SE 6600R

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March 19, 2017
Firmware Version: 2.x

1. DESCRIPTION

The SE 6600R is an industrial rated serial data encryption device featuring two serial ports, a device port and a network port. The SE 6600R uses AES 256-bit encryption, 128-bit block size. AES is the US Government standard, selected using an open selection process, to replace DES and 3DES encryption.

The SE 6600R provides an encrypted link between host and remote user sites. The two RS 232 serial ports operate at asynchronous speeds as low as 1200 bps and as high as 57.6 Kbps. The SE 6600R serial interface can be RS 232 or, 4-wire or 2-wire RS 485.

The SE 6600R may be used point-to-point, linking two separate remote sites with radios, leased lines or dial connections, one port used for the composite, the other port for the user equipment. The SE 6600R can also be used on point-to-multi-point links. The SE 6600R is especially attractive for use over multi-point radios where data privacy is desired.

The SE 6600R has a bypass mode (Block Mode Clear) for use during initial installation. When installing in a large multidrop network, it is desirable to have the remote units not encrypt data until the host unit is installed. This makes the scheduling of installation less critical, as the initial remote installation will not disable the drop if a host unit is not yet in service. The remote unit is temporarily just a bump in the serial cable.

The SE 6600R is straight-forward, easy to configure and maintain. Units can be configured via a serial port, or using the Ethernet port, via telnet or a web browser. The SE 6600R has the features you want without the complexity.

FEATURES

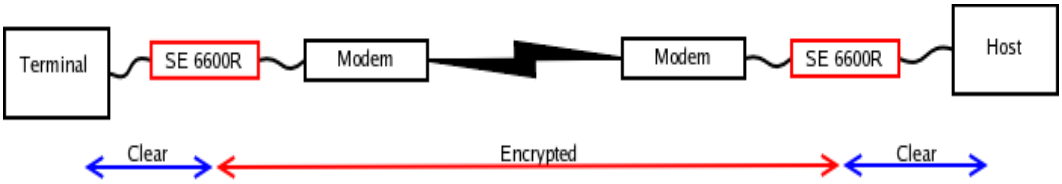
- RoHS compliant.
- Supports standard baud rates from 1200 to 57600.
- Software selectable RS232 and RS485 4/2-wire interfaces. May be used as a RS232 to RS485 converter.
- Pass through of two input and two output control signals when used in RS232 mode.
- Ethernet interface for easy to use web based setup. Telnet and serial setup modes also available.
- 9v – 30v DC power (120VAC power supply included)
- 120VAC and 240VAC power supplies available (specify country)
- 48VDC and 125VDC power supplies available
- -40° to +75°C operating temperature range

APPLICATIONS

NOTE
The Clear Text side of the SE 6600R is Port 1. Port 2 is the Encrypted side.

Point-to-point modem connections (dial-up, leased-line, cellular, radio, etc)

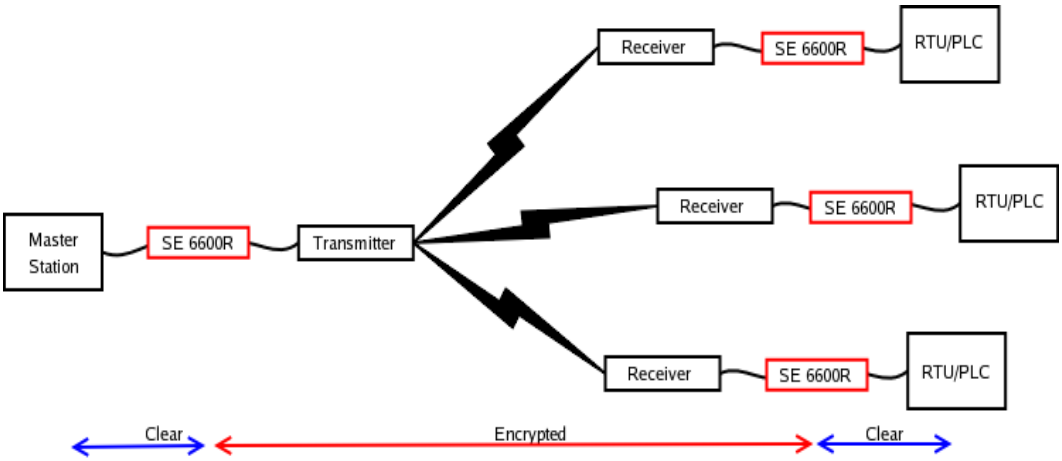
The SE 6600R may be used in modem applications where the SE 6600R is placed between the data source and the modem.



If dial-up modems are used, the modems must be able to dial and connect by themselves. There is no provision for the SE 6600R to issue (or pass through) a dial command to the modem

SCADA polling applications

The SE 6600R may be used in point-to-multi-point polling applications.



INAPPROPRIATE APPLICATIONS

The SE 6600R should not be used in applications where the SE 6600R is relied upon for data integrity or user authentication. The SE 6600R is strictly an encryption device providing data privacy. Garbage in will result in garbage out.

The SE 6600R should not be used in streaming data applications or touch-type terminal applications. It is intended for block oriented polling protocols such as Modbus and DNP3.

SE 6600R Front View

SE 6600R Rear View

2. SPECIFICATIONS

2.1 General

Two asynchronous RS232 ports

- DE-9P (PC-9pin) connectors, DTE interface
- Speeds to 57.6 Kbps full or half duplex
- Can be configured via RS232 serial port, or via Ethernet port for telnet or web browser management

Protocol Features

- 256-bit AES encryption
- 128-bit blocks
- Block Cipher – Cipher feedback mode

2.2 Environmental

- Operational Temperature: -40 to +75 C
- Storage Temperature: -50 to +75 C
- Humidity: <95% Non-condensing

2.3 Physical / Electrical

- Power requirements: 9 to 30 VDC (2 watts)
- 48, 125 VDC and 240 VAC options are available
- Supplied with 120 VAC power supply

- 4 ¼" wide x 3" long x 1" high
- Weight: 7.5 ounces

2.4 Setup Commands

Cipher Configuration
Serial Port Configuration
LAN Configuration
Display Configuration Settings
Reset Configuration to Default
Save and Exit
Exit without Saving

3. INSTALLATION

3.1 Unpacking

The following is included with each unit:

- Unit and external power supply
- Cable for connection to a PC for initial configuration
- Manual CD
- Information regarding warranty, maintenance contracts and repair

3.2 Setup

The SE 6600 must be properly configured before use. See Section 5 for connection and configuration information.

3.3 Connections

The RS-232 serial ports on the SE 6600 are configured as Data Terminal Equipment (DTE). This is the same configuration used on PC COM ports. To connect the SE 6600 to peripheral equipment, use the same cable that would be used to connect that equipment to a PC COM port.

3.4 Using Block Mode Clear

In a multi-drop network it may be desirable to install the remote units configured for "Block Mode Clear". In this mode, the SE 6600 is just a bump in the cable. The Encrypting LED will be OFF.

When ready to enable encryption, install the host end SE 6600 and use the Cipher Configuration option 3, "Signal remotes to switch to Block Mode Cipher", from the serial or Telnet setup menu. If using HTML and a browser, click on the red "Enable Block Mode Cipher" button.

3.5 Default Configuration

The factory default settings for the SE 6600R are as follows:

IP Address: 192.168.1.1
Serial Ports: RS-232, 9,600, 8,N,1
Encryption: Enabled
Ethernet Mode: Auto

To reset the unit to factory defaults perform the following steps:

1. Depress and hold the SETUP switch.
2. Apply power to the SE 6600R.
3. Continue holding the SETUP switch until the RUN indicator begins flashing.
4. Release the SETUP switch and wait for the unit to reset.
5. When the RUN indicator comes on solid, the unit is set to factory default.

4. CONTROLS AND INDICATORS

4.1 Controls

A pushbutton switch to invoke serial port setup is accessible through a small hole on the rear of the unit. Use a paper clip to press the switch.

4.2 Indicators

Indicator	Condition	Meaning
LAN	Yellow	10 MB LAN connection
	Green	100 MB LAN connection
DCD On	ON	COM 2 DCD is ON
Run	ON	Unit has power and is working properly
	Flash	Serial Setup Mode active
Encrypting	ON	Encryption is enabled
Com1 Tx	ON	Serial data out COM 1
Com2 Tx	ON	Serial data out COM 2

5. CONFIGURATION & MANAGEMENT

5.1 Introduction

Initial setup of the SE 6600R is accomplished using serial port Com1. After initial configuration, a web browser or Telnet connection may be used if the unit was configured for LAN operation.

5.2 Connections and Setup

The SE 6600R can be set up through serial port Com1. Connect a PC to serial port 1 using the cable provided. If an asynchronous terminal is used, a null modem cable is required

Use an asynchronous terminal or a PC using a communications program such as HyperTerminal. Set the terminal to 9600 bps, 8 data bits, no parity, 1 stop bit, and no flow control.

Press the Setup switch through the hole in the rear of the case. Pressing the switch will bring up the following screen:

5.3 Serial Mode and Telnet Setup Screens

```
Serial Encryption Module  V2.0
-------------------------------
 MAC: 00:09:AA:55:60:88

 Configuration setup.

 [Press any key to continue]
```

After pressing any key:

```
Main Menu
----------------------------------------
 1  Cipher Configuration
 2  Serial Port Configuration
 3  LAN Configuration
 4  Username/Password Configuration
 5  Display Configuration Settings
 6  Reset Configuration to Default
 7  Save and Exit
 0  Exit without Saving

Choose a Number =>
```

To make configuration changes in the following screens, enter the number of the item to change followed by a space and the number of the new setting. When finished, select item 7, Save and Exit, from the main menu.

5.3.1 Cipher Configuration

```
CIPHER CONFIGURATION:
 Operational Mode: Block Mode Cipher
 Passphrase:   **********

SET CIPHER CONFIGURATION:
 1  Operational Mode   [0=Block Mode Cipher, 1=Block Mode Clear]
 2  Secret Passphrase  [1 to 62 characters]
 3  Signal remotes to switch to Block Mode Cipher.
 0  -- Return to previous menu

EXAMPLE: To set the secret passphrase to "my secret!"
   => 2 my secret!

Enter Command =>
```

5.3.2 Serial Port Configuration

```
SERIAL PORT CONFIGURATION:
 Baud Rate: 9600, Parity: NONE, Data: 8-Bits, Stop: 1-Bit
 COM1 Interface: rs232
 COM2 Interface: rs232
 Rx Idle Time:  12 character times
 Tx Idle Time:   2 character times

SET SERIAL PORT CONFIGURATION:
 1  Baud Rate         [0=57600, 1=38400, 2=19200, 3=9600
                       4=4800,  5=2400,  6=1200]
 2  Parity bit        [0=None, 1=Odd, 2=Even]
 3  Data bits         [0=7bits, 1=8bits]
 4  Stop bits         [0=1bit, 1=2bits]
 5  COM1 Interface    [0=rs232, 1=rs485/4-wire, 2=rs485/2-wire]
 6  COM2 Interface    [0=rs232, 1=rs485/4-wire, 2=rs485/2-wire]
 7  Rx Idle Time      [5 - 1000 character times]
 8  Tx Idle Time      [1 - 1000 character times]
 0  -- Return to previous menu.
EXAMPLE: To set the baud rate to 19200
   => 1 2

Enter Command =>
```

RX Idle Time

Valid values are 5-1000 character times. This is the time the serial port waits looking for an end of frame. It should be set large enough to not falsely cause a frame end to be detected, yet low enough to not bridge inter-frame pauses. This is the inter-character delay used to differentiate between inter-character delays and inter-frame delays. It's used to sends the end of a frame

TX Idle Time

Valid values are 1-1000 character times. This is similar to an RTS-holdoff. It keeps the encrypted port control lead high until the transmitter (assuming a radio link) has time to complete the frame transmission. It keeps the in-between radio/modem transmitters from cutting off before all the data is transmitted.

5.3.3 LAN Configuration

```
LOCAL UNIT CONFIGURATION:
 Local Address: 205.166.54.181       Serial NO: 00:60:E9:00:D7:11
 Gateway Address: (NOT SET)          Subnet Mask: 255.255.255.0
 Ethernet Mode: Auto

LAN CONFIGURATION:
 1  Local IP Address
 2  Gateway IP Address
 3  Subnet Mask
 4  Ethernet Mode [0=Auto, 1=100Mb-Full, 2=100Mb-Half, 3=10Mb-Full, 4=10MB-Half]

 0  -- Return to previous menu

EXAMPLE: To set local IP address to 192.168.1.57
   => 1 192.168.1.57

Enter Command =>
```

5.3.4 Username/Password Configuration

```
USERNAME/PASSWORD CONFIGURATION:

 UserName: (not set)
 Password: (not set)

SET USERNAME/PASSWORD CONFIGURATION:
 1  Username [1 to 16 characters]
 2  Password [1 to 16 characters]
 3  Clear Username and Password
 0  -- Return to previous menu

EXAMPLE: to set username to "admin"
   => 1 admin

Enter Command =>
```

5.3.5 Display Configuration Settings

```
Serial Encryption Module: V2.0

CIPHER CONFIGURATION:
 Operational Mode: Block Mode Cipher
 Passphrase:   (NOT SET)

SERIAL PORT CONFIGURATION:
 Baud Rate: 9600, Parity: NONE, Data: 8-Bits, Stop: 1-Bit
 COM1 Interface: rs232
 COM2 Interface: rs232
 Rx Idle Time:  12 character times
 Tx Idle Time:   2 character times

USERNAME/PASSWORD CONFIGURATION:
 UserName: (not set)
 Password: (not set)

LOCAL UNIT CONFIGURATION:
 Local Address: 192.168.1.1          MAC: 00:09:AA:55:60:88
 Gateway Address: (NOT SET)          Subnet Mask: 255.255.255.0
 Ethernet Mode: Auto

 [Press any key to continue]
```

```
CURRENT STATISITCS:
 Serial clear bytes received:    0
 Serial clear bytes transmitted: 0
 Network packets received:       0
 Network packets transmitted:    1
 Network packet errors:          0

CONFIG Mode

 [Press any key to continue]
```

5.4 Ethernet Management

For a connection directly to a PC, use an Ethernet crossover cable. DCB part number 9500097.
If connecting to an Ethernet hub or switch, use a straight through Ethernet cable. (Patch Cord)

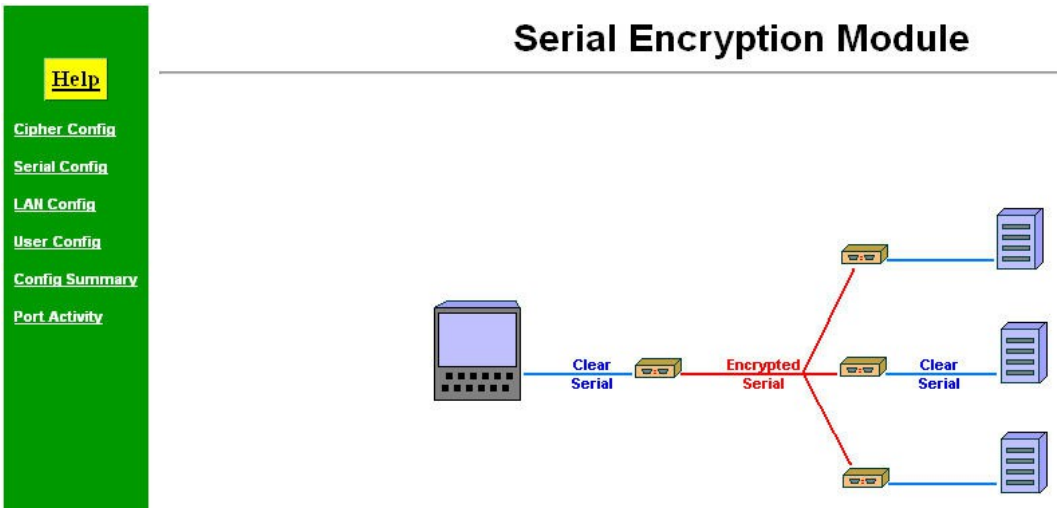
5.4.1 Telnet

Telnet screens are identical to the serial screens.

5.4.2 Browser screens:

NOTE
Context sensitive HELP is available for each browser screen.

Front page screen

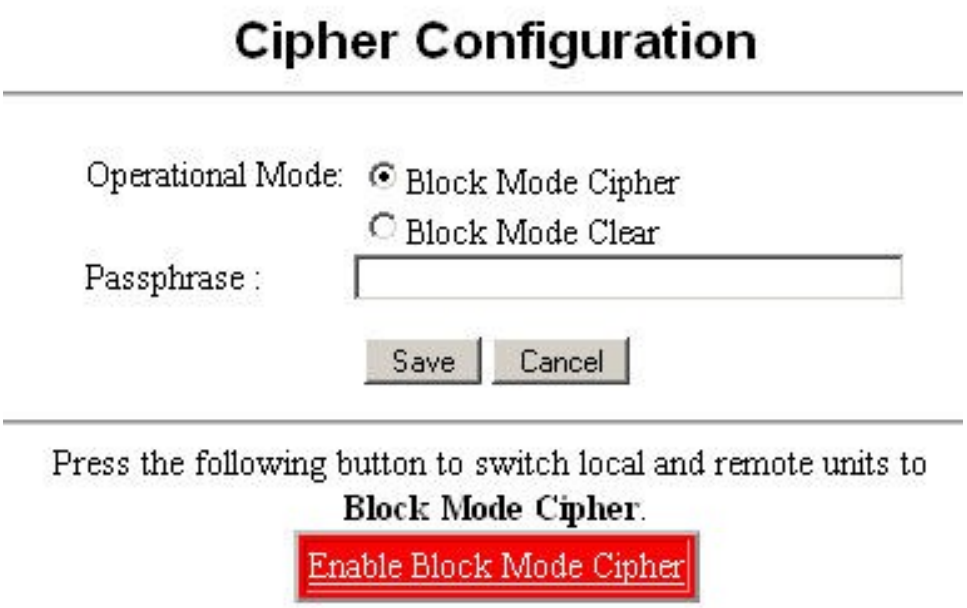


Help box common to every HTML page

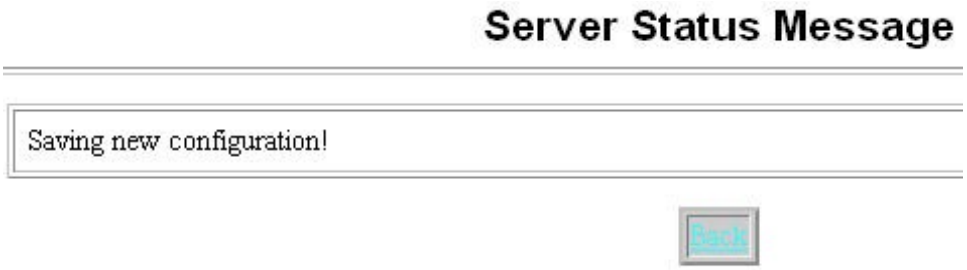
Cipher Configuration screen

One to 62 characters for the passphrase. Any combination of symbols, numbers, letters, upper and lower case. Not useable are CR, LF, or control characters.

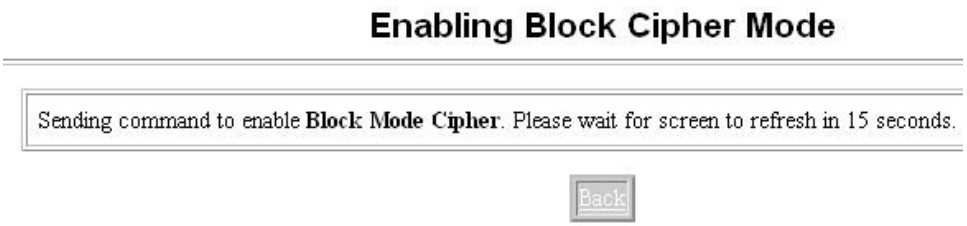
Click on Enable Block Mode Cipher to trigger the remote units and put them in cipher mode.



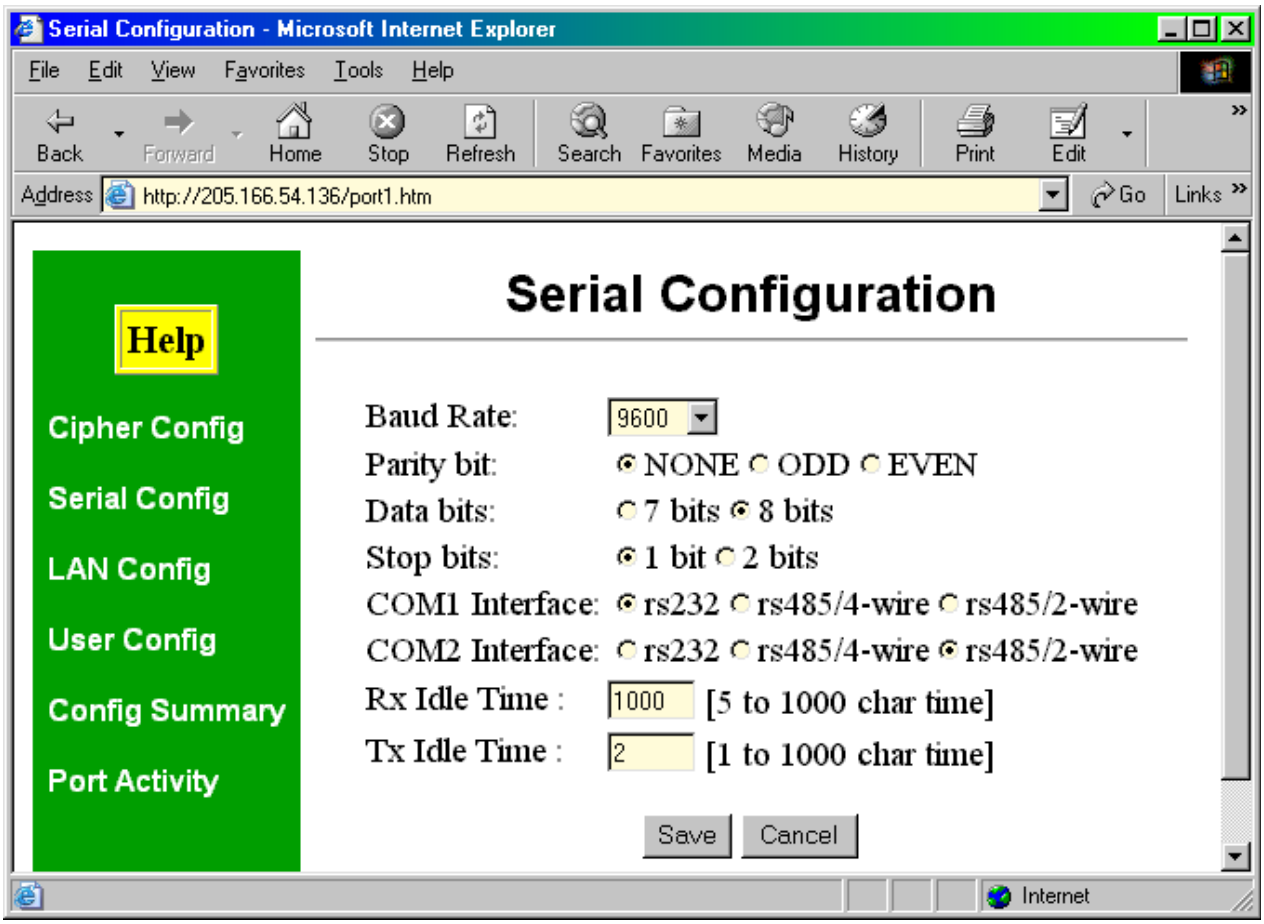
When saving a configuration message



When enabling block cipher mode



Serial Configuration page



RX Idle Time

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TX Idle Time

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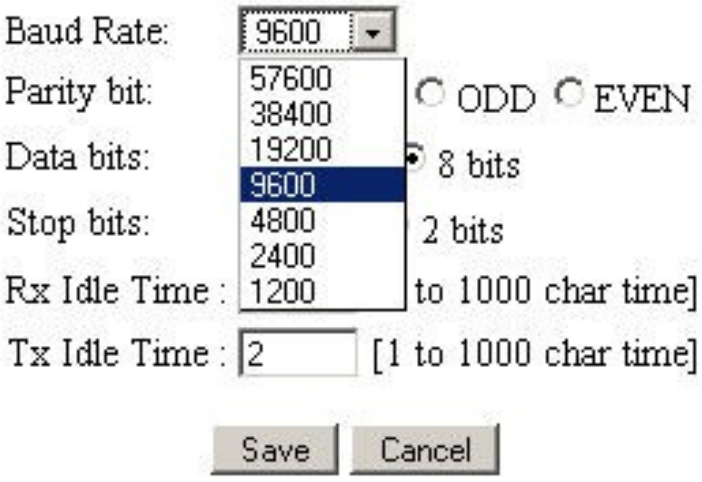
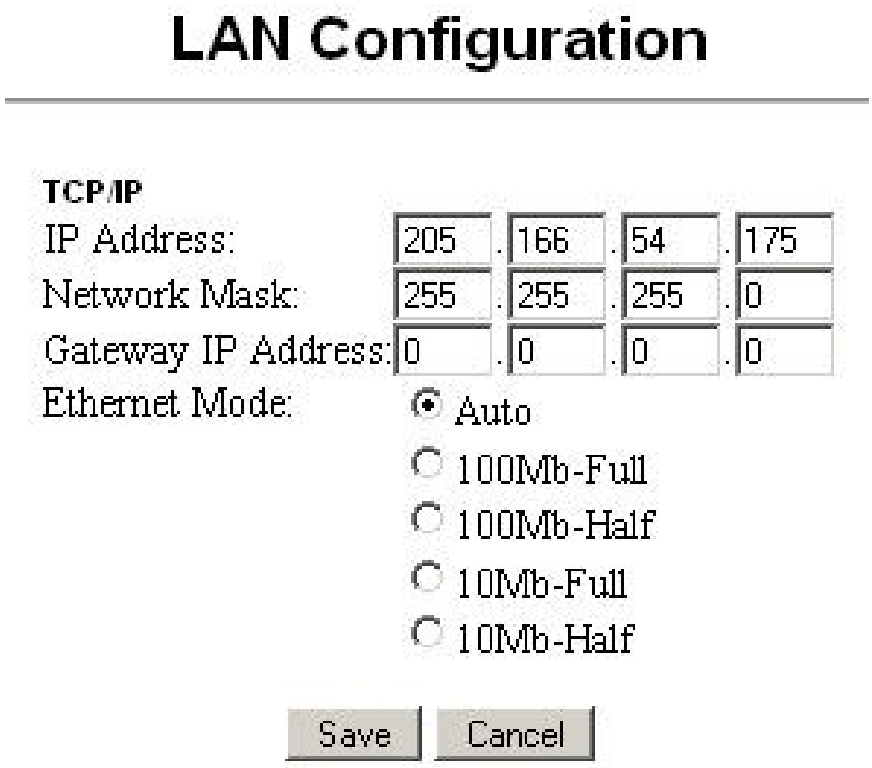
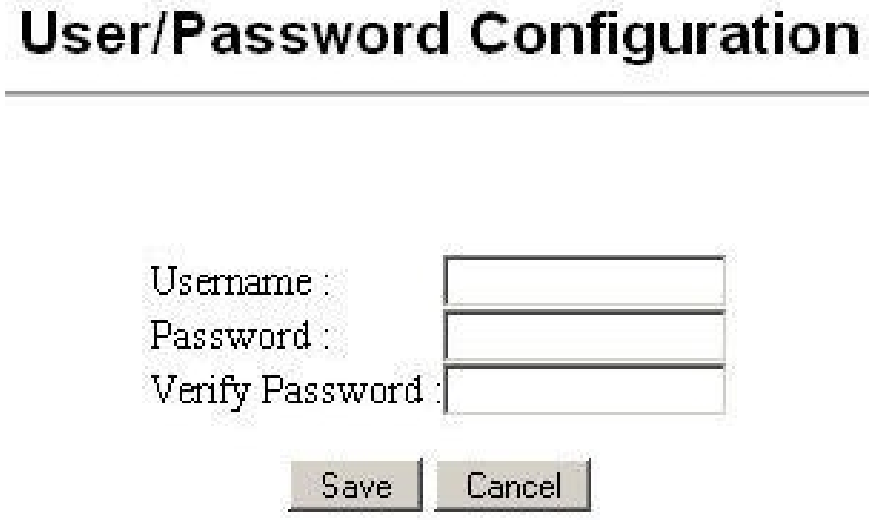
Serial Configuration



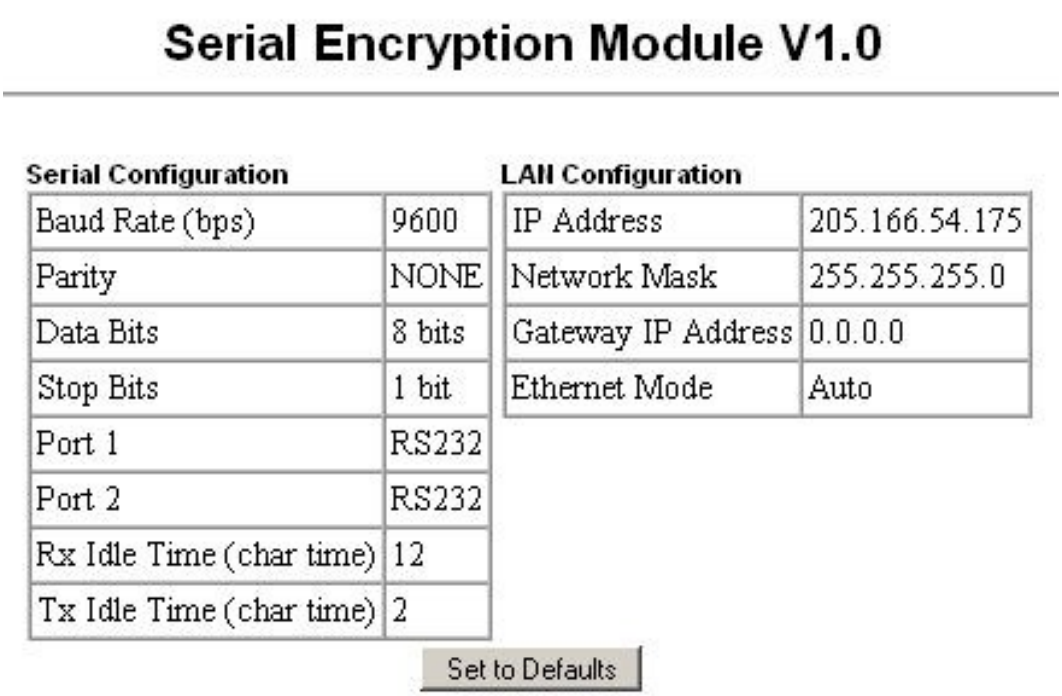
LAN configuration page



User Configuration page



Configuration Summary page



Serial Encryption Module V1.0

Serial Configuration

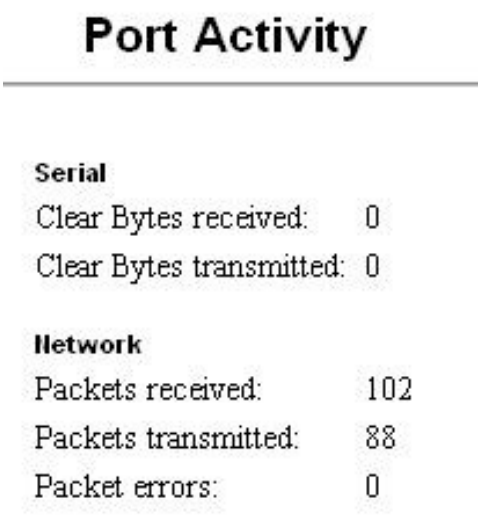
Baud Rate (bps)	9600
Parity	NONE
Data Bits	8 bits
Stop Bits	1 bit
Port 1	RS232
Port 2	RS232
Rx Idle Time (char time)	12
Tx Idle Time (char time)	2

LAN Configuration

IP Address	205.166.54.175
Network Mask	255.255.255.0
Gateway IP Address	0.0.0.0
Ethernet Mode	Auto

Set to Defaults

Port Activity page



Port Activity

Serial

Clear Bytes received: 0

Clear Bytes transmitted: 0

Network

Packets received: 102

Packets transmitted: 88

Packet errors: 0

After entering the data using the HTML method (browser), no need to press a save and exit key. There is a "SAVE"  button on every page.

Save

6. INTERFACE SIGNALS AND CABLING

6.1 Introduction

The serial ports on the SE 6600R can be either RS 232 or RS 485. The configuration is changed using the Serial Port Configuration menu.

The default setting is RS 232.

6.2 RS-232 Port Interface (DE-9P)

Pin	Signal	In/Out
1	Carrier Detect	IN
2	Receive Data	IN
3	Transmit Data	OUT
4	Data Terminal Ready	OUT
5	Signal Ground	----
6	Data Set Ready	NOT USED
7	Request to Send	OUT
8	Clear to Send	IN
9	NOT USED	

6.2.1 Internal RS-232 Signal Paths Through the SE 6600R

Com 1		Com 2
TxD	<----------	RxD
RxD	---------->	TxD
RTS	<----------	CTS
CTS	---------->	RTS
DTR	<----------	DCD
DCD	---------->	DTR
DSR	Ignored	DSR

6.3 RS-485 4-Wire Interface (DE-9P)

Pin	Signal	In/Out
1	NOT USED	
2	Tx+	OUT
3	Rx+	IN
4	NOT USED	
5	Ground	----
6	NOT USED	
7	Rx–	IN
8	Tx–	OUT
9	NOT USED	

RS-485 2-Wire Interface (DE-9P)

Pin	Signal
1	NOT USED
2	NOT USED
3	Data+
4	NOT USED
5	Ground
6	NOT USED
7	Data–
8	NOT USED
9	NOT USED

6.4 Cables

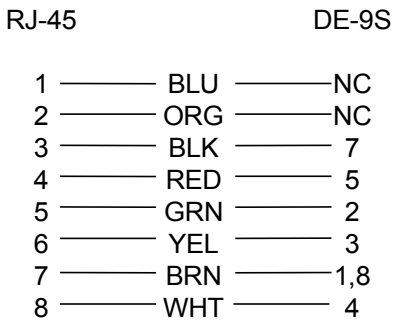
The RS-232 serial ports on the SE 6600R are configured as Data Terminal Equipment (DTE). This is the same configuration used on PC COM ports. To connect the SE 6600R to peripheral equipment, use the same cable that would be used to connect that equipment to a PC COM port.

6.4.1 To connect the SE 6600R clear side port (Com 1) to a PC COM port, use the serial cable provided.

6.4.2 To connect the SE 6600R encrypted side port (Com 2) to a 25 pin modem device, use an IBM modem cable. Available from DCB as P/N 9801009.

6.4.3 To connect the SE 6600R encrypted side port (Com 2) to a 9 pin modem device, use a straight through 9 pin male to female cable. Available from DCB as P/N 9801022.

6.4.4 To connect the SE 6600R to a DCB SR / SR 4 Series Multiplexer Composite port, use the following cable. Adapter available from DCB as P/N 9802067



6.4.5 To connect two SE 6600Rs back-to-back for bench testing, use the serial port setup cable provided.

7. TROUBLESHOOTING

When troubleshooting problems, a rational plan can save you many hours of frustration. The following is a brief outline of standard troubleshooting procedures.

1. Gather the facts to determine the exact nature of the problem.
2. Draw a picture of the system showing the equipment at both the host and remote ends and the phone lines or in-house wiring. Use this as a reference to note your observations, test steps and test results. A picture keeps you focused and often saves duplicate effort.
3. Record the front panel indications before changing anything. This is an important part of fact gathering
4. If you change anything, change only one thing at a time.
5. Record your results.

8. WARRANTY

This DCB product is warranted to be free of defects in materials and workmanship for two years. Data Comm for Business, Inc. will repair or replace any equipment proven to be defective within the warranty period. All warranty work is F.O.B. Champaign, IL. This warranty is exclusive of abuse, misuse, accidental damage, acts of God or consequential damages, etc. DCB liability shall not exceed the original purchase price.

All equipment returned for repair must be accompanied by a Returned Material Authorization (RMA) number. To receive an RMA number, call (217) 897-6600 between the hours of 8 AM and 5 PM central time. Equipment must be shipped prepaid to DCB and will be returned at DCB's expense.

Ship returned items to:

Data Comm for Business
2949 County Road 1000E
Dewey, IL 61840
ATTN: RMA #

Data Comm for Business, Inc.
PO Box 6329
Champaign, IL 61826-6329

Tel (217) 897-6600
Fax (217) 897-1331
Email support@dcbnet.com