CORETEC
DIGITAL VIDEO NETWORKS

INSTALLATION AND OPERATING INSTRUCTIONS v1.04
Revision Date: September 1, 2011

VCX-6400-D   MPEG-2/4 Decoder, IP
VCX-6400-D-R   MPEG-2/4 Decoder, IP Rack Mount

Introduction

Description

The model VCX-6400-D is the stand-alone MPEG-2/4 version of the VCX family. The unit is enclosed with a display, control keys and a universal AC power supply. The configuration of the VCX-6400-D is akin to desktop like devices. The model VCX-6400–D-R is a rack mounted card only used in the 4U 19-inch rack unit. See Accessories R-12.

The VCX-6400 Digital Video Codec system consists of a video decoder model VCX-6400-D or –D-R and encoder models VCX-2400-E/-ER or 4400-E/–E-R and the VCX-6400-E/-ER. Note: the VCX-4400-E and VCX-6400-D units are compatible when using MPEG4 video streams and the VCX-2400-E and VCX-6400-D units are compatible when using MPEG2. When connected with the fore mentioned decoder/encoder configurations, these units provide a one-way end-end transmission of compressed digital video. The transmission medium is Ethernet using IP protocol with data rates in the 64kbps to 4.0 Mbps range.

The VCX-6400 system employs either MPEG-2 or 4 decoding. The encoding-decoding process is applied to an NTSC (or PAL) video input and output respectively, selected through software. The VCX-6400 is a decoder only and therefore will decode both MPEG-2 and MPEG-4 streams present on the network. (See appendix for details)

The VCX-6400 family supports several stream types through the ethernet transmission medium. Elementary, PES, Transport, and Program stream types are supported by the VCX-6400 family in the MPEG-2 mode and Elementary Stream (ES) in the MPEG-4 mode.

The video decoder separates MPEG video and sub-channel information from the IP stream. Video is converted to NTSC (or PAL) signal and sent to the BNC connector while the de-multiplexed sub-channel is passed to the port labeled Com2. Note: Com1 port is for diagnostic purposes by the manufacturer."

Modification of video format and resolution, data sub-channel characteristics, and basic IP parameters is achieved through one of the following means:

a) a Hyper Terminal accessible menu
b) Telnet through the Ethernet connection
c) MMS software
d) SNMP
e) Web Interface (Only for VCX6400Encoder/Decoder)

The video decoder receives IP packets and separates the video data from the stream. The decoder then converts the video data to analog form, providing an NTSC (or PAL) output. The preprogrammed formats are needed in applications providing the sub channel information, which is passed to the camera control.

The unit features a bi-directional sub-channel port (programmable for RS-232 or RS-422). Configuration, control, status and other data are de-multiplexed from the digital data stream, maintaining the communications link with the device connected to the sub-channel port.

Stream Formats

Elementary Stream (ES) is a video elementary stream that consists of all the video data for a sequence, including the sequence header and all the subparts of a sequence. An ES stream carries only one type of data (video or audio) from a single video or audio encoder.

Packetized Elementary Stream is a Packetized Elementary Stream, or PES, consists of a single ES stream, which has been made into packets, each starting with an added packet header. A PES stream contains only one type of data from one source, e.g. from one video or audio encoder.

Transport Stream is a format specified in MPEG-2 Part 1, Systems (ISO/IEC standard 13818-1). Its design goal is to allow multiplexing of digital video and audio and to synchronize the output. Transport stream offers features for error correction for transportation over unreliable media.

Program Stream is a format that supports command controls in which the video stream may be controlled during playback or authoring of video recording. The program elements are used the playback of a recorded stream.

Buffering

Stream buffering gives the decoder the ability to store the incoming stream until a level is reached that insures the network latency has a minimal effect on the decoded video. This means the network latency will be hidden to the limit of the buffer to supply stored data to the decoder. The buffer size is 1 megabyte of storage or 8 megabits of the incoming data. The latency is measured in milliseconds; therefore, the amount of storage needed is directly related to the worst-case network delay. The default buffer-low size has a latency of 100msec and 400msec for the buffer high. Remember this value is viewed as a time based function related to the incoming bit rate in msec by the network latency in msec. When the buffer level drops below the buffer, low value the video decoding is slowed down and when the buffer high value is exceeded, the video decoding is sped up. This is performed at in imperceptible rate. The minimum value is what the operator is willing to use for the display quality and the maximum is derived from the following equation.

6,400,000/Bitrate (Kbps) is the maximum value for the bufferhigh parameter

Generally, set the bufferlow value of 300 less than the bufferhigh number calculated using the above equation.

Quick Start

The quick start procedure will provide an out of the box startup. The steps in the procedures that follow may require the assistance of the network administrator. It is not advisable to connect a default configured unit or a unit with an unknown configuration to an operational network.

1.   Unpack the VCX-6400-D Video Decoder.

2.   Connect a BNC-terminated coaxial cable to a composite NTSC (or PAL) video output (e.g., CCTV monitor) to the BNC connector labeled "VIDEO OUT" on the VCX-6400-D Video Decoder.

3.   Connect a BNC-terminated coaxial cable from a composite NTSC (or PAL) video source (e.g., CCTV camera) to the BNC connector labeled "VIDEO IN" on the video encoder. Any of the VCX-2400/4400 MPEG2/MPEG4 encoded video streams on the network may be used if the source video is set on the decoder VIDEOIP. (See Appendix A Unit Setup)

4.   Connect the video encoder to the VCX-6400-D video decoder via the Ethernet port (RJ-45), located to the right of the two RJ-45 ports on the rear of each unit, using a Cat 5 Ethernet cross over cable (for direct connection), if a switch is not available (the send and receive pairs are swapped end-to end). These cables are identified with a Yellow or Red cover on the connectors. When units are connected to an Ethernet Switch, straight through cables are used.

             Please refer to Appendix C to view the Straight Through and Crossover Ethernet Configurations.

5.   Insert the detachable line cord into the receptacle on the rear of the encoder and VCX-6400-D decoder. The unit will automatically sense line voltage and frequency in the range of 110 to 220VAC, 50 or 60 hertz and will function correctly.

6.   The power control is a rocker switch next to the line cord on the back of the units. The power LED on the front panel display will be illuminated when the unit is activated.

7.   After booting up, the display (if on the decoder) will scroll through the parameters currently programmed in the unit.

8.   After a few moments, video should appear on the output of the VCX-6400-D Video Decoder.

9.   If video is not present on the VCX-6400-D decoder verify the following:

a. Verify the video source is functioning and supplying a proper video signal to the encoder.

b. Both the encoder and decoder power LED's are on. Displays are scrolling on both units and the Video and Multicast LED's are "Green". If the LED's are Red then check the "VIDEOIP" address is the same as the source encoder "VIDEOIP" address. The default video IP address is 239.5.6.8 by default and a standard cross over cable will function properly.

c. The link light (Green) on the Ethernet port (RJ-45), located on the lower left of the port connector is lit on both the encoder and decoder. If not the Ethernet cross over cable may be defective. If data traffic is present the activity light (Yellow) will be on steady or flashing

d. If the above are correct, please read the network setup installation instructions in the manual. Note: the setting in default network setup may have been changed.

Main unit configuration

The VCX-6400-D units incorporate support for two different forms of decoding. It is important the operator understand this to be able to configure the unit properly. All commands follow this simple format:

(command<space>parameter<enter>)

From the command prompt, the operator may view the current configuration by entering the "display" command. This will dump the entire configuration status for the selected decoder. Take note the IP address must be of valid encoders on the network. The IP addressed are an example only. Locate a MPEG2 or MPEG4 encoder to be used.

The compression command will set the decoding format for the output of the unit.

Connection Configuration
ip 192.168.5.150 (use a valid IP on your network)
mask 255.255.240.0
name CoreTec Decoder
com1 1
com1ip 192.168.5.151 (IP address of the encoder receiving sub-channel commands)
com1tcp 1 (assume a universal decoder)
com1server 0
com1timeout 10
com1baud 38400

MPEG2 Configuration
The MPEG2 encoder requires the following parameters be configured to your network:
compression mpeg2
streamtype p
videoip 239.5.5.150 (use a valid IP on your network)
port 4568 (use the video port number programmed in the encoder)

MPEG4 Configuration
The MPEG2 encoder requires the following parameters be configured to your network:
compression mpeg4
streamtype rtp
ip 239.5.5.151 (use a valid IP on your network)
port 4568 (use the video port number programmed in the encoder)

Note: the compression type is mpeg2 or mpeg4. The operator will configure the unit for one or the other.

Saving Configuration
When all the configuration parameters have been entered, they must be saved to memory and the unit restarted by entering the following command:
commit
reboot

VCX Video Decoder Family

The VCX-6400-D Video Decoder will supply a video channel out and one bi-directional serial data sub-channel. The output from the decoder is a video stream assembled from received IP packets from the Ethernet port. The unit also contains a display (available on the VCX-6400-D only) to allow monitoring of unit performance and to facilitate troubleshooting. The decoder has a programmable reset, which prompts the re-initiation of the video stream.

The VCX-6400-D Video Decoder accepts the signal from the network originally generated by a VCX-2400/4400-E video encoder family member. The unit effectively decompresses this data stream and re-creates an analog waveform in NTSC (or PAL) video format. The unit supports one bi-directional serial data port sub-channel, functioning as RS232/RS422. The VCX-6400/6400-D and the -D–R models use the same control board whereas the –D-R is a rack mounted card only; while, the –D is enclosed with a power supply and front panel.

Desk Top Enclosure (-D Model)
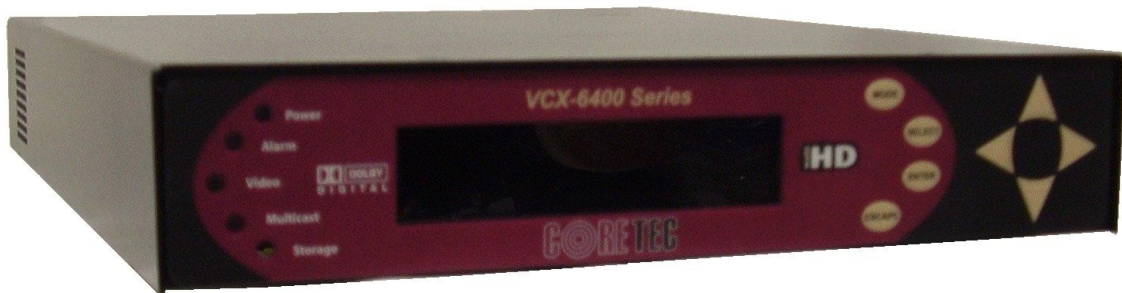
Figure 3 – VCX-6400-D Front View

Figure 4 – VCX-6400-D Back View

Card Only View (-D-R Model)

Figure 5 – VCX-6400-D-R

COM Port Data Interface

Com Port

1.

2.   There are two bi-directional data interfaces on the VCX series units; each may be configurable for either RS-232 or RS-422 through software. Com2 is the sub-channel port (center) while Com1 is for testing only (Left most). Refer to Table 1 for the correct pin out. Comm Port parameters are configured through the system software.

Com Port Pin Description

The 8-pin RJ45 connector supports both RS232 and RS422 standards. Take note of the pin out for the proper PC interface if used. An adaptor is available from the manufacturer that performs a conversion supporting one-to-one ethernet cables as the connection media to the PC 9-pin D-sub connector. RS422 is also supported with a different wiring configuration.

Please refer to Appendix A for Com Port Data Interface pinout.

RS232 Adapter and Cable Wiring

The user may build an RS232 cable fashioned from a one-to-one ethernet cable. A drawing of the cable and the manufacturer-supplied adapter are shown below.

Please refer to Appendix C to view RJ-11 to Serial Interface Adapter Pinout.

Video Interface

3. Decoded and assembled video, in the NTSC or PAL format, is supplied out the BNC connector in the back of the unit. Connect a BNC-terminated coaxial cable from a composite video monitor to the BNC connector labeled "VIDEO OUT" (decoder). The maximum length of cable that should be interfaced to the decoder is 100 feet, although the specific installation environment will dictate the actual permissible length and proper termination.

4.

Ethernet Interface

There is one Ethernet interface for encoder or decoder, which uses a standard RJ-45 connector located to the far right side of the back panel.

Note: the Ethernet port is the larger of the RJ45 connectors and has two status LED's at the bottom. Refer to Figure 3 for the correct pin out.

Ethernet Cables

The standard method of terminating an ETHERNET cable is shown in Figure 6. Figure 8 reflects the TIA568A standard (Telecommunications Industry Association standard). The cable types support the Hub/Switch connections, which are the standard one for one wire connection though out the cable. These cables may be of different colors and lengths; but will have the same color connector cover, if present, as the cable color.

If the cable is a crossover type, the cable color will be RED with a YELLOW or RED connector cover. If the switch is AUTO DETECT, the crossover cable will function as a standard cable and the user will be unaware of the cable. If non-auto detect devices are connected in this way, communications will not take occur.

NOTE: The crossover identification standard, at times, is not followed. Verification may be performed by following the description and diagrams below.

The solid color wires and the striped wires (color stripe on white wire) are always alternated across the connector pins. Pin-1, always being striped, in the diagram below, is White/ORANGE followed by solid ORANGE on pin-2 as the second in the pair. Take note of pin-3, as it is not paired with pin 4, but with pin-6. In the diagram pin-3, being White/GREEN and pin-6 is solid GREEN. Next is pair number one, solid BLUE on pin-4

and White/BLUE pin-5, these are always in the middle of the connector. Followed by White/BROWN on pin-7 and solid BROWN on pin-8.

Command Controls

To give a command to the encoder you have alternative ways of doing so:

1) TelNet through the Ethernet connection
2) Hyper Terminal accessible menu
3) Web Interface
4) MMS software
5) SNMP (only for VCX6400E/D)

Telnet

Refer to the Program Commands Section of this Manual below for the specific commands.

Default Password: admin

This password may be changed by typing in the following command:

PASSWORD [new password of your choice]

Hyper Terminal

You may also configure settings via Hyper Terminal if the serial port is connected to the decoder.

Web Interface

When the unit accepts the log in (default password: admin), the following web page will be displayed. The header identifies the type of unit followed by the page control bar. The basic network configuration is displayed in the appropriate fields giving the operator the option to modify them if needed. There are three (3) pages to select from each giving the operator control over the unit operation. Main, Video, Subchannel provide all the parameters that an operator may modify grouped as labeled. There are two (2) options to the far right, "Log Out" and "Commit/Reboot", which will terminate the session. Log Out will log the operator out without committing to the changes made in the previous pages and the last will perform the commit function, writing the changes to the unit and performing a reboot. Both operations will log the operator off and close the communications channel. The web page may or may not report the termination of the communications channel. The login process must be performed to access the unit again.

The follow pictures show the various parameters available to the operator. The definitions are described below in the command sections.

Open a new Internet Explorer window and enter the IP address of the unit into the explorer address frame. (Review the section INITIAL IP ADDRESSING to obtain this address.
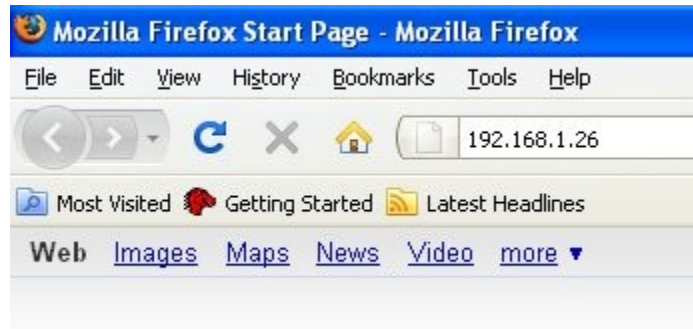
The selected device will respond by opening the following page. Not all internet communication pages will apply while the thread is open.

Log on Page
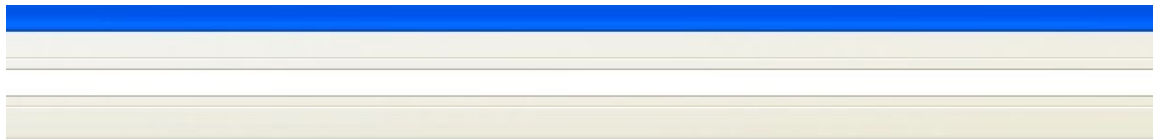
Type password **XXXXXXXXXXX**

Where **XXXXXXXXXXX** is the new password.
The password can be anything up to eleven (11) characters in length.

Main Page- Configuration Parameters

Coretec Communications Device Configuration

Select Settings Page

Main   Video   Subchannel   Log Out   Commit/Reboot

Device Settings

Device Name	VCX6400D
Device IP	192 . 168 . 1 . 26
Subnet Mask	255 . 255 . 240 . 0
Gateway	192 . 168 . 0 . 1

Configure Settings

Video- Configuration Parameters

Coretec Communications Device Configuration

Select Settings Page

Main   Video   Subchannel   Log Out   Commit/Reboot

Video Settings

Compression Type	MPEG-4
Stream Type	RTP
Video IP	239 . 5 . 4 . 104
Video Port	4568
Video Standard	NTSC

Configure Settings

Subchannel- Configuration Parameters

Coretec Communications Device Configuration

Select Settings Page

Main   Video   Subchannel   Log Out   Commit/Reboot

SubChannel Settings

Enable	☑
Baud Rate	9600 ▾
Line Type	RS422 ▾
Stop Bits	ONE ▾
7/8 Bit	8 ▾
Parity	NONE ▾
Destination IP	192 . 168 . 0 . 253
Port	5002
Tcp	☐
Server	☐

Configure Settings

Logout

You must commit and reboot (button to the right) in order to save the new settings made during this session.

Select Settings Page

Main   Video   Subchannel   Log Out   Commit/Reboot

Commit/Reboot

This process will write all the parameters into nonvolatile memory and then reboot the unit. The reboot process will stop all current operations and restart with the new parameters.

Note: The Commit/Reboot operation, in most cases, will not give the operator an indication the operation has started, is in progress or has finished.

MMS Software

Refer to the Watchdog Manuals

SNMP

SNMP is available if wanted.

The two (2) .mib files are available at our website (www.coretec.com). A password will be needed to access these files.

Unit Mounting

Enclosure Options

The VCX-6400-D decoder is a stand-alone self-contained unit in a desktop style enclosure. VCX-6400-D-R is a single card for use in the multi-card chassis, which is a 19-inch 4U unit that will support 12 cards.

Desk Top Enclosures

If the user wishes to place the desktop enclosed unit(s) in a 19-inch rack, a tray adaptor is available from the manufacturer. The tray is installed in a 19-inch rack permitting one or two desktop style units to sit on tray side-by-side in the standard enclosure.

R-2 Enclosures

If a 1U high stackable configuration is required, the unit(s) may be ordered with an R-2 optional enclosure, which will permit mounting of two units side-by-side. NOTE: Mounting eight units this way will occupy a 4U space and gives the user a control/display panel for each of the units.

R-12 Enclosures

If front panel controls are not required, the 4U rack chassis option will permit twelve (12) VCX4400-D-R cards to be mounted in the same space, providing maximum density.

Interface Connections

All signal connections are from the rear of the unit, eliminating the need for setback space in the front area of the rack, thereby permitting doors to be used if needed. The user programming ports and sub-channels are located on the back panel of the units and are used to alter system parameters via a terminal program.

Power

Power Options

The VCX Family is powered by 110 to 220 VAC line power supplies, which will function on 50 or 60-hertz line frequencies. The internal electronics may be powered by 5 or 12-VDC. For these configurations, the user must contact the manufacturer for such options.

Desk Top Enclosures

The VCX-6400-D when supplied in the stand-alone desktop enclosure, power is applied through a standard IEC type detachable line cord at the rear of the unit. The unit automatically senses 110 to 220 VAC at 50 or 60 hertz line supply.

R-2 Enclosures

The VCX-6400-D when supplied in the R-2 side-by-side 19-inch 1U enclosure, an IEC type detachable line cord is needed for each of the units within the R-2 enclosure. The unit automatically senses 110 to 220 VAC at 50 or 60 hertz line supply.

R-12 Enclosures

The VCX-6400-D-R is a card only and receives power from the card cage backplane (R-12). The R-12 option is powered in the same manner as the VCX-6400-D unit. The unit automatically senses 110 to 220 VAC at 50 or 60 hertz line supply.

Front Panel (VCX6400-D)

Front Panel
The front panel consists of a 2 line by 20 character display, displaying unit status and feedback. The five LED's indicate unit power and network status. The seven keys permit interaction with the unit. The keys are divided into two groups' that permit confirmation, selection and menu navigation providing the user with an interface when required.

Display
The front panel display provides a scrolling list of key parameters when the unit is configured to do so. If the display does not scroll, (enabled by default), the user may enable the scrolling feature using the following procedure.

 NOTE: the procedure log on assumes the address and password have not changed, if so contact the system administrator for proper access control.

1.   Connect to the using "telnet(sp)192.168.0.254<enter>"
2.   password "admin<enter>"
3.   frontpanel<sp>1<enter>
4.   commit<enter> (response COMMIT DONE)
5.   reboot<enter> or cycle the unit power

The display is a two-line display. Each parameter is displayed, in turn, for three seconds on the bottom line. It then moves to the top line while the next parameter is displayed on the bottom line.

The parameters displayed are as follows:

- VCX4400D 0281 0   Name of unit, MAC address (Manufacturer Assigned)
- v1.01, 31JAN06 Software Version Number, Software Release Date
- Device IP address   192.168.0.254
- Sub-net mask   255.255.255.0
- Video IP (multi-cast)
- Comm 1 On or Off
- Comm 2 On or Off

Status Indicators
The LED's provide status indicators for power, alarm, video stream and multicast communications as well as mass storage writing when applicable.

Keys
The keys are not enabled on this unit.

Updating Firmware

Universion

In order to update firmware with older versions up to V1.1i (not including V1.1i) use universion.

TFTP

If you are updating any firmware starting with Version 1.1i (including V1.1i) you must use TFTP.

To TFTP, telnet the device you want to be connected to the TFTP Server. Then type the following command:

TFTP <server ip> [file name]

(If you don't type in a file name, then it will assume the default file name **vcx6400d.tgz**)

Programming Configuration

Overview

The commands contained in this section provide the means to configure critical network, comm port and decoder parameters. The user should consult the factory if specific functions of interest do not appear to be supported.

Initial IP Addressing

To set the device parameters properly, encoder and decoder units must be given appropriate IP addresses, compatible with the network on which they are to be connected. The software module **VXNETCONFIG** was developed to allow a network administrator to set the IP and Subnet in the VCX series encoders and decoders.

  1) **Installation**

To load VXNETCONFIG insert the CORE TEC CD into your CD drive. Select VXNETCONFIG by double clicking on the program. The following window will open:
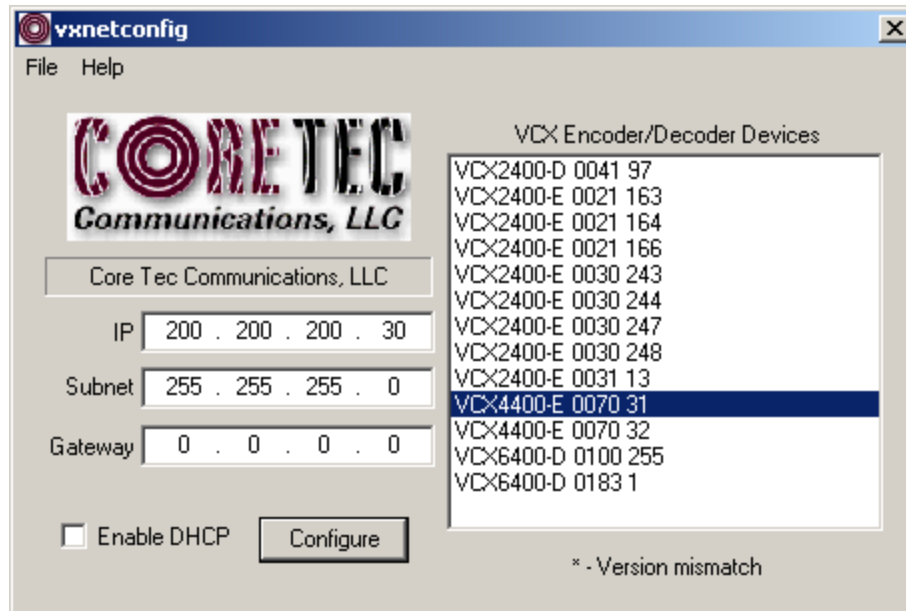
Figure 10 - VXNETCONFIG Window

2) **Description of Program Functions**

(a)   The first box on the left hand side of the window displays the current IP address of the CORE TEC device being interrogated. Type the new IP address into this space if needed.

(b)   The second box is used to change the SUBNET address. Note that the address displayed is always 255.255.255.0. Type the new SUBNET address into this space if desired.

(c)   The Enable DHCP box is checked when DHCP is to be enabled.

NOTE: Do not enable DHCP if sub-channels are being used or if a DHCP server in not present on the network. Check with the Network Administrator, or call Core Tec Tech Support if further assistance is needed.

(d)   The Configure button is to execute the requested changes to the IP and SUBNET information. Note: future queries of the SUBNET will indicate 255.255.255.0 by default. The correct SUBNET address should always be entered prior to using the Configure button.

(e)   The box on the right hand of the window displays all VCX-6400 devices (encoders and decoders) on the network.

3) **To make a change to the equipment addressing, perform the following steps:**

(a)   Select the Core Tec device address from the list in the box on the right side of the window.

(b)   Move the cursor to the IP box and select the first octet by highlighting the octet. Enter the new IP data for the selected octet. As the three digits are entered, the software will automatically highlight the next octet for change. Complete entering the IP address and then switch to the SUBNET data.

(c)   Move the cursor to the SUBNET box and select the first octet by highlighting the octet. Enter the new SUBNET data for the selected octet. As the three digits are entered, the software will automatically highlight the next octet for change. Complete entering the SUBNET data.

(d)   To execute the change press the configure button. The IP address and the SUBNET will be updated in the selected Core Tec equipment. The new IP address will be displayed. The SUBNET will display a default

class C- SUBNET there is no read back of the changed SUBNET displayed.

(e)   Repeat this process for all the CORE TEC equipment requiring change.

Connection

1) **Telnet**

   Password: admin (default)
   To change the default password perform the following:

   Login using admin as the password, then press enter.

   Type **password** <your password (up to 11 characters)>

   Where <your password> equals the new password, the password can be anything up to eleven (11) characters in length.

   For configuration using an Ethernet connection, activate the Telnet function by the following:

   a. Initiating from the Command Prompt - Telnet nnn.nnn.nnn.nnn
   b. Use the MS Windows – START – RUN Telnet nnn.nnn.nnn.nnn

   (where nnn.nnn.nnn.nnn is the IP address of the unit being configured)

   Employ the command set as described below.

   Note that the initial IP addresses (factory default) are:

   Encoder 192.168.0.253

   Decoder 192.168.0.254

   Sub net Mask 255.255.255.0

HyperTerminal

NOTE: The following procedure is valid for standalone units only and is not applicable to rack mount units.

The HyperTerminal configuration procedure uses the serial connection on the front of the unit.

Using the PCA-2400 programming cable, connect to the control port. This cable should be attached to the serial port of an attached PC and the Hyper Terminal program launched. The PC should have its Com Port configured as:

Baud rate	38,400 kbps
Data bits	8 bits
Parity	No Parity
Stop Bits	1 Stop Bit
Flow control	None

Activate the HyperTerminal function, normally found in a sub-menu under ACCESSORIES. Employ the command set as described in the following section.

Password: admin (default)

To change the default password perform the following:

Type password <your password (up to 11 characters)>
Where <your password> equals the new password
The password can be anything up to eleven (11) characters in length.

Program Commands

Command Notation

The following notation is used to describe the command API:

Decimal numeric entries are indicated by a lower case 'n'.

Hexadecimal entries are indicated by a lower case 'x'.

ASCII entries are indicated by "a..z".

IP addresses are entered in dotted decimal notation.   Such as 192.168.0.1

Port numbers are in decimal form.

Optional text is surrounded by '<' and '>' brackets.

Mandatory text is surrounded by '[' and ']' brackets.

The vertical bar '|' separates a series of **two or more variants of an entry**. For example, "COM[1|2]PORT" means that the command is entered as "COM1PORT" or "COM2PORT".

Many commands are for **disabling and enabling a function**. If the parameter for such a function is specified as either zero or one [0|1], then '0' disables or turns off the function and '1' enables or turns it on.

Command Description

Network Setup

The network setup is comprised of the following options:

> IP address – The IP address for the VCX-6400 device
> TCP Command Port – The TCP port for the command channel
> Ethernet MAC (Media Access Control) Address – The low level Ethernet address
> Video Multicast IP – The IP address for the MPEG-4 multicast
> Video Multicast Port – The UDP port for the MPEG-4 multicast

> **Important Notes:**
> After entering one or more commands, it is necessary to enter COMMIT and REBOOT for the new settings to take effect.
> Typing "?" displays a listing of all commands.

IP (IP Address)

The IP address setup is in the form of decimal dotted notation. The selection of an IP should come from the person who administrates the network. The current IP selection is static. A dynamic IP setting using DHCP is planned for future enhancement.

> **Default:**
>
> > **Encoder - 192.168.0.253**
> > **Decoder - 192.168.0.254**
>
> Example command: IP 192.168.0.10 (sets IP address to 192.168.0.10)

IPMASK (IP Subnet Mask)

The IP Subnet Mask is in the form of decimal dotted notation. The selection of an IP subnet mask should come from the network administrator. It is used to represent the number of bits in the current IP subnet.

> Default: 255.255.255.0
>
> Example command: IPMASK 255.255.255.0

GATEWAY

The GATEWAY command can have either one or three parameters. The first parameter is the IP address of the host that is the gateway. Optionally you may include the IP address and the subnet mask of the subnet you want to route through the gateway. You can program up to five gateway entries.

Default: No Gateways
Example command: GATEWAY 192.168.0.1

The following example indicates that all packets sent to hosts on the 62.41.10.xxx subnet should be routed though the gateway at 192.168.100.2

Example command: GATEWAY 192.168.0.2 62.41.100.0 255.255.255.0

CLEARGATEWAY

This command will clear the gateway table. There are no parameters. This command clears all entries.

CMDPORT (TCP Command Port)

The TCP command port selection is configurable. However, the default setting should be adequate for normal operation. The command port is used by software that can operate the VCX-6400 devices programmatically. For example, a Microsoft Windows GUI based application.

Default: 5000

Example Command: CMDPORT 5010 (sets TCP command port to 5010)

VIDEOIP (Video Source IP)

The video source IP is an address that allows the reception of the MPEG-4 stream by a single (unicast) or multiple (multicast) device(s).

NOTE: Class D IP addresses, in the range 224.0.0.0 to 239.255.255.255 are called multicast addresses. The range 224.0.0.0 to 224.0.0.255 is reserved for local purposes and the range 239.0.0.0 to 239.255.255.255 is reserved for administrative scooping. Both the encoder and decoder should be set to the same Video IP for correct operation together.

Default: 239.5.6.8

Example Command: VIDEOIP 234.5.6.10 (sets multicast IP to 234.5.6.10)

VIDEOPORT (Video Multicast Port)

The video multicast port selection is configurable. However, the default setting should be adequate for normal operation.

Default: 4568

Example Command: VIDEOPORT 4569 (sets multicast port to 4569)

COMM PORT SETUP

The VCX-6400 supports two sub-channels that allow the two-way transmission of serial data to selected target devices. The sub-channel can be configured for either RS232 or RS422 operation. It is not necessary for both ends to use the same configuration. The following is a list of the configuration items for the sub-channel:

Channel Enable
Baud rate
Parity
IP address of target
TCP port for operation
RS422 or RS232

Certain VCX-6400 devices can be delivered with either one or two comm ports. The ports are designated as 1 and 2. The commands for configuring the settings use the A or B designation to indicate the port being configured.

Example(s):   COM1xxx for comm port 1 (selects comm port 1)
                    COM2xxx for comm port 2 (selects comm port 2)

Note: Communications port 2 is also the control port for programming. If this port is also needed for non-programming related data purposes, the user should program the necessary parameters with the jumper in place if using the Hyper Terminal method. Upon completion of programming, removal of the jumper will result in port 2 operating as programmed. If not using Hyper Terminal to program, jumper should be removed if comm port 2 is to be used.

COM[1|2] (Comm Port Enable)

This command sets the active state of the comm port. The parameter is "0" or "1", where "1" enables and "0" disables the comm port function. At this time, the comm port is always enabled and this command has no effect.

Default: 0 (OFF)

Example Commands: COM1 1 (enables comm port 1)

COM[1|2]BAUD (Comm Port Baud Rate)

This command sets the baud rate for the comm port. Valid values are 2400, 4800, 9600, 19200, and 38400. Other data rates may be functional but are not tested.

Default: 9600

Example Command: COM1BAUD 4800
                (sets baud rate for comm port 1 at 4800 bps)

COM[1|2]PARITY (Comm Port Parity)

The parity for the comm port can be set to Odd, Even, or None. The parameters for the COM[1|2]PARITY command are N,O,E, which correspond respectively to None, Odd, Even.

Default: None

Example Command: COM2PARITY N (sets comm port 2 to no parity)

COM<1|2>STOPBITS <0|1|2>

Example Command: COM2STOPBITS 1 (sets comm. port 2 to have 1 stops bit used)

At 300 baud, usually 0 or 1 stop bits are used. At 1200 baud, 1 or 2 stop bits are most common.

COM[1|2]IP (Comm Port IP)

The IP address of the destination for the comm port data is set by this command. A typical setup would have a decoder and a decoder. The decoder would have a comm port IP address that is the same as the decoder. In addition, likewise, the decoder's comm port IP would be the same as the decoder. Notice that the default comm ports IP's are the opposite of the default device IP's.

Default:

Decoder comm ports - 192.168.0.253
Decoder comm ports- 192.168.0.254

Example Command: COM2IP 192.168.0.10 (points the comm port data to an decoder, decoder, or other device whose IP address is 192.168.0.10)

COM[1|2]PORT (Comm Port)

The serial communications port has an "IP Port" address, which is configurable. However, the default setting should be adequate for normal operation.

Default:
Comm port 1 - 5002
Comm port 2 – 5004

Example Command: COM1PORT 5010 (sets comm port 1 to port 5010)

COM[1|2]RS422 (RS-232, RS-422 Data Format)

The comm port data-format is configurable. The parameter is "0" or "1", where "1" enables RS-422 and "0" enables RS-232 format.

Default: 0 (RS-232)

Example Command: COM1RS422 0 (sets comm port 1 for RS-232)

COMM PORT COMMAND – FURTHER EXAMPLES

The following examples set up comm port 1:

COM1 1 – Enable comm port 1
COM1BAUD 9600 – Set comm port 1 baud rate to 9600
COM1RS422 1 – Set comm port 1 mode to RS422
COM1PORT 5002 – Set comm port 1 port to 5002
COM1PARITY E – Set comm port 1 parity to even
COM1IP 192.168.0.10 – Set destination address for data to 192.168.0.10

COM[1|2]TCP <0|1> - 1= Use TCP, 0=Use UDP

Example Command: com1tcp 1 (sets the com1 to TCP protocol)

COM[1|2]SERVER <0|1> - 1 = server, 0 = client

Example Command: com1tcp 1 (sets the com1 to server operation)

Decoder Commands

Profile

This command is used to select a desired resolution for the encoded video. It also sets the optimal defaults for other parameters, such as bit rate. The allowable settings are QQCIF, QCIF, CIF, 1/2, D1.

Default: 1/2

Example Command: PROFILE 1/2 (sets resolution to 1/2 D1)

Note: Since the Profile command selects defaults for other settings, it should be issued before any other commands relating to the encoded MPEG stream.

QQCIF	80x60
QCIF	160x120
CIF	352x240
1/2	352x480
D1	720x480

DISPLAY [VIDEO | COM |IP | SAP | SNMP]

This command displays current decoder settings. Entering DISPLAY only provides all settings. Adding the VIDEO, COM, or IP qualifiers displays settings for video, comm port, or IP parameters, respectively.

Example Command: DISPLAY IP (displays current IP decoder settings)

COMPRESSION [MPEG2 | MPEG4 | JPEG]

This command will set the decoder compression format.

Example Command: COMPRESSION MPEG4 (MPEG4 decoding format is in use)

Common Commands

The following commands apply to both decoder and decoder.

? or HELP
This command will display the menu of commands valid for this unit.

AUTOREBOOT

This command permits a periodic timed reboot of the device. The parameter is the number of seconds between reboots.

Default: 0 (off)
Example: AUTOREBOOT 3600

AUTOSTART

This command sets a periodic timed restart of the video decoder/decoder. The parameter is the number of seconds between starts.

Default decoder: 0 (off)
Default decoder: 28800 (8 hours)
Example: AUTOSTART 3600

300 seconds equals 5 minutes
3600 seconds equals 1 hour

COMMIT

This command saves the changed parameter(s) into permanent memory. A commit command must be issued before a reboot or power cycle to save the altered parameters. Commit may be executed at any point in the editing process; but must be the last command before reboot, if those parameters are to be saved.

DEATHBLOW

This command causes a reboot of the device. The purpose of this command is to cause a reboot from the password prompt. If the user cannot login because the "Another administrator is logged in." message occurs, using "DEATHBLOW" as the password will return the unit to the power up state.

EXIT

Exits from the command prompt and releases the current login. You may also use the following alternatives as well LO (LogOff) and QUIT.

NTSC

This command configures the unit for NTSC video operation.

PAL

This command configures unit for PAL video operation.

REBOOT

This command restarts unit, setting the device to a known power up condition. Most changes in device settings require a reboot after a commit.

START

This command starts encoding or playback (video out).

STREAMTYPE [t|p]

This command selects between Program and Transport multiplexing of the video stream. Acceptable parameters are T or P, where P is Program and T is Transport.

Default: P (program stream)
Example: STREAMTYPE T (transport stream)

STOP

This command stops encoding or playback (video out).

VER

This command displays the software version/build date, BSP (board support package) version/build date, and board revision.

Example response:
Version: VCX4400e v1.0h, Date: 10AUG05
BSP VCXWIS v1.2, 29SEP04
Board revision: 2.4

TFTP

This command allows you to choose the server IP you want information to be sent from in order to update your Firmware.

Example: TFTP <Server IP> <file name>

The default file name, if you do not type in a file name is vcx6400d.tgz

SNMP Commands

SNMPMANAGER add <HOST IP> public

This command all you to add an SNMPManager host to receive traps.

Example: SNMPMANAGER add 192.168.11.4 public

ROCOMMUNITY <string>

This command allows you to change the current Read Only community string.

Example: ROCOMMUNITY public

RWCOMMUNITY <string>

This command allows you to change the current Read Write community string.

Example: RWCOMMUNITY private

Test Procedures

Direct Connection Verification
1. Select an encoder-decoder pair
2. Connect an RJ-45 loop back plug into a communications (data comm port) port to be tested.
3. Fabricate an Ethernet Crossover cable per figure 3.
4. Connect the crossover cable between the decoder Ethernet port and the decoder Ethernet port.
5. On the encoder, insert video into the video input using a 75-ohm coax cable. The video source can be from a camera, DVD, VCR, or a color bar generator.
6. At the decoder, connect a video display to the video out cable using a 75-ohm coax cable.
7. Confirm video is being displayed on the monitor.
8. At the encoder, connect a cable to communications port being tested to a data source. This can be a computer in hyper-terminal mode or a Bit Error Rate Tester (BERT). Cable carries the data into the decoder and looped back data from the decoder.
9. If the BERT is being used as a data, source start the BERT test and observe error free data being processed. If the data source is a computer in hyper-terminal mode type on the keyboard and confirm what is typed is being echoed back to the computer.
10. Data presented to the encoder data port will appear at the decoder sub-channel port. To view this data a second hyper-terminal may be used.
11. With valid data flow and good video, the system exhibits proper operation.

Figure 11 – Back-to-Back Test Configuration (Card cage units pictured)

Indirect (Network) Connection Verification
1. Select an encoder-decoder pair as in the direct connection verification procedure. Be sure to record all parameters being changed before making changes, as these parameters are temporary and may need to be restored.
2. Connect an RJ-45 loop back plug into a communications (data comm port) port to be tested.
3. Connect both the encoder and decoder to the network switch using standard ethernet cable (NON-crossover type).
4. On the encoder, insert video into the video input using a 75-ohm coax cable. The video source can be from a camera, DVD, VCR, or a color bar generator.
5. At the decoder, connect a video display to the video out cable using a 75-ohm coax cable.
6. Be sure the "VideoIP" of the decoder is set to the "VideoIP" currently programmed into the encoder. See Appendix A for unit setup procedures.

7. Verify the "StreamType" is set to "Program" on both the source encoder and the decoder under test. See Appendix A for unit setup procedures.
8. Confirm video is being displayed on the monitor.
9. Serial communications are fully bidirectional; therefore, the loop back jumper may be placed at either end of the pair under test. Note: RS232 and RS422 loop back jumpers are different and require a unique setup procedure. A PC running a terminal program (no local echo) is connected to the opposite end of the pair under test. All characters transmitted will be echoed at the terminal. A BERT may be used in place of the PC running the as a terminal.
10. If the BERT is being used as a data source, start the BERT test and observe error free data being processed.
11. Data presented to the terminal (Source data port) will appear at the destination sub-channel port and will be looped back as an echoed character. To view this data on the destination port a second PC-terminal may be used.
12. With valid data flow and good video, the system exhibits proper operation.
13. Return the encoder to previous settings.

Specifications

Physical and Environmental

Dimensions

11.0" x 5.25"

Mounting

R-12 Card Cage Enclosure

Weight

.6 pounds

Temperature

-20 degrees to + 70 degrees Centigrade
(-4 to 158 degrees Fahrenheit)

Humidity

0 to 95% non-condensing

Power Requirements

110-220 VAC 50 or 60 hertz

Connectors

Video

NTSC/PAL   BNC

Power

From Back-plane (33x3 pin)

Data

Network   RJ-45
Comm ports   RJ-45

Electrical

Video Input (NTSC/PAL)

Impedance: 75 ohm unbalanced, return loss ≥ 30 dB

Dynamic
 Range: .5 volts to 2.0 volts peak to peak

Video Output (NTSC/PAL)

Impedance: 75 ohm unbalanced, return loss ≥ 30 dB

Output Level: 1.0 volts peak to peak nominal
                  (.9 volts minimum to 1.1 volts maximum)

Sync Level: 257 mV (36 IRE) to 314 mV (44 IRE)

Bar Level: 642 mV (90 IRE) to 785 mV (110 IRE)

Burst Level: 257 mV (36 IRE) to 314 mV (44 IRE)

Resolution: Full D1: 720h x 480v (NTSC); 720h x 576v (PAL)
               1/2 D1: 352h x 480v (NTSC); 480h x 576v (PAL)
               CIF: 352h x 240v (NTSC); 352h x 288v (PAL)
               QCIF: 160x120
               QQCIF: 80x60

Frame Rate: 1 to 30 frames per second maximum

Data (Network)

Format: Ethernet IEEE 802.3; 10/100 Base T

Line Rate: down to 64kbps

Data (Sub-channels)

Format: RS-232 or RS-422 (programmable) (2)

Data Rates: 2400, 4800, 9600, 19200, 38400 bps

Programming Data

Format: EIA RS-232C (primary data lines)

Rate: 38.4 kbps

Form: 8-bit data, 1 stop bit, no parity

Part Numbers

Base Models

The basic models of the VCX4400 series units are shown below. The standalone model is offered in a desktop model and a 19-inch rack model supporting one or two units side by side. The other version is a card only unit designed for the 19-inch rack 12 card chassis offering the higher density mounting option.
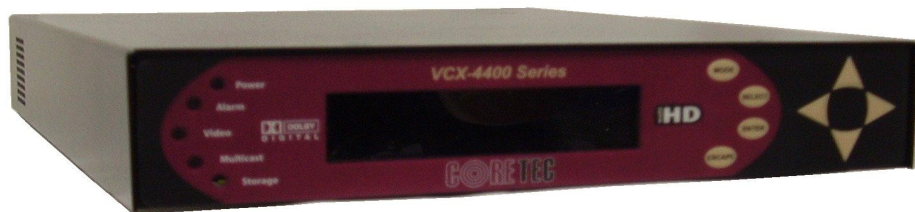

Figure 12 – VCX-6400-D Desk Top Model

Figure 13 – VCX-6400-D-R Card Cage Model

Accessories

Figure 14 – R-12 Front View

Figure 15 – R-12 Back View
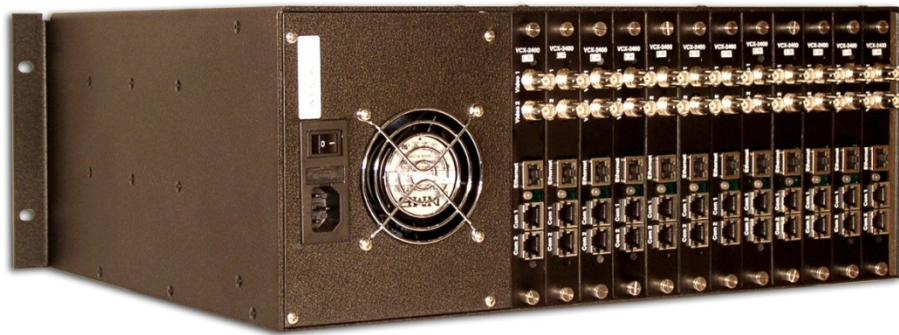
R-12   Twelve Card 4U Enclosure (see R-12 data sheet for product options and accessories)

Figure 16 – R-2 Front View

R-2   Side-by-side 2 unit 1U 19-inch Enclosure

Figure 17 – Tray-19

Tray-19   19-inch tray for –D units

Figure 18 – Ethernet Cable to DB-9 Adapter

PCA-4400/6400   Serial interface adaptor

SW-2400   Video Watchdog™ User Software

Appendix A

Unit Setup

The default settings from the manufacturer may not permit the normal operations to commence on powering up the unit for the first time. The user may need to change the default settings to enable a link between the new unit and others on the network. By following the steps below, the new unit will be properly configured for the user network.

Note: The "commit" command is not required after each command as shown; however, it must be the last command executed or changes will not be saved and will be lost on reboot.

Common notation used is as follows:
<sp> is used to denote a white space is required
<enter> denotes the line termination character usually the "Enter" key on the keyboard or the ASCII "cr".

1. Establishing the telnet connection

   a. The default address of the decoder is 192.168.0.254. The PC running the "Command Prompt" must be on the same subnet. Change the PC network address to 192.168.0.xxx. Do not change the last field of your address. Note: be sure there are not other users on this subnet.
   b. From the command prompt window type "telnet 192.168.0.254<enter>"
   c. When the connection is made the unit response is: "Enter Password:"
   d. Enter "admin<enter>"
   e. Unit response is:
      > Welcome to the VCX4400D Command Shell
      > Type HELP for more info, or EXIT to close
      > >
      > Note: the unit may display informational and or status records from time-to-time.

2. Setting the Unit Video Configuration

   a. Type "display<sp>video<enter>" without the "" marks
   b. Unit response is:
      ```
      ----------------------------------------------------------------------
      Device:  VCX4400D 0281 (SN#)
      ----------------------------------------------------------------------
      Video Standard = NTSC
      Video source = UDP
      ```

HTTP URL =
Audio = OFF
Video Compression = MPEG-4
Stream Type = Transport
Video buffer manager Low[75], High[400] (units: msec)
>

c. Change the Stream Type to "RTP" by entering:
>streamtype r<enter>
>commit<enter>
>reboot<enter>

d. Log in again using the "telnet" procedure as before to reestablish communications with the unit. Note: Wait about 15 to 30 seconds for the unit to start up before attempting the telnet operation.

e. The user may view all the IP parameters by entering the following command "display<sp>ip<enter>"

Unit response is:

```
----------------------------------------------------------------------
 Device:  VCX4400D 0281 (SN#)
----------------------------------------------------------------------
=============== IP SETTINGS ==============
MAC address = 00 0a fc 02 81 00 (all are different)
DHCP is Disabled
IP = 192.168.0.58
IP Mask = 255.255.255.0
Default Gateway not configured
Command Port = 5000
Video Data IP = 239.5.6.175
Video Data Port = 4568
Discovery IP = 239.5.6.0
Discovery Port = 5000
Active discovery is 2 seconds
>
```

f. The user may view a different video stream by changing the "Video IP Address" to the source encoder data stream address by entering:
>videoip<sp>xxx.xxx.xxx.xxx<enter>
Note: this command will alter the parameter displayed in the above IP settings labeled "Video Data IP" until a reboot cycle. If the unit is to remain in this configuration after a reboot cycle, be sure to perform the commit operation to store the adjusted parameters in to permanent memory.

g. If the output stream is not available from a known good source, then the user may want to telnet to the source encoder and perform a start or reboot operation if the encoder has stopped.

The VCX-6400-D unit will be decoding the selected video channel if the address is a MPEG4 encoded source.

3. Setting the Unit Sub-Channel Configuration

The default settings for the serial port are - disabled (Off), 9600 baud, RS232 mode, no parity, 1 stop bit, IP address 192.168.0.253, and Network port 5002. To use the serial port some configuration will be required.

    a. The user may view all Com parameters by entering the following command "display<sp>com<enter>"

Unit response is:

```
-----------------------------------------------------------------
Device:  VCX4400D 0281 (SN#)

-----------------------------------------------------------------
========== COM PORT SETTINGS ============
Com 1 = Off
Com 1 baudrate = 9600
Com 1 mode = RS232
Com 1 parity = None
Com 1 stop bits = 1
Com 1 IP = 192.168.0.253
Com 1 Port = 5002
```

    b. The serial port must be enabled before serial traffic will be supported. The following command will enable the serial port:

```
>com1<sp>1<enter>
>commit<enter>
```

    c. The user will need to set the Com 1 IP address to something other than the default if more that one unit is online. This command is an example and will set the com1 IP to 239.5.6.10:

```
>com1ip<sp>239.5.6.10<enter>
>commit<enter>
```

    d. The serial port interface is set to RS232 by default and may be changed to RS422 by the following command:

```
>com1mode<sp>1<enter>
>commit<enter>
```

The serial port configuration is complete and ready for communications over the network. Any other unit programmed with this decoders COM1IP address will be linked to it through the network. Take note the other unit must be configured as this one is now and must use TCP connection protocols, UDP protocols are not supported at this time. See the encoder manual TCP/UDP setup.

Appendix B

MPEG-2 is the designation for a group of coding and compression standards for Audio and Video (AV), agreed upon by MPEG (Moving Pictures Experts Group), and published as the ISO/IEC 13818 international standard. MPEG-2 is typically used to encode audio and video for broadcast signals, including direct broadcast satellite and Cable TV. MPEG-2, with some modifications, is also the coding format used by standard commercial DVD movies. Using MPEG2 requires paying licensing fees to the patent holders via the MPEG Licensing Association.

MPEG-2 includes a Systems part (part 1) that defines two distinct (but related) container formats. One is Transport Stream, which is designed to carry digital video and audio over somewhat-unreliable media. MPEG-2 Transport Stream is commonly used in broadcast applications, such as ATSC and DVB. MPEG-2 Systems also defines Program Stream, a container format that is designed for reasonably reliable media such as disks. MPEG-2 Program Stream is used in the DVD and SVCD standards.

The Video part (part 2) of MPEG-2 is similar to MPEG-1, but also provides support for interlaced video (the format used by analog broadcast TV systems). MPEG-2 video is not optimized for low bit-rates (less than 1 Mbit/s), but outperforms MPEG-1 at 3 Mbit/s and above. All standards-conforming MPEG-2 Video decoders are fully capable of playing back MPEG-1 Video streams.

With some enhancements, MPEG-2 Video and Systems are also used in most HDTV transmission systems.

The MPEG-2 Audio part (defined in Part 3 of the standard), enhances MPEG-1's audio by allowing the coding of audio programs with more than two channels. Part 3 of the standard allows this to be done in a backwards compatible way, allowing MPEG-1 audio decoders to decode the two main stereo components of the presentation.

Part 7 of the MPEG-2 standard specifies a rather different, non-backwards-compatible audio format. Part 7 is referred to as MPEG-2 AAC. While AAC is more efficient than the previous MPEG audio standards, it is much more complex to implement, and hardware that is somewhat more powerful is needed for encoding and decoding.

http://en.wikipedia.org/wiki/MPEG-2

MPEG-4 is a standard used primarily to compress audio and video (AV) digital data. Introduced in late 1998, it is the designation for a group of audio and video coding standards and related technology agreed upon by the ISO/IEC Moving Picture Experts Group (MPEG). The uses for the MPEG-4 standard are web (streaming media) and CD distribution, conversational (videophone), and broadcast television, all of which benefit from compressing the AV stream.

MPEG-4 absorbs many of the features of MPEG-1 and MPEG-2 and other related standards, adding new features such as (extended) VRML support for 3D rendering, object-oriented composite files (including audio, video and VRML objects), support for externally-specified Digital Rights Management and various types of interactivity. AAC (Advanced Audio Codec) was standardized as an adjunct to MPEG-2 (as Part 7) before MPEG-4 was issued.

Most of the features included in MPEG-4 are left to individual developers to decide whether to implement them. This means that there are probably no complete implementations of the entire MPEG-4 set of standards. To deal with this, the standard includes the concept of "profiles" and "levels", allowing a specific set of capabilities to be defined in a manner appropriate for a subset of applications.

http://en.wikipedia.org/wiki/MPEG-4

Elementary stream (ES) is an elementary stream contains only one kind of data, for example audio or video. The output of a video encoder is an elementary stream. The output of an audio encoder is also an elementary stream. Sometimes referred to as "elementary", "data", "audio", or "video" bitstreams or streams. Defined by MPEG communication protocol.

Packetized Elementary Stream (PES) is a form of the elementary stream that is divided into smaller segments called packets. This allows other communication channels to avoid long periods of media tie-ups.

Transport stream (**TS**) is a format specified in MPEG-2 Part 1, Systems (ISO/IEC standard 13818-1). Its design goal is to allow multiplexing of digital video and audio and to synchronize the output. Transport stream offers features for error correction for transportation over unreliable media, and is used in broadcast applications such as DVB and ATSC.

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Appendix C

Pinouts

Com Port Data Interface Pin Out (uses RJ-45 Plug)

Pin	Signal	Description	Signal Type
1	RS-232	Receive	Input
2	RS-232	RTS	Output
3	RS-232	Transmit	Output
4	RS-232	CTS	Input
5	RS-422	Receive Data +	Input
6	RS-422	Transmit Data -	Output
7	RS-422 RS-232	Receive Data - Ground	Input Ground
8	RS-422	Transmit Data +	Output

Standard Ethernet Pin Out
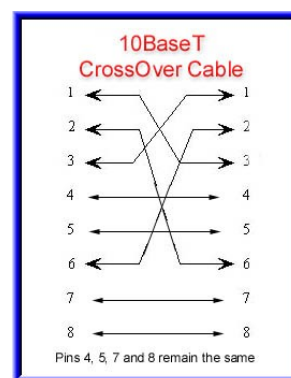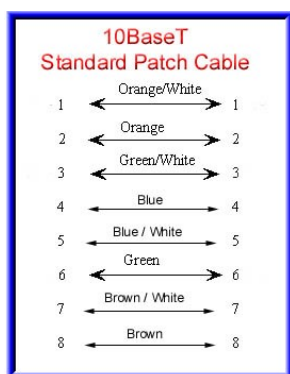
Straight Through Ethernet Pin Out
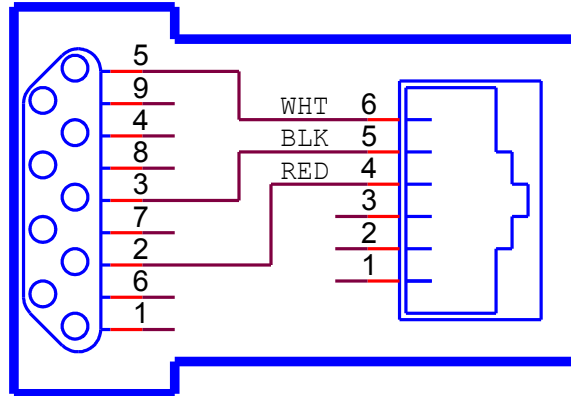
Cross Over Ethernet Pin Out

RJ-11 to Serial Interface Adaptor Pinout

The PC should have its Com Port configured as:

Baud rate 38,400 kbps
Data bits 8 bits
Parity No Parity
Stop Bits 1 Stop Bit
Flow control None

Manufacturer Supplied Serial Adaptor

Below is the pin layout of the RJ-11:

Pin	Function
1	Ground
2	Unused
3	Unused
4	Serial Out
5	Serial In
6	Ground