



## INSTRUCTION MANUAL

**Sensoray Model 241XX-XXXX**

**MPEG1/2 Video over I.P.  
June, 2005**



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# Warranty and Handling Instructions

Sensoray Company, Incorporated (Sensoray) warrants the Model 241XX-XXXX system to be free from defects in material and workmanship and perform to applicable published Sensoray specifications for two years from the date of shipment to purchaser. Sensoray will, at its option, repair or replace equipment that proves to be defective during the warranty period. This warranty includes parts and labor.

The warranty provided herein does not cover equipment subjected to abuse, misuse, accident, alteration, neglect, or unauthorized repair or installation. Sensoray shall have the right of final determination as to the existence and cause of defect.

As for items repaired or replaced under warranty, the warranty shall continue in effect for the remainder of the original warranty period, or for ninety days following date of shipment by Sensoray of the repaired or replaced part, whichever period is longer.

A Return Material Authorization (RMA) number must be obtained from the factory and clearly marked on the outside of the package before any equipment will be accepted for warranty work. Sensoray will pay the shipping costs of returning to the owner parts which are covered by warranty. A restocking charge of 25% of the product purchase price, or \$105, whichever is less, will be charged for returning a product to stock.

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## 1 Introduction

### 1.1 General Functional Description

The model 241XX-XXXX system is a complete stand-alone video stream server. It converts regular NTSC or PAL video input signals, converts them to MPEG1/2 formats and transmits the compressed video over Ethernet or Wireless 802.11b networks. The 241XX-XXXX system uses RTP and UDP protocols for transmission of video over a network. The system allows the user to record video clips either locally on the 241XX-XXXX system or sent over the Ethernet for remote viewing. Depending on configuration the 241XX-XXXX system can encode up to 4 video streams simultaneously with each video stream transmitting at 30 fps in NTSC format or 25 fps in PAL. The maximum number of cameras that can be connected to a single 241XX-XXXX system is 16.

Since 241XX-XXXX system is bi-directional it can either encode or decode a video stream. It can either receive a video stream from another 241XX-XXXX system or transmit to another 241XX-XXXX system via Ethernet. This flexibility allows the system to be an ideal solution for streaming video over LANs/WANs.

#### a) Possible Uses of the 241XX-XXXX System

There are a wide variety of applications where the 241XX-XXXX systems may be used. Here are just some of them:

- Various types of security systems
- Traffic monitoring
- Remote monitoring over internet/network
- Remote camera control and recording
- Wireless monitoring/control
- Police patrol in-cruiser video monitoring and recording
- Digital video distribution
- Digital video recorder
- Streaming video over network

#### b) Audio

The basic model 241XX-XXXX has one stereo audio input and output that are synchronized to the MPEG video. A basic model 2412X-XXXX does not have audio. A basic model 2416X-XXXX does have the audio feature.

#### c) Latency

If RTP protocol is used in the transmission of video then the latency is approximately 2 to 5 seconds, depending on the set bitrate. Higher bitrate produces lower delay. If Sensoray stream format is used (modified transport

stream) then the latency is less than 1 second if Sensoray's 2400WDCS control and display software is used.

If system is configured for RTP protocol then Apple Computer's free QuickTime player may be used to view the stream.

If system is configured for UDP protocol then Sensoray's Control and Display software may be used to view the video.

#### d) Supported Protocols

As mentioned above the 241XX-XXXX system supports UDP and RTP protocols.

The UDP format (user datagram protocol) offers the fastest data rates and minimum CPU usage at the expense of minimal error checking. A disadvantage of the UDP format is that it cannot be played using popular stream players such as QuickTime. However, the latency i.e., the time delay between recording and displaying, while using these players, can be several seconds.

The RTP format (real time protocol) trades off CPU and memory usage for error correction and compatibility with QuickTime and Real Player. Sensoray sells a multi-stream, low-latency software RTP player for Windows 2000 and XP. The latency of Sensoray's software player can be as low as one half second when processed on a 2 GHz, Pentium-4 system. A disadvantage of RTP is that it uses twenty-five percent of the 2416's CPU time, while UDP uses less than five percent. Hence, the 241X-XXXX can only support two RTP streams.

### 1.2 Basic Composition of a 241XX-XXXX System

There are various configurations available with the system however a basic 241XX-XXXX system consists of the following components:

- 1 – Sensoray model 301-06 CPU with Linux web server
- 1 – Sensoray model 516/512 Real time MPEG1/MPEG2 frame grabber
- 1 – Sensoray model 207 power supply

**NOTE:** Please refer to the "Design Assistant" on Sensoray's 2412/2416 web pages to configure your system for the optimum number of channels, camera type, network type, etc.

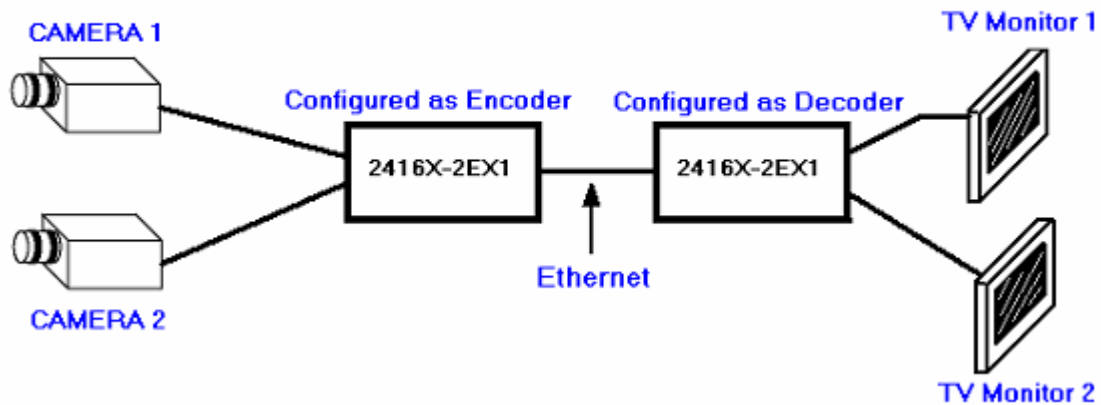
#### a) Available Configuration Options

The system can be configured with the following configurations:

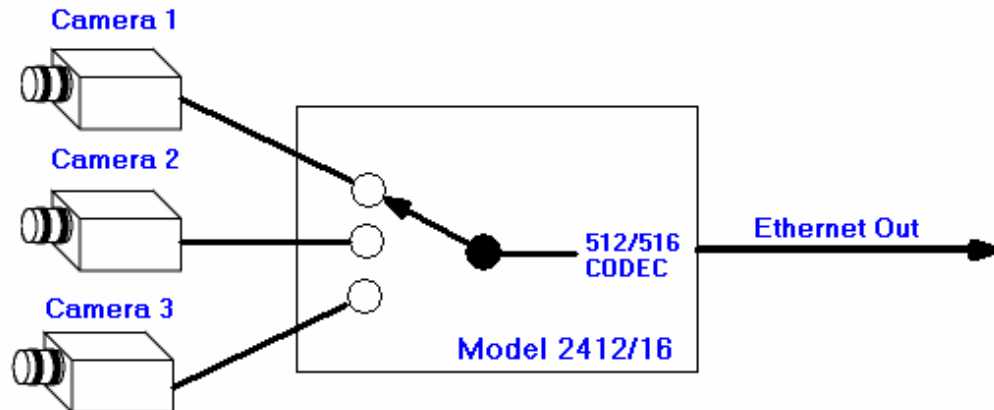
- Encoder (default)-streams the compressed video
- Decoder-receives the compressed video, see (Fig. 2a)
- Wireless Ethernet Access Point
- 802.11b Encoder, Decoder
- On-board video storage on a compact flash

- Different enclosure options (see website)
- Variable number and type of video inputs
- Up to 4 video channels at 30fps/channel
- Patch antenna and pole mount kit for external pole mounting
- Up to 4 composite video inputs or 2 composite and 1 S-Video per codec see (Fig. 2b) below

**Encoding/Decoding Configuration (Fig. 2a)**



**Sequential Camera Selection Using One Codec (Fig. 2b)**



Using the above configuration the user will not achieve 30fps/camera. To achieve 30fps/camera one codec/camera must be used.

**2.0 Feature Descriptions**

**2.1 Web Server**

The 241XX-XXXX is an Ethernet appliance that executes commands from a Telnet command line, Sensoray's Display & Control software or from its internal Apache web server. Most browsers can control and display information from the

241XX-XXXX system however to use the system's controls through the web page the user must have Internet Explorer V6 or higher. Each 241XX-XXXX supports four video channels that are assigned to separate ports.

The system is supplied with specially configured Linux for high reliability and fast response. After power is applied, the software is automatically loaded to RAM from flash memory. The system will then start performing the default configuration instructions set up by the user.

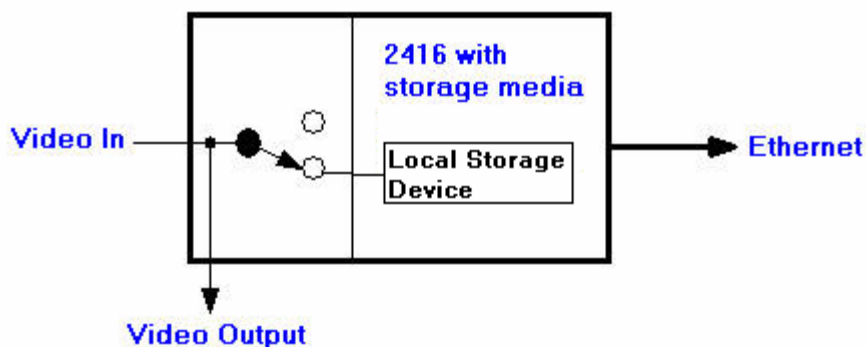
**Although our 2416 software may run on other CPU's only Sensoray supplied CPU's are supported. Sensoray will not assist anyone installing or trying to reproduce our software on other manufacturer CPU's.**

## 2.2 Digital Video Recorder

Video clips may be stored on 2416 servers that have internal storage media as described in this section. The video may be replayed from local or from remote 241XX-XXXX's or they may be rapidly downloaded to remote clients. For example, the daily movies accumulated in a vehicle's DVR may be rapidly transferred over an 802.3 wired Ethernet.

Movies can be stored on a removable compact flash card. In the local record mode, MPEG data from the codec is recorded to a storage media. Proper care is taken to prevent significant data loss in the event of a power loss. While data is being recorded it is also available as composite video from the codec, see (Fig. 3.1) below.

**Simultaneous Video Recording and Viewing (Fig. 3.1)**



Once MPEG video data is stored on the 2416 it may be decoded and viewed by using the 2416's hardware decoding and a video output channel. Recorded movies can also be sent over the Ethernet for remote viewing with QuickTime or Real Player. In this case, the 2416 sends MPEG data which the software player must decode.

### 2.3 Video Storage

There are a couple storage options.

Video clips may be stored on a 2.5 inch IDE hard drive by adding the 300TA interface board and IDE cable. IDE mechanical hard drives have limited temperature and vibration specifications, hence, they are not recommended for use in vehicles or outdoors environments. Some 2.5-inch hard drives may draw too much power from the 2416's power supply and must be powered by an auxiliary power source. Mechanical IDE hard drives have the advantage of low cost and high density.

Compact flash modules may be used with the model 340 option board. They are rugged solid state storage media with capacities up to one gigabyte. They appear as a mountable disk drive to the Linux OS. These modules are limited to 300,000 memory write cycles, hence, they do not have the versatility of mechanical hard drives. We have developed drivers for Lexar ATA, SanDisk, and Hitachi modules.

#### a) Installation of Different Compact Flash Models

If user is using a compact flash model other than Lexar, SanDisk or Hitachi then they must define the compact flash model in the ide.conf file. If this is not done then, upon boot up, the compact flash will not be recognized.

To define a new type of compact flash go to:

..etc/pcmcia/ide.conf

-open ide.conf and add a definition for the new compact flash model (see existing definitions on syntax format)

**Note:** the "manfid" number must be found by the user. It is a good practice to first try a compact flash that is defined ie. SanDisk, Lexar, etc. to make sure it is functional before adding any new definitions

### 2.4 Camera Control

The 241XX-XXXX's CPU sends pan, tilt and zoom command from the Ethernet to one of the RS-232 ports. Many cameras use serial ports for position control. PZT software is included for popular camera assemblies such as Sony (Visca), Pelco(D protocol) and Cohu (iDome).

To facilitate camera adjustment the digitized video can be looped back to the composite video output for viewing on a TV monitor. This is the default mode for the video output.

Using Sensoray's model 2400WDCS real-time display and control software user may decode, control and display up to fifteen MPEG1 and/or MPEG2 streams with a low latency of 1/2 to one second. Thumbnail images from remote video servers may be positioned over a background such as a map or building plan. Multiple server images may be selected for expansion to full size and full frame rate. Users can have several preinstalled configurations (background with arranged cameras) with easy switching between.

## 2.5 Bit Rates and Bandwidth

Model 241XX-XXXX system features selectable bit rate functionality.

Higher bit rates from the MPEG codec give better quality images than lower rates. Full-size interlaced images of 30 frames/sec will start to show noticeable distortions below 1 Mbits/sec. Selecting bit rate of 4Mbits/sec yields a DVD type quality of video. A bit rate of 4Mbits/sec and higher will be unnoticeable in majority of scenes. Some difference in video quality will only be noticeable in high action scenes.

The amount of distortion in high action scenes is much more noticeable in lower quality setting (eg. 200kbits/sec).

A variable or constant bit rate may also be selected for the encoding of the MPEG stream. A variable bit rate should be chosen for the best video quality. In variable bit rate encoding, the bit rate is adjusted according to the compression difficulty of the frame sequence. This mode tries to maintain good image quality by allocating more bits to the more difficult frame sequence (action) which yields a better image quality. Variable bit rate makes a more efficient use of the overall storage media bit capacity.

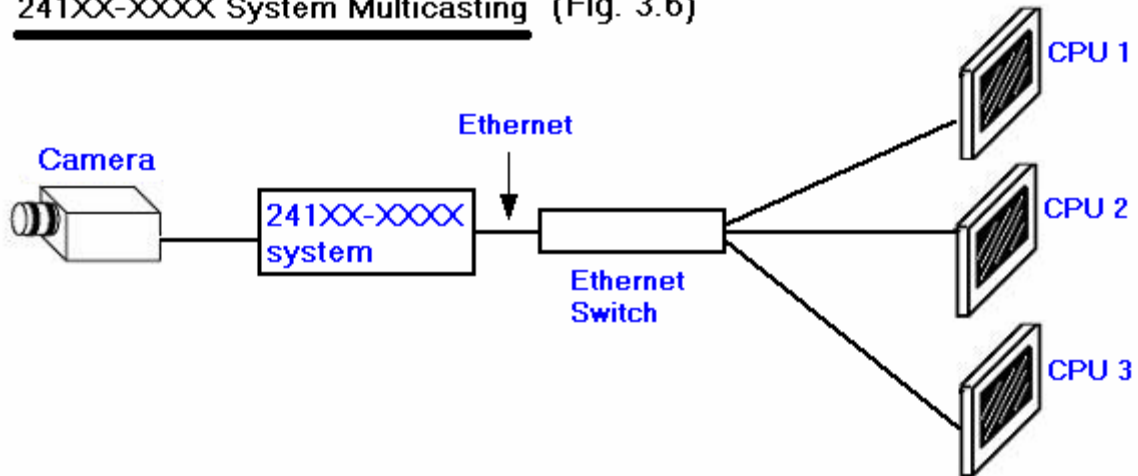
In constant bit rate, all the motion sequences are encoded in the same rate. Therefore if there is motion in a scene then it may render lower quality video since more bits were needed to encode the more difficult part of frame sequence.

Another possible way to decrease the bandwidth is by decreasing the image size. Selecting CIF size images of 320 x 240 pixels will reduce the required bit rate by four compared to 640 x 480 pixel images that occur at the same frame rate.

## 2.6 Multicasting and Unicasting

The 241XX-XXXX system supports multicasting (see Fig. 3.6) and uni-casting. Video streams from 2416's may be viewed simultaneously by several clients on the same network by using multicasting. The 241XX-XXXX automatically stops multicast streaming to RTP clients once they close their RTP player. Multicasting may be replaced with uni-casting by sending a command to the 241XX-XXXX's command processor.

241XX-XXXX System Multicasting (Fig. 3.6)



### 3. System Operation and Functions

The Sensoray model 241xx-xxxx stack consists of a Sensoray model 301 CPU board, a Sensoray model 516/512 MPEG encoder/decoder board, the Linux operating system installed on a solid state disk, and a UDP video server and client.

After applying power, this system will automatically boot Linux and will be fully functional after approximately 30 seconds. By default, after booting, an RTP video server will be automatically streaming MPEG video over the Ethernet to port #18888. This video stream can be viewed by any player which accepts RTP stream such as QuickTime player. The 2416x-xxxx system can be set up to stream using Sensoray's format which has low latency of approximately 0.5 seconds.

### 4. Preference Options

There are several ways to change user preferences for the system. The simplest and recommended method is to change the settings via the browser configuration page which is accessed through the Ethernet port. You can also access the system via telnet and perform the necessary modifications, however, access via telnet will not be covered by this manual. If the system's IP address conflicts with another node on your network, you will need to connect to a dumb terminal (or terminal emulator (VT100) on a PC) to the serial port (com1) on the 2416xx-xxxx (9600 baud, 8 bits, no parity). A step by step procedure will be given.

Currently only UDP multicasting is supported. All your network hardware must support multicasting. Procedures for setting up the 241XX-XXXX as well as getting started follow.

#### a) Setting up the 241xx-xxxx via Browser Interface (Recommended)

1. Connect video source to the system.
2. The default IP address for the system is 10.135.1.99
3. Connect network cable to the 241XX-XXXX, if the factory IP address (10.135.1.99) will conflict with your network you will need follow the **"Setting up the 241XX-XXXX via serial terminal"** procedure described in
4. Connect +12 to +24 VDC to input of Power Supply board and turn ON the power supply.
5. Wait approximately 30 seconds.
6. Open Internet Explorer V6.0 or higher and type in 10.135.1.99 into the address bar. If a page (Fig. 1) doesn't open then wait a few more seconds (to make sure it finished booting) and retry.
7. 241xx-xxxx web interface should open up (see Fig. 1 below).
8. The default stream will be configured for RTP streaming therefore you can click on "*View real-Time stream*" which will open the default RTP player on your system (such as QuickTime) and user should be able to view the video stream.
9. If video doesn't appear then make sure that in the "*Stream*" tab has the following parameters:  
Server type: MPEG-over-IP transmit RTP  
Auto start: NO  
Multicast: NO  
Port number: 18888  
Encoder Picture size: MPEG-1

If the above parameters are present but the video still does not appear then please refer to Section G on basic troubleshooting tips.



## b) Changing Video Stream Parameters

1. For changing various video stream parameters click on the “Stream” tab and a page will appear with many different settings (see Fig. 2). The configuration shown in Fig. 2 is also the default setting
2. For the description and effects of variable parameters please see the description table below Fig. 2. If a certain setting, entered by the user, conflicts with another setting, the conflicting fields will be automatically disabled to prevent user errors.

### Configure Stream Server

Control

Stream

System

Peripherals

Help

Select server

#### Server Attributes

Server	Symbolic name	<input type="text" value="Server 1"/>
	Auto-start	<input type="text" value="No"/>
	Type	<input type="text" value="MPEG-over-IP transmit RTP"/>

#### MPEG-over-IP

Mode	Multicast	<input type="text" value="No"/>
	Interface	<a href="#">Help</a>

Transmit	Address	
	Port number	<input type="text" value="18888"/>

Receive	Address	
	Port number	

[Help](#)

#### Video Recorder [Help](#)

Record	Record time	<a href="#">Help</a>
	Circular	<a href="#">Help</a>

Playback	Start time	
	Stop time	
	Repeat	

[Help](#)

#### Database [Help](#)

Record	Clip length	<a href="#">Help</a>
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Device 0	Mount point	
	Free KB	

Device 1	Mount point	
	Free KB	

Device 2	Mount point	
	Free KB	

Device 3	Mount point	
	Free KB	

#### Caption [Help](#)

Caption	Enable	<input type="text" value="Off"/>
	Text	<input type="text" value="captiontest"/>

<b>Font</b>	Color	White
	Transparency	Transparent
	Scale	X2
<b>Position</b>	X	11
	Y	21
<b>MPEG Codec</b>		
<b>Encoder</b>	Video input	Composite video input 0
	Video bit rate	1 MBits/s
	Variable bit rate	No
	Picture size	MPEG-1
	Audio bit rate	112 KBits/s
	Mux format	Video elementary stream
<b>Video</b>	System	NTSC
<b>Audio</b>	Input source	
	L/R selection	
	Default out volume	10 (max)
Password: <input type="text"/>		<input type="button" value="Submit"/> <input type="button" value="Reset"/>

2. Please refer to the table below for item descriptions on variable parameters

PROPERTY		DESCRIPTION
<b>Server Attributes</b>		
Server	<b>Symbolic name</b>	may change this to any name of user preference
	<b>Auto start</b>	selects to start the server automatically or manually
	<b>Type</b>	selects the type of protocol for video transmission
<b>MPEG-over-IP</b>		
Mode	<b>Multicast</b>	selects to send to single or multiple addresses
	<b>Interface</b>	selects the interface from which to stream
Transmit	<b>Address</b>	selects the destination address where the server will be streaming
	<b>Port number</b>	selects destination port number
Receive	<b>Address</b>	only if multicasting selected, specifies the multicast IP address to which the incoming stream will be directed
	<b>Port number</b>	this designates the IP port number that will be used by the 2412 to receive the stream
<b>Video Recorder</b>		
Record	<b>Record time</b>	applies only when Server Auto-start is set to YES, in conjunction with circular it specifies how long to record after boot up When set to non-zero value: if Circular is NO, recording will stop when database becomes full, if Circular is YES then recording will wrap around and over-write the oldest recorded MPEG data until the specified time has elapsed When set to zero: if Circular is NO recording will automatically stop when database becomes full, if Circular is YES then recording will wrap around forever over-writing the oldest recorded MPEG data
	<b>Circular</b>	NO - recording will stop when storage becomes full YES - recording will wrap around over-writing oldest recorded MPEG data

<b>Playback</b>	<b>Start time</b>	applies only when Server Auto-start is set to YES - specifies start of selected movie
	<b>Stop time</b>	applies only when Server Auto-start is set to YES - specifies stop of selected movie
	<b>Repeat</b>	selects whether to replay movie or play once
<b>Database</b>		
<b>Record</b>	<b>Clip length</b>	MPEG data is recorded in small clips of this size, choose larger size for higher storage capacity or a smaller size for playback granularity (its not possible to change clip length after the movie has been recorded)
<b>Device 0-3</b>	<b>Mount point</b>	selects the destination of the recording file for the specified device
	<b>Free Kb</b>	reserves the amount of memory to leave unrecorded on the device
<b>Caption</b>		
<b>Caption</b>	<b>Caption enable</b>	selects captioning
	<b>Caption text</b>	selects caption text
<b>Font</b>	<b>Color</b>	selects the font color for the caption text
	<b>Transparency</b>	selects the background of the caption window
	<b>Scale</b>	selects the size of the font for the caption text
<b>Position</b>	<b>X</b>	selects X coordinate for the caption box
	<b>Y</b>	selects Y coordinate for the caption box
<b>MPEG Codec</b>		
<b>Encoder</b>	<b>Video input</b>	selects the input of the video signal, Composite or S-video inputs
	<b>Video bitrate</b>	selects the video bit rate, this also determines the visual quality of the video
	<b>Variable bit rate</b>	selects either variable or fixed video bit rate
	<b>Picture size</b>	selects various video picture sizes
	<b>Audio bit rate</b>	selects audio bit rate for sound quality
	<b>Mux format</b>	selects different types of video streams, elementary stream-video with no sound, A/V Muxed - video with sound synchronized, Transport stream - currently not supported
<b>Video</b>	<b>System</b>	selects NTSC or PAL video system
<b>Audio</b>	<b>Input source</b>	currently not available
	<b>L/R selection</b>	currently not available
	<b>Default-out volume</b>	varies the volume, by default set to 10 (max)
	<b>Password</b>	N/A

- The settings in the table above are not available for all system configurations. Depending on the system configuration some options in the “*Stream*” tab will be disabled automatically to prevent user configuration errors.
- For PAL users, if video is suspect make sure that you have the following:
  - in the “ss0.conf” file found in “usr/etc” directory check the settings to make sure that “GOP\_SIZE=“4” , GOP\_IP\_DISTANCE=“1” , VIDEO\_SYSTEM=“PAL”
  - if these settings aren’t present then make the necessary modifications and do not make any other changes

### c) [Changing System Parameters](#)

- To change system parameters such as system’s IP address, Net mask, system time and other configurations user must access the “*System*” tab. Fig. 3 below shows the default settings.

### Configure System

Control

Stream

System

Peripherals

Help

#### System

<b>Host</b>	Name	<input type="text" value="2416"/>	<a href="#">Display file version info</a>
<b>Protocol</b>	telnet	<input type="text" value="Enabled"/>	
	ftp	<input type="text" value="Enabled"/>	
	routed	<input type="text" value="Enabled"/>	
	secure	<input type="text" value="Disabled"/>	
<b>Pcmcia</b>	Slot	<input type="text" value="Enabled"/>	
<b>Time</b>	Zone	<input type="text" value="US/Pacific"/>	
	Set to	<input type="text"/>	
	Current	2005/02/21 12:09:16	

#### Network

	IP address	Net mask	Gateway	DHCP	
<b>Interface</b>	eth0	<input type="text" value="10.135.1.99"/>	<input type="text" value="255.0.0.0"/>	<input type="text"/>	<input type="text" value="No"/>
	eth1	<input type="text"/>	<input type="text" value="255.255.255.0"/>	<input type="text"/>	<input type="text" value="No"/>
	eth2	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text" value="No"/>
	eth3	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text" value="No"/>

#### Ports [Help](#)

<b>Camera</b>	Control	<input type="text" value="21238"/>
<b>Stream</b>	Control	<input type="text" value="17740"/>

#### Serial

	Baud	Data	Stop	Parity	Flow control	
<b>Port</b>	ttyS0	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
	ttyS1	<input type="text" value="9600"/>	<input type="text" value="8"/>	<input type="text" value="1"/>	<input type="text" value="None"/>	<input type="text" value="None"/>
	ttyS2	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	ttyS3	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

#### Wireless

<b>Network</b>	Name	<input type="text" value="06907e"/>
	Type	<input type="text" value="Access point"/>
	Channel	<input type="text" value="0"/>
<b>Encrypt</b>	Enable	<input type="text" value="No"/>
	Key	<input type="text"/>

#### Passwords

<b>Camera</b>	Controller	<input type="text" value="XXXXXXXX"/>
<b>Stream</b>	Viewer	<input type="text" value="XXXXXXXX"/>
<b>System</b>	Setup	<input type="text" value="XXXXXXXX"/>
	Re-enter:	<input type="text" value="XXXXXXXX"/>

Password:

Submit

Reset

2. Please refer to the table below for item descriptions on variable parameters

PROPERTY		DESCRIPTION
<b>System</b>		
Host	Name	modifies host name to user's preference
Protocol	Telnet	allow/deny access to system through telnet protocol
	Ftp	allow/deny access to system through ftp protocol
	Routed	allow/deny access to system through routed protocol
	Secure	allow/deny access to system through secure protocol
PCMCIA	Slot	enables/disables pcmcia for the system
Time	Zone	selects time zone for the system
	Set to	modifies current time of the system
	Current	displays current time of the system
<b>Network</b>		
Interface	eth0-eth3	selects IP address, Net mask, Gateway and DHCP for each of the network devices on the system
<b>Ports</b>		
Camera	Control	used for controlling various servers on 24xx-xxxx, best to use numbers over 10000 to minimize conflicts with standard devices
		selects the base port number for controlling peripheral devices via the camera
		control client
Stream	Control	selects the base port number for controlling MPEG streams, each stream is assigned one port number with Stream0 being base port number
<b>Serial</b>		
Port	ttyS0-ttyS3	selects and modifies such parameters as baud, data, stop, parity and flow control for communication with the system through the terminal
<b>Wireless</b>		
Network	Name	specifies network name
	Type	selects peer-to-peer or access point type of networks, set to access point by
		Default
	Channel	selects the channel for the specified network type
Encrypt	Enable	allow/deny encryption of the video stream
	Key	specifies the key for locking/unlocking of the encryption
<b>Passwords</b>		
Camera	Controller	specifies the password for camera control client to enable camera control
Stream	Viewer	selects the password for access to the stream viewer
System	Setup	selects the master password for the 24xx system, <b>must specify this</b>
		<b>password in order to change camera and stream passwords</b>

#### d) Configuring Wireless Network

1. If the system contains wireless network option then the default configuration will appear as shown below.
2. As can be seen from the picture, eth1 is now enabled with its own IP address and net mask for the wireless adapter card. By having its own IP address, the user may access the wireless network through this address and make the necessary changes in the “*Stream*” tab.
3. Depending on user preference, the network type can be set up to stream as either “*Peer-to-peer*” or “*Access point*”. Peer-to-peer network type allows one wireless system to stream directly to another and can be interacting with only one system at a time. Access point network type allows one system to be accessed by many other wireless systems.
4. The default settings for a “Stream” tab are shown in a diagram below. *Server* and *Symbolic* names may differ. Note that the bitrate is not set to a high level. User must have a strong transmission signal in order to use the higher bitrate successfully. User should experiment within their environment which is the best tradeoff between bitrate, distance and reliability.
5. The “*Transmit address*” is the address where the wireless system will stream the video. This address will likely differ for a user’s system.



# Model

## 2412/2416

### MPEG-over-IP System

#### Configure Stream Server

[Control](#)[Stream](#)[System](#)[Peripherals](#)[Help](#)Select server 

### Server Attributes

**Server** Symbolic name   
Auto-start   
Type

### MPEG-over-IP

**Mode** Multicast   
Interface [Help](#)

**Transmit** Address   
Port number

**Receive** Address  
[Help](#) Port number

### Video Recorder [Help](#)

**Record** Record time [Help](#)  
Circular [Help](#)

**Playback** Start time  
[Help](#) Stop time  
Repeat

### Database [Help](#)

**Record** Clip length [Help](#)

**Device 0** Mount point  
Free KB

**Device 1** Mount point  
Free KB

**Device 2** Mount point  
Free KB

**Device 3** Mount point  
Free KB

Caption <small>Help</small>		
<b>Caption</b>	Enable	<input type="button" value="Off"/>
	Text	<input type="text" value="captiontest"/>
<b>Font</b>	Color	<input type="button" value="White"/>
	Transparency	<input type="button" value="Transparent"/>
	Scale	<input type="button" value="X2"/>
<b>Position</b>	X	<input type="text" value="11"/>
	Y	<input type="text" value="21"/>
MPEG Codec		
<b>Encoder</b>	Video input	<input type="button" value="Composite video input 0"/>
	Video bit rate	<input type="button" value="2 MBits/s"/>
	Variable bit rate	<input type="button" value="No"/>
	Picture size	<input type="button" value="MPEG-1"/>
	Audio bit rate	<input type="button" value="224 KBits/s"/>
	Mux format	<input type="button" value="Video elementary stream"/>
<b>Video</b>	System	<input type="button" value="NTSC"/>
<b>Audio</b>	Input source	
	L/R selection	
	Default out volume	<input type="button" value="10 (max)"/>
Password: <input type="text"/>		<input type="button" value="Submit"/> <input type="button" value="Reset"/>

### e) [Basic Troubleshooting Tips for Wireless Ethernet](#)

1. This section addresses very basic wireless problems that may occur. If these tips still do not solve the problem, we strongly encourage to contact Sensoray's technical support. Also, we do not insist that the solutions suggested is the only way to solve the problem but effort is put forth to simplify the solution.
2. There are many different factors that may cause the wireless system not to stream. If your system does not function with the settings you have selected then the first course of action would be to change the system settings to the default configuration and make sure that it still functions normally.
3. **Problems most likely to occur are:**
  - a) the unit does not stream at all
  - b) the stream breaks up frequently and re-connects
  - c) the unit stops transmitting/receiving after a few days

## **Suggestions:**

- a) Please double check the transmit address in the “Stream” tab to make sure that the destination address, in fact, exists. Also, make sure that network class addresses match for transmitter and receiver units as well as on user’s PC, if used. Check the video inputs to make sure they are correctly inserted. If the wireless Ethernet card is visible then check to make sure that LEDs are flashing rapidly and constantly which is a good indication that system is transmitting. User may log into the system via serial port or telnet (see instructions below) and use the “ifconfig” command to verify that “Tx bytes” value is actually increasing for eth1.
  
- b) This is perhaps the most common problem that may possibly occur. The most common factors that contribute to this behavior are: the bitrate is set too high, the distance between the transmitter and receiver is too large, there are too many obstacles/walls between transmitter and receiver, there is interference from other wireless devices using the same channel.  
User may change the channel number in the “System” tab and experiment with the performance on that channel. The user must also find the balance between the distance, bitrate and reliability for their particular operating environment.
  
- c) First priority is to make sure that the power supply is still functional and outputs the correct voltages. A power surge may have corrupted the power supply operation. Also check the unit to make sure that it is not excessively hot.  
Access the unit via serial port or telnet and use the “**ifconfig**” command for transmitter and/or receiver to see if the units are actually receiving or transmitting data by observing the change “**Tx bytes**” value.  
If all of the above mentioned point are done and there is still a problem then restart the system and make sure it is functional. If the unit exhibits the same behavior again, by stopping after a few days of operation, then contact Sensoray’s technical support.

## **f) Peripherals**

1. Refer to Fig. 4 below for default settings.

### Configure External Peripheral Devices

Control

Stream

System

Peripherals

Help

#### Devices

Interface	Device type <a href="#">Help</a>	Device count <a href="#">Help</a>	Device identifier <a href="#">Help</a>
ttyS0			
ttyS1	sony30	1	0
ttyS2			
ttyS3			

Password:

Submit

Reset

## PERIPHERALS

### Devices

Interface	Device Type	Device Count	Device Identifier
ttyS0-ttyS3			
selects the number of the terminal Interface	<p>specifies the device translator to be used on this interface. Choose a translator that is appropriate for the type of peripheral device connected to the interface</p> <ul style="list-style-type: none"> <li>▪ <b>Camera</b> - select a translator that is compatible with your camera. For example, 'sony 30' should be selected if you are using a Sony model EVI-D30/D31 or equivalent camera</li> <li>▪ <b>None</b> - select if no interface is used</li> </ul>	<p>specifies number of devices (as set forth in the Device Type field) that are connected to this interface. It is applicable only when a peripheral device is currently selected in the <i>Device Type</i> field.</p> <p>Up to four devices may be connected to a single interface. For example, the EVI - D30 camera provides an RS-232 daisy chain that permits multiple cameras to be operated from one interface. All devices connected to a common interface must have the same type, as specified in the <i>Device Type</i> field.</p>	<p>a unique numerical identifier for the device(s) connected to this interface. The device identifier is always 0, second identifier is 1, etc. Device identifiers are contiguous; the range of identifier values for all of 24xx devices range from zero to the number of devices minus one</p>

2. Refer to the table above for the description on setting variable parameters

#### g) Setting up the 241XX-XXXX via Serial Terminal

1. Connect one end of a serial (crossover / null modem ) cable to the 241xx-xxxx system's (DB-9 to 10 pin header cable is supplied) com1 port and connect the other end of the serial cable to either a dumb terminal or a workstation with terminal emulation. The terminal settings must be 9600 baud, no parity, 8 bits, 1 stop, software flow control (xon/xoff). Ideally the terminal type should be VT100 but ANSI will work.

**HINT:** Most Windows based workstations have HyperTerminal installed. To setup, start HyperTerminal, go to *File -> Properties -> Configure* and set the bits per second to 9600, bits to 8, stop bits to 1, parity to none, and flow control to Xon/Xoff. Press OK and set the com port.

2. Boot up the 241XX-XXXX system (for power requirements see "General Specifications" section). As system is booting up you should see various boot messages being displayed by the system.
3. At "241x Login:" type "**root**"  
At "Password:" press "Enter" (no password by default). If everything is done as described a "241x:~#" should appear. If user has mistyped the login or password, just press "Enter" and user should see the login prompt appear again. Now you are ready to make changes to the 241XX-XXXX system.

**NOTE:** ANY CHANGES DONE TO THE SYSTEM OTHER THAN FROM THE BROWSER ARE NOT RECOMMENDED

4. User may also access the system using the telnet protocol through the DOS prompt from any Windows workstation by entering "**telnet 10.135.1.99**" and pressing "Enter" key

#### h) Basic Troubleshooting Tips via Serial Terminal

**NOTE:** See Section F on how to set up the system via serial terminal. We encourage the user to contact Sensoray's technical support first before trying to troubleshoot the system. Troubleshooting through the command line interface (CLI) should only be done by advanced users. Altering the configuration files of the system will only cause confusion and delay in resolution of the problem if Sensoray's technical support is to be contacted.

1. Once the user has successfully connected to the 241XX-XXXX system through the serial terminal they may perform some simple troubleshooting steps to ensure they are connected to the system and have the right settings.
2. Please refer to the table below for basic commands on troubleshooting via the serial terminal. Also please note that these are just some of the basic commands available for troubleshooting and the user may use other commands.
3. If you have changed the IP address, you will need to use the new IP address with subsequent telnet sessions.
4. The user must make sure that the net mask on their computer is not too restrictive to allow access to the 241XX-XXXX system and corresponds to the class of IP address being used.

TASK	COMMAND
Change System's IP Address	netconfig eth0 -i xxx.xxx.xxx.xxx where x is ip address set by the user
Change System's Netmask	netconfig eth0 -n xxx.xxx.xxx.xxx where x netmask set by the user
	<b>NOTE:</b> after changing IP Address or Net mask user must reboot the system <b>(reboots automatically from the browser interface)</b>
Eject Compact Flash Card	cardctl eject
Identify Compact Flash Slot	cardctl ident
Insert Compact Flash Card	cardctl insert
Install a driver	modprobe
List installed drivers	lsmod
Load driver with options	insmod
Mount Compact Flash	mount /dev/hda1 /mnt/cflash
Network adapters information	ifconfig
Reboot the system	reboot
Remove the driver	rmmod
Text editor	vi or joe
Unmount Compact Flash	umount /mnt/cflash

**NOTE:** For different configurations and options that are available for the system please visit the "Design Assistant" on Sensoray's 2416 webpage.

### i) Digital Video Recording

1. 241XX-XXXX system permits the recording of video over Ethernet to either a hard drive or a compact flash drive. One of the standard configurations of the 241XX-XXXX system is to have compact flash as a storage device for video. To use a harddrive as a storage device user must purchase Sensoray's model 300TA accessory interface board which allows the interfacing of IDE devices into the system.
2. The diagram below shows the default configuration for a system with compact flash disk. The "clip length" and "video bit rate" may differ on user's system. The system auto-detects the compact flash disk and enables corresponding features in the "server type" field. If the compact flash disk is defective or something else is wrong with the system then the "server type" field will not display the record/playback options.



# Model

## 2412/2416

### MPEG-over-IP System

#### Configure Stream Server

Control

Stream

System

Peripherals

Help

Select server

#### Server Attributes

**Server** Symbolic name   
Auto-start   
Type

#### MPEG-over-IP

**Mode** Multicast  
Interface [Help](#)

**Transmit** Address  
Port number

**Receive** [Help](#) Address  
Port number

#### Video Recorder [Help](#)

**Record** Record time [Help](#)  
Circular [Help](#)

**Playback** [Help](#) Start time  
Stop time  
Repeat

#### Database [Help](#)

**Record** Clip length [Help](#)

**Device 0** Mount point   
Free KB

**Device 1** Mount point   
Free KB

**Device 2** Mount point  
Free KB

**Device 3** Mount point  
Free KB

Caption <small>Help</small>		
<b>Caption</b>	Enable	Off
	Text	captiontest
<b>Font</b>	Color	White
	Transparency	Transparent
	Scale	X2
<b>Position</b>	X	11
	Y	21
MPEG Codec		
<b>Encoder</b>	Video input	Composite video input 0
	Video bit rate	2 MBits/s
	Variable bit rate	No
	Picture size	MPEG-2 Full D1
	Audio bit rate	224 KBits/s
	Mux format	Program/system stream - A/V muxed
<b>Video</b>	System	NTSC
<b>Audio</b>	Input source	
	L/R selection	
	Default out volume	10 (max)
Password: <input type="text"/>		<input type="button" value="Submit"/> <input type="button" value="Reset"/>

- The default "Control" tab diagram is shown below. Once the user had selected the proper options then the recording button will be enabled automatically.



# Model 2412/2416

MPEG-over-IP System

## MPEG Stream Control

Control

Stream

System

Peripherals

Help

Select server

### Recorder Settings [Help](#)

Movie Name

Timer Duration

Mode Circular

### Playback Settings [Help](#)

Movie Select

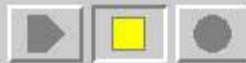
Time Start

Time Stop

Mode Repeat

### Control [Help](#)

Control



Status Mode Stopped

Status Time

Status Refreshing

Password:

4. For definitions of various recording options please see the table below.

PROPERTY	DESCRIPTION	
<b>Recorder Settings</b>		
<b>Movie</b>	<b>Name</b>	This section configures the digital video recorder (DVR) for recording a movie.
		Movie name is a reference name for the recording. Valid movie names consist of alphabetic characters (a-z) and numerical characters (0-9). Other characters, such as spaces, slashes, dollar signs, etc, are not allowed. If you enter the name of an existing movie, it will be overwritten and replaced by the new movie.
<b>Timer</b>	<b>Duration</b>	Specifies the total elapsed time for the recording in seconds. Although you can enter arbitrary values here, recording times are always integer multiples of the clip length (which is configured on the Stream page). Recording times are rounded up to the next clip length.
<b>Mode</b>	<b>Circular</b>	Specifies whether the recording is to wrap around when the timer duration has elapsed. Choose No to terminate the recording when the recording time has elapsed, or choose Yes to wrap around (i.e., record in a continuous loop, always over-writing the oldest data) until the recorder is manually stopped.
<b>Playback Settings</b>		
<b>Movie</b>	<b>Select</b>	This section configures the digital video recorder (DVR) for playback of a pre-recorded movie.
		Movie select is used to select the movie for playback. The movie names listed here are the same movie reference names that were specified when the movies were first recorded. The Erase movie button deletes the currently selected movie.
<b>Time</b>	<b>Start/Stop</b>	Specifies the start and stop times to be played. You can reset the start and stop times so that the entire movie will be played by clicking on the Entire movie button, or you can manually edit the times to view a subset of the movie data. Although any arbitrary times may be entered here, movie start and stop times are always internally aligned to the nearest database clip length.
<b>Mode</b>	<b>Repeat</b>	Specifies whether the movie is to be played repeatedly, in an endless loop, until manually stopped. Choose Yes to play back in an endless loop. Choose No to play back only one time.
<b>Control</b>		
<b>Control</b>		The Control buttons start and stop the DVR. The button functions are (from left to right) Play, Stop and Record. The current DVR operating mode is indicated by a "pressed" button image. A button is disabled when its image is grayed out.
<b>Status</b>	<b>Mode</b>	indicates the operating mode as one of Stopped, Playing or Recording
	<b>Time</b>	Shows the playback timestamp during playback, or the recording time (in seconds) during recording.
	<b>Refreshing</b>	Is a small rectangle that changes colors each time the real-time status is refreshed.
<b>Password</b>		If the system requires a password for stream viewing, you must enter the correct password here before clicking a button on this page.

## j) Basic Troubleshooting Tips for Digital Video Recorder (DVR)

1. The basic solutions shown below are only for most likely problems that may occur. We do not insist that the suggested solutions are the only possible solutions to the problem. We suggest that if the recommended solutions do not solve the problem then Sensoray's technical support should be contacted.
2. Problems most likely to occur are:
  - a) Compact Flash Disk is not found during or after the start-up
  - b) Cannot play back the video recorded on the Compact Flash disk
  - c) The data is corrupt on the disk

### Suggestions:

- a) Make sure the flash disk is not defective.

The system accepts flash disks that are of the following brands: SanDisk, Lexar and Hitachi. If your flash disk is of different brand make sure that you define it in the **ide.conf** file found in the ...**etc/pcmcia/ide.conf** directory and add a definition for the new compact flash model (see existing definitions on syntax format).

\*The "manfid" number must be found by the user.
- b) This can be due for two main reasons: the player cannot decode the data or the data is corrupt on the disk.

Try using a different player to play back the video stream. Any player that can play RTP stream should not have a problem playing back the video recorded in RTP format by the system. Quicktime and RealPlayer are common ones that can play the RTP stream. Sensoray stream can only be played back by Sensoray's 2400WDCS software player. This player has very low latency and can playback up to 16 streams simultaneously. For details you may visit Sensoray's website.
- c) Check the compact flash to make sure there are no corrupt sections on the disk or try a different disk.

Another reason may be the incorrect installation/removal of the compact flash disk into the pcmcia board. The following steps should be performed when installing/removing the disk:

**Removal:** type "**cardctl ident**" command to identify which slot contains the disk, type in "**cardctl eject #**" where # is the slot number where the disk is present, now you may remove the disk from the slot (before removal, one of the red LEDs on pcmcia card should go OFF)

**Installation:** the preferred choice of installing a compact flash disk is to install it before the startup of the system so that the system will automatically detect it. If you wish to take out a disk and install a different one without rebooting then after ejecting the card properly you may type "**cardctl insert**" command and insert the disk, after insertion one of the LEDs on the pcmcia board will go ON.

If the above suggestions do not solve your problem then Sensoray's technical support should be contacted.

## 5. General Specifications

<b>241XX-XXXX General Specifications</b>	
<b>Input Power</b>	12VDC to 27VDC , 12VDC @ 450mA typical for a standard 241XX-XXXX 3 board system stack, adding more than three boards to the stack will increase the power consumption
<b>Supplied Software</b>	Linux 2.4.10 kernel and higher, check website for updates Linux network API
<b>Video Resolution</b>	NTSC 640x480 PAL 725x500
<b>Input Type</b>	Composite - maximum 4 inputs/MPEG codec board S-Video - maximum 2 inputs/MPEG codec board
<b>MPEG type</b>	30 fps, MPEG1, MPEG2 elementary stream MPEG2 Program/System stream - Audio/Video synchronized Transport Stream - currently not supported
<b>Serial Ports</b>	Two RS-232
<b>Watchdog Timer</b>	1.6s time-out, open collector
<b>Memory</b>	16 MB flash, 32 MB SDRAM
<b>CPU</b>	Sensoray Model 301-06
<b>Power Supply</b>	Sensoray Model 207-01, Model 207-02 input - 9-36VDC nominal output - +5VDC at 4A maximum (without enclosure)
<b>PC I/O Board</b>	Model 300TA - Optional PC I/O board for IDE drives
<b>Optional Boards</b>	Model 340 - features dual USB 1.1, dual PCMCIA/CardBus 10Base-T/100Base-TX Ethernet port
<b>Operating Temperature</b>	0C to 70C