eCNA Cinema Automation
Quick Start and General Application Guide

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This guide is for end users that are generally familiar with the operation of the eCNA automation. The goal is to provide some basic concepts of how the eCNA can be programmed to easily integrate with digital cinema equipment. This discussion applies to the eCNA-5, eCNA-10 and eCNA-200 automations systems.

Contents

Definitions

Program : An eCNA program is a series of instructions grouped into segments and separated by the *Wait Cue* instruction. *Wait Cue* is a special instruction that causes the program to wait for a *cue* event before continuing to the next segment. A program automatically ends after the last instruction is executed.

In Progress : Refers to an eCNA program that is running (between a start and the last executed instruction).

Idle : Refers to an eCNA program that is not running ("Ready to Run" state.)

Macro : An eCNA macro is a series of instructions that are used to perform desired actions initiated by a single instruction or event.

Server : The Digital Cinema file server that holds the packaged content (sound and video) for eventual playback.

SMS : The Screen Management System (SMS) provides the theater manager a user interface for local control of the auditorium such as start, stop, select a Show Playlist and edit a Show Playlist.

Playlist : The Show Playlist is the list that the Exhibitor assembles to complete a presentation in the theater. The playlist supports automation cues.

CAI Client : Any device that connects to one or more of the eCNA's *Cinema Automation Interface* (CAI) communications channels, such as the Digital Cinema server.

1.0. eCNA Quick Setup

This section describes the basic eCNA automation configuration. The eCNA contains an HTTP server to host its own web pages. You must a use a java script enabled web browser, such as Internet Explorer® or Firefox, to configure the eCNA.

1.1. Termination Board I/O

Output relays are required to control equipment such as the screen masking motors, slide projector, light dimmer and sound processor. Use the eCNA *Setup: I/O Boards* screens to configure the output control flags, contacts and active state. By default, the "defined" control flags are mapped to their corresponding relays.

In addition to the defined output control flags, there are 16 general purpose output control flags, *Out1* through *Out16*. These can be assigned to any of the relays on the termination board. Use the *Setup: Output Flag Names* screen to name the output control flag and then assign the flag to a relay on the *I/O Boards* screen.

For example, let's say you need a relay to control the auditorium door magnets:

1) Type "Door Mags" in the *Output Flag Name* field for Out1 from the *Setup: Output Flag Names* screen.
2) Assign "Out1: Door Mags" control flag to the *Aux Out 1* relay on the termination board.
3) Use the "Aux Out1: Door Mags" instruction in a program or macro to open and close the doors.

Relays can also be directly controlled by the input control flags. For example, assign input "In 1" to be connected to the *In1* control flag and relay "Aux Out 1" to be controlled by the *In1* control flag. The Aux Out 1 relay can then be turned on and off with the "In 1" input.

Digital inputs are often required for external events such as automation cue, fire alarm, etc.. Inputs can also be re-configured from the *I/O Boards* screens. In addition to the defined input control flags, there are 16 general purpose input flags that can be used as trigger events to call macros. Use the *Setup: Input Flag Names* screen to name the input control flags.

1.2. Programs/Macros

You will need to create programs and/or macros for the shows and macros for certain events. These are created with the *Program* and *Macro* editors found in the *Setup Menu*. The following sections describe how programs and macros can be used.

1.3. Triggers

It's often required that an action or a sequence of actions take place on a power up, a fire alarm, an input or another asynchronous event. In these cases, triggers can be defined to execute macros. The macros contain the instructions to perform the desired actions based on the type of event.

Example: The *Fire Stop Set* event triggers a Fire Stop macro. This is a two step process and is as simple as creating a macro and assigning that macro to a trigger event.

1. First, create a macro to perform the desired actions on a fire alarm condition.

2. Then configure the *Fire Stop Set* event to call the Fire Stop macro.

1.4. Automatic Behavior of Output Control Flags on Show Interruptions

The eCNA is capable of memorizing the state of the output control flags when a program is running, and restoring the same states when a program is resumed. So when the eCNA receives a fault, the outputs can simply be driven to fault states as defined by a macros and triggers. When the program is resumed the eCNA automatically restores the saved states.

This is normally the preferred manner of operation. However, if the default operation is not desirable, the *Setup: Fault Behavior* screen allows you to modify this behavior for individual output flags. The table below summarizes the selections.

When to Memorize/Restore the Instruction Timer and Output State	
On Stop or Fault Set/On Resume or Fault Clear (Default)	The state of the output and the timer are memorized on a stop or a fault. The timer resumes and the output is returned to the memorized state when the program is resumed (or when the fault is cleared in the *idle* state).
On Fault Set/On Fault Clear	The state of the output and the timer are memorized on a fault. When the fault is cleared, the timer resumes and the output is returned to the memorized state.
Never	The state of the output and the timer is not memorized on a fault or a stop. The timer continues to tick and the output fires when the timer expires. In this case the output is not affected unless it is overridden.

1.5. System Parameters

The *Setup: System Parameters* screen displays information about global system settings. Make sure these settings are correct for your application requirements. See the eCNA manuals for details on all of the parameters.

2.0. Interfacing to Digital Cinema Servers

This section describes the eCNA and Digital Cinema server/SMS communications interface. It does not refer to any particular server make or model, but describes the server in general terms in order to simplify the discussion. Details on server configuration can be found in the manufacturer's documentation and in the appendix of the eCNA manuals. The digital cinema server can communicate with the eCNA to one or more of the CAI channels. The eCNA supports Ethernet and RS-232 connections.

CAI channels:

CAI Channel 1: TCP Port 13000 or RS-232 port (P9)
CAI Channel 2: TCP Port 13001
CAI Channel 3: TCP Port 13002 or RS-232 port (P1 on the 39446 optional adapter board)

Hardware Connection:

RS-232:
Port Settings: 19200 BPS, 8 Data Bits, No Parity, 1 Stop Bit
Flow Control: Hardware (RTS-CTS)

Ethernet:
10Base-T: 10 mbps, Half or Full Duplex

2.1. eCNA Serial Commands

The SMS allows the creation of show control events that can be inserted as *automation cues* in the playlist. Such cues may indicate events such as the beginning of the feature, beginning of the intermission, beginning of the credits, and the end of the feature. These events will include eCNA CAI serial commands.

SMS input triggers can be created to execute events as well. These triggers normally wait for a signal (message) from the eCNA in order to execute a show control event.

Examples described in this section use the following CAI commands.

- CONFIGURATION Command
- EVENT Command
- OUTPUT Command
- EVENT Report Messages

Refer to the eCNA manual for details on all commands and messages.

All serial commands and responses are ASCII text. For testing purposes it is easy to use a terminal emulation software program, such as HyperTerminal®, to type commands and view responses. A connection can be made to the RS-232 or Ethernet port.

For example, to make a connection to the eCNA's Ethernet port with Hyperterminal®, connect using TCP/IP (Winsock). Enter the Host Address (eCNA's IP Address) and the Port Number (13000, 13001 or 13002). Under "ASCII Setup", make sure both "Send line ends with line feeds" and "Echo typed characters locally" are checked. Enter commands exactly as they appear in the manual and press *Enter* to send the command.

2.2. eCNA Communications Configuration

The eCNA defaults to a command/response protocol. However, the eCNA can be configured to send 'unsolicited' messages. These messages are sent based on internal and external events and can be used to trigger events on the server. Configure these messages with CONFIGURATION command.

Report Messages are normally used for SMS control. These messages should be enabled.

Turn on *Report Messages*:

Command: CMD,CFG,0,RPTON,Y,??<CR><LF>
Response: RSP,CFG,0,0,725<CR><LF>

Both *Log* and *Status* messages are needed for some CAI clients, but are normally not used with the SMS and should be disabled. These messages are disabled by default.

Turn off *Log Messages*:

Command: CMD,CFG,0,LOGOFF,Y,??<CR><LF>
Response: RSP,CFG,0,0,725<CR><LF>

Turn off *Status Messages*:

Command: CMD,CFG,0,STMOFF,ALLTBL,Y,??<CR><LF>
Response: RSP,CFG,0,0,725<CR><LF>

This configuration is saved to battery-backed memory, but is cleared when the firmware is updated or when the battery is replaced.

As a CAI client, the digital cinema server always initiates the connection to the eCNA. Servers that contain built-in support for the eCNA automation will automatically configure the communication parameters of the eCNA.

If the server doesn't specifically support the eCNA, and the *Report Messages* are required for operation, you will need to manually configure the communication parameters on initial setup and when the eCNA firmware is upgraded. Alternativley, instead of manually configuring the communications parameters, you can put the configuration command in an SMS automation cue.

For example, if the SMS always starts the eCNA, include the configuration command in the automation cue before the start command.

```
         CMD,CFG,0,RPTON,N,??<CR><LF>
         CMD,EVT,0,SPR,N,??<CR><LF>
  SMS  ───────────────────────────────►  eCNA
```
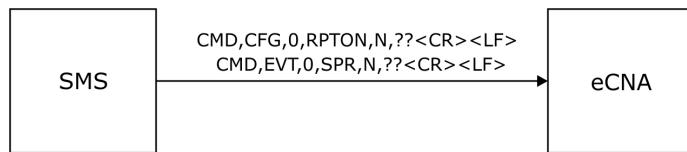
2.3. Show Control Methods

There are many ways to implement an eCNA-based distributed control system in the cinema environment. Three basic control methods provide the building blocks for all show applications.

- Program Show Control
- Macro Show Control
- Discrete Output Control

Any of these control methods can be used in combination. For example, Program Control could be used for a timed sequence during intermission and Macro Control could be used for normal show presentations.

2.3.1. Program Show Control

Program Control is a fixed sequence used to control the booth and auditorium functions. The program is set up to execute a series of instructions and wait for a "cue" from the SMS playlist in order to execute the next series of instructions. This continues until the end of the presentation. Program segments must be synchronized with the playlist.

The eCNA program can be started from the SMS. The automation cue should contain the "set program and run" event command to start the desired program. Subsequent automation cues will contain the "cue" event command.

Note: The eCNA program must be in the "idle" state prior to starting.

SMS starts and advances the eCNA program

SMS Show Playlist		eCNA Program
Automation Cue	CMD,EVT,0,SPR,N,??<CR><LF>	Start
Previews		Previews
Automation Cue	CMD,EVT,0,CUE,N,??<CR><LF>	Wait for Cue
Feature		Feature
Automation Cue	CMD,EVT,0,CUE,N,??<CR><LF>	Wait for Cue
Credits		Credits
Automation Cue	CMD,EVT,0,CUE,N,??<CR><LF>	Wait for Cue
		End of Show
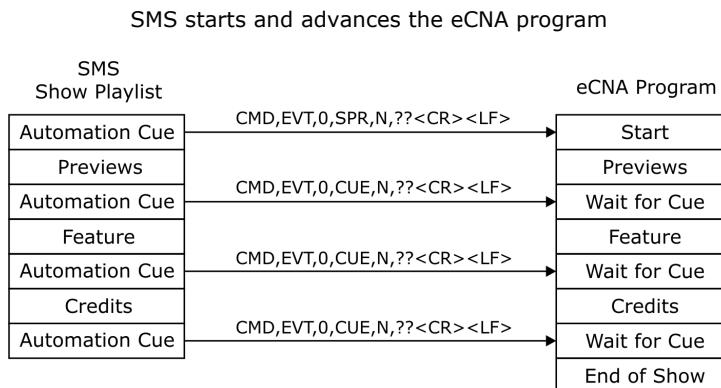
Example eCNA program with four segments

The eCNA can start the playlist. When a program is started, a "start" event is generated. This event is used to start the SMS show playlist. The eCNA can also send a cue to the SMS to advance the playlist.

For example, a cue from an external device, such as an auxiliary projector, causes a "cue" event to be generated.

eCNA starts and advances the SMS playlist
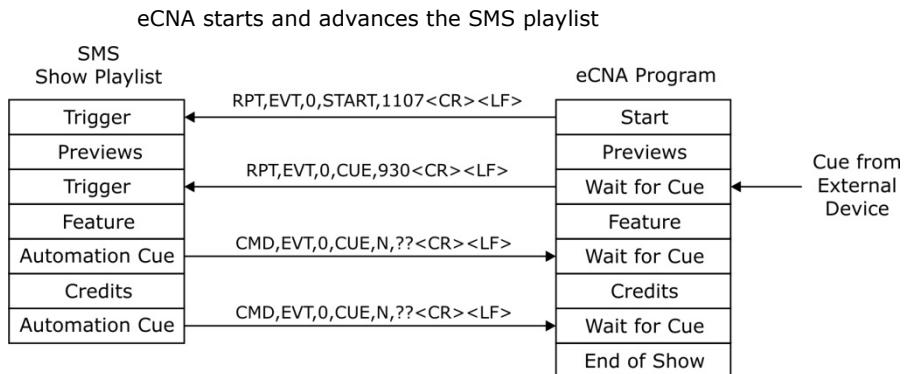
Status flags are automatically generated by the eCNA that reflect the state of the program. These flags are used to display status messages and are available to the SMS to use as input triggers. Note: The GDC Digital Cinema Server can be set up to poll the eCNA for these flags and use them as inputs.

Program Stop/Pause

An eCNA program can be suspended anytime with a stop or pause input.

Pause - This input will stop all output timers if the eCNA program if it is running. A Start input will cancel the pause condition and resume the timers.

Stop – On a stop input, the state of the outputs and the timer are memorized. The timer resumes and the outputs are returned to the memorized states when the program is resumed. A stop event can only occur when a program is in progress and not already stopped.

Program Abort

It may sometimes be necessary to terminate a program. The *Program Abort* event can be initiated with an input, a key press or a CAI command. This event aborts the user program (back to the idle state). All outputs remain in their current state.

The *Program Abort* "event" can be used by the eCNA to trigger a macro. This allows you control the sound, lights, etc. when terminating a program.

The SMS could be setup to send a *Program Abort* command if the show playlist is stopped (terminated), which would allow the playlist and program to stay synchronized.

Program Abort Command: CMD,EVT,0,ABT,N,??<CR><LF>

2.3.2. Macro Show Control

Macro show control is an alternative to a Program. SMS show playlist cues initiate a eCNA macro with a single command. Macros can be executed in any order and at any time. Macros tend to be more suited for distributed control and allow as much or little of control logic to be in the eCNA. This is often the most flexible and straight-forward method of control. In the example below, four macros (Previews, Feature, Credits and Between Shows) are started by the macro event command sent by a playlist cue.
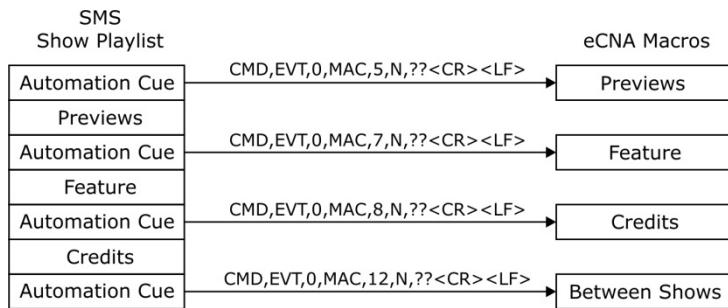
Macro 5 is used to set up the projector and start the lamp. The SMS sends the macro event command to start macro 5. Macro 6 (Previews) is started after one minute by Timer Tmr3.
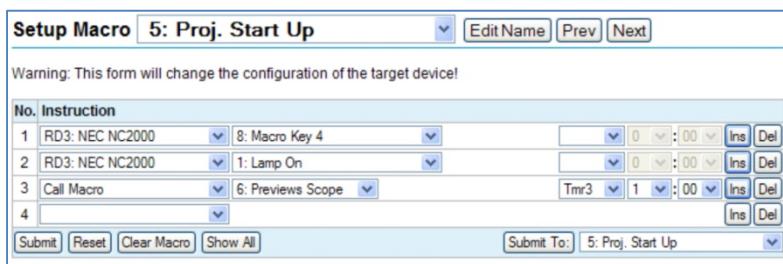
Macro 6 is the "Previews" segment, started by Timer Tmr3 in macro 5. The Show Status instruction is used to display "Running" status on the RCM/RSM-10 and the eCNA displays.

Macro 7 is the "Feature" segment. The SMS sends the macro event command to start macro 7.

Macro 8 is the "Credits" segment. The SMS sends the macro event command to start macro 8.

Macro 12 is the "Between Show" segment. The SMS sends the macro event command to start macro 12. The Show Status instruction is used to display "Ready to Run" status on the RCM/RSM-10 and the eCNA displays.

eCNA Cinema Automation Quick Start and General Application Guide

Using eCNA macros for show control allows you to develop "standard" SMS show playlists that are independent of specific or unique cinema equipment. Instead, the eCNA macros contain the all of the hardware specific control. Macros also have the advantage of not needing to be "sequential" as with a program, and therefore do not need to be synchronized with the playlist.

2.3.3. Discrete Output Control

Discrete output control is where the server directly controls the individual termination board outputs. All output commands are embedded into the show playlist cues. Using this method, the SMS logic is tied directly to specific hardware.
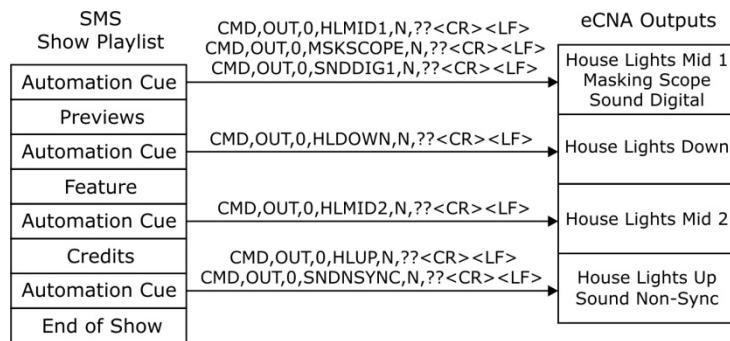
2.4. Miscellaneous Examples

General Purpose Output Messages

The eCNA can be programmed to send user-defined messages to the Server. These messages can be used for just about any purpose. The "SendFx" messages can be assigned a name to help the user identify its purpose. Edit the message name from the CAI SendFx Names screen. (Note: Editing the message name does not change the actual message sent to the SMS). Use the CAI SendFx instruction to send the message. If this instruction is used in a macro, it can be triggered by a fault, an input, a key press, a timer, another CAI client, etc.

For example, eCNA macros could be used to send Start and Pause messages to the SMS.
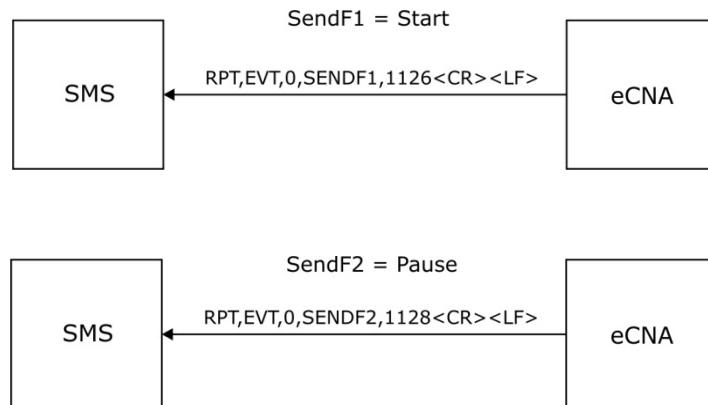
Type names for the SendFx messages.

Create a "Start Playlist" and a "Pause Playlist" macro. These are simple macros that have only one instruction.

Configure an eCNA key to call the "Start Playlist" macro and Input 1 to call the "Pause Playlist" macro.

Fire Alarm

The eCNA can monitor the building fire alarm system and pause/stop playback on the SMS. The fire alarm output is normally wired to the eCNA Fire Stop input. The "Firestop" message is automatically sent when the input is activated (if *Report Events* are enabled). An eCNA macro can also be triggered by this event. The macro would normally contain instructions to also shut down the projector, raise the auditorium lights, mute the sound, etc..
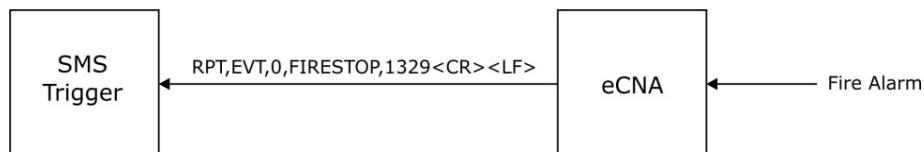
Faults

If the SMS is capable of sending an automation cue in the event of a problem with playback or other server malfunction, a macro (MAC) command or fault (FLT) command can be sent to the eCNA. An eCNA macro can be triggered that would close the projector dowser, raise the auditorium lights, etc..
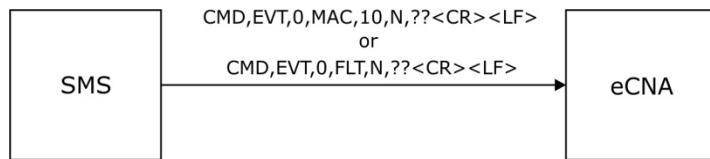
The eCNA can send a message to the SMS in the event of a problem. The ALLSTOP message or user-defined SendFx message could be used to pause/stop playback on the SMS.
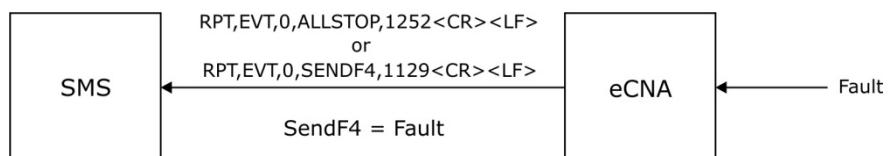
Show Segments

Show Segments can be used to identify parts of a presentation. For example, a typical show could be divided into *Pre-show*, *Previews*, *Feature*, *Credits* and *Between Shows* segments. Use the Segment instruction in a program or a macro along with any other instructions that set up the auditorium for that particular show segment. The segment name is displayed on the eCNA status screens and are available to the CAI client. Depending on the server, show segments can be used as triggers.

Use the Segment instruction in a program or macro. The first instruction in this macro is the Segment instruction.

General Purpose Timers

There are ten general purpose timers available as time-based events that can be used to call macros and delay the execution of instructions. These timers can be set, cleared, paused and resumed with program or macro instructions.

A CAI client, such as the Digital Cinema server, can also start or clear a timer with a serial command.

Command to set Timer Tmr 1 for 5 minutes: CMD,EVT,0,SGT,1,5,0,N,??<CR><LF>

Command to clear Timer Tmr1: CMD,EVT,0,SGT,1,0,0,N,??<CR><LF>

When a timer expires, a timer event is generated which can be used as a trigger to call a macro.

Be aware that the value of the timers are stored in battery-backed RAM. If any timer is ticking previous to a power down, it will continue to tick on the next power up. If this is not desirable, you may want to create a macro to clear all timers on a power up.

3.0. Interfacing to Digital Cinema Projectors

The eCNA can be programmed to control projector functions via an Ethernet TCP connection. Use the Remote Device (RD) instructions to send commands to the projector. Common projector commands operate the lamp, dowser, activate projector macros and select the input signal source.
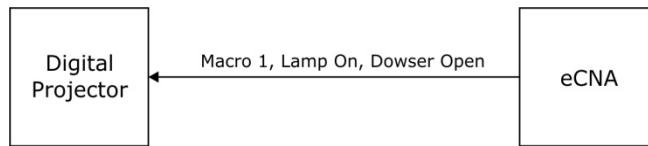
Use the *Setup: Remote Device Configuration* screen to configure the connection parameters. Command messages can be added or deleted as required. Configuration files for the major projectors are available.

The eCNA also has built-in support for acquiring projector status. This status is available to CAI clients for logging or control purposes. In order to get status, *Device Communications* and *Poll for Status* must be Enabled. If status is not required for the application, it is best that *Poll for Status* remain Disabled.

Use the Remote Device (RD) instruction in a program or macro to send the command.
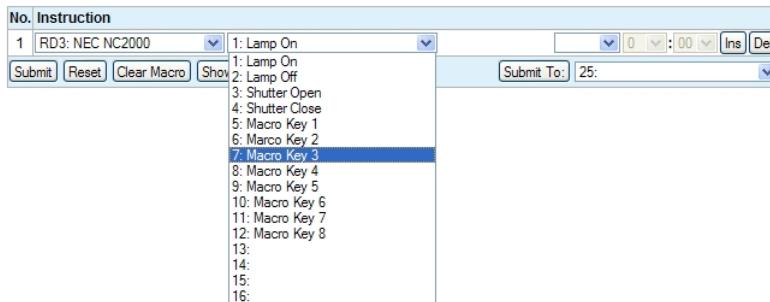
Please see the *Setup: Remote Device Configuration* and *Remote Device Support* in the appendix of the eCNA manuals for detailed information.

4.0. Interfacing to Third-party Digital Cinema Equipment

Cinema equipment that supports a third party Ethernet TCP connection can also be controlled by the eCNA. Enter the communication parameters and command messages from the *Setup: Remote Device Configuration* screen. Use the Remote Device (RD) instructions to send commands to the device. Information on the control commands and network configuration should be available from the manufacturer.
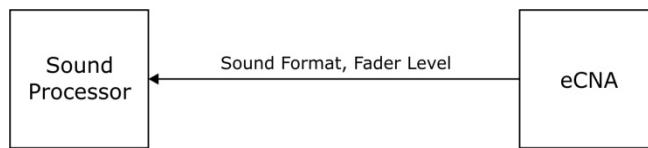
Use the "Raw" Device selection and enter the connection parameters.

The message editor supports both ASCII and binary commands. Enter the name and command code for each message.

Please see the *Setup: Remote Device Configuration* and *Remote Device Support* in the appendix of the eCNA manuals for detailed information.