Microtronix Datacom
Access 1000 and 4000

Terminal Server
Synchronous Server
X.25/TCP Gateway
SIP/SMDI MWI Gateway
Collection Manager

Access User Guide
Software Revision 1.1.2

4056 Meadowbrook Drive, Unit 126
London ON N6L 1E3
CANADA
www.microtronix.com
+519-690-0091

Table of Contents

1 About the Access 1000/4000 Gateway

1.1 Overview

The Access 1000/4000 Gateway has serial and Ethernet ports to provide a number of serial/IP conversions. It comes with a number of standard and optional applications that make use of these interface conversions. An easy to use, intuitive, web-based server is built in, allowing any standard Internet browser for configuration and monitoring. Context-sensitive help is available.

1.1.1 Serial-TCP Terminal Server

The Terminal Server provides conversion of asynchronous/serial interfaces to TCP/IP sockets. This allows external TCP applications, or internal applications like the MWI Gateway and Collection Manager to make a connection to a serial interface.

The Terminal Server comes standard.

1.1.2 HDLC-TCP/UDP Synchronous Server

The Synchronous Server provides conversion of synchronous/HDLC interfaces to TCP/IP sockets. This allows external TCP or UDP applications, or internal applications like the Collection Manager to make a connection to a synchronous interface.

It can also act as a bridge to interconnect 2 synchronous interfaces, replacing any leased line or dial-up modem with an IP network connection.

The Synchronous Server comes standard.

1.1.3 X.25-TCP/IP Gateway

The X.25/TCP Gateway provides conversion of X.25 and TCP/IP for external and internal applications like the Collection Manager. X.25 logical channels are mapped to TCP/IP sockets using a comprehensive routing table that allows for full control of call setup and recognition. Several message encapsulation methods are supported for preservation of messages to suit a variety of applications.

Connections can be made from one X.25 port to another to provide X.25 switching, and X.25 network replacement can be achieved using XOT (X.25 Over TCP).

1.1.4 SIP/SMDI MWI Gateway

The MWI Gateway provides routing and translation of Message Waiting Indicator (MWI) notifications from VoIP Unified Messaging Servers and legacy Voice Mail Systems to one or more legacy or VoIP telephone switches or PBX's.

1.1.5 Collection Manager

The Collection Manager provides collection of Call Detail Records (CDR), and other file types, from legacy X.25 Central Office voice switches and IP-based soft switches.

1.2 Hardware Features and Interfaces

1.2.1 Model 1000-S04 and 1000-N04

- -48VDC connector for Central Office (CO) installation
- S04 includes 100-240VAC adapter, N04 includes -48VDC cable
- 10/100 Base-T Ethernet - RJ45
- WAN (console) interface - DB25F RS530[A] configurable for RS232/V.24, X.21, V.35, RS449/V.36
- USB 1.1 Host Port interface - for additional serial interfaces or storage device
- Rack-mountable using 19” or 25” shelf

1.2.2 Model 4002-S04 and 4002-N04

- -48VDC connector for Central Office (CO) installation
- S04 includes 100-240VAC adapter, N04 includes -48VDC cable
- 10/100 Base-T Ethernet – RJ45
- 2 - WAN interfaces - DB25F RS530[A] configurable for RS232/V.24, X.21, V.35, RS449/V.36
- USB 1.1 Host Port interface for additional serial interfaces or storage device
- Rack-mountable using 19” or 25” shelf

1.2.3 Model 4002-N04-RM

- 19” 1U rack mount enclosure (25” rack extension available)
- -48VDC connector for Central Office (CO) installation
- 10/100 Base-T Ethernet – RJ45
- 2 WAN interfaces - DB25F RS530[A] configurable for RS232/V.24, X.21, V.35, RS449/V.36
- Internally-mounted USB 1.1 Host port interface for internal flash drive or 4 port serial expansion

1.2.4 Model 4002-N44-RM

- 19” 1U rack mount enclosure (25” rack extension available)
- -48VDC connector for Central Office (CO) installation
- 10/100 Base-T Ethernet – RJ45
- 2 WAN interfaces - DB25F RS530[A] configurable for RS232/V.24, X.21, V.35, RS449/V.36
- 4 Serial ports – DB9M RS232 (internally mounted USB serial adapter)

1.3 Software/Application Features

1.3.1 System Configuration and Management

- Web-based interface accessible through any Internet browser
- Context-sensitive help on all web pages
- Command line interface available on WAN or Serial ports; ssh or telnet interfaces
- Syslog with optional remote syslog and/or storage on remote file server

1.3.2 Redundancy

- Redundancy on a pair of units using IP takeover
- Primary with redundant backup unit
- Co-redundancy between a pair of active units
- Redundancy may use primary or secondary/virtual IP addresses

1.3.3 Terminal Server

- Asynchronous Serial interface to TCP/IP
- Client or server support
- Configurable speed, parity, stop bits, and flow control method
- 1, 2, 4, or 8 additional ports on USB-attached serial adapter (optional)

1.3.4 Synchronous Server

- Synchronous HDLC interface to TCP/IP or UDP/IP
- Cient or server support
- Configurable speed, internal or external clocking
- Configurable Encoding (NRZ/NRZI)
- Configurable CRC checking and generation (16 bit, 32 bit)
- Unumbered Information (UI) header recognition and generation

1.3.5 X.25

- 1024 logical channels
- SVC and PVC
- Negotiable packet sizes 16 to 4096 bytes
- Modulo-8 and 128
- DTE or DCE individually selectable at physical, data link, and packet layers

1.3.6 X.25-TCP/IP Gateway

- X.25 to TCP routing
- TCP to X.25 routing
- X.25 encapsulation using X.25 Over TCP (XOT)
- Configurable X.25-TCP conversion/encapsulation methods or RAW

1.3.7 X.25 Packet Switching

- Switching calls between local ports (using local XOT connections)
- Switching calls between remote units using XOT

1.3.8 MWI Gateway

- SIP to SMDI MWI Conversion
- SMDI to SIP MWI Conversions
- MWI Routing by DN

1.3.9 Collection Manager

- Collects CDR and other files from Central Office switches
- Multiple file streams
- Client (pull) and server supported
- Supports X.25, serial, synchronous/HDLC/LAPB, and IP switch interfaces
- File distribution via FTP or SFTP/IP

2 Installation

The first step that should be taken is to ensure that you have received all the equipment ordered and that it has not been damaged in transit. If there are any external signs of damage, note them in writing and contact the transport company to make a claim.

2.1 Packing List

Unless pre-arranged, the following are the lists of the standard items that are packed and shipped with each model:

2.1.1 Model 1000-S04

Qty	Part Number	Part Description
1	1000-S04	Access 1000 Gateway unit with -48VDC input connector
1	5883-PSC30U-48	100-240VAC adapter
1		Country-specific AC power cord (NA, EU)
1	[284-MC1MF	DB9F-DB25M Console cable
1	811-W6002-06	RJ45 Ethernet patch cable (blue), 6 ft

2.1.2 Model 1000-N04

Qty	Part Number	Part Description
1	1000-N04	Access 1000 Gateway unit with -48VDC input connector
1	W1000	-48VDC Power cord
1	[284-MC1MF	DB9F-DB25M Console cable
1	811-W6002-06	RJ45 Ethernet patch cable (blue), 6 ft

2.1.3 Model 4002-S04

Qty	Part Number	Part Description
1	4002-S04	Access 4000 Gateway unit with 12VDC input connector
1	589-PS-1213AP	120/240VAC adapter
1		Country-specific AC power cord (NA, EU)
1	[284-MC1MF	DB9F-DB25M Console cable
1	811-W6002-06	RJ45 Ethernet patch cable (blue), 6 ft

2.1.4 Model 4002-N04

Qty	Part Number	Part Description
1	4002-N04	Access 4000 Gateway unit with -48VDC input connector
1	W4002	-48VDC Power cord
1	[284-MC1MF	DB9F-DB25M Console cable, 6 ft
1	811-W6002-06	RJ45 Ethernet patch cable (blue), 6 ft

2.1.5 Model 4002-N04-RM

Qty	Part Number	Part Description
1	4002-N04-RM	Access 4000 Gateway 19” 1U rack mount enclosure with -48VDC connector
1	W4002	-48VDC Power cord
1	[284-MC1MF	DB9F-DB25M Console cable, 6 ft
1	811-W6002-06	RJ45 Ethernet patch cable (blue), 6 ft

2.1.6 Model 4002-N44-RM

Qty	Part Number	Part Description
1	4002-N44-RM	Access 4000 Gateway 19” 1U rack mount enclosure with 4 Serial ports and -48VDC connector
1	W4002	-48VDC Power cord
1	[284-MC1MF	DB9F-DB25M Console cable, 6 ft
1	811-W6002-06	RJ45 Ethernet patch cable (blue), 6 ft

2.1.7 Optional items

In addition to the above standard items, one of more of the following may be ordered:

- Additional WAN or serial cables
- 19” 1U rack mount shelf for holding 1, 2, or 3 Access 1000 units
- 19” 1U rack mount shelf for holding 1 or 2 Access 4000 units
- 19” to 25” rack mount adapter kit
- External USB serial adapter: 1, 2, 4, or 8 ports
- Internally mounted 4-port USB serial adapter for model 4002-N04-RM
- USB 2.0 8GB or 32GB flash drive (standard with Collection Manager)
- -48VDC to 100-240VAC adapter

2.2 Location

Select a location for the Access Gateway that meets the following requirements:

- Is within cabling distance of the network equipment and power connections.
- Complies with the Environment and Electrical Requirements outlined in this section.
- Does not have restricted airflow. There must be at least 2 inches clearance on all sides so that proper air ventilation is not obstructed. If space is at a premium, you may place light equipment, such as the network modem, on top of the unit.
- Permits access to the back of the unit to allow user to make cable connections.

2.3 Mounting

The Access Gateway may be placed on any flat surface or shelf provided that the unit is within 3 feet of an AC power source. At least 2" of space on each side of the unit is required to ensure proper air flow. The physical dimensions (D x W x H) and nominal weight of the Access Gateways are:

- Model 1000 – 3.34" x 5.625" x 1.25", 0.5 lb (.0.22 kg)
- Model 4002 – 5.5" x 7.25" x 1.6" (14 x 18.5 x 4 cm), 1.4 lb (0.64 kg).
- Model 4002-RM – 5.4" x 14" x 1.72", 4 lb
- Model 4002-RM – 5.4" x 14" x 1.72", 4 lb

2.4 Electrostatic Considerations

All microcomputers are sensitive to electrostatic discharges (ESD). A direct ESD discharge to the chassis or cables can disrupt unit operation, induce a latent failure condition, or even permanently damage circuit components. For these reasons, you must use good ESD control procedures that electrically ground you when making direct physical contact with the unit or cables. The use of grounding wrist straps and cords is strongly recommended for controlling discharges and preventing ESD damage.

WARNING:

To prevent damage to port drivers and receivers, you must use proper electrostatic control precautions when attaching or handling cables.

2.5 Environmental Specifications

The environmental specifications recommended for maximum reliability of the Access Gateway are:

Ambient Temperature	5 to 40 degrees C (For short term operation to 45 degrees C)
Temperature rate of change	3 degrees / hour
Humidity	10% to 95% (non-condensing)
Humidity rate of change	2% / hour

2.6 Power Requirements

The Access Gateway operates from a -48VDC power source.

The maximum power dissipation is listed below.

Operating Voltage	Access 1000 -48 VDC	Access 4000 -48 VDC
Current Draw (maximum)	125 mA	350 mA
Power	6 Watts	17 Watts
BTU	21 BTU / hour	58 BTU / hour
Fuse	1 Amp	1 Amp

2.6.1 -48VDC Electrical Connection

The Access 1000 and 4000 with the -48VDC option are designed to operate from an approved -48VDC Secondary Extra-low Voltage (SELV) commercial battery backed power source used in TELCO Central Office (CO) applications. A 3-pin male power connector – suitably labeled – is provided on the rear of the unit for connecting the -48VDC power source. The unit is protected against reverse polarity connection of the -48VDC power source. The 48VDC power connection should be protected with a 2A, 50VDC fuse or circuit breaker.

A flame retardant wire harness with a 3-pin female jack is provided for making the -48VDC power connection. Three #22 AWG wires in the harness provide the DC power: red +, black -, and one green wire provides the chassis ground connection.

The Frame Ground screw connection on the rear panel **must** be used in order to comply with installation requirements. This #8-32 machine screw has two external toothed (star) lock washers to secure the unit rear plate Frame Ground connection to the Central Office GND system.

The terminal lug of the green wire ground wire must be placed between the star washers to assure an adequate connection. A #14 AWG or larger copper wire must be used; its length should be minimized to assure effectiveness for controlling ESD and EMI.

The Access 1000 wire harness (part number W1000) has an On Shore Technology # OSTTJ0331530 (Digi-Key # ED287-ND) 3-position female jack.

Model 1000-Nxx -48VDC power connector and W1000 wire harness

The Access 1000 and 4000 may also operate from an AC power source using the safety and agency approved (CSA/UL etc.) external 100-240 VAC switching power supply.

Model 1000-Sxx -48VDC AC power supply

The Access 4000 wire harness (part number W4002) has a Molex # 39860-0703 (Digi-Key # WM5855-ND) female jack.

Figure 3: Model 4002-Nxx -48VDC power connector and W4002 wire harness

3 Initial Start-up Procedure

The first step in the initial setup is to configure the IP address and network parameters. This may be accomplished through the serial console port, or using a web browser from a PC on a reachable Ethernet network.

Obtain the following information from your network administrator:

- IP address to be assigned to the Access Gateway
- subnet mask
- address of the default gateway
- Domain Name Server (DNS)

3.1 Configuring IP from the Ethernet port

The IP address can be configured using a standard Internet browser from a PC. The default IP address of the Access Gateway is **10.1.1.240**. The procedure is:

1) Configure a PC's Ethernet/LAN to have an IP Address on the same subnet, for example: 10.1.1.200, subnet mask 255.255.255.0
2) Connect an Ethernet patch cable between the PC and the unit, or connect to a common hub.
3) Connect power cord to the Access Gateway unit
4) Open an Internet browser on the PC to navigate to http://10.1.1.240.
5) Login with username “admin” and password “admin”.
6) Select the **Network** option from the menu in the left pane of the main screen.
7) Configure the desired IP address and network parameters as outlined in the Network section.
8) Remove the cable from the PC and connect to the network.
9) Restore the PC's previous IP settings.

3.2 Configuring Default IP from the Console port

WAN port 0 on the Access 1000 and WAN port 1 on the Access 4000 also serve as console ports during boot-up after power is applied. There is a 10 second window that interrupts the boot process to allow configuration using the console port.

To configure default IP network values in the bootup environment:

1) Connect the Console Cable (DB25M-DB9F) between a PC COM port and the console port of the Access Gateway. A USB serial adapter will be required on the PC if it does not have a serial COM port.
2) Start a terminal emulator like putty or HyperTerminal on the PC and select the correct COM port.
3) Set the COM port for: 9600 bits per second, 8 data bits, no parity, 1 stop bit, no flow control.
4) Connect power cord to apply power to the Access Gateway unit. Startup messages will appear followed by the message: “**`Autoboot in 10 seconds (Enter password to stop)…`**”
5) Before the 10 second timer expires, type the password “**`foad`**”. (The “`A4K:>`” prompt will be displayed). Retype from the beginning if an error is made.

6) Enter the following commands replacing the example values with those provided by your network administrator:

```
set ipaddr 10.1.1.240
set netmask 255.255.255.0
set gatewayip 10.1.1.1
```

7) (optional) Enter a new host name:

```
set hostname NEWNAME
```

8) Enter the following commands to save the changes and restart the system.

```
save
boot
```

3.3 Emergency IP Address Recovery

The u-boot console may be used to recover a forgotten IP address. While in the U-Boot console mode, the default IP address and other parameters may be displayed:

```
print ipaddr
print netmask
print gatewayip
```

If the default values are not in current effect, they may override the system-defined values temporarily by setting new default values (if desired) and entering the U-Boot commands:

```
set ipaddr 10.1.1.240
set netmask 255.255.255.0
set gatewayip 10.1.1.1
set runlevel 2
save
boot
```

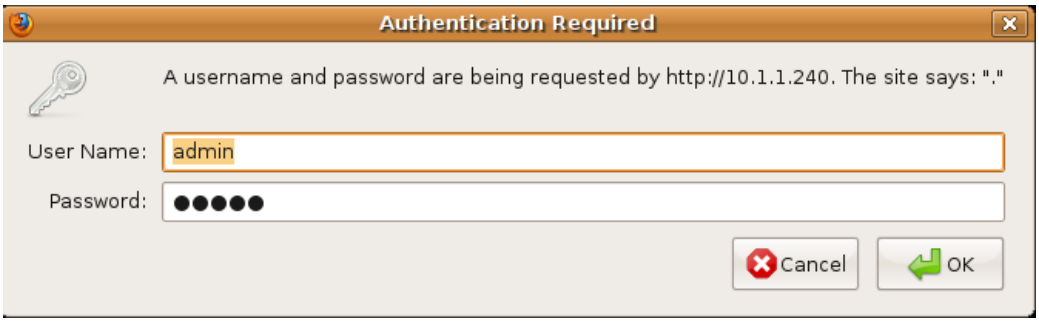
When the system starts up, it will be using the default IP address information, and should be reachable on that network. Browse into the web interface and access the **Network** page to view the “forgotten” values. Restart the system to get the U-Boot console, and reset run level:

```
set runlevel
save
boot
```

The system will restart with the system-defined values.

3.4 Web Configuration Interface

To access the web-based configuration interface, use an Internet browser to navigate to the IP address of the gateway (default 10.1.1.240). When the authentication pop-up appears, use the default username "**admin**" and password "**admin**" to log on.



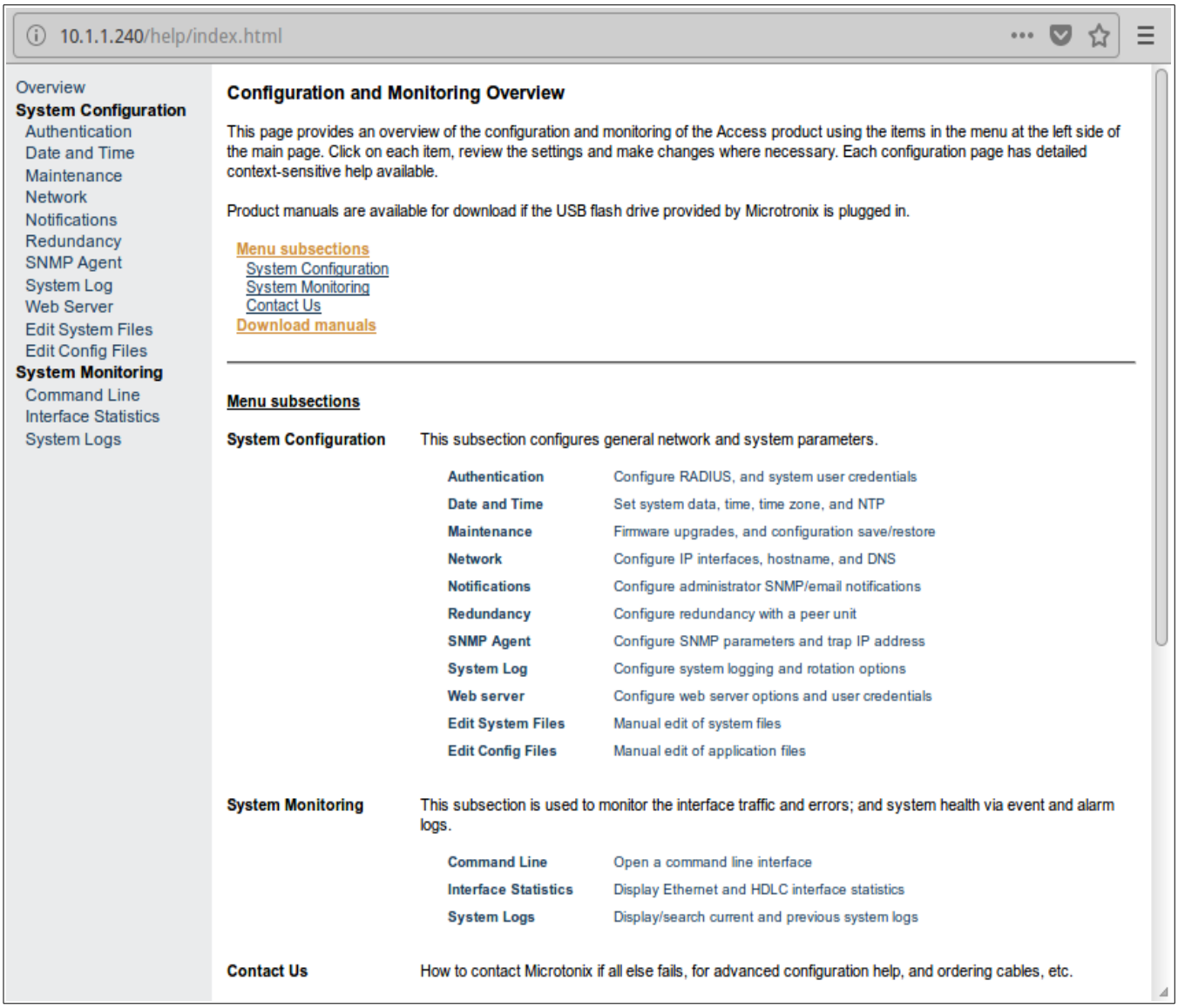
Click OK, and the Home page will be displayed with the main menu down the left side. The page will reflect model, hostname, version, and installed applications (example shows none installed).

Click the Help button for a general configuration guide, and to download full documentation manuals.

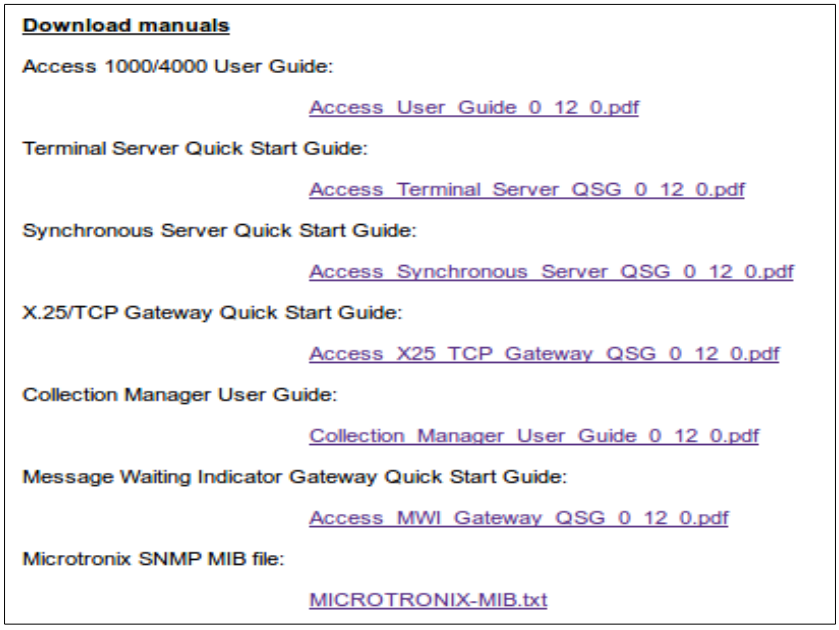
Using the main menu in the left hand pane of the displayed page, click the desired configuration or display options. Edit as needed and remember to click any Apply or Update button to save changes.

Under the **System** section of the main page menu, **Date and Time** settings can be used to configure date, time, time zone, and NTP server. The IP network settings are available with the **Network** menu item. Refer to the following sections for more detail: Date and Time, and Network.

Context-sensitive help is available with the **Help** button located in the top right of each page. These contain the most up-to-date information, and should be used in preference to this manual. An overview is available from the help button on the main page:



If there is a Microtronix USB 2.0 flash drive installed in the unit, the manuals (including this one) are available by following the **Download manuals** link in Menu subsections:



3.5 Configuring a Terminal Server

To set up a port for asynchronous / serial use, click on the **Serial - TCP** item in the **Terminal Server** section of the main menu to display the configuration form. Configure the interface parameters to match the attached device, and assign the TCP/IP network parameters to be connected to this interface. Click on the **Status** item in the same section of the main menu to check the interface operation.

Refer to the Terminal Server sections: Serial - TCP item for configuration details, the Status item for details on the status display, and the Control and Log item for details of that display.

3.6 Configuring a Synchronous Server

To set up a port for synchronous / HDLC use, click on the **HDLC – TCP/UDP** item in the **Synchronous Server** section of the main menu to display the configuration form. Configure the interface parameters to match the attached device, and assign the TCP/IP network parameters to be connected to this interface. Click on the **Status** item in the same section of the main menu to check the interface operation.

Refer to the Synchronous Server sections: HDLC -TCP/UDP item for configuration details, the Status item for details on the status display, and the Control and Log item for details of that display.

3.7 Configuring the X.25/TCP Gateway

To set up a port for X.25 use, click on the **HDLC Physical Layer**, **LAPB Link Layer**, and **X.25 Packet Layer** items in the **X.25 WAN** section of the main menu to display the configuration form for each layer of the protocol. Configure the parameters to match the attached device. Refer to the X.25 WAN section for configuration details: X.25 Packet Layer , LAPB Link Layer, and HDLC Physical Layer.

Click on the **Status** item of the **X.25 WAN** section to display the operational status of the X.25 interfaces, and **LCI Status** to display the operational status of any active logical channels. Refer to the X.25 Status section for details on the display of X.25 interfaces, and LCI Status for details on the display of logical channels.

To configure the X.25 to TCP/IP socket interconnections, click on the **X.25 to TCP Routes** item in the **X.25 Gateway** section of the main menu to display the configuration form. Add or modify routing entries to map incoming X.25 connections to outbound TCP connections.

To configure the TCP to X.25 mapping / routing, click on the **TCP to X.25 Routes** item in the **X.25 Gateway** section of the main menu to display the configuration form. Add or edit routing entries to map incoming TCP connections to outbound X.25 connections.

Click on the **Connection Status** item of the **X.25 Gateway** section to display the operational status of any active X.25–TCP connections.

Refer to the X.25 Gateway sections for configuration details: TCP to X.25 Routes, and X.25 to TCP Routes, the Connection Status item for details on the status display of X.25-TCP connections, and the Control and Log item for detail on that display.

3.8 Configuring the SIP/SMDI MWI Gateway

To configure the MWI Gateway, click on the MWI Gateway MWI Gateway items.

To configure a VoIP voice messaging (UMS or VMS) server as a source for SIP Notify MWI messages, click on UMS SIP Interface. To configure a legacy VMS as a source for SMDI MWI messages, click on VMS Interface.

To configure the MWI output to legacy switch SMDI links, or to VoIP PBX's, click on Switch Interfaces.

3.9 Configuring the Collection Manager

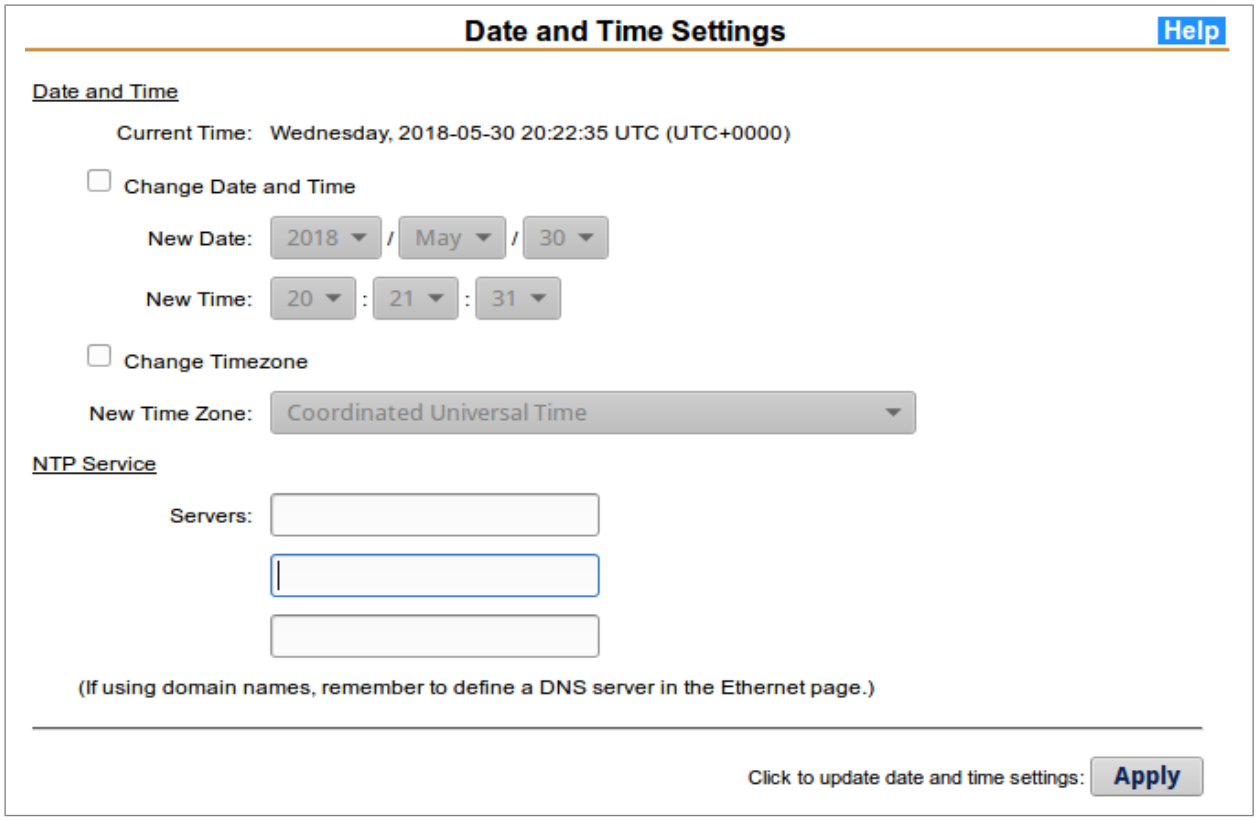
To configure the Collection Manager, refer to the **Collection Manager** user guide.

4 System Configuration

This section allows general configuration and administration of the system. Click on each item in the **System** section of the main menu to display and modify system parameters.

4.1 Date and Time

The Date and Time page displays the current time and date for the time zone configured. Time, date, and time zone may be changed. For synchronized time, an NTP server should be configured.



4.1.1 Date and Time Setup

To modify the date, time of day, and time zone, select the relevant Change box and use the drop down menus to select the correct values.

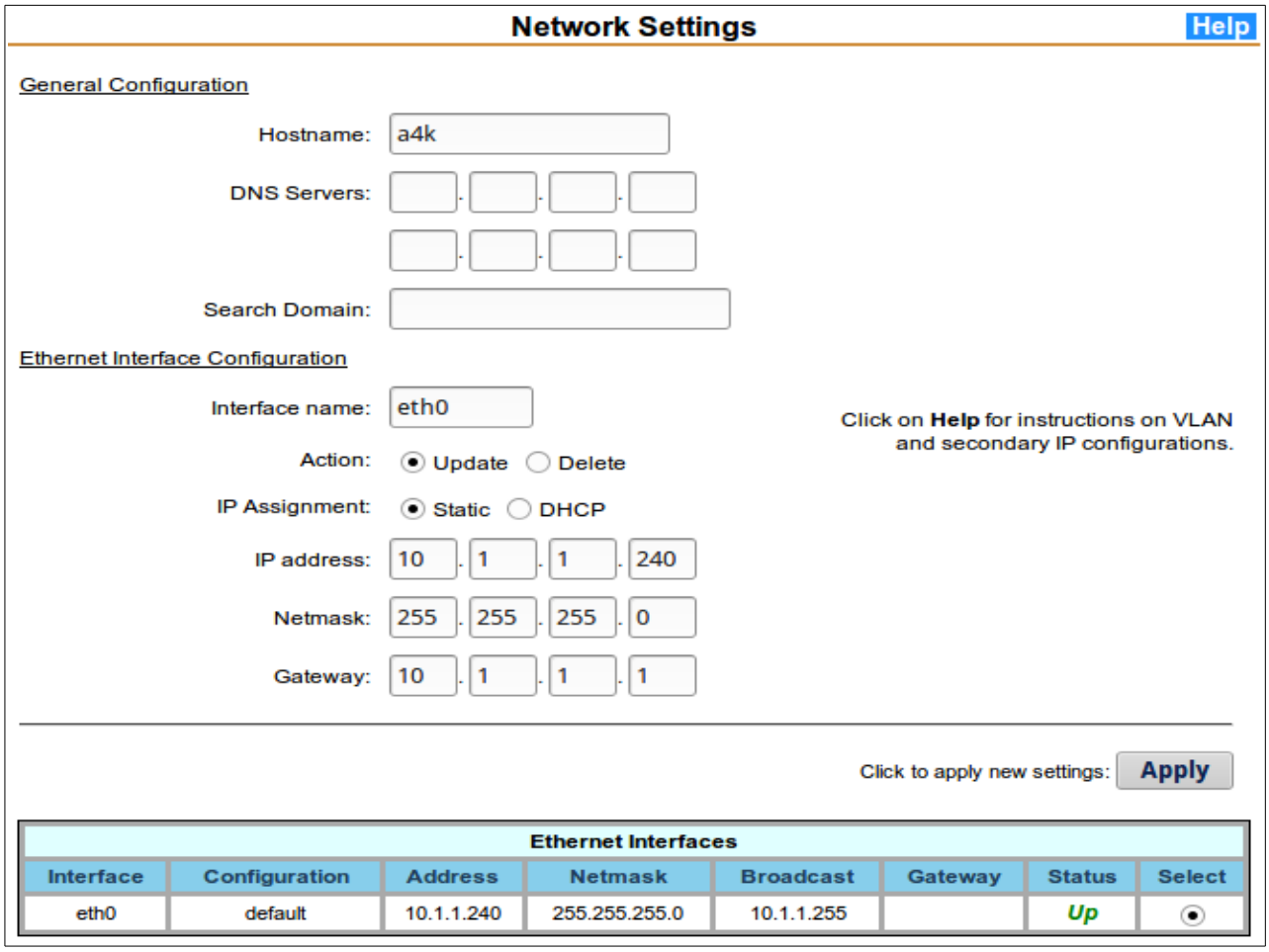
4.1.2 NTP Service

To use an NTP (Network Time Protocol) server to synchronize the correct time, enter the desired NTP server address(es). A DNS server will need to be configured in the Network Configuration section if a domain name is used.

To apply changes, click the **Apply** button. Changes will take effect immediately.

4.2 Network

The Network page displays the status of the current interfaces configured. The form allows changes to the interfaces and the addition of VLAN and secondary IP interfaces.



4.2.1 Network Setup

To modify the IP network settings, fill in the provided configuration fields. If the desired interface has previously been configured, the interface may be selected from the Ethernet Interfaces table which will populate the fields with its current settings.

To configure a VLAN interface, enter “eth0.*x*” in the “Interface Name” field, where ‘*x*’ is an integer from 0 to 4094.

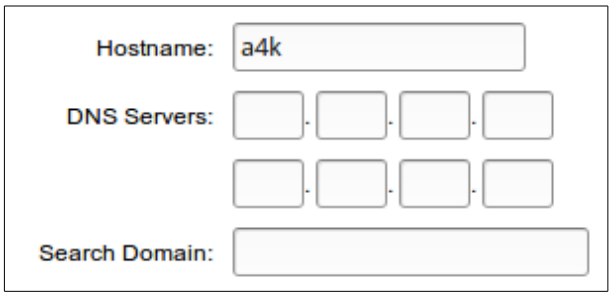
To configure a secondary IP address, enter “eth0:*x*” in the “Interface Name” field, where ‘*x*’ is an integer from 0 to 4095.

To delete a previously configured interface, select it from the table and click on the Delete action button.

To apply changes, click the **Apply** button. Only the interface corresponding to the Interface Name field will be updated.

Note: Upon updating the primary Ethernet adapter configuration, the web interface will automatically redirect the browser to its updated location, if reachable.

4.2.2 General Configuration



Hostname: The host name assigned to the Access Gateway.

DNS: To specify DNS servers for domain name resolution, enter the desired addresses in the provided fields. A DNS serach domain may be entered.

4.2.3 Ethernet Interface Configuration

Network interfaces may be modified, added, or deleted by using this form. The “eth0” interface refers to the Ethernet 10/100 port. Secondary IP addresses and VLAN interfaces may be added to “eth0”. The name may be entered or selected from the Ethernet Interface table.

Interface Name: The label assigned by Linux to the Ethernet adapter. The default primary Ethernet adapter is labelled “eth0”, secondary IP labels appear as “eth0:x, and VLAN labels appear as “eth0.*x*” where x is an integer from 0 to 255.

Action: Choose Update to add or modify the interface displayed in the form, or Delete to remove it. If “eth0” is deleted, the default IP address and network configuration defined in u-boot parameters will be

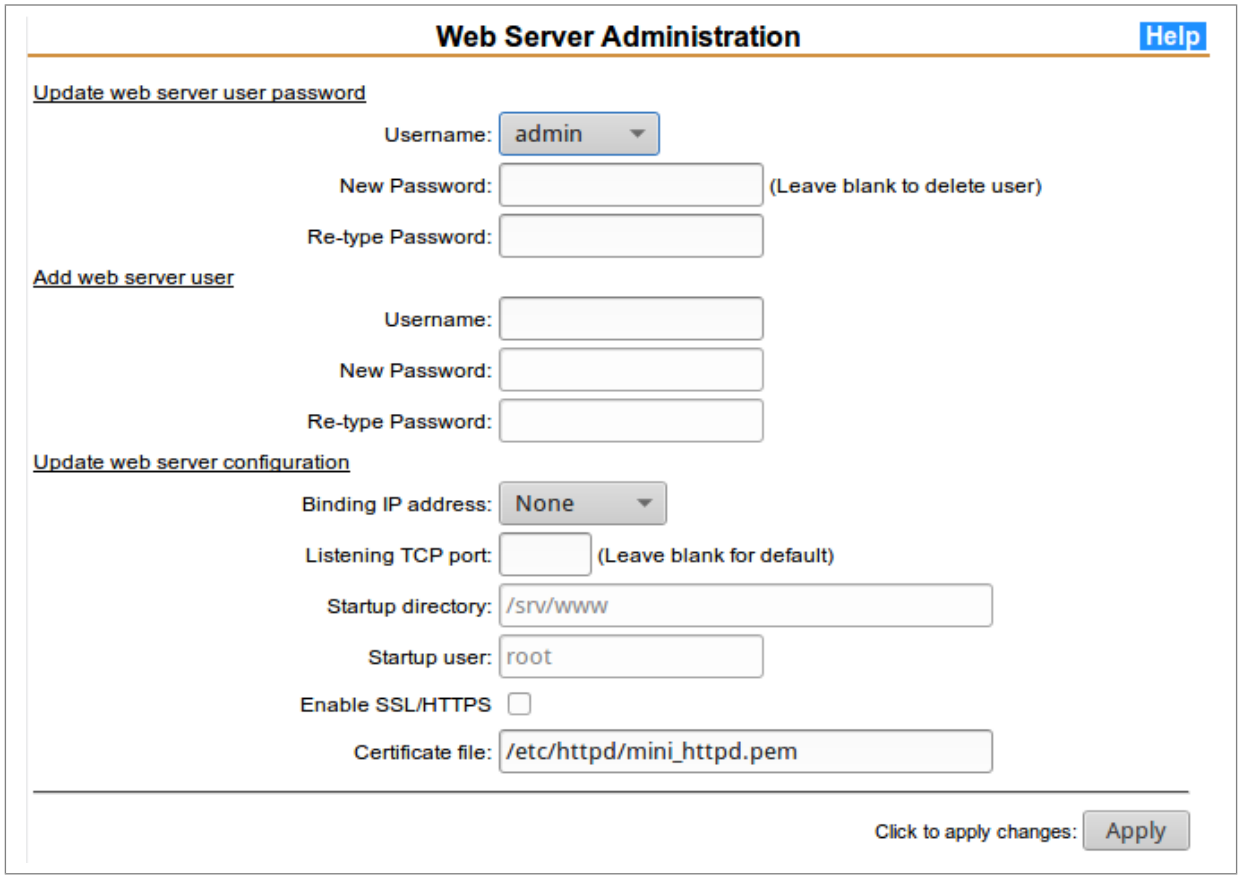
IP Assignment: To specify a static IP address for the interface, select “Static”. To have a DHCP server assign IP network settings automatically, select “DHCP”. When the DHCP option is selected, the following parameters are disabled.

IP Address: The IP address used for web interface access and route connections.

Netmask: The subnet mask which specifies the gateway's network accessibility.

Gateway: The IP address of the gateway. If defined in “eth0”, it becomes the default gateway.

4.3 Web Server



4.3.1 Update web server user password

Select a name from the drop-down list of configured web users, then enter a password to be used for authentication for the selected user. Enter the new password a second time for validation.

4.3.2 Add web server user

Enter a new web user name in the Username field, then enter a password to be used for authentication for the user. Enter the new password a second time for validation.

User names begining with “admin” (case insensitive), and user name “root” have full read/write privileges. Any other user name has read-only privilege.

4.3.3 Update web server configuration

4.3.3.1 Web Server Parameters

Binding IP address: Choose the local IP interface to which the TCP listening port should be bound to prevent unauthorized external access from other IP interfaces. If 127.0.0.1 is selected, then a secure ssh tunnels should be defined to allow specific clients to connect using public key authentication.

Listening TCP port: Enter the TCP port number that should be used for the web werver. Port 80 is assumed if non-secore HTTP is configured, and 443 if SSL/HTTPS is enabled.

Startup directory: Enter the directory where web pages reside. This is fixed at "/srv/www/" on the Access 1000/4000.

Startup user: Enter the user name under which the web server should operate. This is fixed as "root" on the Access 1000/4000.

Enable SSL/HTTPS: Click the button to select secure HTTPS operation.

Certificate file: Enter path and name of the certificate file to be used for HTTPS. The default is shown in the form above.

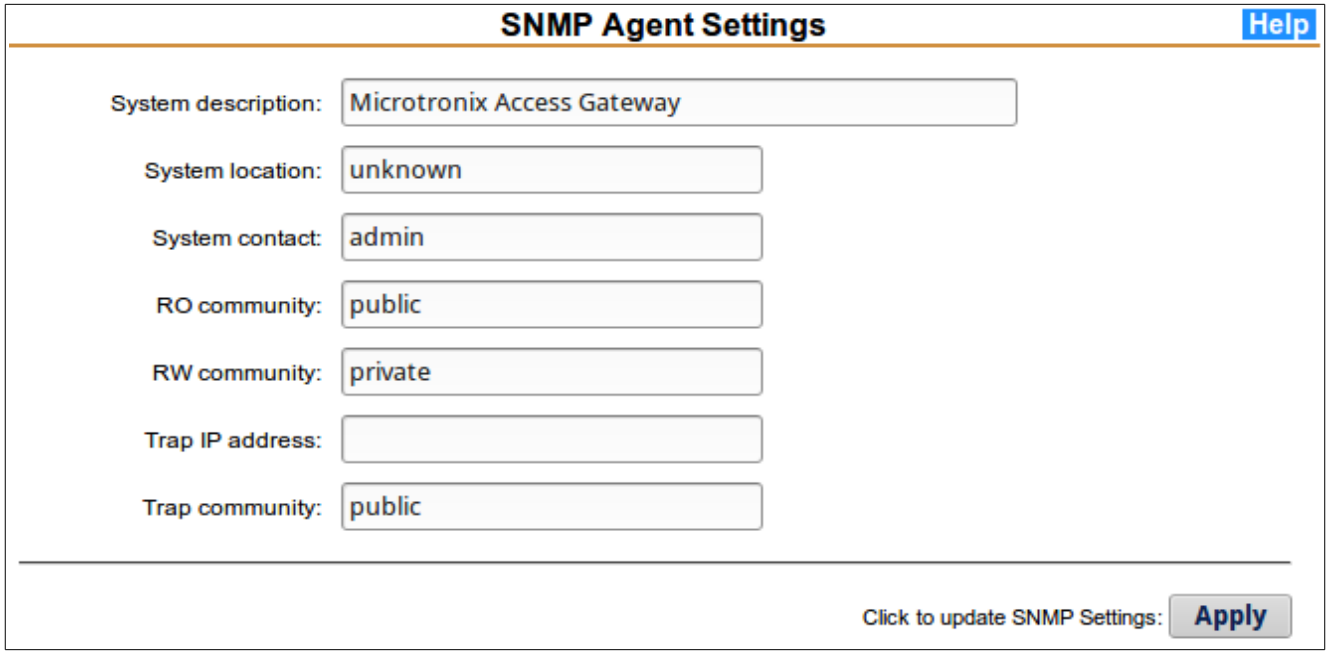
4.4 SNMP Agent

An SNMP agent is enabled by default in the Access Gateway, and will respond to requests if polled. The RO Community name must match that used by the the remote SNMP client. The client may change the system parameters, in which case the RW Community name must also match.

If the Trap IP Address is defined, then system startup and interface alarms will be delivered to the SNMP management server at that address. The Trap Community name must be changed to that expected by the server.

The SNMP parameters may be modified using the form and clicking the Apply button. Changes will take immediate effect.

The Microtronix enterprise-specific MIB can be downloaded from the help page.



4.4.1 SNMP Parameters

System Description: A string describing the system name.

System Location: A string describing the system location.

System Contact: A string describing the system contact information.

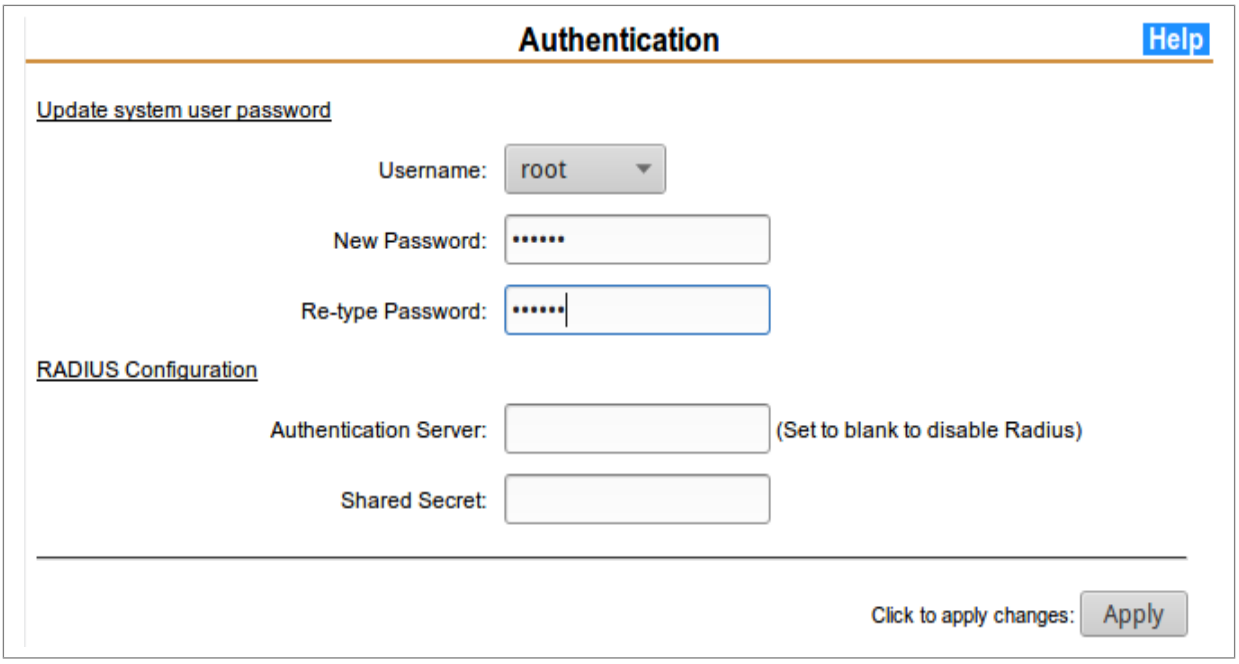
RO Community: A string describing the community for read-only access.

RW Community: A string describing the community for read-write access.

Trap Community: A string describing the community for traps.

Trap IP Address: The address of the SNMP server listening for traps.

4.5 Authentication



4.5.1 Update system user password

4.5.1.1 Sytsem user Parameters

Username: Select from {root, admin}.

New Password: Enter a password to be used for authentication for the selected user.

New Password (re-enter): Enter the new password a second time for validation.

4.5.2 RADIUS Authentication

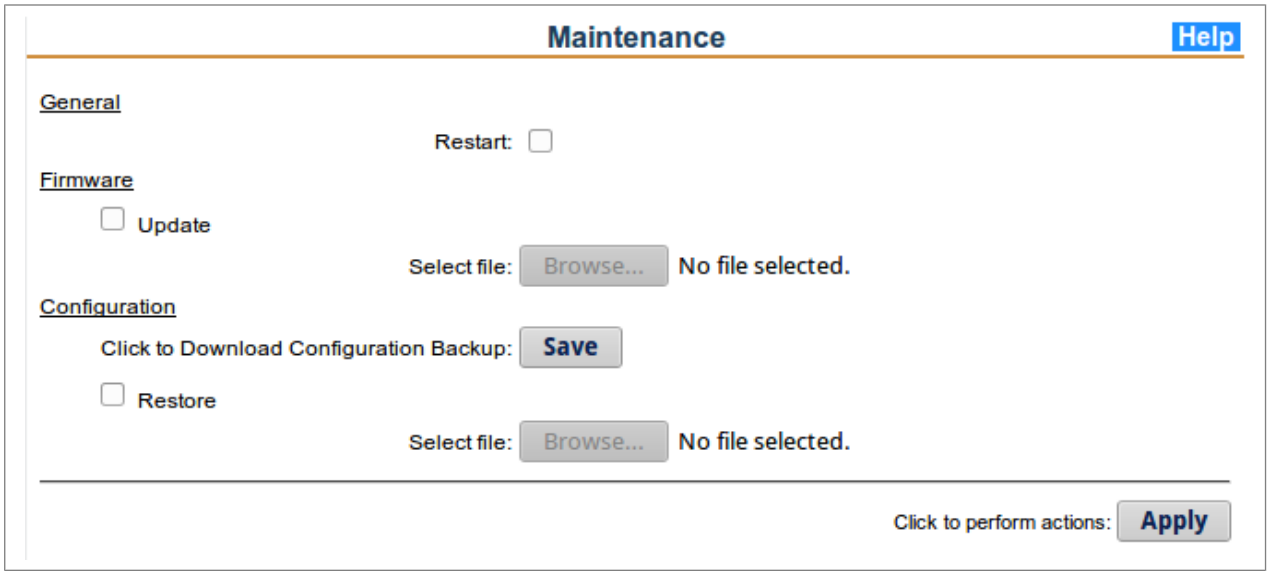
To enable authentication through a RADIUS server, select the “Use RADIUS for Authentication” box, and enter the RADIUS server parameters in the provided fields.

4.5.2.1 RADIUS Parameters

Authentication Server: Enter the server address. To avoid a DNS query it is recommended that an IP address is used instead of a hostname.

Shared Secret: Enter the shared secret that the RADIUS server will use to validate and encrypt communication between the client and the server. Whitespace characters in the shared secret are not supported by the RADIUS client.

4.6 Maintenance

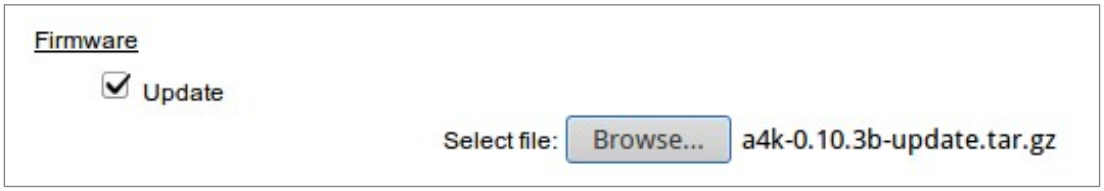


4.6.1 General

To reboot the Access Gateway, select the Restart box and click **Apply**. If other maintenance actions are selected on this page, they will be performed prior to rebooting.

4.6.2 Firmware

To update the firmware (flash image) on the Access Gateway, select the **Update** box and fill in the relevant fields.



4.6.2.1 Update Firmware

Select file: To upload a firmware update file, click Update, then click the “Browse...” button to select the file to upload. The update will occur after the Apply button is clicked.

4.6.3 Configuration

Configuration settings can be downloaded for backup, and then later restored to the Access Gateway. To download the configuration settings backup file, click the **Save** button, and choose a location when prompted. The proper filename for the file is “etc.tar.gz”. If the file or filename is altered by some mechanism then it may not be useable to restore the configuration at a later date.

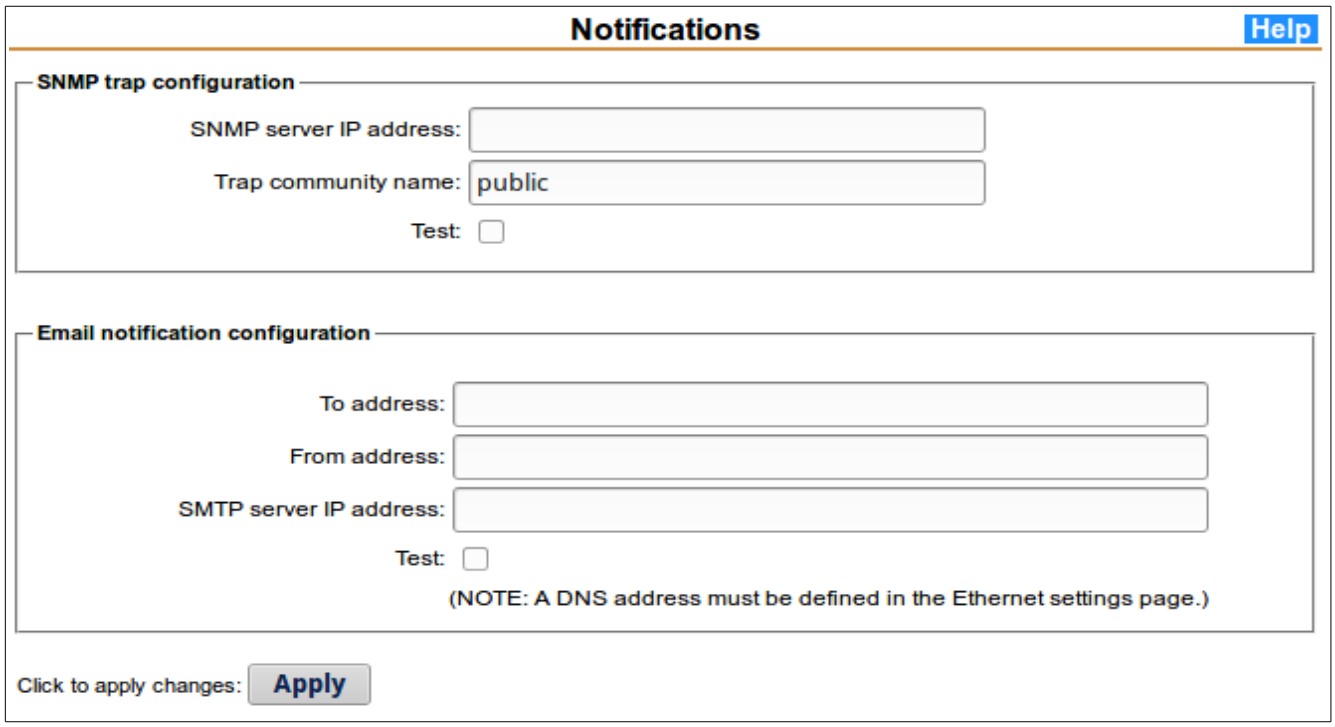
To upload a previously downloaded backup, click the **Restore** checkbox and choose the file using the File field.

File: Select a previously downloaded configuration backup file to restore the configuration settings. The file must be named “etc.tar.gz” and be a gzipped tar file for the upload to succeed.

4.7 Notifications

Applications like the terminal server, X.25/TCP Gateway, Collection Manager can send notifications to a system administrator via email and SNMP traps/events. This page gives a common configuration for the delivery of SNMP traps (cold/warm start, link up/down, enterprise-specific events), and email notifications.

Clicking the Test buttons will do a test notifiction to the configured address when the Apply button is pressed.



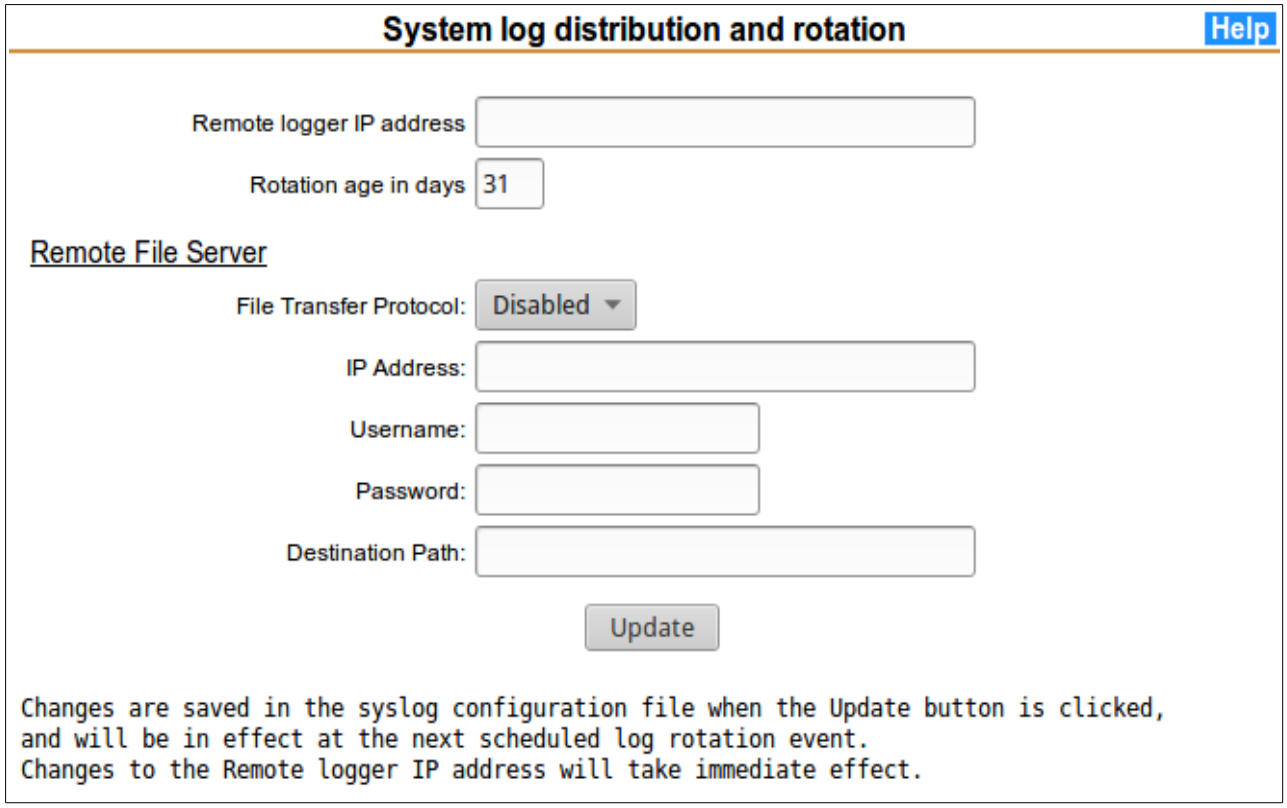
4.7.1 SNMP Trap Configuration

Enter the IP address on which an SNMP agent is listening for SNMP trap events. The default UDP port 162 is used. When configured, installed applications will send SNMP traps to that agent.

4.7.2 Email Notification Configuration

Enter the email address of the support person that will monitor these notifications. An SMTP server needs to be available from the installation platform.

4.8 System Log



This page allows access to the configuration of the sytem logging interface and log file rotation. Log files are rotated by the log rotation script scheduled to run just before midnight local time. The current log file is zipped and saved on the root file system (/var/backups/) or on any mounted USB 2.0 flash drive (/mnt/usb1/log/).

4.8.1 Remote logger IP address

To send logs to a remote syslog server, enter the IP address of the server in this field. The remote syslog server must be able to accept remote syslogs. The default port is UDP 514, but this can be modified by appending ":<port#> to the IP address.

If this field is changed, the syslog daemon will be restarted when the Update button is clicked

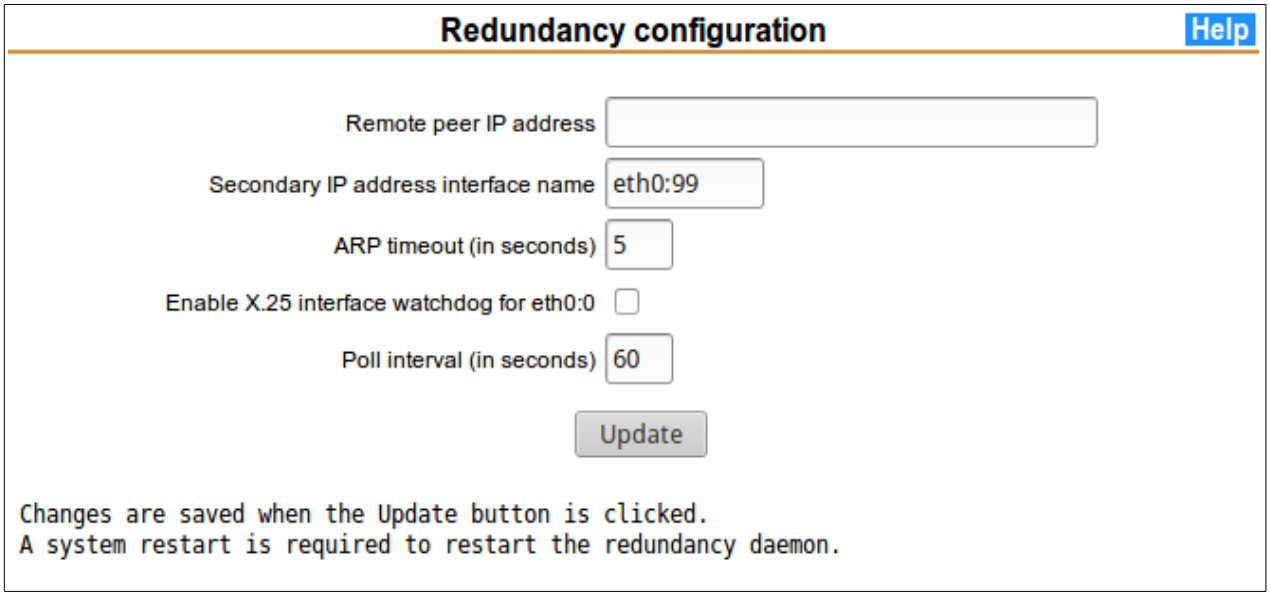
4.8.2 Rotation age

Enter the number of days that log files will be retained. Files older than this age will be deleted. If files are being saved to the root file system, keep this value as short as possible to prevent the limited space from being filled. Files may be transferred to a file server (see below).

4.8.3 Remote File server

Rotated log files may be saved to a remote file server. Enter the server's IP address, the transfer method (FTP, SFTP, or SCP), and the account credentials. SFTP and SCP will require that the local authentication key file be copied to the remote file server.

4.9 Redundancy



This page allows configuration of redundancy between a pair of Access units. One may be master, the other slave, or they can be set up for co-redundancy.

Redundancy is accomplished by monitoring an IP address assigned to the peer unit. If that IP address does not respond for any reason, the monitoring unit will assume it as its own secondary IP address.

In general, it is best for the monitered IP address to be a secondary IP address definition in the monitored unit. This secondary IP address will be used for applications like X.25/TCP gateway, and the primary used for configuration and management. It would be counter-productive for a unit to take over anothers primary IP and “masquerade” its configuration and management interface.

4.9.1 Remote peer IP address

This is the IP address of the remote peer unit, preferably defined as a secondary IP address in the peer unit. The secondary IP address in the peer unit is defined in the **Network** page using Interface name “eth0:0”.

4.9.2 Secondary IP address interface name

If the Remote peer IP address is taken over, it will be temporarily defined as a secondary IP address using this interface name. If takeover has occurred, the temporary definition will appear in the table in the **Network** page.

4.9.3 ARP timeout

This is the number of seconds to wait for an *arping* response from the peer. If it expires without response the peer, the IP takeover will occur.

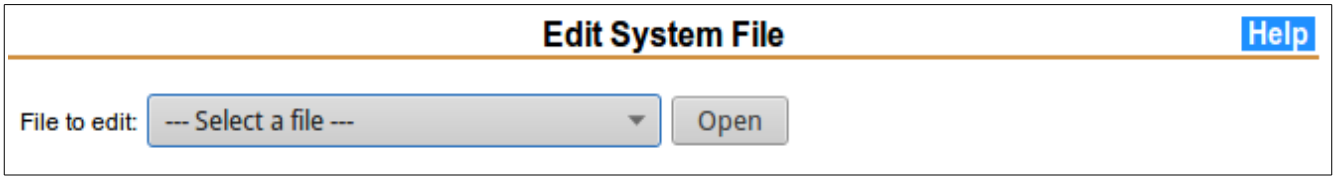
4.9.4 Enable local X.25 interface watchdog

The local redundancy daemon will bring down the secondary IP address as defined by “eth0:0” if the local X.25 ports go down, and back up if the X.25 ports resume.

4.9.5 Poll interval

This is the number of seconds between *arping* poll attempts. The shorter this is, the sooner a takeover can occur when there is a failure in the peer unit.

4.10 Edit System Files



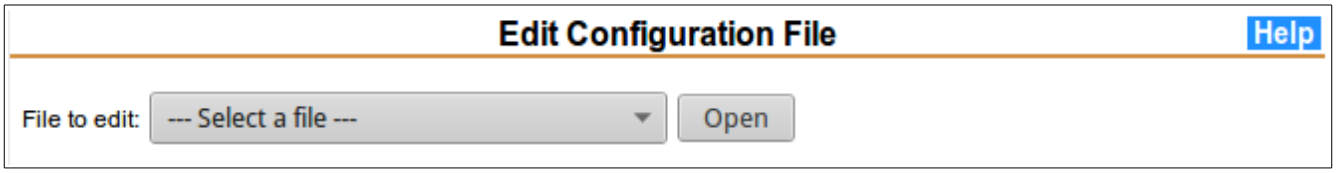
This page allows access to system files for advanced settings. This should only be used by experienced Linux users or with the explicit guidance of a Microtronix support technician. The Help page provides more details.

Some of the things that may be accomplished are:

- Enable or disable servers like telnet, ssh, httpd, https, etc
- Enable system console on the Console/WAN port or a USB serial adapter port
- Enable NFS file system
- Modify USB file system for non-DOS USB flash drives
- Enable redundancy with a peer unit
- Operating system hardening

Contact Microtronix support with your requested change for instructions on how to accomplish it.

4.11 Edit Config Files



This page allows access to application configuration files for advanced settings. This should only be used by experienced users or with the explicit guidance of a Microtronix support technician. The Help page provides more details.

Some of the things that may be accomplished are:

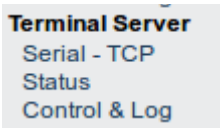
- Modify X.25 interface parameters
- Modify Terminal Server parameters
- Modify Synchronous Server parameters

Saved changes will not take effect until the relevant interface is restarted.

Contact Microtronix support with your requested change for instructions on how to accomplish it.

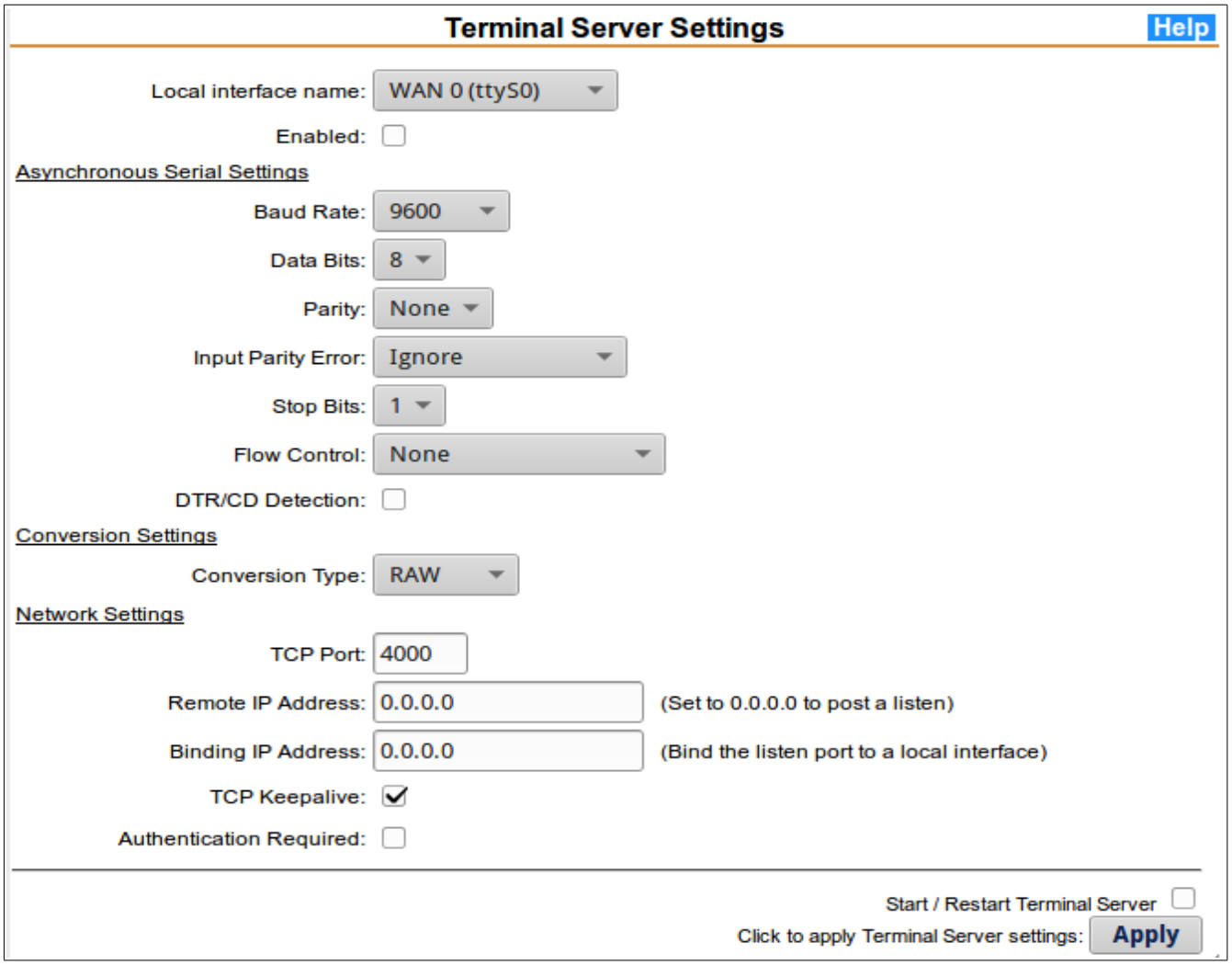
5 Terminal Server Configuration

This section allows configuration and administration of the serial to TCP/IP interfaces. Click on each item in the **Terminal Server** section of the main menu to invoke the configuration form and status displays.



5.1 Serial - TCP

The terminal server application provides a raw TCP socket connection to an asynchronous serial device attached to a local serial interface, through a specified TCP port.



5.1.1 Terminal Server Setup

To configure the terminal server application, select the desired interface from the **Local interface name** field, set the relevant communication parameters, and click the **Apply** button.

Note: The **Start/Restart Terminal Server** box must be selected in order to have configuration changes applied immediately, otherwise only the configuration will be saved.

5.1.2 Terminal Server Parameters

Parameters must be set to match those of the attached device.

5.1.2.1 Serial Interface Settings

Local interface name: The physical interface to which the terminal server application will attach *(internal name)*.

WAN 0 *(ttyS0)* - WAN 0 (hdlc0) MUST be disabled in the X.25 and Synchronous pages

WAN 1 *(ttyS1)* - WAN 1 (hdlc1) MUST be disabled in the X.25 and Synchronous pages

Serial port 1 *(ttyUSB0)*

Serial port 2 *(ttyUSB1)*

Serial port 3 *(ttyUSB2)*

Serial port 4 *(ttyUSB3)*

Enabled: *Select this box to enable the terminal server application for the selected interface.*

Baud Rate: The rate in bits per second at which characters are transmitted. This field has a range from 300 to 115200.

Data Bits: The number of data bits per character. This field ranges from 5 to 8.

Stop Bits: The minimum period of time between characters, in bit-time (so at 9600 baud and 1 stop bit, the delay between characters is at least 1/9600 seconds). If 1.5 is selected, then an actual stop bit value of 2 will be used, as true 1.5 stop bits is not supported.

Parity: An additional bit that can be used for error detection. If enabled, it is added to the end of each character. Options are:

None	No parity bit will be added.
Even	A parity bit will be added so that the character has an even number of 1's.
Odd	A parity bit will be added so that the character has an odd number of 1's.

Flow Control: The method of controlling data flow to the attached device. Options are:

None	No flow control method will be used.
XON/XOFF	XON/XOFF characters will be used to resume and suspend.
RTS/CTS	The status of the RTS and CTS signals will determine whether or not data is transmitted.

DTR/CD Detection: Select this box to have the terminal server react to changes on the received DTR or CD modem control signal. The DB25F WAN interfaces have a DCE interface, so the received signal is DTR. The DB9M Serial ports are DTE, so the received signal is CD. If enabled, TCP connections will only occur when this signal is raised.

5.1.2.2 Conversion Settings

Conversion Type: Specify the method of passing data between the TCP socket and the serial interface.

RAW: Data is passed transparently as received (byte stream).

LINE: Data from the serial interface is passed transparently to the TCP socket. Data from TCP is forwarded when a CR is received. LF following CR is stripped.

IAC-ESC: Data from the TCP socket is scanned for Telnet commands which are stripped and ignored. Escaped IAC characters have the escape removed. Data from the interface is scanned for IAC characters, and an IAC escape is inserted. This ensures binary data integrity in the data stream.

5.1.2.3 Network Settings

Authentication Required: If this option is enabled, a login session is initiated upon incoming connections from a TCP/IP client. If RADIUS support is enabled, the RADIUS server is queried for authentication.

TCP Port: If the IP Address is set to 0.0.0.0, the terminal server will accept connections from a remote TCP/IP client on this TCP port number. If the IP Address is set to a valid destination, the terminal server will connect to a remote TCP/IP server at the Specified TCP port number.

Remote IP Address: If the Remote IP address is set to 0.0.0.0, then the terminal server will listen on the specified TCP Port for connections from a remote TCP/IP client. If the IP address is set to a valid destination, then the terminal server will initiate a connection to a remote TCP/IP server.

Binding IP Address: If the Remote IP address is set to listen (0.0.0.0), then the terminal server will bind the specified TCP Port to a local interface.

5.2 Status

This page provides status information for serial interfaces configured for asynchronous operation.

The table below shows that a connection from a remote TCP client/server has been established.

Terminal Server Interface Status Help

Asynchronous Interface Status										
	Operational mode					DCE signals			DTE signals	
Interface	Baud	Bits	Parity	Stop	F/C	DSR	CD	CTS	DTR	RTS
WAN 0 - ttyS0 (DCE)	9600	8	None	1	No	ON	ON	ON	ON	ON

Terminal Server Connections					
Terminal Interface		TCP/IP socket			
Interface	Conversion	Local IP	Local TCP	Remote IP	Remote TCP
WAN 0	RAW	10.1.1.245	4000	10.1.1.34	38319

Refresh

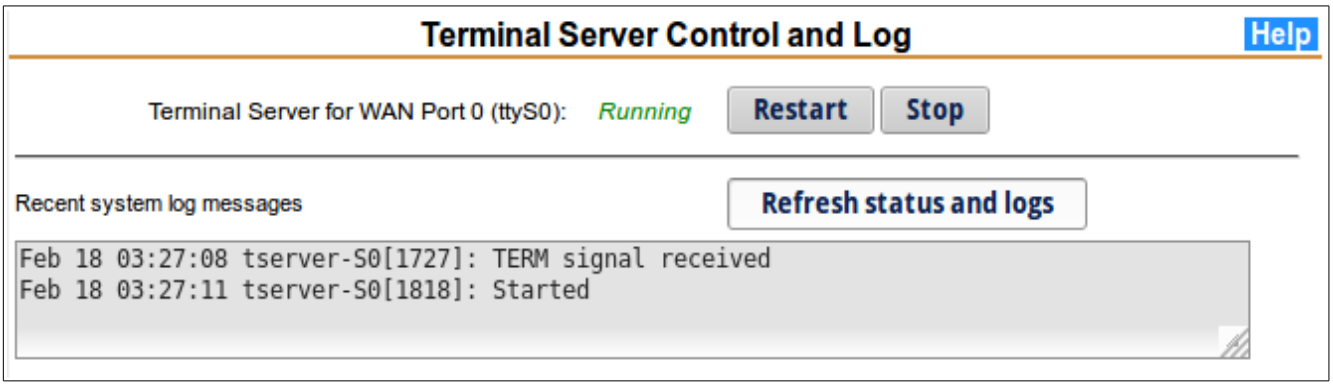
The values in the status display are provided by the running application, and may not necessarily reflect the configured values. If they do not match, then the Terminal Server may need to be restarted.

The following table provides the description of each column.

Terminal Server Status	
Interface	Local interfaces that are currently being used for terminal server operation. Note that the direction of modem signals is reversed between DCE and DTE devices. WAN 0 - ttyS0 (DCE) WAN 1 - ttyS1 (DCE) Serial 1 - ttyUSB0 (DTE) Serial 2 - ttyUSB1 (DTE) --etc--
Baud	Speed of the interface.
Bits	Number of bits per data character.
Parity	Parity bit.
Stop	Number of stop bits.
F/C	Flow Control method.
DSR	Status of the Data Set Ready modem signal. ON indicates readiness of the DCE device to accept connections.
CD	Status of the (Data) Carrier Detect modem control signal. ON indicates data connection status.
CTS	Status of the Clear To Send modem signal. Reflects the DCE flow control condition if hardware flow control option has been selected.
DTR	Status of the Data Terminal Ready modem signal. ON indicates the DTE device is ready for a connection
RTS	Status of the Request To Send modem signal. Reflects the DTE flow control condition if hardware flow control option has been selected.
Conversion	Method used for data conversion between the serial port and the TCP/IP socket.
Local IP	IP address of the local TCP socket. No socket if reported as 0.0.0.0
Local TCP	TCP port number of the local TCP socket. If the local IP address is 0.0.0.0, indicates the terminal server is listening on that port
Remote IP	If not 0.0.0.0, indicates the IP address of a remote client/server.
Remote TCP	If not 0, indicates the TCP port number of a remote client/server.

5.3 Control and Log

This page provides status and control of terminal server application. System log messages pertinent to this application will be displayed.



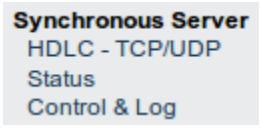
The current status of the applications are indicated by a *Running* or *Stopped* indicator. Stopping or restarting an application will disconnect any active sessions and the associated TCP and serial communication sockets will be closed.

If the application is stopped, then a **Start** button will be displayed to start it again. A terminal server must be enabled (from the Terminal Server Configuration pages) in order to be started.

The system log scrolling region shows significant application events since the box was started. If there are any unusual errors, they will be shown in the log.

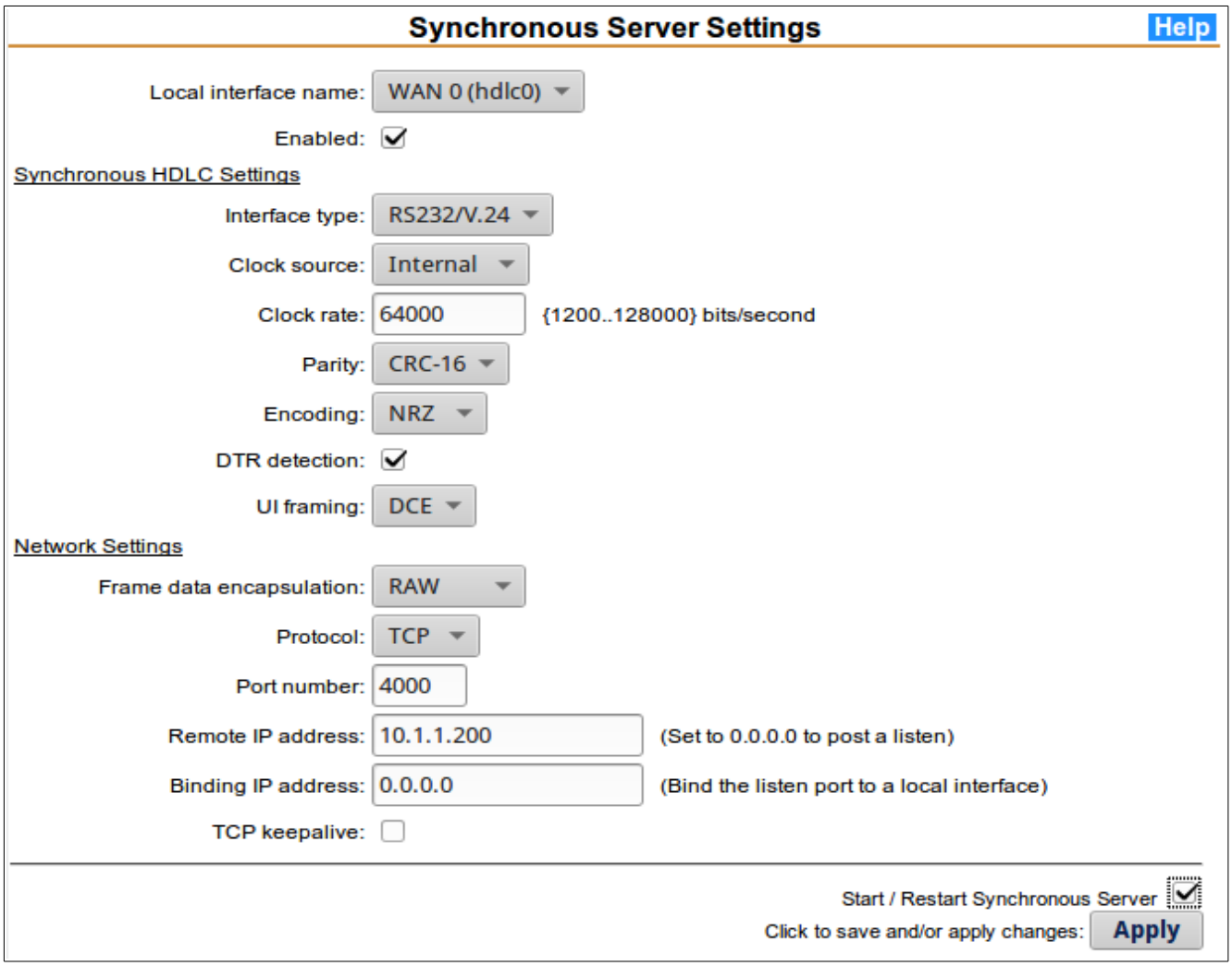
6 Synchronous Server Configuration

This section allows configuration and administration of the synchronous interfaces. Click on each item in the **Synchronous Server** section of the main menu to invoke the configuration form and status display.



6.1 HDLC – TCP/UDP

The synchronous server application provides a TCP or UDP socket connection to a synchronous/HDLC device attached to a local interface.



6.1.1 Synchronous Server Setup

To configure the synchronous server application, select the desired interface from the **Local interface name** field, set the relevant communication parameters, and click the **Apply** button.

Note: The **Start/Restart Synchronous Server** box must be selected in order to have configuration changes applied immediately, otherwise only the configuration will be saved.

6.1.2 Synchronous Settings

Parameters must be set to match those of the attached device.

Local interface name: The local physical interface to which the synchronous server application will attach.

- WAN 0 (*hdlc0)*
- WAN 1 (*hdlc1)*

Note: when using WAN port 0 (hdlc0), then WAN 0 MUST be disabled in the X.25 WAN, and Terminal Server pages. Similarly for WAN 1.

Enabled: Select this box to enable the synchronous server application for the selected interface.

Interface type: The physical interface type to be used. The supported types are: RS232/V.24, V.35, X.21, RS449/V.36, RS530, and RS530a. Refer to the Cables and Connectors section to determine the appropriate cable for the application.

Clock source: Specifies the source of the synchronous clocking (timing) signal.

If connecting to a DCE device (like a modem) that provides the clock signal, an external clock source is chosen. For independent transmit and receive clocks, choose *External*. For a single clock signal source, choose *RxFromTx*. When using a tail circuit cable, choose *TxFromRx*.

If the interface is to provide clocking signal to a DTE device, then select an internal source and specify a Clock Rate appropriate for the interface. Choose *Internal* for independent receive and transmit clocks, or *DTE* to derive the clock from the DTE's external transmit clock.

Clock rate: Specifies the clock rate used for the internal clock source (Internal, TxFromRx, TxInt). Do not set the speed higher than the attached device's capability. RS232 is limited to 128Kb/s with a short, reliable cable. Otherwise RS232 is limited to 64Kb/s. Other interface types allow speeds up to 10 Mbps.

Parity: Cyclical Redundancy Checksum (CRC) added to the end of trnasmitted frames for the detection of bits errors by the receiver. If enabled, it is added to the end of each frame, and checked on received frames. Options are:

None	No CRC will be generated or checked.
CRC-16	2-byte CRC as per ITU
CRC-32	4-byte CRC as per ITU

Encoding: The method of bit encoding. Options are:

NRZ	Non-Return-to-Zero
NRZI	Non-Return-to-Zero-Inverted

DTR detection: Select this box to have the Access Gateway react to changes on the received DTR modem control signal. If enabled, TCP connections will only occur when the DTR signal is raised.

UI framing: Enables HDLC Unnumbered Information (UI) frame header recognition and generation. Options are:

No	Feature disabled (data passed to/from frames as-is)
DCE	UI headers are checked/stripped, and generated using address 01
DTE	UI headers are checked/stripped, and generated using address 01

6.1.3 Network Settings

Frame encapsulation: Specify the method of passing frames across a TCP socket. If UDP is selected, encapsulation is not likely to be necessary (set to RAW).

Valid values are:

RAW: TCP data is passed transparently as received (byte stream). Received frames may become split across TCP packets, or merged into single TCP packets, and the frame boundaries are lost. UDP sockets do not have this issue.

MBIT: Received frames are prefixed with a 2 byte header containing the length of the frame when sent across the TCP/IP interface, so that the boundaries of the frame can be reconstructed by the remote TCP receiver. No checking is done, so invalid headers can cause data loss and stalling.

RFC1006: Received frames are prefixed with a 4 byte header containing a prefix and the length of the frame when sent across the TCP/IP interface, so that the boundaries of the frame can be reconstructed by the remote TCP receiver. Header checking is performed, and any errors will cause any active connection to be terminated.

Protocol: Select the type of IP socket connection to be created with the remote host, connection-oriented TCP or connectionless UDP. Note that TCP guarantees data delivery, whereas UDP does not.

UDP can be used in a broadcast application.

Port number: If the remote IP Address is set to 0.0.0.0, the sync server will accept connections from a remote TCP/IP client on this TCP port number. If the IP Address is set to a valid destination, the sync server will connect to a remote host at the specified TCP or UDP port number.

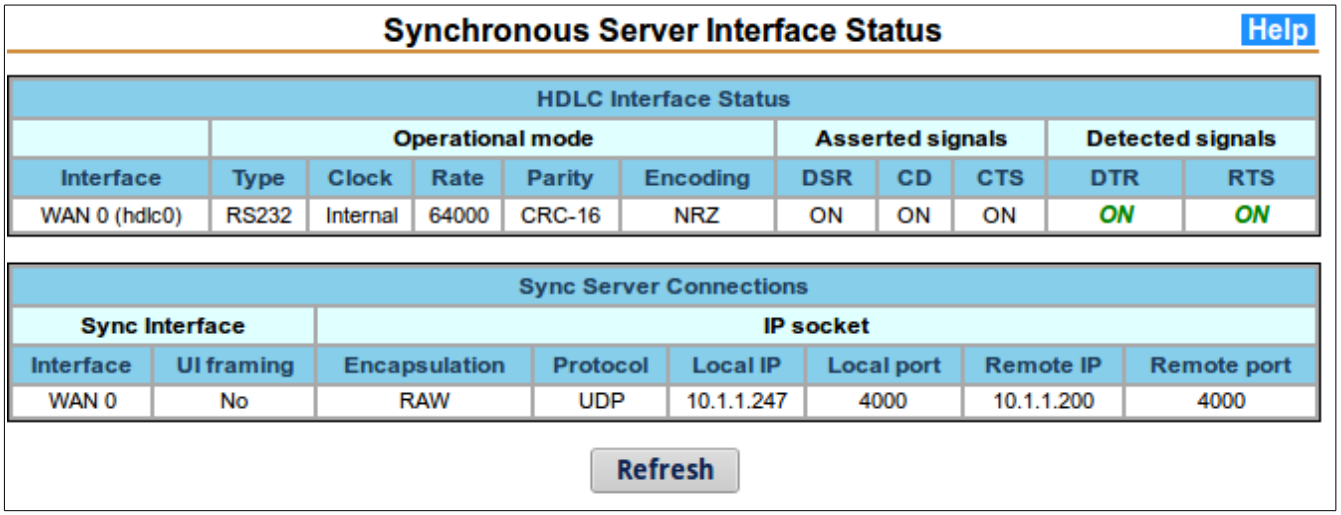
Remote IP address: If the remote IP address is set to 0.0.0.0, then the sync server will listen on the specified TCP Port for connections from a remote TCP/IP client., otherwise the sync server will establish a TCP or UDP connection from a remote client/server.

Binding IP address: This specifies the IP address of a local interface, like 127.0.0.1, to which the TCP or UDP socket will be bound. If set to local, connections can only occur locally.

6.2 Status

This page provides status information for serial interfaces configured for synchronous/HDLC operation.

This table shows that a connection with a remote TCP client/server has been established.



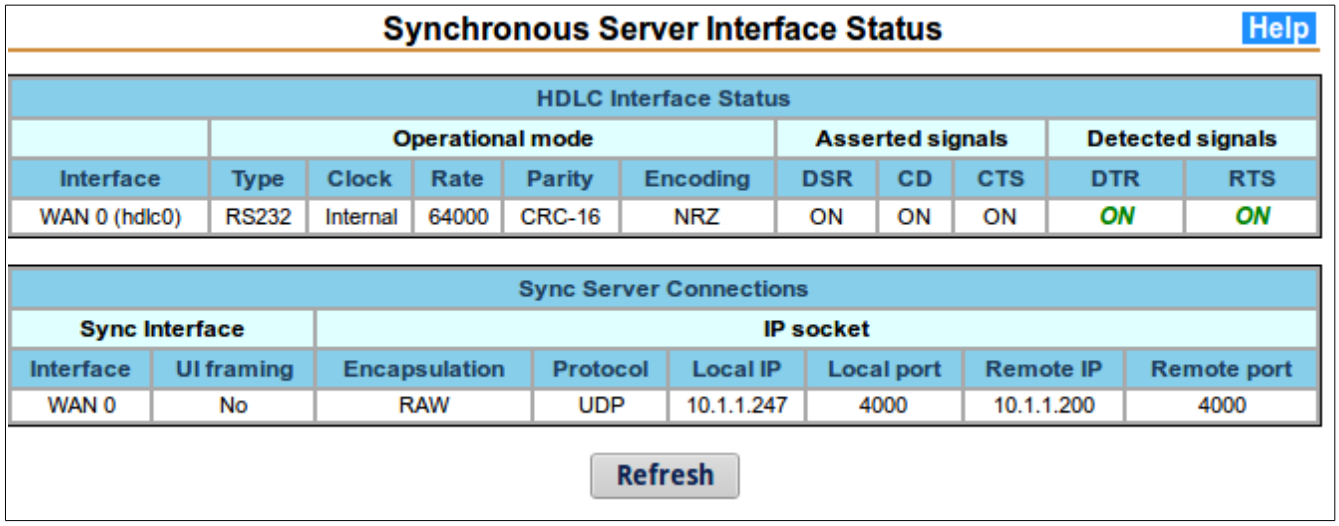
Synchronous Server Interface Status Help

HDLC Interface Status										
	Operational mode					Asserted signals			Detected signals	
Interface	Type	Clock	Rate	Parity	Encoding	DSR	CD	CTS	DTR	RTS
WAN 0 (hdlc0)	RS232	Internal	64000	CRC-16	NRZ	ON	ON	ON	ON	ON

Sync Server Connections							
Sync Interface		IP socket					
Interface	UI framing	Encapsulation	Protocol	Local IP	Local port	Remote IP	Remote port
WAN 0	No	RAW	UDP	10.1.1.247	4000	10.1.1.200	4000

Refresh

This table shows that a connection with a remote UDP client/server has been established. Note that the local and remote UDP port numbers are always the same.



Synchronous Server Interface Status Help

HDLC Interface Status										
	Operational mode					Asserted signals			Detected signals	
Interface	Type	Clock	Rate	Parity	Encoding	DSR	CD	CTS	DTR	RTS
WAN 0 (hdlc0)	RS232	Internal	64000	CRC-16	NRZ	ON	ON	ON	ON	ON

Sync Server Connections							
Sync Interface		IP socket					
Interface	UI framing	Encapsulation	Protocol	Local IP	Local port	Remote IP	Remote port
WAN 0	No	RAW	UDP	10.1.1.247	4000	10.1.1.200	4000

Refresh

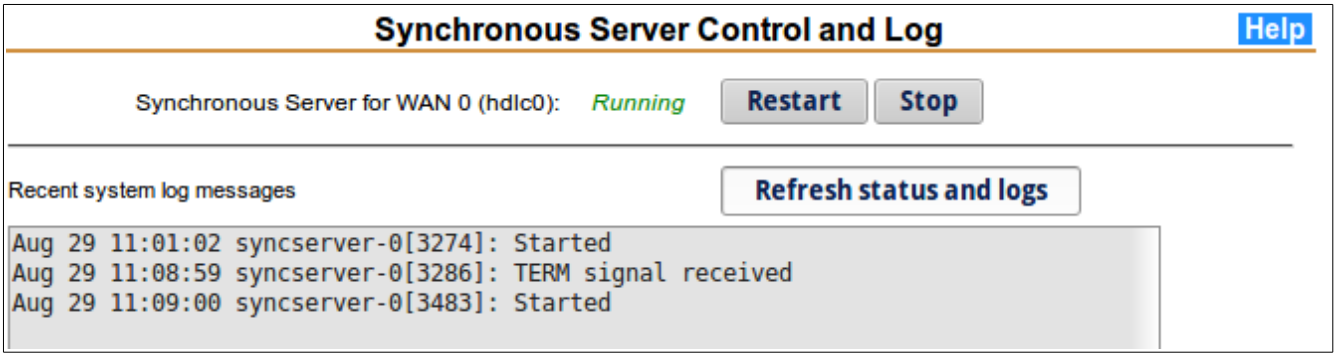
The values in the status display are provided by the running application, and may not necessarily reflect the configured values. If they do not match, then the Synchronous Server may need to be restarted.

The following table provides the description of each column.

Interface	Local interface(s) that are currently being used for synchronous server operation.
Type	Interface type.
Clock	Clock source.
Rate	Clock rate. If an external clock source, will display “unknown”.
Parity	Bit encoding.
Encoding	CRC generation/detection or none.
DSR	ON when the Sync Server application is running
CD	When ON, indicates the presence of a TCP connection
CTS	ON when a TCP connection is present.
DTR	ON indicates the connected device is ready for a connection
RTS	ON indicates the connected device is ready for data.
UI framing	Indicates whether UI framing is check/generated on the HDLC interface
Encapsulation	Indicates the encapsulation (or none) of frame data over the TCP socket
Protocol	Indicates the type of IP socket, TCP or UDP
Local IP	Local IP address of the socket. No socket if reported as 0.0.0.0
Local port	Port number of the local TCP or UDP socket. If the local IP address is 0.0.0.0, indicates the sync server is listening on that port
Remote IP	If not 0.0.0.0, indicates the IP address of a remote client/server.
Remote port	If not 0, indicates the TCP or UDP port number of a remote client/server.

6.3 Control and Log

This page provides status and control of synchronous server application. System log messages pertinent to this application will be displayed.



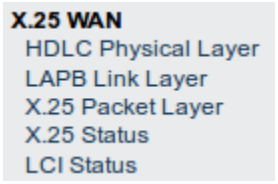
The current status of the applications are indicated by a *Running* or *Stopped* indicator. Stopping or restarting an application will disconnect any active sessions and the associated TCP and HDLC communication sockets will be closed.

If the application is stopped, then a **Start** button will be displayed to start it again. The synchronous server must be enabled (from the Synchronous Server Configuration pages) in order to be started.

The system log scrolling region shows significant application events since the box was started. If there are any unusual errors, they will be shown in the log.

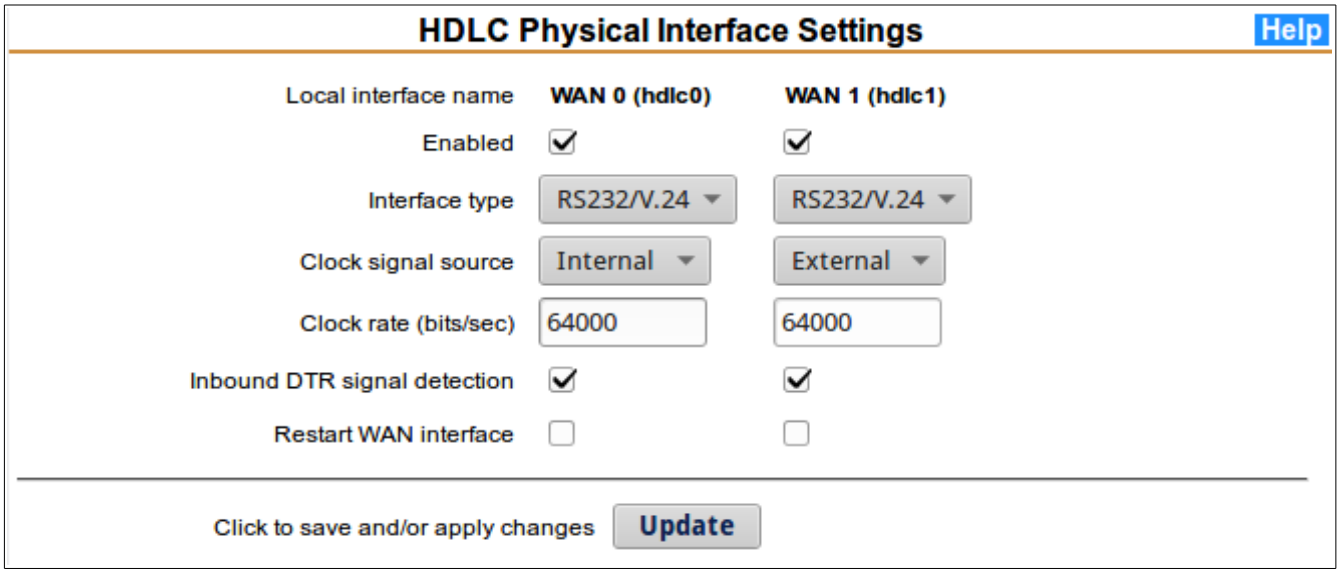
7 X.25 WAN Interfaces Configuration

This section allows for configuration and administration of the WAN (Wide Area Network) interfaces for X.25. Click on each item in the **X.25 WAN** section of the main menu to invoke the configuration forms and status displays.



7.1 HDLC Physical Interface Settings

This form allows any of the X.25 physical layer parameters to be set. The interface type MUST match the attached equipment, and the clock source MUST be compatible. If an internal clock source is selected, the clock rate must not exceed the attached peer's capability.



7.1.1 Physical Layer (HDLC) Setup

1. Choose the **Local Interface name** column for the WAN interface to configure. The Access 4000 has 2 ports, and the Access 1000 has only one.

2. Modify the parameters to be compatible with the attached device**.**

3. In order for the configuration to take effect, the **Restart WAN interface** box must be checked. Otherwise the configuration will be saved, but will not take effect until the next time the interface is restarted.

4. Click the **Update** button to save changes, and restart the interface if selected.

7.1.2 HDLC Parameters

Local interface name: The X.25 WAN interface being configured. This will be WAN 0 (hdlc0), or WAN 1 (hdlc1).

Enabled: Check to enable HDLC/X.25 operation. Un-check to prevent the port from communicating using HDLC/X.25. HDLC must be disabled before the port can be available for terminal or synchronous server configuration.

Interface Type: The physical interface type to be used. The supported types are: RS232/V.24, V.35, X.21, RS449/V.36, RS530, and RS530a. Refer to the Cables and Connectors section to determine the appropriate cable for the application.

Clock Source: Specifies the source of the synchronous clocking (timing) signal.

If connecting to a DCE device (like a modem) that provides the clock signal, an external clock source is chosen. For independent transmit and receive clocks, choose *External*. For a single clock signal source, choose *RxFromTx*. When using a tail circuit cable, choose *TxFromRx*.

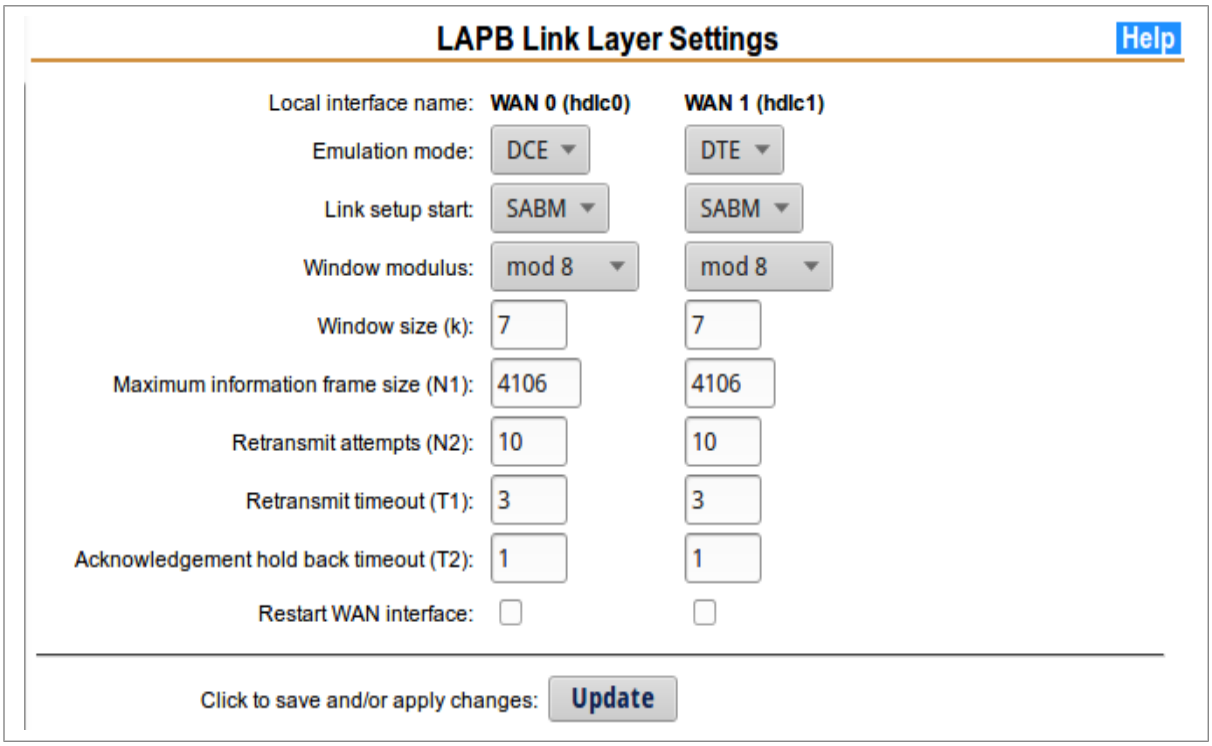
If the interface is to provide clocking signal to a DTE device, then select an internal source and specify a Clock Rate appropriate for the interface. Choose *Internal* for independent receive and transmit clocks, or *DTE* to derive the clock from the DTE's external transmit clock.

Clock Rate: Specifies the clock rate used for the internal clock source (Internal, TxFromRx, TxInt). Do not set the speed higher than the attached device's capability. RS232 is limited to 128Kb/s with a short, reliable cable. Otherwise RS232 is limited to 64Kb/s. Other interface types allow speeds up to 10 Mbps.

DTR Detection: If the attached device does not support a DTR signal, then disable the detection (assumed readiness). Otherwise, enable it for detection of the device's readiness to communicate.

7.2 LAPB Link Layer

The LAPB Link Layer configuration page allows any of the X.25 data link layer 2 parameters to be set. The values that MUST match to the attached X.25 equipment are the default window size and modulus. The Emulation mode (DTE/DCE) MUST be set to the opposite of the attached peer. Other parameters are not usually changed, but can be modified to fine-tune an interface.



7.2.1 LAPB Setup

1. Choose the **Local Interface name** column for the WAN interface to configure.
2. Modify the parameters to be compatible with the attached device**.**
3. In order for the configuration to take effect, the **Restart WAN interface** box must be checked. Otherwise the saved configuration not take effect until the next time the interface is restarted.
4. Click the **Update** button to save changes, and restart the interface if selected.

7.2.2 LAPB Parameters

Local Interface name: The X.25 WAN Interface being configured. This will be WAN 0 (hdlc0), or WAN 1 (hdlc1). WAN 1 is only present on the Access 4000.

Mode: The emulation mode may be specified as Data Connecting Equipment (DCE) or Data Terminating Equipment (DTE). This MUST be opposite to the attached peer device.

Link Setup Start: This configures the first mode setting frame that will be sent (or passive operation) when the link is starting up. SABM is the usual default, but other settings may be used to resolve compatibility issues with the peer device.

Window Modulus: LAPB may be set to standard (**Modulo-8**) or extended (**Modulo-128**) sequencing. Modulo-8 allows for up to 7 unacknowledged packets to be transmitted before receiving an acknowledgment. Modulo-128 will allow up to 127 packets to be transmitted before receiving an acknowledgment. This MUST match the peer device. The usual default is Modulo-8.

Window Size (K): The maximum number of unacknowledged frames that may be transmitted. This MUST match the peer device. For Modulo-8, the valid values are 1-7, for modulo-128, 1-127. The usual default is 7.

Maximum Information Frame Size (N1 Count): The maximum number of bits (expressed as bytes) in an Information (I) frame that the port is willing to accept. This value should include the following:

- maximum data packet size desired (minimum 128 bytes, maximum 4096)
- packet header (3 bytes for modulo-8, or 4 bytes for modulo-128)
- frame header (2 bytes for modulo-8, or 3 bytes for modulo-128)
- checksum (2 bytes)

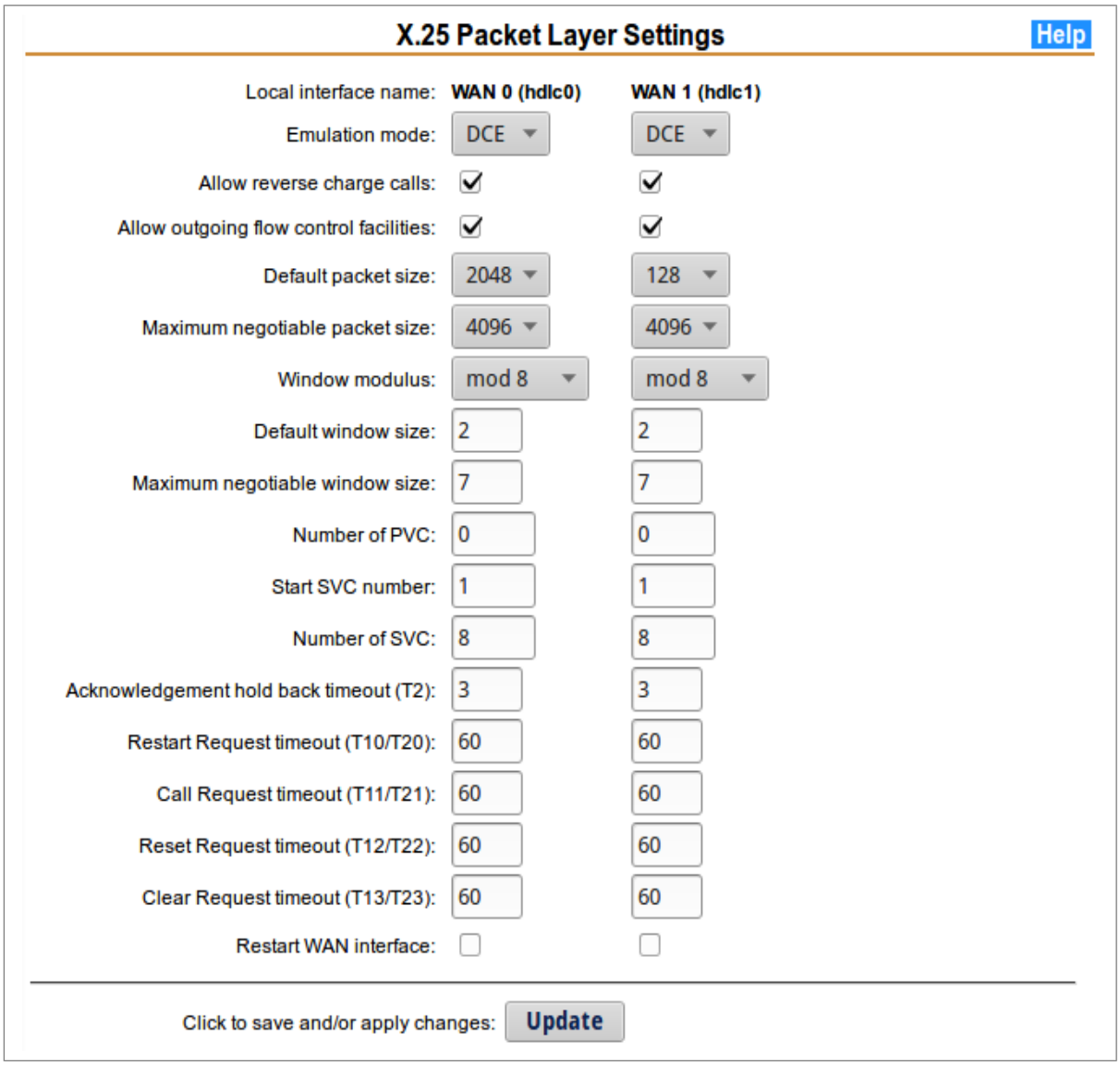
Retransmit Attempts (N2 Counter): The maximum number of attempts made to complete the successful transmission of a frame before attempting recovery.

Retransmit Timeout (T1 Timer): The period of time which must pass before a retransmission of an unacknowledged frame may occur. The normal default is 3 seconds, but this may be increased for slower links (less than 4800 baud) to avoid unnecessary retransmissions.

Acknowledgment Hold Back Timeout (T2 Timer): The period of time, in seconds, before an acknowledgment is transmitted. This allows outbound information (I) frames to “piggyback” any outstanding acknowledgments thereby canceling the timer. This should always be less than the attached peer's T1 timer.

7.3 X.25 Packet Layer

The X.25 configuration page allows any of the X.25 packet layer parameters to be set. The values that MUST match to the attached peer are the packet & window default sizes, and the number of SVC & PVC. The Emulation mode (DTE/DCE) is usually set to the opposite of the attached peer, but this is not mandatory. Other parameters are not usually changed, but can be modified to fine-tune an interface.



7.3.1 X.25 Packet Layer Setup

1. Choose the **Local Interface name** column for the WAN interface to configure.
2. Modify the parameters to be compatible with the attached device**.**

3. In order for the configuration to take effect, the **Restart WAN interface** box must be checked. Otherwise the configuration will be saved, but will not take effect until the next time the interface is restarted.

4. Click the **Update** button to save changes, and restart the interface if selected.

7.3.2 X.25 Parameters

Local interface name: The X.25 WAN Interface being configured. This will be WAN 0 (hdlc0), or WAN 1 (hdlc1). WAN 1 is only present on the Access 4000.

Emulation Mode: The emulation mode may be configured as Data Circuit Equipment (DCE) or Data Terminating Equipment (DTE) for normal X.25 operation.

In DTE mode, outbound calls choose the highest available logical channel number, and outbound clear/reset/restart packets will contain DTE cause codes (0, 128-255).

In DCE mode, outbound calls choose the lowest available logical channel number, and outbound clear/reset/restart packets may contain DCE cause codes (1-127). Normally this is opposite to the peer device, but may be set to DCE for DCE behavior regardless of the peer setting.

Choosing RAW disables X.25 packet layer processing and allows LAPB I-frames to pass transparently through the interface.

Allow Reverse Charge Calls: Specifies that the reverse charging facility will be allowed to be present in incoming calls (the called party pays for the charges).

Allow Outgoing Flow Control Facilities: Selecting this allows any outbound X.25 call request to contain packet or window size negotiation facilities. If not selected, negotiation will not be sent. This may force a backwards negotiation to be initiated.

Default Packet Size: The default maximum number of data bytes to be included in a single packet on this link. The default value may also be changed by packet size negotiation during call setup. This MUST match the peer. The normal default is 128.

Maximum Negotiable Packet Size: The maximum packet size that may be negotiated during call setup.

Window Modulus: X.25 may be set to standard (**Modulo-8**) or extended (**Modulo-128**) sequencing. Modulo-8 allows for up to 7 packets to be transmitted before receiving an acknowledgment. Modulo-128 will allow up to 127. This MUST match the peer device.

Default Window Size: The maximum number of unacknowledged packets that are allowed to be transmitted or received. This MUST match the peer device. The normal default is 2.

Maximum Negotiable Window Size: The maximum window size that may be negotiated during call setup.

Number of PVC: The number of Permanent Virtual Circuits for the link. This MUST match the peer device.

Number of SVC: The number of Switched Virtual Circuits for the link. This MUST match the peer device.

Start SVC Logical Channel: The logical channel number which will be assigned to the first SVC. This number must be at least one (1) larger than the number of PVCs defined. This MUST match the peer device.

Acknowledgment Hold Back Timeout (T2 Timer): The length in seconds before packet acknowledgments (RR) are sent.

Restart Request Timeout (T10/T20 Timer): The length in seconds before an outbound restart request is retransmitted. Canceled once a restart confirmation is received.

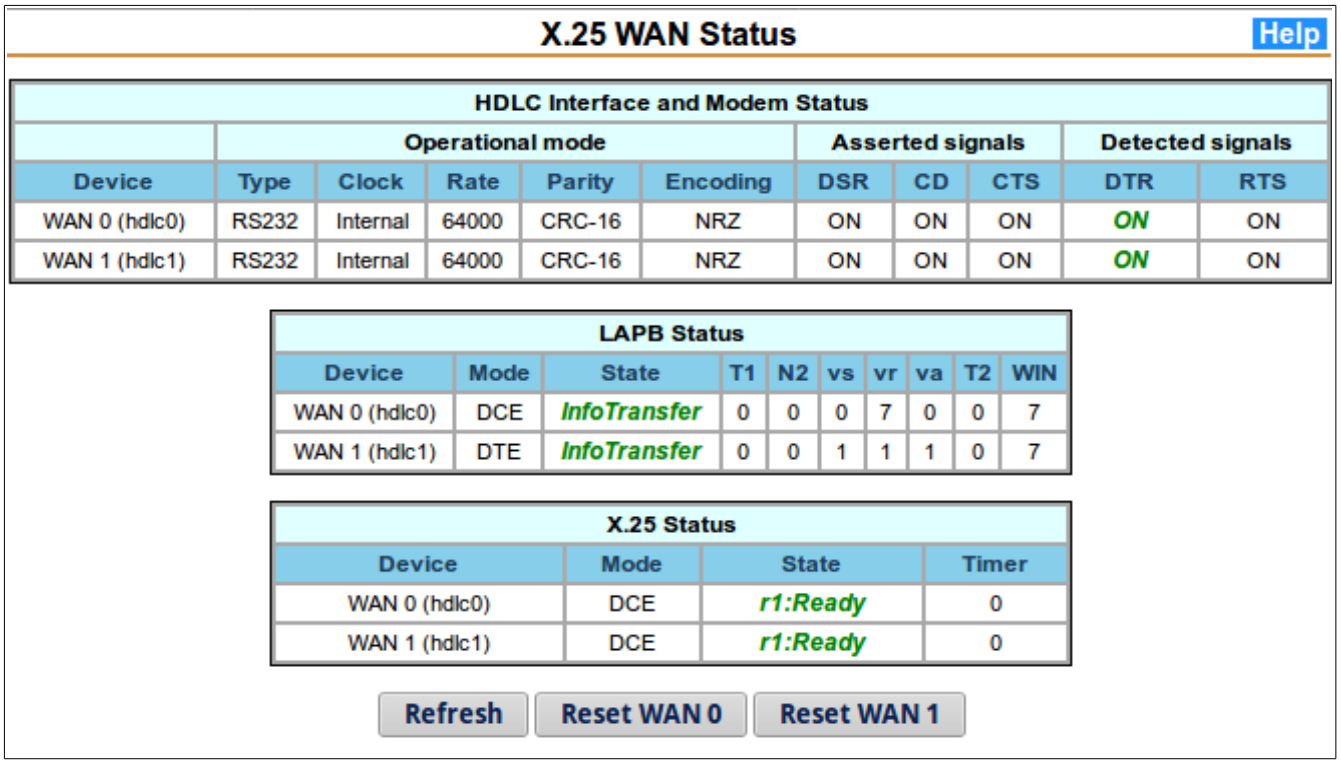
Call Request Timeout (T11/T21 Timer): The length in seconds started when a call request is transmitted. Canceled when a call accept or clear request is received. Upon expiry, a clear request will be transmitted.

Reset Request Timeout (T12/T22 Timer): The length in seconds started when a reset request is transmitted. Canceled when a reset request or reset confirm is received. Upon expiry, a clear request (SVC) or reset request (PVC) will be transmitted.

Clear Request Timeout (T13/T23 Timer): The length in seconds, started when a clear request is transmitted. Canceled when a clear request or clear confirm is received. Upon expiry, a diagnostic packet will be transmitted (DCE) or a clear request will be re-transmitted (DTE).

7.4 X.25 Status

The X.25 Status page displays the current status of the X.25 Interface at each of the 3 layers, physical /HDLC, LAPB, and X.25. The operational values are those in used in current operation. Any saved changes to the values may have not become effective yet. If this is the case, then restart the interface.



X.25 WAN Status Help

HDLC Interface and Modem Status

	Operational mode					Asserted signals			Detected signals	
Device	Type	Clock	Rate	Parity	Encoding	DSR	CD	CTS	DTR	RTS
WAN 0 (hdlc0)	RS232	Internal	64000	CRC-16	NRZ	ON	ON	ON	ON	ON
WAN 1 (hdlc1)	RS232	Internal	64000	CRC-16	NRZ	ON	ON	ON	ON	ON

LAPB Status

Device	Mode	State	T1	N2	vs	vr	va	T2	WIN
WAN 0 (hdlc0)	DCE	InfoTransfer	0	0	0	7	0	0	7
WAN 1 (hdlc1)	DTE	InfoTransfer	0	0	1	1	1	0	7

X.25 Status

Device	Mode	State	Timer
WAN 0 (hdlc0)	DCE	r1:Ready	0
WAN 1 (hdlc1)	DCE	r1:Ready	0

Refresh | Reset WAN 0 | Reset WAN 1

7.4.1 HDLC Interface Status

The HDLC Interface status table provides information for the physical layer. The following table provides a description of each column.

HDLC Interface Status	
Interface	Interface(s) that are currently being used for sync server operation. WAN 0 (hdlc0) WAN 1 (hdlc1)
Type	Interface type.
Clock	Clock source.
Rate	Clock rate. If an external clock source, will display “unknown”.
Parity	Bit encoding. Always NRZ for X.25
Encoding	CRC generation/detection. Always CRC-16 for X.25
DSR	ON when the interface is enabled.
CD	ON when the interface is enabled.
CTS	ON when the interface is enabled.
DTR	***ON*** indicates the connected device is ready. ***OFF*** indicates the device is not ready or not connected
RTS	***ON*** indicates the connected device is ready. ***OFF*** indicates the device is not ready or not connected

7.4.2 LAPB Status

The LAPB status table provides status information for the LAPB frame layer. The following table provides a description of each column.

LAPB Status	
Parameter	**Description**
Interface	Interface(s) that are currently being used for LAPB / X.25 WAN 0 (hdlc0) WAN 1 (hdlc1)
Mode	The current mode of the X.25 device: **DTE**- Data Terminating Equipment (terminal emulation) **DCE** – Data Connecting Equipment (network emulation)
State	The current state of the LAPB device. ***DM*** – Disconnected Mode ***LinkSetup*** – establishing data link (SABM sent) ***Info transfer*** – Normal data transfer ***FRMR*** – frame recovery
T1	Remaining time in seconds before retransmission of an unacknowledged frame
N2	Current retransmit attempts - number of attempts already made to complete the successful transmission of a frame
vs	Send State Variable v(s) – next send frame sequence number
vr	Receive State Variable v(r) – next expected frame sequence number
va	Last acknowledged frame sequence number v(a)
T2	Remaining time in seconds before transmission of an outstanding acknowledgement
WIN	The current frame window size for the interface.

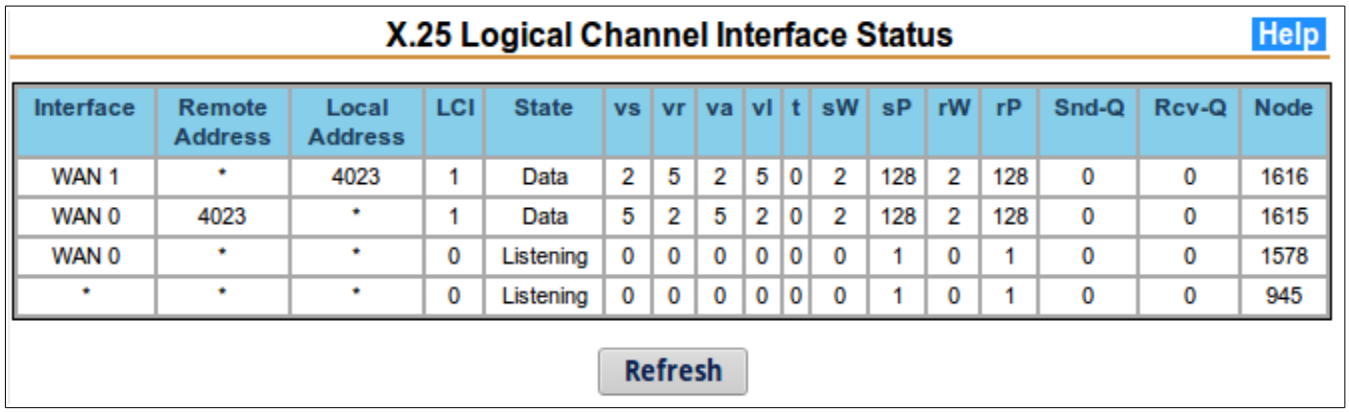
7.4.3 X.25 Status

The X.25 Status table provides information and state of the X.25 interfaces. The following table provides the description of each column.

X.25 Status	
Parameter	**Description**
Interface	Interface(s) that are currently being used for X.25. WAN 0 (hdlc0) WAN 1 (hdlc1)
Mode	The current emulation mode of the X.25 packet layer: **DTE** - Data Terminating Equipment (terminal emulation) **DCE** -Data Connecting Equipment (network emulation) **RAW** - Transparent LAPB interface – reference is LCI 1
State	The current state of the X.25 device. States include: ***Not Ready*** – lower level is down ***r1: Ready*** – Packet Control Ready ***r2*** – DTE Restart Request ***r3*** – DCE Restart Indication
Timer	The remaining time of the outstanding Restart Request Timer before retransmission.

7.5 LCI Status

This page displays the current status of active X.25 Logical Channel Interfaces (LCI) on the X.25 WAN interfaces. Logical channel 0 in Listening state means that the gateway is expecting calls to be received on the interface.



Interface	Remote Address	Local Address	LCI	State	vs	vr	va	vl	t	sW	sP	rW	rP	Snd-Q	Rcv-Q	Node
WAN 1	*	4023	1	Data	2	5	2	5	0	2	128	2	128	0	0	1616
WAN 0	4023	*	1	Data	5	2	5	2	0	2	128	2	128	0	0	1615
WAN 0	*	*	0	Listening	0	0	0	0	0	0	1	0	1	0	0	1578
*	*	*	0	Listening	0	0	0	0	0	0	1	0	1	0	0	945

The following table describes each column of the status table:

Parameter	Description
Interface	Local interface associated with the X.25 logical channel WAN 0 (hdlc0) WAN 1 (hdlc1)
Remote Address	**X.25 to TCP/IP:** address displayed here will be the Calling X.25 Address. **TCP/IP to X.25:** address displayed here will be the Called X.25 Address. **PVC Connection:** address displayed here will be "PVC" with the logical channel number of the PVC
Local Address	**X.25 to TCP/IP:** address displayed here will be the Calling X.25 Address. **TCP/IP to X.25:** address displayed here will be the Called X.25 Address. **PVC Connection:** address displayed here will be "PVC" with the logical channel number of the PVC
LCI	Logical channel identifier (SVC or PVC number)
State	Current state of the logical channel. **p1 –** Channel Ready or "Listening" **p2 –** DTE Call Request **p3** – DCE Incoming Call **p4** – Data Transfer **d1** – Flow Control Ready **d2** – DTE Reset Request **d3** – DCE Reset Indication **p5** – Call Collision **p6** – DTE Clear Request **p7** – DCE Clear Indication
v(s)	Sequence number of the next data packet to be transmitted.

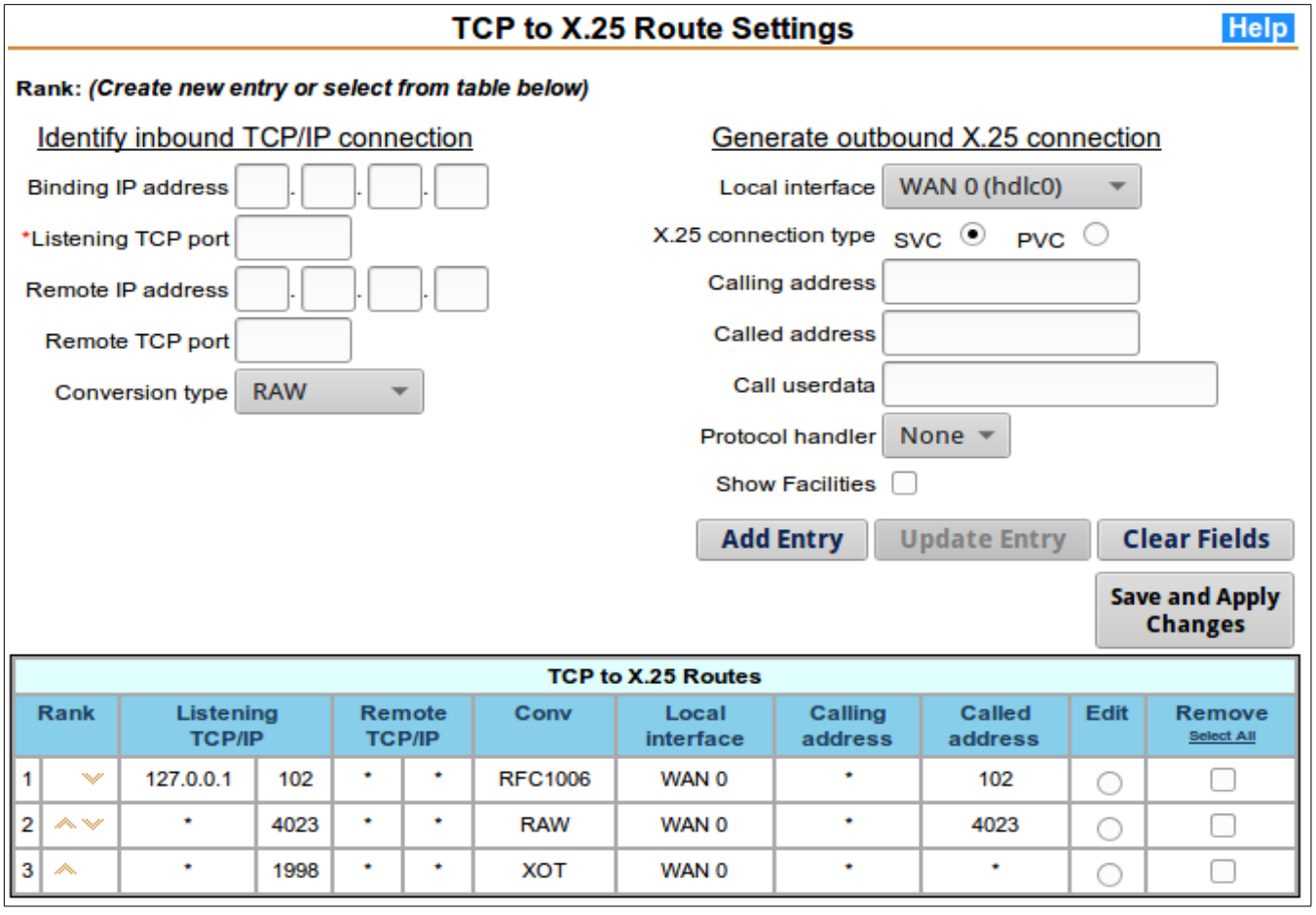
v(r)	Sequence number of the next data packet expected to be received
v(a)	Last acknowledged sequence number
v(l)	Last acknowledged sequence number
t	Time remaining, in seconds, of an outstanding timer
sW	Send window size
sP	Send packet size
rW	Receive window size
rP	Receive packet size
Snd-Q	Amount of data in the socket pending transmission
Rev-Q	Amount of data in the socket pending processing

8 X.25/TCP Gateway Configuration

This section allows general configuration and administration of the X.25 – TCP mappings used by the X.25 Gateway application. Click on each item in the **X.25 Gateway** section of the main menu to display/modify mappings, and view connection status.

8.1 TCP to X.25 Routes

When routing from TCP/IP to X.25, the TCP connection is initiated by the remote IP host using the Listening TCP Port as the destination. The Gateway scans the routes in canonical order for the first matching entry, and then establishes an X.25 connection with a remote X.25 host using the outbound X.25 Connection parameters to construct the call request. When the remote X.25 host accepts the call, the gateway between the TCP socket and X.25 logical channel is ready for data transfer.



The required parameters for a TCP/IP to X.25 route are the following:

- Listening TCP Port

- TCP/IP Data Encapsulation (Conversion) Type
- Local X.25 Interface
- X.25 Connection Type (SVC or PVC)
- Called (destination) X.25 Address, or PVC Logical Channel Number

The route setup page provides a route table with all TCP/IP to X.25 route entries along with a form for route editing.

8.1.1 Route Table

Upon loading the **TCP to X.25 Routes** page, the **TCP to X.25 Routes** table presents the current TCP/IP to X.25 routes. The higher the route is ranked in the table the higher the priority a route will take. As entries are added, modified and ranks adjusted, the table will change. These changes are not finalized until the **Save and Apply Changes** button has been clicked.

8.1.2 Creating a New Route

Under the Inbound TCP/IP Connection section of the route edit form, enter the following:

- A **Listening TCP Port** number to which the remote IP host will connect.
- The **Conversion Type** to specify the message preservation or encapsulation method.

Under the Outbound X.25 Connection section of the route edit form, enter the following:

- The X.25 interface upon which the remote X.25 host will be reachable.
- The **Connection Type**, which is either a Switched Virtual Circuit (SVC) or Permanent Virtual Circuit (PVC).
- If an SVC type has been selected, enter the **Called X.25 Address**. If a PVC type has been selected, enter the **Logical Channel Number.**

Click the **Add Entry** button to add the route to the route table. The new route will be added as the lowest rank.

Use the up and down arrows to adjust the ranking of the new route. The lower the number, the higher the priority the route will take in the scan for a match.

NOTE: Routes added to the table do not take effect until the **Save and Apply Changes** button has been clicked.

8.1.3 Editing an Existing Route

In the **TCP to X.25 Routes** table, a route may be selected for editing by clicking the radio button located within the **Edit** column of the table in the corresponding route row. Once selected, the route will be displayed in the Route Editing form.

Within the form the routes may be modified.

In order for the route to be updated in the route table, the **Update Entry** button must be pressed. The **Add Entry** button may also be pressed if a new route is to be created.

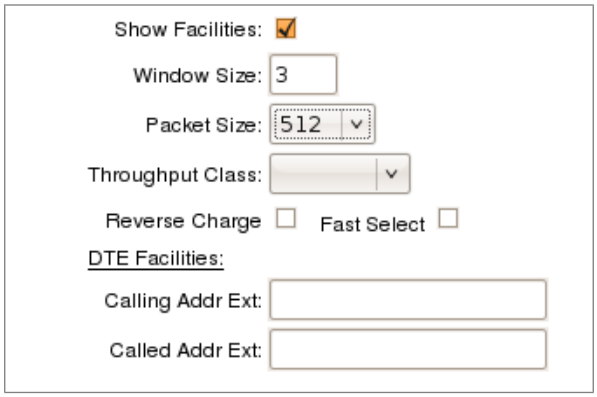
8.1.4 Remove an Existing Route

In the **TCP to X.25 Routes** table a route may be flagged for removal by selecting the checkbox provided in the Remove column of the table in the corresponding route row. Multiple routes may be selected.

The route will not be removed until the **Save and Apply Changes** button has been clicked.

8.1.5 Show Facilities

Selecting **Show Facilities** provides additional parameters in the edit form display. This allows for further generation of additional X.25 call facility parameters including packet and window negotiation.



8.1.6 TCP to X.25 Route Parameters

8.1.6.1 Identify inbound TCP/IP connection

Remote IP Address: IP address of the remote IP host. Used to further qualify an incoming TCP/IP connection request.

Remote TCP Port: TCP port number of the remote IP host. Used to further qualify an incoming TCP/IP connection request.

Binding IP Address: The IP address of the local interface to which the listening TCP port will be bound. This field will be used as a matching criteria when finding a destination. If not specified, connections to any local IP address will be accepted.

Listening TCP Port: TCP port number on which the gateway is listening. The remote IP host uses this as the destination port number.

Conversion Type: Conversion type that will be used for TCP/IP data transfer, XOT, MBIT, RAW, RAW-MBIT, RFC1006, Q-MBIT, RBP, QRBP, AEPN, OFTP, LINE, or IAC-ESC. The remote TCP/IP host application must support this method. Refer to the Conversions And Encapsulations section for details

8.1.6.2 Generate outbound X.25 connection

Called Address: X.121 address inserted into the called (destination) address field of the outbound call request. Not used for PVC.

Local Interface: Name of the physical or virtual local interface to which the peer X.25 device is connected:

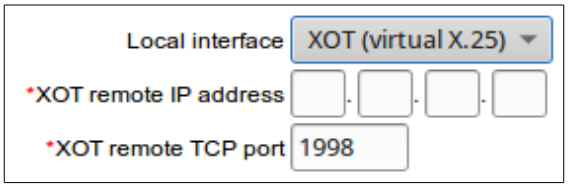
WAN 0 (hdlc0)

WAN 1 (hdlc1))

ANY (either WAN interface)

XOT (X.25 Over TCP with X.25 termination).

If the peer X.25 device is attached to a remote XOT router, then select “XOT”, and specify the IP address and TCP port number of the remote XOT peer device.



XOT remote IP address: IP Address of the remote XOT peer. Relevant only when Local interface (above) is set to “XOT”.

XOT remote TCP port: TCP port of the remote XOT peer. The normal default is port 1998. Relevant only when Local interface (above) is set to “XOT”.

X.25 connection type: Type of logical channel connection made to the remote X.25 host, SVC or PVC.

Calling address: The X.121 address inserted into calling (source) address field of the outbound call request. A wildcard “?” may be entered into the address that will be replaced by the least significant decimal digit of the remote TCP port number. Not used for PVC.

Calling address: The X.121 address inserted into called (destination) address field of the outbound call request. Not used for PVC.

Call User Data: Specifies the userdata to be inserted into the call request. This field includes any Protocol ID bytes (PID). Examples of PID encoding are “01:00:00:00” for PAD (X.29) calls and “03:01:01:00” for OSI Transport Layer calls.

Protocol Handler: Specifies the handling of protocols above the X.25 packet layer 3. Currently, X.29 is the only option available. X.29 does partial handling of X.29 messages contained in Q-bit packets, and is only effective when Conversion Type RAW, RAW-MBIT, MBIT, RFC1006, RBP, LINE, or IAC-ESC is selected.

Local LCN: For PVC connection type, specifies the Logical Channel Number to connect.

XOT remote LCN: For XOT conversion type, and PVC connection type: specifies the Logical Channel Number at the X.25 interface of the remote XOT peer.

XOT remote interface: For XOT conversion type and PVC connection type: specifies the interface name <in brackets> at the remote XOT peer. For example: <hdlc0>

Window Size: Window size negotiation which will be initiated during call setup for SVC, or the size used for a PVC (not negotiated).

Packet Size: Packet size negotiation which will be initiated during call setup for SVC, or the size used for a PVC (not negotiated).

Throughput Class: Data rate to be negotiated during call setup. Not used for PVC.

Reverse: Specifies that the call request is reverse charged (collect call). Not used for PVC

Fast Select: Allows the inclusion of user data in clear request packets, and allowing up to 128 bytes of user data in call request/confirm, and clear request packets. Not used for PVC.

Calling Address Extension: DTE facility inserted into the call request facility field.

Called Address Extension: DTE facility inserted into the call request facility field.

Example encoding for OSI NSAP address 36-12345678-123 (AFI-IDI-DSP) is:

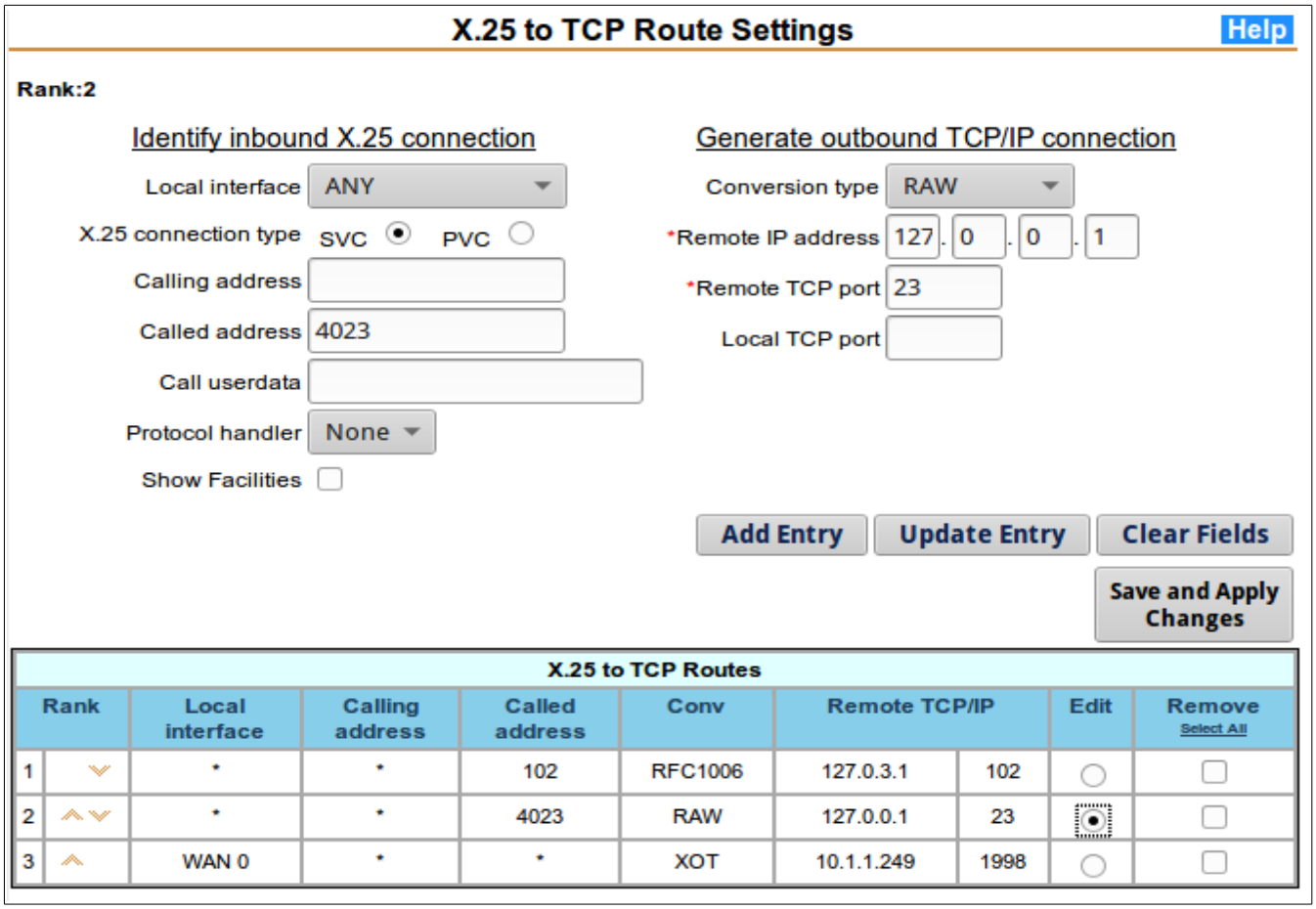
“360000012345678123F”

where the AFI is “36” for X.121 format, the IDI “12345678” is left padded with “0” to make 14 digits, and the DSP “123” is right padded with “F” to make an even number of digits.

8.2 X.25 to TCP Routes

When a call request is received from the peer X.25 host, the route table is scanned in canonical order for the first matching entry, using the inbound X.25 connection parameters to compare to the inbound X.25 call request. When a match is found, the outbound TCP connection parameters of the matched route entry are used to construct the TCP connection request to the remote IP host. When the remote IP host accepts the connection, the X.25 call will be accepted, and the gateway connection between the TCP socket and X.25 logical channel is then ready for data transfer using the conversion method specified in the route entry.

When a PVC route is set up, the TCP/IP connection will be automatically established before the PVC is opened.



The required parameters for a TCP/IP to X.25 route are:

- X.25 Connection Type (SVC or PVC)
- X.25 Interface
- TCP Data Encapsulation Type
- IP Address of remote TCP/IP host
- TCP port of the remote TCP/IP host

The route setup page provides a route table with all the X.25 to TCP/IP route entries along with a form for route editing.

8.2.1 Route Table

Upon loading the **X.25 to TCP Routes** page, the **X.25 to TCP Routes** table presents the currently defined X.25 to TCP/IP routes. The higher the route is ranked in the table, the higher the scanning priority. As entries are added, modified and ranks adjusted, the table will change. These changes are not finalized until the **Save and Apply Changes** button has been clicked.

8.2.2 Creating a New Route

1.Under the Identify inbound X.25 connection section of the route edit form, enter the following:

- Select the **Local interface** which is connected to the peer X.25 host
- The **Connection Type**, which is either Switched Virtual Circuit (SVC) or Permanent Virtual Circuit (PVC).
- If an SVC type has been selected, a **Called X.25 Address** may be entered. If a PVC type has been selected, a **Logical Channel Number** in the defined range must be entered.
- A **Calling X.25 Address** may be specified. This will be inserted into the source or calling address field of the X.25 call request.

1.Under the Generate outbound TCP/IP connection section of the route edit form, enter the following:

- The **Conversion Type** for the TCP/IP connection.
- The **IP Address** of the remote TCP/IP host.
- The TCP port number that the remote TCP/IP host is listening on.

1. Click the **Add Entry** button to add the route to the route table. The new route will be added as the lowest rank.

2. Use the up and down arrows to adjust the ranking of the new route. The lower the number, the higher the priority the route will take in the scan for a match.

NOTE: routes added to the table do not take effect until the **Save and Apply Changes** button has been clicked.

8.2.3 Editing an Existing Route

1. In the **X.25 to TCP Routes** table, a route may be selected for editing by clicking the radio button located within the **Edit** column of the table in the corresponding route row. Once selected, the route will be loaded into the Route Editing form.

2. Within the form, the route may be modified.

3. In order for the route to be updated in the route table, the **Update Entry** button must be pressed. The **Add Entry** button may also be pressed if a new route is to be created using an existing route as a template.

8.2.4 Remove an Existing Route

1. In the **X.25 to TCP Routes** table a route may be flagged for removal by selecting the checkbox provided in the Remove column of the table in the corresponding route row. Multiple routes may be selected.

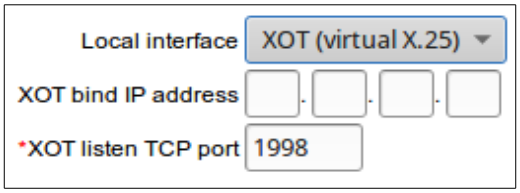
2. The route will not be removed until the **Save and Apply Changes** button has been clicked.

8.2.5 X.25 to TCP Route Parameters

8.2.5.1 Identify inbound X.25 connection

Local interface: Name of the X.25 physical or virtual interface to which the peer X.25 client is connected (WAN 0, WAN 1, ANY, XOT).

If the peer X.25 device is attached to a remote XOT router, then select “XOT”, and specify the listening TCP port number in XOT listen TCP port field below.



XOT bind IP address: IP Address of a local IP interface to restrict access.

XOT listen TCP port: The listening TCP port to which a remote XOT peer will connect. The normal default is port 1998.

X.25 connection type: Type of connection being received: SVC (call request) or PVC (automatic)

Called address: X.121 address expected in the called address field (destination) of a received call request.

Calling address: X.121 address expected in the calling address field (source) of a received call request. If the calling address in the call request is absent, it is considered a match regardless, and will the Calling Address parameter will be inserted into the call request if the destination Conversion Type is XOT.

Call User Data: User data field to match

Protocol Handler: Specifies the handling of protocols above the X.25 packet layer 3. Currently, X.29 is the only option available. X.29 does partial handling of X.29 messages contained in Q-bit packets, and is only effective when Conversion Type RAW, RAW-MBIT, MBIT, RFC1006, RBP, LINE, or IAC-ESC is selected.

Local LCN: For PVC connection type, specifies the Logical Channel Number to connect.

XOT remote LCN: For XOT conversion type, and PVC connection type: specifies the Logical Channel Number at the X.25 interface of the remote XOT peer.

XOT remote interface: For XOT conversion type and PVC connection type: specifies the interface name <in brackets> at the remote XOT peer. For example: <hdlc0>

Window Size: Window size which will be negotiated for the session with the connecting X.25 peer.

Packet Size: Packet size which will be negotiated for the session with the connecting X.25 peer.

Throughput Class: Set the data rate of the DTE/DCE Interface to be negotiated during call setup

Reverse: When checked, this specifies that reverse charging has been selected.

Fast Select: Allows up to 128 byte user data field in the call request and clear indication packets.

Calling Address Extension:

Called Address Extension:

8.2.5.2 Generate outbound TCP/IP connection

Conversion Type: Conversion type that will be used for TCP/IP data transfer: XOT, RAW, MBIT, RAW-MBIT, RFC1006, Q-MBIT, AEPN, RBP, QRBP, OFTP, LINE, or IAC-ESC. The remote host application must support this method. Refer to the Conversions and Encapsulations section for details.

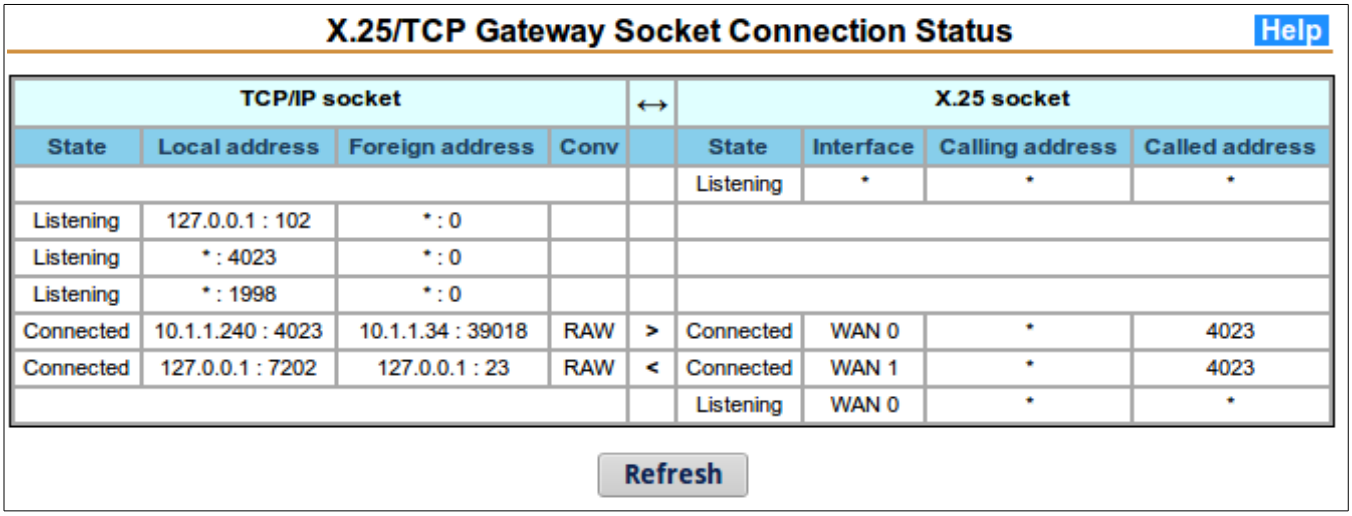
IP Address: IP Address of the remote TCP/IP host.

Destination TCP Port: Remote (destination) TCP port number that the remote TCP/IP host will be listening on.

Local TCP port: Local (source) TCP port number inserted into the connection request to the remote TCP/IP host. Otherwise, an ephemeral port number is used.

8.3 X.25 Connection Status

This page provides information on the current active sessions within the X.25-TCP gateway application. These connections have been established in accordance with the Routing tables.



X.25/TCP Gateway Socket Connection Status Help

TCP/IP socket				↔	X.25 socket			
State	Local address	Foreign address	Conv		State	Interface	Calling address	Called address
					Listening	*	*	*
Listening	127.0.0.1 : 102	* : 0						
Listening	* : 4023	* : 0						
Listening	* : 1998	* : 0						
Connected	10.1.1.240 : 4023	10.1.1.34 : 39018	RAW	>	Connected	WAN 0	*	4023
Connected	127.0.0.1 : 7202	127.0.0.1 : 23	RAW	<	Connected	WAN 1	*	4023
					Listening	WAN 0	*	*

Refresh

The table is divided into two parts, TCP/IP and X.25 sockets. Information is provided for each TCP/X.25 gateway interconnection on a row, showing the X.25 and TCP counterpart sockets. Listening and waiting sessions do not show a counterpart. The “<” and “>” arrows between the TCP and X.25 counterparts show the direction of the original connection.

Clicking the **Refresh** button will update the table to reflect recent changes.

The following table provides the meaning of each column.

Gateway Connections		
	Parameter	**Description**
TCP/IP	State	The current state of the gateway session towards the TCP/IP socket. Disconnected / Connecting / Listening / Retry Listen / Reconnect / Connected / Flow Control
	Foreign address	The IP address and TCP port number of the remote host associated with the TCP socket.
	Local address	The IP address and TCP port number of the local interface associated with the TCP socket.

X.25	State	The current state of the gateway session towards the X.25 logical channel Disconnected / Connecting / Listening / Reconnect / Waiting / Connected / Flow Control
	Interface	The local interface being used for the connection to the remote X.25 Host. May be one of: WAN 0, WAN 1, or XOT
	Calling address	The X.121 address of the initiator of the X.25 connection.
	Called address	The X.121 address of the X.25 destination.

8.4 Control and Log

This page provides status and control of X.25-TCP gateway application. System log messages pertinent to this application will be displayed.

The current status of the application are indicated by a *Running* or *Stopped* indicator. Stopping or restarting the application will disconnect any active sessions and the associated TCP and X.25 communication sockets will be closed. If the application is stopped, then a **Start** button will be displayed to start it again. The system log scrolling region shows significant application events since the box was started. If there are any unusual errors, they will be shown in the log.

9 SIP/SMDI MWI Gateway

The MWI Gateway provides routing and translation of Message Waiting Indicator (MWI) notifications from VoIP Unified Messaging Servers and legacy Voice Mail Systems to one or more legacy or VoIP telephone switches/ PBXs.

The MWI Gateway receives MWI input from either:

- Legacy VMS via SMDI messages over serial interface or TCP/IP socket
- VoIP UMS/VMS via SIP Notify messages over TCP/IP or UDP/IP sockets

Routing of MWI messages to multiple switches may be accomplished with:

- Domain name in the SIP Notify request URI
- Telephone number in the SIP Notify request URI
- Telephone number in the SMDI OP or RMV messages

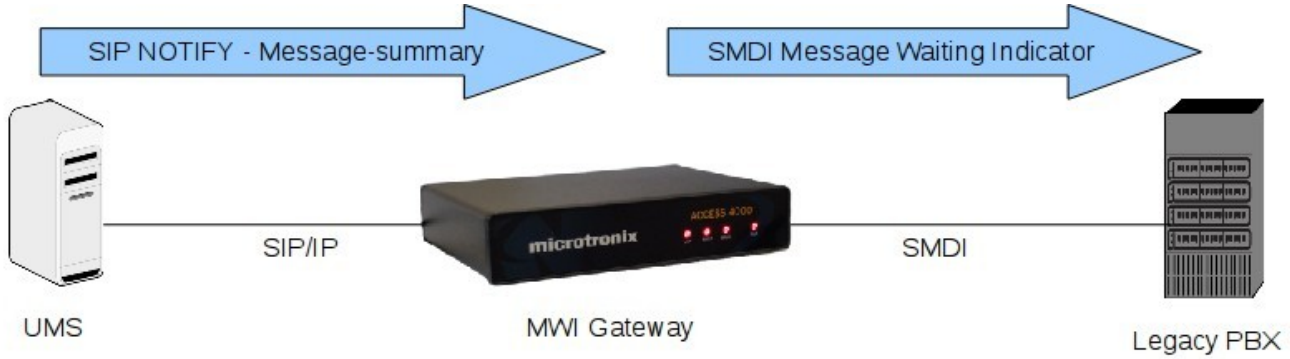
MWI output (with message translation where necessary):

- SMDI via serial RS232 port directly to legacy PBX
- SMDI via TCP/IP to remote terminal server connected to serial port of legacy PBX
- SMDI via TCP/IP to PBX supporting SMDI over TCP
- Sip Notify (message-summary) via UDP/IP to VoIP PBX

9.1 SMDI to SIP Translation

When there is only single VoIP switch/PBX destination configured, routing is unnecessary and the MWI Gateway acts as a simple SMDI to SIP translator.

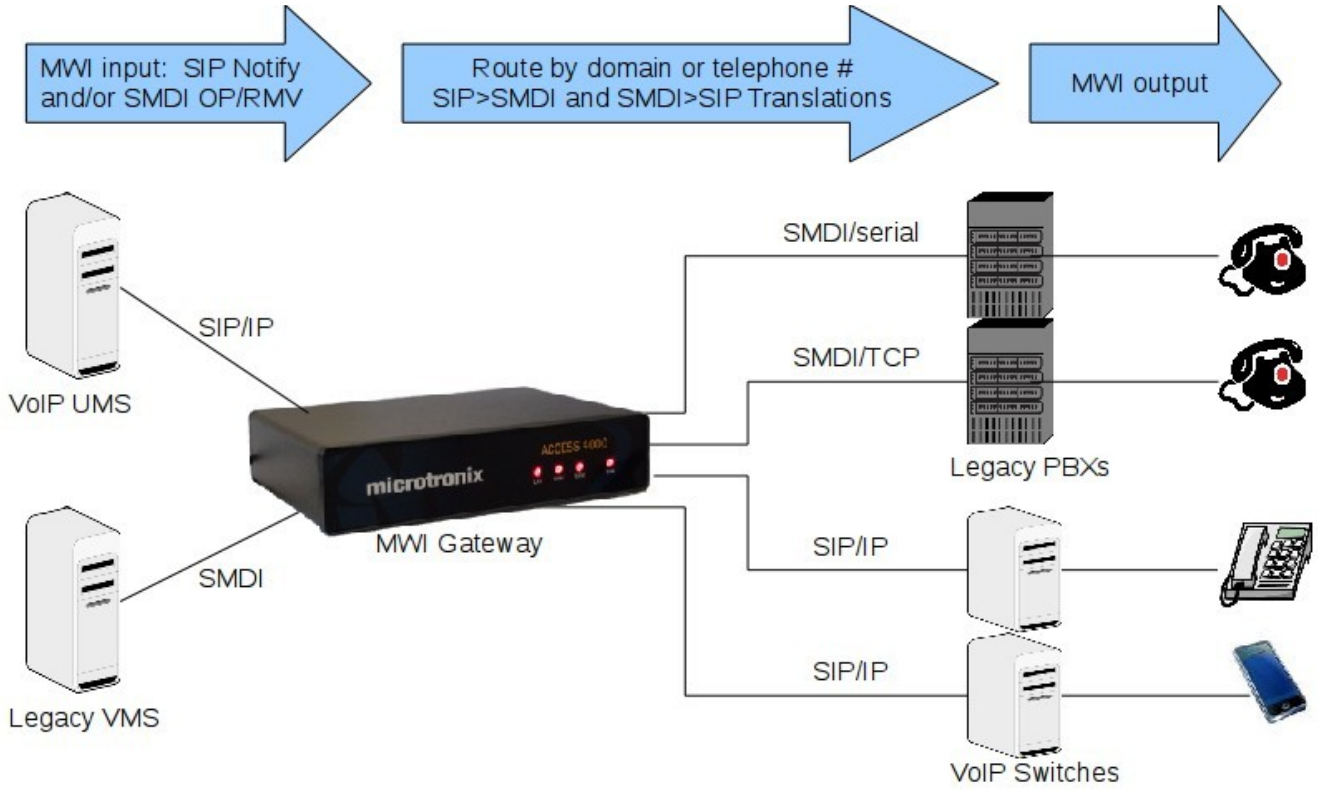
9.2 SIP to SMDI Translation



When there is only single legacy switch/PBX destination configured, routing is unnecessary and the MWI Gateway acts as a simple SIP to SMDI translator.

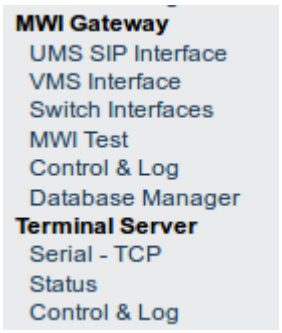
9.3 MWI Routing

When there are multiple destination switches as in the diagram above, an optional telephone number database may be used for routing MWI messages. The database is self-learning and may be populated from a comma separated values (CSV) text file containing telephone number and matching switch interface number. A database manger application allows adding, deleting, and reassigning phone numbers manually.



9.4 Configuration

Configuration is accomplished by selecting the configuration forms from the main menu:

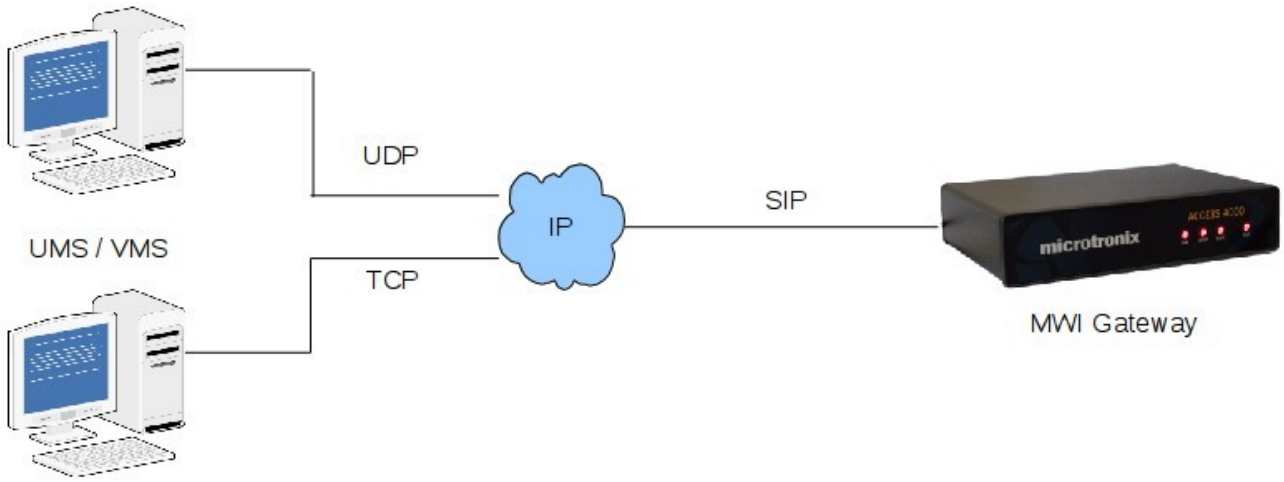


The **MWI Gateway** section provides links to the configuration and status pages for SMDI and SIP interfaces.

The **Terminal Server** section provides links to the configuration and status pages for any local serial interface that may be used. Refer to the Terminal Server configuration section for details.

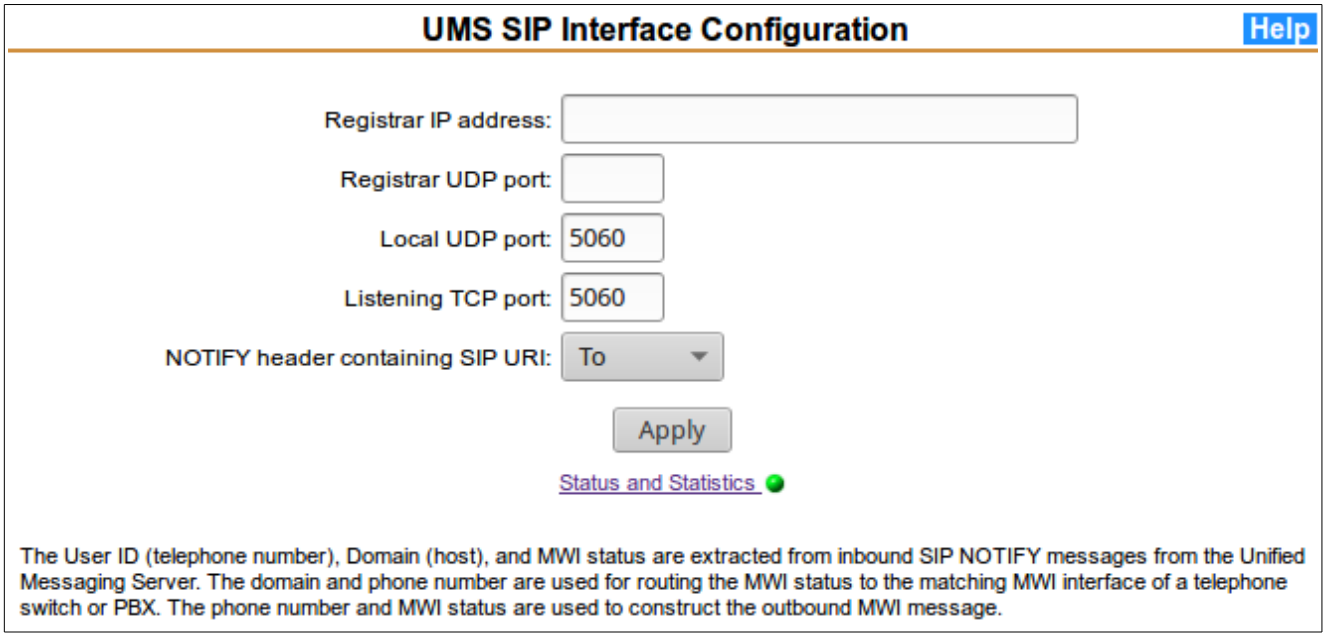
9.4.1 UMS SIP Interface

The VoIP UMS or VMS connects to the MWI Gateway over an IP network as shown in the diagram below. The UMS is configured with the IP address of the MWI Gateway and delivers unsolicited SIP Notify messages over either TCP or UDP sessions. More than one UMS may connect to the MWI Gateway.



The MWI Gateway needs to be configured to accept the incoming connections from the UMS and extract the domain name and telephone number from one of the fields of the SIP Notify message.

From main menu **MWI Gateway** section, select **UMS SIP Interface** to display the configuration form.



If the MWI Gateway needs to register itself, enter the **Registar IP address** and **Registrar UDP port**.

To accept incoming SIP Notify messages:

1) Specify the TCP and/or UDP port number to which the UMS interface will connect. The normal default is port number 5060.

2) Select the SIP NOTIFY header field containing the SIP-URI that will be used for extracting userid (telephone number) and domain name for routing the MWI message to a matching switch.

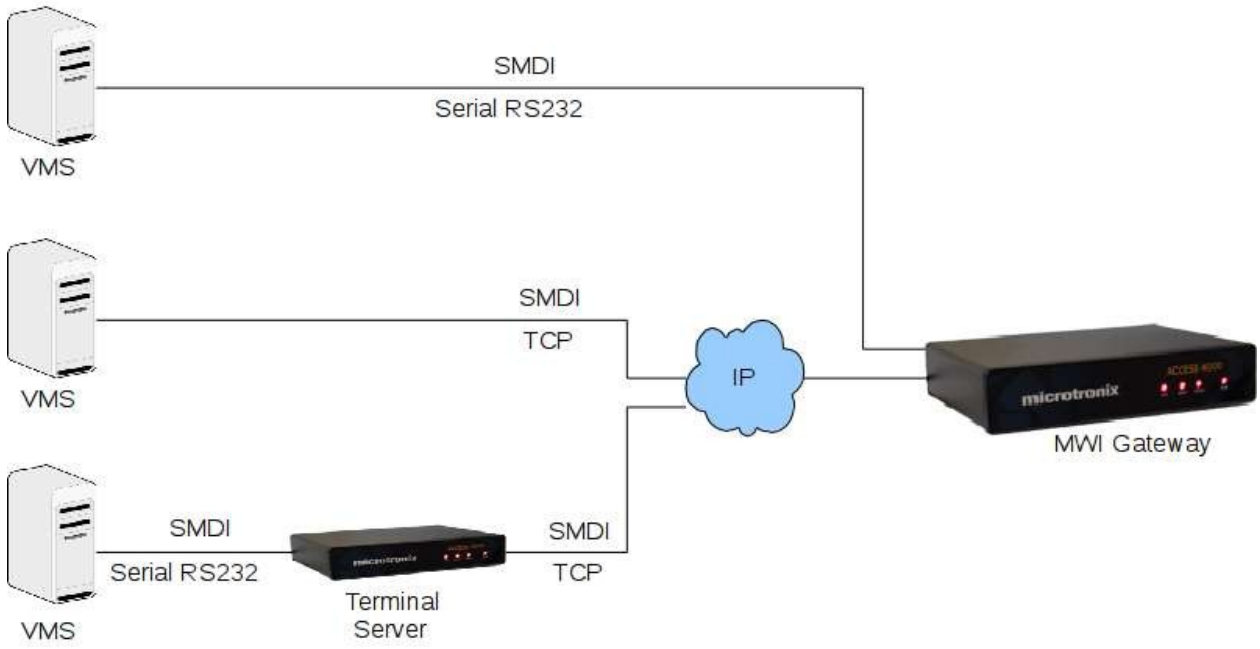
Click **Apply** to commit the settings and restart the application.

For additional information, click the **Help** button on the page.

The **Status and Statistics** link displays the current running status of the application with a red or green indicator. Clicking the link will display the application status and message statistics.

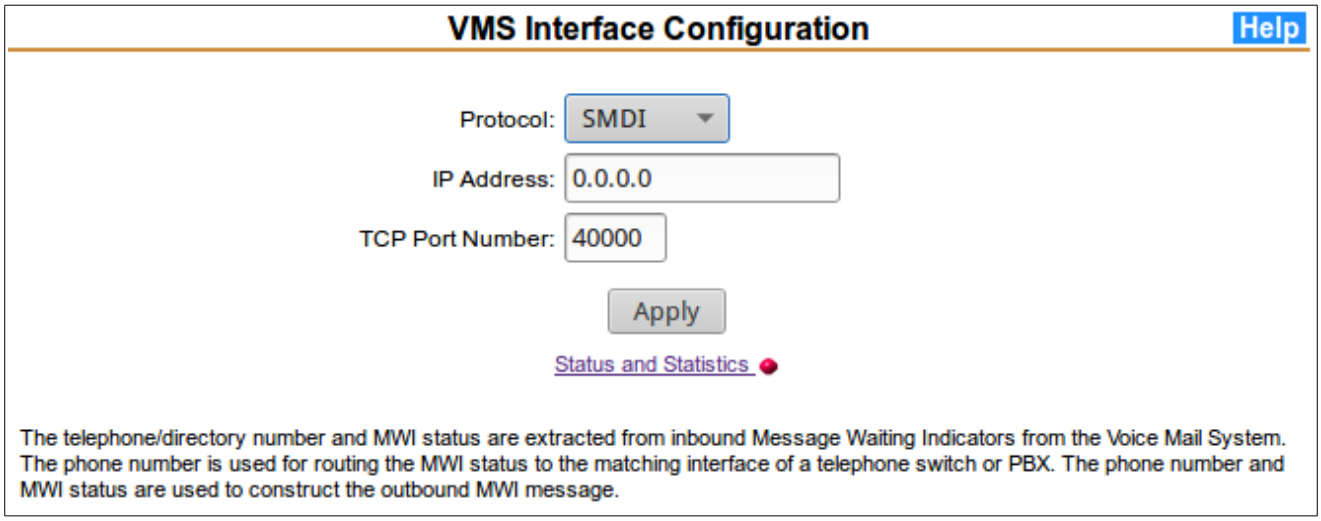
9.4.2 VMS SMDI Interface

The VMS connects to the MWI Gateway via an SMDI link which may be one of the following as depicted in the diagram below:



If connecting directly using a serial port, the SMDI interface connects to the built-in TCP Terminal Server at the local IP address, 127.0.0.1. If connecting remotely via TCP/IP, the IP address of the remote terminal server or of the VMS itself will be used for initiating the connection. Leave the IP address blank if accepting a connection from any source.

From the main menu **MWI Gateway** section, select **VMS SMDI Interface** to display the configuration form.



To configure a VMS SMDI interface:

1) Select SMDI protocol. To disable the interface, set protocol to Disabled.
2) If initiating a connection towards the VMS, specify the IP address and TCP port number of the remote or local terminal server that corresponds to the serial link of the VMS. If accepting connections from any source, leave the IP field blank to listen for a connection. Selecting TCP port 0 also disables this interface.
3) Click the **Apply** button to commit changes made.

The **Status and Statistics** field is a link that displays the current running status of the corresponding application with a red or green indicator. Clicking the link will display the application status and SMDI message statistics.

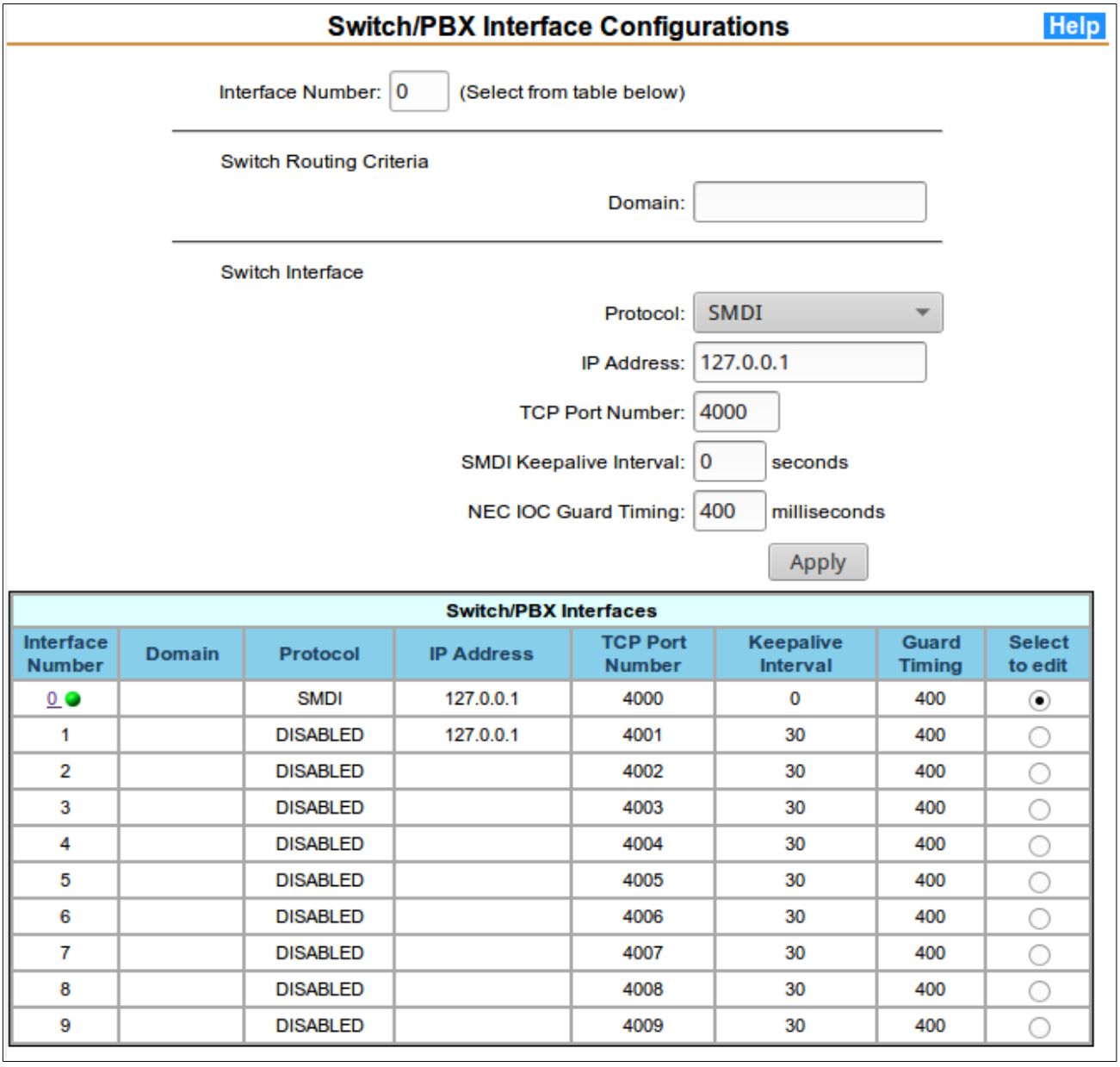
For additional configuration information, click on the **Help** button.

9.4.3 Switch Interfaces Configuration

Incoming MWI messages from UMS and/or VMS systems may be converted to legacy SMDI or NEC MCI, or to VoIP SIP. The MWI messages can be directed to a single switch or PBX, or routed to multiple switches and PBX's via DN (Directory Number) using a self-learning DN database.

Configuration of up to 10 destination switches is accomplished by selecting a protocol, and configuring the IP address and TCP port number of the internal Terminal Server, external terminal server, external SMDI Translator, or PBX.

From the main menu **MWI Gateway** section, select **Switch Interfaces** to display the configuration form, and table of switch interfaces.



Switch/PBX Interfaces

Interface Number	Domain	Protocol	IP Address	TCP Port Number	Keepalive Interval	Guard Timing	Select to edit
0		SMDI	127.0.0.1	4000	0	400	◉
1		DISABLED	127.0.0.1	4001	30	400	○
2		DISABLED		4002	30	400	○
3		DISABLED		4003	30	400	○
4		DISABLED		4004	30	400	○
5		DISABLED		4005	30	400	○
6		DISABLED		4006	30	400	○
7		DISABLED		4007	30	400	○
8		DISABLED		4008	30	400	○
9		DISABLED		4009	30	400	○

To configure switch interfaces, repeat the following steps for each interface:

1) Below the form, a table labeled **Switch/PBX Interfaces** is displayed. This table lists the switch Interfaces with their current configuration and status.
2) To edit or enable a Switch Interface setting, select the corresponding radio button on the right side of the interface table. The current values will populate the fields in the form above. The interface unit number will display in the **Interface Number** box.
3) **Domain:** field - specify the domain name that will be used to match the domain field of the SIP-URI field of incoming SIP Notify messages. Messages matching this will be delivered to this switch. If the name is entered as “default”, then messages that have no other match will be delivered to this switch. If left blank, then only telephone number lookup will apply for this switch.
4) Select the switch's protocol in the **Protocol** drop-down list.
5) Enter the **IP Address** and **TCP Port Number** of the Switch or the terminal server that corresponds to the serial link connected to the Switch. To initiate a connection, specify the external IP address. To accept a connection, set the IP to 0.0.0.0. The built-in terminal server can be specified by using the local loopback IP address (127.0.0.1). The TCP port specified will be 400x, where x is equal to the SMDI-Switch Interface number (ie. Device Port 0 = 4000).
6) For SMDI, specify the SMDI keepalive interval, which is the time it takes in seconds between receiving a response to a heartbeat message and when the next heartbeat message will be sent.
7) Click the **Apply** button to commit changes made.

For additional configuration information, click on the **Help** button.

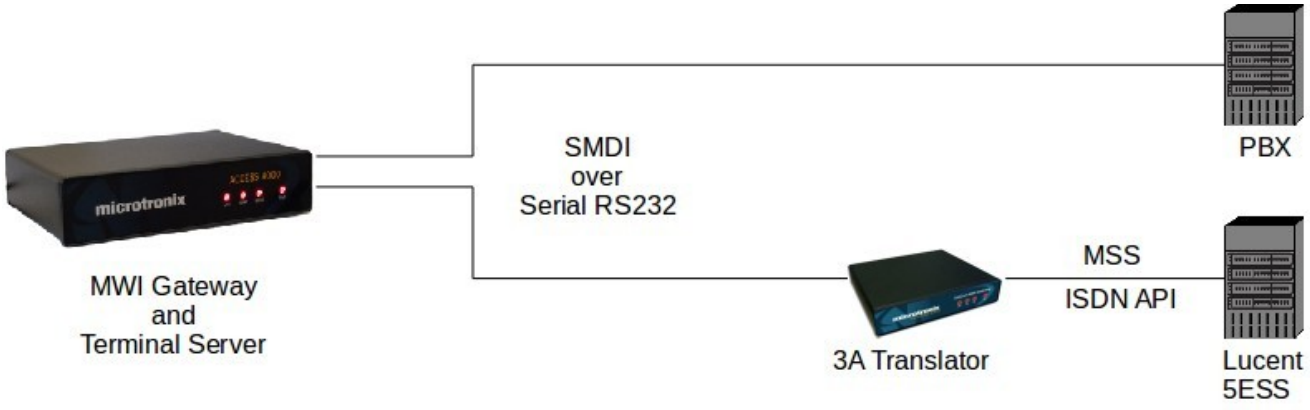
The **Interface number** field in the Switch Interfaces table is a link that displays the current running status of the corresponding application with a red or green indicator. Clicking the link will display the application status and message statistics.

When **multiple** switches are to be configured, start with the switch with the most telephone numbers, followed by switches with decreasing numbers. This increases the likelihood of an early match when the MWI router application is learning a new number. Assign an interface number for each stating with 0.

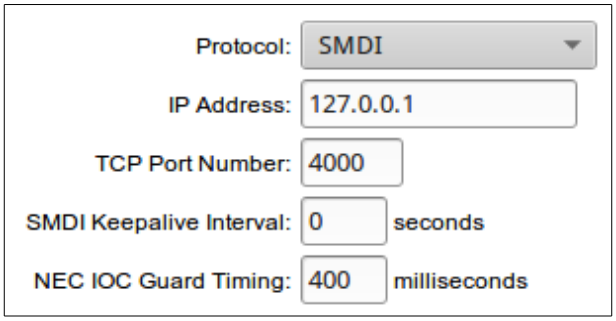
If destination switches are addressed by the UMS by a unique domain name, enter it in the **Domain** field. Lookup by telephone number in the database will not be necessary unless there are exceptions.

The following sections illustrate the possible connection types to the switches or PBX's.

9.4.3.1 Serial Via Internal Terminal Server

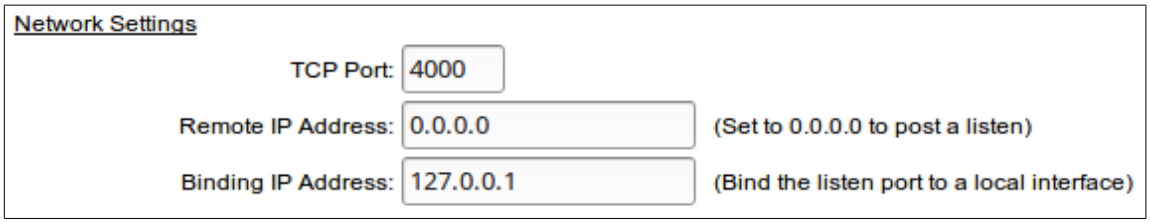


Select an interface number by clicking it's **Select to edit** button to display it's configuration in the form.

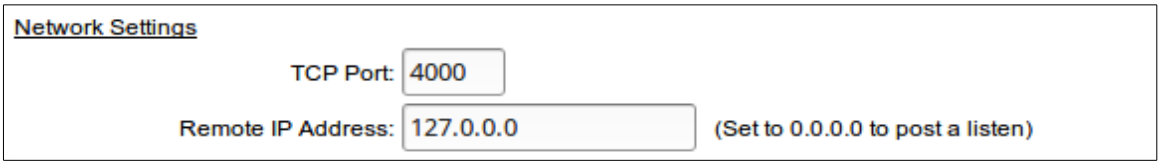


Select the protocol SMDI or NEC MCI to match the switch interface.

To initiate a connection to the internal Terminal Server's serial interface, choose the local IP address (127.0.0.1) and port number associated with the Terminal Server serial interface connected to the switch. The Terminal Server Remote IP address should be set to 0.0.0.0 to listen.

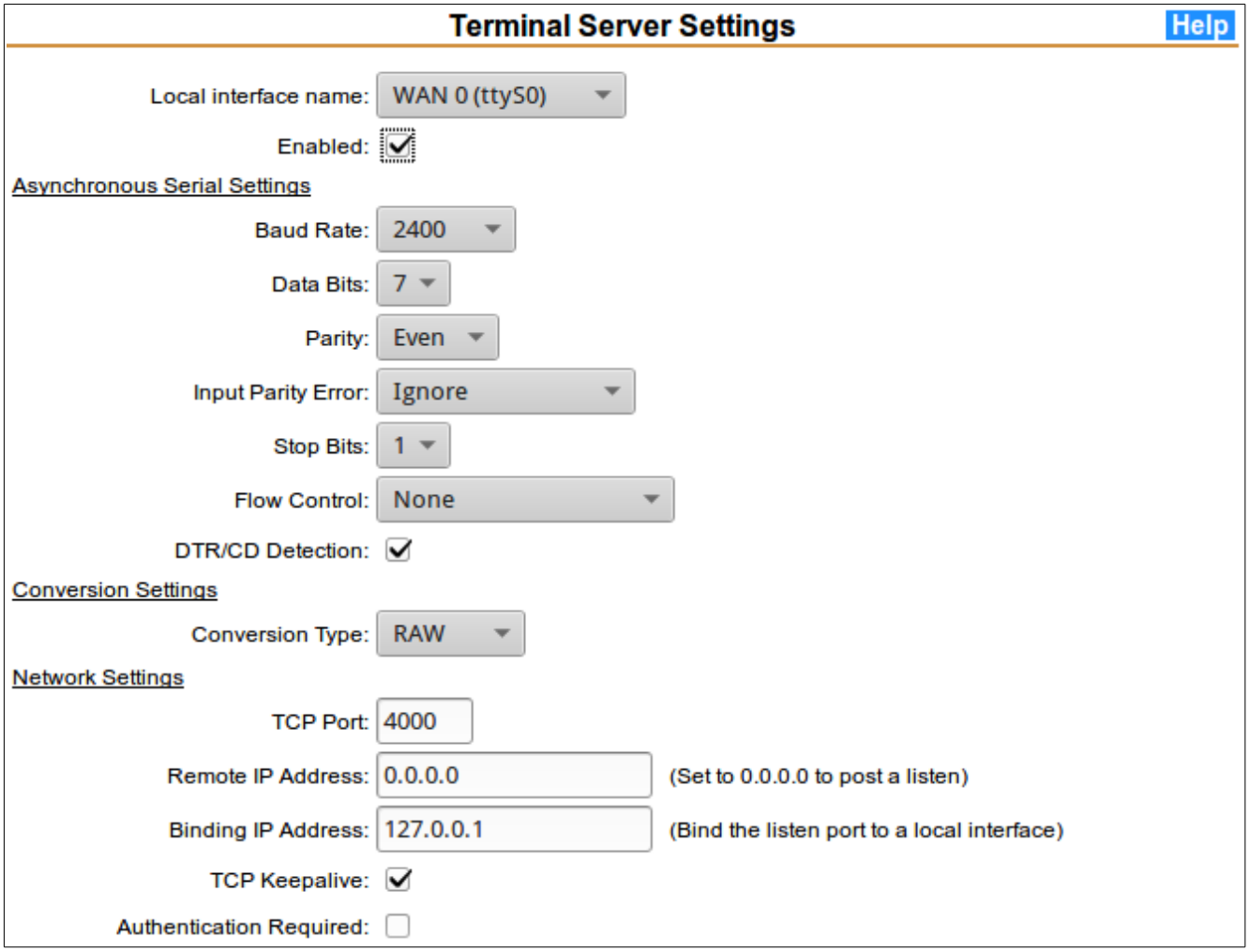


To accept a connection from the terminal server, set the IP Address to 0.0.0.0. The Terminal Server Remote IP address should be set to 127.0.0.0 to initiate the connection.



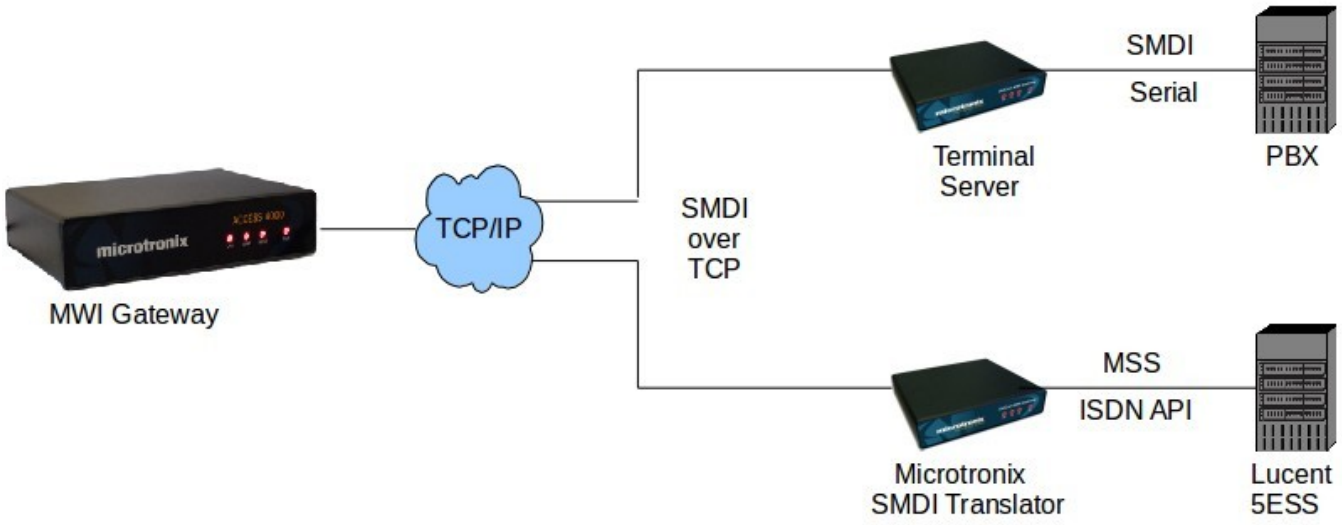
Click the **Apply** button.

Click on the **Serial-TCP** link in the **Terminal Server** menu section to configure the local serial interface connected to the switch.

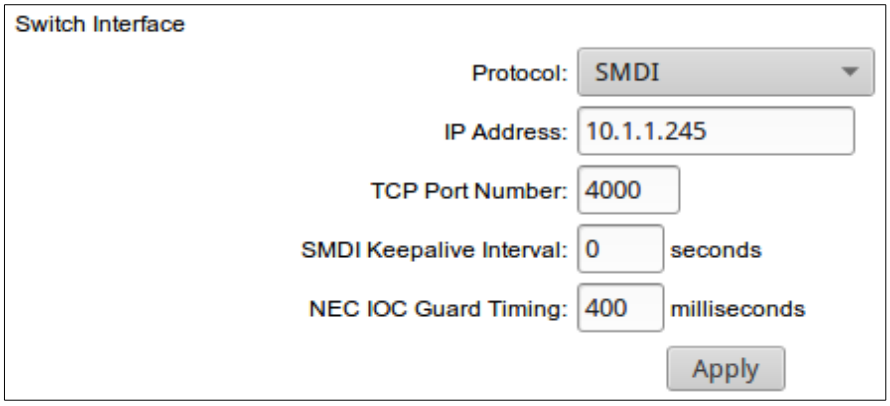


Select the local interface connected to the switch and configure the Serial Settings to match the attached switch interface. Configure a TCP port to match, and set Remote IP address to 0.0.0.0 to listen for the local connection or 127.0.0.1 to initiate a local connection. Configure the Serial Settings to match the attached switch interface.

9.4.3.2 Serial Via External Terminal Server or Translator



Select an interface number by clicking it's **Select to edit** button to display it's configuration in the form.



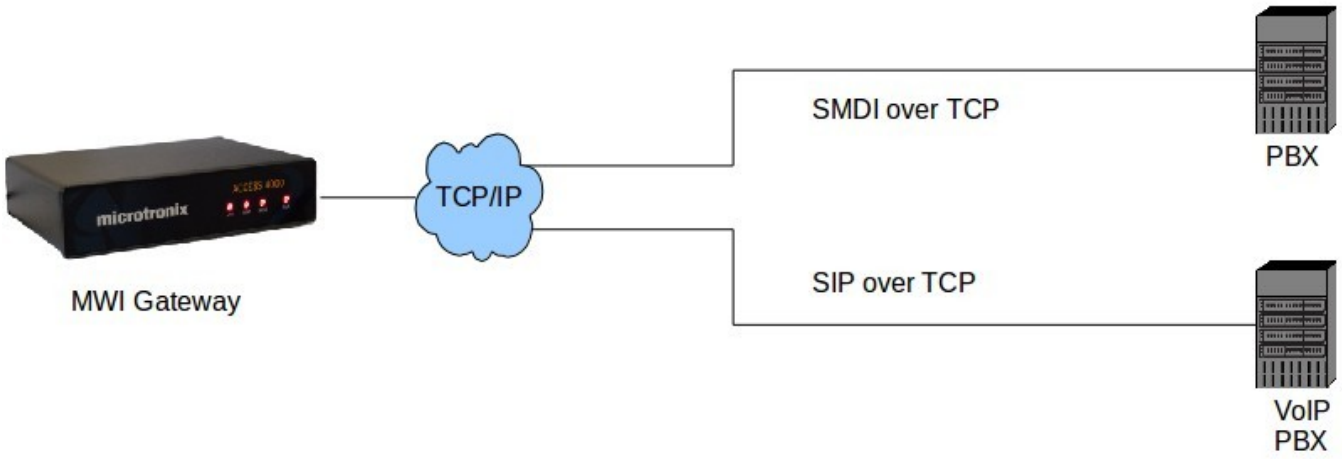
Select the protocol SMDI or NEC MCI to match the switch interface.

To initiate a connection to the external terminal server's serial interface, configure it's IP address and port number associated with it's serial interface connected to the switch. The remote terminal server should be set to listen.

To accept a connection from the remote terminal server, set the IP Address to 0.0.0.0. The terminal server Remote should be set to the IP address of the MWI Gateway to initiate the connection.

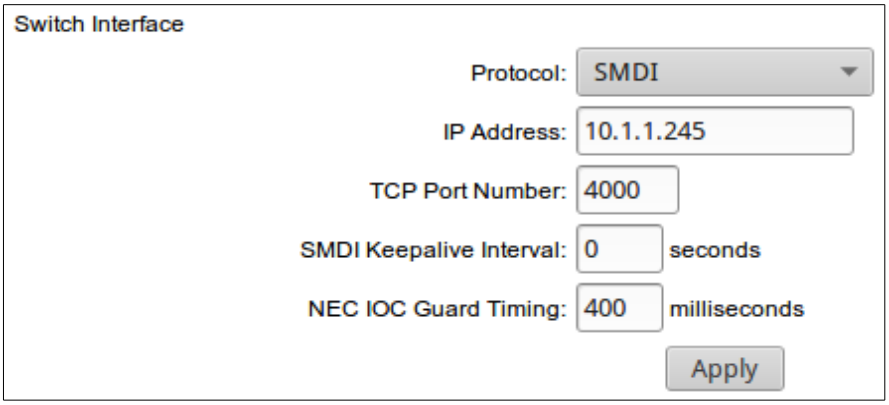
Click the **Apply** button.

9.4.3.3 TCP/IP Direct to PBX

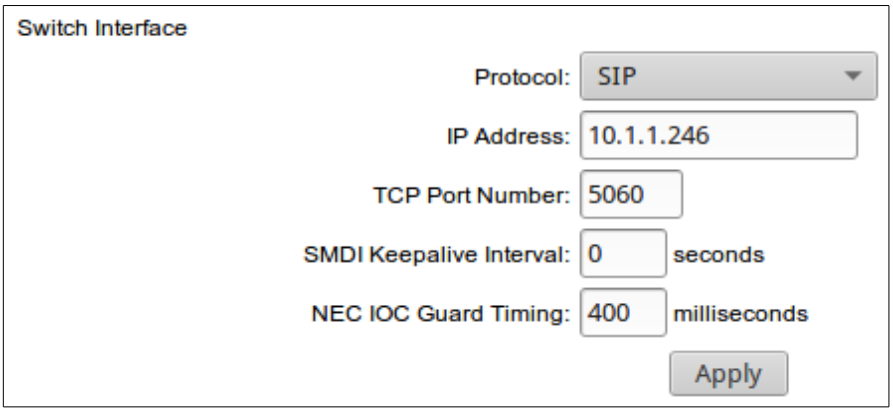


Select an interface number by clicking it's **Select to edit** button to display it's configuration in the form.

Choose Protocol SMDI if the PBX supports SMDI over TCP, and set the PBX's IP address and TCP port number if the PBX is accepting connections. Set IP address to 0.0.0.0 to accept a connection.



Choose Protocol SIP if the PBX supports it, and set the PBX's IP address and TCP port number if the PBX is accepting connections.



9.5 MWI Test

9.5.1 Overview

The MWI Gateway can generate MWI messages internally by using the **MWI Test** page . Choose the main menu option to display the test page.

The test page has 3 input fields for selecting a telephone number, on/off indicator, and message format; and a Test button to initiate the test.

9.5.2 Telephone number (DN)

Enter the telephone number of the telephone that should receive an MWI message. The maximum number of digits is 14. A single digit can be sent as a “keep-alive” signal that should invoke a negative response.

9.5.3 Message Waiting Indication

Choose **ON** or **OFF** depending on the desired affect on the telephone. Sending one then the other in successive tests should cause a toggle of the specific indicator on the telephone. This could be a stutter tone, lamp, or a test message depending on the type of phone and switch/PBX to which the phone is attached.

9.5.4 Message format

Choose SIP Notify or SMDI as the source generator for the message.

If **SIP Notify** is chosen, a SIP Notify “messge-summary” is sent via the **Listening TCP port** of the **UMS SIP Interface**. The port number shoul be non-zero. The SIP interface will forward the message to the MWI Gateway for delivery to it's routed destination switch/PBX.

If **SMDI** is chosen, an SMDI message is send via the listening **TCP Port Number** of the **VMS Interface**. The VMS interface must not be in use by another source, and must be configured for listening on a non-zero **TCP Port Number, IP Address** blank or set to 0.0.0.0, and **Protocol** set to **SMDI**.

9.5.5 Test Button

Click on the **Test** button to generate and send the MWI mesage to the selected input interface, and observe the target telephone. Messages will be displayed in a new window to reflect the progress.

9.6 Telephone Number Database

9.6.1 Overview

If MWI routing to multiple switch destinations is done by telephone number, the USB 2.0 flash drive will contain a telephone number SQL database. The database is initially empty unless pre-populated by arrangement with Microtronix. A telephone number record has 3 fields:

1) Telephone number (up to 14 digits)
2) Switch interface number (matching switch or PBX)
3) Last received message waiting indication (ON / OFF)

The MWI Gateway will use the telephone number extracted from incoming SIP Notify or SMDI MWI messages to route it to a matching switch by looking it up in the database.

9.6.2 Learning Telephone Numbers

If the telephone number does not yet exist in the database, a learning process begins. A record is added and the telephone number assigned to the first available switch interface (lowest interface number). The MWI value is also saved in case the switch rejects the phone number. The MWI message is sent to the switch, and if it is rejected, the phone number and MWI are used to send a message to the next available switch. The phone number is reassigned to the new switch. This process is repeated until a switch has accepted the number, or all have rejected it. If all switches reject the phone number, it will be asssigned to switch interface number 99, and a log event generated.

If the telephone number extracted already exists (has been accepted) in the database, an received MWI message is forwarded to the assigned interfacebut if that switch subsequently rejects the telephone number, the telephone number is re-assigned to the next highest switch interface number and the learning process resumes.

If a telphone number becomes assigned to switch interface 99, the **Database Manager** web page can be used to manually reassign or delete it.

9.6.3 Database Manager

The **Database Manager** web page can be used to:

- find a telephone number switch interface assignment
- find a range of telephone number switch interface assignments
- find the numbers assigned to a switch interface
- reassign the switch interface for a phone number
- delete a phone number record
- add a new phone number record

9.7 SMDI Messaging Examples

1) SIP Notify message-summary received from the UMS contains the following fields:

- SIP-URI: **sip:551234567@domain1**
- message content: **Messages-waiting: yes**

If enabled, the telephone number **55512134567** is looked up in the database for the destination switch interface. If not in the database, the switch interfaces are scanned for a domain name match to **"domain1"** starting at the lowest configured switch interface.

When a switch interface is determined and it is SMDI, the telephone number is used to construct the SMDI MWI message to be sent to the matching switch.

```
OP:MWI 5551234567!<ctrl-D>
```

2) SIP Notify message summary received from the UMS contains the following fields:

- SIP-URI: **sip:551234567@domain1**
- message content: **Messages-waiting: no**

An SMDI MWI message will be sent to the matching switch.

```
RMV:MWI 5551234567!<ctrl-D>
```

3) If a transmitted SMDI MWI message contains a telephone number not assigned to the destination switch, it will respond with an SMDI invalid message.

```
MWI5551234567 INV<cr><lf><ctrl-Y>
```

This will cause the MWI Gateway to remove the current SMDI interface assignment in the database and re-assign to the next available switch interface number. It will transmit an MWI message to the next switch (could be SIP Notify or SMDI).

9.8 Standards

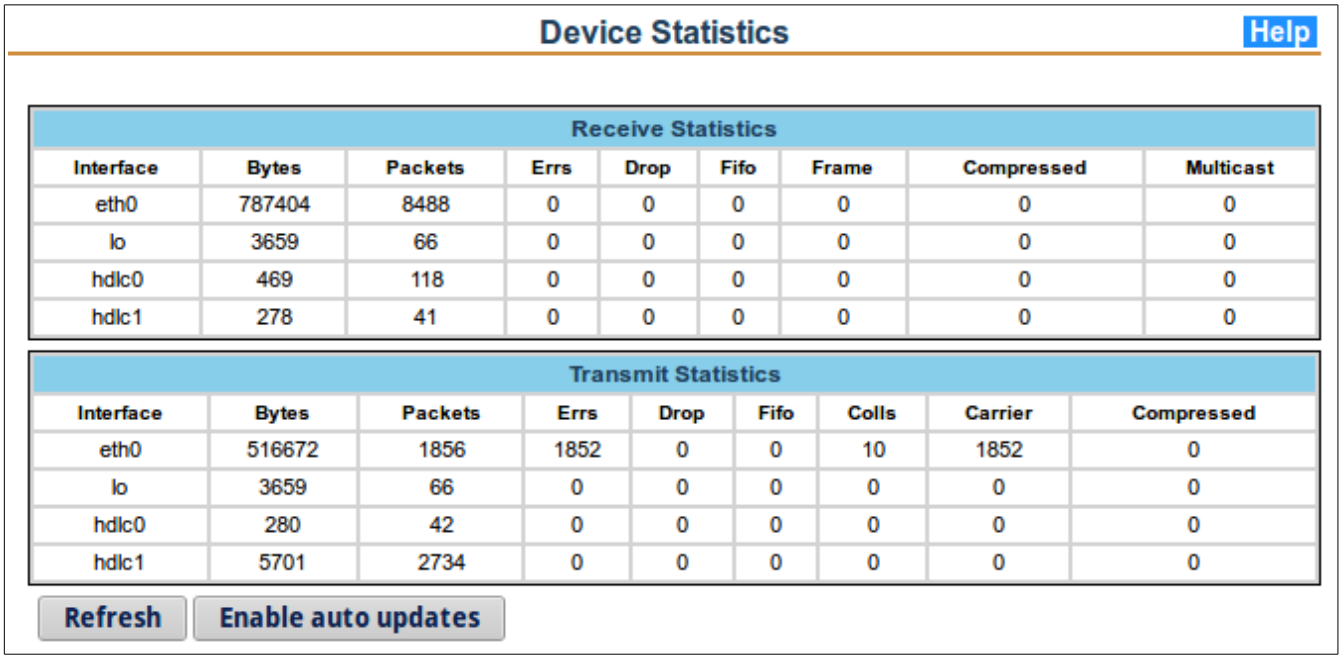
- SMDI: Simplified Message Desk Interface (Bellcore TR-NWT-000283)
- RFC 3261: Session Initiation Protocol (SIP)
- RFC 3265: Session Initiation Protocol - Specific Event Notification: (EXT. of 3261)
- RFC 3842: A Message Summary and MWI Event Package for SIP
- RFC 3966: The tel: URI for telephone numbers
- ITU-T E.123 Notation for national and international telephone numbers

10 Statistics & Logs

This section provides access to statistics and logs. Click on each item in this section of the main menu to display the statistic and log pages.

10.1 Interface Statistics

The statistics page provides statistical information on all the active network interfaces. The statistics are accumulated until the next system restart or power up.



Device Statistics Help

Receive Statistics

Interface	Bytes	Packets	Errs	Drop	Fifo	Frame	Compressed	Multicast
eth0	787404	8488	0	0	0	0	0	0
lo	3659	66	0	0	0	0	0	0
hdlc0	469	118	0	0	0	0	0	0
hdlc1	278	41	0	0	0	0	0	0

Transmit Statistics

Interface	Bytes	Packets	Errs	Drop	Fifo	Colls	Carrier	Compressed
eth0	516672	1856	1852	0	0	10	1852	0
lo	3659	66	0	0	0	0	0	0
hdlc0	280	42	0	0	0	0	0	0
hdlc1	5701	2734	0	0	0	0	0	0

Refresh Enable auto updates

The 2 tables show the Receive and Transmit statistics for all network interfaces (IP and HDLC).

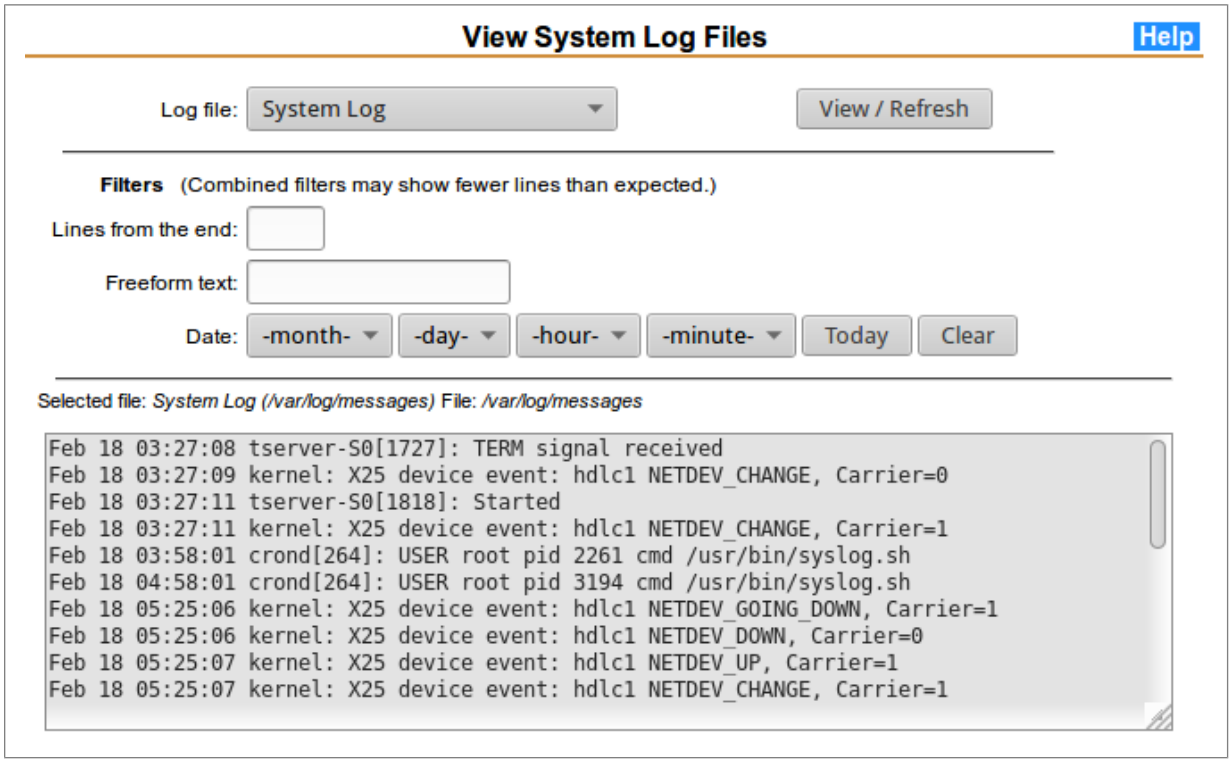
The following tables provide the meaning of each field.

Receive Statistics	
Parameter	**Description**
Interface	The active network interface: eth0 – Ethernet lo – loopback interface (127.*.*.*) hdlc0 – WAN 0 hdlc1 – WAN 1
Bytes	The number of bytes received by the interface
Packets	The number of packets received by the interface
Errs	The total number of receive errors detected, including CRC errors
Drop	The number of dropped packets on the network interface
Fifo	The number of FIFO buffer errors
Frame	The number of packet framing errors
Compressed	The number of packets compressed packets received
Multicast	The number of multicast packets received

Transmit Statistics	
Parameter	**Description**
Interface	The active network interface
Bytes	The number of bytes transmitted by the interface
Packets	The number of packets transmitted by the interface
Errs	The number of transmit errors detected
Drop	The number of packets dropped
Fifo	The number of FIFO buffer errors
Colls	The number of collisions
Carrier	The number of carrier losses detected
Compressed	The number of compressed packets transmitted

10.2 System Logs

This page provides an interface for viewing kernel ring buffer and system log.



10.2.1 Log View Parameters

Log file: The file to view. To view or refresh the display of a log file, select the desired file from the list provided and click the "**View / Refresh**" button.

Lines from the end: To restrict the output to a certain number of lines, enter the desired number of lines and click "**View / Refresh**". If other filters are also in effect or there fewer lines available than entered, then the total number of displayed lines may be less.

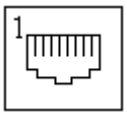
Date: To restrict the log output to a specific month, day, hour or minute, select the desired value and click "**View / Refresh**". If the button labeled "**Today**" is clicked, then the month and day selections will be changed to the values for that day. To clear a date filter, select the first option in the list, which will consist of a string with a dash on each end. To clear all date selections, click the button labeled "**Clear**".

Freeform text: To restrict output to lines containing a specific string, enter a string in this field. Some basic regular expressions are supported.

11 Cables and Connectors

11.1 NETWORK - 10/100 Ethernet Interface

The 10/100 Base-T Ethernet port provides a standard twisted pair interface on an RJ45 socket.



Pin #	Function
1	Transmit +
2	Transmit -
3	Receive +
4	n/c
5	n/c
6	Receive -
7	n/c
8	n/c

11.1.1 Ethernet Cables

A standard RJ45 Ethernet patch cable (straight-through) may be used to connect to a hub/switch, or direct connection to a PC for initial configuration.

Ethernet cable part numbers	
811-W6002-06	RJ45 Ethernet straight through patch cable (blue), 6 ft

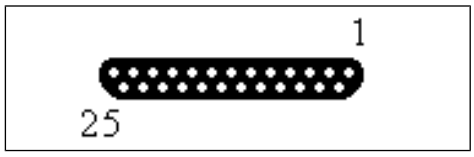
11.2 WAN Interface – Synchronous Operation

The WAN interface provides a choice of RS232 (V.24), RS530, RS530A, RS449, X.21, or V.35 signals in a DB25F connector with standard RS530 DCE pin configuration.

When configured for synchronous or X.25 operation, the interface name is hdlc0 (WAN port 0), and hdlc1 (WAN port 1) on the Access 4000 model.

In RS530, RS449, and X.21 modes, all signals are balanced and have 2 pins per function (A/B). In RS232, only single ended signals are used with a common ground (SG), and the B pins are not used. In V.35 mode, control signals are unbalanced, and data/clock signals are balanced. All balanced signals (A and B) require twisted pair wires in the cable. Unbalanced signals (A only) do not.

The following table shows the RS530 pin configuration of the WAN port.



Pin #	Direction	Signal Name
1	---	FG
2	input	TxD A
3	output	RxD A
4	input	RTS A
5	output	CTS A
6	output	DSR A
7	---	SG
8	output	DCD A
9	i/o	RxC B
10	output	DCD B
11	input	(E)TxC B
12	output	TxC B
13	output	CTS B
14	input	TxD B
15	output	TxC A
16	output	RxD B
17	i/o	RxC A
18		
19	input	RTS B
20	input	DTR A
21		
22	output	DSR B
23	input	DTR B
24	input	(E)TxC A
25		

Note: Receive clock (RxC A/B) on pins 17/9 is bi-directional and depends on the clock configuration of the port. Transmit clock (TxC A/B) is either output on pins 15/12 or input on pins 24/11 depending on the clock configuration. Refer to the following sections for appropriate cabling for each clock configuration.

11.2.1 Connecting to a DTE Device

The primary WAN port is configured as a DCE, so can normally connect to a DTE device using a straight through cable. The port is configured to provide DCE clock. The transmit clock (pins 15/12) and the receive clock (pins 17/9) are sourced from a single baud rate generator, so the attached device may use either signal as a single source for both receive and transmit clock.

If the port is configured to generate DCE clocks internally (**Clock source = Internal**), then a baud rate is chosen and the internal baud rate generator is used to source the RxC and TxC clock signals. Pins 24/11 are not used and may be omitted from the cable.

If the port is configured to receive the clock from the DTE (**Clock source = DTE**), then the received ETxC signal (pin 24/11) is used to generate the output DCE clock signals RxC and TxC.

Pin #	Direction	Signal Name
17	output	RxC A
9	output	RxC B
15	output	TxC A
12	output	TxC B
24	input	ETxC A
11	input	ETxC B

11.2.1.1 Straight Through Cables

The following table shows the pin configurations and connector types for each interface type.

DB25M	RS530 DB25F	RS232 DB25F	V.35 M34F	X.21 DB15F	RS449 DB37F
1	1	1	A	1	1
2	2	2	P	2	4
3	3	3	R	4	6
4	4	4	C		7
5	5	5	D		9
6	6	6	E		11
7	7	7	B	8	19,37
8	8	8	F	5	13
9	9		X	13	26
10	10			12	31
11	11		W		35
12	12		AA		23
13	13				27
14	14		S	9	22
15	15	15	Y		5
16	16		T	11	24
17	17	17	V	6	8
19	19				25
20	20	20	H	3	12
22	22				29
23	23			10	30
24	24	24	U		17

Part Number	Description
811-SC6MF	DB25M-DB25F, RS232/V.24 straight through cable, 6 ft
W4025-RS530-DCE-n	DB25M-DB25F, RS530 straight through cable, custom length
W4025-V35-DCE-001	DB25M-M34F, V.35 adapter cable, 1 ft
W4025-X21-DCE-001	DB25M-DB15F, X.21 adapter cable, 1 ft
W4025-RS449-DCE-001	DB25M-DB37F, RS449/V.36 adapter cable, 1 ft

Other lengths are available by special order.

11.2.2 Connecting to a DCE Device

Because the port is configured as a DCE, a crossover or tail circuit cable must be used to connect to another DCE device (for example, a modem), so that the WAN port emulates a DTE.

11.2.2.1 Crossover Cables

The port is configured (**Clock source = External)** to receive the clock signals from the DCE. The receive clock is on pins 17/9, and transmit clock is on pins 24/11 (not the usual 15/12).

Pin #	Direction	Signal Name
17	input	RxC A
9	input	RxC B
24	input	TxC A
11	input	TxC B

Note: If the DCE uses the same source for generating the clock for both receive and transmit, then the port can be configured for a single clock (**Clock source = RxFromTx**) on pins 17/9 and pins 24/11 may be omitted.

The following table shows the pin configurations and connector types for each supported interface type. The first column, DB25M, is the end of the cable that connects to the WAN port.

DB25M	RS530 DB25M	RS232 DB25M	V.35 M/34M	X.21 DB15M	RS449 DB37M
1	1	1	A	1	1
2	3	3	R	4	6
3	2	2	P	2	4
4	5	5	D		9
5	4	4	C		7
6,8	20	20	H	3	12
7	7	7	B	8	19,37
9	12		AA	13	23
11	9		X		26
13	19				25
14	16		T	11	24
16	14		S	9	22
17	15	15	Y	6	5
19	13				27
20	6,8	6,8	E,F	5	11,13
22,10	23			10	30
23	22,10			12	29,31
24	17	17	V		8

Part Number	Description
W4025-RS530-DTE-001	DB25M-DB25M, RS530 crossover cable, 1 ft
W4025-V24-DTE-001	DB25M-DB25M, RS232/V.24 crossover cable, 1 ft
W4025-V35-DTE-001	DB25M-M34M, V.35 crossover adapter cable, 1 ft
W4025-X21-DTE-001	DB25M-DB15M, X.21 crossover adapter cable, 1 ft
W4025-RS449-DTE-001	DB25M-DB37M, RS449/V.36 crossover adapter cable, 1 ft
	Other lengths are available by special order.

11.2.2.2 Tail Circuit Cables

If the port is configured to connect to another DCE using a tail circuit cable (**Clock source = TxFromRx**), then a baud rate is chosen and the internal baud rate generator is used to source the output RxC clock. Receive and transmit data use the ETxC (pin 24/11) to derive clocking.

Pin #	Direction	Signal Name
17	output	RxC A
9	output	RxC B
24	input	TxC A
11	input	TxC B

The following table shows the pin configurations and connector types for each supported interface type.

DB25M	RS530 DB25M	RS232 DB25M	V.35 M/34M	RS449 DB37M
1	1	1	A	1
2	3	3	R	6
3	2	2	P	4
4	8	8	F	13
6	20	20	H	12
7	7	7	B	19, 37
8	4	4	C	7
9	11		W	35
10	19			25
11	9		X	26
14	16		T	24
16	14		S	22
17	24	24	U	17
19	10			31
20	6	6	E	11
22	23			30
23	22			29
24	17	17	V	8

11.2.3 Split clock configuration

When the primary WAN port is configured for split clock (**Clock source = TxInt**), the clock pins are configured as shown in the table below. The receive clock (pin 17/9) is generated internally, and the transmit clock is derived from the external source on pin 24/11. Pins 15/12 are not used and should be left disconnected. Since this is a custom configuration, the cable may be either straight through or crossover, depending on the application.

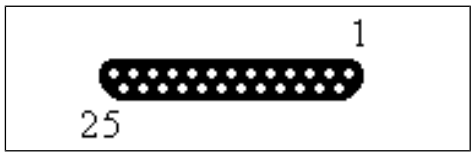
Pin #	Direction	Signal Name
17	output	RxC A
9	output	RxC B
24	input	TxC A
11	input	TxC B

11.3 WAN Interface – Asynchronous / Serial Operation

The WAN interface provides RS232 (V.24) in a DB25F connector with standard DCE pin configuration.

When configured for asynchronous / serial operation, the interface names are WAN 0 hdlc0), and WAN 1 (hdlc1) on the Access 4000 model.

The following table shows the RS232 pin configuration of the WAN interface when configured for asynchronous operation.



Pin #	Direction	Signal Name
1	---	FG
2	input	TxD
3	output	RxD
4	input	RTS
5	output	CTS
6	output	DSR
7	---	SG
8	output	DCD
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20	input	DTR
21		
22		
23		
24		
25		

11.3.1 Connecting to a DTE Device

The WAN interface is configured as a DCE, so can normally connect to a DTE device using standard straight through or 9 pin adapter cables.

11.3.1.1 Straight Through Cables

The table shows the pin configurations and connector types of the cables. The first column, DB25M, is the end of the cable that connects to the WAN interface. The other columns depict the connector and pin configuration of the other end of the cables connecting to DTE device.

DB25M	DB25F	DB25M	DB9F
1	1	1	-
2	2	2	3
3	3	3	2
4	4	4	7
5	5	5	8
6	6	6	6
7	7	7	5
8	8	8	1
20	20	20	4

The following cables are used to connect to DTE devices. Usually a DTE device has a male connector, but some have a female connector requiring a straight through gender changer. Connecting to a DB9M PC COM port requires a 9-pin adapter.

Part Number	Description
811-SC6MF	DB25M-DB25F, RS232 straight through cable
811-SC6MM	DB25M-DB25M, RS232 straight through gender changer
[284-MC1MF	DB25M-DB9F, RS232 adapter cable

11.3.2 Connecting to a DCE Device

Because the WAN interface is configured as a DCE, a standard null modem (crossover) cable must be used to connect to another DCE device (for example, a modem), so that the WAN emulates a DTE.

11.3.2.1 Null Modem Cables

The table shows the pin configuration and connectors. The cable is symmetrical, so it doesn't matter which end connects to the WAN interface.

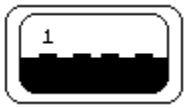
DB25M	DB25M
1	1
2	3
3	2
4	5
5	4
6 [+8]	20
7	7
20	6 [+8]

Note that pins 6 and 8 (DSR and CD) may be wired together at each end. Alternatively, either 6 or 8 may be used for cross-connecting to pin 20 (DTR) at the other end.

Part Number	Description
W4025-V24-DTE	DB25M-DB25M, RS232/V.24 crossover cable
W4025-V35-DTE-001	DB25M-M34M, V.35 crossover adapter cable, 1 ft
W4025-X21-DTE-001	DB25M-DB15M, X.21 crossover adapter cable, 1 ft
W4025-RS449-DTE-001	DB25M-DB37M, RS449 crossover adapter cable, 1 ft

11.4 USB Host Port

The USB host port provides USB 1.1 in a type A connector. It is used for additional serial or storage devices.



USB serial adapters may be connected here to expand the number of ports used in terminal server operation.

In the Access Collection Manager option, the USB port is used to connect a USB 1.1 or 2.0 flash drive for saving and archiving CDR/AMA files.

12 Conversion and Encapsulations

When converting from X.25 to TCP, a fundamental difference in the way application data is transferred needs to be taken into consideration and accounted for. X.25 is message oriented, and TCP is byte-stream oriented. In order to preserve message boundaries required by X.25 applications, a TCP application must introduce a message boundary preservation method into the TCP byte stream so that the intervening X.25/TCP gateway is able to convert the contiguous stream of messages back into discreet messages on the X.25 side. The TCP application and the X.25/TCP gateway must agree on a common encapsulation method. Without this agreement, the X.25/TCP Gateway cannot distinguish message boundaries in the TCP data.

Encapsulation of application messages is often required so that a receiver application can reconstruct a message based on the boundaries defined by a transmitting application. Encapsulation is necessary because often the application message is larger than the network's maximum transmitted packet size, and is fragmented across multiple packets, or multiple messages merged within a packet. This means that the network packet is an unreliable boundary for application messages.

With X.25 interfaces, the boundary offered by the X.25 protocol is the use of a MORE data bit in the data packets to mark when there is continuation of a message in the next packet. The last part of the message is in a data packet with the MORE bit set to zero. With MORE bit markers, X.25 implementations can receive an entire, discreet message in a single read, and transmit a message in a single write.

TCP, on the other hand does not have a specific boundary around messages sent by applications. Like an asynchronous serial data stream, TCP is byte-stream oriented. Even if an application sends a message as a single write operation, there is no guarantee that the message arrives at the receiver application in a single discreet segment. It can get split across TCP/IP packets, or merged with preceding or following messages. So TCP/IP applications must add their own message boundary markers if the message is to be preserved. This method needs to be supported by the X.25/TCP gateway in order for it to be able to translate or convert the message from that encapsulation method to the M-bit method towards the X.25 application.

12.1 RAW

Not all applications require the boundaries of the message to be preserved by an intervening X.25/TCP gateway. The content of the message provides the appropriate markers like start and/or end characters, or has a message header that already contains a length indication. This only works for X.25 applications that do not rely on the message being contained in a MORE-bit sequence of packets. With RAW conversion, both the X.25 and the TCP data are treated as byte streams, and the Gateway does not add MORE bits to data packets. It makes no effort to preserve X.25 message boundaries.

This method requires that both the X.25 application and the TCP/IP application support the embedded boundaries of the application message, or simply don't require any boundaries.

12.2 RAW-MBIT

This method of conversion in the X.25/TCP gateway makes a “best-effort” to preserve boundaries of messages without introducing any additional data into the TCP byte stream.

Requirements:

- The X.25 application uses More-bit packet sequences to mark message boundaries.

- The TCP application scans received message content to determine boundaries, and application messages contain such boundary indicators. - OR – The X.25 application does not send messages larger than the TCP maximum segment size, and the TCP application reads messages in a single TCP socket read.
- The TCP application sends a message with a single write operation to the TCP socket so that the message is contained within a single TCP data packet.
- Messages sent by the TCP application do not exceed the negotiated maximum segment size (MSS) of the TCP session to ensure the message is contained within a single TCP packet. This is usually 1460 bytes.
- Command / response handshake. The application does not send the next message until the other side has received the previous one and acknowledged it with its own message.

If any requirement is not met, message fragmentation and/or merging will occur and cause errors in the application.

Application message handling by the X.25/TCP Gateway:

- An application message contained within an X.25 packet without More-bit is sent in a single TCP write.
- An application message split across a sequence of X.25 packets with M-bit is accumulated until the last packet of the sequence without M-bit is received, then sent in a single TCP write.
- An application message smaller than the X.25 maximum packet size contained within a single TCP packet is delivered as a single X.25 packet.
- An application message larger than the X.25 maximum packet size contained within a single TCP packet is delivered as a sequence of packets with M-bit except the last packet in the sequence.

This prevents merging of messages into the same More-bit sequence of data packets. When merging occurs, X.25 applications often treat the concatenated messages as a single invalid message, or ignore the “trailing” data on the end of the first valid message.

s in one piece for a single read by the X.25/TCP gateway. This prevents fragmentation of the message across multiple X.25 More-bit data sequences. Applications often treat the first fragment as an invalid (short) message, and the following fragments as invalid message types.

12.3 MBIT

This method guarantees message boundaries. Messages received in X.25 More-bit sequence of data packets are transmitted by the X.25/TCP gateway to the TCP side with a header prefixed to the message. This 2-byte header consists of the message length encoded in network format (MSB first, LSB second). The TCP application is expected to read the 2 byte header, then issue another read of the decoded length to receive the discreet and entire message as original transmitted. Conversely, when the TCP application sends a message, it must first write the expected length of the message in the same 2-byte format before writing the message. It doesn't matter if the application writes the message in a single or multiple operations, or if multiple messages are sent in the same write operation. It is essential that the length header is exactly correct. The X.25/TCP gateway reads the 2-byte header for length, and then transmits the message (without the header) toward X.25 as a More-bit sequence of packets.

MBIT message format:

Payload length		Payload
MSB	LSB	Application message

12.4 RFC1006

This method guarantees message boundaries in exactly the same way as the MBIT method described above. Only the message header differs in length and value. The RFC1006 header consists of 4 bytes consisting of 2 fixed-value bytes (for identity and recognition) followed by the length of the entire message, payload and header.

RFC1006 message format:

Version	Pad	RFC1006 message length (4 + payload length)		Payload
0x03	0x00	MSB	LSB	Application message

12.5 Q-MBIT

This method guarantees message boundaries in exactly the same way as the RFC1006 method described above. The message header differs in the pad byte. The Q-MBIT header has 4 bytes consisting of a fixed-value byte (for identity and recognition), a Q-bit flag byte coded 0 or 1, followed by the length of the entire message, payload and header. Q-bit packets are used by some X.25 applications for passing control information..

Q-MBIT message format:

Version	Q-bit	Q-MBIT message length (4 + payload length)		Payload
0x03	0x00/1	MSB	LSB	Application message

12.6 OFTP

This method guarantees message boundaries in exactly the same way as the MBIT method described above. Only the message header differs in length and value. The OFTP header consists of 4 bytes consisting of 1 fixed-value byte (for identity and recognition) followed by a 3-byte length of the entire message, payload and header.

OFTP message format:

Version	OFTP message length (4 + payload length)			Payload
0x10	MSB		LSB	Application message

12.7 LINE

No regard is paid to message boundaries on data passed from the X.25 to TCP direction. Data is forwarded when and as received (RAW byte stream).

Data from the TCP to X.25 direction is buffered until a carriage return (CR), linefeed (LF), or EOT character is received, and then forwarded in a single packet sequence. In addition, any LF characters that may have been inserted after a CR will be stripped, otherwise converted to CR.

This method is useful when replacing an X.25 PAD with a TCP terminal emulator to connect to a command line interface of an X.25 host.

12.8 IAC-ESC

This setting helps ensure data transparency when connecting with a remote Telnet client/server. Data from the TCP socket is scanned for Telnet commands which are stripped and ignored. Escaped IAC characters have the escape removed. Data from the terminal is scanned for IAC characters, and an IAC escape is inserted. This ensures binary data integrity in the data stream.

12.9 RBP

This method guarantees message boundaries in much the same way as the MBIT method described above. The message header differs in length and value, and application messages may span multiple RBP messages by use the the M-bit (0x01) in the RBP flag byte. The RBP header consists of 6 bytes consisting of 2 fixed-value bytes (version) followed by the length of the payload, and a flag byte.

RBP message format:

Version		Payload length		Flag		Payload
0xD7	0x4A	MSB	LSB	0x00/1	0x00	Application message

12.10 QRBP

Identical to RBP as described above, but also preserves any X.25 Q-bits by use of the 0x02 bit in the RBP flag byte. Q-bit packets are used by some X.25 applications for passing control information.

RBP message format:

Version		Payload length		Flag		Payload
0xD7	0x4A	MSB	LSB	0x00/1/2	0x00	Application message

12.11 AEPN

This method guarantees application message boundaries and any X.25 Q-bit messages. The application messages may span multiple AEPN messages by use the the M-bit (0x80) in the flag byte, and any X.25 Q-bit is preserved with the Q-bit (0x40) in the flag byte. The message header consists of 8 bytes where the application message or fragment length (payload length) is given in big endian format (MSB, LSB).

AEPN message format:

ID		Header length	Ver-sion	Payload length		Flag	Pad	Payload
0x54	0x9F	0x08	0x02	MSB	LSB	0xN0	0x00	Application message

13 Safety and Legal

13.1 Regulatory Compliances

The Access Gateway, Model 4000-Snn (where nn is any alphanumeric character representing the software variant) has been tested to comply with the standards listed in the table below.

Type	Part Description
Safety	UL 60950-1, CSA C22.2 No. 60950-1, EN 60950-1 and IEC 60950-1.
EMC/EMI	EU/EMC Directive 2004/108/EC,FCC Part 15 Subpart B, Canadian ICES-003 – Digital Apparatus Issue 4 Feb. 2004, CISPER22

13.2 Radio Frequency Interferences Statements

13.2.1 Industry Canada(IC)

This Class A digital apparatus complies with Canadian (ICES-003).

Cet appareil numéridue de la classe A est conforme á la norme NMB-003 du Canada

13.2.2 Federal Communications Commission (FCC) Declaration of Conformity

Responsible Party: **Microtronix Datacom Ltd**

126-4056 Meadowbrook Drive
London, Ontario, Canada, N6L 1E3
TEL: +(1) 519-690-0091

declares, that the products:

Product Name: Access 4000 Gateway

Product Model Number: 4000-Snn
(where nn is any alphanumeric character representing the software variant).

13.2.2.1 Complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment OFF and ON, the user is encouraged to try to correct the interference by one or more of the following measures:

1) Ensure that all mounting screws, attachment connector screws, and ground wires are tightly secured.
2) Reorient the receiving antenna.
3) Increase the separation between the equipment and the receiver.
4) Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
5) Call the dealer or an experienced radio/TV technician for help.

CAUTION: Changes or modifications not expressly approved by Microtronix could void the FCC compliance and negate your authority to operate the product.

13.2.2.2 Important Notice about Cables

This product requires the use of shielded cables and connectors for proper installation and connection to peripheral devices. Shielded cables and connectors are available from Microtronix Datacom Ltd. or from authorized dealers. The manufacturer is not responsible for any radio or television interference caused by unauthorized modifications to this equipment.

If necessary, the user should consult the dealer, **Microtronix Datacom Ltd**., or an experienced radio/television technician for additional suggestions.

The user may find helpful the following booklet prepared by the Federal Communications Commission: ***How to Identify and Resolve Radio-TV Interference Problems***. This booklet is available at: FOB Public contact Branch, Room 725, 1919 M Street NW, Washington DC 20555 **www.fcc.gov** (telephone (202) 634-1940; Stock No. 004-000-00345-4).

DECLARATION OF CONFORMITY


(CE Conformity Marking)

APPLICATION OF COUNCIL DIRECTIVE(S):

- 2004/108/EC - The EMC Directive
- 2006/95/EC - The Low Voltage Directive

GRANTEE: **Microtronix Datacom Ltd.**
ADDRESS: 9-1510 Woodcock Street London, ON, Canada, N6H-5S1

EQUIPMENT TYPE: Information Technology Equipment
PRODUCT NAME: Access 4000 Gateway
PRODUCT MODEL NUMBER: 4000-Snn (where nn is any alphanumeric character representing the software variant).

I, the undersigned, hereby declare that the equipment as tested is representative within manufacturing tolerance to units and found to comply with the following standard(s):

STANDARD(S) TO WHICH CONFORMITY IS DECLARED:

- **CISPR 22:2008-09 / EN 55022:2006** - Class A – Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment
- **CISPR 24:1997 + A1:2001 + A2:2002 / EN 55024:1998 + A1:2001 +A2:2003** – Information Technology Equipment – Immunity Characteristics – Limits and Methods of Measurements
- **IEC60950–1:2005(2nd Edition);EN60950–1:2006(2ndEdition)**–Information Technology Equipment - Safety – Part 1: General Requirements

TEST LABORATORIES: **UltraTech Engineering Labs Inc.**
3000 Bristol Circle, Oakville, ON, Canada, L6H-6G4

DATE OF ISSUE OF DECLARATION: September 30, 2009

Manufacturer		**Legal Representative in Europe**	
Signature:	Norman McCall	*Signature:*	
Company Name	Microtronix Datacom Ltd	*Company Name:*	
Full Name:	Norman McCall	*Full Name:*	
Title:	President	*Title:*	
Address	126-4056 Meadowbrook Drive	*Address*	
	London, Ontario		
	Canada, N6L 1E3		
Phone No.:	(+1) 519-690-0091	*Phone No.:*	
Email:	nmccall@microtronix.com	*Email:*	

14 Warranty and Support

14.1 Warranty

14.1.1 Microtronix One Year Limited Hardware Warranty

Microtronix Datacom Ltd. (Microtronix) warrants hardware networking products to the original purchaser to be free from defects in material or workmanship under normal use for **one (1) year** from the date of purchase, when used within the limits set forth in the Specifications section of the Product User Guide. Microtronix agrees under this warranty, to repair or replace it with a new or reconditioned product at no additional charge.

If the product proves defective during the warranty period, call Microtronix Technical Support in order to obtain a Return Materials Authorization number. Microtronix will provide **Cross Shipment Support** for warranty replacement of defective units during the warranty period. Customers shall be held responsible for shipping and handling charges incurred in returning the product to Microtronix. Microtronix (as opposed to the customer) will cover the cost of shipment of the replacement product provided a warranty defect has occurred.

Our warranty does not cover any product, which has been subject to neglect, unreasonable use, accident, and violation of operating instruction or any product that has been repaired or modified by an unauthorized service agent.

14.1.2 Microtronix 90-Day Limited Firmware Warranty

Microtronix warrants that commencing from the date of delivery to the Customer for a period of **ninety (90) days** the product Firmware (Software) will substantially conform to its published specifications. The Customer's sole and exclusive remedy and the entire liability of Microtronix under this limited warranty will be at Microtronix' option; firmware replacement, or firmware upgrade repair. In no event does Microtronix warrant that the Software is error free or that the Customer will be able to operate the Software without problems or interruptions. In addition, due to the continual development of new techniques for intruding upon and attacking networks, Microtronix does not warrant that the Software or any equipment, system or network on which the Software is used will be free of vulnerability to intrusion or attack.

14.1.3 Limited Liability

IN NO EVENT SHALL MICROTRONIX'S LIABILITY EXCEED THE PRICE PAID FOR THE PRODUCT FROM DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF THE PRODUCT, ITS SOFTWARE, OR ITS DOCMENTATION.

Microtronix makes no warranty or representation, expressed, implied, or statutory, with respect to its products, its software, or the contents or use of its documentation, and specifically disclaims its quality, performance, merchantability, or fitness for any particular purpose. Without limiting the foregoing, in no event shall Microtronix or its suppliers be liable to the Customer for any incidental, special, punitive, exemplary or consequential damages experienced by either the Customer or a third party (including, but not limited to, loss of data or information, loss of profits, or loss of use). Microtronix reserves the right to revise or update its products, software, or documentation without obligation to notify any individual or entity.

14.2 Customer Service &Technical Support

Installation assistance and warranty support may be attained by email at: support@microtronix.com

Please provide your name, company name, product name and serial number, along with a brief description of the problem.

General information inquiries can be directed to: info@microtronix.com

For general information visit our web page at: www.microtronix.com

15 Product Ordering Information

For information on products, availability, and pricing, please contact: sales@microtronix.com

15.1 Access Gateway Models

The Access Gateway comes in 3 basic hardware platforms: 1000, 4002, and 4002 rackmount. The following table shows the available interfaces and connector types of each Access Gateway model.

The model designation, *mmmm-PSA-RM*, has the following interpretation:

mmmm - mother board (1000, 4002)

P – Power input (S = external AC adapter, N = -48VDC)

S – Serial Expansion ports (0 or 4)

A – Application (0=Terminal server, 4=X.25/TCP Gateway, 1=Collection Manager, 2=MWI Gateway)

RM – 19" 1U rack mount enclosure

Model	RJ45 Ethernet	DB25F WAN ports	USB 1.1 host port interface	DB9M Serial ports	Power connector
1000-S0***A***	1	1	external	0 [2]	AC adapter
1000-N0***A***	1	1	external	0 [2]	-48VDC
4002-S0***A***	1	2	external or internal [1]	0 [2]	AC adapter
4002-N0***A***	1	2	external or internal [1]	0 [2]	-48VDC
4002-N0***A***-RM	1	2	internal [1]	0	-48VDC
4002-N4***A***-RM	1	2	internal [1]	4	-48VDC

Notes:

1 – A 32GB flash drive may be mounted internally and connected to the internal USB interface.

2 – Serial expansion ports may be added using an external 1, 2, 4, or 8 port USB serial adapter.

All models include the following in the shipped package:

- Access Gateway unit
- 120/240 VAC Power adapter or -48VDC power cable
- Console cable
- Ethernet patch cable
- Documentation CD or USB 2.0 flash drive

15.1.1 Serial/TCP Converter (Terminal Server)

Basic model with terminalTCP server and syncronous/TCP server applications (included in all other models).

Part Number	Description
1000-S00	Access 1000 Serial/TCP Converter, 1 WAN port
1000-N00	Access 1000 Serial/TCP Converter, 1 WAN port
4002-S00	Access 4000 Serial/TCP Converter, 2 WAN ports
4002-N00	Access 4000 Serial/TCP Converter, 2 WAN ports
4002-N00-RM	Access 4000 Serial/TCP Converter, 2 WAN ports, 19” 1U rack mount enclosure
4002-N40-RM	Access 4000 Serial/TCP Converter, 2 WAN ports, 19” 1U rack mount enclosure, 4 Serial ports

15.1.2 X.25/TCP Gateway

Gateway applications: X.25/TCP gateway, XOT/TCP gateway, and X.25 switching.

Part Number	Description
1000-S04	Access 1000 X.25/TCP Gateway, 1 WAN port
1000-N04	Access 1000 X.25/TCP Gateway, 1 WAN port
4002-S04	Access 4000 X.25/TCP Gateway, 2 WAN ports
4002-N04	Access 4000 X.25/TCP Gateway, 2 WAN ports
4002-N04-RM	Access 4000 X.25/TCP Gateway, 2 WAN ports, 1U rack mount enclosure
4002-N44-RM	Access 4000 X.25/TCP Gateway, 2 WAN ports, 1U rack mount enclosure, 4 Serial ports

15.1.3 Collection Manager

CDR collection BSS application. Includes Serial/TCP conversion and X.25/TCP gateway for OSS applications. FTAM is an optional package requiring a separate license.

Part Number	Description
1000-S01	Access 1000 Collection Manager, 1 WAN port, external 32 GB USB 2.0 flash drive
1000-N01	Access 1000 Collection Manager, 1 WAN port, external 32 GB USB 2.0 flash drive
4002-S01	Access 4000 Collection Manager, 2 WAN ports, internal 32 GB USB 2.0 flash drive
4002-N01	Access 4000 Collection Manager, 2 WAN ports, internal 32 GB USB 2.0 flash drive
4002-N01-RM	Access 4000 Collection Manager, 2 WAN ports, internal 32 GB USB 2.0 flash drive
-FTAM	Optional ISO/FTAM software package

15.1.4 MWI Gateway (SIP and SMDI Message Waiting Indicator Solutions)

Part Number	Description
1000-S02	Access 1000 MWI Gateway, 1 WAN port
1000-N02	Access 1000 MWI Gateway, 1 WAN port
4002-S02	Access 4000 MWI Gateway, 2 WAN ports
4002-N02	Access 4000 MWI Gateway, 2 WAN ports
4002-N02-RM	Access 4000 MWI Gateway, 2 WAN ports, 1U rack mount enclosure
4002-N42-RM	Access 4000 MWI Gateway, 2 WAN ports, 1U rack mount enclosure, 4 Serial ports

15.2 Accessories

Part Number	Description
589-PS-1213AP	120/240 VAC to 12VDC power adapter with country-specific AC power cord
5883-PSC30U-48	120/240 VAC to -48VDC power adapter with country-specific AC power cord
W1000	-48VDC wire harness for model 1000-N
	3-pin jack for -48VDC connector on model 1000-N
W4002	-48VDC wire harness for model 4002-N
	3-pin jack for -48VDC connector on model 4002-N
M1000-00-19	19” 1U Rack Mount Shelf for 1, 2, or 3 Access 1000 units
M1000-00-25	25” 1U Rack Mount Shelf for 1, 2, or 3 Access 1000 units
M4002-00-00	19” 1U Rack Mount Shelf for 1 or 2 Access 4000 desktop units
288-AF8G	ATP NANODURA 8GB industrial USB 2.0 flash drive
	Other 32GB USB 2.0 flash drive
	1-port USB serial adapter (DB9M DTE connector)
	2-port USB serial adapter (DB9M DTE connectors)
	4-port USB serial adapter (DB9M DTE connectors)
	8-port USB serial adapter (DB9M DTE connectors)

Refer to the Cables and Connectors section to determine the appropriate cable and associated part number.

16 Specifications

16.1 Hardware and Interfaces

16.1.1 Enclosure

- Model 1000 dimensions: 0.0 x 0.0 x 0.0 cm (3.34 x 5.625 x 1.25”), 0.22 kg (0.5 lb)
- Model 4002 dimensions: 14.0 x 18.5 x 4.0 cm (5.5 x 7.25 x 1.6 “), 0.64 kg (1.4 lb)
- Model 4002-RM dimensions: 13.7 x 35.6 x 4.4 cm (5.4 x 14 x 1.72 “), 1.81kg (4 lb)

16.1.2 System

- Model 1000: MPC880 processor @132MHz
- Model 4002: MPC885 processor @132MHz
- 32MB SDRAM memory
- 16MB Flash memory
- CMOS real time clock on Access 4000
- 12VDC or -48VDC power connector

16.1.3 Ethernet Interface

- 10/100BASE-T
- RJ45 connector
- auto-detection

16.1.4 USB Interface

- USB 1.1
- Type A host port connector

16.1.5 WAN Interface

- DB25F DCE connector
- multi-protocol (software selectable): RS530[a], RS232/V.24, V.35, X.21, RS449/V.36
- source or receive signal clocks (software selectable)
- asynchronous speeds: 300 to 115200 bps
- synchronous speeds: 1200 bps to 10 Mbps; 1 input clock signal, 1 bi-directional clock signal
- output modem control signals: DSR, CD, CTS
- input modem control signals: DTR, RTS

16.1.6 Serial Interface (on USB adapter)

- DB9M (DE9M) DTE connector
- RS232 / EIA-574

- asynchronous speeds: 300 to 115200 bps
- output modem control signals: DTR, RTS
- input modem control signals: DSR, CD, CTS

16.2 Software and Protocols

16.2.1 X.25 Features

- Selectable DCE or DTE at LAPB link layer 2 and X.25 packet layer 3
- 1024 logical channels
- SVC and PVC (any mixture supported simultaneously)
- Packet sizes: 16-4096
- Window sizes: 1-7 (modulo 8), 1-127 (modulo-128/extended)
- Flow control facilities: packet & window sizes, throughput class
- Other facilities: reverse charge, etc
- DTE facilities: called and calling address extension
- Q-bit and M-bit control
- X.29 (PAD) support

16.2.2 X.25 / TCP Encapsulation and Conversion methods

- X.25 Over TCP (XOT) per RFC 1613 for X.25 transparency
- RFC1006 for ISO TP0 bridging
- Q-MBIT for X.25 More-bit and Q-bit preservation
- Cisco RBP
- Cisco RBP with Q-bit support
- RAW for byte-streaming
- MBIT for X.25 More-bit message preservation
- AEPN for X.25 More-bit and Q-bit preservation
- OFTP - ODETTE File Transfer Protocol (RFC 5024).
- LINE mode for legacy command line interfaces over X.25
- IAC-ESC for Telnet transparency

16.2.3 X.25 to TCP Connection Mapping and Address Translation

Incoming X.25 connections are scanned for a match from any or all of:

- X.25 interface (WAN port or XOT)
- called X.121 address

- calling X.121 address
- PID or user data

Matched connections are routed to a TCP outbound connection with:

- destination IP address and TCP port number
- via specific local IP interface option
- via specific local TCP port number option
- using specified encapsulation or conversion method

16.2.4 TCP to X.25 Connection Mapping and Address Translation

Incoming TCP/IP connections are scanned for a match from any or all of:

- TCP port number (mandatory listener)
- local IP interface (or VLAN)
- remote IP address
- remote TCP port number

Matched connections are routed to an X.25 outbound connection with any or all of:

- X.25 interface selection (WAN port or XOT)
- destination (called) X.121 address
- source (calling) X.121 address
- PID and userdata
- X.25 and/or DTE facilities
- Using specified encapsulation or conversion method

16.2.5 Asynchronous X.28/Serial Features

- baud rate (300 – 115200 bps)
- data bits (5 – 8)
- parity (odd, even, none)
- stop bits (1, 2)
- flow control (none, soft-XON/XOFF, modem-RTS/CTS)
- TCP port connection

16.2.6 Synchronous HDLC Features

- software configurable interface types: RS232/V.24, RS530, X.21, V.35, RS449/V.36
- Internal and external clock sources
- clock rates (1200 bps – 10 Mbps)

- NRZ or NRZI encoding
- CRC-16, CRC-32, or no CRC generation/checking
- X.25 network configuration or raw/TCP connection

16.2.7 System Services

The Access Gateway can be managed via a number of system services:

- Syslog with logging to remote server
- SNMP – standard system mibs, link alarms
- SSH, Telnet, and/or serial Console for system maintenance
- HTTP / HTTPS for configuration and management web interface
- RADIUS login
- PAM authentication
- FTP, SFTP, SCP file transfers for updates and saving configurations
- NTP client for accurate time synchronization
- SSH tunneling for secure application connections

16.2.8 Collection Manager Option

With the this option, the Access Gateway connects directly to the X.25 interface of the telephone switch and polls for billing CDR/AMA record and traffic data files using the protocols:

File collection protocols:

- AMATPS (BX.25)
- EADAS
- XFER (Nortel DMS) - client
- AFT (Nortel DMS) – server
- FTP/IP or SFTP/IP client/server
- MTP (Ericsson AXE) – client (SFI), or server (SFO)
- OSI/FTAM - client or server (additional license)
- Store and forward BUFFER - client or server

Collected files can be transferred to the billing system using:

- FTP push or pull
- SFTP push or pull
- NFS mounted file server
- Copy or move to local directory

Transferred files are archived on the local media for long term storage and retrieval with:

- GZIP Compression
- GNU Privacy Guard encryption
- Definable archival period

Operations and management command line interfaces (CLI):

- Raw serial (terminal server)
- Raw X.25 (X.25 gateway)
- LINE mode (end-of-line conversion)
- AMTP (Ericsson AXE Command Line Interface)

16.2.9 SIP/SMDI MWI Gateway Option

With the MWI Gateway option, the Access can convert Message Waiting Indicator messages between SMDI and SIP interfaces, and also provide routing between any interface using a pre-defined or learned routing table.

The SIP interface requires unsolicited messaging over TCP and/or UDP, and can support multiple sources.

Multiple SMDI interfaces are supported including:

- Serial RS232, all speeds and parities
- X.25 logical channel
- TCP (raw socket)