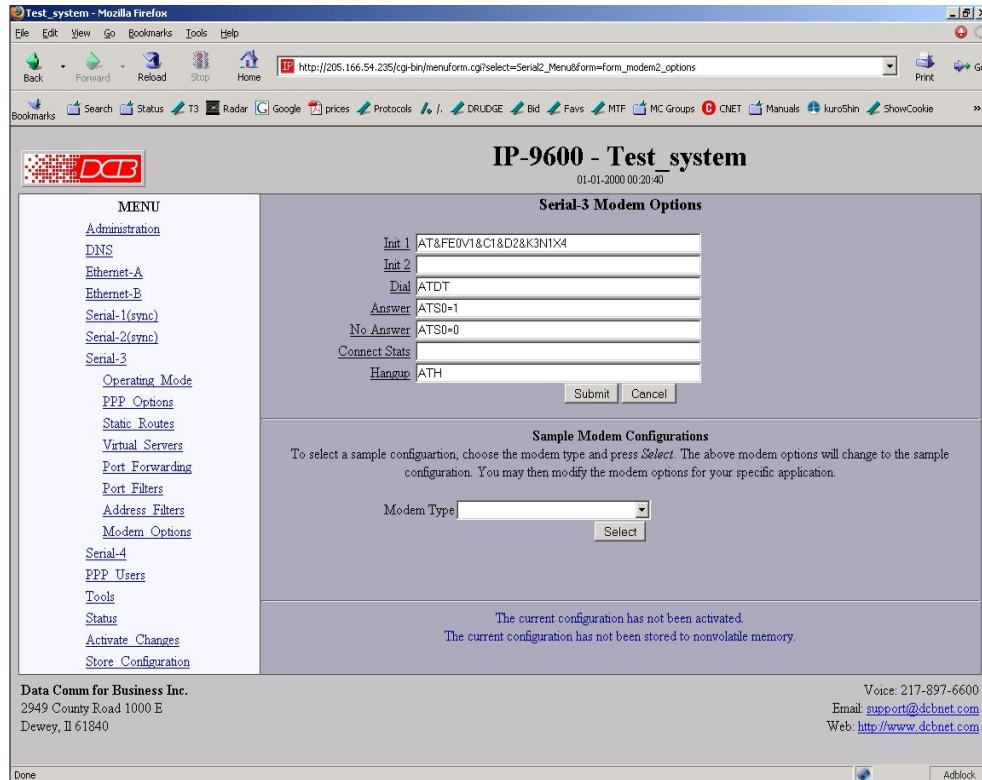
Serial Port Address Filters Screen



Serial Address Filters Screen

The Port Forwarding screen is identical to the Ethernet Port Forwarding screen. See that section for details.

Serial Port Modem Options Screen



Serial Port Modem Options Screen

The Modem Options are used when the PPP Connect Type has been set to modem. They specify the various commands to send to the modem, depending on the selected PPP options.

When configuring your modem, there are several items you should consider in order for the router to correctly inter-operate with it.

The router monitors Data Carrier Detect (DCD) to bring up and take down PPP sessions. The modem should assert (DCD) when a connection is established, and drop DCD when a connection is lost.

The router will assert DTR when it is ready to establish a PPP session and will drop DTR when a PPP session is terminating. The modem should hang up the phone if DTR is inactive. Likewise it should not answer an incoming call if DTR is inactive.

Do not suppress the "OK" message. The router looks for this message to determine when commands have been accepted.

Suppress echo.

The router will look for the messages "BUSY", "NO CARRIER", "CARRIER", "NO DIALTONE", and "NO ANSWER" when dialing a connection. You should not suppress result messages

Fields

Init 1

The router will send this command prior to starting each PPP connection. You should use it to put the modem into a known state. For DCB's D-Series modem, you should use the string:
"AT&FE0V1&C1&D2&K3N1X4"

Init 2

The router will send this command after sending the first initialization command and receiving an "OK" response. This is to allow for additional configuration or to allow for modems that can not be reset and configured with a single command string.

Dial

This command will be used when the router needs to dial-out. It will be concatenated with the phone number specified in the PPP options. For most modems, the command is "ATDT" to do touch-tone dialing and "ATDP" to do pulse-code dialing.

Answer

This command will be used when the router needs to enable auto-answer mode. For most modems, the command is "ATS0=1", where the 1 specifies how many rings to wait for before answering.

No Answer

This command will be used when the router needs to disable auto-answer mode. For most modems, the command is "ATS0=0".

Hangup

This is the command used to hang-up the connection. For most modem, the command is "ATH". The router will initially use the DTR signal to hang-up a connection. However, if the modem does not drop the DCD signal, the router will issue "+++" wait for an "OK" response, then send this command.

Sample Modem Configurations

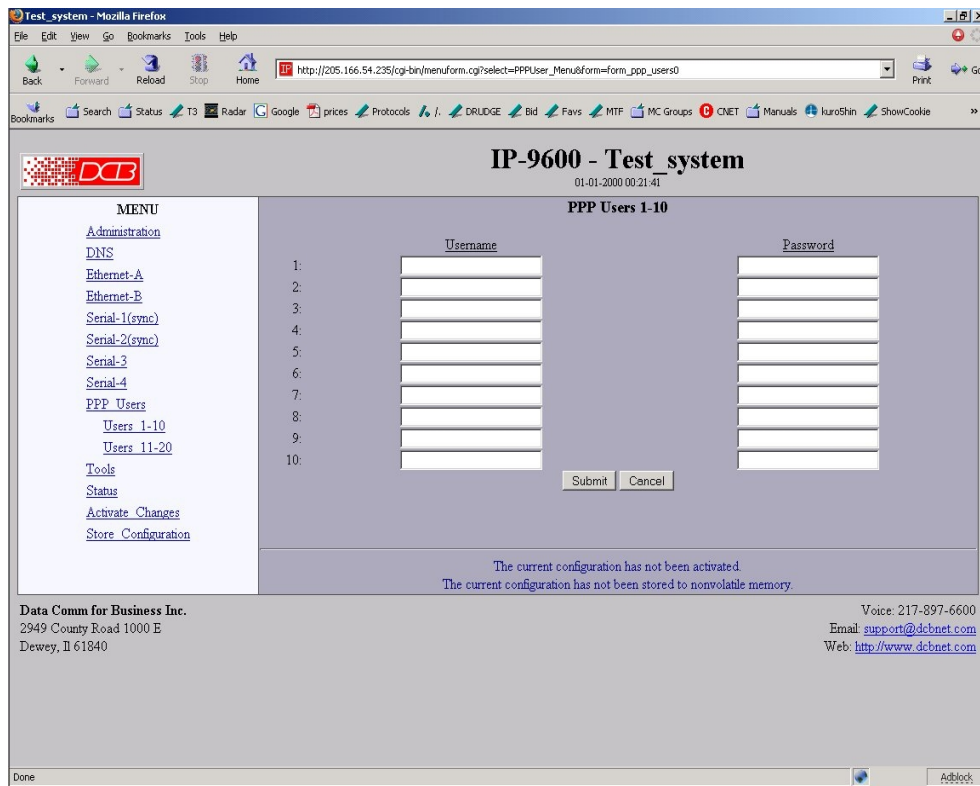
There are several sample configurations for DCB and other brand modems. When one of these is selected, the default values above are set correctly for the modem type selected.

Notes

The router will look for the messages "OK", "BUSY", "NO CARRIER", "CARRIER", "NO DIALTONE", and "NO ANSWER" when dialing a connection. You should not suppress result messages

If the router contains a built-in modem, best operation is obtained by using the "Internal Modem" default configuration option.

PPP Users Screen



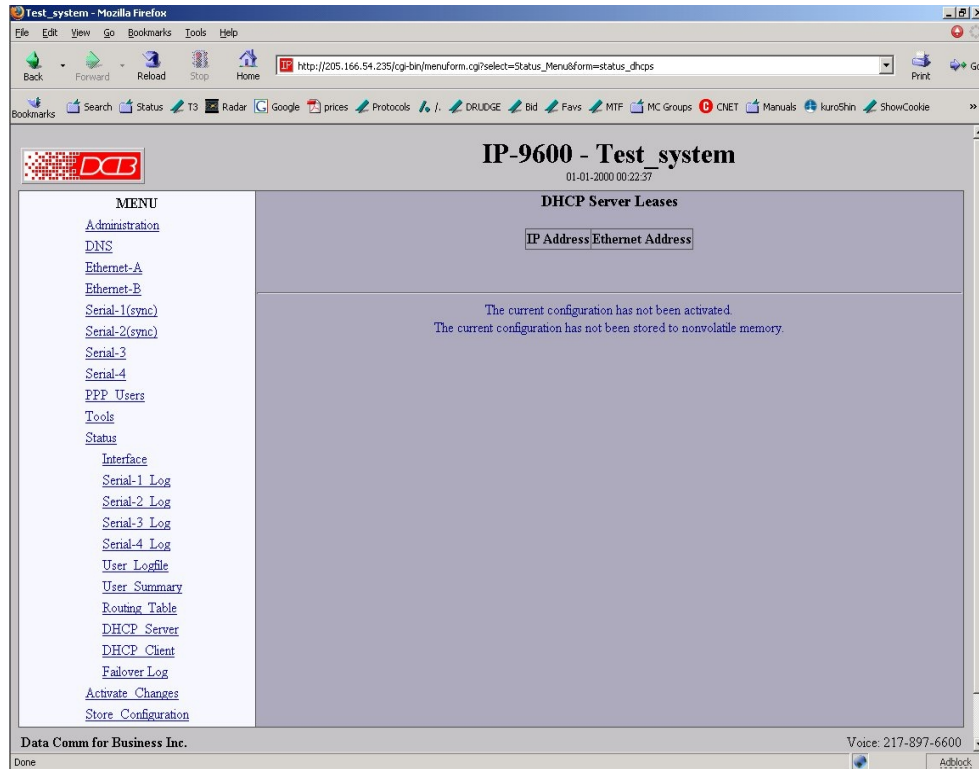
PPP Users Screen

This table specifies the usernames and passwords for remote PPP users. It will be used when either PAP or CHAP authentication is enabled.

Fields

- Username
A string of 0 to 15 printable characters. Do not use space or control characters. Ignored if blank.
- Password
A string of 0 to 15 printable characters. Do not use space or control characters. Ignored if blank.

DHCP Server Status Screen



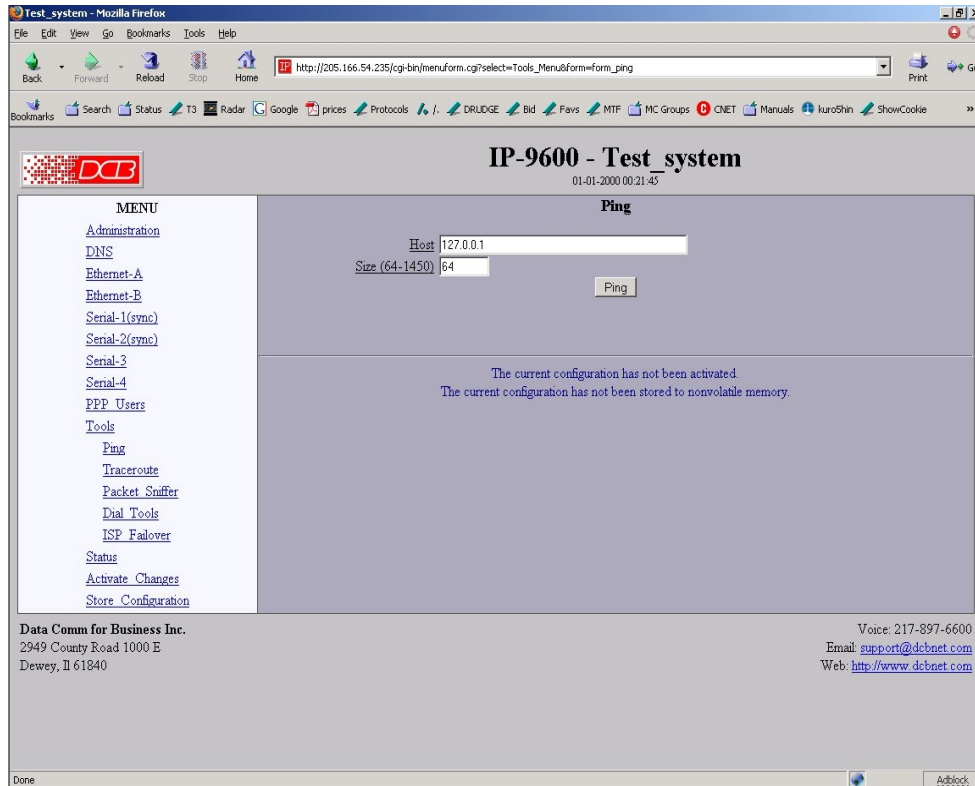
DHCP Server Status Screen

This screen displays a list of IP addresses and the associated ethernet MAC address for each IP address assigned.

Fields

- IP Address
IP address assigned to a host
- Ethernet Address
MAC address associated with the above IP address.

Ping Screen



Ping Screen

Ping will send four ICMP echo requests to the specified host. It will wait approximately 16 seconds for a response.

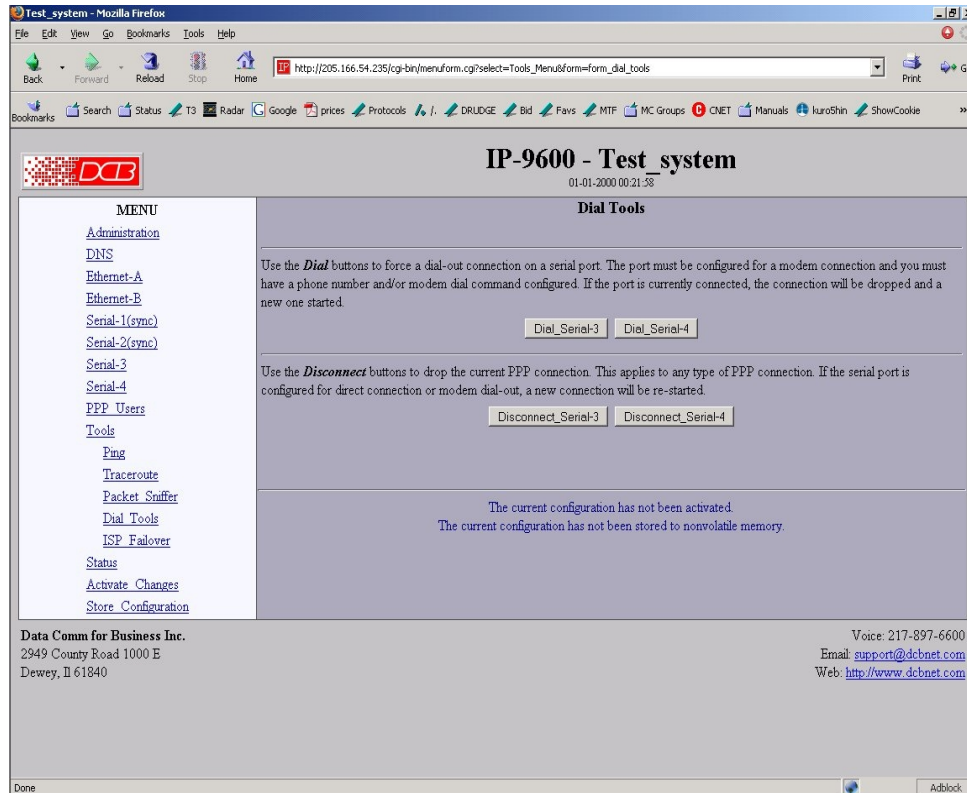
Fields

- Host
IP address of the target host. If hostname DNS is enabled, you may use a hostname.
- Size
Number of data bytes to send.

Notes

- Ping and traceroute are useful tools to determine if routing is correct.
- Ping may also be used to "force" a dial-up connection to dial.

Dial Tools Screen



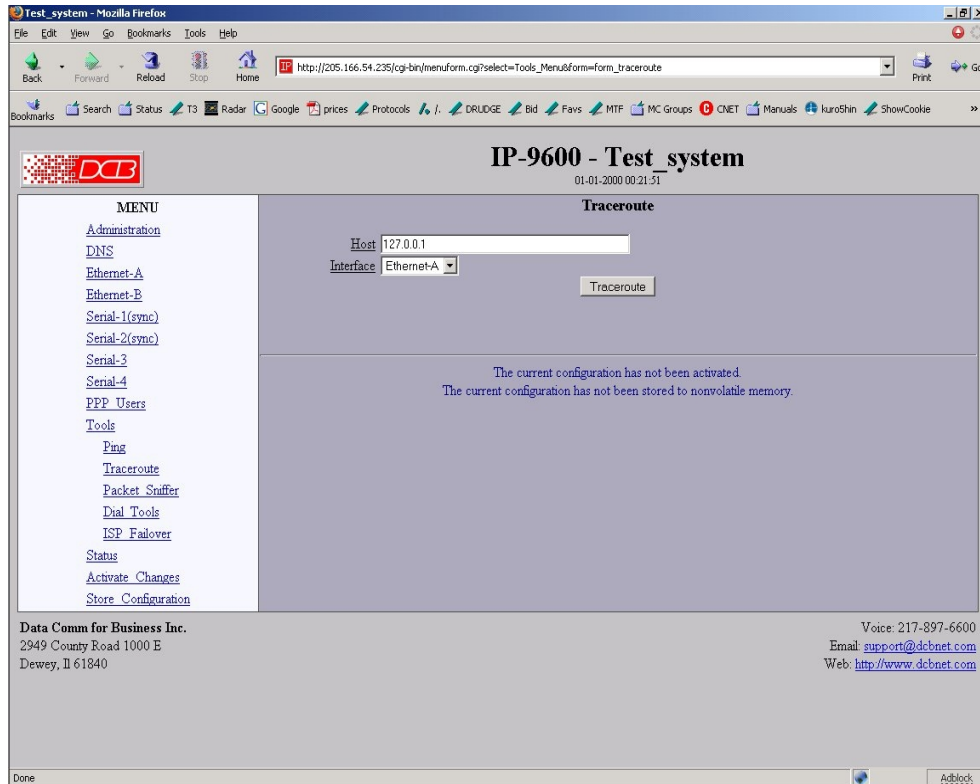
Dial Tools Screen

This screen is used to test and manage the serial lines. The action buttons allow a dial operation to be forced or a connection to be terminated on each interface.

Notes

- Check the port status screens to verify that the disconnect or dial operation was performed correctly.

Traceroute Screen



Traceroute Screen

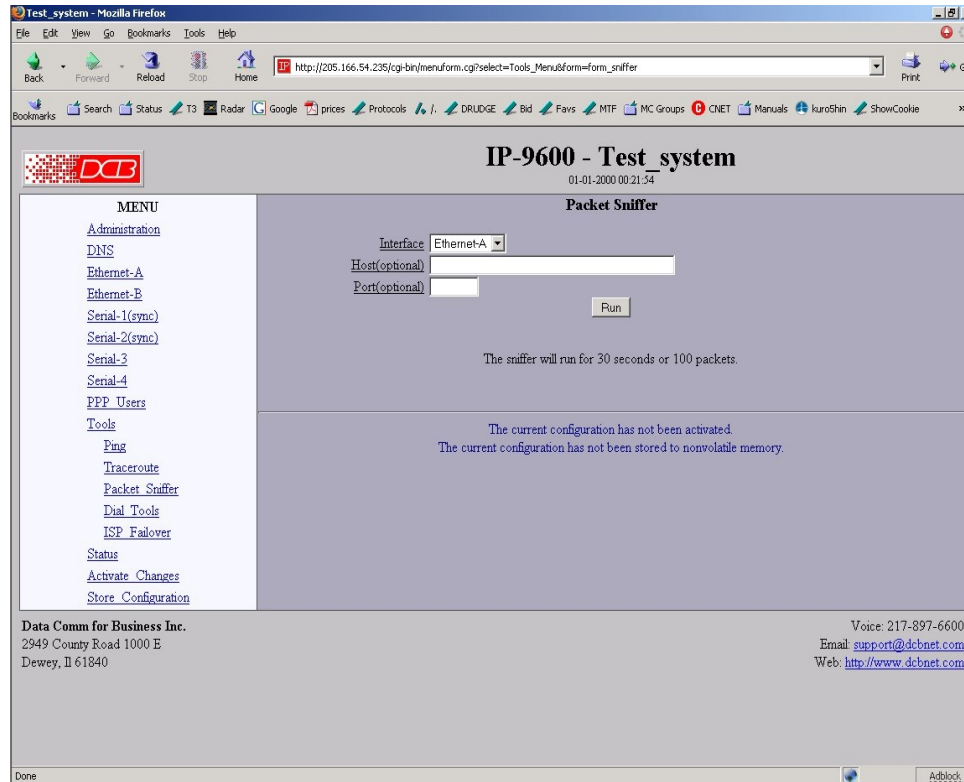
Traceroute displays the route that a packet will take to reach another host. This is performed by sending UDP packets to port 33434 with progressively larger Time-to-Live values and listening for ICMP TIME-EXCEEDED responses from the routers along the way.

Fields

- **Host**
IP address of the target host. If hostname DNS is enabled, you may use a hostname.
- **Interface**
Which interface to use. The routing table is bypassed.

Notes

Packet Sniffer Screen



Packet Sniffer Screen

The Packet Sniffer allows you to take a snapshot of the network traffic passing through an interface.

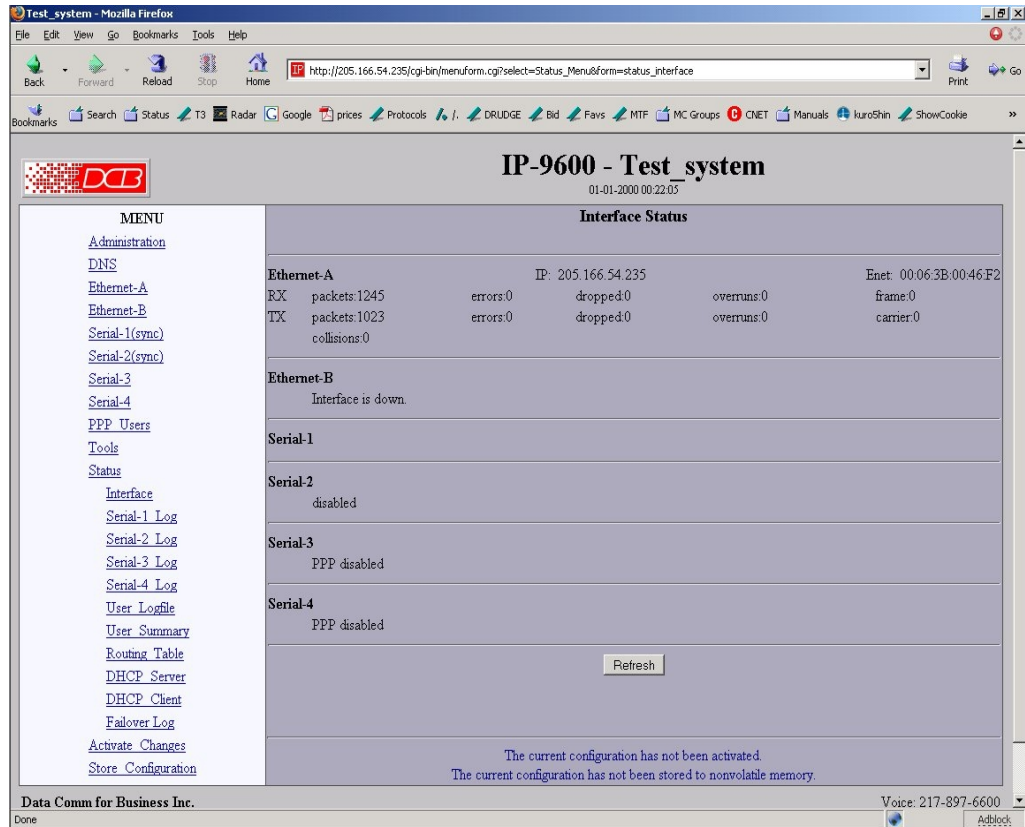
Fields

- **Interface**
Which interface to use. If the interface is a serial port, you will only see the traffic that is passing through the IP layer of PPP. You will not see low-level PPP traffic.
- **Host**
This applies a host filter. Only packets with a matching source or destination IP address will be included in the trace.
- **Port**
This applies a port number filter. Only TCP or UDP packets with a matching source or destination port number will be included in the trace.

Notes

- Only packet headers are shown. You will not be able to see the data contents of the packets.

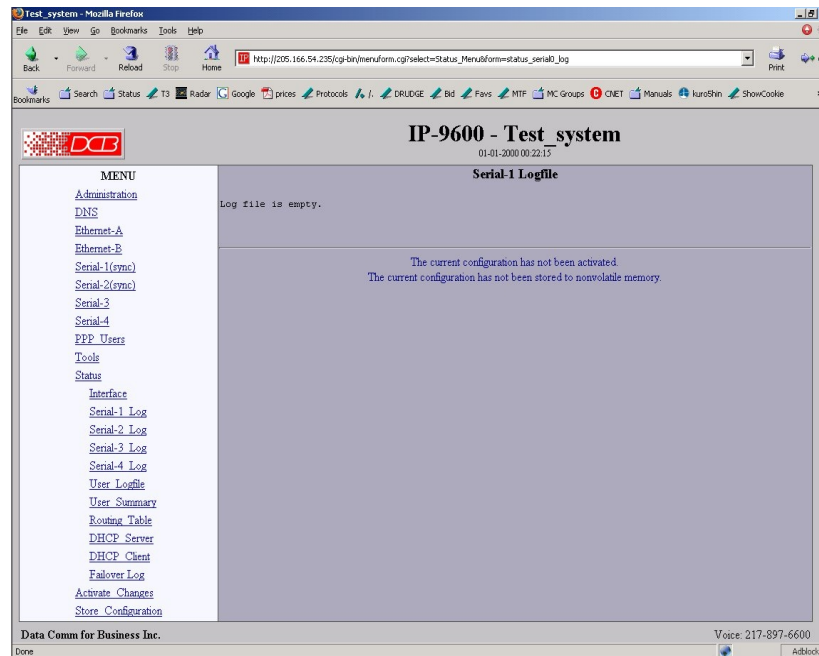
Interface Status Screen



Status Screen

The Interface Status screen shows port status and packet counters for each interface on the router.

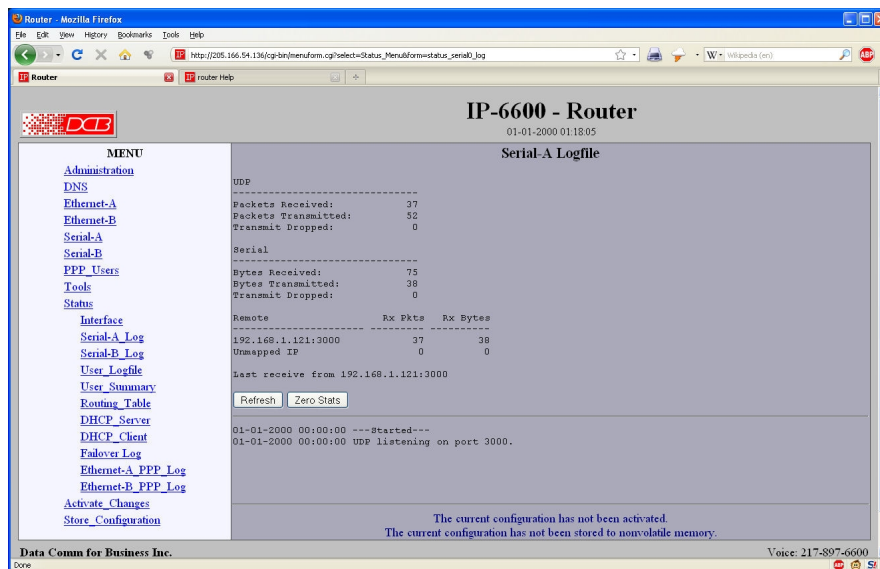
Serial Port Log Screen



Serial Interface Log Screen

The Serial Interface Log screen shows important events logged for each interface on the router.

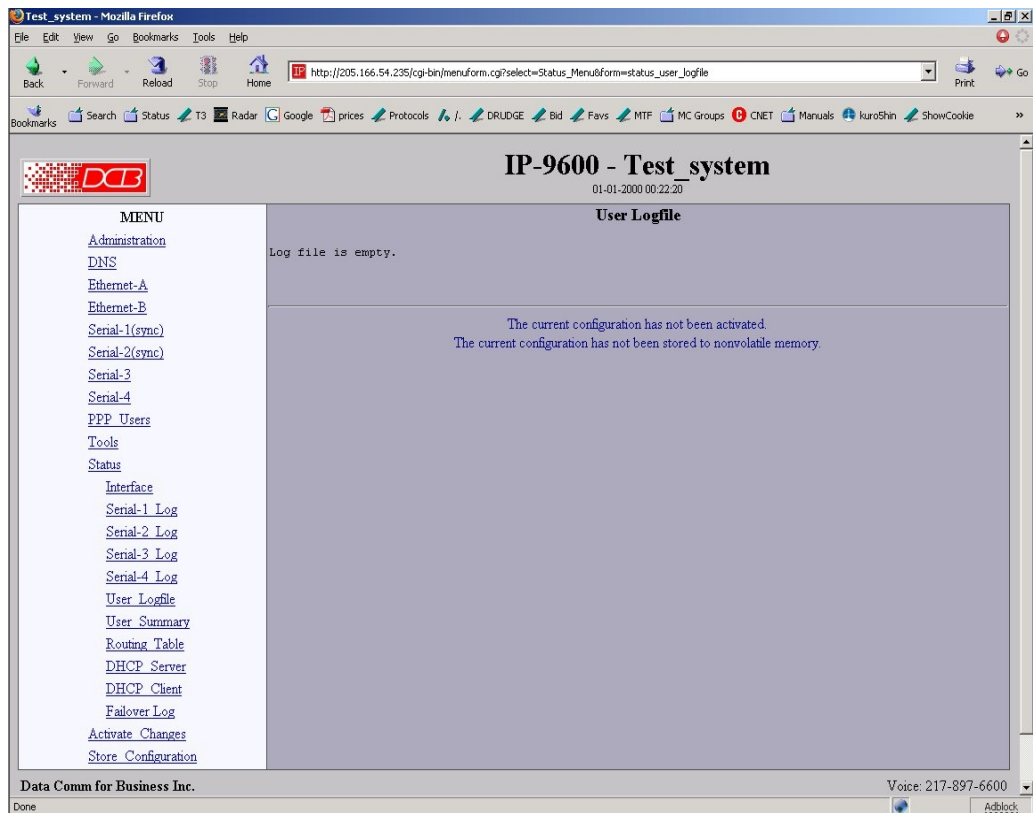
Serial Port *EtherPoll*® Log Screen



Serial Port *EtherPoll*® Functionality Log Screen

This log screen shows important events logged for each interface configured for UDP port functionality. For more information on these log values, please see the EtherPoll product manual. That manual is available from the DCB web site at <http://www.dcbnet.com>.

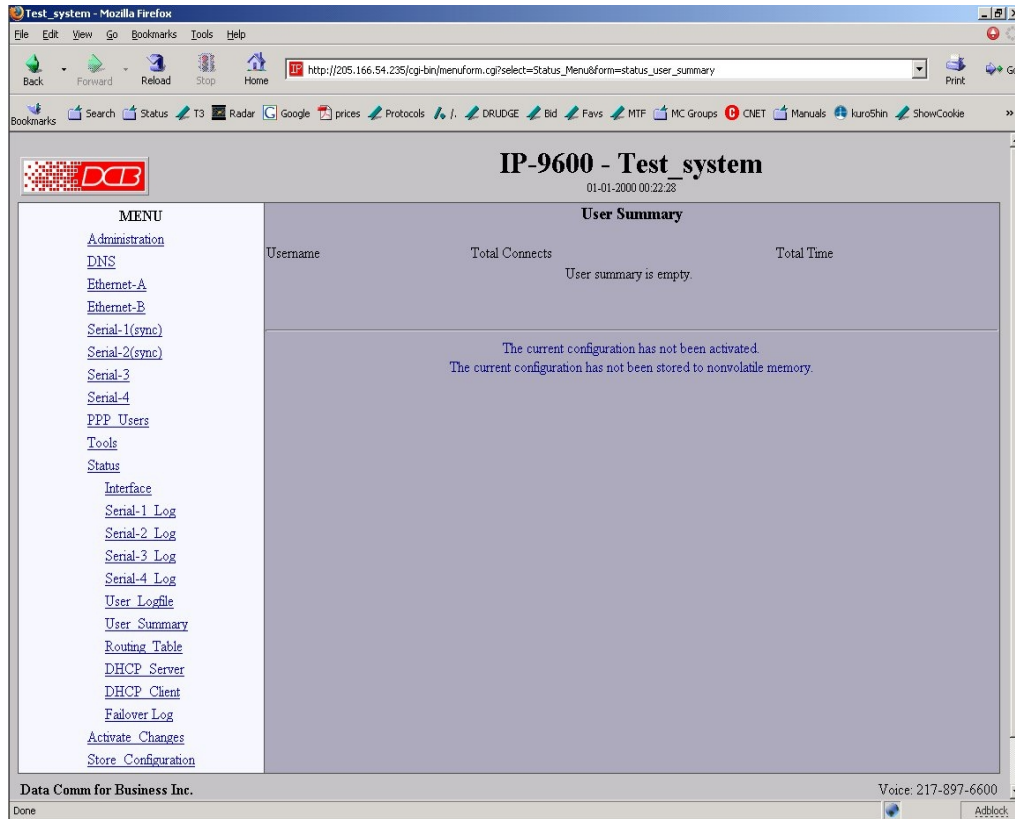
User Log Screen



User Log Screen

The User Log screen shows connect and disconnect events logged at the system level on the router. No logging is performed if PPP authentication is disabled.

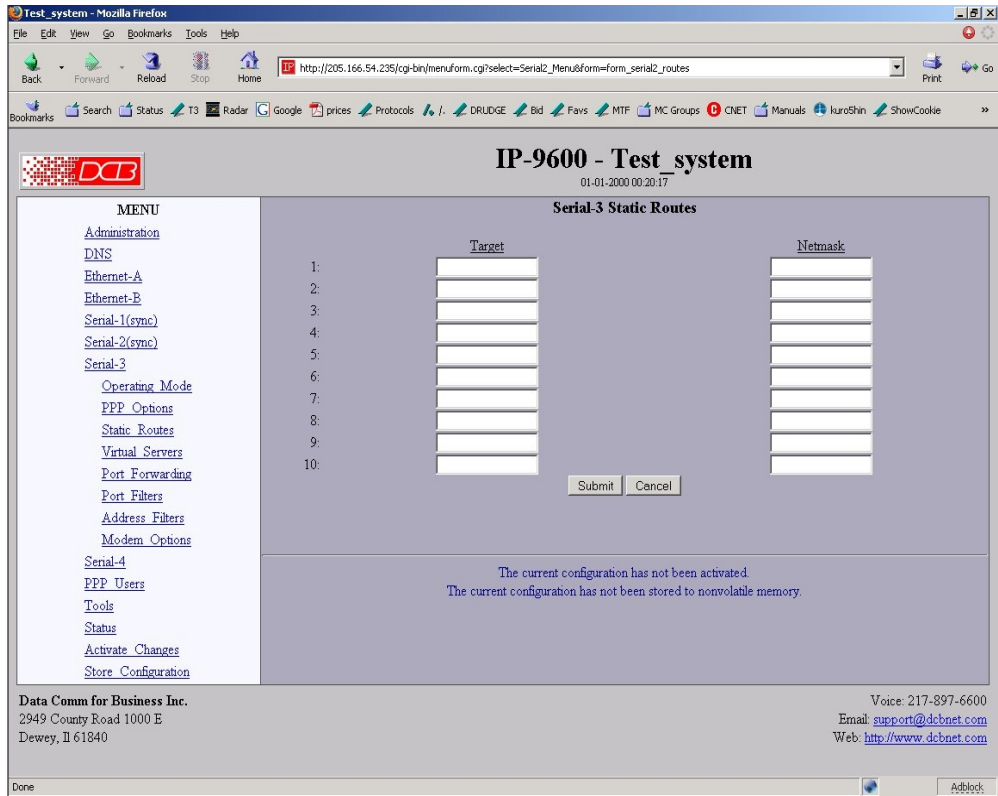
User Summary Screen



User Summary Screen

The User Summary screen shows connection detail by user on the router.

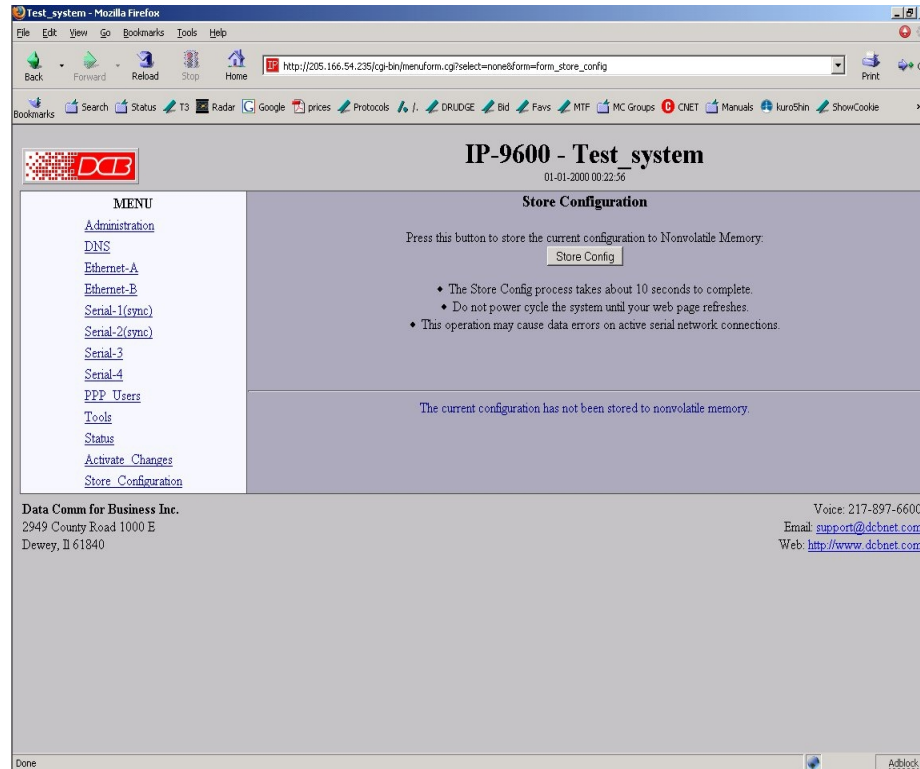
Routing Table Screen



Routing Table Screen

The Routing Table screen shows all routes configured in the router.

Store Configuration Screen



Store Configuration Screen

The Store configuration screen is used to store the current configuration to non-volatile memory. This does not activate configuration changes. Configuration changes are made to a temporary area. They may be “activated” using the Activate Changes screen, in which case they will become immediately active, overwriting the pre-existing configuration for the duration of this session; or, they may be “stored” using this screen, in which case they will be written to non-volatile memory and used at the next reset or power-up.

Chapter 5

Operation

This Chapter explains how to use the EtherSeries router, once it is installed and configured. Operation of the APS-01 Remote Power Switch is also covered.

Common Uses – Overview

The most commonly used configurations are for

- LAN dial-in by a portable computer
- LAN-to-Internet ISP dialout
- LAN-to-LAN connection using two routers and a dedicated communications link.
- LAN-to-LAN connection using dial on demand (DOD).

These configurations are detailed in this chapter. Some sample configuration files may be downloaded from the DCB support web site at <http://www.dcbnet.com/technote.html> and then transferred to your router.

Example 1– LAN Dial-IN

In this scenario, there is a local LAN with the address range of 192.168.0.0 and class “C” subnet mask of 255.255.255.0 . The router is configured to allow a remote PC to connect to the LAN using a dial-up modem. The modem configuration used is for the DCB D-Series V.90 modem. CHAP is used in this example, but PAP or CHAP (or if you’re just testing, NONE) may be enabled for authentication.

At a minimum, one must configure the following screens:

One Ethernet port

One Serial port

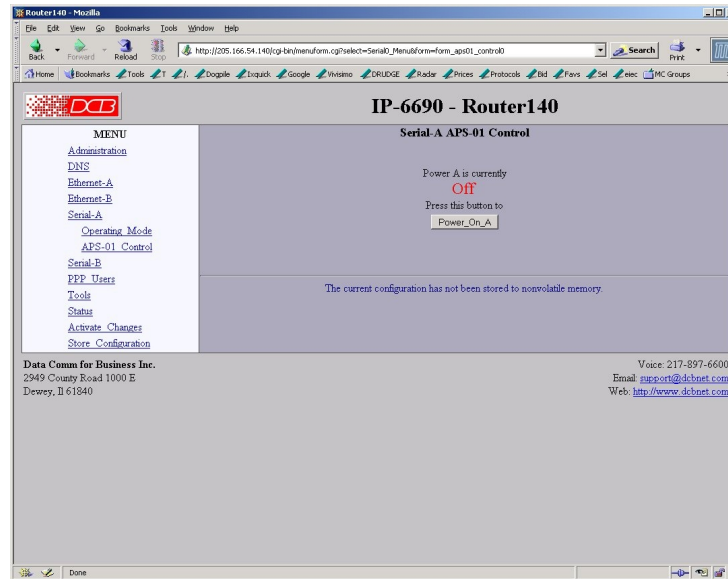
PPP Options

Example 2– LAN –LAN Direct Connect

In this scenario, there is a local LAN with the address range of 192.168.0.0 and class “C” subnet mask of 255.255.255.0 . The router is configured to connect to a remote LAN with the address range of 192.168.1.0 and class “C” subnet mask. The connection is a leased line modem (or non-modem digital link of some kind) set at 57.6 Kbps.

APS-01 Remote Power Switch Operation

The APS-01 is a remote power switch that is controlled by the web browser interface of the router. It is available in models for 120VAC or 240VAC, and will switch 15 Amps. The APS-01 is connected to one of the serial ports of the router using a straight through 10BaseT-type LAN cable. The serial port is configured as an APS-01 port using the Serial A/B Operating Mode screen (other options are PPP and Disabled). Any AC powered device connected to the APS-01 may be switched on or off by using the APS-01 Control Screen (accessible under the Serial A/B tabs).



APS-01 Control Screen

When the unit is switched ON, pressing the Power OFF button will switch the power off and change the label of the on-screen switch button. When the unit is switched OFF, pressing the Power ON button will switch the power ON and change the label of the on-screen switch button.

Chapter 6

Troubleshooting

This chapter outlines some problems that may occur during installation or operation and some possible solutions to them.

If you follow the suggested troubleshooting steps and the EtherSeries router still does not function properly, please contact your dealer for further advice.

Hardware Problems

Before anything else, check that all cables are wired correctly and properly connected.

P: All the LEDs are off.

S: Check the power supply or power connection.

P: When using 10/100Base-T cabling, the unit does not work.

S: Check the Hub's link LED for the port to which the bridge is connected. If it is off, make sure the network cable between the bridge and hub is in good condition.

Can't Connect via the LAN

P: Can't connect with a Web Browser.

S: Check the following:

- Start troubleshooting from a known state. Power the router OFF and ON to reboot.
- Is a proper IP address configured in the router and PC?
- "Ping" the router to see if it responds. From the Windows command prompt or "Run" dialog box, use the command:

```
ping IP_Address
```

Where `IP_Address` is the IP Address of the router (e.g. `ping 192.168.0.1`). If it does not respond, then check all LAN connections. If the LAN connection are OK, the problem is in the LAN addresses or routing **The most common problem cause is incorrect IP address configurations. Make sure the workstation and router have compatible IP addresses.**

- It may be that your "ARP table" contains invalid entries. You can clear the "ARP table" by rebooting, or, on Windows95, by typing the following command at the command prompt or *Run* dialog box.: `ARP * -d`
- Check that you are using the proper Ethernet connection on the router. Only PortA works at 100BaseT, and the port in use must be enabled.
- The router is meant to be connected to a hub or ethernet switch. If connected directly to a PC, an ethernet cross cable must be used.
- In some cases, "smart" hubs and switches must be power-cycled to clear their internal ARP cache. This is often a problem on test bench setups where IP addresses are moved between different equipment or a unit is moved between ethernet switch receptacles.

Other Problems

P: Can't run the initial configuration program using a serial cable connection.

S: Check that:

- The communication parameters are set properly.
- Disconnect and reconnect the power supply to the router with switch two UP.
- Power is available... an LED is on.
- The terminal program is operating properly. Try a loopback connector at the router end of the cable to verify program operation and the proper COM: port.
- The most common problems causing this symptom are incorrect RS-232 wiring or the Windows Hyperterm program not operating correctly.

Checking Router Operation

Once the router is installed on your Network, you verify proper operation by testing its functionality. Attempt to send packets through it, to verify its operation. The procedure is as follows.

From a PC on one side of the router, ping a PC on the other side of the router, or attempt a web connection to a web server on the other side of the router. If either method succeeds, then two-way operation is confirmed.

If any one PC on one side of the router can communicate with any single PC or server on the other side of the router, then the router configuration is likely correct and other problems should be investigated with a larger view of the network in mind.

Appendix A

Specifications

IP-6600 Router Specifications

- Flash Memory: 4 Mbytes
- SRAM: 8 Mbytes
- LAN A Interface: 10/100BaseTx, Autosense
- LAN B Interface: 10BaseT
- RS-232: Two male DE-9 connectors (PC –9 Pin)
- RS-232 speed: Up to 230.4.2 Kbps
- CPU: Motorola Coldfire 5272 CPU 66 MHz
- OS: uClinux
- Power: 6 VDC 600mA or Optional power supplies
- Switch: Configuration, Reset
- LED:8 (Status, Serial Activity, LAN Activity, Power)
- Default IP address: 192.168.0.1
- Browser Management port: 80
- Operational Temperature -40C to +85C subject to power supply limitations

IP-6690 Router Specifications

- Flash Memory: 4 Mbytes
- SRAM: 8 Mbytes
- LAN A Interface: 10/100BaseTx, Autosense
- LAN B Interface: 10BaseT
- RS-232: One male DE-9 connector (PC –9 Pin)
- RS-232 speed: Up to 230.4.2 Kbps
- Modem Connection: Internal V.92 modem, RJ-11 telco connector
- CPU: Motorola Coldfire 5272 CPU 66 MHz
- OS: uClinux
- Power: 6 VDC 600mA or Optional power supplies
- Switch: Configuration, Reset
- LED:8 (Status, Serial Activity, LAN Activity, Power)
- Default IP address: 192.168.0.1
- Browser Management port: 80
- Operational Temperature -40C to +85C subject to power supply limitations

IP-6601 Router Specifications

- Flash Memory: 128 Mbytes Minimum
- DRAM: 128 Mbytes
- LAN 1 Interface: 10/100BaseTx
- LAN 2 Interface: 10/100BaseTx
- LAN 3 Interface: 10/100BaseTx
- CPU: AMD GX-2 333 Mhz
- OS: uClinux
- Power: 12 VDC or Optional power supplies
- LED:8 (Virtual HDD, LAN Activity x3, LAN Link x3, Power)
- Default IP address: 192.168.0.1for LAN 1, DHCP for LAN 2 and LAN 3
- Browser Management port: 80
- Operational Temperature 0C to +50C

IP-6620 Router Specifications

- Flash Memory: 128 Mbytes Minimum
- DRAM: 256 Mbytes
- LAN A Interface: 10/100/1000BaseT, Autosense
- LAN B Interface: 10/100/1000BaseT, Autosense
- CPU: Pentium 4, 2.66Ghz
- OS: Linux
- Power: 120 VAC or 240 VAC, 260 Watts Maximum
- Rack-mount: 1U high
- Switch: Configuration
- LED: (Over-temperature warning, LAN Activity, LAN Status (two per interface), Power)
- Default IP address: 192.168.0.1
- Browser Management port: 443 SSL
- Operational Temperature 0C to +50C

IP-9600 Router Specifications

- Flash Memory: 128 Mbytes
- DRAM: 256 Mbytes
- LAN A Interface: 10/100BaseT, Autosense
- LAN B Interface: 10BaseT
- CPU: Motorola Coldfire 5272 CPU 66 MHz
- OS: uClinux
- Power: One of : 12/24/48/120 VDC or 120/240 VAC
- Rack-mount: 1U high
- Dimensions: 5 ¼” x 5 ½” x 1 ¾”
- Switch: Configuration

- LED: LAN Activity, LAN Status, Power
- Default IP address: 192.168.0.1
- Browser Management port: 80
- Operational Temperature -40 to + 75 C, Non-condensing

IP-6600 Async RS-232 PIN Assignments DE-9P Connector

The DE-9P RS-232 port wiring is identical to a standard PC 9 pin DE-9P COM: port. It operates as a DTE device. The chart below details signal directions and names. RJ-45 serial port wiring is detailed in a later section.

Serial Port Pin Assignments		
Pin	Signal Name	Type
1	Carrier Detect (DCD)	In
2	Receive (Rx)	In
3	Transmit (Tx)	Out
4	Data Terminal Ready	Out
5	Signal Ground (GND)	Power
6	Data Set Ready (DSR)	In
7	Request to Send (RTS)	Out
8	Clear to Send (CTS)	In
9	Ring Indicator (RI) (Not used)	In

Control Signal Operation

DCD

Input. The router monitors Data Carrier Detect (DCD) to bring up and take down PPP sessions. The modem should assert (DCD) when a connection is established and drop DCD when a connection is lost. This signal is ignored on ports configured with EtherPoll functionality.

Receive Data

Input, data into the router

Transmit Data

Output, Data from the router. The router only transmits when it has characters to send and it is not flowed-off with RTS/CTS flow control.

DTR

Output. The router will assert DTR when it is ready to establish a PPP session and will drop DTR when a PPP session is terminating. The modem should hang up the phone if DTR is inactive. Likewise it should not answer an incoming call if DTR is inactive. This output is always asserted when the port is in EtherPoll functionality mode.

Signal Ground

Common ground

DSR

Input. Data Set Ready.

RTS

Output. Input flow control. When the internal buffer reaches the “Flow Off” buffer level, this signal is lowered. When the buffer level decreases to the “Flow ON” buffer level, this signal is raised. When the pin 6 or 8 (CTS) input is LOW, the serial interface turns OFF the pin 4 (DTR) and 7 (RTS) output signals.

CTS

Input. When Flow Control is set for CTS/RTS, lowering this signal will halt data flow from the router's RS-232 port.

Ring Indicator

Not used

Synchronous RS-232 PIN Assignments IP-9600 Port 1

This pinout is used only on Port 1 of the IP-9600 model when configured for RS-232 Synchronous.

The RJ-45 RS-232 port wiring contains all the signals of a standard PC 9 pin DE-9P COM: port on a space-saving RJ-45 connector. It operates as a DTE device. The chart below details signal directions and names. Note that this port may either accept external clocking or be the clock source.

Sync RJ-45 Serial Port Pin Assignments		
Pin	Signal Name	Type
1	Receive Clock (RxC)	In/Out
2	Transmit Clock (TxC)	In/Out
3	Clear to Send (CTS)	In
4	Ground	-
5	Transmit (Tx)	Out
6	Receive (Rx)	In
7	Request to Send (RTS)	Out
8	Carrier Detect (DCD)	In

Synchronous RS-232 Operation IP-9600 Port 1

- RxC Receive Clock

Input/Output. Clock signal for synchronous receiver. This is an output when the router is configured as a clock source

- TxC Transmit Clock

Input/Output. Clock signal for synchronous receiver. This is an output when the router is configured as a clock source

- DCD

Input. The router monitors Data Carrier Detect (DCD) to bring up and take down PPP sessions The modem should assert (DCD) when a connection is established and drop DCD when a connection is lost.

- Receive Data

Input, data into the router

- Transmit Data

Output, Data from the router. The router only transmits when it has characters to send and it is not flowed-off with RTS/CTS flow control.

- Signal Ground

Common ground

- RTS

Output. Input flow control. When the internal buffer reaches the “Flow Off” buffer level, this signal is lowered. When the buffer level decreases to the “Flow ON” buffer level, this signal is raised. When pin 6 input is LOW, the serial interface turns OFF the pin 4 (DTR) and 7 (RTS) output signals.

- CTS

Input. When Flow Control is set for CTS/RTS, lowering this signal will halt data flow from the bridge's RS-232 port. If hardware flow control is enabled, the router uses the RTS and CTS signals for hardware flow control. RTS is an output from the router. It will be asserted when the router is ready to receive data and de-asserted when the router is not ready to receive data. CTS is an input to the router. The router will monitor CTS and will only transmit data when CTS is asserted.

IP-9600 Port 1 Internal Jumpers

Synchronous Clock Source:

The IP-9600 may be configured to either accept an external clock or to provide clock from an internal source.

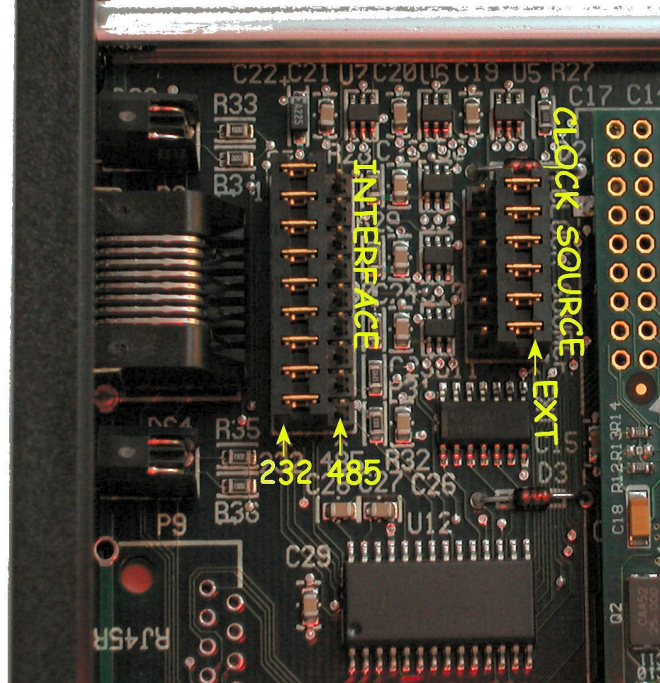
The clock source for the IP-9600 is normally set for external, and the clock signal provided by the DCE device. To configure the IP-9600 as a clock source, remove the board from the cabinet and move the clock source jumper block away from the end of the board to the EXT position as shown on the photograph below. The serial port configuration should be set for Synchronous, Internal Clock, and the speed configured correctly using the web browser configuration.

Interface Configuration (Balanced-Unbalanced):

The first port on the IP-9600 (Port 1) may be configured as an unbalanced RS-232 interface or as a balanced RS-530/V.35/RS-485/422/V.11 interface.

As shipped, Port 1 is normally set for RS-232. To configure port 1 for balanced operation, remove the board from the cabinet and move the interface selection jumper block away from the end of the board to the 485 position as shown on the photograph below.

View of jumpers for interface selection and clock source



IP-9600 Port 1 Synchronous RS-422 PIN Assignments

This pinout is used only on Port 1 of the IP-9600 model when configured for RS-422 or balanced signals (used for RS-530 or V.35). This pinout is used with adapter cables to interface with RS-530 and V.35 interfaces. Internal jumpers must be set for the RS-422 configuration.

The RJ-45 RS-422 port wiring contains the signals of a standard synchronous DCE port on a space-saving RJ-45 connector. The chart below details signal directions and names. Note that this port may either accept external clocking or be the clock source.

Sync RJ-45 Serial Port Pin Assignments		
Pin	Signal Name	Type
1	Transmit Data - (TXD-A)	Out

2	Transmit Data + (TXD-B)	Out
3	Received Data - (RXD-A)	In
4	Receive Clock - (RXCLK-A)	In/Out
5	Receive Clock + (RXCLK-B)	In/Out
6	Received Data + (RXD-B)	In
7	Transmit Clock - (TXCLK-A)	In/Out
8	Transmit Clock + (TXCLK-B)	In/Out

IP-9600 Port 1 Synchronous RS-422 Port Operation

RxC Receive Clock (RXCLK-B), PIN 5

Input/Output. Clock signal for synchronous receiver. This is an output when the router is configured as a clock source. This is the positive side of a balanced signal. The return is on PIN 4, (RXCLK-A)

TxC Transmit Clock (TXCLK-B), PIN 8

Input/Output. Clock signal for synchronous transmitter. This is an output when the router is configured as a clock source. This is the positive side of a balanced signal. The return is on PIN 7, (TXCLK-A)

Receive Data (RXD-B), PIN 6

Input, data into the router. This is the positive side of a balanced signal. The return is on PIN 3, (RXD-B)

Transmit Data (TXD-B), PIN 2

Output, Data from the router. This is the positive side of a balanced signal. The return is on PIN 1, (TXD-B)

IP-9600 Port 2 Synchronous RS-232 PIN Assignments

This pinout is used only on port 2 of the IP-9600 model.

The RJ-45 RS-232 port wiring contains all the signals of a standard PC 9 pin DE-9P COM: port on a space-saving RJ-45 connector. It operates as a DTE device. The chart below details signal directions and names. Not that this port may not be the source of clocking signals, it only accepts external clocking.

Sync RJ-45 Serial Port Pin Assignments		
Pin	Signal Name	Type
1	Receive Clock (RxC)	In
2	Transmit Clock (TxC)	In
3	Clear to Send (CTS)	In
4	Ground	-
5	Transmit (Tx)	Out
6	Receive (Rx)	In

7	Request to Send (RTS)	Out
8	Carrier Detect (DCD)	In

IP-9600 Port 2 RS-232 Interface Operation

RxC Receive Clock

Input. Clock signal for synchronous receiver.

TxC Transmit Clock

Input, Clock signal for synchronous receiver.

DCD

Input. The router monitors Data Carrier Detect (DCD) to bring up and take down PPP sessions. The modem should assert (DCD) when a connection is established and drop DCD when a connection is lost.

Receive Data

Input, data into the router

Transmit Data

Output, Data from the router. The router only transmits when it has characters to send and it is not flow-controlled with RTS/CTS flow control.

Signal Ground

Common ground

RTS

Output. Input flow control. When the internal buffer reaches the "Flow Off" buffer level, this signal is lowered. When the buffer level decreases to the "Flow ON" buffer level, this signal is raised. When pin 6 input is LOW, the serial interface turns OFF the pin 4 (DTR) and 7 (RTS) output signals.

CTS

Input. When Flow Control is set for CTS/RTS, lowering this signal will halt data flow from the bridge's RS-232 port.

IP-9600 Ports 1 & 2 Asynchronous RS-232 PIN Assignments

This pinout is used only on port 1 and port 2 of the IP-9600 model.

The RJ-45 RS-232 port wiring for ports one and two does not contain all the signals of a standard PC 9 pin DE-9P COM: port. It operates as a DTE device. The chart below details signal directions and names.

Sync RJ-45 Serial Port Pin Assignments

Pin	Signal Name	Type
1	Dataset Ready (DSR)	Out-
2	Carrier Detect (DCD)	Out
3	Busy	In
4	Ground	-
5	Receive (Rx)	Out
6	Transmit (Tx)	In
7	Clear to Send (CTS)	Out
8	Request to Send (RTS)	In

IP-9600 Ports 1 & 2 RS-232 Interface Operation

Data Set Ready

Output

TxC Transmit Clock

Input, Clock signal for synchronous receiver.

DCD

Output The router monitors Data Carrier Detect (DCD) to bring up and take down PPP sessions The modem should assert (DCD) when a connection is established and drop DCD when a connection is lost.

Receive Data

Input, data into the router

Transmit Data

Output, Data from the router. The router only transmits when it has characters to send and it is not flowed-off with RTS/CTS flow control.

Signal Ground

Common ground

RTS

Output. Input flow control. When the internal buffer reaches the "Flow Off" buffer level, this signal is lowered. When the buffer level decreases to the "Flow ON" buffer level, this signal is raised. When pin 6 input is LOW, the serial interface turns OFF the pin 4 (DTR) and 7 (RTS) output signals.

CTS

Input. When Flow Control is set for CTS/RTS, lowering this signal will halt data flow from the bridge's RS-232 port.

IP-9600 Ports 3 & 4 Asynchronous RS-232 PIN Assignments

This pinout is used only on port 3 and port 4 of the IP-9600 model.

The RJ-45 RS-232 port wiring contains all the signals of a standard PC 9 pin DE-9P COM: port on a space-saving RJ-45 connector. It operates as a DCE device. The chart below details signal directions and names. Not that this port may not be the source of clocking signals, it only accepts external clocking.

Sync RJ-45 Serial Port Pin Assignments		
Pin	Signal Name	Type
1	Dataset Ready (DSR)	Out
2	Carrier Detect (DCD)	Out
3	Busy	In
4	Ground	-
5	Receive (Rx)	Out
6	Transmit (Tx)	In
7	Clear to Send (CTS)	Out
8	Request to Send (RTS)	In

IP-9600 Ports 3 & 4 RS-232 Interface Operation

DSR

Output.

DCD

Output

Receive Data

Output, Data from the router. The router only transmits when it has characters to send and it is not flowed-off with RTS/CTS flow control.

Transmit Data

Output, Data from the router The router only transmits when it has characters to send and it is not flowed-off with RTS/CTS flow control. Input, data into the router

Signal Ground

Common ground

RTS

Input For Router Use. The router monitors modem Data Carrier Detect (DCD) to bring up and take down PPP sessions on this pin. The modem should assert (DCD) when a connection is established, and drop DCD when a connection is lost.

Input For Serial Server Use Input flow control. When the internal buffer reaches the "Flow Off" buffer level, this signal is lowered. When the buffer level decreases to the "Flow ON" buffer level, this signal is raised.

CTS

Output. When Flow Control is set for CTS/RTS, lowering this signal should halt data flow from the connected device RS-232 port.

CABLES

Cables may be purchased from DCB or user constructed. If you need a cable solution that is not standard, DCB can construct one or provide instructions if you contact DCB with the pinout and signal directions of the equipment to be connected. Commonly used cable connections:

DE-9P 9-Pin port To PC 9-pin COM: port (Also used for configuration)

IP6600		P C
1,6	██████	4
2	██████	3
3	██████	2
4	██████	1,6
5	██████	5
7	██████	8
8	██████	7

This null-modem crossover cable is easily constructed by combining a “PC-Direct” adapter hood and a “Remote-PC” adapter hood along with a straight through 10BaseT cable. This cable is used for configuration and is provided with the router.

IP-9600 Router Port to Asynchronous Modem

Use an “Asynchronous Modem” adapter hood along with a straight through 10BaseT cable. This cable may be provided with the router. Or use the cable pinout below.

RJ-45 IP-9600	Typical Color	DB-25 Modem
1	BLU	N/C
2	ORG	20
3	BLK	5
4	RED	7
5	GRN	2
6	YEL	3
7	BRN	4
8	WHT	8

This is the pin out for the DCB Asynchronous Modem Adapter Part Number 9802018.

IP-9600 Router Port to PC 9-PIN COM: port

Use a “Remote PC” adapter hood along with a straight through 10BaseT cable. This cable may be provided with the router. Or use the cable pinout below.

RJ-45	Typical	DE-9

IP-9600	Color	PC 9-Pin
1	BLU	6
2	ORG	1
3	BLK	7
4	RED	5
5	GRN	2
6	YEL	3
7	BRN	8
8	WHT	4

This is the pin out for the DCB Remote PC Adapter Part Number 9802014.

IP-9600 Router Port to PC 25-PIN COM: port

Use a “Remote PC” adapter hood along with a straight through 10BaseT cable. This cable may be provided with the router. Or use the cable pinout below.

RJ-45 IP-9600	Typical Color	DB-25 PC 25-Pin
1	BLU	6
2	ORG	8
3	BLK	4
4	RED	7
5	GRN	3
6	YEL	2
7	BRN	5
8	WHT	20

This is the pin out for the DCB Remote PC Adapter Part Number 9802013.

Router to hub or ethernet switch

Use any commercially available properly rated BaseT cable.

Router to PC crossover ethernet cable

A crossover cable may be constructed to allow the router ethernet port to directly connect to a PC without using a hub.

Use the following pinout:

10/100BaseT	10/100BaseT
1	3
2	6
3	1
6	2

Appendix B

Open Source Software Information

The router was designed in conjunction with Open Source Linux software..

Introduction

This router was designed and programmed with Open Source Linux software in mind. The core Linux operating system is uClinux, available from <http://www.uclinux.org>. DCB supports the Open Source software effort and is appreciative of the contribution many open source developers have made to the community.

Other open source software used in this product may be obtained from the original developers, and is made available in accordance with GNU licensing terms.

Obtaining the Source Code

For more information on obtaining the source modules for open source code used in this product, send a written request to the following address. Code is provided on CDROM. According to GNU licensing terms, a duplication fee may be charged. The core OS source code is available from <http://www.uclinux.org>.

Open Source Software Administrator
Data Comm for Business, Inc.
2949 CR 1000 E
Dewey, IL. 61840

Appendix C

Frame Relay

Demonstration Configuration

The router family consists of various models with different internal hardware or firmware options. Some models contain synchronous serial interfaces. All units containing synchronous interfaces also support the frame relay protocol. This quick-start information provides a framework for configuring those units.

Introduction

Some models contain synchronous RS-232/ balanced interfaces. These interfaces may be configured to use either synchronous PPP or Frame Relay protocols. By following the directions in this quick-start guide, the routers may be quickly configured to communicate using a frame relay network. This configuration is for two IP-9600 routers communicating through a frame relay switch that doesn't require any protocol management. It may also be used with a plain synchronous connection with minor changes.

Configuration

Configure two IP-9600 units to communicate via a synchronous frame relay link using no frame relay management. Make these changes, submit them on each page, activate, and save globally. You may wish to start from this configuration and add specifics that match your frame relay provider's information.

Basics

Local LAN: Subnet: 192.168.0.0/24

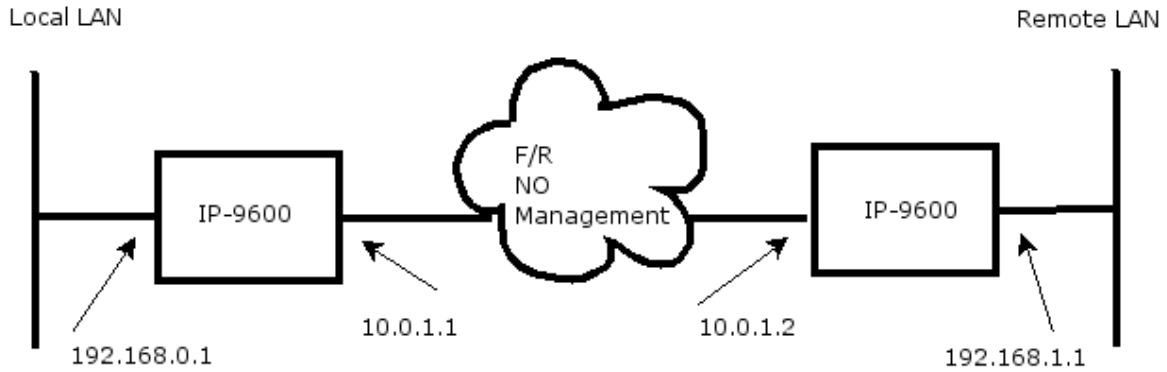
IP-9600 Ethernet A address is 192.168.0.1 /24

IP-9600 Serial 1 address is 10.0.1.1 /24

Remote LAN: Subnet 192.168.1.0/24

IP-9600 Ethernet A address is 192.168.1.1 / 24

IP-9600 Serial 1 address is 10.0.1.2 /24



Configuration:

Local IP-9600:

```

Ethernet A IP Configuration:  Ethernet -A  ENABLE
                               IP address 192.168.0.1
                               Subnet 255.255.255.0
                               No other changes to Ethernet A defaults

Serial 1 Operating Mode:      Serial-1 ENABLE
                               Protocol: Frame Relay
                               Sync Clock source: EXTERNAL
                               No other changes to defaults

Serial 1 Frame Relay:        Link Management NONE
                               Line 1:
                               ENABLE,
                               DLCI=16,
                               LocalIP= 10.0.1.1
                               RemoteIP = 10.0.1.2
                               No other changes to defaults

Serial 1 Static Routes       Target: 0.0.0.0
                               Netmask: 0.0.0.0
                               DLCI/Gateway: 16
                               No other changes to defaults

Serial 1 Advanced            No other changes to defaults

```

Remote IP-9600:

```

Ethernet A IP Configuration:  Ethernet -A  ENABLE

```

	IP address 192.168.1.1
	Subnet 255.255.255.0
	No other changes to Ethernet A defaults
Serial 1 Operating Mode:	Serial-1 ENABLE
	Protocol: Frame Relay
	Sync Clock source: EXTERNAL
	No other changes to defaults
Serial 1 Frame Relay:	Link Management NONE
	Line 1:
	ENABLE,
	DLCI=16,
	LocalIP= 10.0.1.2
	RemoteIP = 10.0.1.1
	No other changes to defaults
Serial 1 Static Routes	Target: 0.0.0.0
	Netmask: 0.0.0.0
	DLCI/Gateway: 16
	No other changes to defaults
Serial 1 Advanced	No other changes to defaults

Notes

If no frame relay network switch is used, a synchronous modem eliminator or equivalent and proper cabling must be inserted between the two routers to provide synchronous clocking.