

FarLinX® Connect Mini v2 Installation & User Manual



Manual Revision 1.01

For use with: FarLinX Connect Mini v2 Firmware Version 1.x.x

FarSite Communications Ltd info@farsite.com www.farsite.com



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Table of Contents

1	Introduction	4
1.1	HDLC to TCP/IP Conversion	
1.2	HDLC Bridging over TCP/IP	4
2	TCP / HDLC Conversion Options	5
2.1	Character Stream	
2.2	Basic Header Conversions	6
3	Initial Configuration	7
3.1	Connecting to the FarLinX Connect Mini v2	
3.2	Changing the Password	8
3.3	Changing the IP Address of the FarLinX Connect Mini v2	8
4	WAN Port/Route Configuration	10
4.1	WAN Port Configuration	
4.1.1	WAN Port Configuration Parameters	11
4.2	Route Configuration	13
4.2.1	Route Configuration Parameters	14
5	Statistics	16
6	Line Monitor	17
6.1	Installing and Configuring the FarSync Line Monitor	
6.2	Configure the FarLinX Connect Mini v2 Settings	
6.3	Start/Stop Monitor	18
7	System Information	18
8	Front Panel LED Indication	19
9	Optimising Performance	19
9.1	Viewing Statistics	
9.2	Line Monitoring	
10	Maintenance	19
10.1	Restart and Shutdown	
10.2	Front Panel Reset Function	19



1 Introduction

This manual describes the installation, configuration, and operation of the FarLinX Connect Mini v2.

Refer to the <u>Quick Start Guide</u> supplied with the product for information about the ports, LED and switches on each end panel and the serial cable options available.

The FarLinX Connect Mini v2 connects an existing HDLC device to a TCP/IP network. A connection to an HDLC device is made via a 'Line' that is connected to the device's WAN port. The configuration for the TCP/IP connection is referred to as a 'Route'.

The FarLinX Connect Mini v2 can initiate TCP/IP connections according to the configured 'Route'. It can alternatively be configured to accept connections instead. Once a TCP session has been established, data can be transferred to and from the connected HDLC device.

The FarLinX Connect Mini v2 supports HDLC bridging over a TCP/IP network when paired with a second FarLinX Connect Mini v2, or other compatible device, which supports the conversion between TCP/IP and HDLC at the peer.

1.1 HDLC to TCP/IP Conversion



When the FarLinX Connect Mini v2 receives data in an HDLC frame from a connected HDLC device, it converts the data in the HDLC frame payload (DL-PDU) into a format suitable for transmission over a TCP/IP network to a TCP/IP based application.

1.2 HDLC Bridging over TCP/IP



When one FarLinX Connect Mini v2 receives data in an HDLC frame from a connected HDLC device, it converts the data in the HDLC frame payload (DL-PDU) into a format suitable for transmission over the TCP/IP network to another FarLinX Connect Mini v2, which then converts the data back into the original HDLC data stream before forwarding it to the connected HDLC device.



2 TCP / HDLC Conversion Options

The three types of conversion options supported by the FarLinX Connect Mini v2 are:

- Character Stream
- Basic Header Conversion
- Basic Header V2 Conversion

For the **Character Stream** conversion option, data received on the TCP data stream can be simply forwarded to the HDLC device as and when it is received. Data received from the HDLC device is forwarded to the TCP data stream according to the configurable Character Stream Forwarding Criteria (i.e. on receipt, block size, timeout or receipt of the forwarding character).

Character streams are typically used where there is no requirement to retain frame boundaries in the stream of data received from the HDLC device.

For the **Basic Header**-based conversions, a header is used to describe the message payload transferred over TCP data streams, but this header is not transferred over the HDLC data stream.

When data is received over the TCP data stream, the device extracts the header from the received TCP payload. The header contains the length of the message in order to delimit the end of the message thus allowing the device to recognise the start of the next message. The device removes the message header before forwarding the message body to the HDLC device. In the reverse direction, HDLC message, constructs and inserts the appropriate message header before forwarding the entire message (header plus body) over the TCP data stream.

The addition of a header in the TCP data stream allows the original HDLC payload to be accurately forwarded to the peer HDLC device.

More details about each of the conversion methods are given below.

2.1 Character Stream

For the Character Stream conversion, no headers are prepended to the incoming HDLC data stream before forwarding the data to the TCP stream. Data received from the HDLC device is forwarded to the TCP data stream according to one or more combined options that have been selected. Whichever option is satisfied first will cause the queued data to be forwarded. If no selected options have been satisfied then, once 4096 bytes have been received, the data will be forwarded regardless. The forwarding options are:

• Default (if none of the options below are selected)

Data received from the HDLC device is stored in the buffer and forwarded to the TCP stream as soon as it is received.

• Block Size [1..4096]

Data received from the HDLC device is stored in the buffer. When the number of bytes received reaches the specified Block Size, those bytes are forwarded to the TCP stream.



• Timeout (ms) [1..43200]

Data received from the HDLC device is stored in the buffer. A forwarding timer is started upon receipt of the first frame of HDLC data. All data in the buffer is forwarded to the TCP stream upon expiry of the forwarding timer, and the timer is restarted when the next frame of HDLC data is received.

• Character [2 hex characters]

Data received from the HDLC device is stored in the buffer. When the specified forwarding character is received, all data in the buffer is forwarded to the TCP stream, including the forwarding character itself.

2.2 Basic Header Conversions

When either of the Basic Header message type is selected, the FarLinX Connect Mini v2 will add a 2 byte header (which contains the length of the message) to messages received from the HDLC device before forwarding them over the TCP connection.

When the device receives data from the TCP connection, it assumes that the TCP payload contains a header of 2 bytes in size. The device will remove this header before forwarding the message to the HDLC device.

Header (MSByte) Header (LSByte) Data

Data sent to the HDLC device is transmitted in its original format, i.e. no concatenation or fragmentation of messages occurs.

If an error is detected within the incoming TCP data stream, the TCP connection is closed. Any data that is present in the buffers will be discarded. The HDLC Line will remain active but it won't buffer any data until the TCP connection is re-established.

In Basic Header mode, the value specified in the 2-byte header includes the length of the header. In Basic Header-V2 this value does **not** include the length of the header.

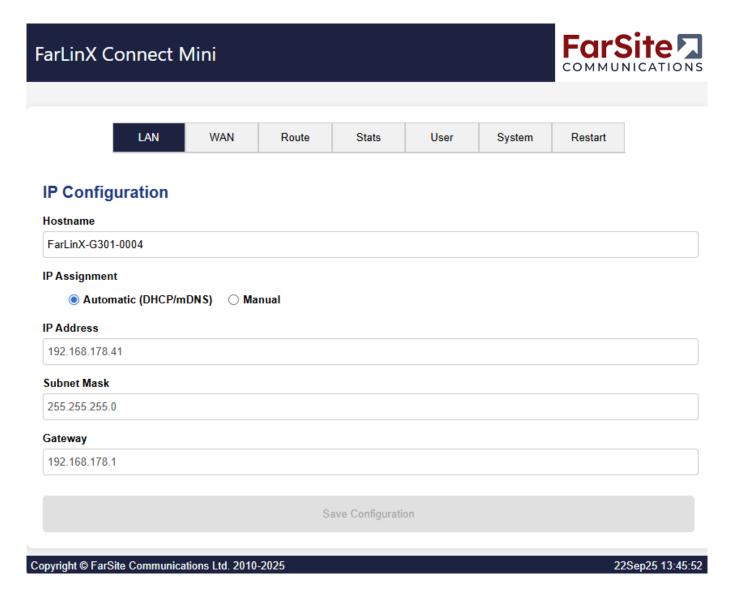
Sample TCP data

Mode	TCP Data with length header	HDLC Frame
Basic Header	00 07 12 34 56 78 90	1234567890 (5 bytes)
Basic Header-V2	00 05 11 22 33 44 55	1122334455 (5 bytes)

Note that the maximum data message size supported by the FarLinX Connect Mini v2 is 4096 bytes.



3 Initial Configuration



3.1 Connecting to the FarLinX Connect Mini v2

The configuration for the FarLinX Connect Mini v2 can be viewed and updated using a browser over a TCP/IP network. A Configuring PC, running a web browser (e.g. Google Chrome, Microsoft Edge), is required. Note that the device must be configured using IPv4 addressing (not IPv6).

The FarLinX Connect Mini v2 should be powered up and connected to a local area network.

When the FarLinX Connect Mini v2 is switched on for the first time, the device can be a located by the browser by simply using the url:

http://farlinx-gxxx-yyyy.local

where **gxxx-yyyy** is based on the serial number of your FarLinX Connect Mini v2. e.g. for the device with serial number, **G301/0003**, use http://farlinx-g301-0003.local

Note that if a DHCP server is available on the local network then http://farlinx-gxxx-yyyy can be used instead.



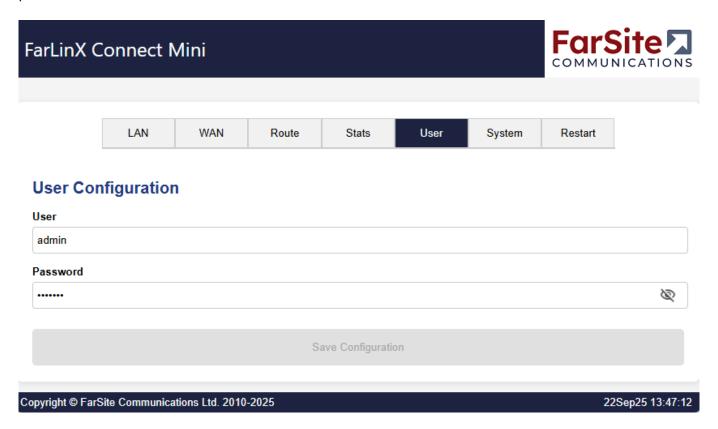
A login dialog will then be presented. Enter the default user credentials:

username: admin password: farlinx

When you have successfully logged in, there are a number of configuration changes that you should make immediately. These are detailed in the rest of this section.

3.2 Changing the Password

To secure your device, click on the **User** tab in the navigation menu and change the default Administrator password.



Enter the new password and click the **Save Configuration button** to apply the new password. This change should take immediate effect.

3.3 Changing the IP Address of the FarLinX Connect Mini v2

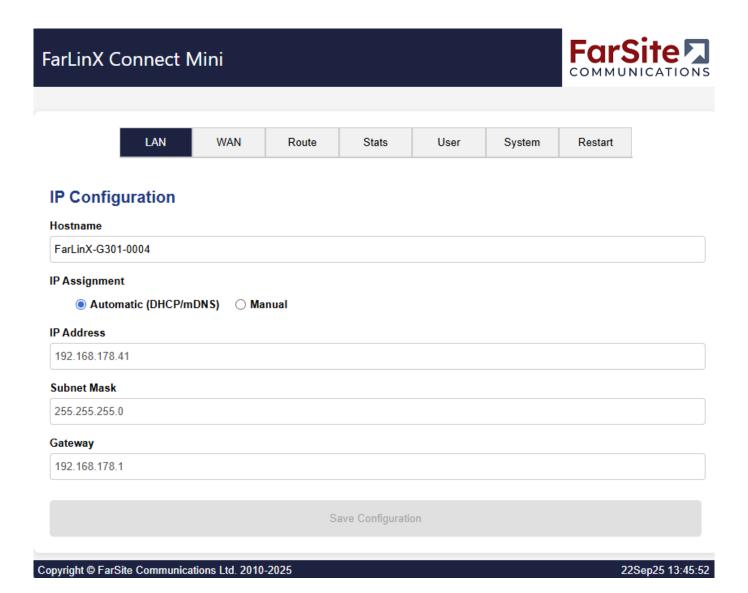
If required, the IP address and other network settings used by the device to access your local network, can be changed by clicking on the <u>LAN</u> tab in the navigation menu and changing **IP Assignment** to **Manual**; suitable **IP Address**, **Subnet Mask** and **Gateway** values can then be set. Finally click **Save Configuration** to commit the changes. Note that the device will need to restart to use the new values. In many cases, but depending on your network setup, the **IP Assignment** value can simply be left as **Automatic (DHCP/mDNS)** and the address settings will then be chosen automatically by the device.

If you do change the device's IP Address, once the device has been restarted you will then need set your browser to select the new IP address that you have just assigned to the device to continue configuration. For example if



you configured an IP address of 192.168.1.100 then use http://192.168.1.100 to access the configuration web interface.

Regardless of the IP Address in use, the device should still normally be accessible from a browser using the http://farlinx-gxxx-yyyy.local address as above.





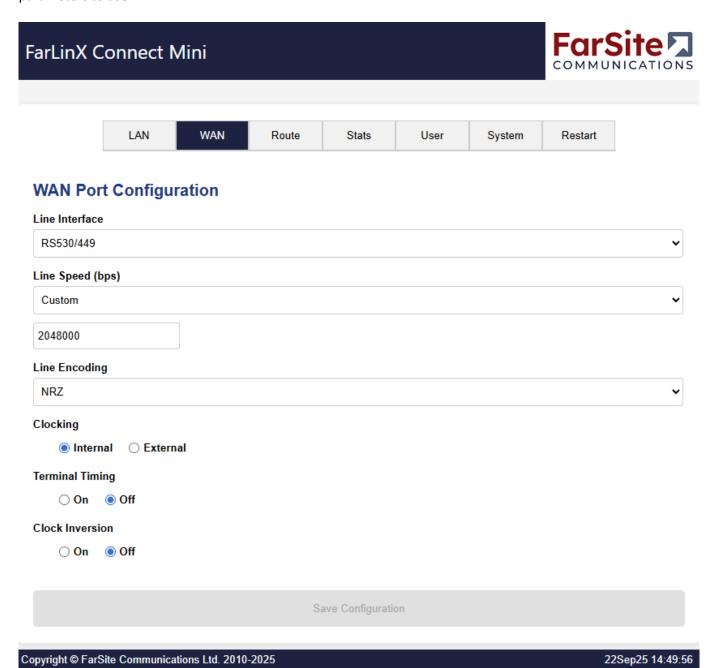
4 WAN Port/Route Configuration

The FarLinX Connect Mini v2 will connect an HDLC-based 'line' with a TCP 'route'. The term 'line' is used to refer to the connection made through the WAN port i.e. physical DB25 port on the back of the device. The term 'route' is used to refer to a TCP/IP connection made via the LAN port. A route and a line act together as a pair.

4.1 WAN Port Configuration

To edit the WAN Port Configuration, click on the WAN tab in the navigation menu.

The required WAN Port Configuration is entirely dependent on the HDLC device connected to the port. Refer to the documentation and current configuration for your HDLC device to determine the correct configuration parameters to use.



Enter the required parameters as described in Section 4.1.1 - WAN Port Configuration Parameters. When you have finished, click on the **Save Configuration** button. If the parameters are valid, they are saved, if they're not you will be prompted to fix them before they are saved.

4.1.1 WAN Port Configuration Parameters

The configurable WAN port parameters are as follows:

Line Interface

This setting specifies the type of interface of the line that is connected to the WAN port. The FarLinX Connect Mini v2 supports the following network interfaces

- **X.21** also known as V.11
- V.24 also known as RS232C and X.21bis
- V.35
- RS530/449 uses RS-422 level signalling
- RS485 4-Wire (Full Duplex)
- RS485 2-Wire (Half Duplex)

Refer to https://farsite.com/product-support/cable-compatibility-tables-and-cable-diagrams/ for details of available cables, and their associated pinouts, for use with the range of interface types.

Line Speed (bps) [100..2048000]

This value specifies the line speed (i.e. clock rate) in bits per second to be used on this line. This is always required if the internal clock option is used since it explicitly determines the rate at which clocks are generated on the line by the FarLinX Connect Mini v2. Even if external clocking is selected, this value should match the externally generated clocking rate of the line since this value is used to tune the device's resources to be optimised for use with the expected rate.

• Line Encoding

The FarLinX Connect Mini v2 supports the following line encodings:

- NRZ
- NRZI
- FM0
- FM1

Clocking

The following basic clocking options are supported:

- Internal
- External

Select 'Internal' to enable internal clock generation for the line (at the rate specified in the **Line Speed** parameter). If clocking is to be generated by the HDLC peer, then select the External clocking option. If the FarLinX Connect Mini v2 is acting as a DCE then an **internal** clock is normally required.

Terminal Timing

If the port has its **Clocking** parameter set to **Internal** (and hence it will behave as a **DCE**) then also setting **Terminal Timing (TT)** to **On** will force it to use the terminal timing clock, as received from the DTE, to clock received data in [DCE/TT mode]. Alternatively, if the port has its **Clocking** parameter set to **External** (and hence it will behave as a **DTE**) then also setting **Terminal Timing** to **On** will force it to loopback, and output, the rx clock, as supplied by the peer **DCE**, as the terminal timing clock [DTE/TT mode]. It therefore supplies this for the peer **DCE** to clock the data in that it receives from the **DTE**. If **Terminal Timing (TT)** is set to **Off** then both Tx and Rx clocks will be sent or received based solely on the setting of the **Clocking** parameter alone.

The following table shows the clock directions for DTE and DCE modes when using TT:

	DTE	DCE
TxC	IN	OUT
RxC	IN	OUT
TT	OUT	IN

For DTE/TT, the incoming TxC is looped to TT and TT is returned with TxD to the DCE, where TT clocks the data in the DCE. For DCE/TT, TT is used to clock TxD into the DCE.

Note that terminal timing is not relevant for X.21 line interface.

Clock Inversion

Select this option to change the phase of the receive clock by 180 degrees for received data. If you are seeing excessive receive errors (in the Stats page) and the port is configured for internal clocking, then inverting the clock might resolve the problem.



4.2 Route Configuration

A route defines the address of a remote TCP endpoint, whether this is another FarLinX Connect Mini v2 or a TCP application. It also defines the formatting of the data carried over TCP/IP.

To edit the Route Configuration, click on the Route tab in the navigation menu.



Enter the required parameters as described in Section 4.2.1 - WAN Port Configuration Parameters. When you have finished, click on the **Save Configuration** button. If the parameters are valid, they are saved, if they're not you will be prompted to fix them before they are saved.

Once the route has been saved it can then be started using the **Start** button.



4.2.1 Route Configuration Parameters

The configurable route parameters are as follows:

Remote Address

This is the address of the LAN-based client endpoint with which the FarLinX Connect Mini v2 is connected when the route is active. Whether the FarLinX Connect Mini v2 initiates the connection to this address or expects an incoming connection request from it, is determined by the **TCP Connection Direction** setting.

Protocol

This is the IP-based protocol (TCP or UDP) that is used for the connection between the LAN-based client endpoint and the FarLinX Connect Mini v2.

• Remote IP Port

This is the port number of the LAN-based client endpoint with which the FarLinX Connect Mini is connected when the route is active. Whether the FarLinX Connect Mini v2 initiates the connection **to** this port or expects an incoming connection request **from** it, is determined by the **TCP Connection Direction** setting.

Local IP Port

This is the port number of the FarLinX Connect Mini v2 used when connecting with the LAN-based client endpoint. Whether the FarLinX Connect Mini v2 initiates the connection **from** this port or expects an incoming connection request **to** it, is determined by the **TCP Connection Direction** setting.

Auto Start

Setting **Auto Start** to **On** causes the route to be automatically started when the unit is powered on, without the need for user intervention.

• TCP Connection Direction

An **inbound** TCP connection is initiated by a LAN-based client endpoint and directed towards the FarLinX Connect Mini v2. An **outbound** TCP connection is initiated by the FarLinX Connect Mini v2 towards a LAN-based server endpoint.

TCP Connection Retry Timer (ms)

This value is used as the time (in ms) between attempts to (re)connect to the LAN-based client endpoint whenever the route is active. It is only applicable if the **TCP Connection Direction** is set to **Outbound**.

TCP Payload Conversion Option



This value is used to set the type of conversion that the FarLinX Connect Mini v2 should use when relaying data between the LAN and WAN. If it is set to **Character S**tream then further related configuration parameters (**TCP Charstream Forwarding Options**) are available - these are not used for Basic-Header-related conversions.

TCP Charstream Forwarding Options

These options are used to determine when to forward downstream data (WAN \rightarrow LAN) as it is received on the WAN port. Whichever option is satisfied first will cause the data to be forwarded. If no selected options have been satisfied then, once 4096 bytes have been received, the data will be forwarded regardless. If no options are selected, then data will be forwarded immediately as and when it is received on the WAN port. Note that these options only apply when the **TCP Payload Conversion Option** has been set to **Character Stream**.

o Default (if none of the options below are selected)

Data received from the HDLC device is stored in the buffer and forwarded to the TCP stream as soon as it is received.

Block Size [1..4096]

Enabling the **Block Size** option and setting its value in the range [1..4096], will cause the FarLinX Connect Mini v2 to defer forwarding of WAN received data until at least that number of bytes have been received on the WAN link. If the value is set to 0, or the option is disabled, then the received data will be forwarded immediately (unless one or more of the other forwarding options conditions is preventing it).

Timeout (ms) [1..43200]

Enabling the **Timeout** option and setting its value in the range [1..43200], will cause the FarLinX Connect Mini v2 to defer forwarding of WAN received data for at least that number of milliseconds. If the value is set to 0, or the option is disabled, then the received data will be forwarded immediately (unless one or more of the other forwarding options conditions is preventing it).

Character [2 hex characters]

Enabling the **Character** option and setting its value in the range [00..FF], will cause the FarLinX Connect Mini v2 to defer forwarding of WAN received data until that data value is received. If the option is disabled, then the received data will be forwarded immediately (unless one or more of the other forwarding options conditions is preventing it).

It is recommended that either of the **Basic Header** modes is used when the remote device is another FarLinX Connect Mini v2 device. Where the remote peer is a TCP/IP application, if it already supports, or can be made to support, either or the basic header modes then this will allow the application to see the payload data as it was received on the line and have greater control over data to be sent on the HDLC line. **Character Stream** is most suitable when the remote partner is an existing TCP/IP application expecting a simple datastream of characters from the HDLC device.

Once configured and saved, the route can be manually started and stopped using the Start/Stop button or, if **Auto Start** is enabled, it will be automatically started each time the device is restarted.



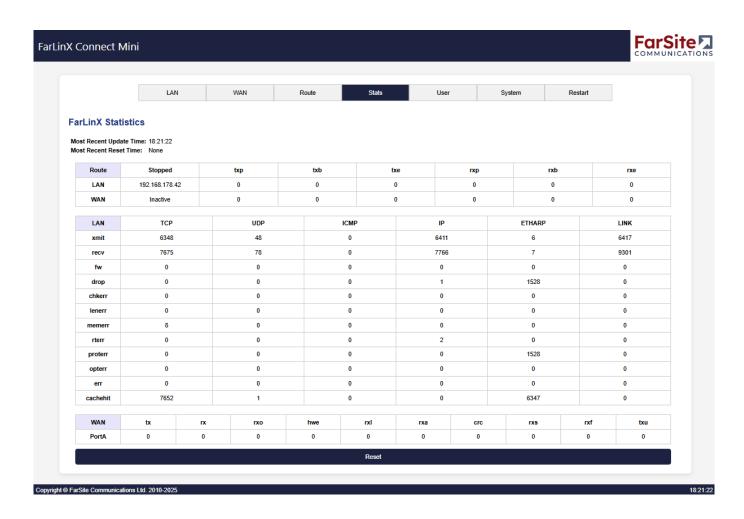
5 Statistics

The FarLinX Connect Mini v2 provides detailed information and statistics for activity on the

- Route this shows not only the tx/rx statistics but also the state of the route e.g. whether it is Started or not, and also the IP address of any connected device
- LAN statistics
- WAN/line statistics

These statistics are updated dynamically without needing a manual refresh.

To view the statistics, click on the <u>Stats</u> tab in the navigation menu.





6 Line Monitor

The FarLinX Connect Mini v2 supports monitoring of the traffic on the HDLC ports. The monitor support can capture all of the data on a given HDLC line and forward it to a remote Windows system running the FarSync Line Monitor (fsmon) software package.

6.1 Installing and Configuring the FarSync Line Monitor

The traffic monitored by the FarLinX Connect Mini v2 is forwarded to a remote Windows machine running the FarSync Line Monitor (fsmon) software package.

To install the FarSync Line Monitor (fsmon) software package, just run the 'FarSyncLineMonitorInstaller.exe' program on the Windows system. The installation package is available via the link in the Downloads section of the FarLinX Connect Mini v2's System page i.e. https://farsite.com/farsynclinemonitorinstaller Once installed, select "FarSync Line Monitor" from the Windows Start menu to run the program.

Once running, from the File menu, select File—Recording Mode... In the subsequent dialog box (see screenshot below), set Monitoring Mode to 'Remote' then set 'Local TCP Port Number' so that it matches the 'remote port' in the device's configuration (See Section 6.2). Click on the 'Save' button to finish the configuration.

Ensure that the Windows system is configured to accept the TCP traffic sent to it from the FarLinX Connect Mini v2. This includes configuring any installed firewall to permit incoming traffic for the configured TCP port.



After configuring the TCP port, restart the line monitoring by pressing the "Record/Stop" button twice. You will then be able to view the monitored data from the FarLinX Connect Mini v2, in real-time.



6.2 Configure the FarLinX Connect Mini v2 Settings

On the FarLinX Connect Mini v2, you need to specify the IP address of the Windows system that is running the FarSync Line Monitor software. You must also select the TCP port number on which the FarSync Line Monitor is listening (default: 5001)

To configure the monitor settings, click on the **System** tab in the navigation menu.

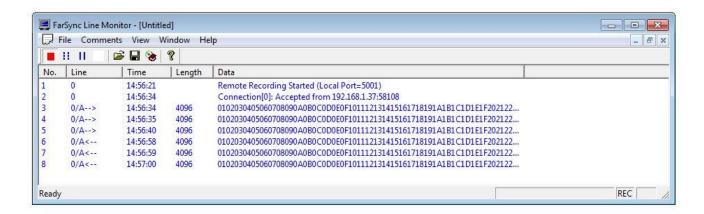
Under the **Monitoring** heading, you can set the IP address and port of the remote machine that is running the FarSync Line Monitor. The configured values are then read/used when monitoring is subsequently started using the **Start** button.



6.3 Start/Stop Monitor

The monitor Start/Stop button will connect/disconnect the to/from the remote FarSync Line Monitor and all traffic on the WAN line will then be captured and forwarded for display in the FarSync Line Monitor window.

Since forwarding of the data to the remote fsmon uses resources on the FarLinX Connect Mini v2, this can affect network and device performance, so always stop the monitoring of the HDLC line using the 'Stop' button when it is no longer required.



7 System Information

General information regarding your FarLinX Connect Mini v2 device is shown under the <u>System</u> tab including the device's serial number and firmware version.



8 Front Panel LED Indication

The front panel LED indicates the operational state of the FarLinX Connect Mini v2 as described in the <u>Quick Start</u> <u>Guide</u> supplied with the product.

9 Optimising Performance

There are a number of factors that can affect the performance of the FarLinX Connect Mini v2, which are listed below. In order to optimise the throughput through the device please make sure that there is no unnecessary monitoring of device activity enabled.

9.1 Viewing Statistics

There are large parts of the Statistics screens that are updated dynamically. If you leave your web browser open on a Statistics display then this can have an impact on the throughput rate. If your connections are sensitive to throughput, then it is suggested that the Statistics screens are only viewed when required.

9.2 Line Monitoring

Line Monitoring enables the data transmitted and received at the HDLC interface to be sent to a remote Line Monitoring system. This could significantly affect the performance of the FarLinX Connect Mini v2 because of the extra processing and additional TCP traffic generated when sending the monitor data to the remote monitor.

10 Maintenance

10.1 Restart and Shutdown

Apart from ensuring that you have saved any pending configuration changes you may have made, there is no shutdown procedure required for the FarLinX Connect Mini v2, you can simply just remove its power as and when required.

To restart the FarLinX Connect Mini v2, click on the Restart tab in the navigation menu.

Clicking on the 'Restart' button will automatically turn the device off and back on again. The same can be achieved pressing the reset button for more than 5 seconds (but less than 10 otherwise the device's factory defaults will be set) – see Section 10.2.

10.2 Front Panel Reset Function

The reset button is located on the front of the FarLinX Connect Mini v2. The reset button can be used as described in the Quick Start Guide supplied with the product.

Note that pressing the reset button for more than 10 seconds can be used to reset the device to its factory default settings. In this case, all configuration information will be reset to factory defaults - this includes:

- Removing any user customisation to the LAN configuration
- Removing all HDLC line and route configuration
- Resetting username/password to the default (admin/FarLinX)





<u>info@farsite.com</u> <u>www.farsite.com</u>