DATA-CONNECT

DCE

EPORT-MLS
MODEM LAN SERVER

User's Guide

Revised April 14, 2014

Firmware Version 2.X

Certifications

FCC Statement

This device complies with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules.

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.

Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at the user's own expense.

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Version 2.x

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RoHS

Some models of this product are available in RoHS versions.

This product is available in RoHS versions.

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Chapter 1
Introduction

This chapter provides an overview of features and capabilities.

The DCE EPORT-MLS is used in pairs to provide a high quality compressed voice channel plus an asynchronous serial data channel through a single composite serial or ethernet data link. The serial network may be synchronous or asynchronous, using leased line modems, radio links, or digital data service. Asynchronous terminal devices may be terminals, printers, computer ports or other asynchronous devices. The voice channel may be connected to standard analog telephone sets, PBXs, key systems, radios, etc. The ethernet network link may be any IP connection, including the Internet, satellite, wireless, and broadband connections.

The asynchronous data port is configurable for speeds up to 57,600 bps. Serial network speeds may be as high as 230.4 Kbps asynchronous or 256 Kbps synchronous. Depending upon the voice quality desired, the voice channel can be configured for bit rates between 2250 and 9600 bps or ADPCM (32K), PCM (64K).

EPORT-MLS is configured via a USB Setup port using a PC with terminal emulation software or using a web browser connection (if the ethernet option is installed). Configuration settings are maintained in non-volatile memory.

Additional features:

- User configurable voice rate and jitter delay.
- Available with an optional built-in 12 VDC, 24 VDC or 48 VDC power supply.
- Industrial temp rating of –40C to +85C
- Ethernet IP connectivity over any Internet connection.
- Rack mount options.
- FXS/FXO, 4-wire E&M, or Push-to-Talk interfaces

Applications

The provides quality voice links at minimum bandwidth. While low-bit-rate voice is adequate for many uses, some audio applications require PCM or ADPCM encoding. DCE EPORT-MLS is the rare product that provides both low-bit-rate as well as high quality ADPCM/PCM options.

- Utility substations
- Office to home analog extensions
- High quality Audio over data links for remote voice logging and transmitter control
- Two-way radio audio over slow speed data links
- Gas and oil production, pipelines
- Remote radio dispatch operations
- Phone extensions over wireless links
- "Hoot 'n Hooller" remote public address/ intercom systems using data connections

Other Features

Multiplexed data port

DCE EPORT-MLS contains an additional asynchronous interface that is multiplexed along with the voice to corresponding remote EPORT-MLS units. This is sometimes used for remote transmitter control,cascading an additional EPORT-MLS unit, or remote control of a computer or controller.

Flexible Configuration Options

While the serial-configured EPORT-MLS is normally configured using a local terminal (or PC with terminal emulation) and the serial connection, Ethernet EPORT-MLSs are configurable using any modern web browser or telnet client.

Voice Interfaces

The EPORT-MLS is available with FXS/ FXO, 4-wire E&M or only push-to-talk (PTT) audio interfaces. PTT is included with the FXS/FXO and E&M units. The interface is specified at the time the unit is ordered. The PTT audio interface is supplied with a microphone and speaker for PTT only orders, and as an add-on item for FXS/FXO and E&M units. The speaker circuit contains a .25 watt amplifier for local PA applications.

Voice Quality

The EPORT-MLS provides exceptional compressed voice quality at speeds ranging from 2400 to 9600 bps. The compressed voice is based on the same chip set used for Project 25 (P25) radio interoperability. This is a voice chip set that has a very long market life, which translates to a long market life for the EPORT-MLS. EPORT-MLS voice choices also includes 56K PCM. The choice of PCM make the EPORT-MLS suitable for applications that require tone control, such as links to radio transmitters.

Security Features

Configuration access may be locked down to individual IP addresses. User names and passwords may be required for configuration, and the web server, telnet server, and SNMP server may be disabled for additional configuration security on the ethernet enabled models.

Extensive audio configuration parameters

In addition to the voice digitization rate, individual settings for each unit include preamp gain, input gain, output gain, jitter buffer, and E&M signaling.

Rugged, Industrial Quality

With various industrial rated power supply options and industrial temperature rating of -40 to 85 C, EPORT-MLS is at home in the field or office.

Package Contents

You should find the following items packed with the EPORT-MLS

- External 100-240VAC power supply (if appropriate)
- Manual on CD
- Warranty, maintenance contract and repair information in the CD manual
- Modem to Composite cable (black) for connecting the EPORT-MLS to an external modem or DSU/CSU
- USB cable for connecting the MLS setup port to a PC for configuration

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

Configuration Software Requirements

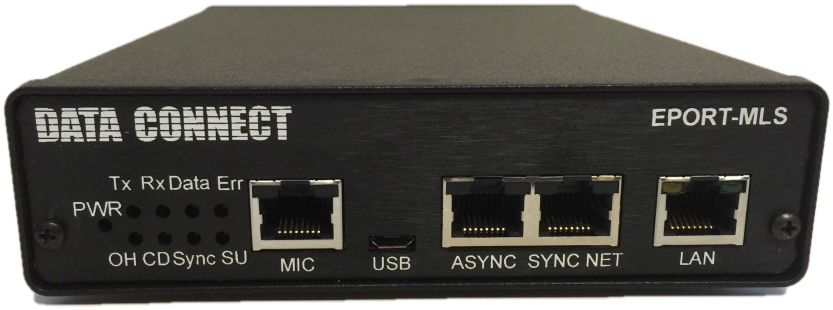
EPORT-MLS units with the ethernet option require a modern web browser for configuration. The PC should be configured with a compatible IP address. The default EPORT-MLS address is 192.168.0.1 .

The serial EPORT-MLS version requires only a terminal (or PC with terminal emulation) connection using the supplied USB cable.

MLS Hardware

Front Panel

The front panel contains LED indicators, a microphone connection, USB configuration connection, Asynchronous data port, Synchronous network port, and Ethernet network port.



Front Panel Layout

Front Panel LED Indicators and Connections

Indicators

- POWER – is ON when the EPORT-MLS is connected to power.
- Tx – Transmit Data is being sent out the network port
- Rx – Receive Data is being received on the network port.
- Data – TX or RX Data is present on the data port.
- Err(or) – Flashes for data port errors (framing, overrun, parity) and for network receive block checksum errors.
- OH – Flashes when the voice port is active.
- CD – On when DCD is present on network port.
- Sync – On when network port is set for synchronous operation.
- SU – Flashes when DIP switch 2 is up and unit is reset. This maps the setup functions to the ASYNC port on the front of the unit.
- There are also two LED indicators on the Ethernet LAN adapter connector. Yellow Activity indicator and RED 10/100 Mbit indicator.

Connections

- Microphone Connection for local microphone
- USB Configuration connection (used for serial configuration)
- Asynchronous RS-232 data connection
- Synchronous RS-232 network connection used for serial units)
- Ethernet LAN network connection

Rear Panel

Real Panel Connections and Switches

Connectors

- Power Connector Either a 6VDC coaxial connector for the AC powered units or a multi-pin screw connection connector used for DC powered units
- Two pin screw connection for an optional audio speaker
- RJ-45 E&M connection. Only operational on units with E&M interface
- RJ-45 FXS/FXO connection. Only operational on units with FXS/FXO interface

Switches

Four DIP switches are accessible on the rear of the unit. There functions are as follows:

Switch 1 – not used
Switch 2 – If up when unit is reset, the RS232 data port becomes the setup port.
Switch 3 – Factory use only.
Switch 4 – not used

There is also a RESET switch accessible through a small hole in the rear panel.

NOTE

The EPORT-MLS is not operational while in switch 2 setup mode.
If switch 2 is used for setup, connect the PC Com port to the MLS using the cable shown in paragraph 6.3.2 (To a PC Com Port).
Set the PC terminal emulator for 9600, 8,N,1 and no flow control.
Set switch 2 UP and press reset to enter setup mode. To exit setup, put switch 2 DOWN and press reset to resume normal operation.

Chapter 2
Installation

Overview

The EPORT-MLS unit can be configured using a USB connection to a local PC, a serial connection to a local PC or if an ethernet model, via telnet, or a web browse.

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

Setup

The network port must be configured properly for the type of link used (Sync or Async). If required, the ASYNC data port and voice port must also be set correctly for the application. See the CN, CP and CV commands in Section 5.

Using Leased Line Modems

In this section, a reference to modem includes modems, digital radios or DSU/CSUs for leased line installations.

Connect the modems to the phone line and power ON the modems. Confirm the presence of carrier at each modem. If carrier is not detected at both ends, recheck the option settings. If carrier is still not present, check the cable from the telephone line to the modem. If everything is correct and still no carrier call the manufacturer of the modem or contact the telephone company for assistance.

Connect the EPORT-MLS network port to the modem. A two foot RJ45 to DB-25 male cable connects the network port of the EPORT-MLS to the data port of the modem (usually a DB-25 female connector). See the cabling information section for details.

Connect the EPORT-MLSs to power.

Power and CD indicators on the front panel of the EPORT-MLS must be ON indicating the on-line condition (see Section 4).

Cabling

Cabling between the EPORT-MLS and the computer ports or terminal devices is a common source of installation problems. The EPORT-MLS must have data from attached terminal devices or computer ports, as an input on position 6 of the RJ45 connector. Data from the EPORT-MLS to any attached equipment will be transmitted on position 5 of the RJ45 connector. See the cabling information for pin position locations on the RJ45 connector and to determine the correct cables for your computer and terminal devices.

Parity Considerations

EPORT-MLS transfer all character bits whether it is 7 data bits plus parity or 8 data bits plus none, even or odd parity (7,N,1 is not supported). All 7 bit plus parity data should use the 8N1 setting. When 8E1 or 8O1 is enabled, parity is tested on the incoming data port characters, and the character is discarded if the parity is incorrect.

Voice Bandwidth Requirements

The following chart shows the bandwidth required for each voice rate setting. The maximum sustained data bandwidth is the network rate minus voice bandwidth.

Voice Rate (bps)	Bandwidth Required (bps)	Minimum Network Rate (bps)
2250	4375	4800
2400	4375	4800
3600	5875	9600
4800	7375	9600
6400	9375	9600
8000	11375	19200
9600	13375	19200
ADPCM (32K)	45500	57600
PCM (64K)	84500	115200

Voice Settings

Select the proper voice channel settings for your application based on the following chart. The voice interface is selected by the CV command and/or internal jumper settings.

Equipment		Voice Interface	
Local	Remote	Local	Remote
Analog Phone[1]	Analog Phone[1]	fxs[2]	fxs
Analog PBX Ext.	Analog Phone	fxo[3]	fxs
Analog PBX Ext.	Key System	fxo	fxs
Key System	Analog Phone	fxs	fxs
Key System	Key System	fxs	fxs
Analog Phone Line	Analog Phone	fxo	fxs
PBX 4-wire tie line	PBX 4-wire tie line	e&m	e&m
PTT Microphone	Speaker	MIC-PTT	E&M[4]

1 – Digital or “feature” phones of the type used by some PBX systems are not supported.
2 – To set the FXS/FXO port for FXS, set the jumper on J6 to the left .
3 – To set the FXS/FXO port for FXO, set the jumper on J6 to the right .
4 – Set internal jumper J4 to position 2,3 to route audio output to rear panel audio connector .

FXS – In this mode, the EPORT-MLS provides DC voltage and current (talk battery) for a local telephone instrument. By monitoring the presence or absence of current to the telephone instrument, the EPORT-MLS detects whether the

phone, or telephone equivalent, is idle (on hook) or busy (off hook). This information is then transmitted to the far end EPORT-MLS. The on-hook or off-hook information is then relayed to the telephone switching e quipment by the far end FXO unit. Tone dial DTMF tones are transferred transparently, pulse dialing is not supported.

In an FXS to FXS configuration automatic ring-down is enabled. When the telephone at one end is off-hook, the telephone at the other end rings automatically. If the always off hook option is enabled, no ringing occurs.

CAUTION
Excessive ringing loads on the voice circuits can cause damage to the units! Old style telephones with "bell" ringers will damage the equipment. Use newer phones with electronic ringers having a ringer equivalence of 1.0B or less.

FXO – The FXO mode is the inverse of the FXS mode. The FXO interface appears as a telephone instrument to the attached equipment. When in FXO mode, the MLS's signaling circuits are conditioned to detect an incoming ring signal, representing an incoming call, and to provide a DC path (loop closure) to the PBX or central office switch to indicate on-hook/off-hook status. When ringing is detected, the FXO end will send an incoming call indication to the FXS unit at the far end, thus instructing it to ring its phone. When the far end FXS unit detects an off-hook condition, it sends an off-hook indication to the near end FXO which then provides an off-hook (loop closure) state to the telephone switching system. In this manner, the FXS/FXO pair together make the two EPORT-MLS units at the two ends of the line appear "transparent" to the operation of a normal telephone line. Thus the user may establish the same type of telephone services over the circuit derived through the use of the LS multiplexers that he or she could by direct connection over a normal telephone pair. In other words, the EPORT-MLS multiplexer will not interfere, and will pass essentially unchanged, the signaling normally present in a standard telephone line connection. FXO to FXO connections are not allowed.

E&M – In this mode, the EPORT-MLS interfaces to the tie trunk port of a PBX, and provides a Type 1 E&M signaling interface. This is a logic level type interface, where typically the PBX places battery voltage on the M-lead to indicate an off-hook condition to the unit, and the EPORT-MLS in return, places a ground on the E-lead to indicate a busy condition to the PBX. The E&M interface of the EPORT-MLS is available on the eight wire modular jack marked "E&M", and provides for four-wire voice operation.

There are two modes of E&M operation. In normal mode the audio channel is always active and voice transmission can occur with or without M-lead control.

In M-input mode, analog voice transmission will occur only when the M-lead is driven to -48v with respect to E&M ground.

MIC-PTT – In this mode a Push-to-Talk Microphone (available from DCE) is connected to the front panel MIC port. The audio output at the far end is controlled by internal jumper J4 .

Resetting Factory Defaults

The factory default settings for the EPORT-MLS data and voice ports are as follows:

Network Port:
- Modem type Async
- Rate 57.6 Kbps

Data Port:
- Rate 9600 bps
- Parity None (8N1)
- Flow Control None
- Transmit Timer 10ms
- DCD to RxD holdoff 0 ms (DCD forced ON)

Voice Port:

Factory Default Gain Settings

Mode	Preamp	Input	Output
FXS	+0dBm	-3dBm	-3dBm
FXO	+0	-6	-6
PTT	+24	+0	+0
E&M	+0	+0	+0

Voice rate 3600 bps
Voice input FXS/FXO (jumper selectable)
Voice jitter delay 140 ms

Optional LAN Port:
IP: 192.168.0.1
Subnet Mask: 255.255.255.0

ID: EPORT-MLS

To reset the unit to factory defaults use the !R command from the setup menu. This will not affect the LAN Port settings. Other methods to reset to factory defaults are detailed in the troubleshooting section.

Internal Jumpers

There are several internal jumpers in EPORT-MLS. Only jumpers J4 and J6 are typically of interest to the EPORT-MLS user. To access the jumpers, remove the two screws from the front panel and slide the enclosure cover forward about three inches. The jumper functions are noted below.

J3 – 1,2 - Ties signal ground to chassis ground.
J4 – 1,2 - Audio out to E&M interface.
J4 – 2,3 - Audio out to AUDIO connector.
J5 – 1,2 - Forces the unit to factory default if off when unit is reset.
J6 – When set to the left, sets interface to FXS.
J6 – When set to the right, sets interface to FXO.

Telnet Setup

EPORT-MLS models contain a telnet configuration server that responds to telnet on port 8000. The telnet server is used only for ethernet setup, no voice configuration is performed via telnet. The default address is 192.168.0.1.

USB Configuration Port

Introduction

The USB Setup port is used to configure the EPORT-MLS for proper operation. This connection must be used to configure the EPORT-MLS network, voice and data ports.

Connections and Terminal Setup

Connection to the Setup port is through the USB port on the front of the EPORT-MLS. Use the USB cable provided to connect to a PC USB port. When connected, the EPORT-MLS will create a COM port on the PC. Use Hyper Terminal (or other terminal emulation software) to connect to this COM port. Set the PC for 57600, 8 data bits, no parity, one stop bit and no flow control. When connected, you should see:

Modem Lan Server (MLS) Vx.y

AT YOUR COMMAND >>

Using the Setup port Commands

To activate the Setup port press the <Enter> key. When you see **AT YOUR COMMAND >>**, the Setup port is active and ready for your commands. Type H <Enter> to display the command set.

The following Error Messages may be displayed if an incorrect command is typed.

Error Message	Meaning
What?	Invalid command entered.
Not allowed!	Illegal remote command entered.
Remote MLS did not respond!	Network link is down.
ERROR: No FXS/FXO (J6) jumper detected!	J6 jumper removed. See paragraph 4.2.

Help (H or ?)

COMMAND	LOCAL	PARAGRAPH
Config/Show:		
LAN CL	5.4.2	
Network	CN/SN	5.4.3
Port	CP/SP	5.4.4
Voice	CV/SV	5.4.5
Show Config	SC	5.4.6
Show Status	SS	5.4.7
Activity/Zero	AC/Z	5.4.8
ID	ID	5.4.9
Type	TY	5.4.10
Reset	RE	5.4.11
Load Defaults	!R	5.4.12
Connect Remote	CR	5.4.13
Test Tools	TT	5.4.16
Time	TI	5.4.14
Repeat Last Cmd	*	5.4.15
Help	H,?	5.4.1

This Help screen shows the choice of commands available. The commands allow you to display selected options and configure the EPORT-MLS. To leave a setting unchanged, press <Enter>. To return to AT YOUR COMMAND, press <Esc>.

Configure LAN (CL) – Ethernet option only

```
 EPORT-MLS LAN  V1.0g
--------------------------------
 Device Name: GW003E5A
 Physical Location: Head Office

 Configuration setup.

 [Press any key to continue]

 EPORT-MLS LAN Setup Menu
-----------------------------------
 1  Local LAN Configuration
 2  Remote LAN Configuration
 3  Security Configuration
 4  Configure Access
 5  Configure SNMP
 6  Display Config Summary
    Z  Zero Activity Counts
 7  Reset Configuration to Default
 8  Save and Exit
 0  Exit without Saving

Choose a Number =>
```

Use option 1 to change the LAN port IP address if required. After that you may use a web browser to configure the unit. See the Web Browser Configuration section for details.

Configure/Show Network (CN/SN)

```
Config Network
----------------------------
Network: ASYNC - 57,600 bps


New ASYNC or SYNC network? [A/S] >>
New rate? [4800 9600 19200 38400 57600 115200 230400] >>
```

To leave a setting unchanged, press <Enter>. Only the first two digits are required to select the rate. Use the SN command to display the settings without changing.

Configure/Show (Async) Port (CP/SP)

```
Config Port
----------------------------
Port rate: 9600 bps
Parity: NONE (8N1)
Flow control: NONE
Idle Timeout: 10 ms
DCD to RXD on holdoff:   0 ms (DCD FORCED ON)
RXD to DCD off holdover: - ms

New Rate? [1200 2400 4800 9600 19200 38400 57600] >>
New Parity? [NONE EVEN ODD] >>
New Flow Control? [RTS XON NONE] >>
New Idle Timeout? [0 - 250 ms] >>
New DCD to RXD Holdoff? [1 - 250 ms; 0=DCD ON] >>
New RXD to DCD Holdover? [0 - 250 ms] >>
```

Only the first two digits are required to select the rate.

The parity setting is for data using 8 data bits plus parity only. All 7 bit plus parity data should use the NONE setting, (7,N,1 is not supported).

Flow control options are RTS/CTS, XON/XOFF and NONE.

The Idle Timeout setting delays network transmission until an entire block is received from the terminal device. This insures data integrity and prevents fragmented blocks. Settings are from 0 to 250 ms. Default is 10ms.

DCD to RXD Holdoff can be set from 2 to 250ms. This is the time between Port DCD being asserted and data being sent out the port to the attached device. For example, if you are using a 202T modem off the data port, you may want to set the RXD holdoff to match the modem RTS/CTS delay and use the EPORT-MLS DCD signal to drive the modem RTS signal. When set to 0, DCD is forced ON.

If DCD is not forced on, the RXD to DCD Holdover delay may be set to a value between 0 and 250ms. This will hold port DCD on for the designated time after the port buffer empties. This can help insure that all data gets to the attached device.

Use the SP command to display the settings without changing.

Configure/Show Voice (CV/SV)

```
Config Voice
----------------------------
```

```
Preamp gain:  +0 dB
Input gain:   -3 dB
Output gain:  -3 dB
Voice rate:   3600 bps
Interface:  FXS
Jitter delay: 140 ms

New Preamp gain? [0 +6 +12 +24 dB] >>
New Input gain? [-9 -6 -3 0 +3 dB] >>
New Output gain? [-9 -6 -3 0 +3 dB] >>
New Voice rate? [2250 2400 3600 4800 6400 8000 9600 ADPCM PCM] >>
New Interface? [1=FXS 2=MIC-PTT 3=E&M] >>
Always off-hook on FXS interface? [Y/N] >>
New Jitter delay? [40 - 1000 ms] >>
```

The input voice waveform is amplified by the sum of the preamp gain and the input gain. The preamp gain provides a coarse setting while the input gain supports a finer adjustment.

The output voice waveform is amplified by the output gain setting.

Only the first two digits are required to select the rate. If the network rate is too slow to support the selected voice rate, a WARNING message will be displayed.

The always off-hook on FXS interface option provides a 2-wire E&M-like interface on the FXS port. That is, there is an open bi-directional audio channel at all times. No ringing is provided in this mode. This option is not available if the interface is strapped for FXO.

If the E&M interface is selected there is an option to use M-input to control transmit. In this mode, analog voice transmission will occur only when the M-lead is driven to -48v with respect to E&M ground(+).

More jitter delay means more buffered voice packets and increased end to end voice delay. Less jitter delay raises the possibility that the buffer will empty due to network multiplexing or radio delays, and audio glitches may be heard. Jitter delay is set in 20ms increments.

EPORT-MLS will perform an automatic reset at the end of the CV command.

Use the SV command to display the settings without changing.

Show Configuration (SC)

```
EPORT-MLS Config
------------------------
Network: ASYNC - 57,600 bps
```

```
Port rate: 9600 bps
Parity: NONE (8N1)
Flow control: XON/XOFF
Transmit timer: 10 ms
DCD to RXD on holdoff:   0 ms (DCD FORCED ON)
RXD to DCD off holdover: - ms

Preamp gain:  +0 dB
Input gain:   +0 dB
Output gain:  +0 dB
Voice rate:   3600 bps
Voice input:  FXS
Jitter delay: 140 ms

ID: EPORT-MLS
```

Show (Voice) Status (SS)

```
MLS Voice Status
------------------------
FXS interface enabled
FXS is on-hook

E&M input is on-hook
E&M output is on-hook
```

Activity(Counts)/Zero (AC/Z)

```
Activity Counts
----------------------------
Network TX out = 0
Network RX in  = 0
  RX Errors    = 0

Data TX in  = 0
  TX Errors = 0
```

```
  Overflow  = 0
Data RX out = 0

Voice TX in  = 0
Voice RX out = 0
  Underflow  = 0

Remote connects = 0

Local E&M off-hook count  = 0
Remote E&M off-hook count = 0

Counts were cleared 0 days, 0 hrs, 41 mins, 43 secs ago.
NOTE: Use Z command to Zero activity counters.
```

The Network TX out and RX in counts show the number of network blocks sent to the network and received from the network. RX Errors shows the number of network blocks received with a checksum error. If a block format error of some sort occurs before the checksum calculation, the block is discarded silently.

The Data TX in and RX out counts show the number of characters received from the DTE and sent to the DTE. TX Errors shows the number of TX characters with a framing error or overrun error. Framing errors may occur when the data port is set to the wrong serial data rate.

The Overflow count shows the number of times the serial input buffer has overflowed. Generally, overflow errors mean that the port is not set for the proper flow control or the DTE does not use flow control. When the buffer overflows, all buffered data is discarded.

Voice TX in and RX out shows the number of voice packets sent and received from the network.

The Underflow count is the number of times that the voice packet jitter buffer empties during an active voice session. This can occur if the network is interrupted or if network end to end delays vary widely. When the jitter buffer underflows, the MLS has no new voice packets to send to the decoder, and the result is a glitch in the recovered audio. When an underflow is detected, the MLS will stop sending voice packets to the decoder until the jitter buffer again fills above the jitter level.

Remote connects is the number of times remote control of the unit has been activated.

Counters show the number of times the local and remote voice port goes off-hook.

The elapsed time since the counters were last cleared is displayed. Use the Z command to zero the counters.

(Unit) ID

```
ID: EPORT-MLS
New ID? [16 char max] >>
```

Unit ID does not affect operation of the EPORT-MLS. It is provided for documentation purposes only.

Type (TY)

```
Type: Modem Lan Server (MLS)
Ver:  Vx.y  mm/dd/yyyy
Boot: Vx.y
ID:   MLS1

MLS up time: 0 days, 0 hrs, 46 mins, 41 secs
```

Reset (RE)

```
Reset MLS? [Y/N] >> Y
Wait for reset...

Analog Voice Adapter (MLS) Vx.y

AT YOUR COMMAND >>
```

Load Defaults (!R)

```
Load MLS default config? [Y/N] >> Y
Restored MLS default config.
Wait for reset...
```

```
Modem Lan Server (MLS) Vx.y

AT YOUR COMMAND >>
```

Connect Remote (CR)

```
AT YOUR COMMAND >> CR
Connect to remote MLS...
CONNECTED to remote MLS
-----------------------

Modem Lan Server (MLS) Vx.y
REMOTE COMMAND [EXIT to disconnect] >>
```

While this connection is active, the normal AT YOUR COMMAND prompt is replaced with the REMOTE COMMAND prompt. Most MLS commands can be entered and are transmitted to the remote MLS. This allows configuration and testing of the remote unit.

The following commands are not allowed in remote mode and, therefore, are not displayed on the remote Help menu: CR, CN, RTD and !R.

If the EXIT command is not issued, the connection will time out in 30 seconds and return to the local AT YOUR COMMAND prompt.

```
REMOTE COMMAND [EXIT to disconnect] >> EXIT
Disconnect remote MLS...
Remote MLS DISCONNECTED
AT YOUR COMMAND >>
```

Time (TI)

This command displays the MLS up time. That is, the elapsed time since the unit was last reset.

Repeat Last Command (*)

To repeat the last command, simply press the * key. This is handy for repeating screens of constantly changing data.

Test Tools (TT)

COMMAND	LOCAL	PARAGRAPH
Monitor Data Port:		
RX/TX	MR/MT	5.4.17
RX/TX in HEX	MRH/MTH	5.4.18
Show RS232 SR		5.4.19
Round Trip Delay	RTD	5.4.20

Monitor Data Port RX/TX (MR/MT)

```
Monitor data port: RX - Press ESC-ESC to quit.MT
Monitor data port: RX TX - Press ESC-ESC to quit.
Stop port monitor
```

MR monitors data received on the network going out of the data port. MT monitors data coming into the data port being sent out the network port. Both commands can be active at the same time. The data on the screen will be tagged at [RX] or [TX] as it is displayed. Press the <Esc> key twice to exit the command.

Monitor Data Port in HEX (MRH/MTH)

MRH and MTH work the same as MR and MT except the data are displayed in HEX.

Show RS232 (SR)

```
Data Port RS232: RTS(8)-HI  CTS(7)-HI  DTR(3)-HI  DCD(2)-HI
DSR(1)-HI
```

This command displays the current state of the data port RS232 control leads.

Round Trip Delay (RTD)

```
Measure Round Trip Delay...
Round Trip Delay is 2 ms.
```

This command measures the round trip delay between the local and remote MLSs. The delay is rounded to the nearest 1ms and cannot be 0.

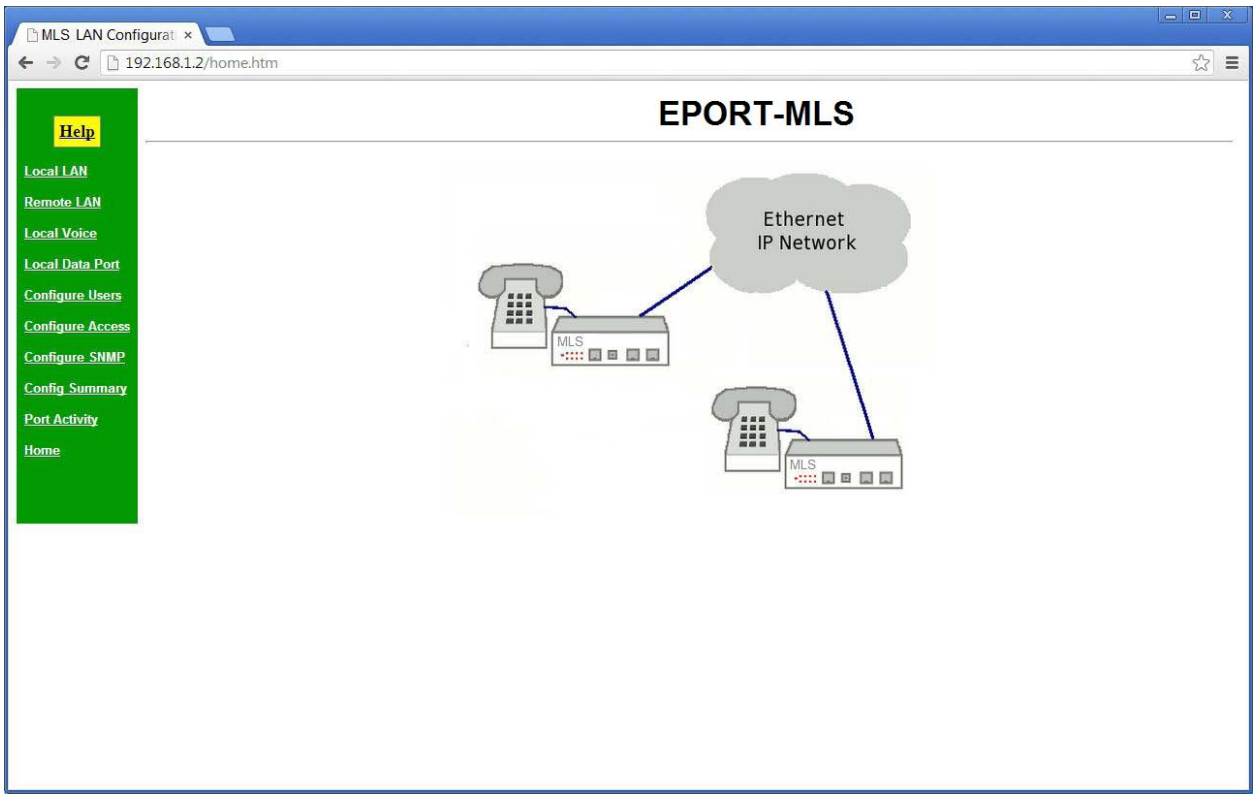
Chapter 4
Web Browser Configuration

This Chapter describes configuration screens and some configuration hints.

Overview

The MLS-E is most commonly configured using forms displayed on a web browser. In this chapter, we illustrate all entry forms, and describe their use. Familiarity with IP and related information is required before you can configure any ethernet product. The workstation and MLS-E must have IP addresses on the same LAN subnet. If they aren't, use the USB or serial cable configuration to configure the MLS to reside on the IP address subnet of your workstation.

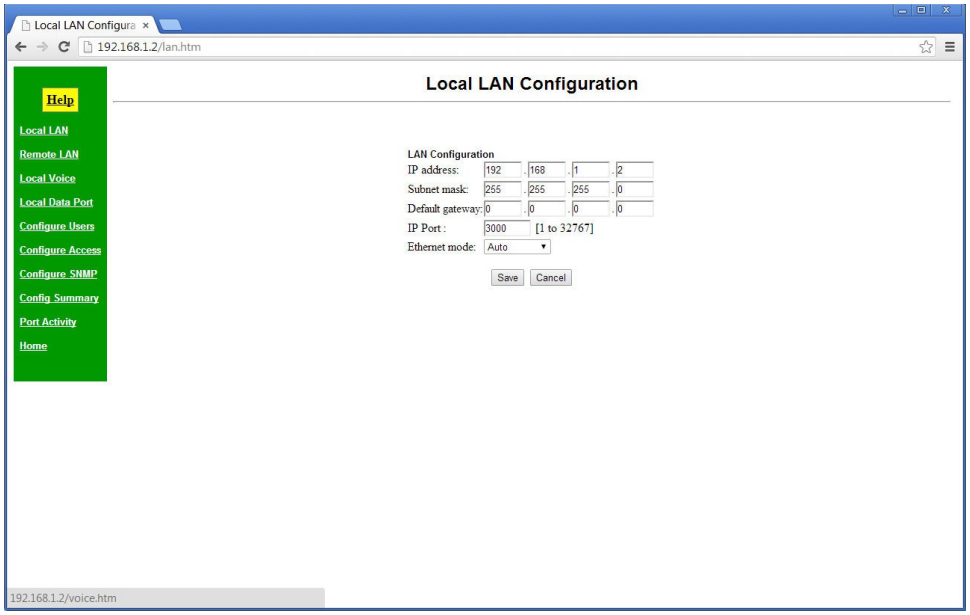
All configuration screens are accessed from the main index screen shown below. They are divided into sections with only one layer of screens below the top level.



Main Screen

From this index, click on a menu keyword to open the appropriate screen. In this manual, screens are discussed in the order shown on the index screen.

Local LAN



Local LAN Configuration Screen

The LAN interface must be configured correctly to match the network it's connected to.

Fields

LAN-1 (Trusted)

- IP Address
  The IP address of MLS on your LAN. The default IP Address is 192.168.0.1 ss.

- Subnet Mask
  A subnet mask is a bit mask applied against the IP address. It specifies which portion of the IP address is the subnet identifier and which portion is the host identifier. For example, many subnets have a mask of 255.255.255.0. This means the first 24 bits of the address is the subnet identifier and the last 8 bits is the host identifier.

- Default Gateway

  The Gateway specifies the address of the gateway router on the local subnet. Packets destined for a host not on the local subnet are forwarded to the gateway router. If your LAN uses a router, enter the IP Address of the Router. Otherwise, leave this value set to 0.0.0.0
  globally unique.
  This field is not used if DHCP Client has been enabled. The DHCP server will assign the IP address.

- Subnet Mask
  A subnet mask is a bit mask applied against the IP address. It specifies which portion of the IP address is the subnet identifier and which portion is the host identifier. For example, many subnets have a mask of 255.255.255.0. This means the first 24 bits of the address is the subnet identifier and the last 8 bits is the host identifier.

  This field is not used if DHCP Client has been enabled. The subnet mask will be assigned by the DHCP server.

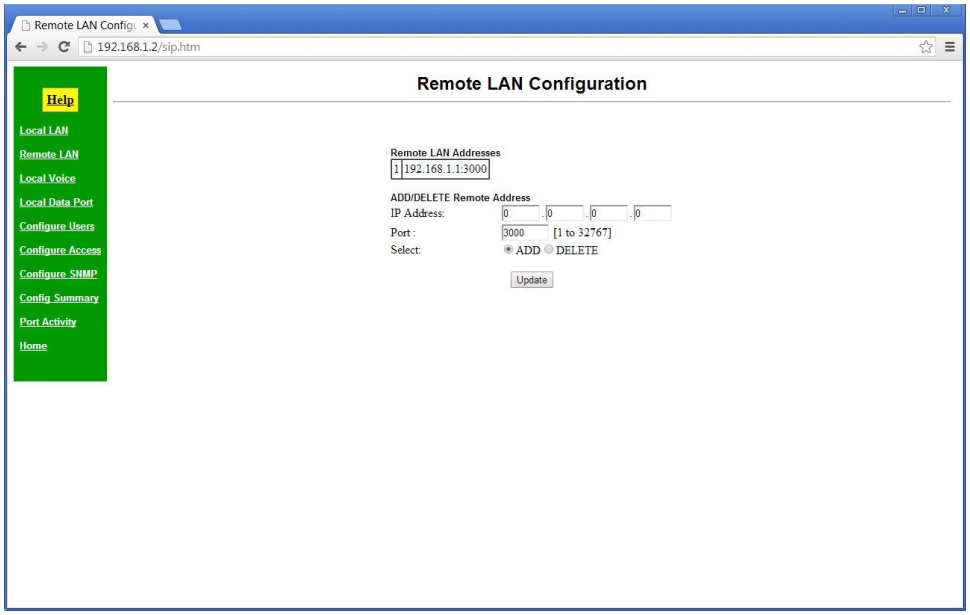
- IP Port

Select any desired IP port. All MLS units must use the same IP port.

- Ethernet Mode
  This option allows you to control the Ethernet speed and duplex. In **Auto** mode, the Ethernet controller will automatically negotiate the speed and half/full duplex with the connected device. This is the preferred setting. However, for compatibility reasons you may need to force operation to one of the other settings. Make sure the connected device supports the mode you select. Keep in mind that hubs do not support full-duplex operation.

Notes

Remote LAN



Remote LAN Configuration Screen

This is the IP address for each remote MLS this unit will communicate with. Up to 5 remote IP addresses can be stored. If you do not enter any remote IP addresses, this unit will transmit packets to the last IP address from which it received packets.

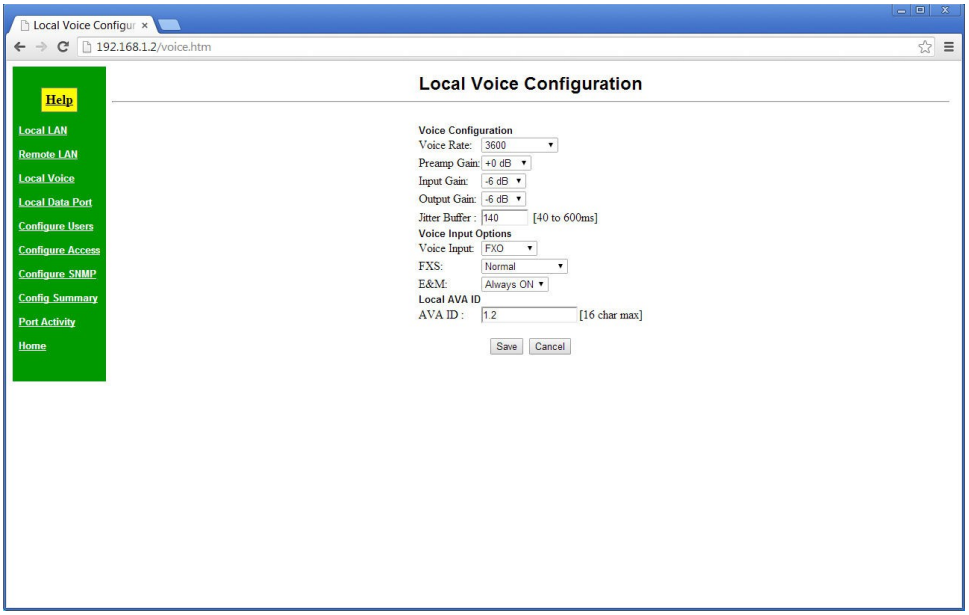
Fields

- ADD/DELETE IP Address
  The IP address of an MLS on your LAN.
- Port
  Select any desired IP port. All EPORT-MLS units must use the same IP port.
- Add / Delete
  Select the operation to add a new address or delete an existing address.

Notes

- More than one IP address should be used only in broadcast applications or with M-controlled E&M audio transmission.

Local Voice



Local Voice Configuration Screen

Voice configuration values must match the other EPORT-MLS units with which it communicates. As with all voice telecommunication networks, there is no set rule for the various gain values; they are installation specific and are usually compromises to obtain the highest quality voice with adequate levels and without excessive echo.

Fields

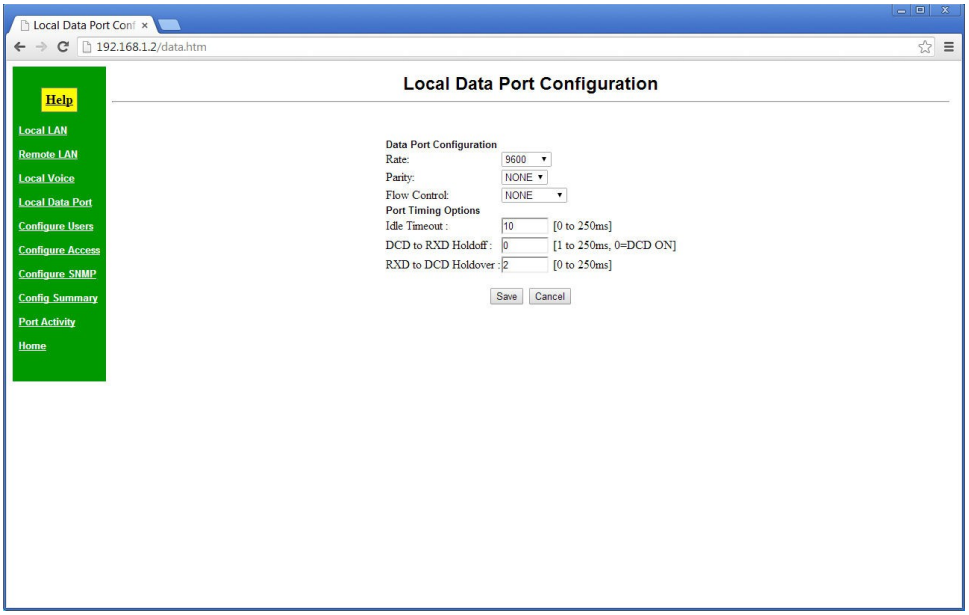
- Voice Rate
  Digitization rate for the audio to digital conversion. The local and remote MLS voice rate setting must be identical.
- Preamp Gain
  Set the audio preamp gain level. The default depends on the voice input.
- Input Gain
  Set the audio input gain level. The actual audio input gain is the sum of Preamp Gain and Input Gain. The default depends upon the voice input.
- Output Gain
  Set the audio output gain level. The default depends upon the voice input.
- Jitter Buffer
  The Jitter Buffer is a delay added to the audio sample to accommodate delays in the network. The default value is 140 ms. The value entered is converted to an integer multiple of 20 ms.
- Voice Input
  Select the MLS audio input. Available options are FXO, FXS, MIC-PTT, and E&M. Some settings require internal jumper changes.

- FXS Options
  Options are *Normal* and *Always off-hook*. When the FXS input is selected, this option forces the input off-hook continuously. Default is *Normal*, where off-hook is controlled by the connected telephone device.
- E&M
  When the E&M input is selected, this option enables the M input signal to control audio transmission when set to *M-control*. Default is *Always ON*, where E&M is always transmitting audio.
- MLS ID
  The ID name of the local EPORT-MLS unit. 16 characters maximum length.

Notes

- Voice configuration values often require adjustment for best voice quality, adequate volume, and minimum echo. Jitter buffer adjustments are required to eliminate audio gaps or noise when packet transit times are inconsistent.

Local Data Port



Local Data Port Configuration Screen

There is a single RS-232 asynchronous port on each EPORT unit. These are tunneled together

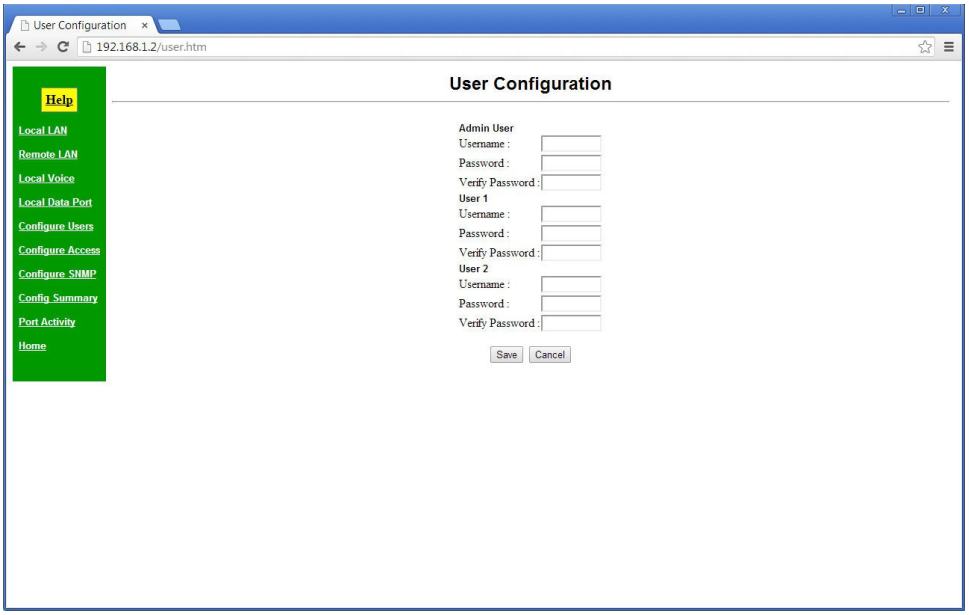
Fields

- Rate
  Select the proper data rate. Valid options are 1200, 2400, 4800, 9600, 19,200, 38,400, and 57,600 bps. Default is 9600 bps.1
- Parity
  Select the desired parity. Valid options are none, even, and odd. Default is NONE.
- Flow Control
  Select the desired flow control. Valid options are RTS, Xon/Xoff, and NONE. Default is NONE.
- Idle Timeout
  The Idle Timeout setting delays network transmission until an entire block is received from the terminal device. This insures data integrity and prevents fragmented blocks. Settings are from 0 to 250 ms. Default is 10ms. If changed from the default, this is normally configured to be 3 or 4 character times at the selected data rate.
- DCD to RxD Holdoff
  The DCD to RXD Holdoff can be set from 2 to 250ms. This is the time between Port DCD being asserted and data being sent out the port to the attached device. For example, if you are using a 202T modem off the data port, you may want to set the RXD holdoff to match the modem RTS/CTS delay and use the MLS DCD signal to drive the modem RTS signal. When set to 0, DCD is forced ON.
- RXD to DCD Holdover
  If DCD is not forced on, the RXD to DCD Holdover delay may be set to a value between 0 and 250ms. This will hold port DCD on for the designated time after the port buffer empties. This can help insure that all data gets to the attached device.

Notes

- In most installations, the default values are adequate if the asynchronous device operates at 9600 bps.

Configure Users



Configure Users Configuration Screen

User names and passwords may be used to restrict administrative access to the device. Three users are defined. One user is considered the Administrative user and has full acces to the device. The other two users are restricted users and may only view the configuration. If all Usernames and Passwords are blank, this feature is disabled.

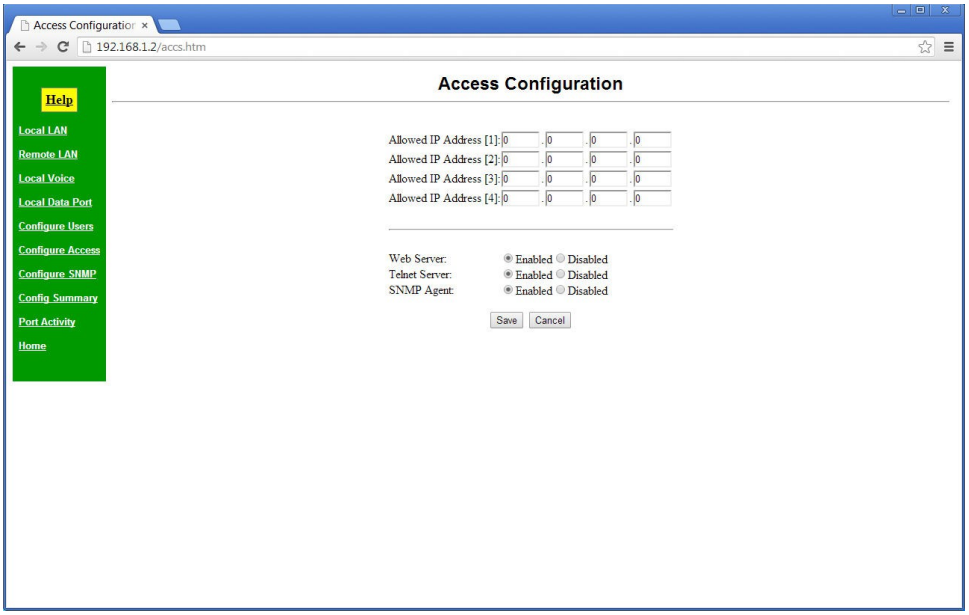
Fields

- Username
  The username may consist of 1 to 8 printable ASCII characters. A space character may be used if it is not the first or last letter of the string.
- Password
  Configure a password for the user. The password may contain any printable ASCII characters.
- Verify Password
  The password must be entered twice to verify it was entered correctly.

Notes

- This unit uses HTTP basic authentication. It is not a high security device.

Configure Access



Access Configuration Screen

Access to EPORT-MLS configuration may be restricted by IP address.

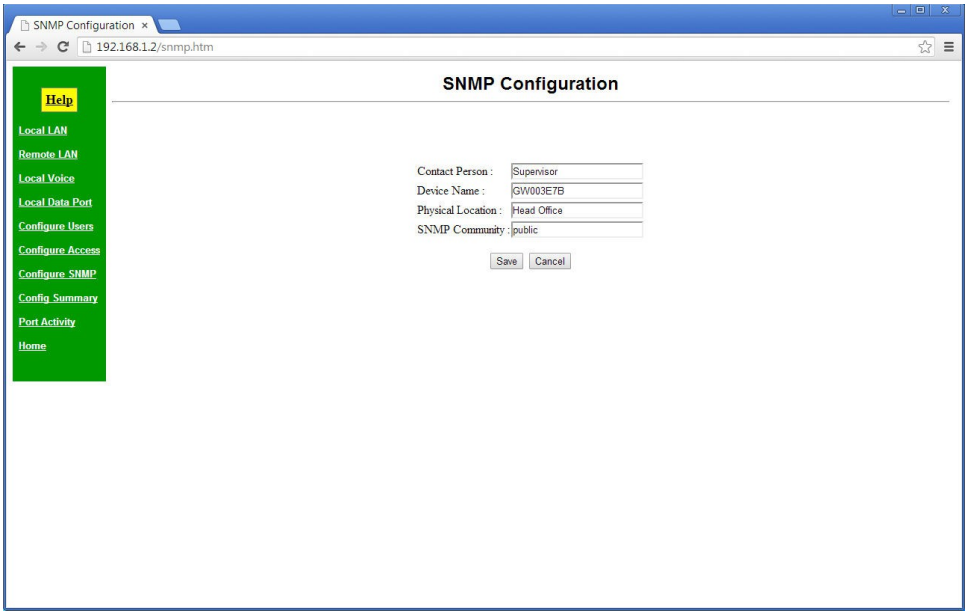
Fields

- Allowed IP Address
  Enter the IP addresses of the workstations which you wish to have access to the device. If these are left at the default of 0.0.0.0, all workstations have access.
- Web Server
  Enable or disable the web server configuration screens.
- Telnet Server
  Enable or disable the telnet configuration server.
- SNMP Agent
  Enable or disable the SNMP agent.

Notes

-

Configure SNMP



SNMP Configuration Screen

These are text fields, commonly used in SNMP (Simple Network Management Protocol) programs to identify this device when browsing the network. These values have no effect on MLS's operation and the limited SNMP functionality is meant only to provide an indication that the EPORT-MLS unit is on-line.

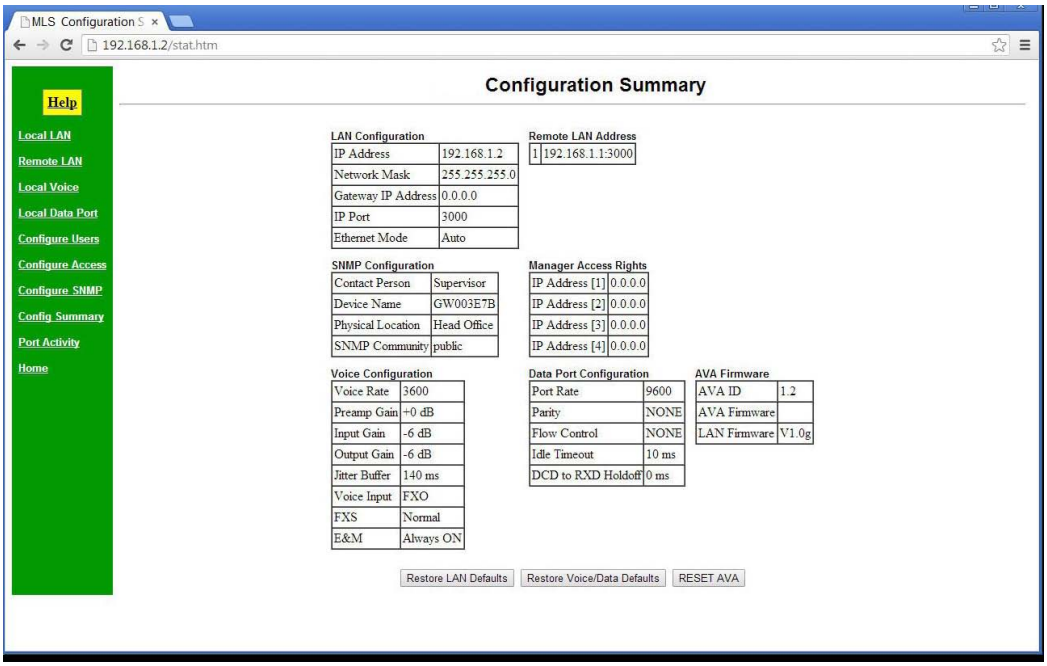
Fields

- Contact Person
  A text field that can be used to store the name of the person responsible for this EPORT-MLS unit.
- Device Name
  A descriptive name for this EPORT-MLS
- Physical Location
  This field can be used to store the location of this EPORT-MLS unit.
- SNMP Community
  This field is used to set the SNMP community name. Only one community name is supported. Access is limited to read-only.

Notes

- Limited SNMP functionality is provided to allow SNMP managers to determine the MLS is active.

Configure Summary



Configuration Summary

This screen displays all configuration values of the EPORT-MLS. Click buttons provide a method to reset the unit to defaults.

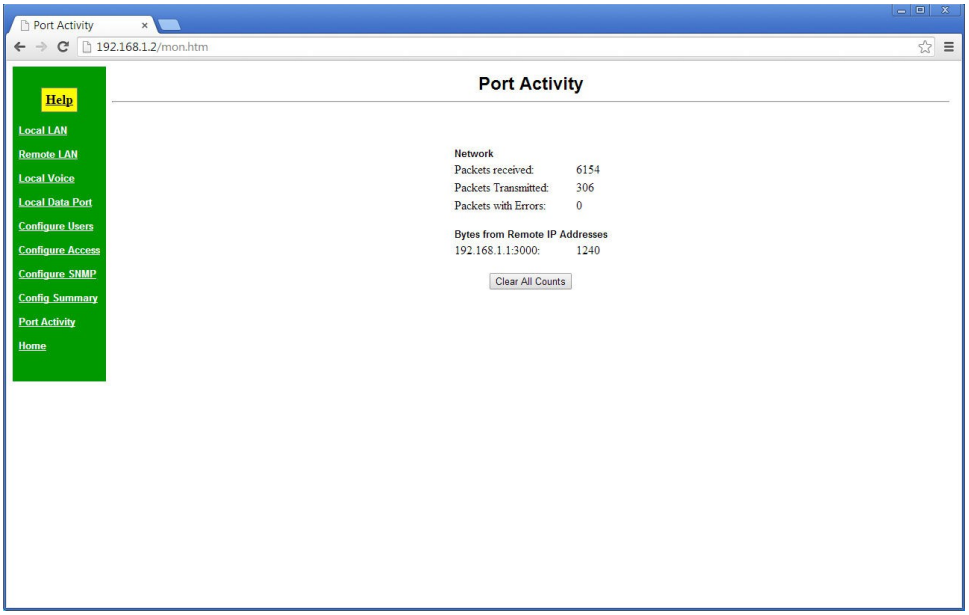
Fields

- Display Fields
  The entire configuration is visible on this screen. Fields are described in the appropriate configuration section.
- Restore LAN Defaults
  Clicking the *Restore LAN Defaults* button will restore the LAN default settings.
- Restore Voice Data Defaults
  Clicking this button will restore the LAN default settings.
- RESET EPORT-MLS
  Clicking this button will reset the EPORT-MLS. No settings are changed. This is equivalent to a power cycle.

Notes

-

Port Activity



Port Activity Screen

This screen displays counters for packets and bytes received over the network.

Fields

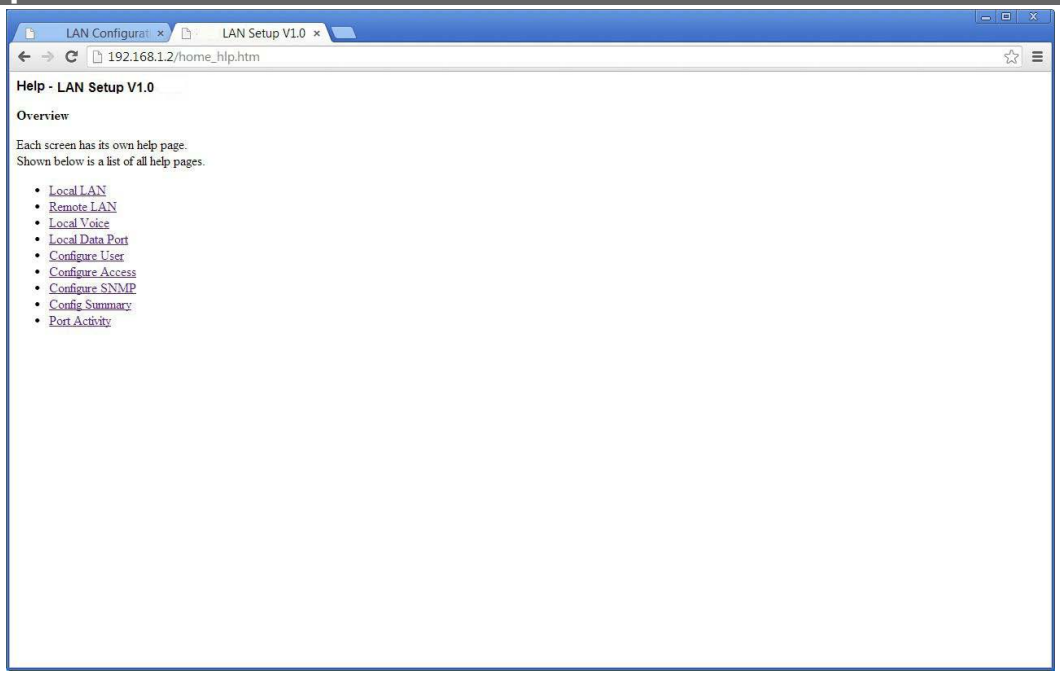
- Packets Received
  The number of packets received by EPORT-MLS from the ethernet interface.
- Packets Transmitted
  The number of packets transmitted by EPORT-MLS to the ethernet interface
- Packets with errors

  Number of packets transmitted or received by the EPORT-MLS through the LAN connection that contained errors.
- Bytes from Remote IP Addresses
  The number of bytes received by EPORT-MLS from the listed IP addresses.

Notes

- The values shown include management packets as well as data or payload packets. Even with no voice or data transmission, the counters increment with web browser screen refresh transmissions.

Help Screen



Help Menu Screen

There is a context sensitive help screen for each configuration screen available by clicking on the HELP button on individual configuration screens. Clicking the HELP button on the main menu screen returns this help menu screen.

Fields

- Hot links
  Links to each configuration section help screen.

Notes

-

Chapter 5
Troubleshooting

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

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

Hardware Problems

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

***P*:** All the LEDs are off.
S: Check the power supply or power connection.

P: When using 10/100/1000Base-T cabling, the unit does not work.
S: Check the switch or hub's link LED for the port to which the bridge is connected. If it is off, make sure the network cable between the bridge and hub is in good condition.

Can't Connect via the LAN

***P*:** Can't connect with a Web Browser.
S: Check the following:

- Insure that you are addressing the EPORT-MLS correctly. Check IP addressing.
- Start troubleshooting from a known state. Power all equipment OFF and ON to reboot.
- Is a proper IP address configured in the PC?
- "Ping" the unit to see if it responds. From the Windows command prompt or "Run" dialog box, use the command:

  `ping IP_Address`

  Where `IP_Address` is the IP Address of the unit (e.g. `ping 192.168.0.1`). If it does not respond, then check all LAN connections. If the LAN connection are OK, the problem is in the LAN addresses or routing **The most common problem cause is incorrect IP address configurations. Make sure the workstation and EPORT-MLS have compatible IP addresses.**
- It may be that your "ARP table" contains invalid entries. You can clear the "ARP table" by rebooting, or, on Windows, by typing the following command at the command prompt or *Run* dialog box.: `ARP * -d` **. This is a common problem with test-bench setups.**
- EPORT-MLS is meant to be connected to a hub or ethernet switch. If connected directly to a PC, anethernet crossover cable may be required.
- In some cases, "smart" hubs and switches must be power-cycled to clear their internal ARP cache. This **is often a problem on test bench setups where IP addresses are moved between different equipment or a unit is moved between ethernet switch receptacles.**

Voice Problems

Each installation is unique. There are configurable voice parameters that can be tuned to maximize the quality of transmitted audio. Remember, most audio configuration values are compromises, so some experimentation may be required to obtain optimum settings.

***P*:** Too much echo.

S: On any link with delay that gets above 100 ms or so, the 2-wire to 4-wire conversion echo becomes noticeable. The MLS has echo cancellation, but with that much delay, one has to be more picky about setting the voice transmit and receive levels. "That much delay" is the digitization of the MLS plus the transmission path turn around. The transmission path delay is likely the largest component of the delay.

The same issue comes up with all VOIP applications. One has to work with the levels to get the echo down to where it is either not heard any more or so low that it is ignored by the caller.

Excessive echo is usually present when audio levels are higher than need be. Lower the levels one step at a time. Eventually there should be a good talk level found where the echo fades far into the background, but the talk level is sufficient for normal conversation.

P: E&M Interface Control Lead Problems

S: The "M" lead is the input on pin 7 of the E&M interface. With a -48 VDC in on pin 7, with the + side of the 48 volts on pin 8, ground of the RJ45 interface, the M lead relay is activated. At the far end MLS, pin 2, the "E" lead relay closes. If testing with a VOM between pin 2, the E lead, and pin 1, ground, it shows that the circuit between 2 and 1 goes from open to closed. The input side, M lead, is a mechanical relay. The E lead output is solid state.

The M lead relay is 48 volts. It is activated by a voltage of at least 38 volts. The holding voltage is 4 volts or more. There are a number of relays available at different voltages available as factory options, such as 24 volts, 12 volts, 9 volts, 6 volts, 5 volts.

Other Problems

***P*:** Can't run the initial configuration program using a serial or USB cable connection.
S: Check that:

- The communication parameters are set properly.
- Power is available... an LED is on.
- The terminal program is operating properly. For a serial connection, try a loopback connector at the bridge end of the cable to verify program operation and the proper COM: port.
- With USB connections, it's common for Windows to assign a new COM: port number with each new start up or when plugging the USB cable into the PC.
- The most common problems causing this symptom are incorrect RS-232 wiring or the Windows Hyperterm program not operating correctly.

How To Return To Factory Defaults

- If the browser configuration interface is available, click the "Restore LAN Defaults" and the "Restore Voice?Data Defaults" buttons on the *Configuration Summary* screen.
- If the telnet (port 8000) or serial configuration interface is available, select *option 7 Reset Configuration to Default*.
- Set internal jumper J5 to 1,2 to force the unit to factory default when it is reset or power cycled.

Chapter 6

Interfaces and Cables

This chapter describes electrical interfaces and commonly used cable connections.

Cables

Commonly used cable connections.

Ethernet Cables

Use any commercially available 10/100BaseT cable. If using 100BaseT or 1000BaseT, an appropriately rated cable is required.

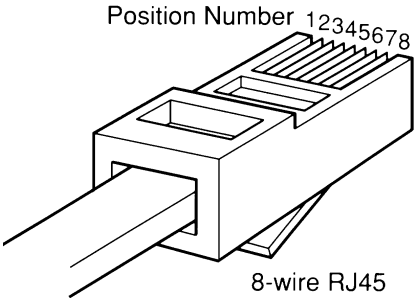
Ethernet Crossover Cable

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

Use the following pinout to build an ethernet crossover cable:

UT		PC
RJ-45		RJ-45
PIN		PIN
1	-	3
2	-	6
3	-	1
6	-	2

RJ45 Pin Reference



RJ45 Plug Positions

Port Interface

Network Port (RJ45)

Pin	Signal	In/Out
1	Receive Clock	IN
2	Transmit Clock	IN
3	Data Carrier Detect	IN
4	Signal Ground	
5	Transmit Data	OUT
6	Receive Data	IN
7	Request to Send	OUT
8	Clear to Send	IN

ASYNC Data Port (RJ45)

Pin	Signal	In/Out
1	Data Set Ready	OUT
2	Data Carrier Detect	OUT
3	Data Terminal Ready	IN
4	Signal Ground	
5	Receive Data	OUT
6	Transmit Data	IN
7	Clear to Send	OUT
8	Request to Send	IN

LAN Port

Pin	Signal	In/Out
1	Data (Tx+)	OUT
2	Data (Tx-)	OUT
3	Data (Rx+)	IN
6	Data (Rx-)	IN

Voice Port Interfaces

FXS/FXO (RJ11 600 ohm)

Pin	Signal
3	Tip
4	Ring

E&M (RJ45)

Type 1, Side A, 600 ohm

Pin	Signal	In/Out
1	E&M Ground	
2	E lead	OUT
3	Audio	IN
4	Audio	OUT
5	Audio	OUT
6	Audio	IN
7	M lead	IN
8	E&M Ground	

MIC/PTT (RJ45)

Pin	Signal
1	Signal Ground
2	Signal Ground
3	Not Used
4	Audio Ground
5	Not Used
6	Mic Audio In
7	Not Used
8	PTT In

Cables

Network Port to Modem

A two foot composite to modem cable is included with each MLS. The pinout is as follows:

MLS RJ45	Modem DB-25P
1	17
2	15
3	8
4	7
5	2
6	3
7	4
	20
8	5

Network Port to Wireless Modem

This cables connects the MLS network port to a DCE wireless modem.

MLS RJ45	DCE-115 DE-9P
1	
2	
3	6
4	5
5	3
6	2
7	4
8	8

Configured as DTE

MLS RJ45	Computer DB-25
1	6
2	8
3	20
4	7
5	3
6	2
7	5
8	4

Configured as DCE

MLS RJ-45	Computer DB-25
1	20
2	NC
3	6, 8
4	7
5	2
6	3
7	4
8	5

Data Port to a PC Com Port

MLS RJ-45	PC DB-25S		PC DE-9S
1	6	or	6
2	8	or	1
3	20	or	4
4	7	or	5
5	3	or	2
6	2	or	3
7	5	or	8
8	4	or	7

Crossover Cable

This is for back-to-back bench testing using the asynchronous network port.

MLS Network RJ-45	MLS Network RJ-45
3	7
4	4
5	6
6	5
7	3

E&M Port to Analog Modem

E&M Port to Analog Modem (PCM or ADPCM)

E&M RJ45	Modem RJ11
3	3
4	2
5	5
6	4

RMA PROCEDURE

Before returning any DCE product, an RMA number must be obtained. Before asking for an RMA number, ascertain that the product was purchased from DCE. If you bought the product from a Distributor or Systems Integrator, the product should be returned to that vendor.

The most convenient method to obtain an RMA authorization for a product purchased from DCE is to submit a request by fill in the form from www.data-connect/returns.htm. Information required must include

-Company name
-Address (including any Mail Stop or specific delivery information)
-Name, contact information, and e-mail address for the technical contact(s) at your company

If the above information is on your letterhead, that format is acceptable.

For each item you wish to return, please include:

-The product model number (usually found on the serial number tag)
-The serial number for each item you wish to return
-A description of the problem you are encountering
-The cause of the problem (if known)

A product support specialist may call to verify that the product is properly installed or may ask you to perform tests to insure that the product has actually failed. After reviewing the problem, DCE will assign an RMA number and you will be notified by email or FAX.

The product must be properly packed and returned to:

Data Connect Enterprise.
3405 Olandwood Court,
Olney, MD 20832
Attn: RMA Technical Support

The RMA number must be legibly displayed on the shipping carton. No RMAs will be issued without a product review. DCE will not be responsible for any product returned without an RMA number.

If you believe the product may be out of warranty, include a method of payment for repairs (either a Purchase Order number or credit card number), card holder name, date of expiration on the RMA request. Repairs currently require 5 working days and are returned UPS second day air.

Contact us by e-mail mspellerberg@data-connect.com or call 301.924.7400 x25 if you should have any questions.

Appendix A

Specifications

MLS-E Specifications

- Data Port

Port Speeds

Asynchronous only

300, 1,200, 2,400, 4,800, 9,600, 19,200, 38,400 or 57,600 bps

Port Rate Selection
Selected through setup port.

Data Format

10 bits/character, 1 start, 1 stop, 8 data (including parity)

Interface

CCITT V.24, RS-232D, implemented in RJ-45, 8 position connectors. (RS-561 standard physical pin-out used on RJ-45 connectors)

- Network Port
Full Duplex

Speed

Synchronous up to 256 Kbps

Asynchronous from 4800 to 230,400 bps

Interface

RS-232D, implemented in RJ-45, 8 position connector

- Ethernet Port
10/100BaseT Autosensing or selectable
- Voice Interface

Type: FXS, FXO, E&M or Push-to-Talk

Rate: 2250 – 9600 bps

Preamp Gain: 0, +6, +12 or +24 dB

Input Gain: –9, –6, –3, 0 or +3dB

Output Gain: –9, –6, –3, 0 or +3dB

Jitter delay: 40 to 1000 ms (20ms increments)

- Audio Interface

2-wire terminal block for connection of 8 ohm speaker