

NCast Product Documentation

Presentation Recorder Galaxy Series Reference Manual

Revision 1.0

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Regulatory Compliance Information

Equipment Label

The Presentation Recorder meets all applicable FCC, CE and ICAN radiation and emission standards:

 <p>1726 Ringwood Avenue San Jose, CA 95131 USA (510) 490-4307 (510) 490-3441 Fax</p>	<p>Report 4351-FCC Electromagnetic Compatibility Test Report ANSI C63.4-2014 EMI Test Standards Radiated Emission Test Method Conducted Emission Test Method</p>
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- (1) Connections between peripherals of this equipment may be made with low voltage non-shielded computer data cables.
- (2) Network connections may consist of non-shielded CAT 5 cable.

Warnings

- (1) A non-shielded power cord may be used to connect AC power to every component and peripheral of the system.

<p>FCC NOTICE This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.</p> <p>FCC NOTICE – INFORMATION FOR THE USER This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:</p> <ol style="list-style-type: none">(1) Reorient or relocate the receiving antenna.(2) Increase the separation between the equipment and receiver.(3) Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.(4) Consult the dealer or an experienced radio/TV technician for help. <p>The user may find the following publication prepared by the Federal Communications Commission helpful:</p> <p style="text-align: center;"><i>“How to Identify and Resolve Radio-TV Interference Problems”</i></p> <p>Stock Number 004-000-00345-4, available exclusively from the Superintendent of Documents, Government Printing Office, Washington, DC 20402 (telephone +1-202-512-1800).</p> <p>FCC WARNING Changes or modification not expressly approved by the party responsible for compliance to Part 15 of the FCC Rules could void the user’s authority to operate the equipment.</p>

<p>CE NOTICE – INFORMATION FOR THE USER</p>
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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to EN 55022 Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the expense of the user.

The user may find the following publication prepared by the Federal Communication Commission helpful:

“How to Identify and Resolve Radio-TV Interference Problems”

Stock Number 004-000-00345-4, available exclusively from the Superintendent of Documents, Government Printing Office, Washington, DC 20402 (telephone +1-202-512-1800).

WARNING

Changes or modifications not expressly approved by the party responsible for compliance to EN 55022 Rules could void the user's authority to operate the equipment.

ICAN Class A Digital Equipment

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

1. Introduction

1.1. PURPOSE

The *NCast Presentation Recorder Galaxy Series Reference Manual* is intended for the Audio/Video or Network engineer who will be tasked with the job of installing and setting up a Galaxy Presentation Recorder.

1.2. PRESENTATION RECORDERS – GALAXY SERIES

The Presentation Recorder is a stand-alone network communications appliance which captures HDMI signals from a video camera, desktop or laptop, compresses the image with an industry standard compression algorithm and records the capture to a file. Presentation Recorders are able to archive the media stream in real-time while simultaneously webcasting, allowing for playback by the recipient at a later date.

The following Presentation Recorder models are covered by this documentation:

PR-Aries – A single HDMI input, single HDMI confidence monitor output, USB or HDMI audio, ethernet 10/100, WiFi, external 12V DC power. Records and/or streams a single HDMI source such as a camera or PC.

PR-Leo – Dual HDMI inputs, single HDMI confidence monitor output, USB or HDMI audio, ethernet 10/100, WiFi, external 12V DC power. Records and/or streams either or both inputs with PIP or side-by-side layouts of the captured input signals.

PR-Gemini - Dual HDMI inputs, dual HDMI confidence monitor outputs, USB or HDMI audio, ethernet 10/100, WiFi, external 12V DC power. Records and/or streams either or both inputs with PIP or side-by-side layouts of the captured input signals or in dual streaming mode creates two independent media streams and video archive files, one from each of the HDMI inputs.

All PR-Galaxy Series units share a core operating system and base set of features.

1.3. CONNECTOR OPTIONS

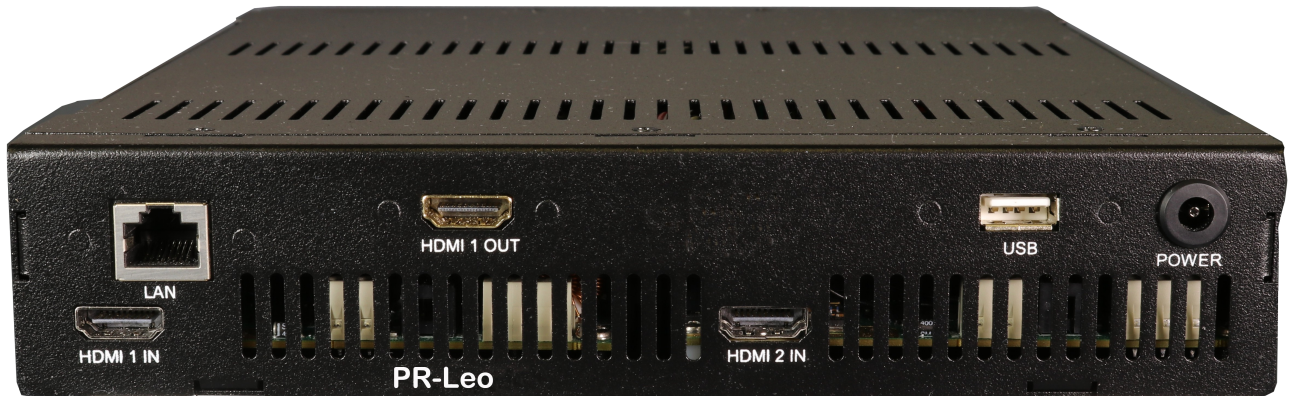
The following diagrams show the back-panel connectors available:



Backpanel for PR-Aries

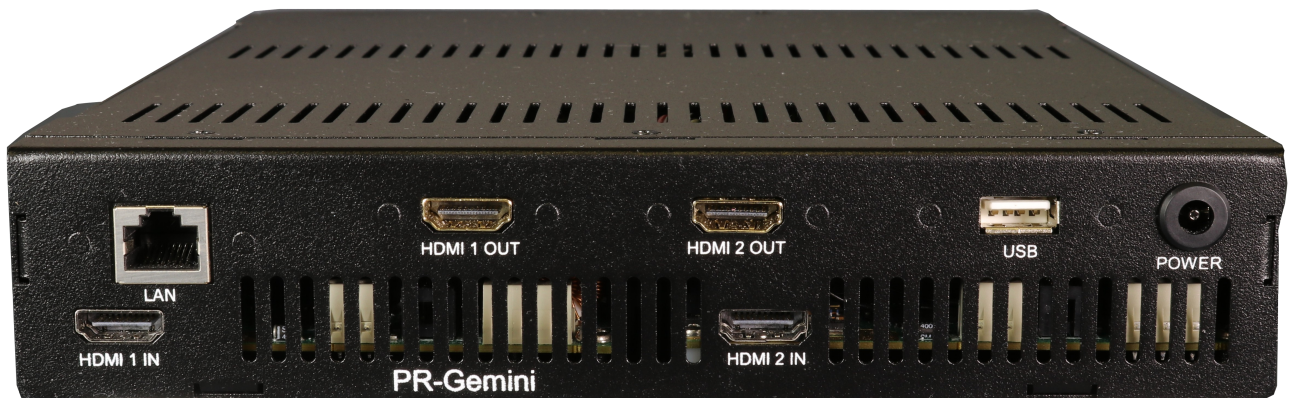
- **HDMI IN** – Video input from a camera or computer. HDMI audio input.

- **HDMI OUT** – Confidence monitor output with On-Screen-Display of audio levels and IP address.
- **LAN** – Connection to the Internet using 10/100 ethernet.
- **USB** – USB audio input. Download recorded archive files. Specify a static IP address.
- **Audio Out** – Analog audio out (not used).
- **Power** – 12V DC power.



Backpanel for PR-Leo

- **HDMI 1 IN** – Video input from a camera or computer. HDMI audio input.
- **HDMI 2 IN** – Video input from a camera or computer. HDMI audio input.
- **HDMI 1 OUT** – Confidence monitor output with On-Screen-Display of audio levels and IP address.
- **LAN** – Connection to the Internet using 10/100 ethernet.
- **USB** – USB audio input. Download recorded archive files. Specify a static IP address.
- **Power** – 12V DC power.



Backpanel for PR-Gemini

- **HDMI 1 IN** – Video input from a camera or computer. HDMI audio input.
- **HDMI 2 IN** – Video input from a camera or computer. HDMI audio input.
- **HDMI 1 OUT** – Confidence monitor output with On-Screen-Display of audio levels and IP address.
- **HDMI 2 OUT** – Confidence monitor output with On-Screen-Display of audio levels and IP address.
- **LAN** – Connection to the Internet using 10/100 ethernet.
- **USB** – USB audio input. Download recorded archive files. Specify a static IP address.
- **Power** – 12V DC power.

1.4. INSTALLATION

The diagram below shows a typical room installation:



2. Quick Start

2.1. STARTUP

2.1.1. Installation

There are a few easy steps to get your PR-Galaxy Recorder and Streamer up and running:

Unpack the unit and plug in the external power supply, your ethernet cable (if you will be using a wired connection) and an HDMI monitor (if you have one). Power on the unit. Make note of the Serial Number (needed for wireless access and administrative access).

2.1.2. Startup

Initial configuration can be done via wireless. Look for a wireless network with an SSID similar to AP-xxxxxxxxxxx and use the serial number of your unit as the password to sign in. Alternatively, plug the unit into an ethernet network with DHCP and check the attached HDMI monitor for the registered IP address. Enter "192.168.42.1" if on wireless or the IP address if wired and login using "admin" as the user and the "serial number" as the password.

Proceed to the "Configuration" tab and click on the Network icon. Configure your wireless or wired network as needed.

Reboot the unit (icon in the upper right corner) and login with the new network address.

2.1.3. Operation

Go to the Quick Start page and press Start to start recording and then Stop when you have finished.

Visit the Archives page and download your recording. You're done!

2.1.4. Configuring From a Boot File

The following file may be used to configure the wired and wireless addresses of the recorder. Create a file called "network.txt" and place on a USB stick during the boot process.

```
dhcp=true
dns_1=8.8.8.8
dns_2=8.8.4.4
gateway=192.168.10.1
ipaddress=192.168.10.24
netmask=255.255.255.0
ap=true
## 2-32 characters
ap_ssid=PR-ACCESS
## 8-64 characters
ap_password=passphrase
## 2-32 characters
wifi_ssid=MyWiFi
## 8-64 characters
wifi_password=passphrase
wifi_1_ssid=MyWiFi-1
wifi_1_password=passphrase1
```

Only lines needed for configuration are necessary. For example, to configure a static IP address:

```
dhcp=false
dns_1=8.8.8.8
dns_2=8.8.4.4
gateway=192.168.10.1
ipaddress=192.168.10.24
netmask=255.255.255.0
```

To configure WiFi only:

```
ap=false
wifi_ssid=My-WiFi-Network
wifi_password=passphrase
```



NCast Presentation Recorder Reference Manual

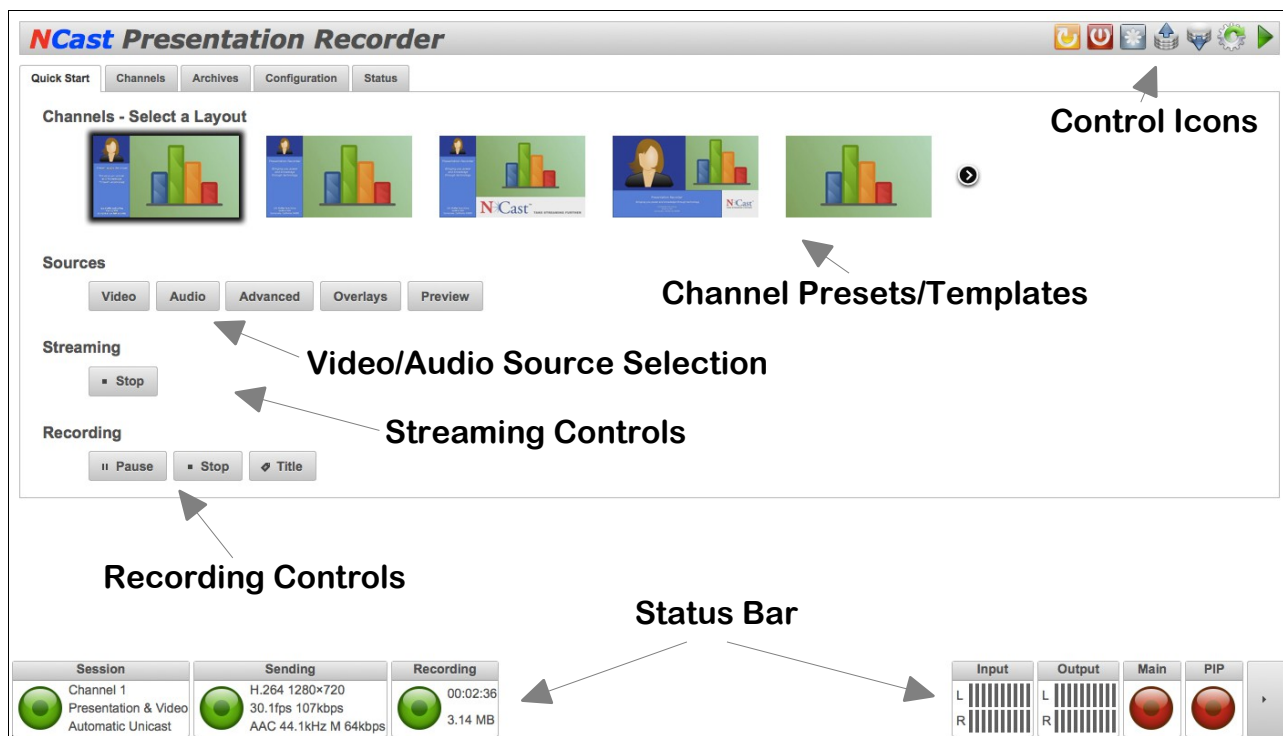
Please feel free to contact NCast Corporation if you have any questions about the use or configuration of the Presentation Recorder

3. Quick Start Configuration and Setup

3.1. QUICK START PAGE ORGANIZATION

The Quick Start page is the primary control page for the Presentation Recorder and has six distinct functional areas:

- **Channel Selection** – A Channel is a preset or template containing all layout and startup parameters
- **Source Selection** – Input connectors are assigned to the active windows in a video frame
- **Streaming Control** – Streaming session activity on a Channel is started or stopped
- **Recording Control** – Recording of a session on a Channel is started, paused or stopped
- **Status Bar** – A real-time display of session activity and input signal status
- **Control Icons** – Special controls to power-off the unit, reboot and several other functions



With the Quick Start page the sequence of operations required to activate a streaming/recording session may be summarized as follow:

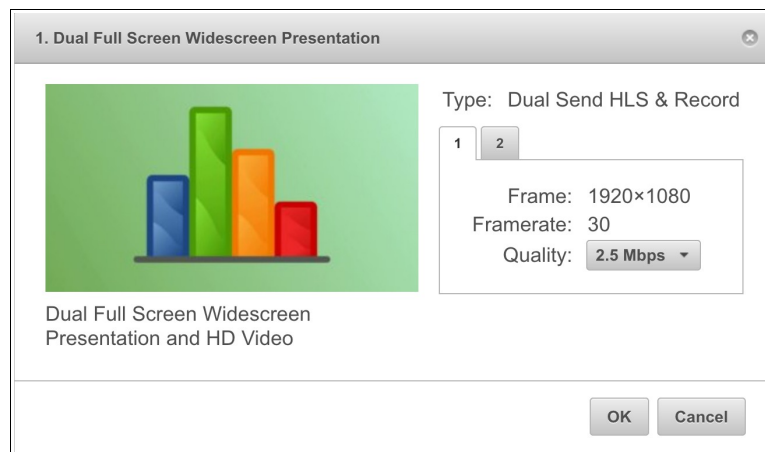
1. Select a Channel layout.
2. Select the appropriate video and audio sources.
3. Start a streaming session.
4. Start recording.
5. Stop recording.
6. Stop the streaming session.

3.2. CHANNEL SELECTION

A Channel is a preset containing all the layout and startup parameters needed for a streaming or recording session. There are seven categories of channel parameters:

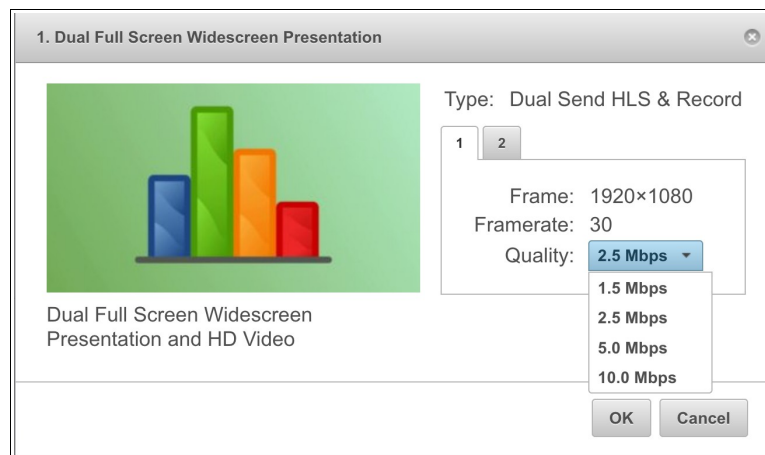
- **General** – The Channel name and the type of Channel operation desired.
- **Layout** – The frame size, aspect ratio, position of the Main and PIP windows and graphical overlays.
- **Quality** – The video and audio quality desired and respective bit-rates.
- **Network** – The Channel's multicast or unicast addresses.
- **Recording** – Archive filenames and other recording parameters.
- **Upload** – Disposition of the archive file once the recording has completed.
- **Notifications** – Email messages to the administrator of the Channel.

The Quick Start page allows for a limited selection of factory default settings. More comprehensive modifications to a Channel are done from the **Channels** tab.

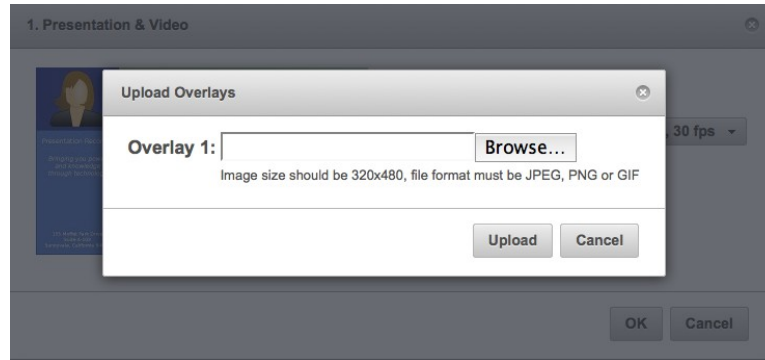


The first dialog box allows selection of a number of standard bit-rates and the upload of custom graphics for overlay.

Select the lower speeds for material that is mainly graphics and the higher bit-rates for video material.



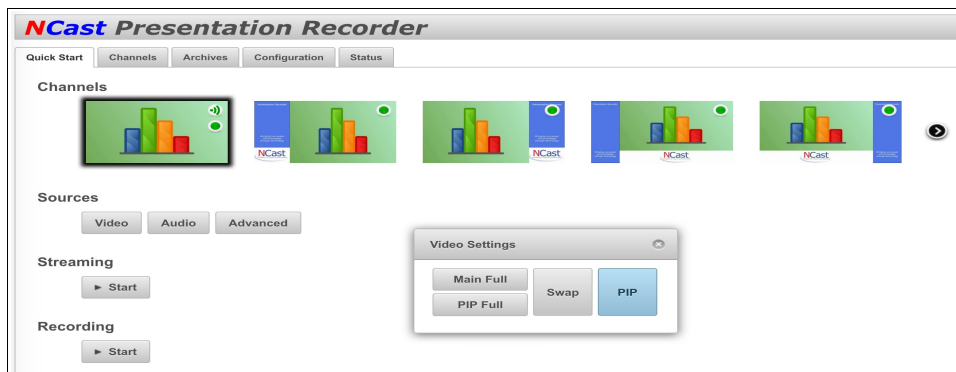
Graphical overlays are JPEG, GIF or PNG images that may be used to fill in or overlay areas of the frame being captured. Create a custom graphic in your favorite photo editing program and upload it to the Channel by selecting “Customize Overlays”. Make sure the dimensions are correct as the Recorder does not do any scaling of the incoming picture.



When all selections have been made the new Channel will be ready for use and the new layout will appear on the locally attached monitor.

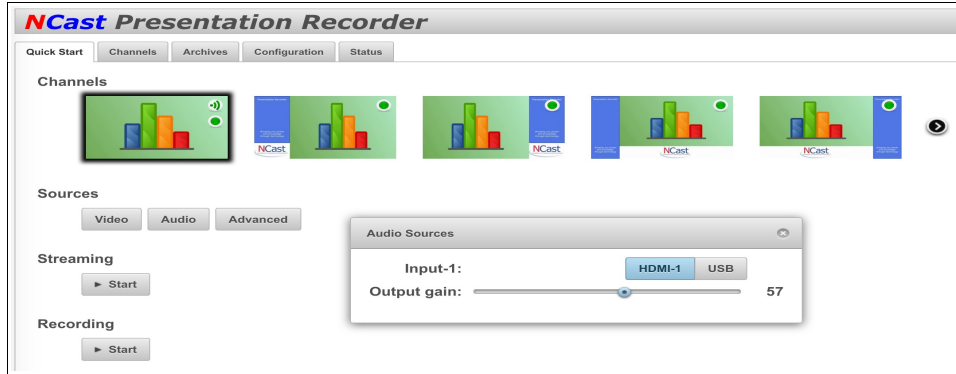
3.3. SOURCE SELECTION

The selection of which input signal (connector) to use for the Main and the PIP windows is accomplished by clicking the Video button in the Sources area. This selection may be changed at any time during a recording. The Swap button will exchange the Main and PIP window settings. The “Main Full” or “PIP Full” will expand the Main or PIP window to fullscreen.



Similarly, the audio inputs are selected by the audio button. Choices include:

- **HDMI-1**– HDMI Embedded Audio
- **USB** – USB Audio
- **Output gain** – Speaker output level



The other buttons on this line control these functions:

- **Advanced** – Fine adjustment and positioning of the images.



3.4. STREAMING START/STOP

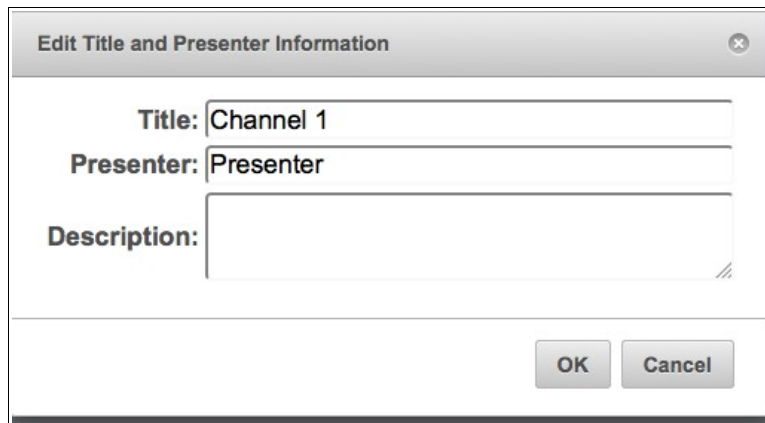
The Streaming Start button activates a streaming/recording session based on the Channel parameters and the selected video and audio sources.

Once activated the View button allows reception of the transmitted stream using an appropriate media player.



3.5. RECORDING

The Recording button starts the recording and archiving of the video/graphics/audio media being presented. A recording may be Paused and Resumed, and if Stopped and then Started a second file will be created.



The Title button allows entry of metadata for the recorded file (Title, Presenter, Description).

3.6. STATUS BAR

The Status Bar at the bottom of the page creates a real-time report of the activity underway and has indicators for Streaming and Recording operations and the state of the selected Main and PIP input signals.



Clicking the righthand grey panel collapses the Bar and hides it from view.

3.7. CONTROL ICONS

The upper righthand corner of the page contains two Control Icons:



Clicking the green arrow expands the slider to reveal an additional set of Icons:



The function of these Icons (left to right) is listed below.

3.7.1. Reboot

Restarts the unit and reinitializes all processes. This operation may be needed to clear problems after a power brownout or other unexpected glitch

3.7.2. Shutdown

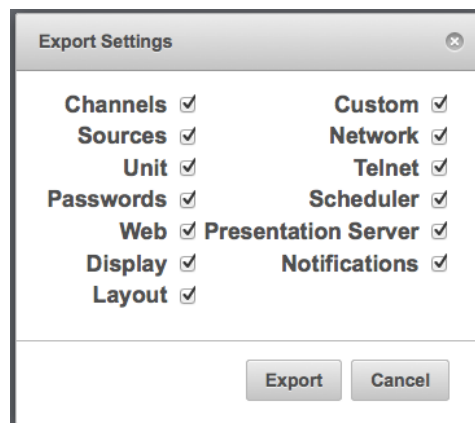
Powers down the encoder. It is HIGHLY recommended to power off the equipment with this Icon rather than simply pulling the plug. All operating parameters will be properly saved and restored.

3.7.3. Factory Defaults

Restores all Channels and other settings to their factory default. All configuration information will be lost. Nothing is saved and the reset is irreversible.

3.7.4. Export Settings

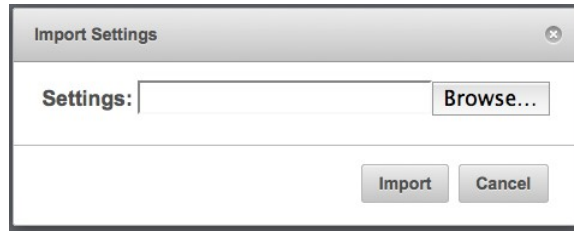
Once a recorder has been setup and configured, it's highly recommended to export all settings to save the configuration of the unit for easy restore or repair.



Clicking the Export button will create and download a .zip file with all of the checked information.

3.7.5. Import Settings

To restore an encoder to a previously configured state, press Import Settings and locate the previously exported .zip file.



3.7.6. Software Update

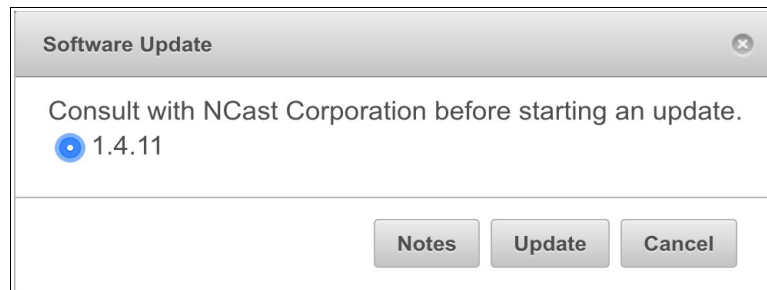
NCast regularly releases new software revisions for its encoders with many updated features, new functionality and bug fixes. The Software Update Icon brings up a dialog box with these choices:

- **Network** – The update will use the Internet to reach NCast's update server.
- **USB Disk** – The encoder is "off net" and a USB thumb drive will supply the required files.

The Network option is normally used to update the encoder, and in the case of a closed or secure network requiring USB drive files, please contact a customer support person at NCast for assistance in doing a USB update.

To do an Update, first use the **Status** tab to determine what release the encoder is currently using. Then click on the Software Update Control Icon and select "Network".

After the Network selection is made, the dialog panel displays the update revision levels available:



If the encoder is not on the latest release, select the desired revision and click "Update". All necessary update files will be downloaded over the net and the encoder will reboot once the new firmware has been installed.

The Support section on NCast's website contains Release Notes outlining what features or fixes have been implemented in the latest firmware.

The Software Update dialog box lists the current release(s) of software available for this Presentation Recorder. If no information is listed then there is a problem reaching the update server. The network Update Tool requires HTTP access to the external Internet to function correctly. If this access is fire-walled or if the HTTP proxy settings are not correctly employed, then update listings and software updates are not available. There may also be a problem with the settings for the DNS servers as well.

Once the "Update" button is pressed the Presentation Recorder downloads a list of required files and their timestamps. Files which are missing or out-of-date are downloaded and installed. The unit will then reboot and becomes ready for service again with the new software release.

Configuration files are not altered during this process. All Unit, Channel, Source and other settings should remain intact through this update.

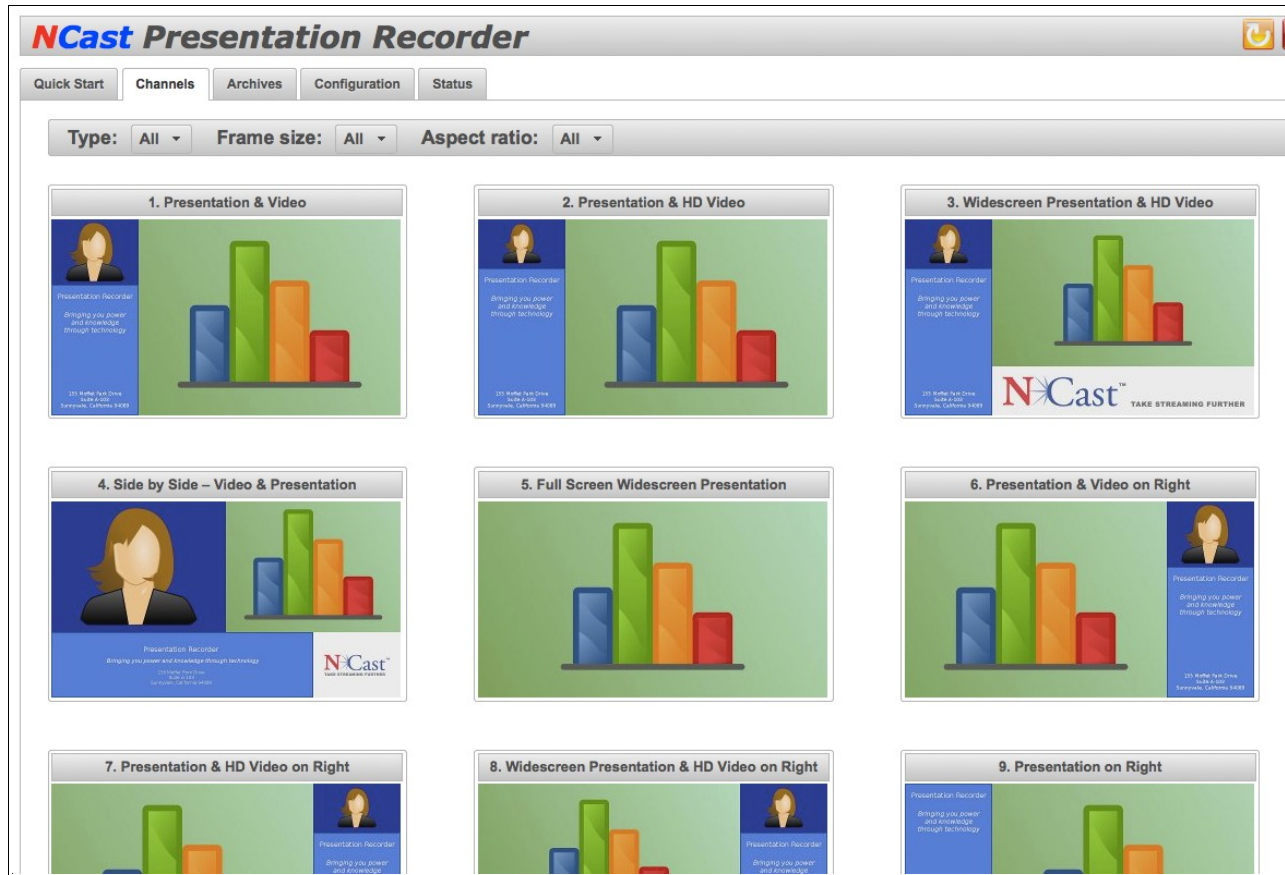
File system verification and new file download may take some time, so allow the unit to reboot on its own and do not prematurely hit the reset switch as that could damage the filesystem and cause the unit to fail to restart.

4. The Channel Table

4.1. CHANNEL SETTINGS

A “Channel” is a preset or template, a collection of parameter settings that defines the operating characteristics for a streaming webcast or a recording session. Just as Channel 2 on your TV defines the video carrier to be “55.25 MHz.”, Channel 2 on a Presentation Recorder might define the graphics multicast address to be “239.192.0.1”. There are many parameters associated with a Channel, items like the video and audio multicast or unicast addresses, port numbers, MTU’s, codecs, bit rates, layouts, overlays and modes of operation. Think of a Channel as a type of “preset” for all of those parameters. There are 10 Channels allowed, so 10 different presets are available for definition.

By default, the encoder comes with 10 factory-defined Channel layouts for the most commonly used inputs and compositions. These layouts are not “fixed” permanently, but simply examples of commonly used arrangements. Any Channel may be completely customized by the customer simply by overriding the factory default settings.



Once the Channel settings have been established, typically by the administrator of the Presentation Recorder, or maybe the IT or Network department within an organization, they will not be changed by ordinary users of the Presentation Recorder. The user is instructed to “Use Channel 2” and no further detailed instructions are required.

When a Channel is started the Presentation Recorder begins its broadcast or recording Session. All of the many Channel parameters are transferred to the working Session parameters and the encoding and layout parameters defined by the Channel become the current encoding mode and layout of the Presentation

Recorder. Any changes or updates to the Channel Table have no effect on the Session until the next Session start.

Session parameters which may be changed or updated appear on the Quick Start page and on the Custom page. Windows and Overlays may be altered during a Session, but the initial Frame size and aspect ratio may not change. The Frame size MUST remain fixed during a Session.

4.1.1. Channel Initiation

At the left edge of each channel icon is a Start button. Pressing this button activates all the parameters for the Channel and a new Session based on these settings is started.

4.1.2. Channel Modification

Setup of a Channel, started by pressing the “Edit” key, is divided into seven parts:



- General – Channel name, description and the type of operation
- Layout – Frame size and placement of the Main and PIP windows
- Profile – Bit-rate, frame-rate and quality settings
- Network – Setup of multicast and unicast addresses, MTU's and TTL
- Recording – Recording filename, title and description
- Upload – FTP or Secure FTP server names and passwords, USB or Presentation Server
- Notifications – E-mail reports of important Channel events

Only setup windows relevant to a Channel's settings will be shown (e.g. a streaming-only channel will not ask for recording information). The paragraphs which follow describe in detail each of these parts.

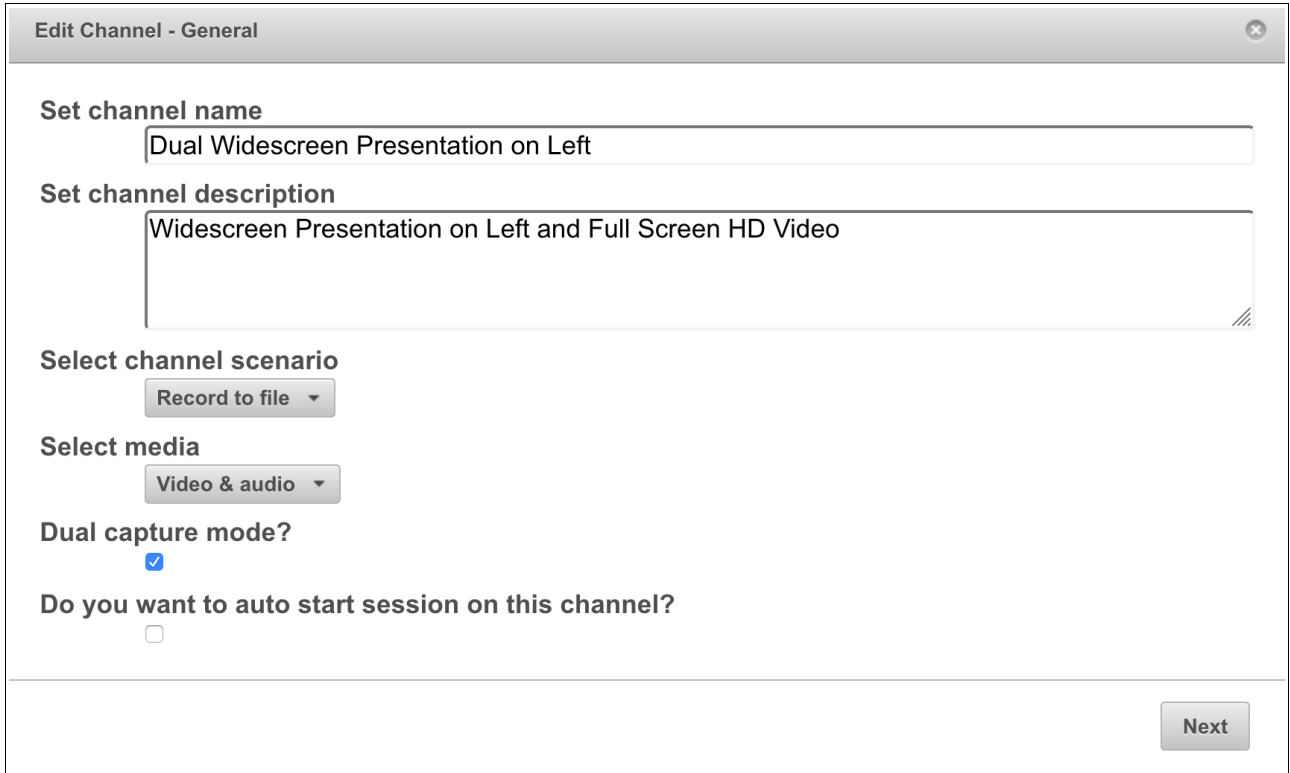
4.1.3. Channel Export/Import

A Channel's setup with all required parameters and settings may be exported to a .zip file. This provides for off-line backup. Use of the Import button allows restoration of the channel, or copying of the parameters from one channel to another.

4.2. EDIT CHANNEL – GENERAL

4.2.1. Set Channel Name

Each channel can be assigned a name, and these names can reflect the functional use of the channel. The factory default settings name the channels in correspondence with their layout properties. Another example might be “International Sales Team Update” for corporate usage, “Engineering Collaboration” in the case of departmental usage, “San Francisco” designating some geographical assignments, or “Chemistry 101” designating course related usage. Additional descriptive text may be added in the “description” field.



Edit Channel - General

Set channel name
Dual Widescreen Presentation on Left

Set channel description
Widescreen Presentation on Left and Full Screen HD Video

Select channel scenario
Record to file

Select media
Video & audio

Dual capture mode?

Do you want to auto start session on this channel?

Next

As a specific example, a Presentation Recorder might set up the following 3 channel assignments:

Channel 1 – The unit transmits using multicast address 239.192.0.0

Channel 2 – The unit receives using multicast address 239.192.0.0

Channel 3 – The unit initiates an RTMP stream to the required CDN.

Enter a descriptive name for the channel that makes sense to the administrators or users.

4.2.2. Select Channel Scenario

The recorders have four basic modes of operation:

- Record to File – The unit is placed into record-only mode. No stream for internet use is generated. This mode enables the highest quality capture at the highest frame rates.
- Send Stream – The unit will be transmitting in a one-way, one-to-many (multicast only) session to other units or remote desktops.
- Send Stream and Record to File – The unit will be transmitting in a one-way, one-to-many (multicast only) session to other units or remote desktops. Simultaneous recording is enabled.
- Receive Stream – The unit will be receiving a transmission from some other source on this network.

Edit Channel - General
✕

Set channel name

Set channel description

Select channel scenario
Record to file ▾

Select media

 Record to file
 Send stream
 Send stream and record to file
 Receive stream

Dual capture

Do you want to auto start session on this channel?

Next

4.2.3. Select Media

The media choices:

- Video & Audio – Record with all media, video and sound
- Video – Create a video recording with no sound
- Audio – Create an audio recording with no video

4.2.4. Dual Capture Mode (PR-Gemini Only)

Enables dual stream operation. Two media streams and two video archive files will be created.

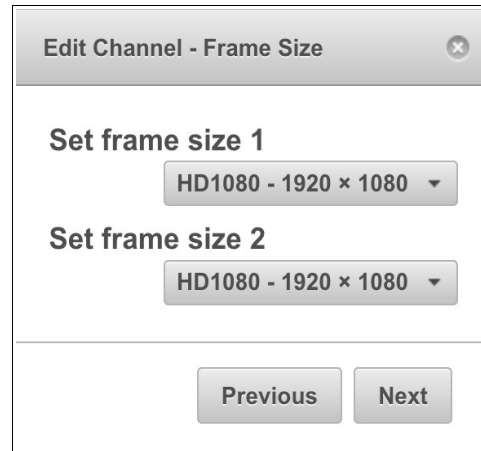
4.2.5. Auto Start Session

If the “Auto-Start” checkbox is enabled on a Channel, then Session activity for that Channel will automatically resume when the unit is rebooted or restarted after a power failure.

4.3. EDIT CHANNEL – FRAME SIZE

4.3.1. Set Frame Size

The Frame Size defines the dimensions of the Frame, a surface (capture surface or “the canvas”) which is the primary imaging surface on which the composite image (Main window + PIP window + Overlays) is drawn. The resolution and aspect ratio of the transmitted or archived media stream aligns exactly with the resolution and aspect ratio of the Frame. Consequently, selection of one of the default frame sizes and aspect ratios, or definition of a custom Frame Size is the first step in defining the format of the media stream which will be produced by the Presentation Recorder.



Once the frame is defined, the next step is the (X,Y) placement and (W,H) sizing of the primary or “Main” image window/stream. Typically the “Main” stream is sized at “Full-screen” which means that the primary stream is scaled to the full dimensions of the frame. It is useful to note, however, that the primary stream can be dimensioned to a smaller size than the full frame size. The unused space might then be reserved for the secondary image stream (the PIP image, but placed outside the boundaries of the Main image) and possibly an overlay graphic. A “Main” and “PIP” side-by-side composition would also dictate that the Main image only occupies one-half of the capture surface area.

4.3.2. Dual Frame Size (PR-Gemini Only)

In Dual Mode (PR-Gemini only) two frames are utilized, one for each media stream and recording.

4.4. EDIT CHANNEL – LAYOUT

4.4.1. PIP

If the “PIP” window is enabled, its (X,Y) placement and (W,H) dimensions are overlaid on the frame. Typically this might be in the upper-right or lower-right corner of the frame. The user has the option of determining if the PIP window obscures any portion of the Main window. It can be placed on top of or outside of the Main image

4.4.2. Background

A Background graphic or “underlay” may be enabled (and uploaded) to the recorder. It is positioned as the lowest level graphic in the composition. All other windows and overlays will be placed on top of this graphic.

Press the Upload button to upload the background image.

4.4.3. Graphical Overlays 1-4

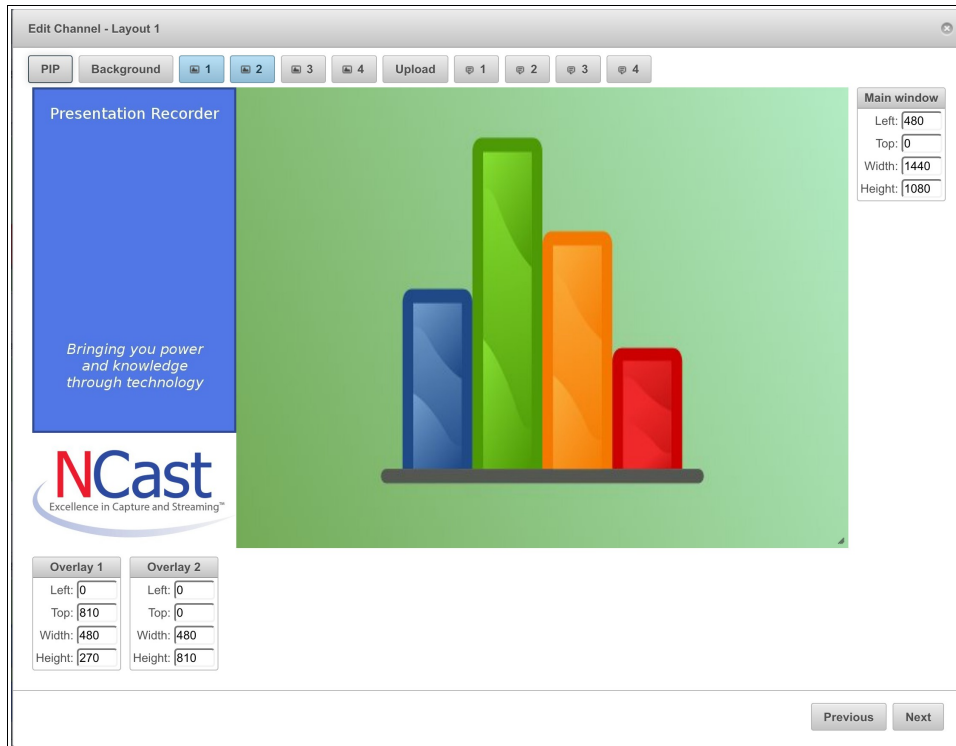
Customized images may be added to the media stream being created. These images would typically be corporate or organizational logos, trademarks or watermarks, copyright statements, media content or date annotation, or descriptive information on the course or presentation being viewed (speaker, topic, etc.).

There can be up to four different Overlay images per Channel (40 images total). These images must be created in .jpg, .png, or .gif format. The dimensions of the image must match exactly the space allocated for the Overlay. They are not scaled during Upload. Transparency in the alpha channel is not implemented.

The information box “Overlay n (Left,Top,Width,Height)” shows where the overlay will appear in the composition. The (0,0) coordinate is the upper-left corner of the screen. Dimensions are in pixels. Overlay 1 will be obscured by Overlay 2 and then Overlay 3. Overlay 4 is always on top.

The enable/disable setting will cause the image to be included or not included in the composite media stream being created. More than one image (all four, in fact) may be included if required.

The Channel Table Image Overlays are transferred to the operating Session parameters at Session startup



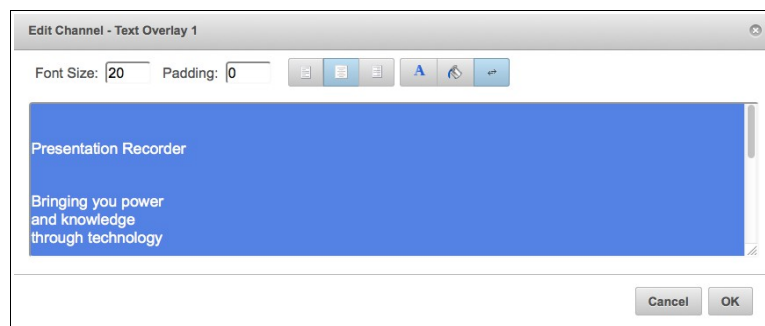
and thus initialize the image overlays used during the Session. Once a Session has started modifications to these entries have no effect until the next Session start.

Changes to the Image Overlay(s) in use during a Session may be made from the **Quick Start** page.

Press the Upload button to upload the Overlays which have been selected.

4.4.4. Text Overlays 1-4

Text Overlays are windows which contain text to be displayed on the frame. The text can be inserted from fields on administration web pages (Channel settings), or can be sent via serial RS-232 or Serial Telnet IP commands. See the *Presentation Recorder Serial Interface Specification* for details on these commands.



Also, a text overlay may be a calendar time and date stamp to burn in the exact time a recording was done.

Text overlays can implement dynamically displayed text such a news tapes, stock tickers, closed captions, and for other purposes such as changing the name of the speaker for a presentation due to a last-minute change of presenters or participants

The Channel Table Text Overlays are transferred to the operating Session parameters at Session startup and thus initialize the text overlays used during the Session. Once a Session has started modifications to these entries have no effect until the next Session start.

The enable/disable button will cause the text to be included or not included in the composite media stream being created. More than one text window (all four, in fact) may be included if required.

The information box “Text overlay n (Left,Top,Width,Height)” shows where the overlay will appear in the composition. The (0,0) coordinate is the upper-left corner of the screen. Dimensions are in pixels. Overlay 1 will be obscured by Overlay 2 and then Overlay 3. Overlay 4 is always on top.

The Font Size may be specified in pixels.

The Padding specifies a minimum distance (in pixels) between the frame of a window and the text. This option keeps the text from crowding or adjoining the edge of the window.

Text may be aligned Left, Center or Right within the window.

The RGB color values for the foreground and background may be specified through use of the color picker dialog box.

Text wrapping may be enabled or disabled.

The text may include format strings (e.g. %b, %d, %Y for month, day, year. See table below.).

<i>Format String</i>	<i>Function</i>
%a	Abbreviated weekday name (for example Sun)
%A	Full weekday name (for example Sunday)
%b	Abbreviated month name (for example Jan)
%B	Full month name (for example January)
%d	Day of the month (01 to 31)
%D	Archive description
%H	Hour (00 to 23)
%I	Hour (01 to 12)
%k	Hour (0 to 23)
%l	Hour (0 to 12)
%L	Archive title
%m	Month (01 to 12)
%M	Minute (00 to 59)
%n	Channel number (001 to 100)
%N	Channel name
%p	AM/PM
%P	am/pm
%R	Archive presenter
%S	Second (00 to 60)
%x	Date (for example 12/31/08)
%X	Time (for example 23:13:48)
%Y	Year (for example 2009)
%z	Numeric time zone (for example -4000)
%Z	Alphabetic time zone abbreviation (for example EDT)
%%	%

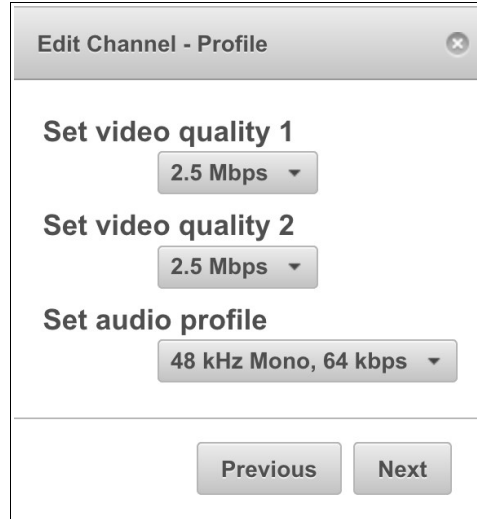
The text within a text overlay can be changed and frequently updated through use of serial commands. See the *Presentation Recorder Serial Interface Specification* for details.

- OT0 - disables all four text overlays
- OT[1|2|3|4],[0|1] - disables/enables given text overlay
- OS0 - sets empty text on all four text overlays
- OS[1|2|3|4],TEXT - set TEXT text on given text overlay

4.5. EDIT CHANNEL – PROFILE

4.5.1. Set Video Quality

Each channel can be assigned a video quality (bit-rate) level. Use the standard settings or choose Custom (see the section below).



The screenshot shows a dialog box titled "Edit Channel - Profile". It contains three dropdown menus for configuration:

- Set video quality 1**: 2.5 Mbps
- Set video quality 2**: 2.5 Mbps
- Set audio profile**: 48 kHz Mono, 64 kbps

At the bottom of the dialog are two buttons: "Previous" and "Next".

4.5.2. Set Audio Profile

This menu pulldown selects the bandwidth and encoding properties of the audio media stream associated with the graphics stream. All audio is encoded in the Advanced Audio Coding (AAC) format. An optional stereo setting provides for stereo operation of the media stream.

4.6. EDIT CHANNEL – STREAMING - RTMP

4.6.1. Set RTMP Server Address

This Channel Type, if set to **Remote**, enables use of the RTMP protocol for live broadcast to a streaming server or CDN. If set to **Internal**, a server inside the recorder provides for local viewing.

Enter the name of the server or its IP address followed by the name of the application instance used for this broadcast.

4.6.2. Port Number

Port number 1935 is standard for this service. Enter an alternate number if your server is configured differently.

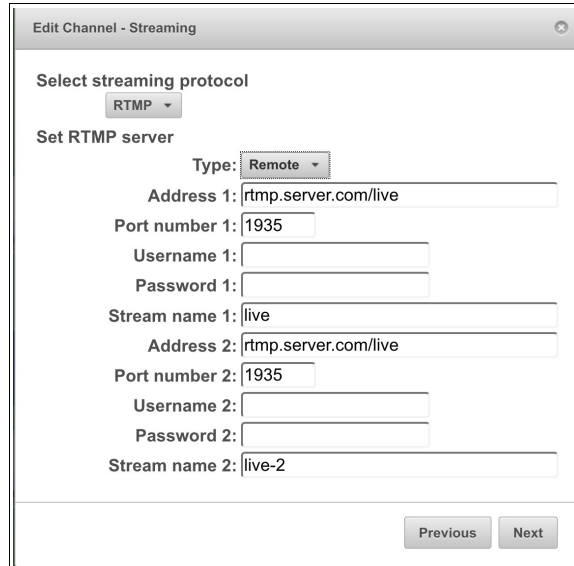
4.6.3. Stream Name

Enter the name of the live stream. This name must be unique for each encoder broadcasting to the server.

Examples of streaming setups for several different services may be found under the "Tech Tips" section of the NCast website Documents page.

4.6.4. Dual Mode

In Dual mode two RTMP servers must be independently configured.



4.7. EDIT CHANNEL – STREAMING - HLS

4.7.1. The selection of HLS streaming provides for local viewing of the video material being captured. There are no parameters to set for this option.

4.8. EDIT CHANNEL – STREAMING - RTP

4.8.1. Set Video Stream Destination – Address

An address entered for Video (the Video or Graphics media stream) will be either a valid multicast address, or the numeric host IP address of the remote unit if a point-to-point connection is being established.

A full discussion of multicast addressing is beyond the scope of this document, but briefly summarized, there are three classes of multicast addresses typically used by multicast applications:

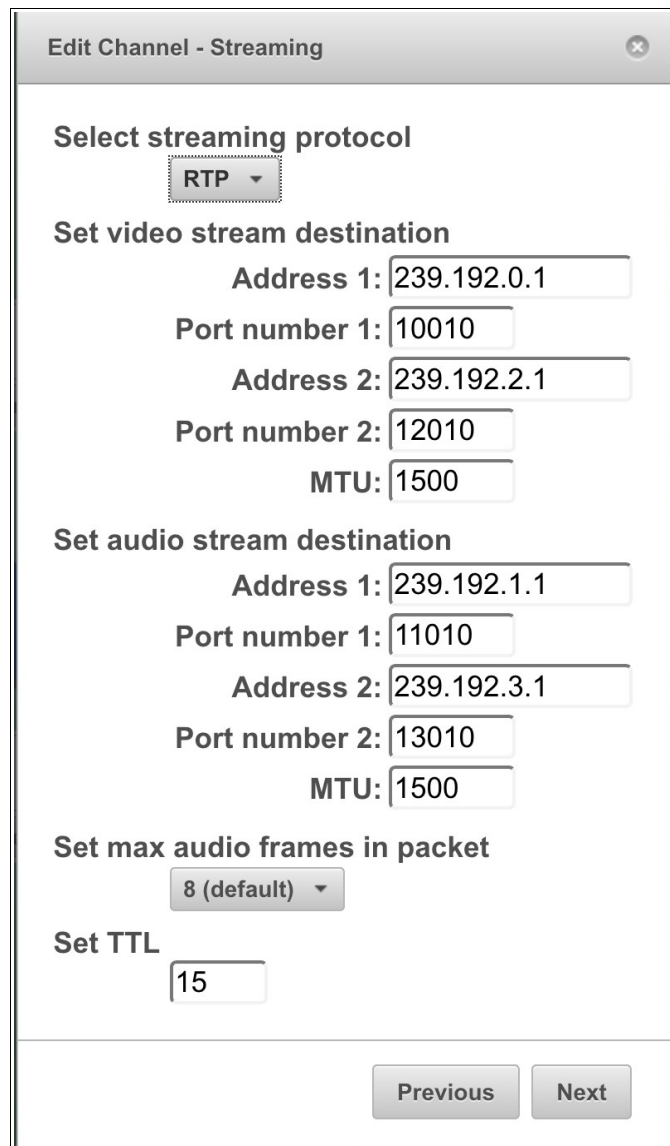
Global Addresses – The range of multicast addresses 224.0.1.0-238.255.255.255 are used for global communications. These addresses are dynamically allocated and not statically reserved. These addresses are unsuited for static assignment in the Channel Table.

GLOP Addresses – A document, IETF RFC 3180, describes a mechanism for statically assigned multicast addresses in the address space 233/8 based on a formula that incorporates the Autonomous System (AS) number in the middle two octets. The AS number is owned by the ISP providing service to the account and use of a GLOP address must be coordinated with that ISP.

Administratively Scoped Addresses – The multicast address range of 239.0.0.0 to 239.255.255.255 has been defined to be a range of administratively scoped multicast addresses in IETF RFC 2365. These addresses may be statically assigned by the administrator of an organization’s network, and there will be no conflict with other organization’s use of these addresses because border routers on the edge of an organization’s network enforce policies to stop multicast traffic flow for addresses within this range. Further, these same border routers can enforce policies so that subsets of these addresses are contained within administrative boundaries, such as a local LAN, a building, a campus or a region. These are safe addresses to use in setting up an organization’s multicast network and ideal entries for use in the Channel Table. Consult with the Network Administrator for the particular address ranges in use on the network hosting the Presentation Recorder.

All units in one session use the same multicast address. The Video and Audio multicast addresses for a session can be the same if the Port numbers are different. Units engaged in different sessions should use

different multicast addresses to minimize traffic loading on the network (the multicast routers distribute all traffic to all points subscribed on a particular multicast address, independent of the port number).



Edit Channel - Streaming

Select streaming protocol
 RTP

Set video stream destination
 Address 1: 239.192.0.1
 Port number 1: 10010
 Address 2: 239.192.2.1
 Port number 2: 12010
 MTU: 1500

Set audio stream destination
 Address 1: 239.192.1.1
 Port number 1: 11010
 Address 2: 239.192.3.1
 Port number 2: 13010
 MTU: 1500

Set max audio frames in packet
 8 (default)

Set TTL
 15

Previous Next

The default settings for a Presentation Recorder use Administratively-Scoped multicast addresses. This implies that streams created using these addresses will not exit the organization's network.

If the network is not multicast enabled, point-to-point communications between two Presentation Recorders is possible by entering the numeric IP address of the remote unit into this field.

4.8.2. Set Video Stream Destination – Port Number

In addition to a multicast address, each media stream requires a unique port to be assigned. Ports must be even-numbered (the succeeding odd number is used for control purposes and must be available). Port numbers range from 1024 to 65,535 and this range is divided into two parts: the Registered Ports are those from 1024 through 49151 and Dynamic and/or Private Ports are those from 49152 through 65535.

In practice, multicast applications assign port numbers in the range of 5002 and up. The port range 1024-5000 is typically used by a Unix system to assign ports to applications desiring an automatically generated port number.

Even if different multicast addresses are being used, it is recommended that different port numbers be used for the different media streams (graphics, audio and collaboration). On some system implementations, use of the same port number will cause errors.

For multicast traffic to get through a firewall, the even-odd pair defined in this entry must be opened by the firewall administrator.

4.8.3. Set Video Stream Destination - MTU

The Maximum Transmission Unit (MTU) is the maximum length of a packet and is normally set to 1500. For some special circuits (satellite links, others) the maximum size may need to be adjusted downward to avoid packet fragmentation, which leads to inefficiencies and possible packet loss.

4.8.4. Set Audio Stream Destination - Address

An address entered for Audio (the Audio media stream) will be either a valid multicast address, or the numeric host IP address of the remote unit if a point-to-point connection is being established.

For a discussion of multicast addresses, see the discussion above (Set Video Stream Destination - Address).

All units in one session use the same multicast address. The Video and Audio multicast addresses for a session can be the same if the Port numbers are different. Units engaged in different sessions should use different multicast addresses to minimize traffic loading on the network (the multicast routers distribute all traffic to all points subscribed on a particular multicast address, independent of the port number).

If the network is not multicast enabled, point-to-point communications between two Presentation Recorders is possible by entering the numeric IP address of the remote unit into this field.

4.8.5. Set Audio Stream Destination - Port

The port number assigned to the audio media stream.

See the discussion above (Set Video Stream Destination – Port Number) for more detailed information on ports.

4.8.6 Set Audio Stream Destination – MTU

The Maximum Transmission Unit (MTU) is the maximum length of a packet and is normally set to 1500. For some special circuits (satellite links, others) the maximum size may need to be adjusted downward to avoid packet fragmentation, which leads to inefficiencies and possible packet loss.

4.8.7 Set Max Audio Frames in Packet

Sets how many AAC frames can be sent in one packet. The default value is 8. The valid range is from 1 to 10. Lower values result in lower network jitter and lower latency, but higher network overhead (each packet contains additional headers). Set to 1 to achieve extra low audio latency. This is an audio encoder option - it doesn't affect the decoder.

4.8.8 Set TTL

The time-to-live defines the number of router hops that will be valid for a packet. When the number of hops is exceeded, the packet is discarded. The minimum value for this field is 1, and a value of 127 or greater should be used for global transmission.

In some multicast networks TTL defines the “scope” or boundary conditions for containment of the multicast traffic flow. The following table lists commonly accepted values of TTL used in this manner.

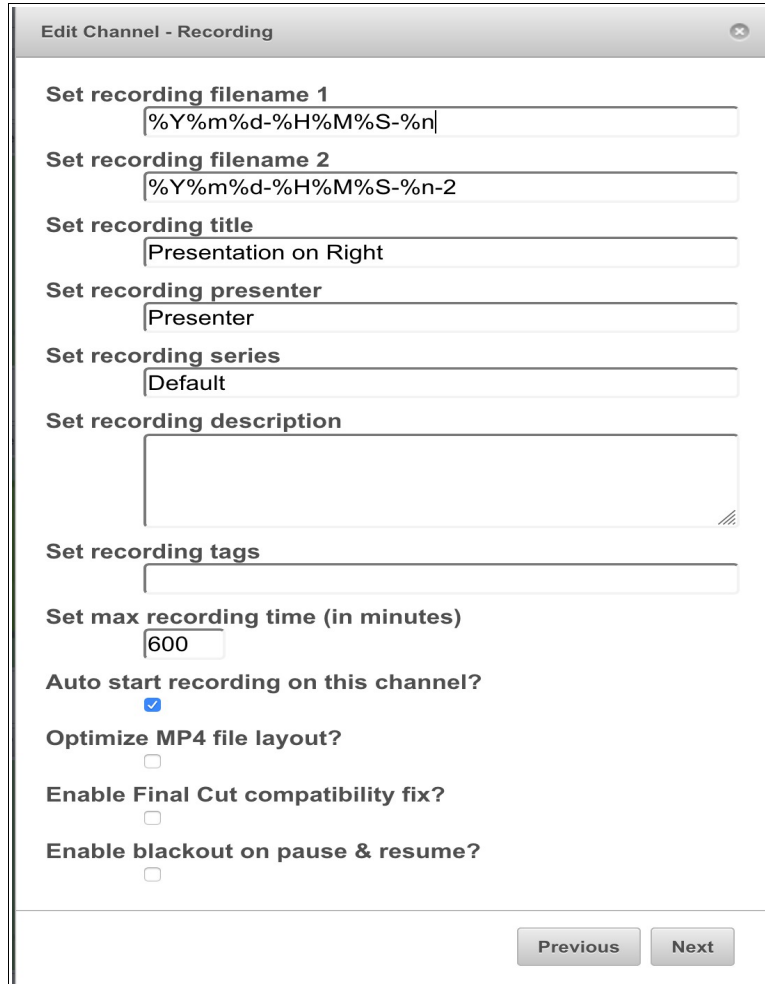
<i>TTL</i>	<i>Scope</i>
0	Restricted to the same host. Won't be output by any interface.
1	Restricted to the same subnet. Won't be forwarded by a router.
<32	Restricted to the same site, organization or department.
<64	Restricted to the same region.
<128	Restricted to the same continent.
<255	Unrestricted in scope. Global.

TTL scopes, however, have fallen into disfavor, and current practice recommends use of administratively scoped addresses for containment of multicast traffic flows.

4.9. EDIT CHANNEL - RECORDING OPTIONS

Two options are available for control of recording:

- Manual – Recording must be started and stopped by the user via controls on the Quick Start page or by the room controller via one of the serial interfaces or via the REST API.
- Auto – Recording starts automatically when the Session starts.



The screenshot shows a dialog box titled "Edit Channel - Recording" with a close button in the top right corner. The dialog contains several configuration options for recording:

- Set recording filename 1:** A text field containing the format string `%Y%m%d-%H%M%S-%n`.
- Set recording filename 2:** A text field containing the format string `%Y%m%d-%H%M%S-%n-2`.
- Set recording title:** A text field containing the text "Presentation on Right".
- Set recording presenter:** A text field containing the text "Presenter".
- Set recording series:** A text field containing the text "Default".
- Set recording description:** A large empty text area.
- Set recording tags:** A text field.
- Set max recording time (in minutes):** A text field containing the number "600".
- Auto start recording on this channel?:** A checked checkbox.
- Optimize MP4 file layout?:** An unchecked checkbox.
- Enable Final Cut compatibility fix?:** An unchecked checkbox.
- Enable blackout on pause & resume?:** An unchecked checkbox.

At the bottom right of the dialog, there are two buttons: "Previous" and "Next".

4.9.1. Set Recording Filename

The default archived filename is of the form

20071119-143206-001.mp4

which represents the start time of the recording through use of the fields: *year, month, day, hours, minutes, seconds, channel-number, filetype*.

This default filename format may be altered to reflect more customized filenames through use of a formatting string utilizing any of the following codes:

<i>Format String</i>	<i>Function</i>
%a	Abbreviated weekday name (for example Sun)
%b	Abbreviated month name (for example Jan)
%c	4 digit counter
%C	6 digit counter
%d	Day of the month (01 to 31)
%H	Hour (00 to 23)
%l	Hour (01 to 12)
%m	month (01 to 12)
%M	minute (00 to 59)
%n	Channel number (001 to 100)
%p	AM or PM
%P	am or pm
%S	seconds (00 to 61)
%Y	year
%%	%

For example, if a Presentation Recorder user wishes to create a custom filename for the “Accounting 101” series of lectures, the following filename formatting string might be used:

```
Acct101-%Y-%m-%d
```

This will create filenames of the form:

```
Acct101-2007-11-19.mp4
```

```
Acct101-2007-11-21.mp4
```

```
Acct101-2007-11-23.mp4
```

...

Using this formatting notation, the default value of the format string for standard archive filenames is this:

```
%Y%m%d-%H%M%S-%n
```

The counter variables start at 0001 or 000001 and go to 9999 or 999999. Only one counter variable is permitted per filename. The counter’s next value is calculated by scanning existing archives which match the filename template. The filename with highest counter value is discovered and the counter value found is incremented by one. If all files are removed the counters will start again from 1.

If a newly created archive filename conflicts with an existing archive, a suffix `_n` (`_1`, `_2`, `_3`, ...) is added to the new name to avoid overwriting an existing file.

4.9.2. Set Recording Title

Enter information about the Title of the session being recorded (e.g. class or course number, conference session title, meeting name, etc.). This information is entered as meta-data about the recorded archive and will be captured in the .xml data file associated with the archive.

Once a recording has commenced the title information may be updated on the Archives page.

Special text variables %0-%9 may also be entered in this field. See discussion below.

4.9.3. Set Recording Presenter

Enter information about the Presenter of the session being recorded (e.g. class professor or instructor, conference session speaker, meeting chairperson, etc.). This information is entered as meta-data about the recorded archive and will be captured in the .xml data file associated with the archive.

Once a recording has commenced the presenter information may be updated on the Archives page.

Special text variables %0-%9 may also be entered in this field. See discussion below.

4.9.4. Set Recording Series

Some video content management systems group recordings into collections of related content often called a "Series" (e.g. all recordings for a Physics 101 class). The Series associated with this Channel may be entered here.

4.9.5. Set Recording Description

Enter additional descriptive details about the event, the presenter, the topic or background of the recording. This description field will be used, for example, in automatically creating RSS feeds for the recording once it has been uploaded to an Presentation Server.

Once a recording has commenced the description information may be updated on the Archives page.

Special text variables %0-%9 may also be entered in this field. See discussion below.

4.9.6. Set Recording Tags

Recording Tags are keywords used to categorize the content of this recording for the backend server (e.g. if the Series is "Physics 101" then Tags might be "Acceleration", "Electromagnetism", etc.).

4.9.7. Set Max Recording Time (in minutes)

The Maximum Recording Time specifies when a recording should be unconditionally stopped. This value is used to prevent "runaway" recordings where the presenter forgets to press the Stop button on the control panel interface and the unit might be left recording all weekend long. The time value is in minutes and the default is 10 hours.

4.9.8. Auto Start Recording

This option will force recording to start when the Channel Session is started.

4.9.9. Optimize MP4 File Layout?

Sometimes a media file is placed on a web server and is played without the assistance of a streaming server. In such instances the location of the media data required for progressive download needs to be optimized. Optimization rearranges the audio and video blocks within the file. Optimization does not significantly affect the size of a file, but adds slightly to the post-Session processing time required. Uncheck this box if files will not be used in progressive download environments.

4.9.10. Enable Final Cut Compatibility Fix?

Due to certain limitations in Final Cut software (related to frame-rate and variable frame length processing) a special fix-up operation is required if this file will be imported into a Final Cut editor. Only check this box if Final Cut import will be needed as it adds to the post-processing time required for the file.

4.9.11. Enable Blackout on Pause and Resume?

This option adds a fade-in/fade-out special effect when the recording is paused.

4.9.12. Special Text Variables

Metadata for the Title/Presenter/Description information is only created after a Channel & Session is started and recording commences. By default this information is pulled from the Channel template/preset. In most cases, however, it's desirable to alter this information for each instance of a recording, saving new Title/Presenter/Description information.

One method to do this is to click on the "Edit" operation on the Archives page, either during or after a recording.

Another method is to send serial commands (RT, RP, RI) to the unit after recording has started.

To provide for the situation where Title/Presenter/Description information needs to be entered prior to recording start (say from a scheduling system or data input from an instructor) some special text formatting variables were created to solve this need.

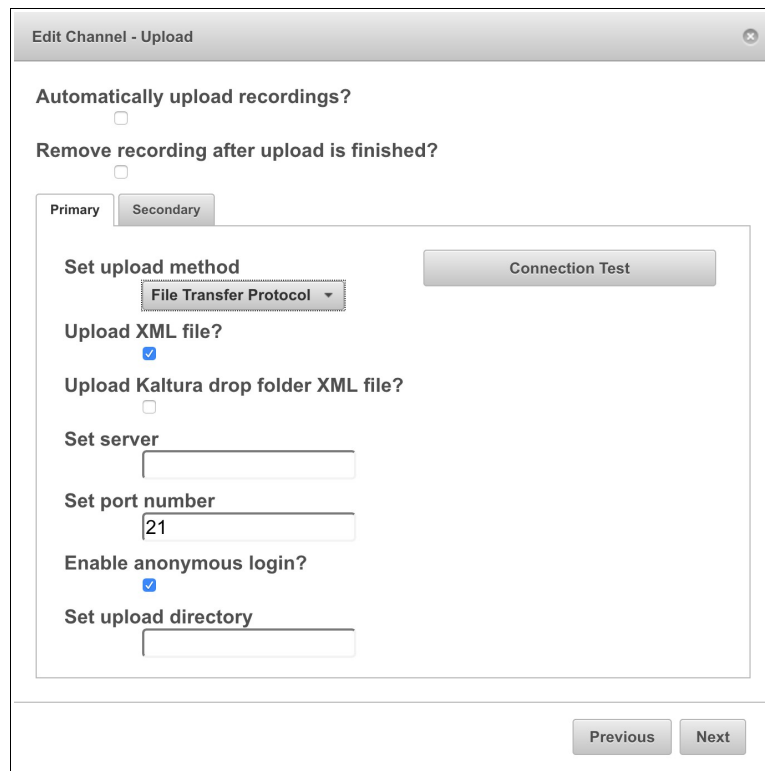
These formatting variables take the form "%0" to "%9" and the contents of each variable may be sent to the unit via serial commands (TA, ..., TJ).

To use the variable to create a new title, simply enter "%0" in the Title field. The metadata will contain a title with the contents of the Text "0" variable (TA command). The substitution of the %n format variable with its underlying text occurs at recording start, so any changes after that time will not be recognized.

The current contents of the Text variables may be viewed on the Configuration-->Custom-->Texts tab.

4.10. EDIT CHANNEL – UPLOAD

The Upload tab provides for automatic upload of archives to a streaming server using File Transfer Protocol (FTP) or Secure File Transfer Protocol (SFTP), and other services or to a locally inserted USB stick.



4.10.1. Automatically Upload Recordings?

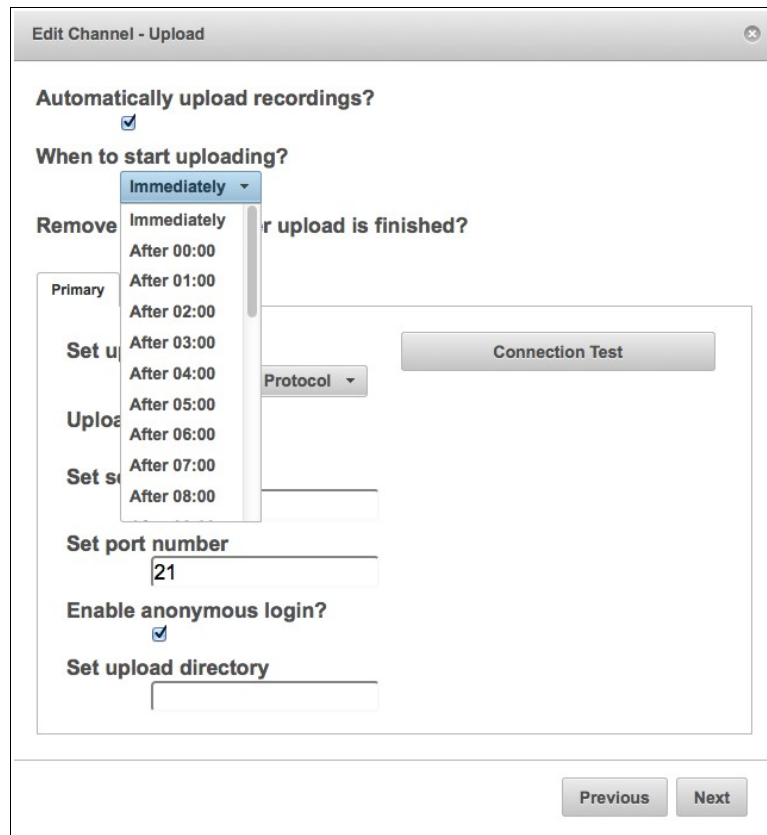
Automatic upload transfers archives automatically at a scheduled time (or immediately after creating the archive).

The system marks an archive for automatic upload right after it was created if auto upload is enabled. If auto upload is disabled archives are not marked and will be not uploaded even when auto upload is later enabled. Archives marked for automatic upload will not start uploading when a session is active. The automatic upload mark is preserved after system shutdown or reboot.

Manual upload is available from the **Archives** page, where a user may choose to upload one archive or all archives. The selected archive(s) will be marked for manual upload. Manual upload is executed immediately and can start when a session is active. The system will upload archives marked for manual upload before archives marked for automatic upload. The manual upload mark is not preserved after system shutdown or reboot. When the archive is being uploaded to the target destination its transfer progress is shown on **Archives** page.

4.10.2. When to Start Uploading?

This menu pulldown schedules automatic upload. It will start immediately after capture or in the selected 1 hour time window (i.e. "After 18:00" means upload after 6:00 p.m., not after an 18 hour delay).



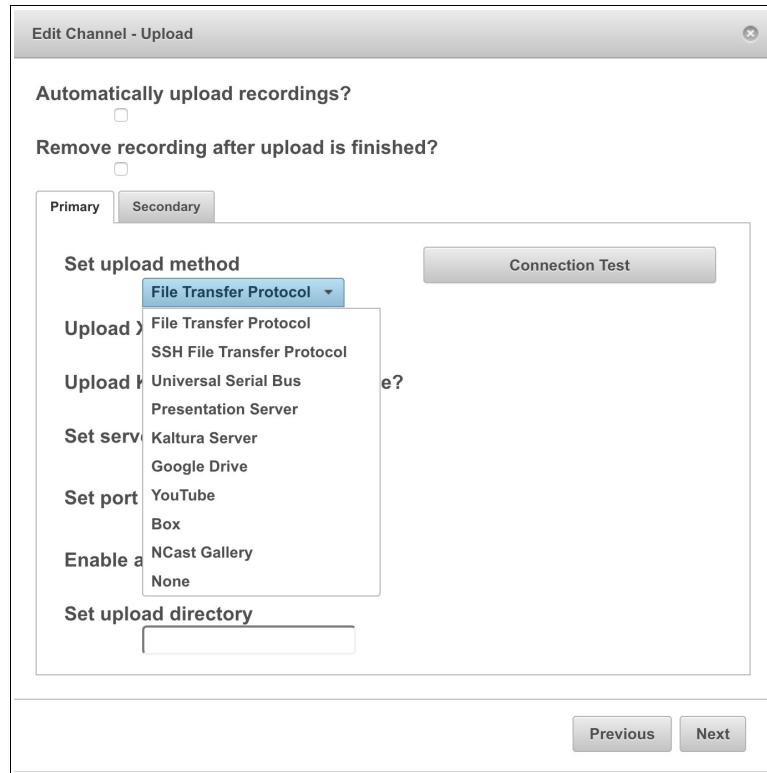
4.10.3. Remove Recording After Upload is Finished?

The recording will be removed after the archive has been transferred to its target location. Actually, the recording is not removed but is placed into the Trash Can where it remains until accumulated Trash exceeds the space allocated for it. Trash is carried out at the time a new recording starts. This means that generally a recording remains available for some time after Upload even though it has been "officially" removed. See Section 6.10.3. for a discussion on disk space management.

There is an option to "Remove Archives Automatically" which will unconditionally delete recordings when space is needed. See Section 6.10.5. for information on how to enable this option.

4.10.4. Set Upload Method

There are multiple target locations for a finished and ready file.



There is a Primary Upload choice and a Secondary Upload choice. This allows the Presentation Recorder to target two different entities for delivery of the file.

For example, the Primary choice could be set to USB and the secondary choice to Presentation Server. This would allow the Presenter to walk away with the recording on a USB stick and a backup copy is sent to Presentation Server for processing there.

Another example would be to set the Primary choice to Presentation Server for local content distribution, and the Secondary choice to FTP the file to a remote CDN service.

The Upload settings are on a per-channel basis, so use of different Channels can facilitate upload to different places when the archive is ready.

4.10.5. Connection Test

The recorder will try to connect to the server and list contents of the upload directory. It uses the current configuration of all parameters.

4.10.6. Multiple Upload Locations

The Upload information is specified on a Channel basis. Since each Channel has its own unique target information, different target locations may be accessed by starting or using different Channels.

For example, if the Session starting at 9:00 am needs to be uploaded to Dept. A's server, and the Session starting at 10:00 am needs to be uploaded to Dept. B's server, this is easily accomplished by specifying different target sites in the Channel Table. Or if some uploads go to a local, on-campus server and if other uploads go to a remote CDN server, the Channel Table settings may be used to differentiate the upload repository for each different recording.

Information about what Channel was used to record an archive is retained with the archive. If later, from the Archives page, a new upload or re-upload is requested, the system extracts current target settings from the Channel Table entry and uses that target information to upload the recording. Thus, the "Upload All Archives" operation may result in the transfer of existing archives to many different target sites.

4.10.7. File Transfer Protocol

Select "File Transfer Protocol" and fill in the required fields.

4.10.8. Upload XML File

The XML file is a metadata file containing everything the recorder knows about the recording. It can be used for automatic indexing and processing of the file. Keep this checked unless the XML is not used and does not need to be uploaded.

4.10.9. Set Server

Enter the IP address or DNS name of the server

4.10.10. Set Port Number

Enter the server port number for the protocol in use.

4.10.11. Enable Anonymous Login

For FTP transfer the use of anonymous login does not require any credentials.

4.10.12. Set Username

The user account for the server.

4.10.13. Set Password

The password required for the user account

4.10.14. Set Upload Directory

The name of the directory where archives will be placed, which may be an absolute or relative name (from the home directory of the account).

4.10.15. Upload Directory – Special Parameter

The upload directory name may include a special codes (%n) which will modify the directory name based on the Channel number. For example, if the FTP upload directory path is written as:

```
pr/Class-%n/archives
```

then for files completing a Channel 1 session the effective upload directory will be

```
pr/Class-001/archives
```

and for files completing a Channel 2 session the effective upload directory will be

```
pr/Class-002/archives
```

This provides for automatic placement of uploaded files into directories based on the channel number which was used for recording. Changing directories based on Channel number may help ease the administration of many incoming files being recorded and uploaded by a single Presentation Recorder.

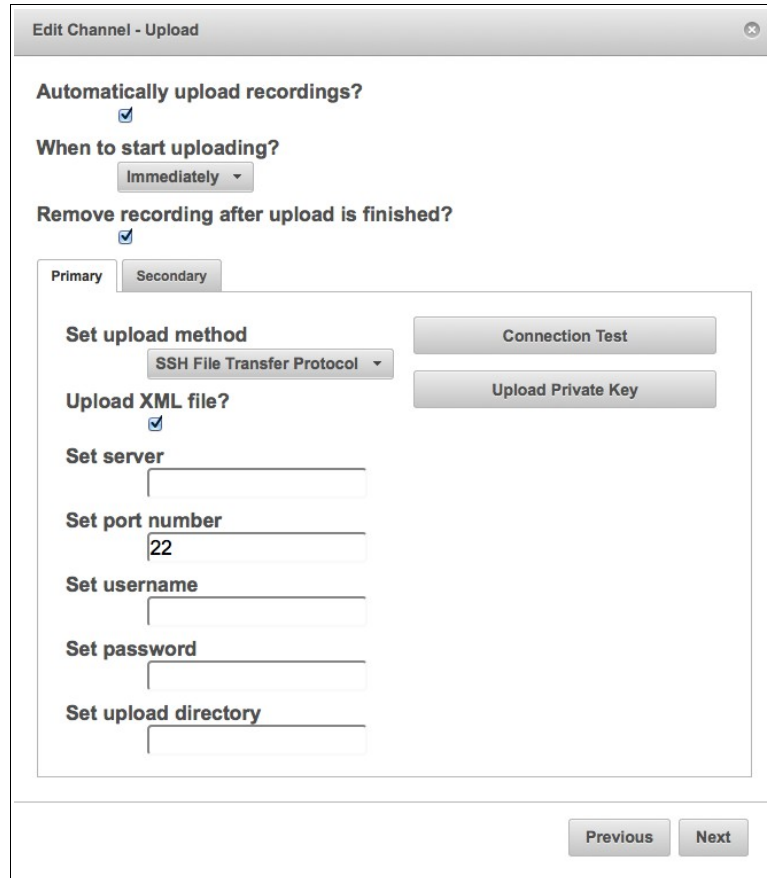
Directory based access rights will automatically restrict viewers rights to the directory/channel for which they are entitled.

4.10.16. Secure File Transfer Protocol

Secure FTP (SFTP) is supported with password and private key authorization. It will first try to use private key and if it fails password authorization is used. Only SSH-2 protocol is supported. The private key should be in Open SSH's SSH-2 format or PuTTY's SSH-2 format or ssh.com's SSH-2 format and can't be password protected.

Use the "Upload Private Key" button to install the private key for this unit.

Secure retrieval of files is also possible through use of the HTTPS SSL encrypted interface, utilizing either the standard web page or the scripts documented in Section 10.3 of the HTTP interface.



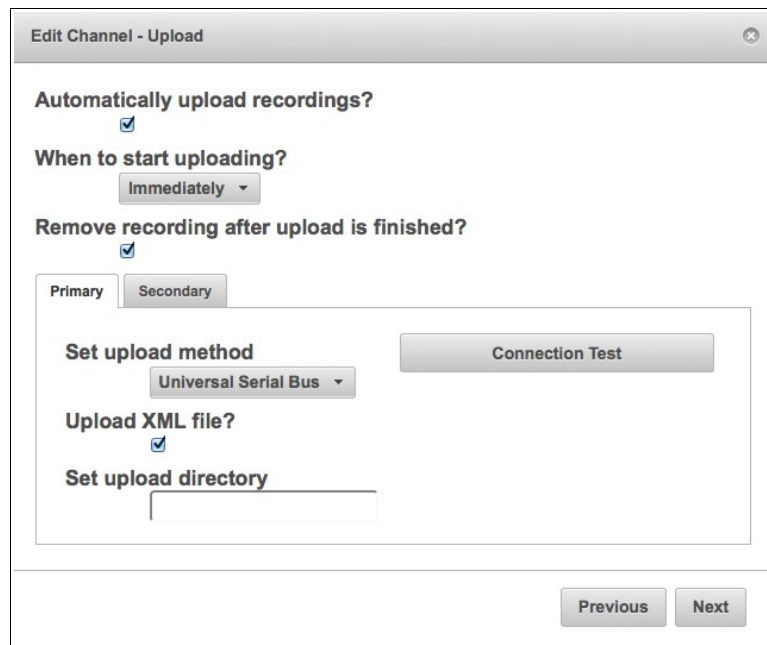
The screenshot shows the 'Edit Channel - Upload' dialog box. It has a title bar with a close button. The main content area contains the following elements:

- Automatically upload recordings?** with a checked checkbox.
- When to start uploading?** with a dropdown menu set to 'Immediately'.
- Remove recording after upload is finished?** with a checked checkbox.
- Two tabs: 'Primary' (selected) and 'Secondary'.
- A section for 'Set upload method' with a dropdown menu set to 'SSH File Transfer Protocol' and a 'Connection Test' button.
- Upload XML file?** with a checked checkbox and an 'Upload Private Key' button.
- Set server** with an empty text input field.
- Set port number** with a text input field containing '22'.
- Set username** with an empty text input field.
- Set password** with an empty text input field.
- Set upload directory** with an empty text input field.

At the bottom right, there are 'Previous' and 'Next' buttons.

4.10.17. Universal Serial Bus Upload

The Presentation Recorders are able to transfer ready archive files to a locally inserted USB drive.



The screenshot shows the 'Edit Channel - Upload' dialog box. It has a title bar with a close button. The main content area contains the following elements:

- Automatically upload recordings?** with a checked checkbox.
- When to start uploading?** with a dropdown menu set to 'Immediately'.
- Remove recording after upload is finished?** with a checked checkbox.
- Two tabs: 'Primary' (selected) and 'Secondary'.
- A section for 'Set upload method' with a dropdown menu set to 'Universal Serial Bus' and a 'Connection Test' button.
- Upload XML file?** with a checked checkbox.
- Set upload directory** with an empty text input field.

At the bottom right, there are 'Previous' and 'Next' buttons.

Due to the wide variety (and often poor performance) of USB sticks, all archive files are first recorded and finished on the internal storage of the unit and then transferred to the external USB drive.

Transfer to USB drives formatted with NTFS is not recommended due to extremely long transfer times.

4.10.18. Presentation Server

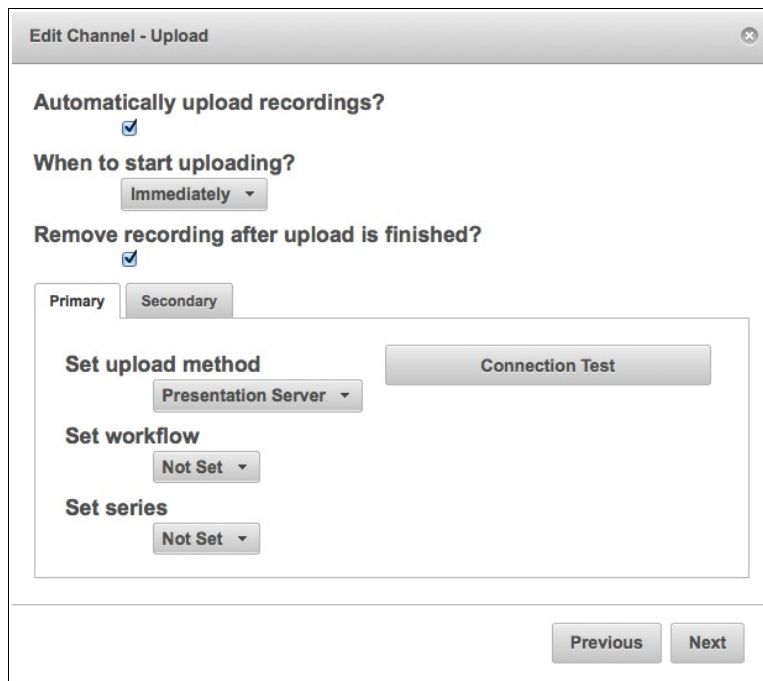
Upload to a Presentation Server utilizes a specialized open-standards protocol (the Opencast Capture Agent REST API).

The credentials to access a Presentation Server are setup in the Configuration → Presentation Server tab.

A recording for a Presentation Server may be initiated via two different methods:

- Use of the Scheduler on the Presentation Server
- Locally through in room controls, the web page, java programs or Google calendar

In the case of using the Presentation Server scheduler, the Series and Workflow in effect for the archive come from entries in the scheduler.



For locally initiated recordings the Channel preset will be used to specify this information. Thus, starting recordings on different Channels may be used to upload the recording to a different Series or to assign it to a different processing Workflow.

- Set workflow – A Workflow is a series of processing steps in the server to ingest, transcode and distribute the file as desired. The Presentation Recorder will query the server to populate the entries in these two menu pulldowns.
- Set series – A Series is a sequence of recordings and controls viewing rights to those recordings.

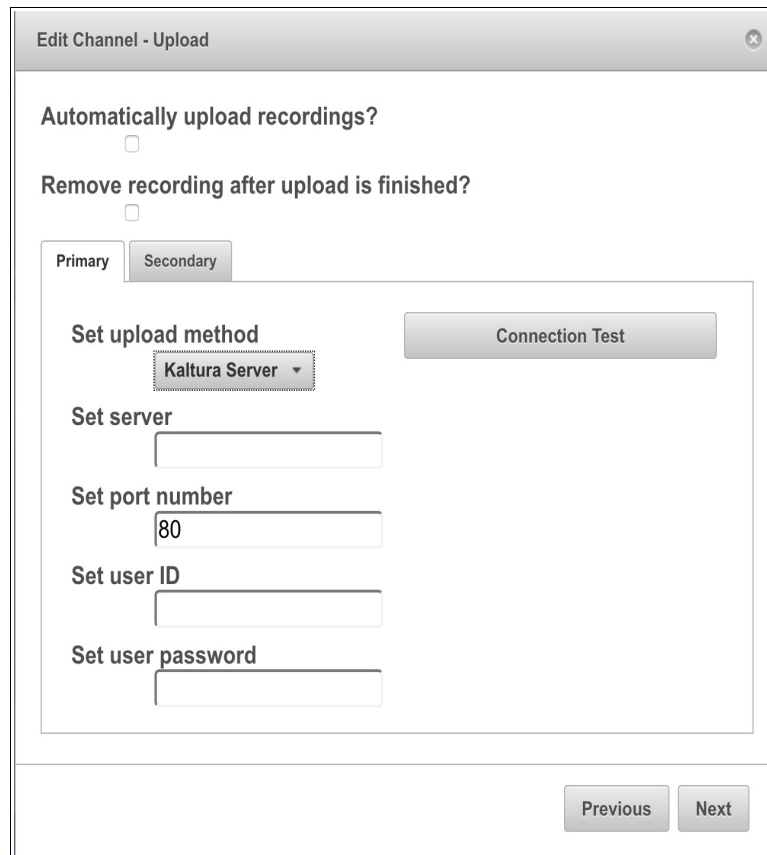
Consult Section 6.8. for additional information on configuring and troubleshooting a Presentation Server connection.

4.10.19. Kaltura Server

Upload to a Kaltura Server utilizes a specialized protocol unique to Kaltura. Uploaded files will be automatically indexed and made available to viewers.

Enter the following credentials for your server:

- Set Server – The Kaltura server address and port.
- Set User ID – Enter your User ID as provided by your network administrator.
- Set User Password – Enter the user password provided by your network administrator.



4.10.20. Google Drive

Uploads to a Google Drive account. Credentials must be set in the Configuration tab.

4.10.21. YouTube

Uploads to a YouTube account. Credentials must be set in the Configuration tab.

4.10.22. Box

Upload to Box account. Credentials must be set in the Configuration tab.

4.10.23. Gallery

Upload to an NCast Gallery server backend.

4.11. EDIT CHANNEL – NOTIFICATIONS

The Presentation Recorder has an extensive system of notifications by e-mail for routine and extraordinary events related to Channel operation. Events can be informational, like “Archive uploaded” or “Recording

Started Normally”, or they can be error reports such as “Recording Start Failed - Disk Full” or “Archive Upload Failed”. See Section 6.9. for information on how to setup system-wide error notifications.

4.11.1. Channel N Settings - Notifications

Each Channel provides for entry of an e-mail to be associated with that Channel. Channels are often used in conjunction with specific presenters or Departments, so the person or Department most closely associated with the operation of that Channel will be informed of any normal or unusual events. A typical use would be to inform a presenter or lecturer that the recordings and transcodes have completed and are available on the VOD server.

See Section 6.9. for detailed information on the entries required for this page.

Click on the “Select Events” button to choose which events to report.

Edit Channel - Notifications

Set e-mail address **Connection Test**

Set e-mail from address **Select Events**

Set SMTP server

Set SMTP port number

Enable SMTP authentication?

Set SMTP username

Set SMTP password

Enable SSL/TLS?

Previous **Finish**

4.11.2. Channel N Settings – Notification Events

A subset of all system-wide events is available for Channel-specific notifications. A system-wide event would report the start of ANY Session, whereas a Channel-specific event would only report the start of activity on Channel N. See Section 6.9.11. for additional information on use of this menu.

Edit Channel - Events ✕

Select by event type:

- Critical
- Error
- Warning
- Info

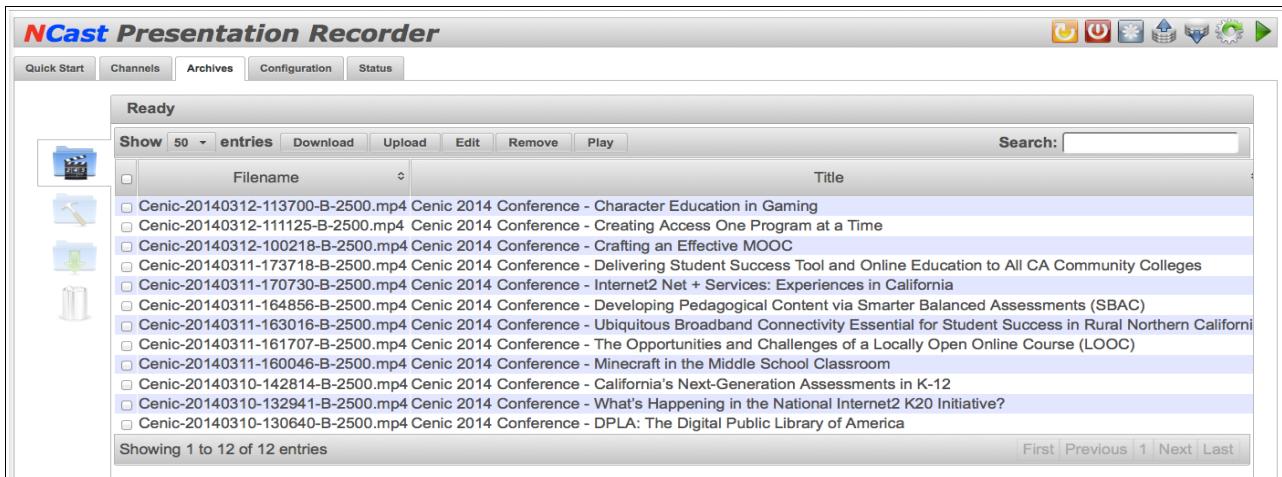
Select by event name:

- Session start
- Session stop
- Recording start
- Recording pause
- Recording continue
- Recording stop
- Archive ready
- Archive remove
- Archive restore
- Archive upload
- Archive download

5. Archives

5.1. ARCHIVE SETTINGS

The Presentation Recorder units allow complete recording of audio and graphics streams onto internal storage for later retrieval and playback.



The estimate for recording time is a simple calculation based on the bit-rate set for the channel.

Take the bit rate set for the channel in use and divide by eight to get the bytes/second of archive space needed. Multiply by 3600 to get the bytes required per hour.

So for a 5 Mbps stream (graphics plus audio) we estimate 625,000 bytes/second or 2.25 GB per hour. If we use a 16 GB archive disk that's about 7.1 hours of recording. The disk size in the unit is noted at the beginning Archive page.

The resolution and frame-rate of a channel aren't as important as the max bit-rate set for operation. Recording times may be slightly longer than the above calculation would suggest because the actual bit-rate generated during operation varies with the material being encoded, and the calculation above should represent worst-case conditions.

Archive files are named with time-stamp information indicating the start time of the archive:

yyymmdd-hhmmss-nnn.mp4

where

- yyyy Year of archive
- mm Month of archive
- dd Day of archive
- hh Hour of archive
- mm Minute of archive
- ss Second of archive
- nnn Channel number
- .mp4 File format, MPEG-4

The default archive filename may be changed (See Section 4.9.1 above).

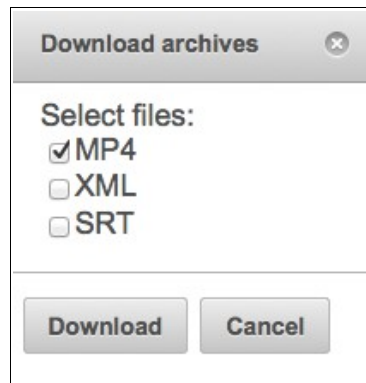
If the archive time is not correct, check the Date & Time Timezone field settings on the **Status** → **System** tab, check for correct DNS entries on the network page, and finally, determine if any network firewall is blocking access to the time-servers configured in the Presentation Recorder.

The final processing of an archive file occurs when a Session has ended. If a Session is active an archive file may be in an incomplete state listed as “Captured” or “Processing”. After pressing the “End Session” button all archive files will be finished and converted into a “Ready” state.

At the end of a Session the Archive page will show a status of “Unfinished” for files which are in the process of being hinted, optimized or fixed. When the status becomes “Ready” the archived file is ready for download.

5.1.1. Download Button

To download one or more archives, select the files to be downloaded and click on the Download button.



In addition to the MP4 file two additional files may be retrieved:

- XML – Contains metadata about the recording such as Title and Presenter.
- SRT – Contains a timed text track which may be used for captioning, chaptering or event marking. Refer to the Serial Command Reference Manual for more information on timed text tracks.

5.1.2. XML Metadata

This information is available in XML format for use by other applications:

```
<?xml version="1.0" encoding="UTF-8"?>
<archive version="1.0">
<filename>20181105-154321-001.mp4</filename>
<title>Full Screen Widescreen Presentation</title>
<presenter>Presenter</presenter>
<description></description>
<series>Default</series>
<tags></tags>
<id>MjAxODExMDU0MTU0MzIxLTAwMQ==</id>
<capture_number>1</capture_number>
<unit>PR-GEMINI</unit>
<channel>Dual Full Screen Widescreen Presentation</channel>
<start>2018-11-05 15:43:21</start>
<duration>00:04:06</duration>
<timezone>-0800</timezone>
<width>1920</width>
<height>1080</height>
<main_window>0,0,1920,1080</main_window>
<pip>0</pip>
<pip_window>0,0,320,180</pip_window>
<bitrate>2564</bitrate>
<framerate>30</framerate>
<file_format>mp4</file_format>
<video_format>h264</video_format>
```

```
<audio_format>aac</audio_format>
</archive>
```

The use of XML format allows the content to be encoded in the Unicode (UTF-8) character set.

The `<main_window>` and `<pip_window>` tags record the position of these windows at the start of a session. This information may be useful for downstream video editing processes which wish to extract video or graphics details from these windows.

The “video_format” types currently supported are “mpeg4” and “h264”. There is currently only one audio format available, “aac”.

5.1.3. Upload Button

Clicking on this button marks this archive file for immediate upload (via FTP or Secure FTP or other options) to the configured FTP server (see Section 4.10 for details on (S)FTP server setup). The upload is executed immediately and can start when a Session is active. Immediate upload may interfere with ongoing Session streaming, and should be used cautiously or not at all if network bandwidth is not available to support both streaming and file transfer.

The (S)FTP information is specified on a Channel basis. Since each Channel has its own unique (S)FTP information, different (S)FTP sites may be accessed by starting or using different Channels.

For example, if the Session starting at 9:00 am needs to be uploaded to Dept. A's server, and the Session starting at 10:00 am needs to be uploaded to Dept. B's server, this is easily accomplished by specifying different (S)FTP sites in the Channel Table. Or if some uploads go to a local, on-campus server and if other uploads go to a remote CDN server, the Channel Table settings may be used to differentiate the upload repository for each different recording.

Information about what Channel was used to record an archive is retained with the archive. If later, from the Archives page, a new upload or re-upload is requested, the system extracts current (S)FTP settings from the Channel Table entry and uses that (S)FTP site information to upload the recording. Thus, the “Upload All Archives” button may result in the transfer of existing archives to many different (S)FTP sites.

5.1.4. Edit Button

Along with every archive file an associated text file (in XML format) is kept with additional information about the archive. The Edit button allows entry of “Title”, “Presenter” and “Description” comments into this file. These entries may be made during the presentation or afterwards.

5.1.5. Remove Button

Places the archive file into the Trash. Files may be recovered from the Trash Can if they have not yet been automatically deleted by the system during recording operations which require more disk space.

5.1.6. Play Button

The Play button allows an archive to be played directly and immediately on a PC or laptop. No download is needed.

5.1.7. Unfinished Tab

Files which are not yet ready or are being processed are unfinished. To reduce processing and archive not ready time, uncheck the “Hints track”, “Optimize MP4” and “Compatibility” options on the recording tab.

5.1.8. Uploads Tab

A list of files uploading or waiting to be uploaded.

5.1.9. Trash Can Tab

Files which have been removed are placed into the system Trash Can. If a file was removed or deleted in error, opening the Trash Can permits recovery of the file, provided the file was not permanently deleted in the quest for more recording space. At the start of recording the system empties trashed files until the Trash Can size threshold is reached (See Section 6.10.4.). If the recording consumes all free space, more archive files in the Trash Can will be permanently deleted until the disk becomes completely full.

5.1.10. Editing Archive Files

There are several tools which have been used to edit and manipulate MPEG-4 archive files: Quicktime Pro, Adobe Premiere, Adobe After Effects, Final Cut and Streamclip. There may be, and probably are, other tools as well, but these are known to work.

The words "video editing" means different things to different people. Common tasks related to manipulating archive files would include these different activities:

- Reducing resolution and reducing the frame rate to downsize the file to smaller formats and smaller bit rates so lower power PCs can successfully play them back.
- Cleaning up a file by removing unneeded material at the beginning, end or in the middle of a file.
- Converting archive files to another format (e.g. conversion to RealMedia or WindowsMedia formats).
- More complex editing tasks such as adding titles, inserting other video sequences or material that was not in the original presentation, selectively adding or deleting sequences or scenes from the original file, rearranging the order of the presentation, adding fancier transitions or wipes, and technical work such as fixing color balance.
- Creation of DVDs, VCR tapes, CDs etc. from the original material.

Obviously this could be a long list and the above items are only representative.

The nature of MPEG-4 files (one keyframe - I frame followed by many differential frames - P, B frames) is hard for a video editor to deal with directly. Any type of more complex edit would require conversion of the archive files to an I-frame only format (Motion JPEG or DV format, for example) where differential frame interpolation is no longer required.

Quicktime Pro, an inexpensive add-on to Quicktime player for both MACs and Windows, is suitable for taking the original files and exporting them to a variety of other formats for further editing or simple playback in the new format. It is not a video editor and should be used just for straight export of the original files to the new format.

Adobe Premiere, a well know and very popular video editor from Adobe.

Adobe After Effects (available on PCs and MACs) is a high powered, full-featured video editor, which is very popular with professional videographers and which can do almost any video editing or rendering task known to man. It is, however, expensive in both cost and time-to-learn. This package can import the archive files directly.

Final Cut Express and Final Cut Pro are two popular video editors used with Apple computers.

Squared 5 MPEG Streamclip is an application for editing Presentation Recorder MPEG-4 files, setting In/Out points, and converting to different formats such as AVI and DV.

The archive files are at the ultra-high-end in terms of resolution and frame rate, and that processing times for these files are not trivial, with rendering times often being 3 to 7 times real-time (one minute of material may take three minutes to export, for example).

A high-powered PC is absolutely essential, with something like a 3 GHz. Pentium with 1.5 GB of RAM being the required hardware. A 1 GHz laptop with 256 MB of memory will not do the job.

Customers should carefully assess what their target audience requirements are, and make recordings in reduced resolution or reduced frame rates if a lot of down-conversion is contemplated. Keeping everything at the highest resolution and highest frame rates will be very costly in terms of video-editing post processing.

6. Configuration

6.1. PERSONAL

The Unit Options page gives the Presentation Recorder its unique ID and provides a place to enter system-wide settings. The ID and contact information are transmitted over the Internet to identify this Presentation Recorder as a member of an ongoing conference session.

The screenshot shows the 'NCast Presentation Recorder' interface with the 'Configuration' tab selected. The 'Personal' section is active, displaying a form with the following fields and values:

Unit ID:	Presentation Recorder
Contact name:	Administrator
Contact e-mail:	info@ncast.com
Contact phone:	408-541-9230
Contact location:	Sunnyvale CA
Contact web page:	http://www.ncast.com

An 'Apply' button is located at the bottom of the form. To the left of the form are icons for a person, a clock, a globe, and a globe with a signal tower.

6.1.1. Unit ID

The Unit ID uniquely identifies a Presentation Recorder within a conference. The Unit ID can be descriptive of the location of the unit, or it can reflect the departmental ownership, or any other characteristic that clearly differentiates it from its peers.

Examples:

PR Galaxy West Campus

PR Galaxy Engineering

The Unit ID is written to the XML meta-data file which accompanies each recording, and may be used to index the recorded file based on information about which unit sourced the recording.

6.1.2. Contact Name

The Contact name is typically the name of the owner or administrator of the unit responsible for being the source of the generated media stream. It could also be the name of the person in charge of the course material being webcast. This item is transmitted in real-time over the network as an SDES element in the RTP protocol (see IETF RFC 1889 for a more detailed description of the Real-Time Protocol). Other SDES items include the Contact e-mail, Contact phone, Contact location, and Contact web page.

6.1.3. Contact E-mail

The Contact e-mail should be the address of the owner/administrator of the unit or an address where questions or service requests concerning the unit are sent. The email address should be formatted according to RFC 822, for example, info@ncast.com.

6.1.4. Contact Phone

The Contact phone should be the number of the owner/administrator of the unit or a number of a service desk, which a user could contact for help with regards to the media stream being generated. The phone

number should be formatted with a + sign replacing the international access code. For example, a phone number in the United States would appear as "+1-800-555-1212".

6.1.5. Contact Location

The location of the unit. The degree of precision of the location is at the discretion of the systems administrator. For example, one might enter "Sunnyvale, CA" or "Room 23B, Building 5, San Jose Campus, 2050 Tasman Drive, San Jose, CA".

6.1.6. Contact Web Page

The Contact web page can be the URL of the Contact name's personal web page, department, service group, help page or course material outline.

6.2. TIME

6.2.1. Time Zone

The Time zone setting is required so that the timestamp information embedded in the archive filenames correctly matches the local time-of-day.



6.2.2. Network Time Protocol

When enabled the unit's system time is synchronized with public or private NTP servers. When stopped the system time is not synchronized and may drift over longer time periods. This option is controlled by the "Stop NTP" button, which will terminate any active Session and reconfigure the system. If the NTP client has been stopped an additional setting for manual time and date setup appears. The NTP client requires a proper DNS configuration to work correctly.

Selection of this option requires that the network in use allows the Presentation Recorder to access external, publicly available time servers. If you are on a private or closed network, local NTP servers may be listed in the "NTP server N" fields.

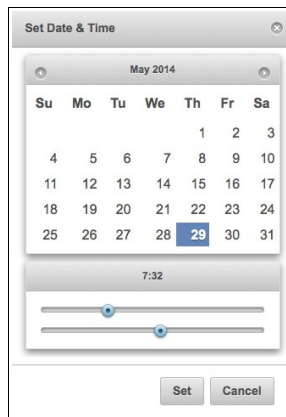
Disable this selection if access to the network time servers is not available (closed network) or if the unit is being used in a temporary location with a standalone hub or router (e.g. a tradeshow, conference or demo). Bootup time will be substantially reduced if the system does not wait for a response from non-existent time servers.

6.2.3. Manual Time setting

To set the time manually (if the unit is not on a network where time servers are reachable) the first step is to "Stop NTP". A new set of buttons will appear, one of which is labelled "Set Date & Time".



Clicking on this button will bring up the manual time setting window:



There will be some time offset with clock drift, so if running manually the clock time needs to be rechecked on a periodic basis.

6.3. NETWORK

The Network Configuration page is used to set and report parameters related to the IP address of the unit and its behavior on an Internet network. The network parameters are normally set using this page, but alternatively, they may be entered through the use of commonly available USB memory sticks.

When shipped the units are setup with DHCP enabled. The DHCP setting means that any network or router which provides DHCP services will automatically assign an IP address to the unit. This address is reported on the display screen during initial bootup. Once that address is noted, the installer may use the web interface and Network Configuration page to assign the unit to any statically desired IP address, which will take effect on the next power-on cycle. If this method does not work, use the USB stick method discussed below.



The following parameters may be configured on the Network page:

6.3.1. DHCP

If DHCP is enabled the unit will automatically receive an IP address from the network's DHCP server. Some networks require MAC address registration with the DHCP server before an IP address can be allocated. The MAC address is on a label on the bottom of the chassis, and is also reported on the Network Configuration page. If DHCP is disabled, a static IP address must be provided by the installer. Consult with the IT staff or network management to obtain the IP address allocated for the unit.

6.3.2. IP Address

The static IP address to be used by the unit in numeric form (www.xxx.yyy.zzz). Not required if DHCP is enabled.



6.3.3. Netmask

The IP netmask in use for this LAN segment (e.g. 255.255.255.0).

6.3.4. Gateway

The numeric IP address of the gateway host on this LAN segment (e.g. www.xxx.yyy.1).

6.3.5. Primary DNS

The numeric IP address of the primary Domain Name Server (DNS) for this LAN segment (e.g. www.xxx.yyy.10). Domain name servers translate symbolic domain names to numeric IP addresses. Various processes within the Presentation Recorder may, on occasion, require contact with a valid name server.

6.3.6. Secondary DNS

The numeric IP address of the secondary (or backup) Domain Name Server.

6.3.7. Wireless Configuration



The Presentation Recorders can function as either a WiFi client or an Access Point. The default Access Point name is “AP-” followed by the unit's MAC address. The default password is the unit's serial number, found on the outside of the case. Uncheck the Access Point checkbox to configure the unit as a WiFi client.

6.3.8. USB Stick Network Settings

An alternative way to configure network parameters for the unit is to edit a special text file on a USB memory stick and to insert that memory stick into any USB slot in the unit during power-on. The operating software looks for the presence of a USB memory and searches for the presence of a specially named file. If this file is found, the network parameters are read from the file, installed into unit and used during the network boot process. Once the unit has booted, the USB memory may be removed and is not required again. The network settings from the file will be reflected as permanent entries shown on the Network Configuration page.

The file on the USB stick must be named “network.txt” and has the following lines of information:

```
dhcp=true
dns_1=8.8.8.8
dns_2=8.8.4.4
gateway=192.168.10.1
ipaddress=192.168.10.24
netmask=255.255.255.0
ap=true
## 2-32 characters
ap_ssid=PR-ACCESS
## 8-64 characters
ap_password=passphrase
## 2-32 characters
wifi_ssid=MyWiFi
## 8-64 characters
wifi_password=passphrase
wifi_1_ssid=MyWiFi-1
wifi_1_password=passphrase1
```

Only lines needed for configuration are necessary. For example, to configure a static IP address:

```
dhcp=false
dns_1=8.8.8.8
dns_2=8.8.4.4
gateway=192.168.10.1
ipaddress=192.168.10.24
netmask=255.255.255.0
```

To configure WiFi only:

```
ap=false
wifi_ssid=My-WiFi-Network
wifi_password=passphrase
```

The “dhcp” keyword accepts two values: “false” which means disabled (no dhcp, use static addresses) or “true” which means enabled (use dhcp, dynamic addresses). The “dns” values identify the domain name servers. These values are case sensitive. The other keywords require numeric IP addresses or netmasks as shown above.

This file should be created/edited with any simple ASCII text editor (e.g. Notepad, TextEdit). Do not use an advanced word-processing editor to alter this file. Each key=value pair must be on a separate line with no whitespace prior to the key, and no blank lines in the file.

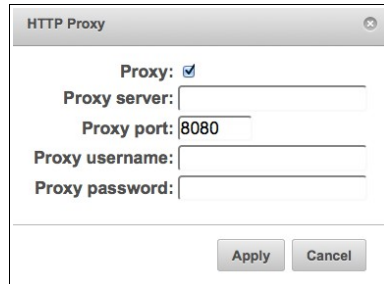
6.3.9. IP Address Display

When the unit boots the On Screen Display (OSD) will show the unit's IP address.

If the OSD is enabled (on the local loopback screen) the current IP address of the unit will be shown with the meter continuously, allowing verification of the unit's address.

6.3.10. HTTP Proxy

Software updates for the Presentation Recorder are achieved through use of HTTP protocol. If the network being used is firewalled and requires the use of HTTP Proxy services, then this checkbox must be enabled for proper downloads of new software updates.



6.3.11. Proxy server

The IP address (symbolic or numeric) of the network's proxy server.

6.3.12. Proxy Port

The proxy server port (e.g. 80).

6.3.13. Proxy User

If the proxy server requires a username and password for access, enter the username.

6.3.14. Proxy Password

If the proxy server requires a username and password for access, enter the password.

All changes to these network settings require a reboot of the unit. Press the "Update & Reboot" button when all entries are complete and you have double-checked the correctness of these entries.

6.3.15. SNMP – Simple Network Management Protocol

The SNMP protocol is a widely used, industry standard protocol designed to monitor devices of all types (e.g. routers, servers, switches, PC's, etc.) on a network. Commercial and open-source tools (e.g. Nagios) are available to provide comprehensive reports on the health of units being monitored. Customers running multiple encoders may benefit from the use of SNMP to track the availability and performance of their systems.

The agent supports protocol versions 1, 2c and 3. The following MIBs (Management Information Base) are included in this implementation:

- SNMPv2-MIB
- IF-MIB
- RFC1213-MIB
- IP-MIB
- IP-FORWARD-MIB
- TCP-MIB
- UDP-MIB
- HOST-RESOURCES-MIB
- DISMAN-EVENT-MIB
- NOTIFICATION-LOG-MIB

For security reasons and to prevent unwanted use and probes of your network it is advised to change all the default settings in the SNMP configuration window to private, custom values.



SNMP

SNMP:

Community string: public

Security name: snmp3

Authentication password: 12345678

Privacy password: 12345678

Apply Cancel

6.3.16. Community String

In Versions 1 and 2c of the protocol the community strings identified sets of resources to monitor and some of these resources could be “read-only” and some could be “read-write”. In most default installations of SNMP the community string “public” is read-only and returns limited, basic information about the system being monitored.

Use of Version 1 or 2c protocol is considered to be insecure as clear-text is used and this is easily compromised.

6.3.17. Security Name

In Version 3 a “Security Name” is similar to a username on other systems. It identifies an authorized user of the system.

6.3.18. Authentication Password

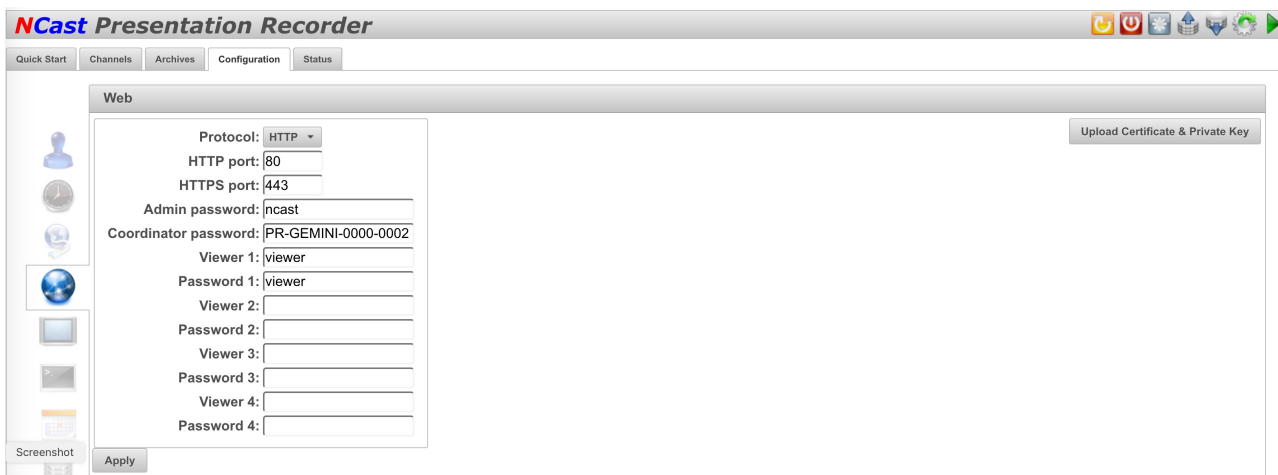
Authentication is performed by using a user's authentication password to create an authentication key to sign the message being sent. The signing key is generated from a password that must be at least 8 characters in length.

6.3.19. Privacy Password

A private key is used to encrypt the data portion the message being sent. The private key is generated from the privacy password that must be at least 8 characters in length.

6.4. WEB

The Web tab provides for security settings and selection of the type of HTTP protocol access to the encoder. Also, the Admin and Coordinator passwords may be changed on this page.



NCast Presentation Recorder

Quick Start Channels Archives Configuration Status

Web

Protocol: HTTP

HTTP port: 80

HTTPS port: 443

Admin password: ncast

Coordinator password: PR-GEMINI-0000-0002

Viewer 1: viewer

Password 1: viewer

Viewer 2:

Password 2:

Viewer 3:

Password 3:

Viewer 4:

Password 4:

Upload Certificate & Private Key

Apply

6.4.1. HTTP/HTTPS Access

Normal web access, which is unprotected and insecure, is accomplished through use of the HTTP protocol typically utilizing port 80. Secure access using HTTPS (the SSL protocol) utilizes port 443. Administration of the Presentation Recorder in open and insecure networks without the use of HTTPS presents a security risk and should be avoided.

The Web Control page allows three different options related to Viewer and Administrative access.

- All HTTP – Utilizes HTTP for Viewer and Administrative access.
- Viewer HTTP/Admin HTTPS – Utilizes HTTPS for Administrative access
- All HTTPS – Viewers and Administrators must use HTTPS

The downside of using HTTPS is that SSL Certificates (which usually require an annual fee or license payment) are required for each Presentation Recorder unit. Non-authoritative certificates may be used, but Viewers will see ominous warning notices in their browsers about the certificate, asking the user to accept the validity of the connection. Also, client players such as Quicktime, which need to download .sdp files using HTTPS protocol, may not function correctly if the certificate is not valid. Consult with your network administrator about certificate availability for your organization.

Access using HTTPS is straightforward. Simply use the “https” prefix:

```
https://pr.ncast.com
```

This will automatically direct the request to port 443, the standard for HTTPS access.

6.4.2. Upload Certificate & Private Key

If an organization has purchased an official SSL Certificate, or has created a non-authoritative one (which can be done with many different SSL tools) this new certificate may be uploaded and installed on the Web Control page.

When HTTPS is turned on, the Apache server requires that the certificate be authenticated with a password. Since this is not possible inside the Presentation Recorder, a private RSA key may be used instead of a password. If there is not a valid private RSA key available, then Apache will not start. This is used to disable third parties launching HTTPS with stolen certificates. More information on this topic is at <http://www.apache.org>. The pass-phrase should be removed from the private key before upload.

6.4.3. Admin password

The Admin password grants rights to all configuration and setup options for the Presentation Recorder. This password should be chosen carefully and with security in mind. Avoid use of common names, dictionary words and the like. A randomly chosen string greater than 8 characters in length is suggested.

6.4.4. Coordinator password

The Coordinator password allows access to the Archive files.

6.4.5. Viewer password

Viewer passwords control access to streaming and archive viewing.

6.5. DISPLAY

The Display settings control activity relative to the local display attached to the Presentation Recorder. If activated this display normally loops back the graphics or video signals selected on the input connectors (after digitization of the signal). The displayed material shows the final-form composition of what will be compressed and recorded (except for the audio-meter or OSD, if present). Also, if graphic overlays are being used, these will appear on the local loopback display.



6.5.1. Loopback

Turns on and off the loopback of locally generated graphics or video input. If a local display and local loopback is not being used in an installation this setting should be unchecked as that will free up CPU cycles which are required to generate the loopbacked image.

6.5.2. On Screen Display (OSD)

The On Screen Display (OSD) presents the following information on the locally attached display:

- Local Audio Levels (Left, Right) – Level of audio to be recorded or streamed
- Network Audio Levels (Left, Right) – Level of audio being received from a remote source
- IP address – Current IP address of the recorder
- Streaming LED – Indicates if the unit is active and in Session
- Recording LED – Indicates if the unit is recording

When the OSD checkbox is checked, two pairs of audio meters appear on the local loopback display connected to the Presentation Recorder. The audio meter window is never transmitted over the network nor recorded as part of the media stream.

The stereo meters on the left show local audio activity originating from the microphone or line-level inputs. The stereo meters on the right show network activity, that is, strength of the audio derived from the incoming media stream in full-duplex or collaboration mode.

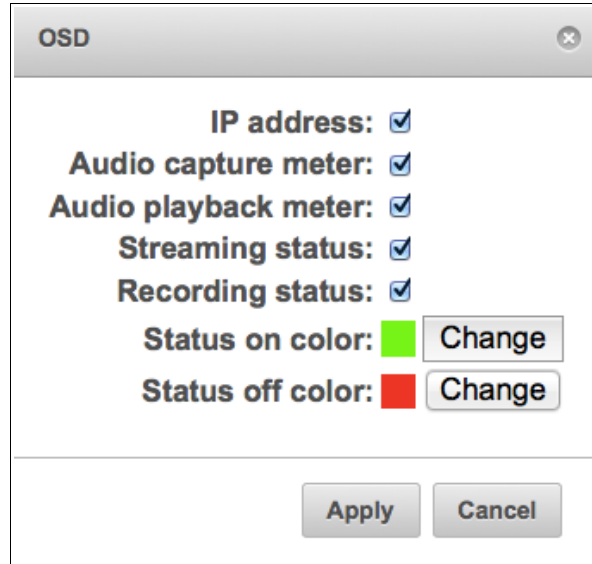
The local meters are useful to check for proper connectivity and activity of the sound system connected to the Presentation Recorder. The levels should be checked for proper range, and gains should be changed if the audio is too hot or soft.

6.5.3. OSD Position

The OSD positioning controls (Top-left, Top-right, Bottom-left, Bottom-right) allow the meter display to be set in an area of the screen that does not obscure other important windows (like the PIP window, for example).

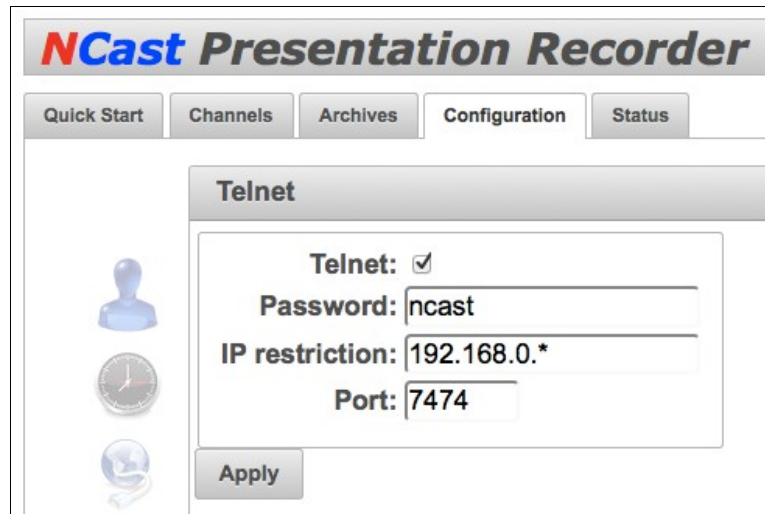
6.5.4. Configure OSD

The contents of the OSD can be tailored to contain only those elements required to be shown on the screen:



6.6. TELNET SETTINGS

The Telnet tab is used to enable the Telnet Serial Interface to the unit, an interface, which may be used to send and receive command and control, strings over IP-based networks. See the *Serial Interface Specification Manual* for complete information on the serial command interfaces.



If the interface is enabled, secure the interface with a unique and non-dictionary password, and configure the IP restriction field to only allow the IP address of the controller unit to command the Presentation Recorder.

6.6.1. Telnet

Uncheck access if the serial command interface is not in use.

6.6.2. Password

Choose a password, which has random characters and numbers and is at least 8 characters in length. Unfortunately, Telnet protocol sends this password in clear-text, so network sniffers may be able to compromise this entry.

6.6.3. IP Restriction

This limits the valid IP addresses, which may send commands to the Presentation Recorder. Normally this field should contain a single IP address, which is the IP of the controller in charge of the Presentation Recorder. Thus, if the password is compromised an attacker will still not gain access to the unit. This field may contain:

www.xxx.yyy.zzz	A single address
www.xxx.yyy.*	An address range
www.xxx.yyy.0/24	A subset of a network (CIDR notation)
www.xxx.yyy.zzz,sss.ttt.uuu.vvv	A comma-separated list of addresses
www.xxx.yyy.zzz,sss.ttt.uuu.*	A comma-separated list of addresses and ranges

Standard CIDR notation is documented in IETF RFC 4632.

6.6.4. Port

For security reasons the default Telnet port is not utilized. Enter a port number if the factory setting is not acceptable.

6.7. SCHEDULER

6.7.1. Overview

The PR-Galaxy Series Scheduler is a feature that allows the manager of one or more Presentation Recorders to schedule these appliances through use of a Google calendar or through use of industry-standard iCalendar files. The manager can start and stop each Presentation Recorder at a predetermined time, load unique settings for each individual presentation, send serial control commands to each Presentation Recorder to provide additional functionality, and specify how and where the Presentation Recorder sends its output, all without touching the actual Presentation Recorder user interface. All that is required is one or more Presentation Recorders, each with a connection to the Internet, and access to a Google calendar or an iCalendar file, no matter where in the world the equipment is located.



See also the Miscellaneous tab to activate/deactivate the Google login account.

6.7.2. Components of the Solution

The Scheduler Implementation uses three components to allow automatic start/stop scheduling of one or more Presentation Recorders in a network. These components are:

- An administrative interface based on Google Calendar or other Calendar system using iCalendar
- A scheduler process which queries the calendar information and activates the Presentation Recorder.
- The Presentation Recorder IP serial command interface, which receives commands at the scheduled times.

6.7.3. Scheduler Overview

The following sections describe how to use a Google Calendar account or an iCalendar file to setup a schedule for one or more Presentation Recorders and how to use the Scheduler web page.

Complete documentation for the serial command set is in the “*Presentation Recorder Serial Interface Specification*”. Please refer to this manual for a more complete description of commands which may be used. This guide lists a few basic commands which allow the user to start and stop a unit from the Scheduler interface.

6.7.4. Google Calendar Events

Google Calendar is a web-based interface used to enter calendar events such as meetings and appointments. It allows multiple personal calendars (e.g. business and home) and allows sharing of public and private calendars with friends and associates.

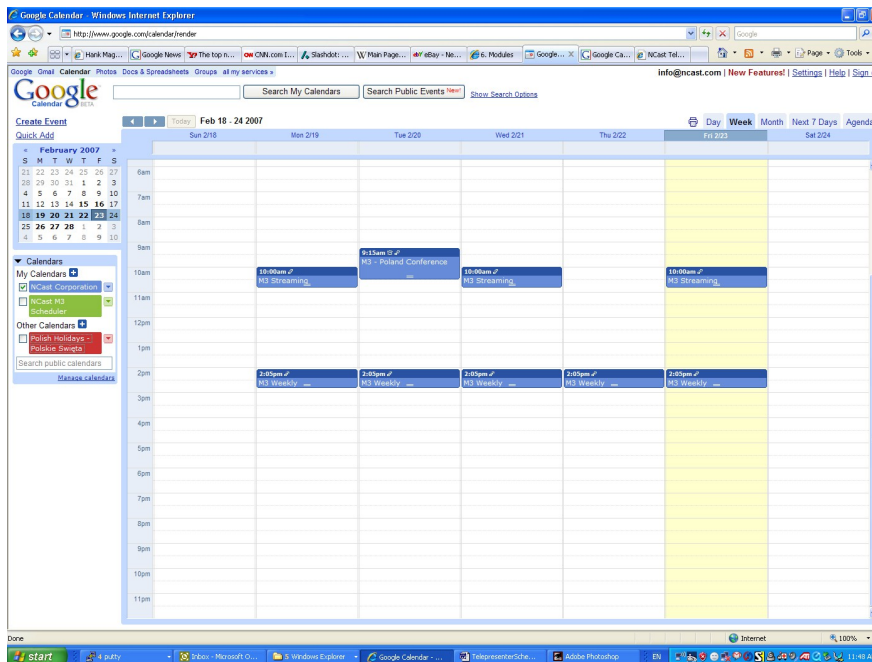
One interesting and important aspect of this calendaring system is that Google has defined a standards-based software API (called “gdata” for many of their services) which allows programmatic access to the calendars and the events contained within them. The API is implemented in Java and several other languages, and allows outside programs (e.g. clock widgets, PDA’s, other calendar systems) to access and create events within a Google calendar.

NCast has taken advantage of this programmable API to implement a scheduling system for Presentation Recorders where the web-based Google Calendar is the administrative interface for defining session start/stop times for one or more Presentation Recorders within a customer’s network.

The process works in three steps:

1. An administrator enters one or more scheduled events for a Presentation Recorder
2. The scheduling process queries the calendar at regular intervals and captures these events.
3. Commands sent to the IP Serial Interface of a Presentation Recorder starts and stops the unit.

The calendar interface allows an administrator to setup single or repeating events. The example below shows a single event scheduled for Tuesday, a Monday-Wednesday-Friday repeating event, and a Monday-to-Friday repeating event. An event is associated with a single Presentation Recorder listed in the “Where” field. Two events with the same start/stop times on the same day can be directed to two different Presentation Recorders simply by changing the contents of the “Where” field. The “Description” field (discussed below) allows customization of the actions executed at scheduled start time.



So to get started, and administrator must establish a Google Calendar account (different from a Google mail account) and provide a password for this account. Multiple accounts can be established for multiple Presentation Recorders if that is easier to administer.

Only the primary or default user calendar is processed. The program is not able to deal with secondary calendars at this time.

6.7.5. Creating Scheduled Events

To create an event click on a time-slot and fill in the following fields:

The "*What*" field (Title shown above) must contain (anywhere in the field) the letters "PR720" to identify this as a Presentation Recorder event. Additional words can further describe the nature of this entry (e.g., "Chem 101", "Weekly Staff", etc.).

The "*When*" field (Dates shown above) is used to delimit the start/stop times for the event. The drop-down menu only shows hour/half-hour entries, but by clicking again on the time field arbitrary times may be entered. The repeat options allow multiple occurrences of this event. If a stop time of 11:00 am is listed, the program uses 10:59:59 as the actual stop time. Thus, events may be scheduled back-to-back.

The "*Where*" field is the DNS name or IP address of the Presentation Recorder to be controlled. Only one Presentation Recorder may be listed. This allows one calendar to control many different units.

The "*Calendar*" field must be the primary or default calendar for this account.

The "*Description*" field is a series of serial IP commands to be issued to the Presentation Recorder at the time of the Start event (see below). In the example above, "C1" starts the Presentation Recorder session on Channel 1.

6.7.6. Scheduled Event Commands

The "*Description*" or content field is a series of serial IP commands to be issued to the Presentation Recorder at the time the Start event is processed. Each command is terminated with a ";" character. For example:

C10;

This is the only command needed to start a Presentation Recorder ("Start on Channel 10 with all other settings unchanged"). A more complicated example:

G3; V1; p1; C8; R1; RP,The CEO; RT,Weekly Performance Review;

where:

- G3 Set the Main input to the VGA input connector
- V1 Set the PIP input to the Composite video input connector
- p1 Turn PIP on
- C8 Start session on Channel 8
- R1 Turn recording on
- RP Set presenter information to "The CEO"
- RT Set title information to "Weekly Performance Review"

Commands are case-sensitive and must be written exactly as shown. The commands are processed in the order given.

The presenter and title information are stored by the Presentation Recorder in an XML file associated with archived MPEG-4 file. This XML file will normally be uploaded to the content server and can be used to provide additional details about the content for archiving and indexing.

The "*Presentation Recorder Serial Interface Specification*" lists all the commands available on the serial IP interface. Please check that document for additional setup commands that might be issued.

At the end of the event period, the program issues the "End Session" command "PE". No other commands are sent.

The scheduler program queries the calendar every few minutes. Changes to the schedule may be entered prior to this query. Once an event has started the event can only be stopped by going directly to the Web interface of the Presentation Recorder and stopping it manually or waiting for the scheduled stop.

The scheduler program does not check for conflicts or overlapping events. If times overlap for a given Presentation Recorder the results will occur in the order scheduled

6.7.7. iCalendar Overview

There are many different calendar applications in use, both PC based and Web based. NCast provides a facility to utilize these other calendar applications to generate schedules through a file interchange standard known as "iCalendar".

Another situation where use of an iCalendar file would be needed is when immediate access to Google Calendar is not available. For example, if Presentation Recorders are being utilized to record a conference on a closed network at a hotel without Internet access, the scheduler file can be created for all tracks of the conference and used to run all machines during the event.

6.7.8. The iCalendar Standard

iCalendar is the name for an Internet industry standard from the Internet Engineering Task Force (IETF):

- [RFC 2445: Internet Calendaring and Scheduling Core Object](#)
- [RFC 2446: iCalendar Transport-Independent Interoperability](#)

These standards specify the format and contents of a file (usually a ".ics" file) which contains text strings describing calendar events. The sample below is a small portion of a typical iCalendar file:

```
BEGIN:VCALENDAR
PRODID:-//Google Inc//Google Calendar 70.9054//EN
VERSION:2.0
CALSCALE:GREGORIAN
METHOD:PUBLISH
X-WR-CALNAME:NCast Corporation
X-WR-TIMEZONE:America/Los_Angeles
BEGIN:VTIMEZONE
TZID:America/Los_Angeles
X-LIC-LOCATION:America/Los_Angeles
BEGIN:STANDARD
TZOFFSETFROM:-0700
TZOFFSETTO:-0800
```

```
TZNAME:PST
DTSTART:19701025T020000
RRULE:FREQ=YEARLY;BYMONTH=10;BYDAY=-1SU
END:STANDARD
```

The iCalendar file interchange standards are not associated with the popular Macintosh program “iCal” or any other specific calendar application. The files provide a standard way to export, import and exchange calendar events, ToDo’s, meeting invitations and blog entries between different computer applications, and indeed, many different programs now support this standard (including Google Calendar).

The NCast Scheduler can read standard iCalendar (.ics) files containing scheduled events, and can control Presentation Recorders based on the contents of these events.

6.7.9. Using an iCalendar File

There are three basic steps to use an iCalendar file with the NCast Scheduler:

1. Create the schedule in a calendar application
2. Export a “.ics” file with the event information
3. Start the scheduler program with this file.

It is possible to use both iCalendar and Google Calendar at the same time. The scheduler program reads the file first and extracts up to one month’s worth of events from the file, then checks for a Google Calendar account and utilizes any additional event information coming from Google Calendar. Overlapping or conflicting event information is not checked for and could cause scheduling errors.

Entering the event information is similar to the process described above using Google Calendar:

- Summary field – must contain “PR720” somewhere in the field
- Location field – must contain the IP address of the Presentation Recorder
- Description field – contains serial commands to be sent to a Presentation Recorder

6.7.10. Importing iCalendar Files

An alternate way of utilizing iCalendar files is to first import them into a Google Calendar account, and then use the Scheduler program only with Google Calendar.

To import an iCalendar file into Google:

1. Go to the “Settings” link (upper right corner) and click on it.
2. Select the “Import Calendar” tab and click on it.
3. Browse for the “.ics” file on the PC and select it.
4. Choose the default or primary calendar for the account.
5. Click “Import”
6. Verify that the events have been properly imported and that all required fields are present.

This facility allows Presentation Recorder scheduling from almost any calendar application in use.

6.7.11. Exporting iCalendar Files

Each calendar application should have an “Export” or “Save” command to create an “.ics” file for backup or use by other applications.

To do this in Google Calendar:

1. In the “Calendars” sidebar/block on the left side, click on the menu pop-up for the primary calendar.
2. Select “Calendar settings”.
3. In the “Private Address:” details, click on the green “ICAL” button. A pop-up window should come up.

4. Right click on the “basic.ics” and do a “Save as ...” function in your browser, saving the .ics file to a known location in your PC.

If you simply click on the link, your calendar application will probably come up, and that is not the way to save the file. It will, however, allow you to import the file into your calendar and look at the contents locally.

6.7.12. Configuration

These parameters control scheduler process:

- Google calendar – Enables or disables scheduling using Google Calendar data.
- Google username – The account containing the calendar to be used.
- Google password – Password for the above account
- Google keyword – Unique identifier for the calendar entry
- iCalendar – Enables or disables scheduling using an iCalendar file.
- iCalendar to upload – Use this item to enter the filename of the iCalendar scheduling file which will be used.

6.7.13. View Buttons

These buttons allows the operator to check on scheduled events:

- View Google – Check on activities scheduled by Google calendar entries.
- View iCalendar – Check on activities scheduled by iCalendar entries.

6.7.14. Viewing Scheduler Activity

The Logs page (See Section 7.3.) permits viewing the scheduler activity logs for possible error messages, reports on scheduled events and other actions. The Serial log contains information on serial command activity.

6.7.15. External Scheduler Program

There is an external utility program available (in the Python programming language) which may be used to schedule multiple Presentation Recorders from a single, central location. Check the download area of the NCast website for this utility.

6.8. CONTENT SERVERS

6.8.1. Media Gallery

The Media Gallery is a hosting service provided on the Cloud by NCast to serve as a repository for recorded content and as a live-streaming site. Monthly plans are available for different usage levels.

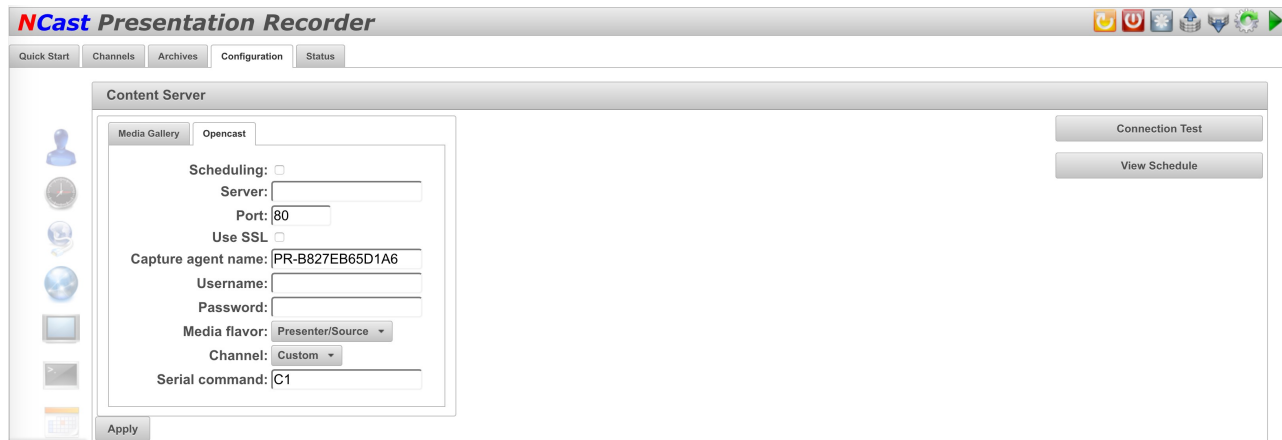


Entering the server address and credentials will allow the recorder to automatically upload and stream to the Media Gallery.

6.8.2. Opencast

The upload process to Opencast fits into the Upload method used by the Channel architecture of the encoder. Upload to Opencast is conceptually no different than, say, and FTP upload to any other content management system. Special REST API's have been implemented to execute this upload.

So, the first step in configuration is to go to the Configuration-->Content Server-->Opencast panel and enter the required credentials to access the server. Once this has been entered and the function enabled the encoder will register with the server.



6.8.3. Scheduling

If the Opencast Server scheduler will not be used, uncheck this box to save unneeded network activity.

6.8.4. Server/Port

Enter the server address and access port.

6.8.5. Use SSL

Check if communications with the server is required to use SSL protocol.

6.8.6. Capture Agent Name

The unique name for this encoder to be used when registering with the server. The default name is PR- plus the MAC address.

6.8.7. Username

The account name used by Capture Agents to log into the server. Usually the system account.

6.8.8. Password

The password for the system account.

6.8.9. Media Flavor

The default tag/flavor to use for the uploaded media.

6.8.10. Serial command

This entry specifies the serial command which will be used to start a Channel when a scheduled event is activated.

6.8.11. Troubleshooting the Opencast Installation

Use the following checklist if there are problems in getting the encoder to work with the server:

1. On the Configuration-->Content Server-->Opencast tab double check that the correct server address, port and credentials have been entered. Try the Connection Test and/or view the upcoming Schedule. At this point the encoder should be registering as a Capture Agent and its status should be visible on the server's Capture Agent page.

2. There is no Capture Agent configuration required on the server. The Capture Agent simply registers with the server and tries to pull down its upcoming schedule. If there is no status visible, make sure that the encoder's DNS settings are correct and that there is no firewall blocking the ports (often 8080) used to communicate with the server. Make sure each Capture Agent has its own unique name. Getting the encoder to register with the server is a critical step and must be completed for anything else to work.
3. If the status shows that the Capture Agent is registered, next try to manually start/stop a recording. Modify a Channel for PS Upload as described previously. Select the desired Workflow and Series. Make sure that the Channel is set for "Auto" recording on the Channels-->Edit-->General tab. Start the Channel from the Channels page and check that "Recording" is active. Then Stop the recording Session. Go to the Archives page and see if the recording has been created. As soon as the recording becomes "Ready" the file should upload to the server. Verify that a new Workflow has been launched on the server's Workflows page.
4. Finally, schedule a recording for future capture. Allow 10-15 minutes lead time for all the schedules to get synced. Verify that the encoder is seeing the event using the "View Schedule" test button. At the scheduled time the encoder should be recording. Upload should work the same way as a manual event.

Please contact NCast if any of these steps are not working.

6.9. NOTIFICATIONS

The PR-Galaxy Series has an extensive system of notifications by e-mail for routine and extraordinary events during its operation. Events can be informational, like "Archive uploaded", or they can be error reports such as "Disk full".



Event are categorized by their severity level (Info, Warning, Error and Critical), and by their specific action or type (e.g. Session start, Recording start, etc.). Events can be system-wide (e-mails are sent to the system administrator) or Channel specific (a subset of events is associated with a single Channel and sent to an e-mail address associated with that Channel).

System-wide events are configured in the **Configuration** → **Notifications** → **Select Events** menu, and Channel related events are configured in the **Edit Channel** → **Notifications** → **Select Events** menu (see Section 4.11.). The rules controlling event reporting are the same in both cases, except for the System or Channel orientation of the activity.

In summary, there is a comprehensive e-mail notification system in place to inform the administrator that "The disk is full!" or the Channel owner that "Your recording is ready" and many other notices.

6.9.1. Notifications

This dropdown menu selection enables or disables the system-wide e-mail notification service. It does not affect Channel notification activity.

6.9.2. E-mail Address

Enter the e-mail address of the administrator to be informed about system-wide events.

6.9.3. E-mail from Address

Enter the e-mail address denoting the source of this email (this unit). Something like *PR-LEO.Room-A105@myorganization.com* would instantly identify the source of the e-mail.

6.9.4. SMTP Server

Enter the DNS address or IP number of your mail server.

6.9.5. SMTP Port

Enter the port number needed to contact your SMTP (outbound) server. Normally port 25, the port number might be non-standard due to firewall rules, ISP restrictions or other requirements.

6.9.6. SMTP Authentication

Check this box if your SMTP server requires authentication.

6.9.7. SMTP Username

The username required for authenticated e-mails.

6.9.8. SMTP Password

The password required for authenticated e-mails.

6.9.9. SSL/TLS

Check this box if your SMTP server utilizes secure SSL or TLS connections.

6.9.10. Connection Test

Clicking this button will send a test message to the account listed on this page.

6.9.11. Select Events

This button brings up a checkbox menu which allows selection of notifications by severity level or by type.

Select Events ✕

Select by event type:

Critical

Error

Warning

Info

Select by event name:

Power On <input type="checkbox"/>	Detected main input signal <input type="checkbox"/>	Archive upload <input type="checkbox"/>
Shutdown <input type="checkbox"/>	Detected PIP input signal <input type="checkbox"/>	Archive download <input type="checkbox"/>
Reboot <input type="checkbox"/>	Lost main input signal <input type="checkbox"/>	Disk full <input checked="" type="checkbox"/>
Software update start <input type="checkbox"/>	Lost PIP input signal <input type="checkbox"/>	Disk nearly full <input checked="" type="checkbox"/>
Software update finish <input type="checkbox"/>	Video framerate stall <input type="checkbox"/>	Empty archive trash <input type="checkbox"/>
New software update available <input checked="" type="checkbox"/>	Recording start <input type="checkbox"/>	Resize archive trash <input type="checkbox"/>
Digitizer firmware update start <input type="checkbox"/>	Recording stop <input type="checkbox"/>	Scheduler start event <input type="checkbox"/>
Digitizer firmware update finish <input type="checkbox"/>	Recording pause <input type="checkbox"/>	Scheduler stop event <input type="checkbox"/>
Web login <input checked="" type="checkbox"/>	Recording continue <input type="checkbox"/>	Lost Google Calendar connection <input type="checkbox"/>
Web logout <input type="checkbox"/>	Archive ready <input type="checkbox"/>	Telnet connected <input type="checkbox"/>
Session start <input type="checkbox"/>	Archive remove <input type="checkbox"/>	Telnet disconnected <input type="checkbox"/>
Session stop <input type="checkbox"/>	Archive restore <input type="checkbox"/>	

There are two methods by which to choose a notification to be reported:

- *Select by event type* – Any event which is assigned the selected severity level is reported. Selecting “Info” will report Info level events, but not others. You must also select “Critical” and “Error” to be informed about events classified as Critical and Error.
- *Select by event name* – Any activity identified by the given name is reported. It does not matter if the “type” box is checked or not, the report is issued.

So a typical strategy for using this selection page is as follows:

First, select the severity level desired for reporting. Typically this would be “Critical” and “Error” unless there is an interest in the more frequent and less interesting “Warning” and “Info” messages.

Next, select particular events of interest to be reported. Perhaps “Session start” and “Recording start” are required. The net result is that all “Critical” and “Error” messages will be generated, and “Info” level messages about “Session start” and “Recording start” will be sent as well.

6.10. MISCELLANEOUS

6.10.1. Activate/Deactivate Google

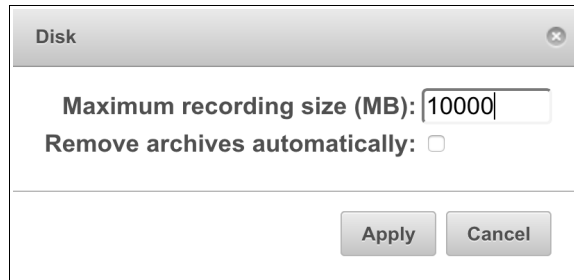
In order to use Google Calendar scheduling an association with a Google account must be established. Credentials for the Google account are entered here. This authorization occurs in a transaction directly between Google and the user. Google account names and passwords are not kept on the recorder, only tokens showing a successful login.

6.10.2. Activate/Deactivate Box

Automatic uploads to the Box cloud service are available. Credentials are entered here.

6.10.3. Disk

There are two specialized settings that apply to disk space management:



6.10.4. Maximum Recording Size

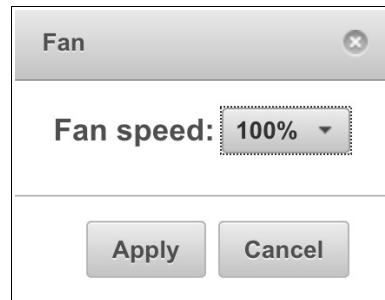
This setting establishes an upper limit on the recording in the case where recording started and nobody remembered to stop it. It prevents the disk from becoming completely full.

6.10.5. Remove Archives Automatically

The Remove Archives Automatically checkbox will cause unconditional and unquestioned removal of archives as space is needed. This policy should be used with caution and assumes that it's better to throw away old recordings (without asking or knowledge of the administrator) than to stop a new recording because of lack of available disk space. A new large or runaway recording could delete the entire contents of the Archive disk with this item checked.

6.10.6. Fan

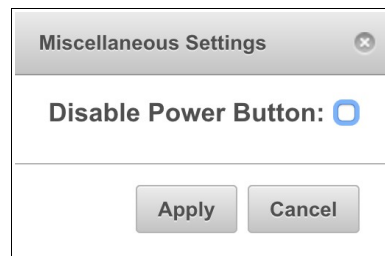
Allows the user to unconditionally set the fan speed.



The recorder does not adjust the fan speed automatically. A user can read the CPU temperature (on the Status tab) and adjust fan speed according to the cooling needed. The minimum value is 30%. A value of 100% should be used if the unit is in a rack with other equipment.

6.10.7. Miscellaneous – Disable Power Button

This setting prevents the recorder from being accidentally turned off from the front panel button:

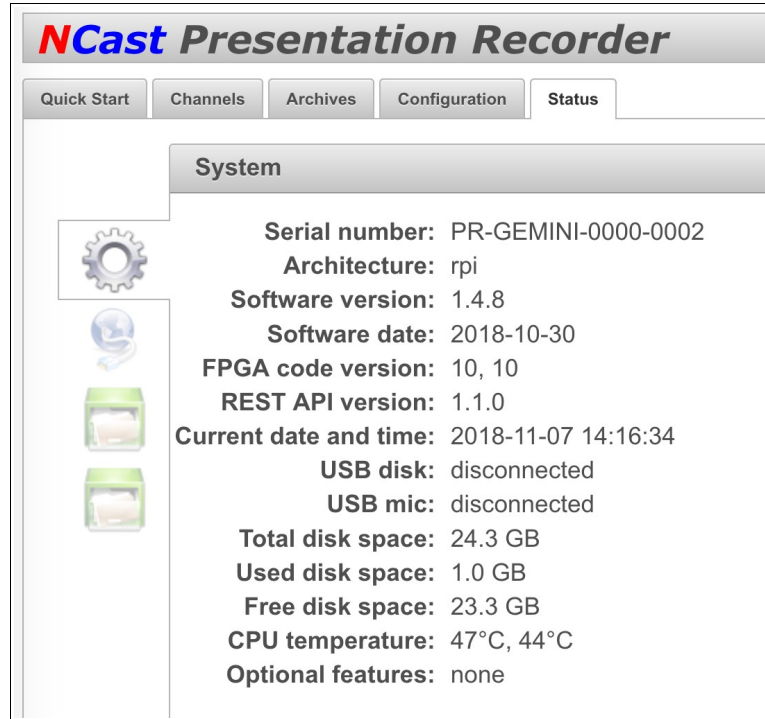


7. Status

7.1. SYSTEM

7.1.1. Serial Number and Revision Information

The System tab lists current information about this system including:



The screenshot shows the NCast Presentation Recorder interface with the 'Status' tab selected. The 'System' section displays the following information:

Serial number:	PR-GEMINI-0000-0002
Architecture:	rpi
Software version:	1.4.8
Software date:	2018-10-30
FPGA code version:	10, 10
REST API version:	1.1.0
Current date and time:	2018-11-07 14:16:34
USB disk:	disconnected
USB mic:	disconnected
Total disk space:	24.3 GB
Used disk space:	1.0 GB
Free disk space:	23.3 GB
CPU temperature:	47°C, 44°C
Optional features:	none

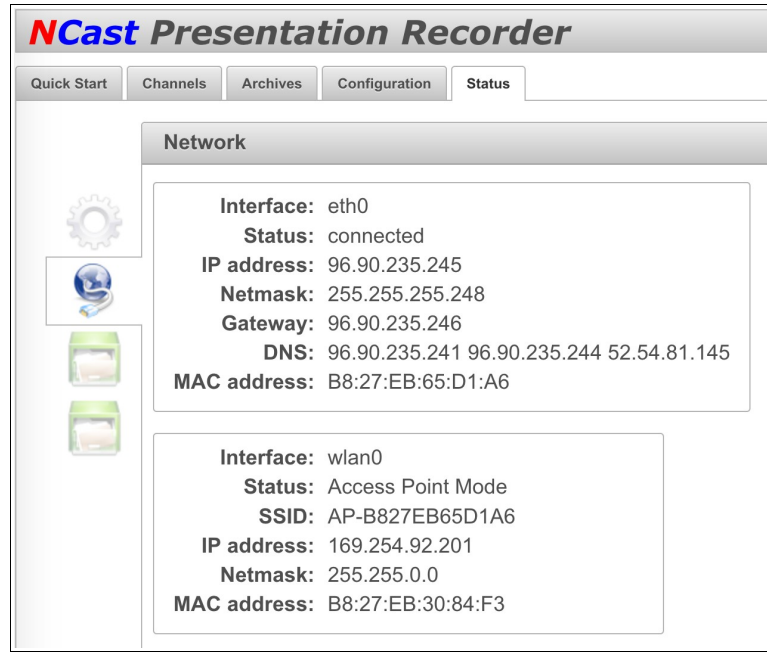
- Serial number of the hardware unit
- Hardware architecture
- Software release revision and date
- Revision of firmware and FPGA code
- REST API interface level
- Current system date and time
- USB Disk Status
- USB Microphone Status
- Archive space available
- Mainboard CPU temperature
- Optional features installed

When reporting problems to NCast it is very helpful to copy and send this information as part of a trouble ticket.

7.2. NETWORK

7.2.1. IP Address Details

The Network tab reports the IP address, WiFi status and other related parameters currently in use. The MAC address is frequently needed to register this device on corporate or university networks.



NCast Presentation Recorder

Quick Start Channels Archives Configuration **Status**

Network

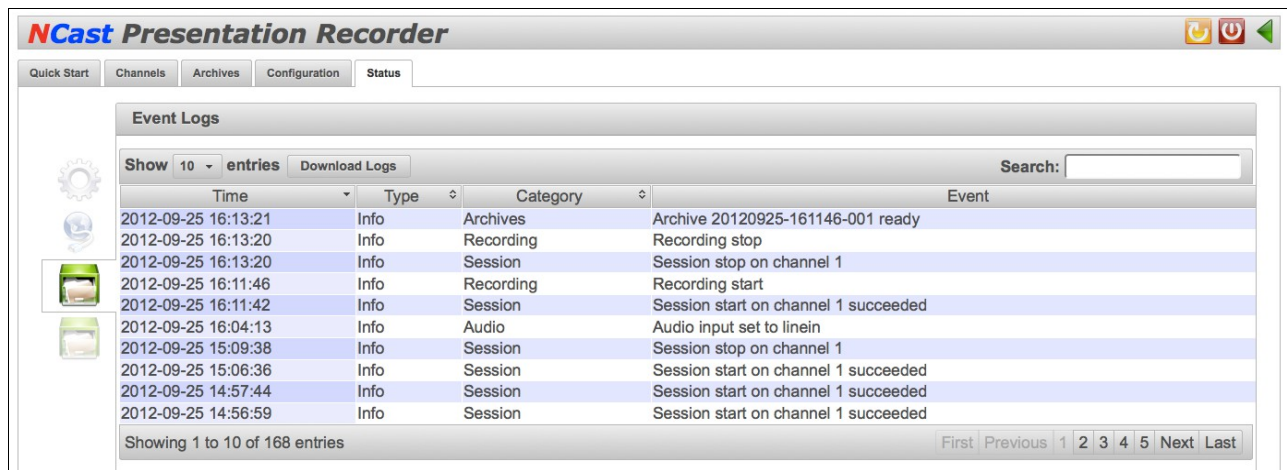
Interface: eth0
Status: connected
IP address: 96.90.235.245
Netmask: 255.255.255.248
Gateway: 96.90.235.246
DNS: 96.90.235.241 96.90.235.244 52.54.81.145
MAC address: B8:27:EB:65:D1:A6

Interface: wlan0
Status: Access Point Mode
SSID: AP-B827EB65D1A6
IP address: 169.254.92.201
Netmask: 255.255.0.0
MAC address: B8:27:EB:30:84:F3

7.3. EVENT LOGS

7.3.1. Event logging

Many events during the operation of the Presentation Recorder are recorded in the Event Logs. These Logs are part of the Event Notification System discussed in Section 6.9.



NCast Presentation Recorder

Quick Start Channels Archives Configuration **Status**

Event Logs

Show 10 entries Download Logs Search:

Time	Type	Category	Event
2012-09-25 16:13:21	Info	Archives	Archive 20120925-161146-001 ready
2012-09-25 16:13:20	Info	Recording	Recording stop
2012-09-25 16:13:20	Info	Session	Session stop on channel 1
2012-09-25 16:11:46	Info	Recording	Recording start
2012-09-25 16:11:42	Info	Session	Session start on channel 1 succeeded
2012-09-25 16:04:13	Info	Audio	Audio input set to linein
2012-09-25 15:09:38	Info	Session	Session stop on channel 1
2012-09-25 15:06:36	Info	Session	Session start on channel 1 succeeded
2012-09-25 14:57:44	Info	Session	Session start on channel 1 succeeded
2012-09-25 14:56:59	Info	Session	Session start on channel 1 succeeded

Showing 1 to 10 of 168 entries First Previous 1 2 3 4 5 Next Last

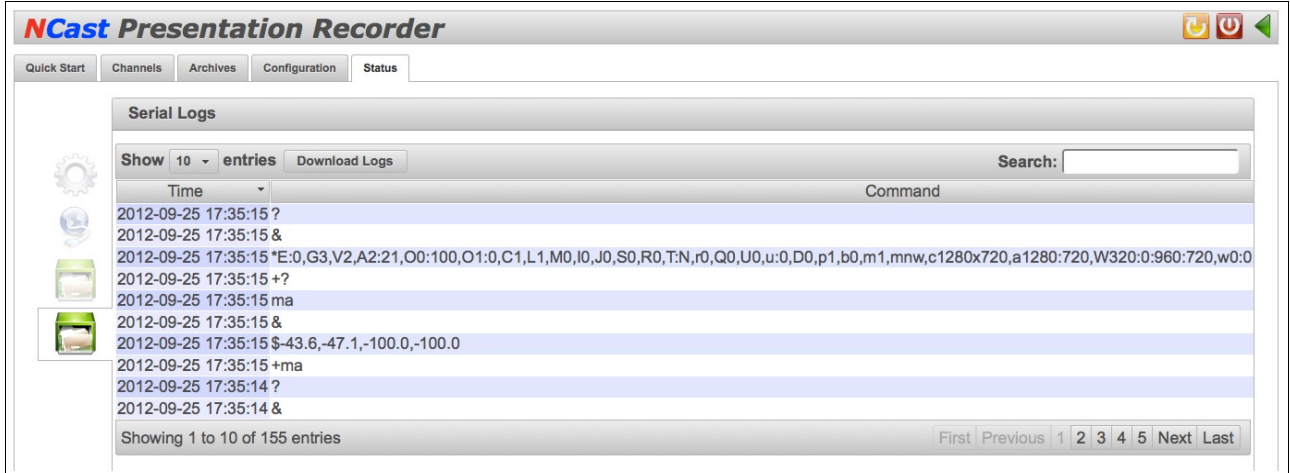
7.3.2. Download Logs

Log reporting is an important tool which NCast uses to diagnose any problems, whether they hardware or software, bugs or operational issues. When reporting a problem, please click on the “Download Logs” button which will create a .zip file of recently logged activity. Make a note of the time of the incident (if known) and forward this information to NCast for analysis.

7.4. SERIAL LOGS

7.4.1. Serial Command Logging

Serial command activity can be initiated from the Telnet interface. Serial commands are also used with the Scheduler interface. This screen allows inspection of recent activity for the Serial link.



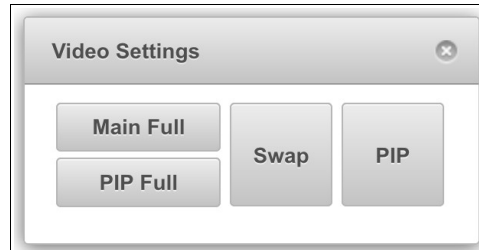
7.4.2. Download Logs

Log reporting is an important tool which NCast uses to diagnose any problems, whether they hardware or software, bugs or operational issues. When reporting a problem, please click on the “Download Logs” button which will create a .zip file of recently logged activity. Make a note of the time of the incident (if known) and forward this information to NCast for analysis.

8. Sources

8.1. VIDEO

The Sources line on the Quick Start page controls what graphics/video or audio inputs will be sent to the compression engines.



8.1.1. Main Full

The Main HDMI input expands to fill the entire screen (frame).

8.1.2. PIP Full

The PIP HDMI input expands to fill the entire screen (frame).

8.1.3. Swap

The Swap button is used during Picture-in-Picture (PIP) setups. The Main and PIP inputs will be exchanged when the button is toggled. For example, if a video PIP was overlaying a graphics background, pressing the Swap button will result in a graphics PIP overlaying a video scene.

8.1.4. PIP

The PIP button turns the PIP window on or off.

8.2. AUDIO

8.2.1. Audio Connections

There are two audio input options – HDMI input or USB input.



8.2.2. Output Gain

The audio output gain adjusts the signal level from the audio codec to the line-out connector. This signal powers the local speakers (after suitable amplification) and delivers the audio media stream to the audience.

8.2.3. USB Devices

The following USB audio devices have been tested and approved by NCast:

- Shure X2u
- Tascam US-1x2 USB microphone
- Icicle Microphone to USB converter

- MXL USB Mic Mate
- Cables with the C-Media Chip (e.g. AGPtek, HDE)

Even though it's called a "Universal" bus we have found many variations in the implementations of USB audio and we cannot guarantee proper operation of USB devices not on this list. Please contact NCast technical support if you are having issues with your USB audio connection or device.

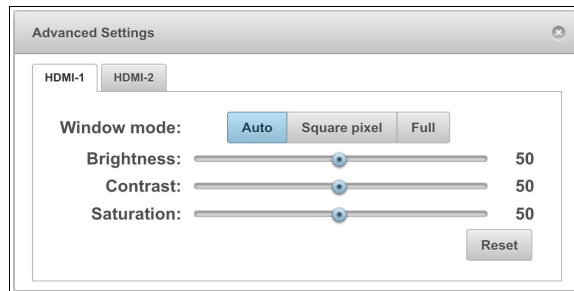
8.3. ADVANCED SETTINGS

These values allow fine tuning of window aspect ratio and image brightness, contrast, saturation.

8.3.1. Window Mode

Some layouts are a mix of 16:9 and 4:3 windows. If the Swap button is pressed with a mix of two different window aspect ratios there will be distortion. When there is a change of speakers with a change of computers, there may be a change of aspect ratios for a given connector. Keeping all these possible variations captured correctly is a real problem.

The Window mode allows fine tuning on how input signals are mapped to their respective windows. Techniques of full-screen stretching, letter-boxing and pillar-boxing may be used.



8.3.2. Brightness, Contrast, Saturation

The following table shows the allowable ranges of adjustment:

<i>Control</i>	<i>Range</i>
Brightness	0-100
Contrast	0-100
Saturation	0-100

9. Custom Layouts

9.1. FRAME LAYOUTS AND PRESETS

The main Frame of a Presentation Recorder composition consists of the following elements:

- Text Overlays (1-4) (optional)
- Graphical Overlays (1-4) (optional)
- A PIP Window Border (optional)
- The PIP Window (optional)
- The Main Window
- A Background Image (underlay, optional)
- The Black Matte Background

The size and arrangement of all of these elements is completely under the user's control and may be changed on a Channel-by-Channel basis.

The order of precedence (the visibility stack) is in the order given above (Text Overlay 4 has the highest visibility and the black matte background the lowest).

As part of the **Edit Channel – Layout** window the Presentation Recorder provides an easy to use drag-n-drop style interface which allows a user to:

- Select which of the above elements will be in the final frame composition
- View the coordinates and sizes of all the windows and overlays selected
- Modify the coordinates and sizes of all the windows and overlays via numerical coordinates or drag-n-drop
- Upload the background (underlay) image
- Upload the images required for the graphical overlays
- Edit the properties of the dynamic text overlays
- Enter text into the dynamic text overlays

9.1.1. Overlay Layout Placement

Conference rooms or presentation auditoriums typically have the speaker's podium to the right or left of the projection screen being viewed by the audience. A potential problem in using the PIP video window or speaker shot as a side-by-side layout is to position the window in the wrong spatial relationship to the screen being discussed by the presenter.

If the podium is to the right of the projection screen (as viewed from the audience) the PIP window should be placed on the right-hand side of the video frame.

If the podium is to the left of the projection screen (as viewed from the audience) the PIP window should be placed on the left-hand side of the video frame.

10. Presentation Recorder Interfaces

10.1. SERIAL INTERFACE

There is no hard-wired RS-232 style serial interface on the Galaxy recorders.

10.2. TELNET INTERFACE

Commands to control the Presentation Recorder over an IP network interface using industry standard Telnet protocol are documented in the *Presentation Recorder Serial Interface Specification*. Please refer to that document for complete details.

NCast offers several example programs which allow operation of the Presentation Recorder using the Telnet Interface. One such program is called the "Presentation Recorder Management System" and there is a version written in Java. See the "Download" area of the NCast web site. An example of the interface implemented is shown here:



For simple operations such as starting and stopping a Presentation Recorder from a controlling system, simple scripts will be adequate. For example, to start a Presentation Recorder here is a sample script:

```
#!/bin/bash
#
# Starts Presentation Recorder session using telnet interface

if [ $# -ne 3 ]; then
    echo "This script starts a Presentation Recorder session using the telnet interface."
    echo "Synopsis: start.sh address password channel"
    exit
fi

ADDRESS=$1
PASSWORD=$2
CHANNEL=$3

( echo "IdTelnet,002,$PASSWORD"
  sleep 1
  echo "C$3"
  sleep 1
  echo "QT"
  sleep 1 ) | telnet $ADDRESS 7474 >& /dev/null
```

Stopping a session utilizes this script:

```
#!/bin/bash
#
```



```
# Stops a Presentation Recorder session using the telnet interface

if [ $# -ne 2 ]; then
    echo "This script stops a Presentation Recorder session using the telnet interface."
    echo "Synopsis: stop.sh address password"
    exit
fi

ADDRESS=$1
PASSWORD=$2

( echo "IdTelnet,002,$PASSWORD"
  sleep 1
  echo "PE"
  sleep 1
  echo "QT"
  sleep 1 ) | telnet $ADDRESS 7474 >& /dev/null
```

10.3.REST INTERFACE – ARCHIVE DOWNLOAD

Special HTTP commands are available to enable automatic or script downloading of archive files:

```
wget --user=admin --password=ncast http://192.168.0.100/rest/files/recordings/20120926-061931-001.mp4
wget --user=admin --password=ncast http://192.168.10.100/rest/files/recordings/20120926-061931-001.xml
```

where

- file.mp4 The time-stamped archive filename obtained from the downloaded list
- file.xml The time-stamped xml file associated with an archive file.

Note that archive operations are username/password protected and this information must be supplied to utilize these special URLs. The required username is “admin”. The password is entered on the **Configuration** → **WEB** page.

10.4.REST INTERFACE – IMAGE AND THUMBNAIL CAPTURE

The HTTP Interface may be used to capture single images from the encoder. Commonly employed utilities such as “wget” can retrieve the current composite frame for placement of the image on a web page or elsewhere. Here is an example of the single command line needed:

```
wget --user=admin --password=ncast http://192.168.0.100/rest/files/preview.jpg
```

The default settings are format=jpg, quality=85, and the width and height will match the current settings of the session frame size.

10.5.REST INTERFACE – GRAPHICS OVERLAY UPLOAD

Overlay graphics used in presentations may be uploaded dynamically through use of an upload utility program. When used in conjunction with a scheduler or serial interface command controller this leads to a powerful method to configure all aspects of a Presentation Recorder for a given Session. It allows custom templates to be changed on an hourly basis, for example.

You can upload a channel overlay with this command:

```
curl -O --digest -u admin:ncast -F "overlay_1_1_file=@test.png" http://192.168.0.100/rest/files/upload
```

This will upload the first overlay on Channel 1. Option “-O” is required because lighttpd is not handling HTTP 1.1 upload correctly.

10.6.REST INTERFACE – REFERENCE MANUAL

All REST Interface calls are documented in the *Presentation Recorder REST Interface Guide*.

11. Terms and Definitions

11.1. AUDIO AND VIDEO TERMS AND DEFINITIONS

A complete discussion of MPEG compression, Internet streaming, webcasting protocols and related topics is beyond the scope of this document. Other sources cover this material in great detail. The following are brief definitions of some of the terms used throughout this manual.

AAC – Advanced Audio Coding, a wideband audio encoding and compression algorithm.

Auto-detect – A capability to automatically sense if an input signal (graphics or video) is present and to lock onto that signal without further manual intervention.

CIF - Describes an image or display surface with a resolution of 352x288 pixels.

DVI – Digital Visual Interface, a digital interface standard which provides for connection to LCD panels and displays.

H.264 – A compression format that delivers very high quality video at low bit rates. MPEG-4 Part 10 utilizes the H.264 codec for transmission.

HDMI – An industry standard audio/video connector.

HD-SDI, 3G-SDI – Hi-Def Serial Digital Interface, a coax based standard for digital video signal interchange.

IETF – Internet Engineering Task Force, the standards body for Internet protocols.

ISO – International Standards Organization

Latency – The end-to-end time delay between a change in the source image and the corresponding change in the remotely displayed image.

Line-Level – Sound level signals typically in the range of –10 dBu to +30 dBu.

Lip-sync – The synchronization of independent audio and video streams at a receiving decoder so that the presentation is in the same time relationship as the source.

Mic-Level – Sound level signals typically in the range of –70 dBu to –30 dBu.

MPEG Compression – MPEG is an acronym for Motion Picture Experts Group, an industry-wide committee which has defined a series of standards for the compression of audio and video source material.

MTU – The maximum transmission unit is the maximum number of bytes permitted in a transmitted packet.

Multicast – A family of computer transmission protocols where multiple receivers access a single transmitted packet stream.

PIP – A picture-in-picture function overlays one video or graphics image with a reduced-sized version of another video image.

Presentation Server – NCast's Open-Standards video and presentation content management system and video-on-demand server.

REST - REpresentational State Transfer (*REST*) is a style of software architecture for distributed systems such as the World Wide Web.

RFC – Request for Comments, an Internet protocol standard.

RTMP – Real-Time Messaging Protocol was initially a proprietary protocol developed by Macromedia for streaming audio, video and data over the Internet, between a Flash player

and a server. Adopted by Adobe and YouTube, it is now widely used on the internet for streaming video.

RTSP – Real-Time Streaming Protocol is an IETF approved protocol for control of real-time streaming on the Internet.

S-Video – A video connector (usually DIN style) where luminance and chroma information are transmitted on separate wires or cable pairs. Provides for a higher fidelity image than a composite connection.

SDI – Serial Digital Interface, a coax based standard for digital video signal interchange.

SDP – Session Description Protocol, for describing streaming media transmissions

SIF - Describes an image or display surface with a resolution of 320x240 pixels.

SVGA – Describes an image or display surface with a resolution of 800x600 pixels.

SXGA – Describes an image or display surface with a resolution of 1280x1024 pixels. The aspect ratio for SXGA is 5:4. Support for a 4:3 aspect ratio is accomplished by utilizing a 1280x960 subset of the display surface.

Telnet – An IP network based protocol, which was originally used to connect remote consoles and terminals to mainframes, but is now used as a general, bi-directional, byte oriented communications facility. See RFC's 854 and 855.

Unicast – Refers to a point-to-point connection between two Internet host machines.

USB – Universal Serial Bus.

UXGA – Describes an image or display surface with a resolution of 1600x1200 pixels.

VGA – Describes an image or display surface with a resolution of 640x480 pixels.

WUXGA - Describes an image or display surface with a resolution of 1920x1200 pixels.

WXGA – Describes an image or display surface with a resolution of 1366x768 pixels. Some projectors use WXGA to refer to 1280x720 as well. This display size implements a 16:9 aspect ratio, as compared to a normal 4:3 monitor.

XGA – Describes an image or display surface with a resolution of 1024x768 pixels.

12. References

12.1. MPEG COMPRESSION

ISO 14496-12 - ISO base media file format

ISO 14496-14 - MP4 file format

12.2. PACKET TRANSMISSION

IETF RFC 3550 "*RTP: A Transport Protocol for Real-Time Applications*", H. Schulzrinne, et. al., July 2003

IETF RFC 3551 "*RTP Profile for Audio and Video Conferences with Minimal Control*", H. Schulzrinne, et. al., July 2003

IETF RFC 3016 "*RTP Payload Format for MPEG-4 Audio/Visual Streams*", Y. Kikuchi, et. al., November 2000

IETF RFC 3640 "*RTP Payload Format for Transport of MPEG-4 Elementary Streams*", J. van der Meer, et. al., November 2003

IETF RFC 2326 "*Real Time Streaming Protocol (RTSP)*", H. Schulzrinne, et. al., April 1998

IETF RFC 2327 "*SDP: Session Description Protocol*", M. Handley, et. al., April 1998

12.3. MULTICAST

IETF RFC 1112 "*Host Extensions for IP Multicasting*", S. Deering, August 1989

IETF RFC 3171 "*IANA Guidelines for IPv4 Multicast Address Assignments*", Z. Albanna, et. al., August 2001

IETF RFC 3180 "*GLOP Addressing in 233/8*", D. Meyer, et. al., September 2001

IETF RFC 3138 "*Extended Assignments in 233/8*", D. Meyer, June 2001

IETF RFC 2365 "*Administratively Scoped IP Multicast*", D. Meyer, July 1998

IETF RFC 2327 "*SDP: Session Description Protocol*", M. Handley, et. al., April 1998

13. Revision History

- Revision 1.0 – Initial revision based on software Release 1.4.11.