

EN-31

Dual Channel Capable HD/SD MultiCODEC DSNG Encoder
w/ optional IF/LB/10Mhz Modulation

USER GUIDE

v2.00.14

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Electrical Device Compliance Notices

Safety Warnings and Cautions

For your safety and the proper operation of the device:

- This unit must be installed and serviced by suitably qualified personnel only.
- Do not break the warranty seals on the device or open the lid. Only approved service technicians are permitted to service this equipment.
- Disconnect all power before servicing the unit.
- Do not expose this device to rain or other moisture. Clean only with a dry cloth.
- If not installed in an equipment rack, install the product securely on a stable surface.
- Install the product in a protected location where no one can step or trip over the supply cord, and where the supply cord will not be damaged.
- If a system is installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than the room ambient temperature.
- Consideration should be given to installing the unit in an environment compatible with the maximum recommended ambient temperature of 50 degrees Celsius (122 degrees Fahrenheit).
- Install the unit in a rack so that the amount of airflow required for safe operation is not compromised.
 - The recommended clearance on the top and sides of the unit is at least ½ " (one half inch/one centimeter).
- Mounting of the unit in a rack should be such that no hazardous condition is achieved due to uneven mechanical loading.
- Use only a grounded electrical outlet when connecting the unit to a power source.
- Reliable earth grounding of rack-mount equipment should be maintained.
 - Particular attention should be given to supply connection other than direct connections to the branch circuit (e.g., use of power strips).

Compliance Notices

FCC

Note: This equipment has been tested and found to comply with the limits for a Class B 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:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Warning: Changes or modifications to this device not expressly approved by Adtec Digital could void the user's authority to operate the equipment.

Industry Canada

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

Cet appareillage numérique de la classe B répond à toutes les exigences de l'interférence canadienne causant des règlements d'équipement. L'opération est sujette aux deux conditions suivantes: (1) ce dispositif peut ne pas causer l'interférence nocive, et (2) ce dispositif doit accepter n'importe quelle interférence reçue, y compris l'interférence qui peut causer l'opération peu désirée.

European Union EMC Directive Conformance Statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. Adtec Digital cannot accept responsibility for any failure to satisfy the protection requirements resulting from a user modification of the product. This product has been tested and found to comply with the limits for Class B Information Technology Equipment according to CISPR 22 / EN 55022.

Chapter 1 - Product Overview

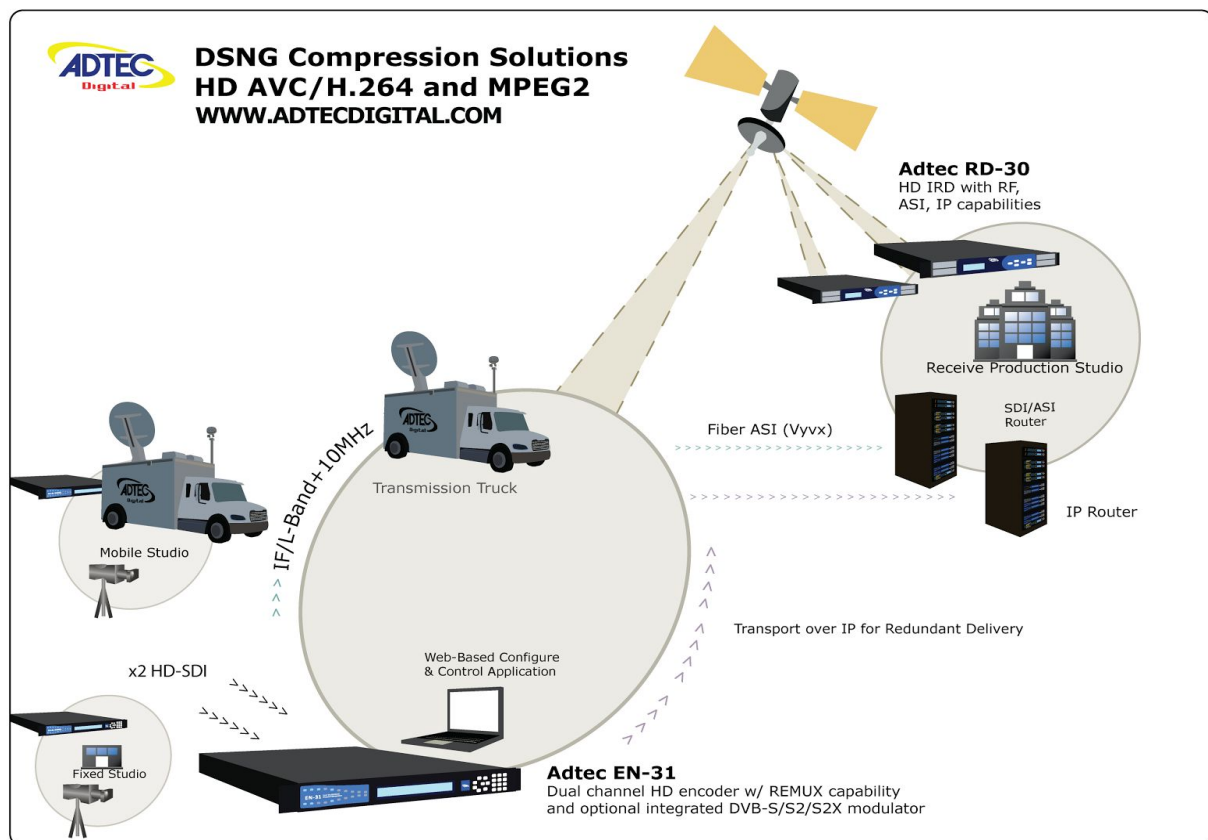
Product Introduction

The EN31 is a two-channel High and Standard definition MPEG-2 or H.264 encoder supporting ATSC and DVB tables through ASI and IP transport streams. The EN31 can be ordered with optional satellite modulation for contribution and distribution applications.

It inherits Adtec's broadcast quality compression, advanced feature set, service performance, and reliability in a dense two-channel platform targeted towards broadcasters, cable and IP compression applications.

The device automatically detects video and audio from two sources (combination of HD and SD acceptable), encodes, multiplexes and sends them back out as one combined TS via IP, ASI or optional RF. VBI, CAS, and support for Emergency Alert (EAS) triggering are standard. It can also send the two sources as single program transport streams via IP.

Applications



Adtec Digital EN-31 and RD-30 contribution

Chapter 2 - Getting Started

Front Panel

The Function Buttons and Directional Keypad of the EN-31 are used to configure and monitor the signal input and output of the device.

Panel Diagram



<http://www.adtecdigital.com>

Adtec Digital Technical Support: 615.256.6619

support@adtecinc.com

EN-31 Front Panel

revision 1.0

03.18.2015

Model Indicator Decals



No modulator



IF/LB/10M modulator

Front Panel LCD Quick Views

There are 8 Quick Views that can be accessed by the front panel LCD by pressing the up and down arrows.

1) **Encoding State:** When in normal encoding mode, the LCD will display the following information. Since there can be up to 2 encoders in the product, you can view the status of both services. *When only one encoder module is present the second module statistics will not be displayed*

```
ENCODING:38.810Mb/s  A/F:OFF  CAS:BISS_1
TSI:00001          SUC1:ON    SUC2:OFF
```

2) **Services State:** This quick view displays the Service ID number, short name, and long name for both encoder modules.

```
SUC1:00003  "AdtecHDTV1"  Adtec Digital 1
SUC2:00004  "AdtecHDTV2"  Adtec Digital 2
```

3) **Video Input State:** This quick view displays the resolution, input signal source, and input signal mode for both encoder modules.

```
RES1: 1920x1080 29i  INP:SDI  MODE:AUTO
RES2: 720x480 59F   INP:COMP MODE:SD
```

4) **Video Encoding State:** This quick view displays the Video Bit Rate, CODEC, and Chroma type for both encoder modules.

```
URT1:18531000b/s  COD:MPEG2  CHR:420
URT2:10000000b/s  COD:H.264   CHR:422
```

5) **Audio Encoding State:** This quick view displays the type of Audio Encoding and the bit rate for both encoder modules. Service 1 statistics are the first line of information. Service 2 statistics are the second line of information.

```
1:DD 640k 2:MU 192k 3:MU 192k 4:OFF
1:MU 192k 2:DD 640k 3:OFF      4:MU 192k
```

6) **PID Statistics:** This quick view displays the Video and Audio PIDs for both encoder modules. Service 1 PIDs are the first line of information. Service 2 PIDs are the second line of information.

```

VID:0309 AUD:1:0257 2:0258 3:0259 4:0260
VID:0308 AUD:1:8180 2:8181 3:8182 4:8183

```

7) **TSoIP State:** This quick view displays the status of IP Transport mode, RTP, FEC mode, and number of selected services. Up to 4 destination IP addresses can be sent simultaneously.

```

1:SEND ON OFF MPTS 3:SEND OFF OFF SPTS
2:SEND ON BUR SPTS 4:OFF OFF OFF MPTS

```

8) **ASI Remux State:** This quick view displays the status of ASI Remux status if the feature is enabled.

```

REMUX:ACTIVE PROGRAMS:2
INPUT:058.061Mb/s RESERVED:060.000Mb/s

```

9) ***Modulator State:** This quick view displays the status of RF Tx status if the unit is equipped with optional modulator.

```

TX:ENABLED 32APSK_9/10 Pwr:-30dB RO:25%
Freq:1290MHz DVB-S2 Sym:15Ms Pilot:ON

```

Transport LED Indicators - Channel 1 & 2

| Indicator | Function |
|-----------|--|
| Video | On - Video is detected on the selected input. Blink - No video is detected. |
| Encode | Off - Device is not encoding. Idle State On - Device is encoding. |
| AVC | Off - MPEG 2 module installed. On - MPEG 4 (H.264) module installed. |
| HD | Off - Encoding standard definition. On - Encoding high definition. |

Audio Encode Indicators - Channel 1 & 2

| Indicator | Function |
|-----------|--|
| A1 -A4 | Off - Audio encoder configuration is set to off. On - Audio encoder configuration is set to encode or passthru. Blink - Audio pair is enabled but there is no payload on the input |

System Indicators

| Indicator | Function |
|-----------|---|
| Alarm | Off - No system alarms. On - System alarm. (Typically NTP alarm) |
| BISS | Off - No encryption set On - Encryption active |
| Link | Off - No network detected On - Network communication active |
| Busy | Off - No network activity On - Network traffic present |

Controls

Using the Mode, Select, Enter, Escape, and directional buttons, the user can control the unit via the front panel.

| Control | Function |
|--------------------|---|
| Mode button | Mode will cycle you through top layer menus. |
| Select | Select will enter you into edit mode. |
| Enter | Enter submits any edits. |
| Escape | Escape returns you to the previous menu layer. |
| Cursor Arrows | Arrows will navigate you within submenus |
| Programming Keypad | For value entry. F2 functions as a "." decimal or period. |

Modulator Lineup

This feature enables the operator to quickly view and/or configure select modulator RF output parameters. The parameters available in this menu are;

1. Carrier Mode: [PURE_CARRIER or MODULATED]
2. Transmit: [ENABLED or DISABLED]
3. Output Power: [in 0.5dB increments]
4. Uplink Frequency: [in 1.0MHz increments]

To access the menu, press the F1 and F2 keys simultaneously. The front panel will briefly flash "MODULATOR LINEUP" then display the menu.

Note: To use this feature, the front panel display must be illuminated. If the display is dim, press ANY front panel button to illuminate it.

Note: If the unit has been previously configured by the operator and powered OFF and ON, then the display will read the last valid configuration, however, Tx will read DISABLED. To select the desired Carrier Mode, press the front panel "SELECT" button.

```
Carrier: MODULATED      Power (dBm): -30.0
Tx: DISABLED           Uplink (MHz): 1350.0000
```

To set Transmit to ENABLED or DISABLED, press the front panel "ENTER" button.

```
Carrier: PURE_CARRIER Power (dBm): -35.0
Tx: ENABLED           Uplink (MHz): 1350.0000
```

To set the desired output Power Level, press and hold the front panel ↑ or ↓ button.

```
Carrier: MODULATED      Power (dBm): -30.0
Tx: ENABLED           Uplink (MHz): 1350.0000
```

To set the desired Uplink Modulator Frequency, press and hold the front panel ← or → button

```
Carrier: MODULATED      Power (dBm): -30.0
Tx: DISABLED           Uplink (MHz): 950.0000
```

Note: If the Modulator Frequency is reconfigured when Transmit = ENABLED, then Transmit will be automatically set to DISABLED.

Front Panel Menu Structure

Services Menu

The following diagram illustrates the structure and flow of the **Services Menu** on the Adtec EN-31 device. TX MUX Rate, Table, and TSID are global configurations, while items under the denoted << >> parallel menu are unique to each encoder :

| Control | Function | Options | API Command |
|------------------|--|--|----------------------|
| TS MUX Rate | Configures the total transport multiplex rate. *Controlled by modulator when set to Enable | 1 - 150 Mb/s | *.ECMD0 TMR |
| Video Autofill | Video Autofill automatically adjust the Video Bit Rate to occupy the maximum fill of the TS Mux Rate | ON OFF | *.ECMD0 VAF |
| Tables | Configures the table generation standard to be used | DVB ATSC MPEG | *.ECMD0 TON |
| TSID | Transport Stream ID is a user-defined value in the PAT packet used to identify individual transport streams | 0x0000 - 0xFFFF | *.ECMD0 TSI |
| ASI Mode | Configures the encoder to egress a constant transport stream when video is not present. It is recommended to keep ASI Mode set to Continuous | ON OFF | *.ECMD0 ASM |
| ASI Remux | Reserves the bandwidth needed for incoming ASI transport stream Note: Setting value to zero disables ASI Remux | 0-100 Mb/s | *.ECMD0 TRS ASI 0 |
| Active | Configure each encoding module to be turned on or off | ON OFF | *.ECMD# STU |
| Service Name | Name of the program or event, carried in the SDT table of a transport stream | text field; 20-character limit (incl. spaces) | *.ECMD# SNA |
| Service Provider | Name of the party offering the program or event, carried in the SDT table of a transport stream | text field; 20-character limit (incl. spaces) | *.ECMD# SPR |
| Service Number | The Service Number or Program Number in PAT & PMT packets identifies which program is | 1 - 65535 | |

| | | | |
|------------------------|---|---|-------------|
| | associated with which Video & Audio PIDs. This value should be entered in decimal format | | |
| Logical Channel Number | This setting allows you to set the logical channel number that will be used to tune in with a set top box or television. This setting is only valid with DVB table generation. | 1 - 9999 | *.ECMD# LCN |
| Bars, Tones, ID Menu | <p>Bars, Tones and Service ID information can be overlayed on top of valid video by selecting the desired combination from this menu.</p> <p>Note: When an audio input / channel is configured for Pass through operation Internal tone generation does not function for the pass through channels.</p> | <p>Bars Mode: ON, OFF</p> <p>Bars Type: BARS, Solid color, FLASH</p> <p>Tones Mode: ON, OFF</p> <p>OSD Mode: ON, OFF, BLINK</p> | |

Important: setting the Major Channel Number to zero (0) will equate to setting a single-part channel number in ATSC applications.

RF Tx Menu

The following diagram illustrates the structure and flow of the **RF Tx Menu** on the Adtec EN-31 device. This menu will not be available on units without the optional RF modulators.

| Item | Function | Options |
|------------------|--|---|
| Transmit | Allows the operator to enable or disable the Main RF output. If Transmit is enabled and any value for Type, Frequency, Rolloff, Symbol Rate, or Interface Rate is changed, then Transmit will be automatically disabled. However, the monitor output will remain active. | Disable Enable |
| Type | Allows the selection of the mod type. | DVBS DVBS-2 |
| Mode | This control allows the operator to select the desired modulation mode and FEC code rate. | We display all possible ranges available via our device in the Front Panel. This list will differ from the list found in the web UI as it only shows those options available based on the feature keys found. <div> <div>QPSK-1/2</div> <div>QPSK-2/3</div> <div>QPSK-3/4</div> <div>QPSK-5/6</div> <div>QPSK-6/7</div> <div>QPSK-7/8</div> <div>QPSK-1/4</div> <div>QPSK-1/3</div> <div>QPSK-2/5</div> <div>QPSK-3/5</div> <div>QPSK-4/5</div> <div>QPSK-8/9</div> <div>QPSK-9/10</div> <div>8PSK-3/5</div> <div>8PSK-2/3</div> <div>8PSK-3/4</div> <div>8PSK-5/6</div> <div>8PSK-8/9</div> <div>32APSK-3/4</div> <div>32APSK-4/5</div> <div>32APSK-5/6</div> <div>32APSK-8/9</div> <div>32APSK-9/10</div> </div> |
| Local Oscillator | Determines the Local Oscillator Frequency (in Mhz) variable in the embedded Uplink Calculator. For Normal (Non-Inverted) Spectrum Mode: | User defined |

| | | |
|--------------------|--|------------------|
| | $Freq_{Modulator} = Freq_{Uplink} - Freq_{Local Oscillator}$ <p>For Inverted Spectrum Mode:</p> $Freq_{Modulator} = Freq_{Local Oscillator} - Freq_{Uplink}$ <p><i>Note: This field is provided for convenience purposes only and to aid in the automatic calculation of the Modulator frequency. The actual setting will depend on your external hardware (Block Upconverter), and may differ from the value set in here.</i></p> | |
| Uplink Frequency | <p>Determines the Uplink Frequency (in Mhz) variable in the embedded Uplink Calculator.</p> <p><i>Note: This field is provided for convenience purposes only and to aid in the automatic calculation of the Modulator frequency. The actual setting will depend on your external hardware (Block Upconverter), and may differ from the value set in here.</i></p> | User Defined |
| Frequency | Allows the operator to enter the desired output frequency of the main RF output port. | IF or L-Band |
| Power | Allows the operator to configure the output power of the main RF output port. Power is defined as the composite power referenced to an un-modulated (Pure Carrier) carrier. | RF power level |
| Spectrum Inversion | The Spectrum Inversion options are either Normal or Invert. If Normal is selected, then spectrum inversion does not occur. Spectral inversion can occur when either the baseband signal is up-converted to an IF frequency or when the IF is upconverted to the desired RF output frequency. | Invert Normal |
| FEC Frame | When operating in DVB-S2, the | Short |

| | | |
|----------------|---|---|
| | <p>Frame Type options are either Normal or Short. The Normal 64,800-bit FEC frame provides better protection but introduces more latency compared to the Short 16,200-bit FEC frame. Therefore, the Short FEC frame type should be selected in applications where latency is critical and the longer frame type should be used to optimize protection.</p> | Normal |
| Rolloff | <p>The Rolloff selection will determine the shape of the output filter. The occupied bandwidth of the modulated signal is the symbol rate multiplied by $(1+\alpha)$ where α is the rolloff factor. By using a lower α, carriers can be spaced closer together on a given transponder or an increased symbol rate can be realized for a given bandwidth.</p> | <p>5 10 15 20 25 30</p> |
| Pilot | <p>When operating in DVB-S2, the Pilot options are either ON or OFF. When pilots are enabled, the total data throughput is reduced by approximately 3.0%.</p> | <p>On Off</p> |
| Rate Priority | <p>The Rate Priority control allows the operator to designate which rate will be kept constant. When the Symbol Rate is entered and Rate Priority is Symbol, the symbol rate is held constant and the Interface rate is calculated. When the Interface Rate is entered and Rate Priority is Interface, the interface rate is held constant and the symbol rate is calculated.</p> | Symbol Interface |
| Symbol Rate | <p>The number of symbols transmitted per second. The amount of data per symbol is dependant upon the modulation type, e.g. QPSK, 8PSK, etc.</p> | Range can be determined by feature key. |
| Interface Rate | <p>The Interface Rate is the bit rate at the baseband interface.</p> | Range can be determined by feature key. |

| | | |
|-----------------------|---|---|
| Carrier Mode | The Carrier Mode control allows the operator to select ON for normal operations or select one of four unmodulated carriers. The Pure Carrier option will provide an un-modulated output carrier at the desired frequency and output power. Other Carrier Mode options include Clock 4/8/16. | Pure Carrier On Clock/8 Clock/4 Clock/16 |
| 10MHz Clock | Allows operator to generate or pass a 10MHz signal. The signal can be generated internally or sourced externally. *** This is a special order option. If your unit does not have the functionality the setting will read "N/A" | OFF ON EXTERNAL |
| 10 MHz Clock Combined | Allows the operator to choose whether or not to combine the 10MHz signal with the L-Band output. *** This is a special order option. If your unit does not have the functionality the setting will read "N/A" | UNCOMBINED COMBINED |
| MODULATOR LINEUP | This feature enables the operator to quickly view and/or configure select modulator RF output parameters. | Carrier Mode: PURE_CARRIER or MODULATED Transmit: ENABLED or DISABLED Output Power: User defined in 0.5dB incr. Output Frequency: User defined in 1.0MHz incr. |

IP Tx Menu

The following diagram represents the structure of the **IP Tx Menu** Menu:

| Control | Function | Options | API Command |
|---------|----------|---------|-------------|
|---------|----------|---------|-------------|

| | | | |
|---------------|--|--|---------------|
| Mode | switches multicast function on and off | Off Send | *.ECMD0 MMO # |
| Tx IP Address | The IP Address of which the Multicast or Unicast is broadcast. Multicast addressing supports the transmission of a single IP datagram to multiple receivers. Valid Multicast addressing range is 224.10.XXX.XXX to 239.XXX.XXX.XXX. Unicast addressing sends a single IP datagram to only one receiver. The Unicast address will be the unique IP of the receiving device. | user-defined; numeric field in format xxx.xxx.xxx.xx x | *.ECMD0 MSI # |
| Tx Port | port assignment used for transmitting a multicast | user-defined; numeric field | *.ECMD0 MSP # |
| DVB per IP | Configures the amount of DVB transport stream packets (188 bytes per DVB packet) per IP packet payload. | 1 4 7 | *.ECMD0 MSY # |
| RTP | Allows for sequence numbering and timing for accurate playback. | On Off | *.ECMD0 RTP # |
| FEC Mode | Forward Error Correction; selects on/off. When selected, sends two FEC RTP streams in addition to a source RTP stream enabling a receiver to reconstruct missing packets in the source stream. The RTP Control (above) must be set to ' on ' to enable FEC. | On Off Available if RTP selected 'on' | *.ECMD0 FEP # |
| FEC L | affects the maximum burst packet loss that can be recovered | 4-20 | *.ECMD FEP # |
| FEC D | defines latency involved in burst recovery | 4-20 | *.ECMD FEP # |
| TOS | Type of Service helps define how the network should make negotiate queuing between throughput, delay, reliability, and cost. | Normal Minimize Cost Maximize Reliability Maximize Throughput | *.ECMD0 TOS # |

| | | | |
|---------------------|---|---------------------|---------------|
| | | Minimize Delay | |
| TTL | Time to live is a numeric value from 1 to 255 that specifies the number of iterations or transmissions the packet can undergo before it is discarded. The default value is 7. | 1 - 255 | *.ECMD0 TTL # |
| Multicast Connector | sets the physical connector (on the rear of the unit) to use for multicast transmit purposes on the indicated encode channel. | Ethernet !GigE | *.ECMD0 MCN # |
| Service Select | Select both services or single service transport stream | ALL ENC1 ENC2 | *.ECMD0 MST # |
| Multi Mux Rate | Configures the TMR of the IP output. Note:only usable in SPTS mode | 0 - 150 Mb/s | *.ECMD MMO # |
| Multi Mux Mode | Configure Multi Mux Rate to auto or manual mode | Auto Manual | *.ECMD MMO # |

Note: Four IP destinations are available on the product. The '#' denoted in the IP Tx Commands above are relevant to the four destinations indexed 0 - 3.

Video Menu

The following diagram illustrates the structure and flow of the **Video Menu** on the Adtec EN-31 device:

| Control | Function | Options | API Command |
|--------------|--|--|---|
| Input | Video Input designates the type of video signal being received, either SDI or Composite. If the input is SDI, the encoder will automatically detect the resolution and frame rate of the incoming video source. | SDI COMPOSITE | *.ECMD# INP |
| SDI Mode | This allows automatic or fixed rate detection of SDI video signal. | AUTO SD HD1.4G | *.ECMD# SVM |
| Chroma | Chroma Type is the color information signal used to determine chrominance for the encoded video. Note: 422 is only available for MPEG2 SD encoding | 420 422 | *. ECMD# CHT |
| Video Rate | Elementary stream video rate. In standard definition encoding mode. (input is composite video, or SDI auto-detected at standard definition) MPEG2 (MP2): 1 - 15 Mb/s H.264 (MP4): 500 kb/s - 10 Mb/s In high definition encoding mode. (SDI input only and auto-detected as 720p or 1080i) MPEG2 (MP2): 7 - 60 Mb/s H.264 (MP4): 2 - 30 Mb/s | MPEG2: 1 - 60 Mb/s H.264: 0.5 - 30 Mb/s | *.ECMD# VRT |
| Aspect Ratio | Aspect Ratio can be set to 16x9 or 4x3 when the input is a SD resolution | 16x9 4x3 | *.ECMD# ARA |
| AFD | Active Format Descriptor is data that can be sent in a MPEG video stream that provides information about the aspect ratio and picture characteristics within the stream for cropping/letter boxing | OFF WSS 2 - 11 | *.ECMD# AFD View AFD API documentation for further details of arguments 2-11 |

| | | | |
|------------------|--|---|-------------|
| | by downstream devices. The configuration can be set to OFF, WSS for AFD 'passthrough' or manually set. | | |
| GOP Type | GOP Type can be set to open or closed. An OPEN GOP uses referenced pictures from the previous GOP at the current GOP boundary. A CLOSED GOP starts with an I Frame and subsequent B Frames do not rely on I or P frames from the previous GOP. | OPEN CLOSED | *.ECMD# GOP |
| GOP Structure | GOP Structure sets the format Group-of-Pictures will use; the order of interframes and the various types of picture frames that will be used. | IBBP IBP IP I | *.ECMD# GOP |
| GOP Size | GOP Size is the distance between two full image frames (I-Frames) in a GOP Structure. | 1 - 30 | *.ECMD# GOP |
| Fault Mode | The user can select encoder behavior during video loss. The encoder can stop encoding, encode black, or generate a combination of Black, Bars, Tones and Service ID. | OFF BARS BARSTONES BARSOVERLA Y BARSTONES OVERLAY | *.ECMD# RVD |
| Fault Resolution | Allows the operator to select what resolution to encode at during fault mode. | 480I59.94 576I50 720P59.94 720P50 1080I59.94 1080I50 | *.ECMD# RVD |

Audio Menu

The following diagram illustrates the structure and flow of the **Audio Menu** on the Adtec EN-31 device:

| Control | Function | Options | API Command |
|----------------|---|--|--|
| | << 1 - 2 >> Parallel Menus. | | |
| Surround Sound | Determines the surround sound mode | OFF, DD, DD-06, AAC-LC, AAC-HE v1 | *.ECMD# SMO 0 |
| | << 1 -4 >> Parallel Menus. | | |
| Input | Determines type of audio input being received Note: AES and Analog input are only available for Audio1 and Audio2 | SDI Analog AES | *.ECMD# AIN (0-3) |
| Mode | The Audio Mode can be set to ENCODE (compress the audio) or PASSTHRU (accept compressed Dolby or PCM type bitstream on SDI or AES. It will be time-aligned and multiplexed into the transport stream.) | OFF Encode Passthru | *.ECMD# AMO (0-3) SEE AMO in API documentation |
| Type | If the mode is ENCODE, the type can be set to MPEG, AC3, and AAC codec. If the mode is set to PASSTHRU, there is support for Dolby E, Dolby Digital AC3 and 5.1, PCM (302M), and Linear Acoustic E2. Dolby Digital is part of the ATSC A53 spec. with a stream type of 0x81 and required for ATSC applications. | DD 0x81 MU 0x03 DE LP DD 0x06 MU 0x04 AAC-LC AAC-HEv1 AAC-HEv2 | *. ECMD# AMO (0-3) SEE AMO in API documentation |
| Rate | Mpeg1Layer2 32-384 kbit/s AC3 Encode 56 - 640 kbit/s AAC - 48 - 320 kbit/s PASSTHRU - Auto-Detects | 32 - 640 kbit/s | *.ECMD# AMO (0-3) SEE AMO in API documentation |

| | | | |
|------------------|--|----------------------------|-------------------|
| Level | Audio Level can be set in one-decibel increments, with a range of -18 to +8 decibels. Available only in Encode Mode. | -18 - +8 dB | *.ECMD# ALV (0-3) |
| Sync | Audio Sync set the audio sync offset. The valid range is +/- 800 milliseconds. Non functional for Musicam Encode | +/- 800 ms | *.ECMD# AUS (0-3) |
| Format | Determines the format of the audio CODEC | STEREO MONO DUALMONO | *.ECMD# MCM (0-3) |
| IFB | <p>This is a low latency audio path for communications to a remote van or studio using the same distribution path. It requires a special IFB receiver or manual PID selection with a standard IRD.</p> <hr/> <p>Note: There is no PID reference in the PMT for GHOST functionality. It is considered a ghost PID. The IFB PID will not be lip-sync aligned with video.</p> | OFF ON GHOST | |
| SDI Pair | Allows the operator to route embedded audio from SDI input to the specified audio encoder. | 1-8 | |
| SDI Clock Source | The embedded audio clock source configuration determines whether to use the embedded clock phase words or derive from video clock. Default is EMBEDDED. If the SDI source has problem (or non-compliant) embedded audio clock phase words, then choose the video clock as the source. Note that choosing the video clock requires that all audio channels are embedded in a fully synchronous fashion. | EMBEDDED VIDEO | |

| | | | |
|-----------------|--|--------------------|--|
| ECC Words | Default is ON. Select OFF if the SDI source has problematic (or non-compliant) ECC words. | OFF ON | |
| SDI Audio Group | Per SMPTE 272/299M SDI supports embedded audio Groups 1, 2, 3, 4. Each group has 2 channels and each channel is a stereo pair. | 1 and 2 3 and 4 | |

The same menu options are available for both Channel 1 and Channel 2

Note: If using API Commands, you must specify which encoder the command applies to by substituting '0' (for Encoder 1) or '1' (for Encoder 2) in place of the '#' symbol in the commands above. For more information, see the "API Commands" article in this manual.

PIDs Menu

The following diagram illustrates the structure and flow of the **PIDs Menu** on the Adtec EN-20 device:

| Control | Function | Options | API Command |
|-------------------|--|----------------------------|---------------|
| PMT PID | Configures PID marked for the PMT | Hex value 0x0020 - 0x1FFE | *.ECMD# PPI |
| PCR PID | Configures PID marked for PCR packets | Hex value 0x0020 - 0x1FFE. | *.ECMD# PRP |
| Video PID | Configures PID marked for the Video PES stream | Hex value 0x0020 - 0x1FFE | *.ECMD# VPI |
| Aud 1 PID | Configures PID marked for the Audio 1 PES stream | Hex value 0x0020 - 0x1FFE | *.ECMD# API 0 |
| Aud 2 PID | Configures PID marked for the Audio 2 PES stream | Hex value 0x0020 - 0x1FFE | *.ECMD# API 1 |
| Aud 3 PID | Configures PID marked for the Audio 3 PES stream | Hex value 0x0020 - 0x1FFE | *.ECMD# API 2 |
| Aud 4 PID | Configures PID marked for the Audio 4 PES stream | Hex value 0x0020 - 0x1FFE | *.ECMD# API 3 |
| Tltxt PID | Configures PID marked for Teletext Packets | Hex value 0x0020 - 0x1FFE | *.ECMD# TPI |
| VITC Mode | Enables VITC Mode | OFF ON | *.ECMD# BMO 1 |
| VITC PID | Configures PID marked for ANC / VITC Packets | Hex value 0x0020 - 0x1FFE | *.ECMD# BMI 1 |
| Splice PID Active | Enables Splice PID | OFF ON | *.ECMD# RIT |
| Splice PID | Configures PID marked for Splicing | Hex value 0x0020 - 0x1FFE | *.ECMD# SPI |

Note:

No two PID's may be configured for the same value with the exception of VIDEO and PCR with MPEG2 encoder. The encoder does not accept PID values already assigned to another elementary stream. Use the PDU command to get a 'Program Dump' of all assigned PID's. Adtec Digital encoders have the ability to process VBI waveform data and Ancillary (SDI non video information), however they can't process both at the same time. If the

"VITC PID" option is turned on, waveform closed captions and teletext will not be able to be processed.

VBI Menu

The following diagram illustrates the structure and flow of the **VBI Menu** on the Adtec EN-31 device:

| Control | Function | Options | API Command |
|----------------|--|---|-------------|
| VBI Source | VBI Source allows selection of Composite or SDI for as vbi data source. | SDI Composite | *.ECMD# VBS |
| Closed Caption | Closed Caption support includes waveform caption processing, 608->708 up-conversion (composite, SD-SDI), and ancillary 608/708 processing (SD/HD-SDI). | OFF ATSC ATSC Convert ATSC 708 DVS 157 | *.ECMD# CLC |

Profile Menu

The following diagram illustrates the structure and flow of the **Profile Menu** on the Adtec EN-31 device:

| Control | Function | API Command |
|---------|---|-----------------|
| Select | Select a previously saved profile to RUN / LOAD as the current configuration. Press <select>, then use up/down arrows to browse through available profile names. Press <enter> to run the selected profile. | *.SYSD PROFILE |
| Save | Saves the currently running configuration into a file stored on the unit. Press <select>, then use up/down/left/right arrows to name a profile. Press <enter> to save the current profile name. | *.SYSD PROFILE |
| Delete | Deletes previously saved files from stored memory. Press <select>, then use up/down arrows to browse through profile names. Press <enter> to delete selected profile | *. SYSD PROFILE |

CAS Menu

The following diagram illustrates the structure and flow of the **CAS Menu** on the Adtec EN-31 device:

| Control | Function | Options | API Command |
|------------|--|---|---------------------------|
| Channel 1 | Turns Service 1 Encryption ON/OFF | ON OFF | *.ECMD0 ECR |
| Channel 2 | Turns Service 2 Encryption ON/OFF | ON OFF | *.ECMD1 ECR |
| Mode | Determines whether the encoder will pass the transport stream through the Encryption Block. Only one encryption mode is supported at a time (BISS1 or BISSE), but each channel has individual control. | OFF BISS_1 BISS_E_USER_ID_ON E BISS_E_USER_ID_TW O | *.ECMD# ECR |
| Clear SW | 12-digit hexadecimal Clear Session Word used with BISS1 | CSW | *.ECMD0 ECR CSW [key] |
| Encrypt SW | 16-digit hexadecimal Encrypted Session Word used with BISSE | ESW | *. ECMD0 ECR ESW [key] |
| User ID 1 | 14-digit hexadecimal user id 1 used with BISSE | AID1 | *.ECMD0 ECR AID1 [key] |
| User ID 2 | 14-digit hexadecimal user id 2 used with BISSE | AID2 | *.ECMD0 ECR AID2 [key] |

System Menu

The following diagram illustrates the structure and flow of the **System Menu** on the Adtec EN-31 device:

Login

Units ship with the front panel logged in by default. If you become logged out and are prompted for a password, use the following key sequence for access.

| Action |
|---------------------|
| Press <Select> |
| Press <Up> arrow |
| Press <Select> |
| Press <Enter> |
| Press <Right arrow> |
| Press <Enter> |

Duration

The front panel also has a login duration feature. This setting Allows the operator to specify a time frame (in minutes) until the unit will automatically log itself out.

| Action |
|--|
| Press mode until you see the System Menu. |
| Press <Select> |
| Press the <Down> arrow |
| Press <Select> |
| Using the <Up> and <Down> arrows, select the value you wish. |
| Press <Enter> to save your selection |

Possible Configurations:

0 (Zero): The unit will not automatically log out.

1-9: The duration of time, in minutes, before the unit logs out, if no input is received.

Backlight Dim Delay

| Action |
|--|
| Press <Select> |
| Using the <Up> and <Down> arrows, select the value you wish. |
| Press <Enter> to save your selection |

Network Sub Menu

| Item | Function | Options |
|---------------------|--|--|
| Ethernet IP Address | This is the address of your device on your network specific to the Ethernet Port. | user-defined using the numeric keypad Default is 192.168.10.48 |
| Ethernet IP Mask | Defines the unit relative to the rest of your network. | user-defined using the numeric keypad Default is 255.255.255.0 |
| Ethernet DHCP | The Dynamic Host Configuration Protocol allows your device to self-locate network Ethernet parameters. | On (finds own DHCP Address) Off (defaults to last entered IP Address) Default is OFF |
| GIGE IP Address | This is the address of your device on your network specific to the GigE Port. | user-defined using the numeric keypad Default is 192.168.20.48 |
| GIGE IP Mask | Defines the unit relative to the rest of your network. | user-defined using the numeric keypad Default is 255.255.255.0 |
| GIGE DHCP | The Dynamic Host Configuration Protocol allows your device to self-locate network GigE parameters. | On (finds own DHCP Address) Off (defaults to last entered IP Address) Default is OFF |
| Gateway IP Address | The gateway is a routing mechanism that passes traffic between different subnets and networks. | user-defined using the numeric keypad Default is 192.168.10.1 |
| Stealth IP Address | This is a security feature that | user-defined using the numeric |

| | | |
|--|---|---|
| | allows only the designated Stealth IP Address to communicate with the unit for FTP and other services. This control allows one-point override access to the Stealth IP Address. | keypad Default is 0.0.0.0. Using all 0s effectively turns this function off. |
|--|---|---|

Time Sub Menu

| Item | Function | Options |
|----------|--|---------------------------------------|
| Time | Defines system time | user-defined using the numeric keypad |
| Timezone | Defines the time zone the unit operates in | |

NTP Sub Menu

| Item | Function | Options |
|----------------|---|--|
| NTP Status | Network Transfer Protocol | Read-only |
| NTP IP Address | IP address designated for Network Transfer Protocol | user-defined using the numeric keypad Default is 0.0.0.0. Using all 0s effectively turns this function off. |

Alarm

| Item | Function | Options |
|--------------|---|--------------------------------------|
| Event Record | Log of events outside of regular operating parameters | scroll up and down to view log items |

SNMP Sub Menu

| Item | Function | Options |
|----------------------|--|---|
| SNMP | Controls the status (ON/OFF) of the Simple Network Management Protocol (SNMP) feature. We support SNMPv2c version. | OFF ON CLEAR |
| Read-only community | The Simple Network Management Protocol (SNMP) Read-Only Password. Default Value: "adtec" | user-defined |
| Read-write community | The Simple Network Management Protocol (SNMP) Read-Write Password. Default Value: "none" | user-defined |
| Trap community | The Simple Network Management Protocol (SNMP) trap community. Default Value: "public" | user-defined |
| Trap sink | The Simple Network Management Protocol (SNMP) trap sink. Default Value: "127.0.0.1" | Enter the IP address of your SNMP trap sink server. |

Com2

| Item | Function | Options |
|---------------|---|---|
| Com2 Settings | RS-232 terminal monitor for communicating with the internal host motherboard for diagnostics. | 115200 8 1 NONE 57600 8 1 NONE 38400 8 1 NONE 19200 8 1 NONE 9600 8 1 NONE Default is 38400 8 1 None |

Feature Sub Menu

| Item | Function | Options |
|--------------|---|--|
| Permanent ID | This is one of the unique IDs for your unit. This number along with your serial number are used to generate permanent feature keys. | read only value |
| Temporary ID | This is the other unique ID. It along with the permanente ID, and serial number are used to generate temporary feature keys. | read only value |
| Key status | Depending on what keys you have and if they are temp or permanent they will be listed here. | read only values with countdown for temp keys. |

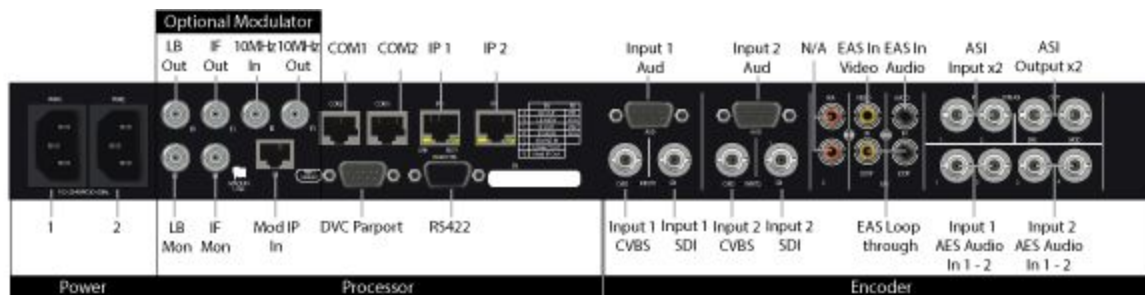
Name

| Item | Function | Options |
|------|--|-------------------------|
| Name | Displays and allows editing of the units name. This becomes the units host name for networking purposes. | Enter Ascii characters. |

Firmware

| Item | Function | Options |
|----------|---|-----------|
| Firmware | Displays the currently running firmware version | Read-Only |

Back Panel Diagram



Processor Connectors

| Connection | Function |
|------------|--|
| AC Power | AC Power- standard 3-pin plug (70-240 VAC 50-60 Hz), 5VDC Power (x2) - External Power Only |
| COM1 | Serial Port used for Troubleshooting |
| COM2 | API Serial Communication Interface |
| IP1 | GigE Interface- Default Management Port |
| IP2 | GigE Interface- Default TSoIP Output |
| GPIO | Tally and Control Port |

Video/Audio Inputs

| Connection | Function |
|------------------------|------------------|
| HD/SD-SDI Input 1 | BNC 75 Ohm Input |
| CVBS Composite Input 1 | BNC 75 Ohm Input |
| Analog Audio Input 1 | DB9 |
| HD/SD-SDI Input 2 | BNC 75 Ohm Input |
| CVBS Composite Input 2 | BNC 75 Ohm Input |
| Analog Audio Input 2 | DB9 |
| EAS Video In | RCA 75 Ohm |
| EAS Video Loop Out | RCA 75 Ohm |

| | |
|--------------------------|---------------------------------|
| EAS Audio In | Vertical single RCA jack |
| EAS Audio Loop Out | Vertical single RCA jack |
| ASI Input for Remux | BNC 75 Ohm |
| ASI Input to Modulator | BNC 75 Ohm (Future Integration) |
| TSoIP Input to Modulator | (Future Integration) |

Output

| Connection | Function |
|-------------------|---|
| ASI Out | BNC 75 Ohm, Asynchronous Serial Interface (EN 50083-9) |
| RF L-Band | BNC 75 Ohm, L-Band |
| RF IF | BNC 75 Ohm, IF |
| RF L-Band Monitor | BNC 75 Ohm, -20dBm from main power. Track frequency of L-Band output. |
| RF IF Monitor | BNC 75 Ohm, -30dBm Fixed power at 1210MHz |
| 10 MHz Clock In | BNC 75 Ohm |
| 10 MHz Clock Out | BNC 75 Ohm |

Chapter 3 - Using the Web Application

Introduction

Adtec Digital has deployed a web-based configuration and control software application for our products. The program is optimized to work with the following browser versions:

- Firefox: 3.5 (recommended)
- MS Internet Explorer: 8.0 and higher
- Safari: 3.0 and higher
- Google Chrome: 5.0 and higher

Note for Safari users:

- The program is designed to use the Bonjour Zero Configuration Protocol.
 - When using Safari, click on the " ^^ " symbol to open a networked devices list.
 - Select the device to point the browser to that device's IPA.

Logging In

Access the application by pointing your web browser to the unit's IP address. Log in to the application by clicking the **"Proceed to Login"** button and typing in the user name **'adtec'** and the password **'none'** in the pop-up box that appears.

The screenshot displays the EN-31 web application interface. The top navigation bar includes links for Services, Profile, Video, Service 1 Audio, Service 2 Audio, VBI, PID, CAS, EAS, System, Security, Upgrade, and Help. The main content area is divided into two columns. The left column contains a sidebar with sections for Global settings, Service 1, Service 1 Audio, and Service 2. The right column displays the configuration details for Service 1, including Global Settings, Carrier ID, and Service 1/2 parameters. The Global Settings section includes fields for TS Mux Rate, ASI Mode, Autofill, Tables, ASI Input Reserve, Transport Stream ID, and Carrier ID. The Carrier ID section includes fields for Id, Phone, Longitude, Latitude, and Info. The Service 1/2 section includes fields for LCN, Service Number, and Service Name.

EN-31
Version 2015-03-24_12-55-52
VE1/VE1
Temperature: 34(C)

Global:
TransMux Rate: 38810671 bp/s
Encryption: OFF
ASI Input: 0 bp/s

Service 1:
IDLING: 0 days 00:00:00.00
Video Detected: NO VIDEO - SDI
Bars/Tones/ID: OFF/OFF/OFF
CODEC/Chroma: MPEG2 / 420
Res./Frame Rate: N/A /
AutoFill/Rate: ON / 22063000 bp/s
Teletext: OFF
Service No: 3
Service Name: Adtec 1
Service Provider: Adtec Digital 1

Service 1 Audio:
A1: IDLING SDI/ENCODE
MPEG 1 Layer 2 / STEREO / 192000(b/s)
A2: OFF
A3: OFF
A4: OFF

Service 2:
IDLING: 0 days 00:00:00.00
Video Detected: NO VIDEO - SDI
Bars/Tones/ID: OFF/OFF/OFF

Global Settings:
TS Mux Rate: (Mbit/s) 38.810671
Autofill: ON
Tables: DVB
ASI Input Reserve: (Mbit/s)
ASI Mode: CONTINUOUS
Transport Stream ID: 0x0001 1 (hex) (dec)
Carrier ID: 1

Carrier ID:
Id: ADTEC
Phone: +(000)0000000
Longitude: +000.0000
Latitude: +00.0000
Info: USER_INFO

Service 1: ON
LCN: 1
Service Number: 3
Service Name: Adtec 1

Service 2: ON
LCN: 2
Service Number: 4
Service Name: Adtec 2

The application has two operating windows, the **Status Window** and the **Main Window**:

Status Window: The Status Window is fixed on the left-hand side of the screen- it will display regardless of what function is being displayed in the Main Window. The current status parameters of the unit's are always in view and are updated in real time.

Main Window: The Main Window is used to access the device's configurations and operating settings.

Help Notes: Help blurbs are available for the configurations on each tab; click on the "Question Mark" symbol next to the configuration name for a pop-up screen explaining the control.

Upgrading your device

To upload new firmware versions, click on the **<Upload>** button in the top navigation bar next to Log Out. A pop-up screen will allow you to browse for the firmware file by clicking Upload within the pop-up screen. After the new version is uploaded, its availability on the device will display under "available versions".

After the new version is uploaded, Click **<Install>** to extract the firmware. It will then be available under **Installed Versions**.

Once you have the version you wish to use in the Installed Versions list, you can select into it by clicking the select button. The unit will reboot and come up running in the new version.

Chapter 4 - How-To Guides

How to Complete a Manual Upgrade

You can upgrade your Adtec device's firmware via built-in web-based application, described in the [Upgrade Tab](#) section, or via a Telnet/FTP session, described in this article.

To update your Adtec device 's firmware via a Telnet session, perform the following:

Manual Upgrade Process

| Step | Action |
|------|---|
| 1 | Obtain the desired firmware version file from www.adtecftp.com note*: Firmware releases are found in the Public Folders -> Firmware -> Release -> section of the website, in a folder marked with the product name. username: adtecftp password: adtecftp2231 note**: Windows Internet Explorer renames adtec firmware file extensions to .gz . When saving please add a t within the extension to read .tgz if IE has renamed your file. |
| 2 | Using your favorite FTP client to upload the firmware file to the device. If you are unfamiliar with FTP you may use a 'My Computer' window and type in the address bar, ftp://adtec:none@192.168.10.48 where 192.168.10.48 should be replaced with the IP Address of YOUR device. You may then drag and drop the firmware file into the hd0 folder. |
| 3 | Open a Telnet session and enter the IP address of the unit you are going to update. note*: If you are unfamiliar with telnet, open a command prompt window (windows: start -> run.., mac: macintosh hd -> applications -> utilities -> terminal) and type: telnet 192.168.10.48 |
| 4 | Enter the username as ' adtec ' and the password as ' none '. |
| 5 | Enter the following in sequence: *.ecmd stop |
| 6 | *.sysd vrn search - from the results, look for the pathname of recently uploaded firmware file |
| 7 | *.sysd vrn install [pathname of the .tgz file] ex: *.sysd version install /media/hd0/EN-20-v1.00.12.nfcms.tgz |

How to Connect via Telnet

* Using Telnet (standard 23 port)* To connect to your device using a terminal session, you will need to set the IP address of the unit. See earlier instructions on setting the IP via the front panel.

Using a terminal window, complete the following:

| Step | Action |
|------|--|
| 1 | Type 'telnet x.x.x.x' in a terminal window, without quotes, where x.x.x.x is the IP address of the unit. |
| 2 | Press <Enter>. |
| 3 | When prompted for a username, enter adtec. |
| 4 | When prompted for a password, enter none. |

Once you see "User 'adtec' connected", the session is open and you may issue API commands to the unit.

For the EN-31 device, there are specific commands for the modulator, encoder, and the unit's operating system. Each has a unique way of accepting commands. If using telnet is your preferred method of communication to your device, familiarize yourself with the API commands and their respective command handlers. For more information on this, point your browser to the IPA of your unit and look through the API notes that are described for the device.

How to Connect via FTP

FTP connections can be made to the adtec device using any ftp client.

Host: <ipa of the unit>

Default Username: adtec

Default Password: none

Port: 21

FTP is only useful for collecting logs from the device.

How to Use API Commands

The Adtec EN-31 device is unique in that it handles two physical encoders. To accommodate commands for controlling both encoders, you will need to specify which encoder you are working with for each command you issue.

Please make the following adjustments:

- Instead of using *.ecmd as noted the API descriptions, you will need to use.
 - *.ecmd0 to specify the first encoder.
 - *.ecmd1 to specify the second encoder.

Example: (*.ecmd0 TRA) will give you the transport status of the first encoder.

How Video Rates are Configured

(Example is pertinent to MPEG2)

Video rates can be configured manually or automatically. The factory default is to automatically set the video rate based on TMR. This option is referred to as VAF (Video Autofill). VAF determines what the TMR is. It reserves 3.5% for null packets. It detects the video input resolution for each channel. It automatically calculates the required headroom for audio pids. It sets the video bit rate for each channel accordingly to maximise available bandwidth.

SD encode bitrate = 1.00 to 15.00 Mbps

HD encode bitrate = 7.00 to 60.00 Mbps

Example:

TMR is set to 40 Mbps.

Channel 1 has a SD 720x480i source.

Channel 2 has a HD 1920x1080i source.

15.00 Mbps will be allocated to channel 1 because the source is standard definition. 19.10Mbps will be allocated to channel 2 (this is the available bandwidth after VAFs calculation)

If VAF is set to OFF, the video rate can be manually adjusted for each channel. If the manual configured video rate would cause an egress overflow, the VAF logic will constrain the misconfiguration and reconfigure the video rate for both channels.

Example:

TMR is set to 40 Mbps.

Both channels have a HD1920x1080i source.

Both channels audio = 256 kbps

Video fill is set to off.

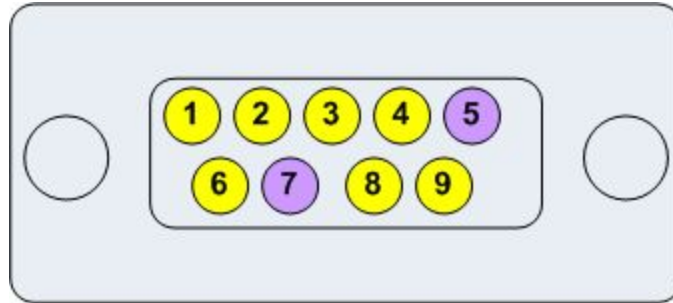
If both encoders are set to 19.10 Mbps and you want to reconfigure them to say 15.00 Mbps for channel 1 and 25.00 Mbps for channel 2. This would cause an egress overflow condition because you have not factored in the 3.5% reserve and bandwidth occupied by audio pids. Even though VAF is set to off it's logic will override the configuration request and constrain the video rates back down to 19.10 Mbps for both channels. To obtain the desired configuration, the user would need to recalculate rates, then configure channel 1 to 15.00 Mbps and channel 2 to 23.00 Mbps.

How to enable EAS mode

EAS can be enabled from an automation system contact closure or from the webUI EAS tab.

To enable EAS, VIDEO+AUDIO, via the 9 Pin GPIO, short pin 5 to pin 7.

EAS GPIO Connector Pinout



To enable EAS mode via the WebUI. Click the EAS tab, select the desired EAS mode, then click the large GO button. To disable EAS mode press the large STOP button.

How to configure Network EAS Triggering

By default, the EN-31 is configured to send an EAS trigger over the local network to all Adtec dual channel encoders (HDMI2QAM, YUV2QAM, EN-20 or EN-31). This feature can be disabled by unchecking the box next to "Network EAS Triggering", then pressing the apply button on the EAS tab.

How passthru audio function - Dolby E / 5.1 / 2.0, Dolby D, LPCM

The Adtec EN-31 encoder supports four pairs of audio encoding or two pairs of passthru per service. An audio passthru consists of a compressed bitstream (Dolby E 20 Bit / Dolby E 16 Bit / Dolby Digital / Linear Acoustic Stream Stacker 2) or an uncompressed stereo pair (LPCM) from embedded SDI passed into the egress transport stream (IP, *RF, ASI).

To enable Audio passthru for Audio 1:

| Step | Action |
|------|---|
| 1 | On the Audio -> Encoder 1 subtab in the Web GUI Control Application, configure the "Audio Mode" for <PASSTHRU> . |
| 2 | Configure the "Audio Input" for <SDI> . |
| 3 | Select the type of audio from the "Type" drop down. <Dolby Digital> , <Dolby E> , or <Linear PCM / E2> . note: If Dolby E or Dolby Digital is valid at the input, the bit depth and bitrate are automatically determined after clicking Apply. |
| 4 | On the "PID" tab, type in the desired Audio PID for "Audio 1" . |

Common Passthru Problems:

Dolby E Line Placement and/or Dolby E Continuity Count Errors:

Dolby E audio compression technology is designed so that 1 Dolby E audio frame corresponds to 1 Video frame. This 1:1 ratio of video and audio timing was designed to assist in Video editing and seamless cuts without losing audio data. Due to the crucial and sensitive timing, Dolby E encoders must have a reference phase locked to the video. In other words, the SDI video timing feeding the encoder must match the same composite reference timing that is connected to the Dolby E encoder. A simple black burst generator that does not share the same SDI video timing will not work to source a Dolby E encoder. A composite video reference that shares the same timing as the video source should be used. The encoder preserves audio and video timing as it is presented. If the audio timing does not match video timing at the inputs of the encoder, there will be line placement errors and/or CRC errors seen on a decoder.

If Detection of Dolby E / Dolby Digital is not present, the Front Panel Quickview will show "DE ---" or "DP ---" and the corresponding Front Panel LEDs will blink.

The encoder will automatically detect the bit depth of Dolby E (16 / 20 bit) and the bitrate of Dolby E / Dolby Digital. If Dolby E is selected and Dolby Digital is presented, the encoder will change automatically and vice versa. If Dolby Digital is selected and Dolby E is presented, the encoder will change the configuration automatically. If the front panel shows dashes for the detected bitrate '---', Dolby is not being detected. This is most commonly due to a mis-configured SDI Audio Matrix or Dolby not being present on the specified input pair. Look at the SDI signal on an SDI analyzer to verify that Dolby is present on the pair intended. If an SDI analyzer is not available, one troubleshooting tip is to set the mode to ENCODE. If silence or regular audio is heard on the decoder, a compressed bitstream is

not being presented on the corresponding input. The SDI matrix can be changed to each pair without restarting the encode session. Once hash is heard, then a compressed bitstream should be present. Set the mode back to Passthru for the automatic detection mechanism to configure the Dolby type and bitrate.

EN-31 Audio

The 8 pairs of Audio are divided equally between each Service (4 pairs each).

- There are 4 AES inputs. These inputs are hard-wired to the following configuration
 - AES Input 1 → Service 1, Audio 1
 - AES Input 2 → Service 1, Audio 2
 - AES Input 3 → Service 2, Audio 1
 - AES Input 4 → Service 2, Audio 2
- Analog Audio input is hard-wired to the following DB9 pinout:

| PIN | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|--------|-------|-------|-----|-------|-------|-------|-------|-------|-------|
| Signal | +L A1 | -L A1 | Gnd | -R A1 | +R A1 | +L A2 | -L A2 | -R A2 | +R A2 |

- Audio 3 and Audio 4 can only be set to SDI input for both services
- Passthru is only an option for Audio 1 and Audio 2 for both services
- The audio resources are divided 50/50 between Service 1 and Service 2
 - **Even if Service 2 is set to OFF, Service 1 can still only allocate 50% of the Audio resources**

Encoding:

The EN-31 has the following Audio Encoding capabilities and resources. Different CODECs require a different amount of resources. The EN-31 has logic built-in so that the user cannot exceed the audio resources.

| CODEC | MODE | % Usage per Pair |
|-------------------------------------|--------|------------------|
| MPEG1(2) Layer 2 -- MU | Stereo | 9% |
| Dolby Digital AC3 (x06 & x81) -- DD | 2/0 | 14% |
| AAC-LC | 2/0 | 19% |
| AAC-HEv1 | 2/0 | 17% |
| AAC-HEv2 | 2/0 | 12% |
| Surround CODEC | | |
| Dolby Digital AC3 (x06 & x81) -- DD | 5/1 | 29% |
| AAC-HEv1 | 5/1 | 36% |
| AAC-LC | 5/1 | 38% |

The important thing is to be aware of different configurations and how resource intensive they are. If an EN-31 is not accepting the settings being submitted, then check the other pairs of audio and ensure the threshold is not being exceeded.

How to use ASI Remux

Terminology:

“ASI Remux” refers to the ability for an Adtec EN to accept a Transport Stream (TS) via ASI input, and multiplex the incoming service or services with it’s locally encoded service.

The result is that the transport stream output becomes a MPTS containing the services from the ASI input in addition to the locally encoded service.

“ASI Reserve” refers to the bandwidth the user must define to allocate enough space for the incoming services. “ASI Input Reserve” is how the field is displayed in the WebUI and should be set to the same or greater than the aggregate rate of the services from the Input ASI transport stream.

“Downstream Device” refers to a unit that is receiving an ASI transport stream and multiplexing the services.

“Upstream Device” refers to a unit that is supplying the ASI transport stream.

Example:

If my “Upstream Device” is generating a transport stream with 2 services with an aggregate rate of 50 Mb/s then the “ASI Reserve” for my “Downstream Device” should be set to 50 Mb/s.

The TMR of my “Downstream Device” needs to be configured to allow for the incoming services as well as it’s locally encoded service. If the user wanted to receive a 50 Mb/s ASI TS and encode it’s locally service at a rate of 30 Mb/s then the TMR for the “Downstream Device” should be set to greater than 80 Mb/s
 $50 \text{ Mb/s (ASI Reserve)} + 30 \text{ Mb/s (Local Encoding)} = 80 \text{ Mb/s (TMR)}$

Thing to be aware of:

- ASI Remux requires enabling of the ASI Remux Feature Key
- Setting ASI Input Reserve to zero disables ASI Remux
- If there is a ASI Input Reserve value set but nothing on the input, then there will be null packets filling the bandwidth allocated for the ASI Input
- If Upstream and Downstream services have PID or Service Number conflicts (meaning they are the same value) the MPTS of the Downstream EN can and will be corrupt
- ATSC tables are not supported on the ASI input. DVB and MPEG are
- The downstream drops all Ingress tables and rebuilds only PAT, SDT and NIT with the upstream services information.
- Users should ensure that the same table 'types' are being used (DVB to DVB, MPEG to MPEG) to reduce SI table packet incompatibility issues.
- If the Upstream Device is supplying more data than is allocated by ASI Input Reserve, then there Upstream services are truncated and packets are lost. Locally encoded service is not affected by this condition.
- Null packets are stripped from the incoming ASI TS

- There is no “Table Mapping” functionality with ASI Remux. Ingress tables are copied to the egress.
- If the user attempts to set a TMR and an ASI Input Reserve that does not allow enough bandwidth for the locally encoded service (dependent on resolution and encoding modules) the TMR will be auto calculated to allow for ASI Reserve and minimum value allowed for locally encoded service
- TMR is currently capped at 150 Mb/s ASI. Input Reserve is currently capped at 100 Mb/s

****TMR and locally encoded services take priority over remuxed services. Therefore if TMR is set to a rate that does not allow enough bandwidth for native encoding, then the ASI Reserve setting will be truncated****

EN-XX ASI Remux with Manual PID Mapping

Terminology:

Transport Stream - A stream of 188-byte transport packets that contains audio, video and data belonging to one (SPTS) or several (MPTS) programs.

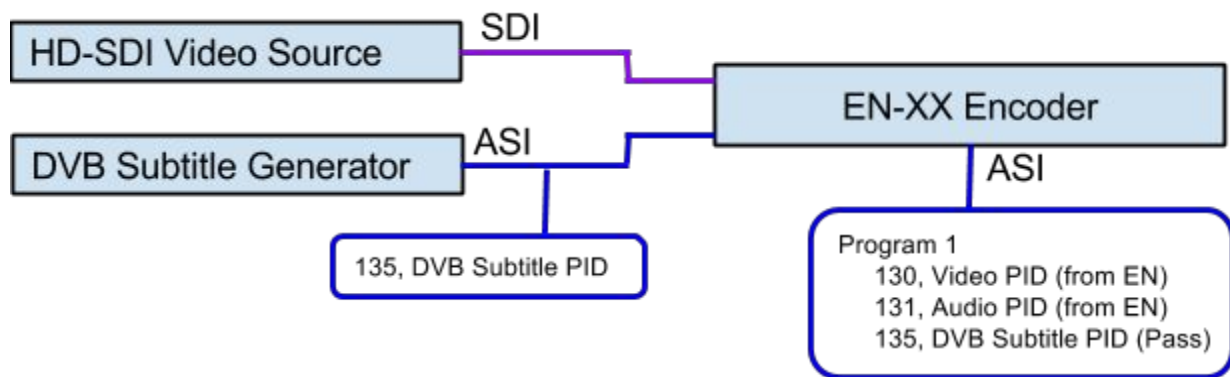
PID - Packet Identifier. This unique integer value identifies elements in the transport stream such as tables, data, or the audio for a specific program

PAT - Program Association Table. This MPEG-2 table lists all the programs contained in the transport stream and shows the PID value for the PMT associated with each program. The PAT is always found on PID 0x0000.

PMT - Program Map Table. This MPEG-2 table specifies PID values for components of programs.

The Adtec EN-3X and EN-100 encoders have an ASI input available for the ASI remux feature. Further information can be read about ASI Remux in the ASI Remux article. In some cases, users may want to add custom PID's from third party generators, such as a DVB Subtitles, into the main video programming. With a custom application, the standard ASI remux feature would not work without additional configuration. To keep the system open-ended and to allow any type of special passthrough application, we have allowed the user to configure *any* type of PID passthrough.

Some DVB Subtitle Generators do not generate MPEG Transport Stream Tables (PAT, PMT). In order to associate DVB Subtitle PIDs with the desired program on the EN output, the encoder PMT must be modified. A wiring diagram and sample PMT view can be seen in the drawing below.



In the example above, a raw PID was sent into the system with no program association. The EN modified the main program PMT, Program 1, to add an additional DVB Subtitle PID entry. As EN encoders do not perform PID conflict resolution at this time, the PID's inserted into the system should not conflict with other PID's utilized by the EN-31.

To configure ASI Passthrough of DVB subtitles, visit the Manual PIDs tab. This tab contains PMT template entries that will be used to insert into the PMT.

| Service PIDs | Manual PIDs | Manual PID Mapping | | | | | | | | | | | | |
|--|-------------|--------------------|---------------|----------------------------|--|-------|-------------|--|--|--------|-----|---|----------------------------|--|
| <div> <input type="button" value="Apply"/> <input type="button" value="Cancel"/> </div> | | | | | | | | | | | | | | |
| <div> Manual PIDs ? <input type="button" value="Clear All PIDs"/> </div> | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>Manual PID 1:</th> <th>Hex:</th> <th>Dec:</th> <th>Type:</th> <th>Descriptor:</th> <th><input type="button" value="Clear PID"/></th> </tr> </thead> <tbody> <tr> <td></td> <td>0x0087</td> <td>135</td> <td>6</td> <td>52010259086974611000020002</td> <td></td> </tr> </tbody> </table> | | | Manual PID 1: | Hex: | Dec: | Type: | Descriptor: | <input type="button" value="Clear PID"/> | | 0x0087 | 135 | 6 | 52010259086974611000020002 | |
| Manual PID 1: | Hex: | Dec: | Type: | Descriptor: | <input type="button" value="Clear PID"/> | | | | | | | | | |
| | 0x0087 | 135 | 6 | 52010259086974611000020002 | | | | | | | | | | |

The user will need to know:

- The PID number of which they would like to pass. This can be entered into the Hexadecimal or Decimal fields.
- The Stream Type identifier of the PID that will be written into the PMT. This can be entered in decimal only.
- The Descriptor of the PID that will be written into the PMT. This field is entered as hexadecimal pairs where each pair represents a byte field. Up to 32 pairs (64 characters) can be entered.

In the DVB Subtitle example, the PID is 135, DVB Subtitles use stream type 0x06 and a sample DVB descriptor with italian language is 52010259086974611000020002.

The user will then need to map the entry into the associated PMT by visiting the Manual PID Mapping tab. The Italian DVB Subtitle PID was entered into the first manual PID configuration. This can be mapped by moving the associated PID from the 'Unmapped PIDs' box into the 'Mapped PIDs' box.

The screenshot shows the 'Manual PID Mapping' configuration window. At the top, there are three tabs: 'Service PIDs', 'Manual PIDs', and 'Manual PID Mapping', with the last one being active. Below the tabs are 'Apply' and 'Cancel' buttons. The main heading is 'Service 1 Manual PID Mapping'. Under this, there is a 'PMT Index Selection' dropdown menu currently set to '1'. Below the dropdown are two list boxes. The 'Unmapped PIDs' list on the left contains entries from ManualPID2 to ManualPID12. The 'Mapped PIDs' list on the right contains ManualPID1. Between these two lists are two buttons: '>>' (move right) and '<<' (move left).

For dual encoder products, the Service 1 heading refers to the first logical encoder. The PMT Index selection refers to the first or second program being generated by the logical encoder. In most applications, this should always be 1.

Once configured, the encoder will have a new PMT with an additional DVB-Subtitle subtitle entry. It will be described as stream type 6 with an Italian language descriptor and referencing PID 135. It is up to the user to verify accuracy of all information entered.

To aid in user configuration a few common stream types are below.

| Stream Description | Stream Type (Decimal) |
|----------------------|--------------------------|
| ISO_IEC_11172_VIDEO1 | 1 |
| ISO_IEC_13818_VIDEO | 2 |

| | |
|----------------------------|-----|
| MPEG1_Layer2 | 3 |
| MPEG2_Part3 | 4 |
| ISO_IEC_13818_PRIVATE | 5 |
| ISO_IEC_13818_PES_PRIVATE | 6 |
| DVB_AC3_AUDIO | 6 |
| ISO_IEC_13522_MHEG | 7 |
| DSM_CC | 8 |
| ITU_T_REC_H222_1 | 9 |
| ISO_IEC_13818_6_Type_A | 10 |
| ISO_IEC_13818_6_Type_B | 11 |
| ISO_IEC_13818_6_Type_C | 12 |
| ISO_IEC_13818_6_Type_D | 13 |
| ISO_IEC_13818_1_Aux | 14 |
| AAC | 15 |
| ISO_IEC_13818_7_AUDIO_ADTS | 15 |
| AAC | 17 |
| H264_VIDEO | 27 |
| AVC_VIDEO | 27 |
| DCII_VIDEO | 128 |
| DOLBY_AC3 | 129 |
| DCII_SUBTITLES | 130 |

DVB Specification for Service Information (SI) in DVB systems. Descriptor information can be reviewed here.

https://www.dvb.org/resources/public/standards/a38_dvb-si_specification.pdf

Vertical Interval Time Code

Vertical Interval Time Code (VITC) is typically used in transmissions that require time code from the originating source to be preserved. It was originally developed for analog television recording systems, but has new standards for transmitting in digital systems (SMPTE-12M-1 / SMPTE-12M-2). Preserving time code is beneficial for future editing and playback of captured material.

EN-XX-series devices with an SDI input can pass VITC ancillary data as part of the ANC PID. The ANC PID is a separate PES located in the transport stream. Additionally, time code within the GOP of the video will also be adjusted at encoder start up to match the incoming ancillary VITC.

VITC data packets will contain a DID of 0x60 and an SDID of 0x60. The VBI tab contains an SDI ancillary inspector that allows users to view ANC data present at the input. This tab can be viewed for verification of present ancillary data at the SDI input.

Refresh Stats

Current VBI Stats ?

| Line | Field ID | Count | Length | DID/SDID |
|------|----------|-------|--------|----------|
| 09 | 1 | 14254 | 32 | 6060 |

VBI Source: ?

SDI

Closed Caption: ?

ATSC 708

To enable VITC passthrough:

| Step | Action |
|------|---|
| 1 | On the VBI Tab in the Web GUI Control Application, configure the "VBI Source" for <SDI>. |
| 2 | On the PID Tab in the Web GUI Control Application, select the <On> setting for "VITC PID Active". |

Chapter 5 - Appendix

Appendix A - GNU General Public License

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Ty Coon, President of Vice

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Appendix B - Technical Specifications

EN31-MP2 Video Specs (MPEG2):

Encoder Video Profiles

MPEG 2 SD Profile 1: Adaptive Field Frame (AFF) ISO13818-2 MP@ML

MPEG 2 SD Profile 2: AFF ISO13818-2 422P@ML

MPEG 2 HD Profile 1: ISO13818-2 MP@HL (1920/1440x1080 or 1280 x 720)

Video Encoding Data Rates (Manual)

MPEG 2 MP@ML SD: 1 Mb/s - 15 Mb/s (NTSC and PAL)

MPEG 2 422P@ML SD: 1 Mb/s - 50 Mb/s (NTSC and PAL)

MPEG 2 MP@HL HD: 7 Mb/s - 59.5 Mb/s

EN31-MP4 Video Specs (AVC):

Encoder Video Profiles

H.264 SD Profile 1: Adaptive Field Frame (AFF) ISO/IEC14496-10 MP@L3.0

H.264 HD Profile 1: ISO/IEC14496-10 HP@Level4.0 (1920/1440x1080 or 1280x720)

Video Encoding Data Rates (Manual)

H.264 MP@L3.0 SD: 0.5Mb/s - 10 Mb/s (NTSC and PAL)

H.264 HP@Level4.0: 1Mb/s - 30Mb/s

General:

Video Encoding Data Rates

720P: 12 - 23 Mb/s (5 - 15Mb/s for EN-MP4)

1080i: 14 - 25 Mb/s (7 - 17Mb/s for EN-MP4)

NTSC/PAL: 15Mb/s fixed (10Mb/s for EN-MP4)

(HD rates are calculated based on video input resolution and video complexity)

Video Input:

Connector: BNC 75 Ohm

Interface: SD/HD-SDI Auto frame rate and resolution detection

SD-SDI (SMPTE 259M - 270 Mb/s) with embedded audio per SMPTE 272M

HD-SDI (SMPTE 272M - 1.485 Gb/s) with embedded audio per SMPTE 299M

Connector: BNC 75 Ohm

Interface: SD Composite (CVBS) Analog Composite NTSC and PAL

Audio Input:

Connector/Interface: BNC/SDI, BNC/AES (Synchronous to video) and DB9/Analog

*** See "DB9-M Analog Audio input pinout" in this Appendix.

Supported Audio: (up to four audio pairs per video encoder depending on keys/configuration)

Dolby Digital 2.0/5.1 (AC3) encode

MPEG1 Layer 2 encode

AAC encode (LC 2.0/6.0, HEv1 2.0/5.1, HEv2 2.0)
Dolby E passthrough
Dolby Digital 2.0/5.1 (AC3) passthrough
Linear PCM passthrough

Analog Digital/Closed Captions/VBI VANC

Waveform or Analog (Composite or SD-SDI):

Connector: RCA jack 75 Ohm Terminated Input
Closed Captions per CEA-608-C (2005), Closed Captions per DVS-157, Wide Screen Signaling (WSS) per ETSI EN310294 V1.4.1 (2003-04), Teletext per ETSI EN 300 472 V1.3.1 (2003-05)

Ancillary (ANC) per SMPTE 291M (Native via SD/HD-SDI):

Connector: BNC 75 Ohm Terminated Input for HD/SD-SDI
Closed Captions per CEA-708 (SMPTE 291M), Teletext per OP47 and SMPTE 2031, VITC per SMPTE 2038, EBU Teletext/Subtitles, WSS/Teletext/NABTS/CEA-608/TV2GX/AMOL48/96, User Defined (2031-2007) per SMPTE 2031, AFD/Bar Data/Pan Scan per CEA-CEB16 (2006) per SMPTE 2016

Waveform Bridging and Conversion of Video User Data

Connector: BNC 75 Ohm Terminated Input
CEA 608 to CEA 708 up-conversion
Caption Bridging: CEA-608 via Composite merged with SD or HD Video via SDI (Similar frame rates required)
Teletext Bridging: Waveform Teletext via Composite merged with SD or HD Video via SDI
WSS Bridging: Waveform WSS via Composite merged with SD Video via SDI

Transport Stream User Data Carriage

SCTE 127-2007, ETSI EN 301 775, v1.2.1 (2003-05)

Emergency Alert System (EAS) Input:

EAS Video:

Connector: RCA jack 75Ohm
Interface: Terminated NTSC or PAL D1 Composite Input with loop

EAS Audio:

Connector: Vertical single RCA jack
Interface: mono audio channel with loop

EAS Triggering Interface:

GPI
Web UI
XCP

Conditional Access:

BISS 1/E

Transport Outputs:

All outputs operate concurrently.

ASI

Connector: BNC x2

ISO13818-1 MPEG 2 Transport Stream per EN 50083-9:1997 (188 byte only).

Both ASI outputs contain multiplexed output of both services (MPTS) if using 2 service model

Physical interface 150Mb/s with no encryption

Transport Over IP (TSoIP)

Connector: RJ45 x1 10/100/1000GigE

ISO13818-1 MPEG 2 Transport Stream per EN 50083-9:1997 (188 byte only).

UDP or RTP encapsulated routes with SMPTE 2022 (COP3 FEC). MPTS or SPTS user definable.

Physical:

Ambient Environment Temp.: 0 to 45 °C/ 32 to 113°F

Power Supply (nominal): 100 - 240 VAC

Power Consumption (nominal): 33.6 W (120V @ 280mA)

Weight: 7 lbs

Measurements: (H X W X D) 1.73" X 19" X 13.32"

Management:

Front Panel Controls

Browser-based Web Interface

SNMP

IF, L-Band Modulator + 10MHz (option) - IF/LB/10M-01

Requires factory installation

note*: software keys are required to unlock full hardware support.

Compliant standards supported: DVB-S (EN 300421), DVB-S2 (EN 302307) and DVB-S2X (DVB-S2 Extensions)

Modulation Scheme Support: QPSK / 8PSK / 16APSK / 32APSK / 64APSK / 128APSK / 256APSK

DVB-S QPSK FEC rates: 1/2, 2/3, 3/4, 5/6, 7/8

DVB-S2 QPSK FEC rates: 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10

DVB-S2 8PSK FEC rates: 3/5, 2/3, 3/4, 5/6, 8/9, 9/10

DVB-S2 16APSK FEC rates: 2/3, 3/4, 4/5, 5/6, 8/9, 9/10

DVB-S2 32APSK FEC rates: 3/4, 4/5, 5/6, 8/9, 9/10

DVB-S2X QPSK 13/45, 9/20, 11/20

DVB-S2X 8APSK 5/9-L, 26/45-L, 23/36, 25/36, 13/18

DVB-S2X 16APSK 1/2-L, 8/15-L, 5/9-L, 26/45, 3/5, 3/5-L, 28/45, 23/36, 2/3-L, 25/36, 13/18, 7/9, 77/90

DVB-S2X 32APSK 2/3-L 32/45 11/15 7/9

DVB-S2X 64APSK 2/3-L 32/45 11/15 7/9 5/6

DVB-S2X 128APSK 3/4, 7/9

DVB-S2X 256APSK 29/45-L, 2/3-L, 31/45-L, 32/45, 11/15-L, 3/4 QPSK 11/45, 4/15, 14/45,

7/15 , 8/15 , 32/45
DVB-S2X 8PSK 7/15 , 8/15 , 26/45 , 32/45
DVB-S2X 16APSK 7/15 , 8/15 , 32/45
DVB-S2X 32APSK 2/3

Interface Rate: 50 kbit/s- 150 Mb/s (modcod & interface dependent)
Baudrate range: 0.05 - 72 Mbaud. (modcod dependent)
Clean Channel Technology - Roll-off factors: 5%, 10%, 15%, 20%, 25%, 35% for all modulations
RF Carrier ID compliant
IF and L-Band outputs are not active simultaneously

IF Output

Output level: -35 to +5dBm (+/- 2dB)
Frequency: 50 - 180MHz
Connector: BNC (50Ohm)

L-Band Output

Output level: -35 to +5dBm (+/- 2dB)
Frequency: 950 - 2150MHz
Connector: BNC (50Ohm)

L-Band Monitor Output

Output level: -45 dBm (+/- 5 dB)
Frequency: Follows L-Band main output or fixed at 1050 MHz when IF output active.
Connector: BNC (50Ohm)
note*: When IF is selected, monitor will be fixed at 1080MHz in future firmware update.

Reference Input

Level: -3 to +7 dBm
Frequency: 10 MHz
Connector: BNC (50Ohm)

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Appendix C - DB9-M Analog audio input pinout

| Pin | Signal |
|-----|-------------------|
| 1 | Left + (Audio 1) |
| 2 | Left - (Audio 1) |
| 3 | Ground |
| 4 | Right - (Audio 1) |
| 5 | Right + (Audio 1) |
| 6 | Left + (Audio 2) |
| 7 | Left - (Audio 2) |
| 8 | Right - (Audio 2) |
| 9 | Right + (Audio 2) |

Appendix D - Adtec Digital Support & Service

Technical Support and Customer Service includes troubleshooting product/system functional operations concerning Adtec equipment, embedded systems and single device issues; Service Order generation, processing and tracking; Warranty claim processing; and on-site system evaluation and maintenance. Technical Support plans do not include customer training programs. Programs incorporating customer training are defined in the Training Services Policy. Customer Services technicians provide limited instruction during a support call/email/fax in order to facilitate checking for proper equipment operation.

Telephone and Email Support

- **Telephone:** 615-256-6619 ext. 166
- **Email:** support@adtecinc.com
- **Internet:** <http://adtecdigital.com/support/support-request>

Adtec Digital offers telephone, email and fax support, warranty and service related inquiries during normal business hours: 9:00am to 5:00pm Central Standard Time (CST), Monday through Friday, holidays excepted. Support Requests can also be submitted on-line. All inquiries will be processed in the order in which they are received and by the criteria outlined in the Call Response Order. Inquiries and inquiry responses made after 5:00 PM (CST) weekdays, Saturday, Sunday or on an Adtec-recognized holiday will be processed the next business day in the order received.

Callers on hold and returned calls will be prioritized by the following criteria:

- Priority-24 Subscription Customers
- Standard-Priority Subscription Customers
- All customers that have purchased Installation & Training, within 90 days of the installation.
- Adtec Certified Operators (ACO)
- Limited Level Support, Warranty & Service Requests
- Multi-device system installations that have purchased Installation & Training from Adtec
- Distributors
- System Integrators
- Multi-device systems
- Single device users

Preparing for Support

To help expedite the troubleshooting process, please be prepared to provide the following information to the support representative:

- **Product(s) affected:** Please provide a list of the Adtec Products involved including the Revision Number for each affected product.
- **Description of the Problem:** Please include a detailed description of the problem. Include the approximate time and day the problem occurred, the spot ID of the

material being inserted and what the operator reported about the incident. It is also helpful to note any recent changes to the system. More information is always better than too little information.

- **Your Contact Data:** Please include contact information so we can reach you to discuss how to fix the problem, additional troubleshooting steps that are required or to gather more complete information regarding the problem. Please include your facility name (or call letters), your name, title, email address, telephone number, hours of work, and other contact persons if you are not available.

SLA Options

Effective January 1, 2015

For questions, please email slaquestions@adtecinc.com

SLA STANDARD **

Services: Includes initial product orientation

Technical Support (Available during business hours, excludes published holidays)

Firmware and software upgrades

Fees: Free for one year after purchase with option to renew

SLA PRIORITY 24 **

Services: SLA Standard, plus...

Technical support 24x7x365

Fees: 10% of the purchase price per year

SLA PREMIUM 24 * **

Services: SLA Standard, plus...

Technical support 24x7x365

Next business day advance loaners

Fees: 15% of the purchase price per year

EXTENDED WARRANTY * **

Services: Extends warranty after year one

Includes repair expenses

International shipping is extra

Expedited shipping is extra

Fees: 10% of the purchase price per year

SLA LEGACY

Services: Includes initial product orientation

Technical Support (Available during business hours, excludes published holidays)

Firmware and software upgrades

Includes Duet, Soloist 2/ 2S, Mirage, edge10xx, edge 20xx, edge 3xxx series units and EOL Products

Does not include repair expenses or shipping

Note: Most legacy products cannot be repaired

Fees: Contact slaquestions@adtecinc.com for more information

SLA SESSION SUPPORT

Services: Technical Support (Available during business hours, excludes published holidays)

Includes support for 5 days after first call

Fees: Contact slaquestions@adtecinc.com for more information

SE SUPPORT

Services: Event based on-site technical representation

Fees: Contact slaquestions@adtecinc.com for more information

* Available for up to three years after purchase for Adtec Manufactured Products Only

** Excludes equipment that has been subject to misuse, negligence, or accident

All SLAs are subject to terms and conditions of Sale and Support.

For details, see Adtec Digital Terms of Sale of Sale and Adtec Digital Terms of Standard Limited Support