Microtronix
Access 1000 & 4000
X.25 – TCP/IP Gateway
Quick Start Guide 1.1.2

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1 Overview

The Microtronix *Access X.25–TCP/IP Gateway* provides conversion between X.25 and TCP/IP devices, or X.25 encapsulation over TCP (XOT). In addition, raw synchronous and serial terminal servers may be configured.

A web interface allows for configuration and monitoring from any Internet browser, and telnet/SSH servers allow for connecting to the command line interface for additional management.

1.1 Access X.25-TCP/IP Gateway models

The following table shows the available interfaces and connector type of each Access Gateway model.

Model	RJ45 Ethernet	DB25F WAN	USB host port Interface	DB9M Serial ports	Power connector
1000-N04	1	1	external	0	-48VDC
4002-N04	1	2	external or internal	0	-48VDC
4002-N04-RM	1	2	internal	0	-48VDC
4002-N44-RM	1	2	(not available)	4	-48VDC

The following pictures of the rear plate of each model illustrate the interfaces and connectors.
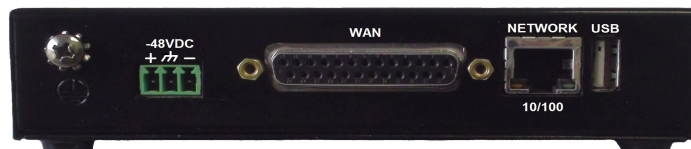
Model 1000-N04

Model 4002-N04

Model 4002-N44-RM

The model name and serial number are printed on the label located on the bottom of the unit.

The following sections describe the each attributes and function of each interface type.

1.2 WAN interface

WAN interfaces support RS232/V.24 with speeds up to 128 Kbps, and V.35, X.21, RS530, RS449/V.36 interface types with speeds up to 10 Mbps, in a standard DB25F DCE connector. They may be used for:

- X.25
- Synchronous Server
- Terminal Server

The 1000 models have one WAN interface that doubles as the boot console, and the 4002 models have two WAN interfaces with one that doubles as the Console port. See the notes under *Console interface* below.

1.3 Console interface

The Console/WAN port (WAN 0 on the 1000, and WAN 1 on the 4000) may be used for:

- X.25
- Synchronous Server
- Terminal Server
- System console port for configuration and monitoring

In addition, the Console/WAN interface serves as the console for the boot program and operates in RS232 asynchronous mode during boot up. The boot command line interface may be invoked for system management and emergency IP address recovery by entering a password during a 10 second interval after power up.

1.4 Network (Ethernet) interface

The RJ45 NETWORK interface is 10/100 Ethernet with full auto-detection, supporting a rich set of standard IP protocols.

1.5 USB interface

The USB 1.1 type A host port supports additional serial interface or storage devices:

- USB serial adapters (FTDI chipset only) for up to 8 additional Terminal Server interfaces
- USB flash drive for storing and moving files

The 4002 models may be specially ordered with an internally mounted USB flash drive with no external USB connector.

The 4002-N44-RM models have an internally mounted USB 4-port serial expansion card.

2 Package Check List

Check that the Access model received matches the order by comparing to the model number printed on the label on the bottom of the unit.

Check that the package shipped contains the following items.

- Access Gateway unit as above
- Rack mount brackets (model 4002-Nxx-RM only)
- AC adapter with AC power cord **or** - 48VDC power cord
- DB9F-DB25M Console Cable
- RJ45 Ethernet patch cable (blue)
- DB25MF straight through RS232 WAN cable

The following optional items are available through special order, and may be included:

- Additional WAN or serial cable(s) – refer to the Cables section for part numbers
- USB serial adapter unit: 1, 2, 4, or 8 ports
- USB flash drive
- AC adapter for -48VDC unit
- Rack mount shelf for 1 or 2 model 4002-N0x units

3 Quick Start Guide

Configuration of the Access Gateway will require a PC or laptop with standard Internet browser like Internet Explorer or Mozilla Firefox. Optionally, a serial COM port (or USB serial adapter) on the PC with a terminal emulator application may be used to connect to the Console port.

3.1 Installation

1) The Access Gateway may be placed on a shelf in a rack, or mounted using a rack mount kit.

2) Connect the RJ45 10/100 Network port to the IP network or directly to the PC using an Ethernet patch cable.

3) Optional: Connect the Console port to the PC using the Console Cable. Refer to the "Console Port" section below for instructions.

4) Connect AC/DC power adapter and AC power cord (or attach the -48VDC power cord)

5) Wait 30 seconds for the boot process to complete. The RUN led will start to blink.

3.2 Ethernet / IP Port

The Ethernet port can be used for initial configuration. The default IP address of the Access Gateway is 10.1.1.240/24. To connect via IP, set the PC's IP address to 10.1.1.200, and subnet mask to 255.255.255.0 (10.1.1.0/24).

3.2.1 Web Interface (htttp / https)

The Access Gateway has a web-based server for configuring and monitoring. Use any Internet browser to connect to the web interface. Login is required with username "admin", and default password "admin".

3.2.2 Terminal Interface (telnet / ssh)

The Access Gateway will also accept Telnet or ssh client connections for advanced monitoring and troubleshooting. The username is "root", and the default password is "f0adA" (0=zero) for privileged access, and "admin", "admin" for non-privileged access.

3.3 Console Port (Optional)

The Console port offers system control access during the boot-up process. Boot messages will be displayed if a PC COM port is connected using the Console Cable, and a terminal emulator like "putty" or "HyperTerminal" is set for 9600-N-8-1.

3.3.1 U-Boot Command Access

After power up, there is a 10 second delay that allows U-Boot command access:

```
Autoboot in 10 seconds (Enter password to stop)...
```

if the password "**foad**" is typed while the message is displayed, the U-Boot prompt "A4K:>" will indicate command readiness.

3.3.2 Setting Default IP Parameters

The default IP network parameters may be modified or added here as an alternative to the configuration via the web interface. Enter the following commands to change the default IP address, netmask, default gateway (if needed), and optionally a new system "hostname"

```
set ipaddr 10.1.1.240
set netmask 255.255.255.0
set gatewayip 10.1.1.1
set hostname MYNAME
save
boot
```

These defaults will remain in effect until again changed again in U-Boot, or explicitly changed via the **Ethernet** configuration page in the web interface.

3.3.3 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 Ethernet 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.

3.3.4 System Firmware Updates

The U-Boot console may also be used in conjunction with Microtronix support for applying firmware updates.

To apply firmware updates:

1) Obtain the kernel image (uImage) and/or filesystem image (jffs2.img) files from Microtronix

2) Start a tftpd server on a PC or an available file server

3) Place the file(s) in the tftpd default directory on the PC or server

4) Enter the PC or server IP address (example 10.1.1.200) using the u-boot commands:

```
set serverip 10.1.1.200
save
```

5) Load the new kernel image:

```
run updatekernel
```

6) Load the new filesystem image:

```
run updatejffs2
```

7) Start the system by re-applying power or typing the "boot" command.

3.4 Configuration Web Interface

The default IP address of the Access Gateway is **10.1.1.240**. The PC used to access the web interface must be configured (temporarily) for an address in the same subnet, for example, 10.1.1.200. Connect the PC to the same LAN, or temporarily connect directly to the Access Gateway.

Open the web browser on the PC, and enter _http://10.1.1.240_ in the URL field. When prompted by a popup window, login using default user name: `admin,` and password: `admin`.

The home page will be displayed with the main menu down the left hand side.
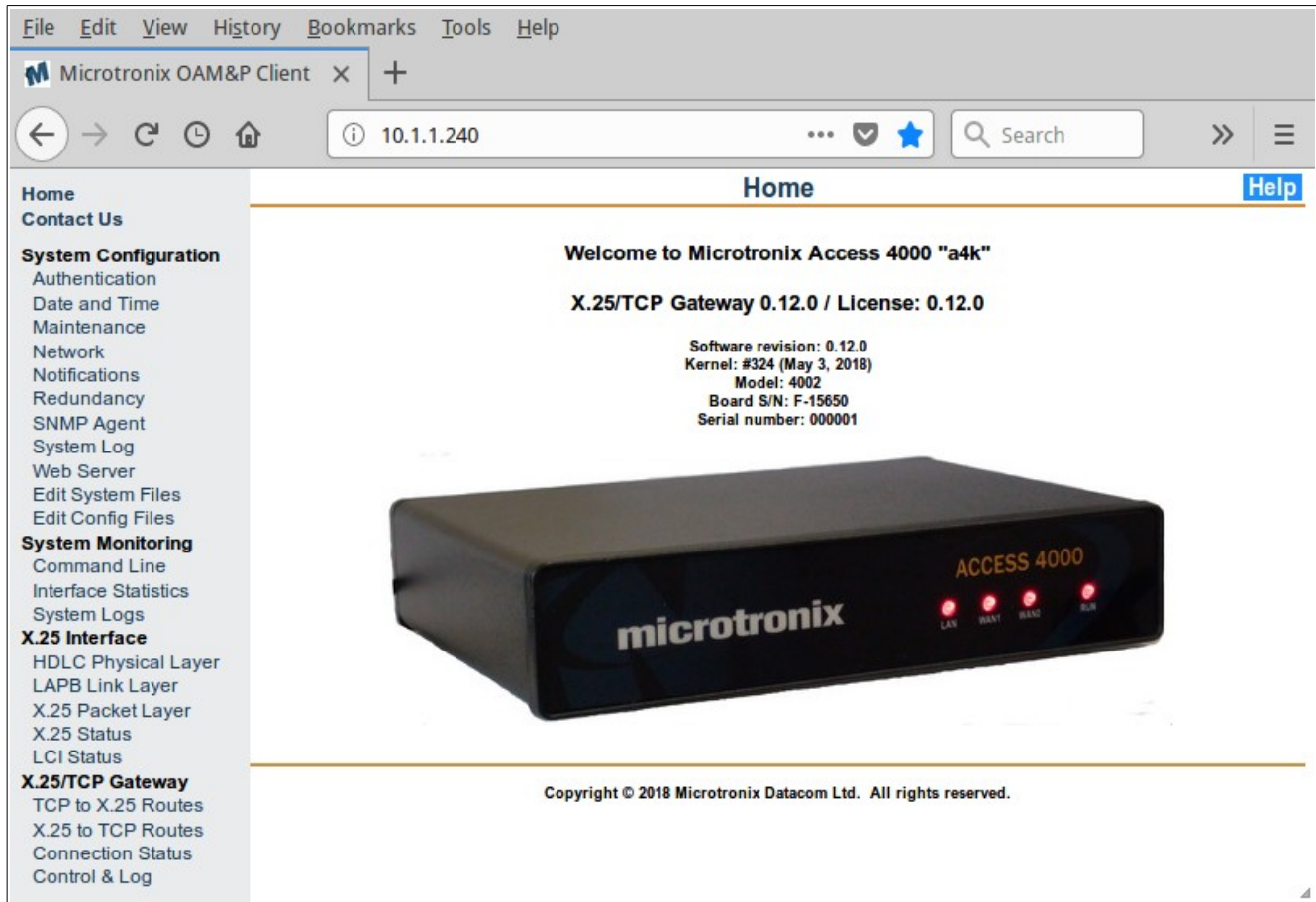
The Access Gateway can now be configured by selecting the main menu items. Each page has a **Help** button in the upper right corner for viewing additional information specific to the current page.

3.5 IP Network Configuration

To create or modify the IP network parameters different than the default values defined in U-Boot , obtain the new IP address, network mask, and default gateway values. Follow this procedure only if you don't want the default values to be used in the running system.

From the main menu **System Configuration** section, select **Network** to display the configuration form.

1) Modify the Hostname as desired.

2) Click on the Select button in the Ethernet Interfaces table corresponding to "eth0".

3) Enter the new IP address, network mask, and default gateway.

4) Click the **Apply** button for the changes to be saved and to take affect.

Connect the Ethernet interface to the new network, if not already. Since the IP connection may be lost due to the change, the new address may need to be entered in the browser. The Ethernet configuration page displays the current status of the Ethernet interface.

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

3.5.1 Verifying IP Network

Use ping from a PC or other station on the IP network to verify the Access Gateway is reachable. Sometimes ARP cache tables are obsolete and need refreshing after an IP change.

The LAN led on the front panel will blink when there is activity on the Ethernet port.

If the PC used for configuration is still able to reach the Access Gateway, use telnet or ssh to connect to the command line interface. Login using user name "root" and password "f0adA" (0=zero).

Enter the command "`ifconfig eth0`" to view the status and statistics of the Ethernet interface.

Use ping to test the connection to the default gateway or another station on the IP network. Enter the command "ping a.b.c.d", where a.b.c.d is the IP address in dotted notation.

To test the connectivity to a remote IP host that will be connecting to or receiving connections from the Access Gateway, use ping to verify reachability.

3.5.2 Monitoring IP Network

Sometimes tracing the IP interface may be necessary to determine a problem. The standard **tcpdump** utility is provided for this purpose. To run the tcpdump utility, make a telnet connection from a PC to connect to the Access Gateway command line interface. Respond to the login request with the default username "root" and password "f0adA" (0=zero). At the "#" prompt, enter the "tcpdump" command. It can be entered with a number of command line options. Use the "-h" option to see a list of all available options. The normal syntax is:

```
tcpdump –i INTERFACE –w OUTPUT_FILE   EXPRESSION
```

where:

INTERFACE: primary "eth0", loopback "lo", secondary IP "eth0:1", VLAN "eth0.1"

OUTPUT_FILE: File name must include one of the paths: "/tmp/" or "/mnt/usb1/"

EXPRESSION: any valid tcpdump expression like "tcp port 102" or "ip host 10.1.1.200"

To stop tcpdump, type control-C (Ctrl+C). The file can be FTP'd to the PC for display and analysis using Wireshark (Ethereal).

For example, to monitor TCP port 102 on the Ethernet interface, and record the output into a file:

```
tcpdump –i eth0 –w /tmp/tcpdump.pcap tcp port 102
```

The loopback interface "lo" is used for internal connections (127.x.x.x):

```
tcpdump –i lo –w /mnt/usb1/tcpdump.pcap tcp port 1998
```


Care must be taken to **NOT** use an expression that would monitor the initiating telnet session.

For extended monitoring, the output file should be written to a USB-mounted flash drive (if the USB port is not used for serial adapters) by using the path:

```
–w /mnt/usb1/tcpdump.pcap
```

To transfer a file to a PC, run FileZilla or WinSCP with the IP address of the Access. The local ftp, scp, or sftp client commands can be used to push the file to the PC if it has the matching server.

3.6 X.25 Configuration

To configure a WAN port to match the attached X.25 equipment at all 3 layers of the X.25 protocol, select each of the following items from the **X.25 WAN** main menu section:

3.6.1 HDLC Physical Layer

From the main menu **X.25 WAN** section, select **HDLC Physical Layer** to display the form:

HDLC Physical Interface Settings   Help

Local interface name:	**WAN 0 (hdlc0)**	**WAN 1 (hdlc1)**
Interface type:	RS232/V.24 ▼	RS232/V.24 ▼
Clock signal source:	Internal ▼	External ▼
Clock rate (bits/sec):	64000	64000
Inbound DTR signal detection:	✔	✔
Enable WAN interface:	✔	✔
Restart WAN interface:	☐	☐

Click to save and/or apply changes: **Update**

1) Choose the column with the WAN interface to which changes will be made.

2) Select the interface type to match the attached X.25 device.

3) For connection to a DTE device, select Internal Clock signal source and an appropriate rate. For connection to a DCE device or modem, select External (or rxfromtx).

4) Click the Enable WAN interface checkbox to also restart it.

5) Click the **Update** button for the changes to be saved (and the interface restarted).

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

3.6.2 LAPB Link Layer

From the main menu **X.25 WAN** section, select **LAPB Link Layer** to display the form:

LAPB Link Layer Settings   Help

Local interface name:	**WAN 0 (hdlc0)**	**WAN 1 (hdlc1)**
Emulation mode:	DCE	DTE
Link setup start:	SABM	SABM
Window modulus:	mod 8	mod 8
Window size (k):	7	7
Maximum information frame size (N1):	4106	4106
Retransmit attempts (N2):	10	10
Retransmit timeout (T1):	3	3
Acknowledgement hold back timeout (T2):	1	1
Restart WAN interface:	☐	☐

Click to save and/or apply changes: **Update**

1) Choose the column with the WAN interface to which changes will be made.

2) For connection to a DTE device, select DCE; for connection to a DCE device, select DTE.

3) Configure the Window Size to match the attached device (usually 7).

4) Click **the Enable WAN interface** checkbox to also restart it.

5) Click the **Update** button for the changes to be saved (and the interface restarted).

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

3.6.3 X.25 Packet Layer

From the main menu **X.25 WAN** section, select **X.25 Packet Layer** to display the form:

X.25 Packet Layer Settings   Help

	WAN 0 (hdlc0)	WAN 1 (hdlc1)
Local interface name:		
Emulation mode:	DCE	DCE
Allow reverse charge calls:	✓	✓
Allow outgoing flow control facilities:	✓	✓
Default packet size:	128	128
Maximum negotiable packet size:	4096	4096
Window modulus:	mod 8	mod 8
Default window size:	2	2
Maximum negotiable window size:	7	7
Number of PVC:	0	0
Start SVC number:	1	1
Number of SVC:	8	8
Acknowledgement hold back timeout (T2):	3	3
Restart Request timeout (T10/T20):	60	60
Call Request timeout (T11/T21):	60	60
Reset Request timeout (T12/T22):	60	60
Clear Request timeout (T13/T23):	60	60
Restart WAN interface:	☐	☐

Click to save and/or apply changes: **Update**

1) Choose the column with the WAN interface to which changes will be made.
2) For connection to a DTE device, select DCE; for connection to a DCE device, select DTE.
3) Configure the packet and window sizes to match the attached X.25 interface. *A mis-match may cause packet layer resets and data loss, or data stalls.*
4) Configure SVC and PVC settings to match the attached X.25 interface. *A mis-match may cause unanswered call requests.*
5) Click the **Restart WAN interface** checkbox to cause all the changes to take affect.
6) Click the **Update** button for the changes to be saved and take affect.

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

3.7 Verifying X.25 Interface

The WAN led on the front panel will illuminate when the X.25 link is established at all 3 layers of the WAN port. To view detailed status of each layer of the X.25 interface, click **X.25 Status** in the main menu **X.25 WAN** section.

X.25 WAN Interface Status Help

Physical Interface and Modem 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*
WAN 1 (hdlc1)	RS232	External	unknown	CRC-16	NRZ	ON	ON	ON	*off*	*off*

LAPB Link Layer Status									
Interface	Mode	State	T1	N2	vs	vr	va	T2	WIN
WAN 0 (hdlc0)	DCE	*InfoTransfer*	0	0	1	1	1	0	7
WAN 1 (hdlc1)	DTE	*Disconnected*	0	0	0	0	0	0	7

X.25 Packet Layer Status			
Interface	Mode	State	Timer
WAN 0 (hdlc0)	DCE	*r1:Ready*	0
WAN 1 (hdlc1)	DCE	*Link down*	0

[Refresh] [Reset WAN 0] [Reset WAN 1]

Start at the top level (X.25) and work down to troubleshoot.

3.7.1 X.25 Status

Shows the current status of the packet layer. If in "r1:Ready" state, then all 3 layers are established. If not, then:

- There is saved configuration that has not become effective with a restart. Restart the interface.
- There is a problem at the LAPB or HDLC levels.
- The attached device does not support X.25, or has become disabled.

3.7.2 LAPB Status

Shows the current status of the data link layer – should be in "Info Transfer" state. If not, then:

- There is a problem at the HDLC level.
- The emulation mode (DTE/DCE) is not set correctly. It must be opposite to the attached device.

3.7.3 HDLC Interface Status

Shows the current operational mode and status of the interface signals.

If the current mode does not match the configuration, then the port needs to be restarted.

If the asserted signals (DSR, CD, CTS) are OFF, then the port is disabled and needs to be configured

to have Status enabled, then restarted.

If the received DTR and RTS signals are off, then:

- The cable is not connected.

- The cable is the wrong DTE/DCE gender or wrong pin configuration for the interface.

- The interface is the wrong type (X.21 uses balanced signals, RS232 & V.35 use unbalanced).

- The attached device is not on, or its X.25 interface is disabled.

If the received DTR is off and RTS is ON, then the attached device may not support a DTR output signal. If this is the case, then the port must be configured to ignore DTR (DTR Detection: OFF).

3.7.4 Interface Statistics

If the detected modems signals appear to be correct, there may be a problem with the interface type or synchronous clocking on the interface. Click on **Device Statistics** in the main menu section **Statistics & Logs**. If the receive statistics show an increasing number of errors, then the interface type or clocking source may not be correct.

If there is transmit bytes/packets but no receive bytes/packets, then there may be a cable issue or a problem with the attached device which may have become disabled and needs a restart.

3.7.5 X.25 Monitor

Sometimes tracing an X.25 interface may be necessary to determine a problem. To run the X.25 monitor, make a telnet connection from a PC to connect to the Access Gateway command line interface. Respond to the login request with the default username "root" and password "f0adA" (0=zero). At the "#" prompt, enter the command:

```
hdlctrace -ax hdlc0
```

The X.25 exchange will be displayed in interpreted form.

Assuming that the correct cable is properly connected, and there is no transmitted data (out), then there must be a configuration problem.

If there is transmitted data but no received data (in), then there is likely a problem with the HDLC clock configuration. Only one side of the interface can be configured to source the clock, and the other side must be configured to receive it. Chances are that the transmitter of the attached device is not receiving a clock signal.

If there is both transmitted and received data, then the data itself needs to be analyzed.

Layer 2 (LAPB) setup requires a SABM / UA exchange. If there is SABM from both sides and the address field (adr) is the same (either 01 or 03), then both sides are set for the same DTE/DCE mode. Change one side. If the addresses on the SABM frames are different, and there is outbound UA, but no inbound UA, then the attached device may not be receiving correctly. Again, the clock signal configuration may not be correct.

Layer 3 (X.25) exchange will occur when the LAPB has been properly setup. A RESTART / RESTART CONFIRM exchange must occur for the packet level to become ready for accepting logical channel connections. If a RESTART is transmitted, but no RESTART packet is received, then the attached device may not be configured correctly, or there may be a synchronous clock issue. If both sides are providing clock at the same nominal speed, then tiny frames like SABM and UA may be OK, but longer packets may suffer a CRC error as any clock differences skews the reception.

For a trace of the X.25 packets only (no LAPB frames), run the X.25-only trace:

```
x25trace -a hdlc0
```

Analysis beyond this is out of scope for this document. The displayed data may be captured and forwarded to Microtronix Support for analysis.

3.7.6 X.25 Logical Channel Status

Select the **LCI Status** item to examine the status of any SVC or PVC logical channel connections active on the X.25 interface(s). Details of the display can be found on the **Help** page.

X.25 Logical Channel Interface Status																**Help**
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	4	2	4	0	2	128	2	128	0	0	582
WAN 0	4023	*	1	Data	4	2	4	2	0	2	128	2	128	0	0	581
WAN 0	*	*	0	Listening	0	0	0	0	0	0	1	0	1	0	0	556
*	*	*	0	Listening	0	0	0	0	0	0	1	0	1	0	0	526

Refresh

3.8 X.25 to TCP Routing Configuration

If X.25 call requests are initiated by the attached X.25 equipment, then X.25 to TCP routing must be configured. Entries can be added to the X.25 to TCP Routing table, or existing entries modified or deleted.

To add an X.25 to TCP mapping entry to the routing table, select **X.25 to TCP Routes** in the **X.25 Gateway** section of the main menu to display the configuration form, and current X.25 to TCP routes.

X.25 to TCP Route Settings   Help

Rank:2

Identify inbound X.25 connection   **Generate outbound TCP/IP connection**

Local interface ANY   Conversion type RAW

X.25 connection type SVC ◉   PVC ○   *Remote IP address 127 . 0 . 0 . 1

Calling address   *Remote TCP port 23

Called address 4023   Local TCP port

Call userdata

Protocol handler None

Show Facilities ☐

Add Entry   **Update Entry**   **Clear Fields**

Save and Apply Changes

X.25 to TCP Routes								
Rank	Local interface	Calling address	Called address	Conv	Remote TCP/IP		Edit	Remove Select All
1 ⌄	*	*	102	RFC1006	127.0.3.1	102	○	☐
2 ⌃⌄	*	*	4023	RAW	127.0.0.1	23	◉	☐
3 ⌃	WAN 0	*	*	XOT	10.1.1.249	1998	○	☐

3.8.1 Identify inbound X.25 connection

Specify the call request parameter(s) that will be used to identify the incoming X.25 call request. This is usually the physical port (WAN), and the X.25 called address. Fill in the left side of the form:

1) Select the Local interface name on which the call request is going to be received

2) Choose the X.25 connection type (usually Switched Virtual Circuit)

3) Enter destination X.25 address in the Called Address field

If the inbound X.25 connection is via an XOT interface, then additional fields will display to define the TCP/IP parameters of the XOT listen port.

Local interface | XOT (virtual X.25) ▾

XOT bind IP address | [ ] . [ ] . [ ] . [ ]

*XOT listen TCP port | 1998

3.8.2 Generate outbound TCP/IP connection

Specify the TCP/IP host to which the call will be connected. Fill in the right side of the form:

1) Specify the destination IP address in the Remote IP Address field.

2) Specify the TCP port number on which the destination is listening in the Remote TCP Port field

3.8.3 Specify Conversion or Encapsulation Method

Choose from the drop-down list in the Conversion Type field, the X.25 to TCP conversion method for this connection. This method MUST be supported by the remote TCP/IP application.

- RAW for no message preservation (byte stream).

- MBIT, RFC1006, OFTP or RBP for message preservation.

- Q-MBIT, QRFC1006 or QRBP for message preservation including Q-bit packets.

- XOT for X.25 encapsulation.

- LINE for special CR/LF handling.

- IAC-ESC for data transparency with remote Telnet sessions.

Add the new entry to the displayed table at the bottom by clicking **Add Entry**.

Repeat for each desired mapping.

When all mappings required have been added, click on **Save and Apply Changes** button for the new entries to be saved and become active.

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

3.9 TCP to X.25 Routing Configuration

If connection requests are initiated by remote IP hosts, then TCP to X.25 routing must be configured. Entries can be added to the TCP to X.25 Routing table, or existing entries modified or deleted.

To add a TCP to X.25 mapping entry to the routing table, select **TCP to X.25 Routes** in the **X.25 Gateway** section of the main menu to display the configuration form and current TCP to X.25 routes.

TCP to X.25 Route Settings `Help`

Rank:2

Identify inbound TCP/IP connection

Binding IP address `_` . `_` . `_` . `_`

*Listening TCP port `4023`

Remote IP address `_` . `_` . `_` . `_`

Remote TCP port `_`

Conversion type `RAW`

Generate outbound X.25 connection

Local interface `WAN 0 (hdlc0)`

X.25 connection type SVC ⊙ PVC ○

Calling address `_`

Called address `4023`

Call userdata `_`

Protocol handler `None`

Show Facilities ☐

Add Entry   **Update Entry**   **Clear Fields**

Save and Apply Changes

	Rank	Listening TCP/IP		Remote TCP/IP		Conv	Local interface	Calling address	Called address	Edit	Remove Select All
1	⌄	127.0.0.1	102	*	*	RFC1006	WAN 0	*	102	○	☐
2	⌃⌄	*	4023	*	*	RAW	WAN 0	*	4023	⊙	☐
3	⌃	*	1998	*	*	XOT	WAN 0	*	*	○	☐

Table caption: **TCP to X.25 Routes**

3.9.1 Identify inbound TCP/IP connection

Identify the parameter(s) that will be used to match the incoming TCP/IP connection. This is usually just the TCP port number, but may include the remote IP address. Fill in the left side of the form:

1) Specify the TCP port to which the remote IP host will connect in the Listening TCP Port field.

2) Optionally, enter the initiator's IP address in the Remote IP Address field.

3.9.2 Specify Conversion or Encapsulation Method

Choose from the drop-down list in the Conversion Type field, the X.25 to TCP conversion method for this connection. This method MUST be supported by the remote TCP/IP application.

- RAW for no application message preservation.

- AEPN, MBIT, RFC1006, OFTP, or RBP for message preservation.

- AEPN, QRFC1006, or QRBP for message preservation including X.25 Q-bit packetization.

- XOT for X.25 encapsulation.

- LINE for special CR/LF handling.

- IAC-ESC for data transparency with remote Telnet sessions.

3.9.3 Generate outbound X.25 connection

Specify the X.25 destination to which the connect will be delivered. (Note that if the conversion type is XOT, only the Local interface field needs to be entered as the X.25 call request is delivered by the remote XOT peer). Fill in the right side of the form:

1) Select the Local interface name connected to the X.25 host.

2) Choose the connection type (usually Switched Virtual Circuit)

3) Specify the called and calling X.25 addresses to be used in the outbound call request

4) Specify user data and facilities if required

If the destination X.25 connection is via an XOT interface, then additional fields display to define the TCP/IP parameters of the remote XOT port.

Local interface	XOT (virtual X.25) ▼
*XOT remote IP address	☐ . ☐ . ☐ . ☐
*XOT remote TCP port	1998

Add the new entry to the displayed table at the bottom by clicking **Add Entry**.

Repeat for each desired mapping.

When all mappings required have been added, click on **Save and Apply Changes** button for the new entries to be saved and become active.

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

3.10 Verify X.25 Gateway Status

To examine the status of the X.25/TCP gateway application and the connections controlled by the gateway, select the following items from the **X.25 Gateway** main menu section.

3.10.1 Connection Status

This page displays summary information about the interconnections between TCP sockets and X.25 logical channels. These interconnections result from connection requests being mapped by the routing pages.

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						
					Listening	WAN 0	*	*
Connected	10.1.1.240 : 4023	10.1.1.34 : 39658	RAW	>	Connected	WAN 0	*	4023
Connected	127.0.0.1 : 7990	127.0.0.1 : 23	RAW	<	Connected	WAN 1	*	4023

`Refresh`

To view details specific to the X.25 logical channels, refer to the LCI Status page.

To view details specific to the TCP sessions, Telnet or ssh to the command interface. Once logged in, the following Linux command may be used to view details:

```
netstat –natp
```

Use the "-h" option to view additional command options.

3.10.2 Daemon Control

This page displays the operational status of the X.25/TCP gateway application, and allows the application to be stopped or started. The log section displays the history of the application since startup, or last log file rotation.

X.25 Gateway Control and Log   `Help`

X.25 Gateway: *Running*   `Restart` `Stop` `Reload`

Recent system log messages   `Refresh status and logs`

```
Feb 18 03:09:08 x25_gateway[942]: Started
Feb 18 03:09:08 x25_gateway[946]: Signal received to update maps
```

3.11 Synchronous Server Configuration

A WAN interface may be configured for synchronous HDLC operation by configuring it as a Synchronous Server interface. Ensure that X.25 WAN and Terminal Server operation are disabled for the selected interface by de-selecting the **Enable** button in the **HDLC Physical Layer** and **Serial-TCP** pages.

To configure a WAN interface for synchronous service, select **HDLC-TCP** from the main menu **Synchronous Server** section to display the configuration form:

3.11.1 Synchronous HDLC Settings

1) Select a WAN interface from the **Local interface name** drop-down list.
2) Configure the settings to match the attached device.
3) If the device asserts a DTR signal, select **DTR detection**. This also controls TCP connectivity.
4) Select the Unnumbered Information (UI) frame support by choosing DTE or DCE.
5) Click the **Enabled** checkbox.

3.11.2 Network Settings

6) Select the Encapsulation from the drop-down list. RAW does not preserve frame boundaries across the TCP/IP interface. MBIT and RFC1006 will preserve frame boundaries when transmitting over the TCP/IP interface. These should not be necessary for UDP.

7) Select the protocol, TCP or UDP.

8) Select the TCP or UDP port number on which a listen is posted for remote clients, or to which a connection is to be initiated towards a remote server.

9) Enter the remote IP address to which the connection will be made, or enter 0.0.0.0 for a listen to be posted.

3.11.3 Update and Start the Server

10) Check the **Start / Restart Synchronous Server** box for changes to become active.

11) Click the **Apply** button to save changes and (re)start the server if requested.

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

3.11.4 Verify Synchronous Server Connection

Click on the **Status** and **Control & Log** items in the **Synchronous Server** main menu section. Refer to the **Help** pages for details.

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	DCE	RAW	UDP	10.1.1.247	4000	10.1.1.200	4000

Refresh

Synchronous Server Control and Log　Help

Synchronous Server for WAN 0 (hdlc0):　*Running*　**Restart**　**Stop**

Recent system log messages　**Refresh status and logs**

```
Jan  1 01:01:29 syncserver-0[1721]: Started
Jan  1 01:03:06 syncserver-0[1733]: TERM signal received
Jan  1 01:03:08 syncserver-0[1857]: Started
```

3.12 Terminal Server Configuration

The WAN interface, and external USB serial adapter ports may be configured for asynchronous serial operation by configuring them as a terminal server interface. Ensure that X.25 WAN and Synchronous Server operation are disabled for the selected interface by de-selecting the **Enable** button in the **HDLC Physical Layer** and **HDLC-TCP** pages.

To configure a port for terminal service, select **Serial-TCP** from the main menu **Terminal Server** section to display the configuration form.

3.12.1 Asynchronous Serial Settings

1) Select an interface from the **Local interface name** drop-down list.

2) Configure the settings to match the attached device.

3) If the device asserts a DTR signal, select **DTR detection**. This also controls TCP connectivity.

4) Click the **Enabled** checkbox.

3.12.2 Conversion Settings

5) Select the mode of operation from the drop-down list. RAW treats data as a byte stream. LINE does special line handling for data from TCP to the serial interface. IAC-ESC ensures data transparency when connecting to remote Telnet sessions.

3.12.3 Network Settings

6) Select the TCP port on which a listen is posted for remote clients, or to which a connection is to be initiated towards a remote server.

7) Enter the remote IP address to which the connection will be made, or enter 0.0.0.0 for a listen to be posted.

8) Optional: Enter the IP address of the local interface on which the listen TCP port is to be bound. For internal connections, 127.0.0.1.

9) Check the **Authentication Required** box if the remote client must login.

3.12.4 Update and Start the Server

9) Check the **Start / Restart Terminal Server** box for changes to become active.

10) Click the **Apply** button to save changes and (re)start the server if requested.

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

3.12.5 Verify Terminal Server Connection

Click on the **Status** and **Control & Log** items in the **Terminal Server** main menu section. Refer to the **Help** pages for details.

Terminal Server Interface Status — Help

Asynchronous Interface Status

Interface	Operational mode					DCE signals			DTE signals	
	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*
Serial 1 - ttyUSB0 (DTE)	0	7	Odd	2	No	??	??	??	??	??

Terminal Server Connections

Terminal Interface		TCP/IP socket			
Interface	Conversion	Local IP	Local TCP	Remote IP	Remote TCP
WAN 0	RAW	10.1.1.247	4000	10.1.1.34	58157
Serial 1	RAW	0.0.0.0	5001	0.0.0.0	0

Refresh

Terminal Server Control and Log — Help

Terminal Server for WAN Port 0 (ttyS0):   *Running*   **Restart**   **Stop**

Recent system log messages   **Refresh status and logs**

```
Feb 18 03:27:08 tserver-S0[1727]: TERM signal received
Feb 18 03:27:11 tserver-S0[1818]: Started
```

4 Cables

4.1 WAN Cables

When configured for synchronous (X.25), the DB25F WAN interfaces have an RS530 DCE pin configuration (compatible with ISO 2110). RS232 is a subset of RS530, so interface has a standard RS232 pin assignment when configured for RS232/V.24.

4.1.1 Connecting to a DCE device

The following cables are used when connecting to DCE device (like a modem) with a female connector that is supplying clocking on the DCE transmit and receive clock pins.

Crossover cable part numbers	
W4025-V24-DTE	DB25M-DB25M RS232 /V.24 crossover cable
W4025-V35-DTE	DB25M-M34M V.35 crossover cable
W4025-X21-DTE	DB25M-DB15M X.21 crossover cable
W4025-RS449-DTE	DB25M-DB37M RS449/V.36 crossover cable
W4025-RS530-DTE	DB25M-DB25M RS530 crossover cable

4.1.2 Connecting to a DTE device

The following cables are used when connecting to DTE device with a male connector that expects to receive clocking on the DCE transmit and receive clock pins. If replacing a modem, avoid any modem handshake issues by configuring the device's interface for "leased line" or "permanent modem" type connection.

Straight through cable part numbers	
811-SC6MF	DB25MF RS232/V.24 straight through cable
W4025-V35-DCE	DB25M-M34F V.35 straight through cable
W4025-X21-DCE	DB25M-DB15F X.21 straight through cable
W4025-RS449-DCE	DB25M-DB37F RS449/V.36 straight through cable
W4025-RS530-DCE	DB25M-DB25F RS530 straight through cable

4.2 Serial and Console Cables

When configured for asynchronous serial, the DB25F WAN interfaces have an RS232 DCE pin configuration.

4.2.1 Connecting to a DCE device

The following cables are used when connecting to a serial DCE device (like a modem) that has a DB25 or DB9 female connector.

Null modem cable part numbers	
W4025-V24-DTE	DB25M-DB25M - WAN port to DB25F
W4009-V24-DTE-S	DB25M-DB9M - WAN port to DB9F

4.2.2 Connecting to a DTE device

The following cables are used when connecting to a serial DTE device (like a PC COM port) that has a DB25 or DB9 male connector. If replacing a modem, avoid any modem handshake issues by configuring the device's interface for "leased line" or "permanent modem" type connection.

Straight through cable part numbers	
811-SC6MF	DB25MF - WAN port to DB25M
[284-MC1MF	DB25M-DB9F - WAN port to DB9M

5 Encapsulation Message Formats

The following are the formats of the messages used to encapsulate X.25 packet data over TCP connections. The TCP/IP host is expected to implement one of these methods if message preservation is required on the X.25 host.

Count (length) fields are in network byte order (big endian) with most significant byte first, least significant byte last.

5.1 MBIT (2-byte count field)

Simple encapsulation of data using a 2-byte length field. Used to encapsulate and demarcate X.25 packet data. Each MBIT message contains the data from an X.25 packet with More bit set to zero, or the concatenated data from a sequence of data packets with More bit set trailed by a data packet with More bit clear. The purpose is to preserve the boundaries of application messages.

Count = x	Payload (x bytes)

5.2 RFC1006 (ISO TP)

Encapsulation method to provide ISO Transport Service for bridging between X.25 and TCP hosts. Preserves application message boundaries similar to MBIT above, and can be used as an alternative to MBIT. The header is 4 bytes.

03	00	Count = 4+x	Payload (x bytes)

5.3 Q-MBIT (extended RFC1006)

Identical to RFC1006, and also provides preservation of the Qualified bit (Q-bit) of data packets. This method may be used whenever the X.25 application makes use of of Q-bit packets for control information.

03	0	Q	Count = 4+x	Payload (x bytes)

5.4 XOT (RFC 1613 – X.25 Over TCP)

This method is used for encapsulation of the entire X.25 packet including control, data, and RR packets. The payload is the entire X.25 packet including the 3-byte packet header. The count is the payload length.

00	00	Count = x	Payload (x bytes)

5.5 OFTP (RFC 5024)

Encapsulation method to provide bridging between X.25 and TCP hosts using ODETTE File Transfer Protocol. Preserves application message boundaries by using a 4-byte Stream Transmission Header on top of TCP to preserve X.25 M-bit sequences. Version (V) is 4 bits with value 1, Flags (F) is 4 bits with value 0, and Length is 24 bits (3 bytes) in big endian (network) order.

V	F	Length = 4+x	Payload (x bytes)

5.6 RBP (Cisco Record Boundary Preservation)

Encapsulation method to provide bridging between X.25 and TCP hosts. Preserves application message boundaries similar to MBIT above, and can be used as an alternative to MBIT. The header is

6 bytes. The count (2 bytes network order) is the payload length. The flag is coded 0x00 to indicate a complete application message, or coded as 0x01 to indicate a continuation of the application message in subsequent RBP messages with the final fragment in an RBP message with flag 0x00.

D7	4A	Count = x	Flag	00	Payload (x bytes)

5.7 QRBP

RBP with Q-bit support. Identical to RBP above, except the flag can include value 0x02 to indicate an X.25 Q-bit message.

D7	4A	Count = x	Flag	00	Payload (x bytes)

5.8 AEPN

Encapsulation method to provide bridging between X.25 and TCP hosts. Preserves application message boundaries similar to MBIT above, and can be used as an alternative to MBIT. The header is 8 bytes. The count (2 bytes network order) is the payload length. The flag is coded 0x00 to indicate a complete application message, or coded as 0x80 to indicate a continuation of the application message in subsequent AEPN messages with the final fragment in an RBP message with flag 0x00.

X.25 Q-bits are preserved by use of the 0X40 bit in the flag field.

54	9F	08	02	Count = x	Flag	00	Payload (x bytes)

6 Contact Microtronix

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