RD-30

Receiver / Decoder

USER GUIDE

The RD-30 is an SD and HD MPEG 2 / MPEG 4 4:2:0
IRD for distribution, turnaround and monitoring applications.

6.30.15 - v2.3.3

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Trademarks & Copyrights

Trademarks: RD-30 is a trademark of Adtec Digital. Dolby Digital, Dolby Digital Plus, AC-3 and the double-D symbol are registered trademarks of Dolby Laboratories. Other product and company names may be trademarks or registered trademarks of their respective companies. The information in this document is subject to change without notice.

Electrical Device Compliance Notices

Safety Notices

- Read these instructions
- Keep these instructions
- Heed all warnings
- Follow all instructions
- Do not use this apparatus near water
- Clean only with dry cloth
- Do not block any ventilation openings. Install in accordance with the manufacturer's instructions
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat
- Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer.
- Unplug this apparatus during lightning storms or when unused for long periods of time.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
- Do not expose this apparatus to dripping or splashing and ensure that no objects filled with liquids, such as vases, are placed on the apparatus.
- To completely disconnect this apparatus from the AC Mains, disconnect the power supply cord plug from the AC receptacle.
- The mains plug of the power supply cord shall remain readily operable.
- Damage Requiring Service: Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
    - When the power-supply cord or plug is damaged.
    - If liquid has been spilled, or objects have fallen into the product.
    - If the product has been exposed to rain or water.
    - If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions as an improper adjustment of the controls may result in damage and will often require extensive work

by a qualified technician to restore the product to its normal operation.

    - If the product has been dropped or damaged in any way.
    - The product exhibits a distinct change in performance.
- Replacement Parts: When replacement parts are required, be sure the service technician uses replacement parts specified by Sencore, or parts having the same operating characteristics as the original parts. Unauthorized part substitutions made may result in fire, electric shock or other hazards.

Safety Warnings and Cautions

There is always a danger present when using electronic equipment.

Unexpected high voltages can be present at unusual locations in defective equipment and signal distribution systems. Become familiar with the equipment that you are working with and observe the following safety precautions.

For your safety and the proper operation of the device:

- Every precaution has been taken in the design of the product to ensure that it is as safe as possible. However, safe operation depends on you the operator.
- Always be sure your equipment is in good working order. Ensure that all points of connection are secure to the chassis and that protective covers are in place and secured with fasteners.
- Never work alone when working in hazardous conditions. Always have another person close by in case of an accident.
- Always refer to the manual for safe operation. If you have a question about the application or operation call Adtec for assistance.
- WARNING – To reduce the risk of fire or electrical shock never allow your equipment to be exposed to water, rain or high moisture environments. If exposed to a liquid, remove power safely (at the breaker) and send your equipment to be serviced by a qualified technician.
- To reduce the risk of shock the product must be connected to a mains socket outlet with a protective earthing connection.
- The mains plug is the main disconnect and should remain readily accessible and operable at all times.

- The product is equipped with an internal system battery. The product must be sent to Adtec service for replacement of this battery.

  CAUTION – Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type.

- 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.
- 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

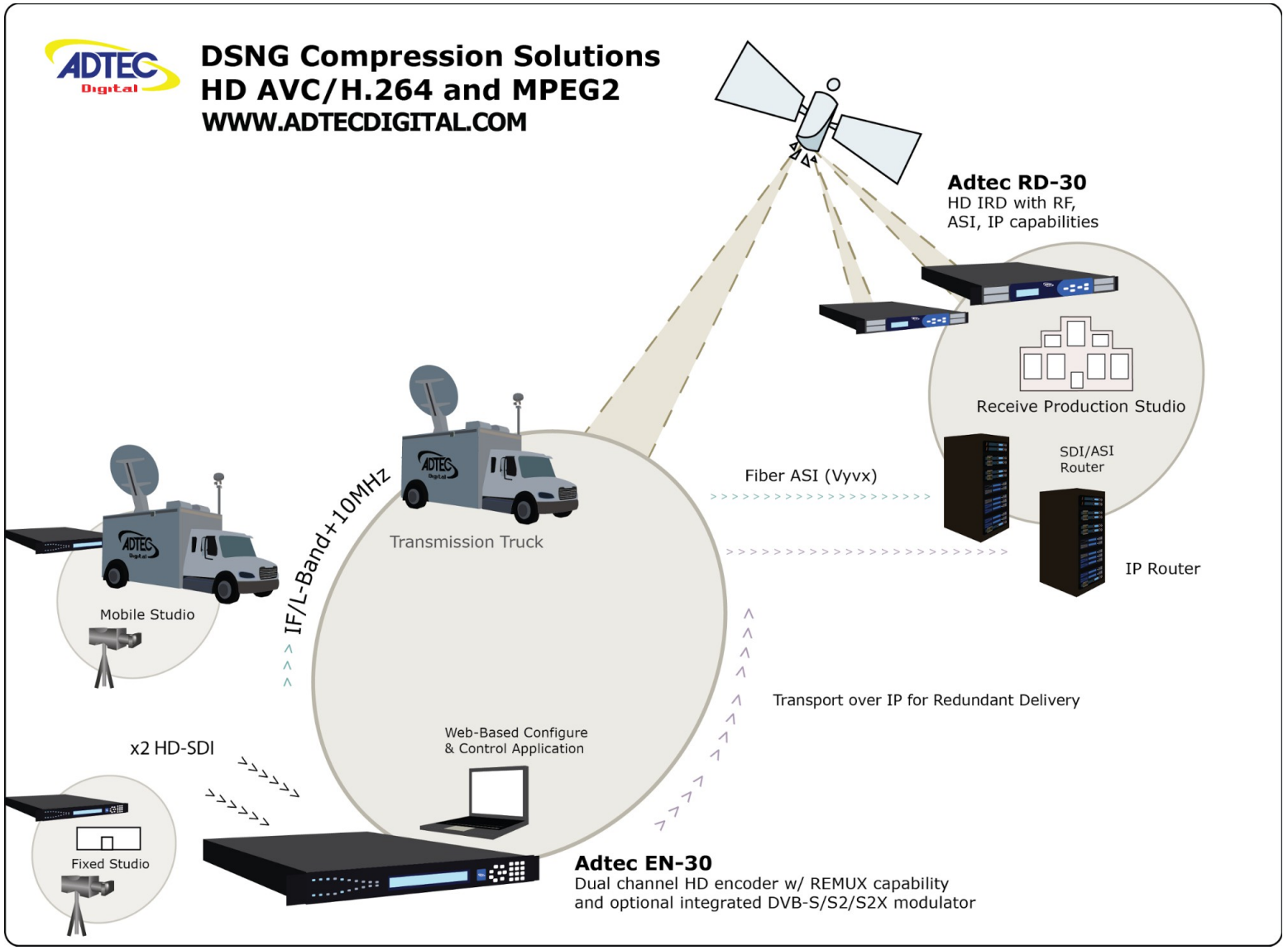
FCC Class A Information

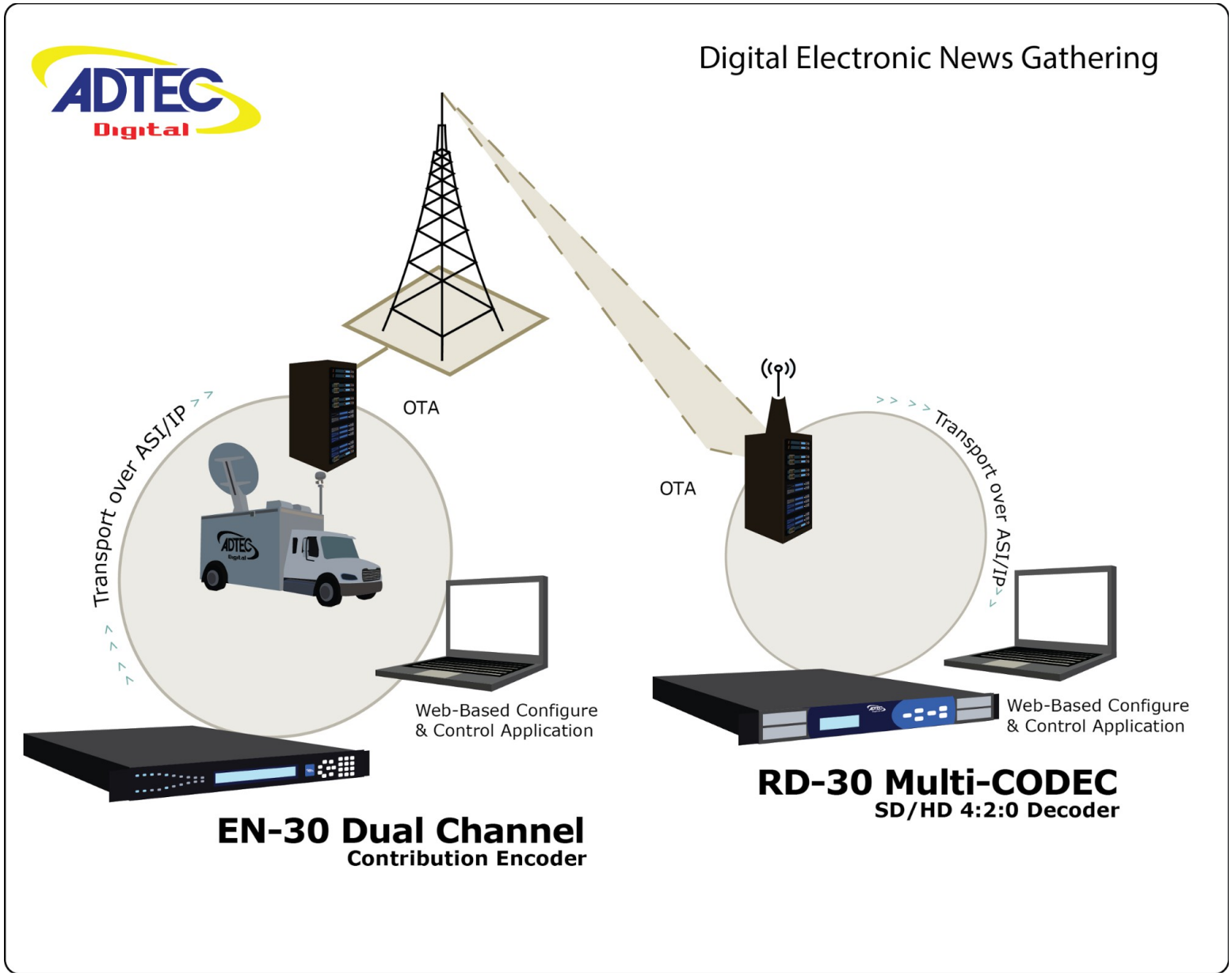
The RD-30 has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment

in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his or her own expense.
Shielded cables must be used with this unit to ensure compliance with the Class A FCC limits.

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

Chapter 1 - Product Introduction


DSNG Compression Solutions
HD AVC/H.264 and MPEG2
WWW.ADTECDIGITAL.COM
Adtec RD-30
HD IRD with RF,
ASI, IP capabilities
Receive Production Studio
SDI/ASI
Router
IP Router
Fiber ASI (Vyvx)
Transmission Truck
IF/L-Band+10MHz
Mobile Studio
Transport over IP for Redundant Delivery
Web-Based Configure
& Control Application
x2 HD-SDI
Fixed Studio
Adtec EN-30
Dual channel HD encoder w/ REMUX capability
and optional integrated DVB-S/S2/S2X modulator


Digital Electronic News Gathering
OTA
Transport over ASI/IP
Web-Based Configure
& Control Application
EN-30 Dual Channel
Contribution Encoder
OTA
Transport over ASI/IP
Web-Based Configure
& Control Application
RD-30 Multi-CODEC
SD/HD 4:2:0 Decoder

Covered Equipment

RD-30 (RD30-01): The RD-30 is an HD MPEG 2 / MPEG 4 4:2:0 capable IRD for distribution, turn-around and monitoring applications. Standard transport stream input/output includes ASI and GigE. Standard video outputs include SDI, Composite and Digital Video. Standard audio includes two (2) audio PIDs available for processing. Dolby E/Dolby D/Dolby D+ pass-through, MPEG 1 Layer 2, AAC-LC, HE-AAC v1, HE-AAC v2, Dolby Digital (AC-3) and Dolby Digital+ (E-AC-3) downmix decode with an optional additional two (2) stereo pairs for a total of four audio PIDs. Genlock is standard on all models.

RD-30 w/ L-Band Demodulator (RD30-01-LB): RD-30 (as configured above) + Demodulator and CAM module support.
* Software Key field upgradeable to 16/32APSK, VCM, ISI, MultiBISS, MultiCAM

Available Software Options

RD30-M2/M4-HD-KEY - Adds the capability of HD MPEG 2 / MPEG 4 (1080i/720p), SD is standard.
RD30-AUD-EXP-KEY - Expands audio decode from 2 pairs to 4 pairs.
RD30-SURROUND-KEY - Adds discrete surround audio decoding.
RD30-BISS-KEY - Adds multi-service BISS E/BISS 1 Descrambling capability.
RD30-IP-OUT-KEY - Adds SMPTE 2022 FEC Output capability.
RD30-SCTE104-KEY - Adds SCTE 35 to SCTE 104 conversion and SCTE 35 generation capability.
RD30-ESAM-POIS-KEY - Adds CableLabs ESAM POIS Interface capability.
RD30-SVC-FLTR-KEY - Adds PID/Service Filtering for MPTS to XPTS turnaround capability.

Available for RD30-01-LB model only:
RD30-16/32APSK-KEY - Adds 16/32APSK, VCM and Multistream ISI
RD30-CAM-KEY - Adds DVB-CI multi-service (Decrypts multiple services. RD30-CAM-KEY is not required for a single DVB-CI service decrypt.)

Front Panel

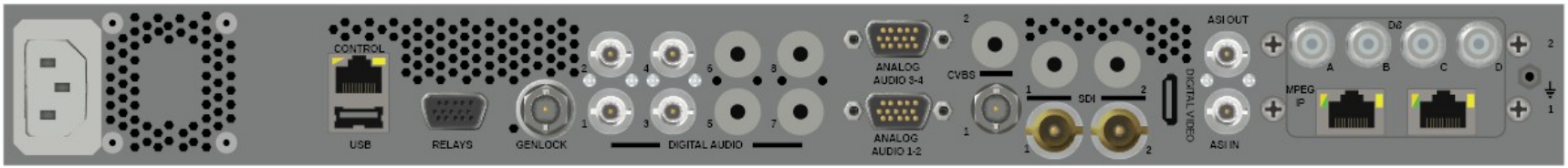
The front panel LCD and keypad can be used to configure and monitor your device.

Controls

Using the **Enter, Back** and **directional buttons (up, down, left, right)**, the user can control the unit via the front panel.

Control	Function
Enter Button	Will enter menus and confirm selections.
Back	Will back out of menus and escape from item entries.
Up, Down, Left, Right	Arrows are used for menu navigation and for editing configuration fields within the unit.

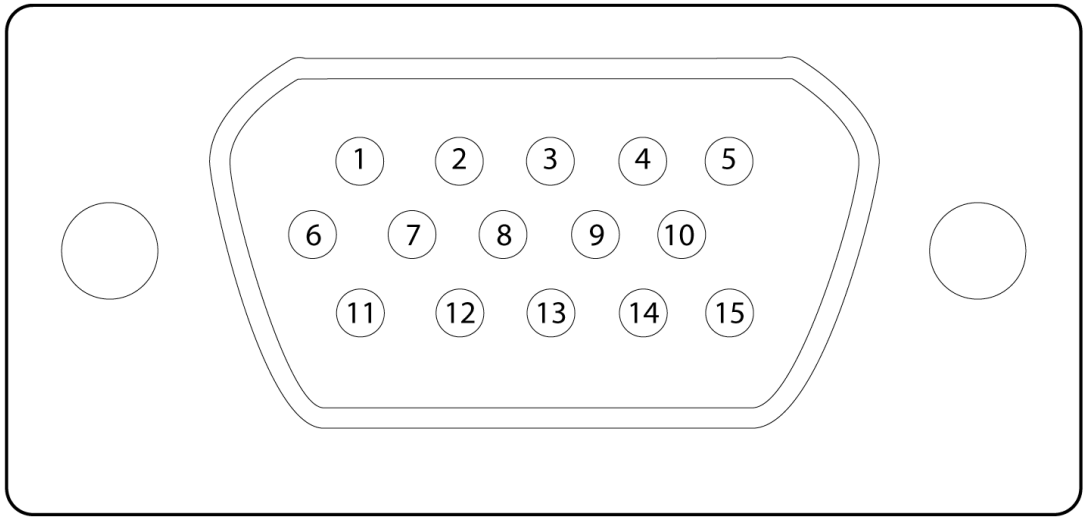
Back Panel



Connector	Description
Processor	
Power	AC Power, Standard 3 pin computer power plug (Auto range 100-240 VAC Input)
Ethernet	10/100 BASE-T ethernet interface (Monitoring/Management)
DB9-F Relay	9-pin female connector interface for alarms
Decoder	
Genlock	Bi-level / Tri-Level sync input used for decoder reference
AES Audio Out 1-4	x4 75 Ohm AES-3/EBU BNC
Analog Audio Out	x2 15-pin male audio outputs, 2 pairs per DB15-M connector
CVBS Out	75 Ohm BNC Standard Definition Composite Video Output (SMPTE 170M-2004, NTSC, PAL-B/G/I/D/M/N)
SDI Out	x2 mirrored SD-SDI/HD-SDI outputs from decoder. Video/Audio/VBI (SMPTE 259M - SD, SMPTE 292M - HD).

Digital Video	Digital Video Output connector
ASI In	75 Ohm BNC input.
ASI Out	75 Ohm BNC output.
RF 1, 2, 3 & 4	x4 L-Band inputs, 75 Ohm F-Connector (RD30-01-LB option)
GigE In/Out	x2 10/100/1000 GigE ports for UDP or RTP transport ingress/egress

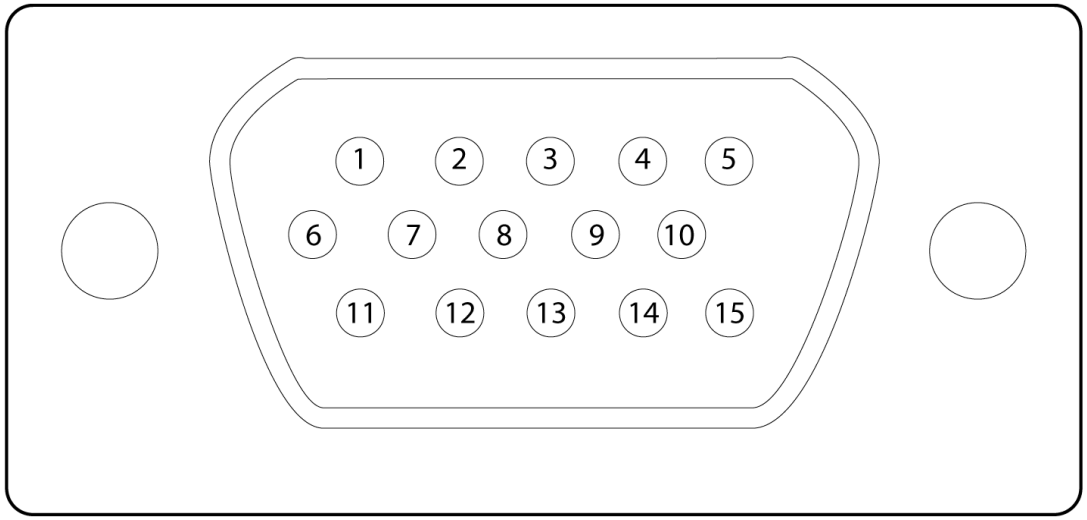
DB15-M Analog audio output pinout (AUDIO 1-2)



PIN	Designation	Function
1	Pair 1, Channel 1 L+	Left +

2	Pair 1, Channel 2 R+	Right +
3	Pair 2, Channel 3 L+	Left +
4	Pair 2, Channel 4 R+	Right +
5	NC	NC
6	Pair 1, Channel 1 L-	Left -
7	Pair 1, Channel 2 R-	Right -
8	Pair 2, Channel 3 L-	Left -
9	Pair 2, Channel 4 R-	Right -
10	NC	NC
11	GND	Ground
12	GND	Ground
13	GND	Ground
14	GND	Ground
15	GND	Ground

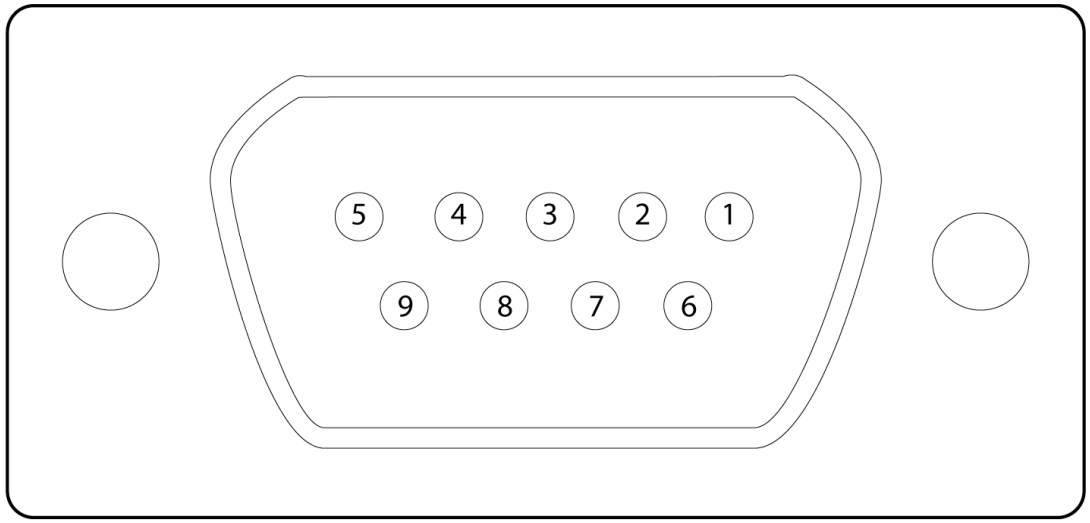
DB15-M Analog audio output pinout (AUDIO 3-4)



PIN	Designation	Function
1	Pair 3, Channel 5 L+	Left +
2	Pair 3, Channel 6 R+	Right +
3	Pair 4, Channel 7 L+	Left +
4	Pair 4, Channel 8 R+	Right +
5	NC	NC
6	Pair 3, Channel 5 L-	Left -
7	Pair 3, Channel 6 R-	Right -

8	Pair 4, Channel 7 L-	Left -
9	Pair 4, Channel 8 R-	Right -
10	NC	NC
11	GND	Ground
12	GND	Ground
13	GND	Ground
14	GND	Ground
15	GND	Ground

DB9-F Relay Pinout



PIN	Designation	Function

1	Relay 1 NO	Normally Open
2	Relay 1 NC	Normally Closed
3	Relay 2 Common	Common
4	Relay 3 NO	Normally Open
5	Relay 3 NC	Normally Closed
6	Relay 1 Common	Common
7	Relay 2 NO	Normally Open
8	Relay 2 NC	Normally Closed
9	Relay 3 Common	Common

Cooling

The RD-30 is cooled via forced induction through the front of the unit and exhausted through the vents in the rear of the chassis. The RD-30 is equipped with a temperature controlled status indicator. If the temperature inside the unit exceeds 60° C the red “Error” text will illuminate on the front panel and a description of the error will appear in the “Error List.”

Rack Information

The RD-30 is intended to be mounted in a standard 19” rack. It occupies 1RU of rack space and the connections are all on the rear of the unit.

Chapter 2 - Installation

Rack Installation

To install the RD-30 into a rack use the following steps:

Step	Description
1	Determine the desired position in the rack for the RD-30 making sure that the air intake on the front of the unit and the exhausts on the sides of the unit will not be obstructed.
2	Insert the rack mount clips into place over the mounting holes in the rack.
3	Slide the RD-30 into position in the rack.
4	Secure the RD-30 to the rack by installing the four supplied screws through the front mounting holes and tightening.
5	If needed, secure a grounding wire use the grounding location on the rear panel of the RD-30. See Chapter 1 back panel for grounding location.

AC Power Connection

Using the proper power connections is vital to the safe operation of the RD-30. Only use the supplied 3-prong power connector or one with equal specifications. NEVER tamper with or remove the 3rd – prong grounding pin. This could cause damage to the RD-30, personnel, or property.

The RD-30 is intended for use on either 120V or 240V systems. The power supply will automatically detect the system it is connected to. To hook up the power use the following steps:

Step	Description

1	Locate the AC power cord that was included with the RD-30.
2	Plug the female end of the power cord (end with no prongs) into the back of the unit.
3	Locate a protected outlet (usually inside of the rack) to plug the male end of the power cable into.

Maintenance

The RD-30 is virtually a maintenance-free piece of equipment. There are no user serviceable parts on the inside of the unit.

Chapter 3 - Getting Connected

Introduction to the WebUI Control Application

A web-based control software application comes pre-installed on the RD-30.

Compatible browsers

Firefox (recommended)
MS Internet Explorer
Safari
Chrome

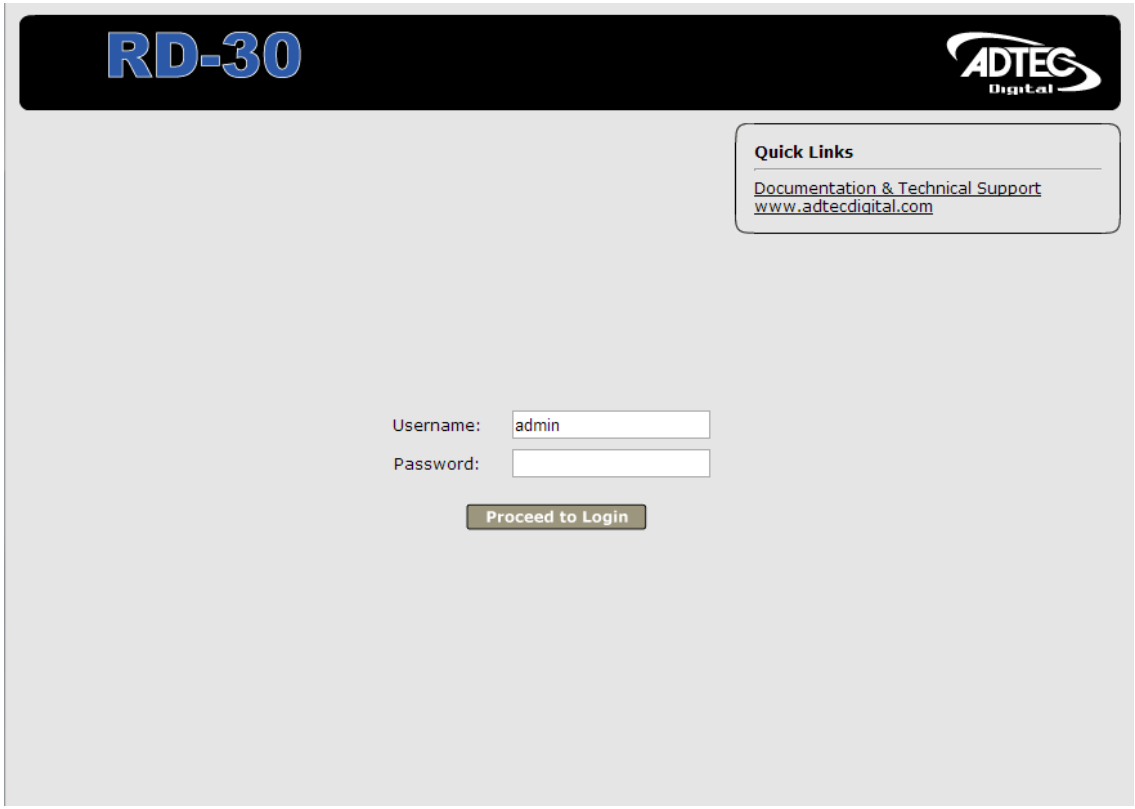
Ethernet Access

To begin, you will need to connect to your RD-30 via Ethernet directly, or by adding the RD-30 to your local area network. The default address for all Adtec devices is 192.168.10.48. The default username for the RD-30 is 'admin', which will auto populate, and the default password is cleared or left empty. Click the 'Proceed to Login' button to log in.

To connect directly to the device, make sure that your computer and the device have IP addresses within the same IP class range. (ex. 192.168.10.48 for the device and 192.168.10.49 for your computer).

If you need to change the IP address of the device, this can be done via the front panel, Admin > Unit Networking menu. Using a CAT 5 crossover cable, connect one end to your computer and the other to the Ethernet port found on the processor section of the back panel. (Some computers can auto negotiate the connection and a crossover may not be necessary.)

To add the device to a LAN, connect a standard CAT 5 Ethernet cable to your network router and then to the Ethernet port on the back of the device. If your network is DHCP enabled and you prefer that over a static IP, you can turn on DHCP for the device via the front panel, Admin > Network menu.



Chapter 4 - WebUI overview

WebUI Status Panel

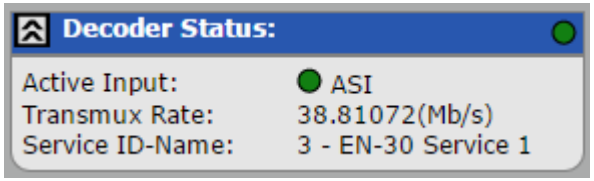
The left-hand panel of the web application will report current device status while the right-hand panel will allow you to configure your device. This section will cover what each part of the status panel represents. Each panel may be collapsed or expanded

by clicking on the icon with the 'double up' or 'double down' arrows. The heading of each status may contain an LED that summarizes the current state of the individual status box. Green represents, OK, Yellow represents, Potential Warning, and Red represents an alarm.

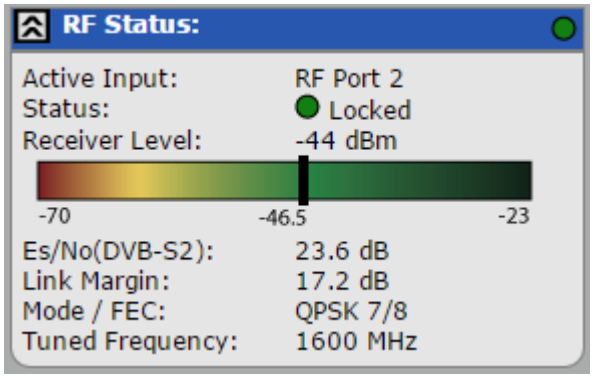
Firmware and Temperature

The top left hand status displays a logo of the product, Firmware version and operating temperature of the IRD	

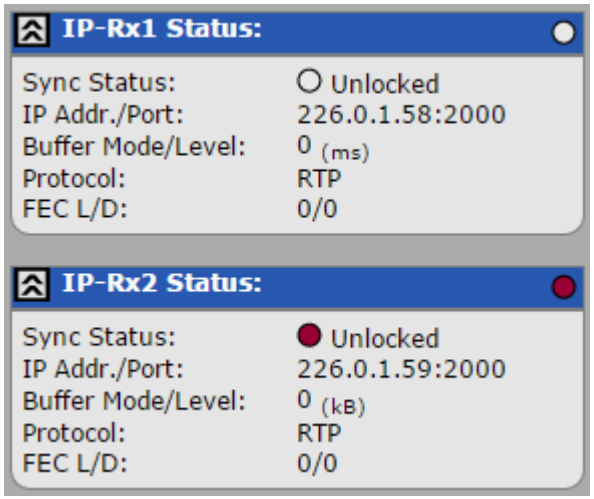
Decoder Status

The Active Input LED will be green if the decoder is actively decoding a program from the input. The selected input data rate (Transmux Rate) is displayed as well as the Service ID (Program Number) and Program Name if available.	

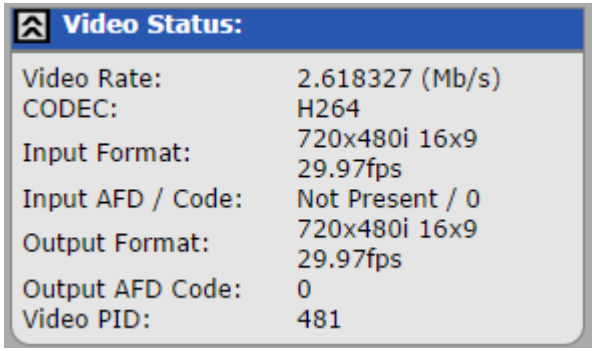
RF Rx Status

The Active Input will display the last actively selected RF port. It does not represent the active input for the decoder (refer to Decoder status for Decoder input). Status provides an indication of tuner lock along with the receive level (dBm), Eb/No or Es/No (dB) and Link Margin (dB). The modulation and coding mode detected will be displayed under the Mode / FEC title along with the tuners acquired L-Band frequency (MHz).	

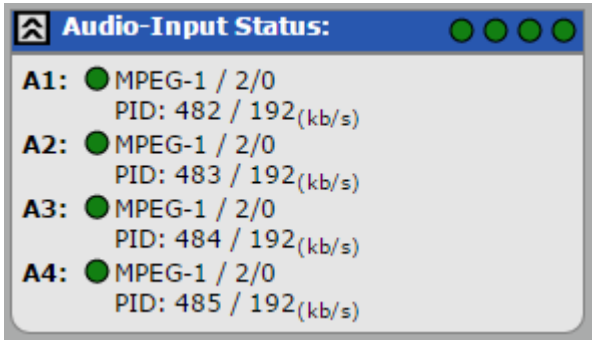
IP-Rx Status

The IP-Rx1 and IP-Rx2 status display information about the two potential IP-Rx profiles that can be configured. The Sync Status LED will be grey if the input is disabled, red if a transport stream is not detected and green if a transport stream is detected. The current IP-Rx configuration is also displayed for IP Address/Port and Buffer Mode/Level. The IRD automatically detects protocol and FEC parameters if enabled.	

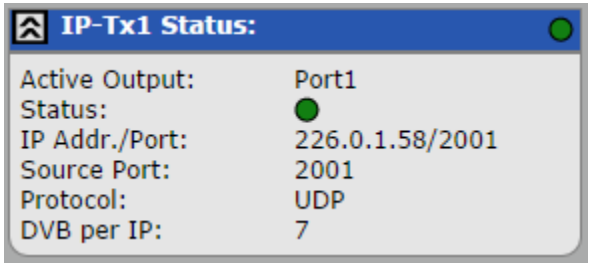
Video Status

This window shows statistics about the decoded incoming (video elementary stream) and outgoing (processed) video. Input transport stream information includes video rate (Mb/s), codec detected, resolution, frame rate, AFD information and PID. Output baseband information includes resolution, frame rate and AFD information.	

Audio Status

This window shows statistics about the decoded incoming audio elementary streams. Input transport stream information includes audio type, channel configuration, PID (decimal) and the encoded audio rate (kb/s).	

IP-Tx Status

The IP-Tx1 and IP-Tx2 status windows display information about the first two IP-Tx profiles that can be configured. Status will be green if the Tx profile is set to ENABLED *and* if link is detected on the configured output. Each output profile can share the same GigE port if needed, they can also share the same port as the configured Rx profiles. The configured IP destination parameters IP Address/Port, Source Port, Protocol and DVB TS Packets per IP Packet can be viewed in this status.	

Chapter 5 - Operational Information

UDP / RTP / FEC IP Rx

The RD-30 supports a number of IP based protocols for the reception of transport streams via private and public networks. The RD-30 will automatically determine if an IP stream is UDP or RTP.

UDP (User Datagram Protocol) multicast/unicast streams are commonly used for broadcast transport streams in local or private networks that contain little to no packet loss. UDP offers no protection against dropped packets or packets received out of order (usually due to packets taking a different amount of time to traverse network devices). Due to the low reliability of UDP, it is generally not recommended to be used over the public internet or in environments where the potential of packet loss, increased jitter, or out of order packets is high. If packets are lost or received out of order, service anomalies will occur.

RTP (Real-time Transport Protocol) is another type of multicast/unicast stream that is better to use than UDP in some environments. RTP is built upon the building blocks of UDP, but adds packet sequence identification. Packet sequencing gives a receiver the information needed to detect and correct packets that were received 'out of order'. RTP is highly recommended when timely delivery of each consecutive packet may not be guaranteed.

RTP + FEC or SMPTE-2022 is an additional method used in dealing with lost packets, where RTP alone can only tolerate packets received out of order. FEC (Forward Error Correction) streams add overhead to the overall data rate, but add protection in

case of a lost packet. FEC (detection and correction of lost packets) adds latency and data overhead as opposed to UDP where no protection mechanisms exist. The amount of packet redundancy and overhead can be configured at the RTP/FEC transmitter. Each multicast/unicast FEC stream is transmitted on base port N and two FEC streams are sent on N+2 and N+4 respectively. When receiving FEC streams behind firewalls, please bear in mind that two additional ports (N+2 and N+4) must be allowed through for proper error recovery to occur.

The RD-30 supports both unicast (point to point) and multicast (broadcast) streams. How to setup IP addressing, port forwarding, port mapping or other third party network configurations is outside the scope of this document. Please verify that IP addresses, gateways and network equipment is configured properly at both the transmit and receive sites for proper stream reception.

Multicast Reception - Address

To receive a multicast (UDP/RTP/SMPTE 2022) stream, place the IP Rx mode to 'multicast' and insert a multicast address desired to receive in the 'Address' field. This address must match the same address used on the multicast transmitter. Multicast IP address ranges are 224.xxx.xxx.xxx to 239.xxx.xxx.xxx, where 0 <= xxx <= 255. If you are new to multicast and attempting a first time connection, 226.0.1.1 is a common address to start with. Please verify transmitter address configuration.

Unicast Reception - Address

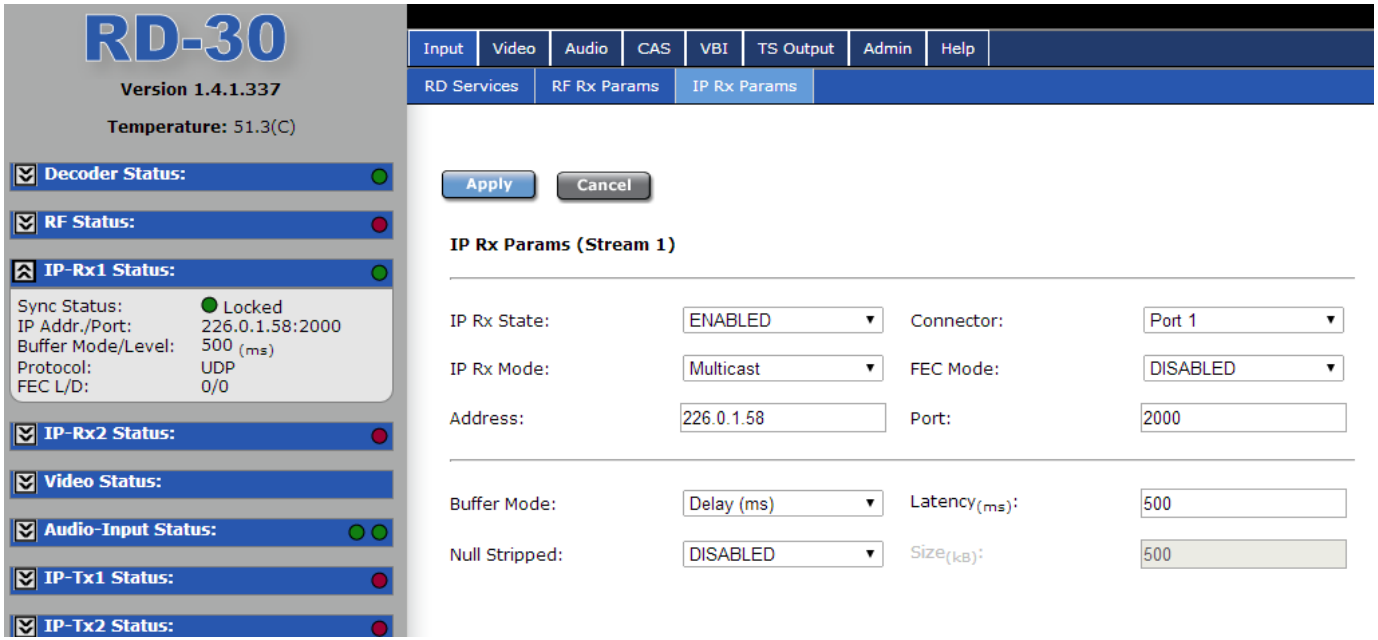
To receive a unicast (UDP/RTP/SMPTE 2022) stream, place the IP Rx mode to 'unicast'. The unit will be 'listening' for any streams sent directly to it. Refer to your IP transmitter documentation for proper configuration of the transmitter.

Unicast/Multicast - Port

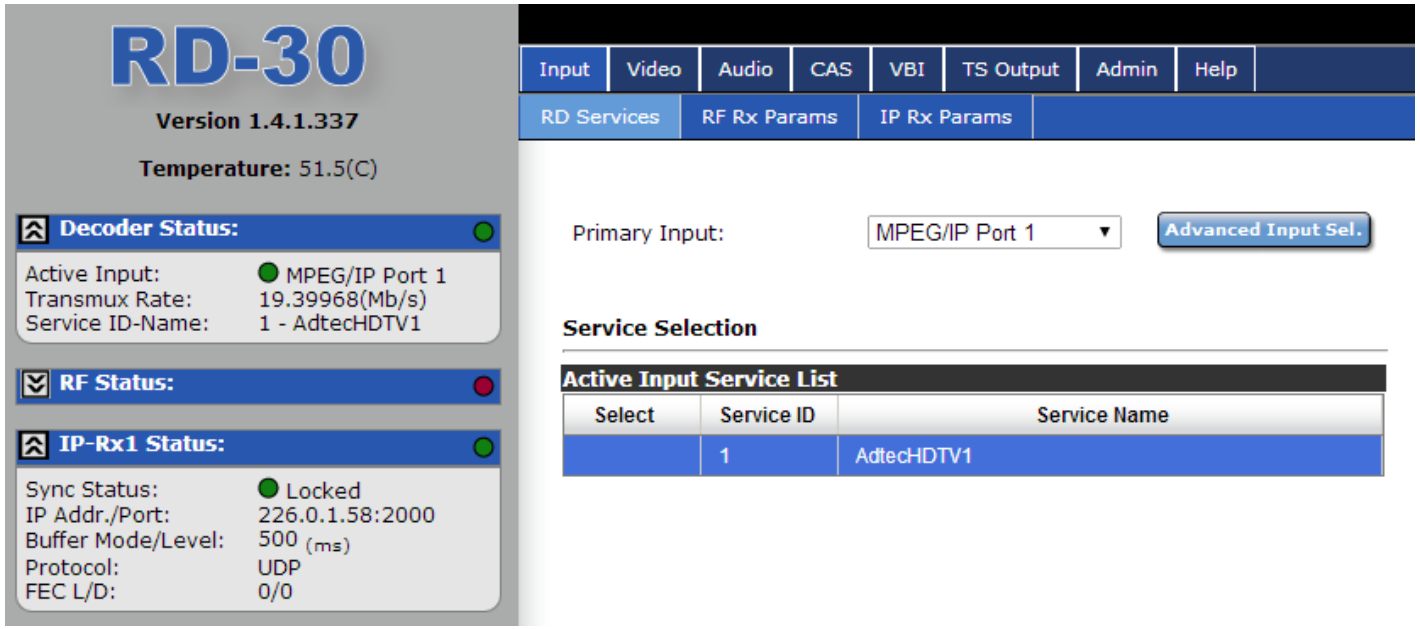
Enter the port number in the 'port' field. The port number must match the port number used on the transmitter where the range is 1 to 65535. If you are new to multicast and attempting a first time connection, 2000 is a common port to start with. Lower port numbers are usually reserved for other network services. Please verify transmitter port configuration.

Choose the IP Rx 'Connector' dependent upon your network setup. There are two available GigE cards available for receiving network streams.

Once IP Rx is configured, click Apply.



Visit the Input -> Service tab and Select the appropriate IP input (Port 1 or Port 2) from the drop down to select IP for decoding. IP service names will populate in the service list.



DVB-S / DVB-S2 RF Rx

There are four physical RF connectors and four available RF profiles. Each profile corresponds to the provided physical input on the IRD. These inputs are on a switch, which means only one input can be active at one time. The last selected RF input via the services tab will be the current switched input.

Each RF input provides the following configurations:
State - Whether the input should be enabled for tuning.

Wide Acquisition range - With this option disabled, acquisition range is +/- 3 MHz between 5 and 60 Msym/s. With this option enabled acquisition range is dependent upon the chart below. This option is recommended to be ENABLED.

Acquisition State / Range	+/- 3 MHz	+/- 4 MHz	+/- 5 MHz
DISABLED	5 - 60 Msym/s	N/A	N/A
ENABLED	4 - 5 Msym/s	5 - 6 Msym/s	6 - 60 Msym/s

Downlink - The value for the Downlink frequency is used with the Local Oscillator frequency to calculate the L-Band frequency. If the LO is set to 0MHz, this field denotes the L-Band frequency. L-Band = absoluteValue(Downlink - LO). Range: 950 - 14500 MHz .

Local Oscillator - The Local Oscillator (L.O.) control specifies the frequency of the LNB local oscillator. Common L.O. frequencies for "C" and "Ku" bands are 5150 MHz and 10750 MHz respectfully although, some other variants are included. 0MHz may be used if the user desires to enter the L-Band frequency directly into Downlink.

Type - Allows the selection of DVB-S, DVB-S2 or Automatic detection of the DVB satellite standard.

PL Scrambling Code - This control is used if the input is using PL scrambling. Valid PL Scrambling code range: 0 - 262141

Symbol Rate Mode - Symbol Rate Mode can be configured for AUTO (automatically determine symbol rate) or manual (define a symbol rate in the Symbol Rate field).

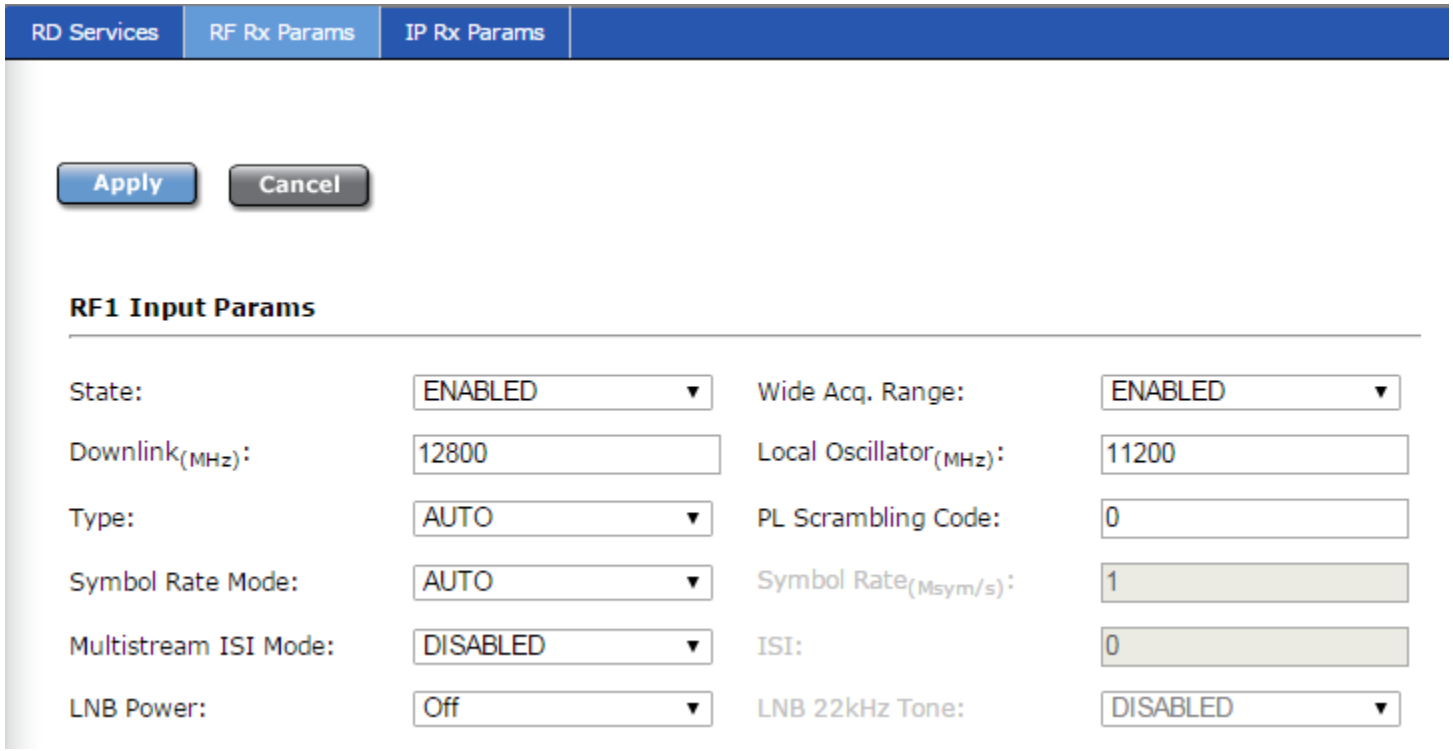
Symbol Rate - Symbol Rate is defined for digital communications as the number of symbols per second. The amount of data per symbol depends on the modulation type. Units for this field are expressed in Msym/s. Lock may not be possible below 1 per specification, but the allowed configuration range is 0.5 - 60 Msym/s.

ISI Mode - Enables/Disables DVB-S2 multistream capability if receiving a DVB-S2 input signal.

ISI - If multistream capability is enabled, the specified ISI (input stream identifier) that will be output.

LNB Power - This control is primarily used in "Universal" LNB applications. The LNB Polarity control allows for LNB polarization selection; the 13/14VDC source will select the Vertical polarity and the 18/19VDC source will select the horizontal polarity.

LNB 22kHz Tone - This control is used only for Universal LNB applications. A universal LNB can route the high or low band from either polarity to the IRD. The high band is selected by enabling the 22 kHz tone and the low band is selected when the tone is disabled.



DVB-S2 - Recommended use of Pilots

The use of DVB-S2 pilots within the modulated carrier are recommended under certain conditions. With the following configurations, Pilots are recommended for the transmitting modulator:

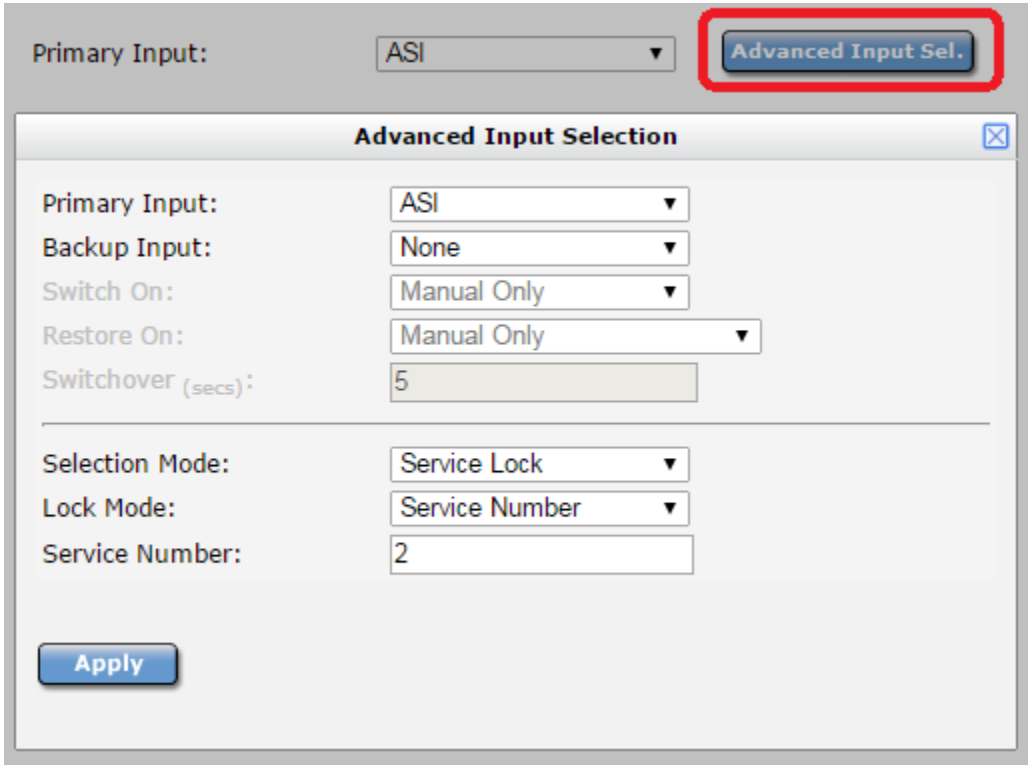
- High order modulation schemes: 16APSK and 32APSK

- Low code rates QPSK: 1/4, 1/3, 2/5, 1/2, and 3/5
- Low code rates 8PSK: 3/5, 2/3, 3/4, and 5/6
- Low symbol rates: < 5 Msym/s for free running DRO LNB
- Low symbol rates: < 3 Msym/s for Phase Locked DRO LNB

Advanced Input Configuration - Input Redundancy

The Advanced Input selection allows configuration of redundant input behavior and manual service/program number selection.

When the ‘Backup Input’ is set to ‘None’, redundant input switching is disabled. The ‘Backup Input’ setting can be modified to allow switchover on a triggered event such as TS Sync Loss, Decode Failure or a Manual Switch. After a unit redundantly falls to a backup input, it can be configured on what event will restore the unit back to the primary input. The amount of time before switching is also configurable in seconds.



Service Filtering

Terminology:

TS - Transport Stream - A stream of transport packets that contain audio, video and data belonging to one (SPTS, single program transport stream, also known as SCPC.) or several programs (MPTS, multiple program transport stream, also known as MCPC.).

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.

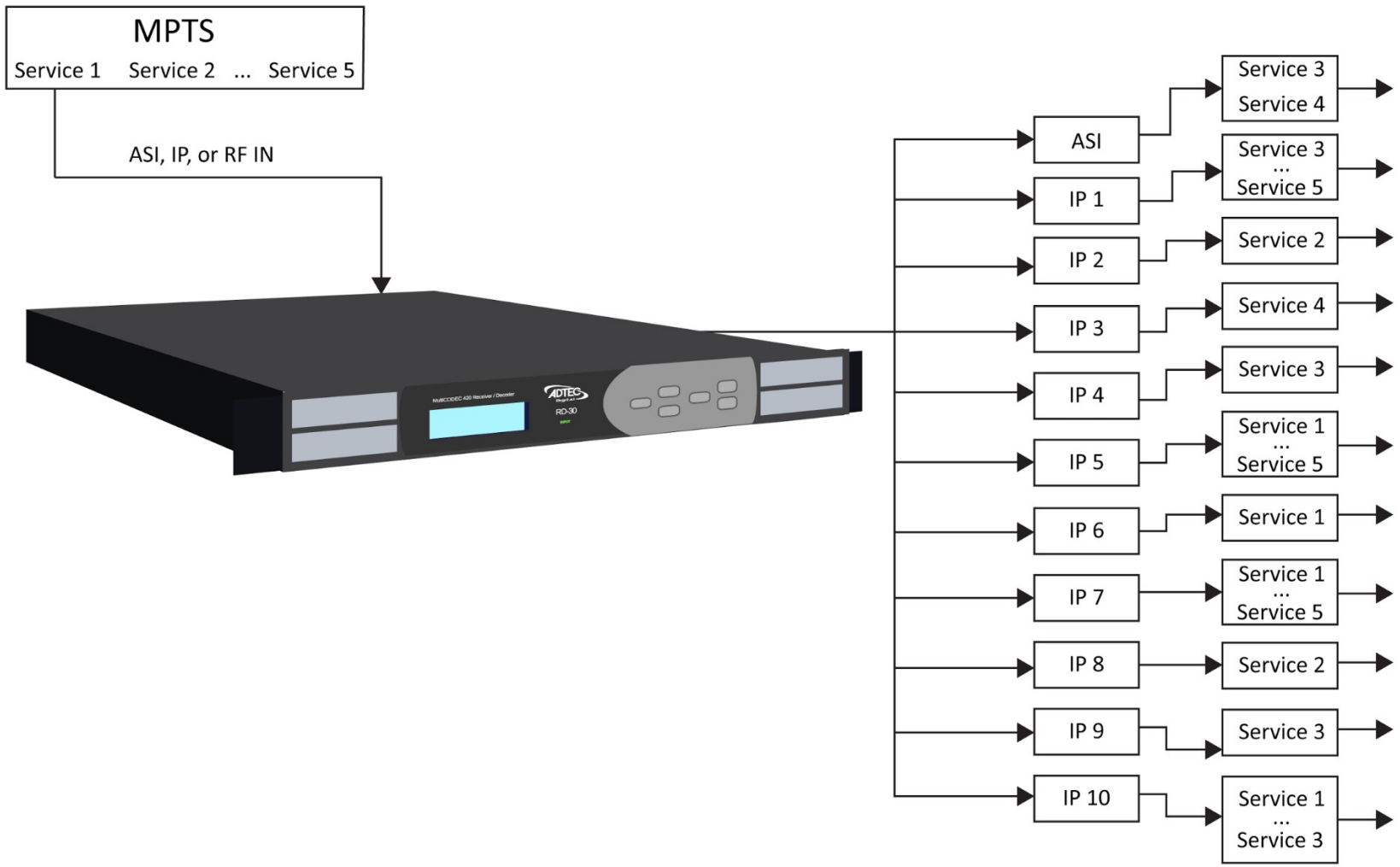
PMT - Program Map Table. This MPEG-2 table specifies PID values for components of programs.

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

Program / Service / Channel - A combination of one or more elements (video, audio or data) defined by a PMT.

Summary:

Service Filtering allows an MPTS from the input to be turned into an SPTS or program reduced MPTS on a given output. This is helpful in service turn around applications where all programs are not desired for re-transmission. The RD-30 has an ASI output and up to 10 available IP destinations. There are up to 10 filters available to assign to the outputs. The RD-30 does *not* support multiplexing of the inputs. An example of a 5 MPTS input to customized program outputs is shown below.



Service Filtering - 5 Service Input to various outputs

The RD30-SVC-FILTR-KEY key must be enabled to configure Service Filtering. If filtering is disabled, all programs available on the selected input for decode are available on the output, ie. unit is in service pass through mode.

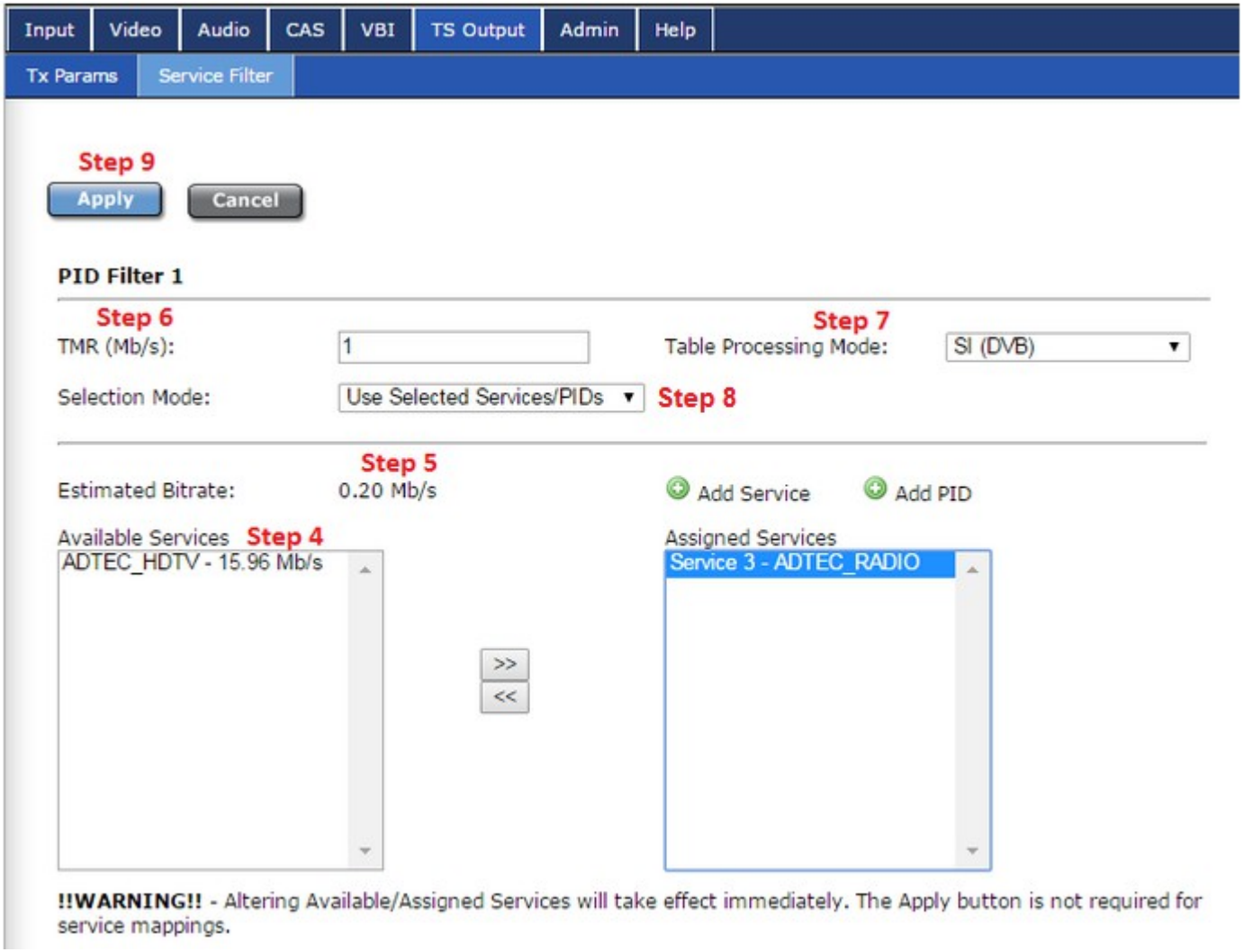
Configure Service Filtering

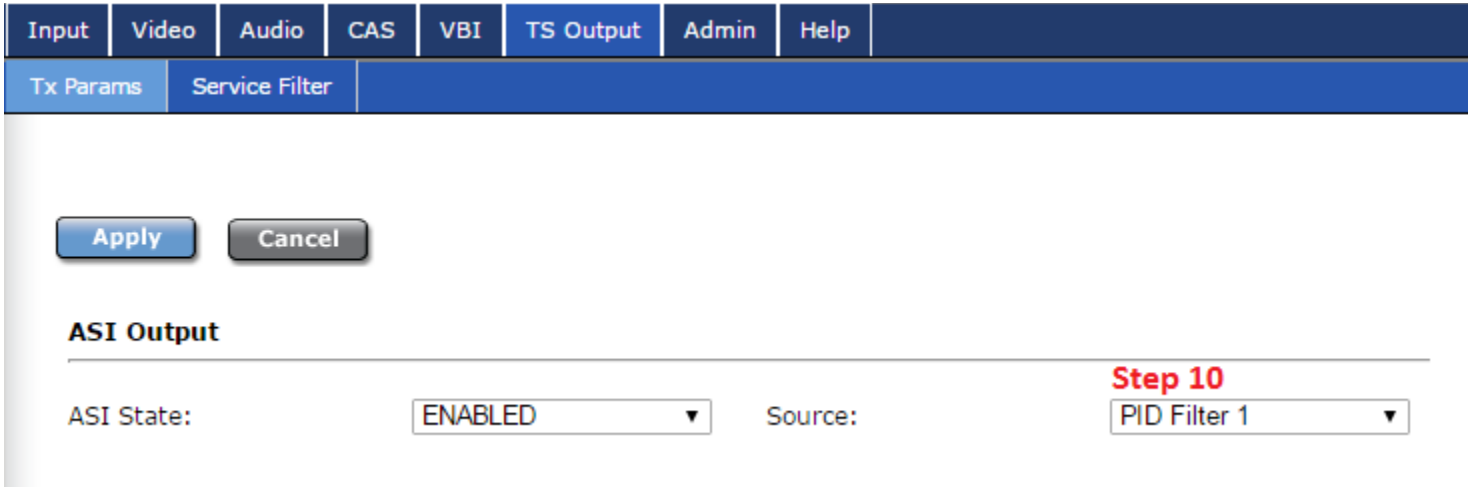
Filters can be created from the live input (Available Services) or they can be configured manually if the service is not live.

To configure a custom service filter with a 'live input':

Step	Description
1	Verify unit is licensed for Service Filtering via the Admin -> Features tab.
2	Configure one of the ten filters on the TS Output -> Service Filter Tab.
3	The Available Services list will list all Service Names with their corresponding estimated bit-rate.
4	Choose an 'Available Service' and click the double right arrow to move to 'Assigned Services'. Repeat until all desired services are assigned. **note:** The Service will immediately map after clicking the arrow, the apply button is not required.
5	The 'Estimated Bitrate' will calculate the total of all Assigned Services. The configured TMR *must* be higher than this rate or CC errors will occur on output.
6	Configure the filter TMR to a bit-rate higher than the Estimated Bit-rate.
7	Configure the table processing mode. DVB will generate DVB tables for the selected filter, including service names (SDT). MPEG will generate PAT and PMT only. Service names will not be available on the output with MPEG processing.
8	Configure Selection mode to 'Use Selected Services/PIDs' to utilize the newly

	‘Assigned Service’ list for the filter.
9	Click the Apply button to set TMR, Table Processing Mode and Selection Mode.
10	Visit the TS Output -> TX Params tab and assign the Service Filter to the desired output via the ‘Source’ configuration and click Apply.

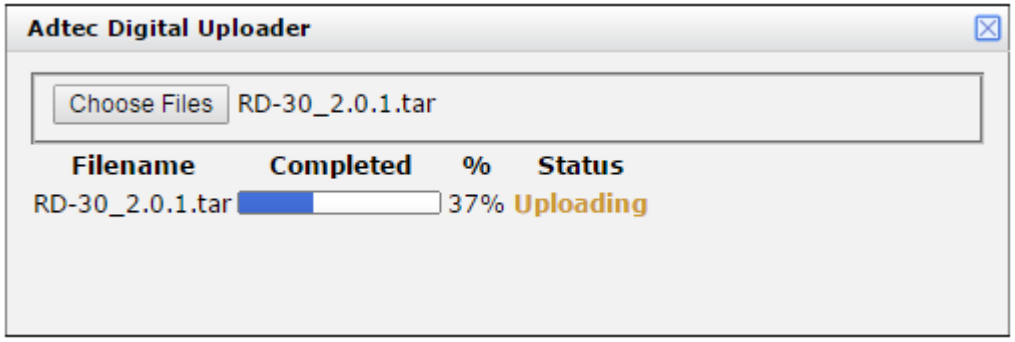

Input
Video
Audio
CAS
VBI
TS Output
Admin
Help
Tx Params
Service Filter
Step 9
Apply
Cancel
PID Filter 1
Step 6
TMR (Mb/s):
1
Step 7
Table Processing Mode:
SI (DVB)
Selection Mode:
Use Selected Services/PIDs
Step 8
Step 5
Estimated Bitrate:
0.20 Mb/s
Add Service
Add PID
Available Services
Step 4
ADTEC_HDTV - 15.96 Mb/s
>>
<<
Assigned Services
Service 3 - ADTEC_RADIO
!!WARNING!! - Altering Available/Assigned Services will take effect immediately. The Apply button is not required for service mappings.



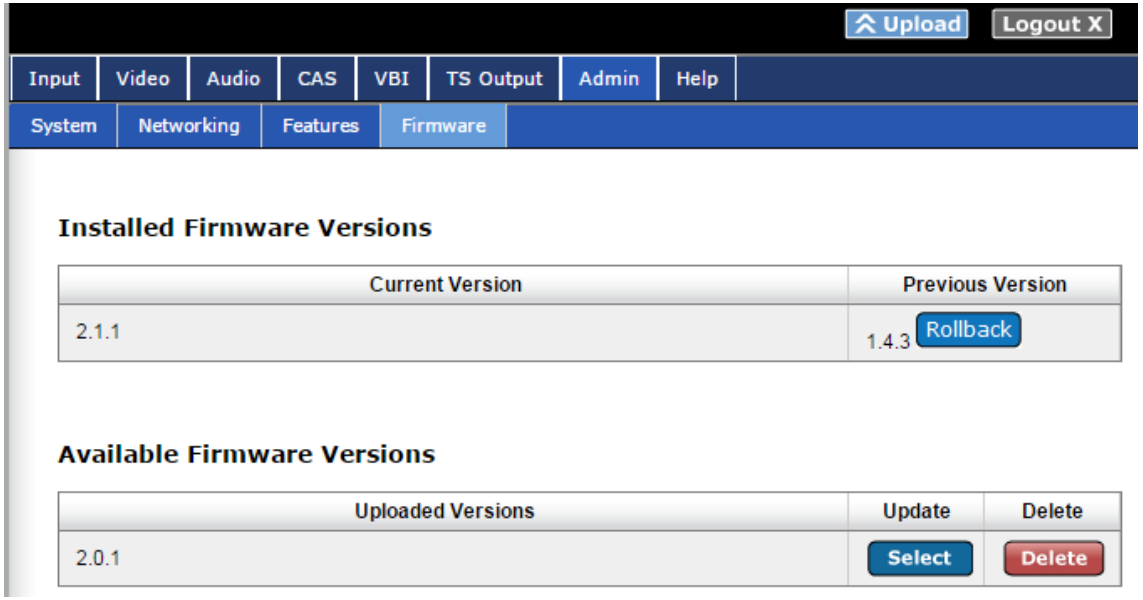
To manually configure Service Filtering from a non-live input, manual entry is required on the TS Output -> Service Filter tab. Choose the 'Add Service' or 'Add PID' button to manually add service numbers or PID numbers that are desired to be added. Values should be entered in decimal format.

Upgrading Via Web User Interface

Periodically, we will provide firmware updates to our products via our website, http://www.adtecdigital.com. To upgrade your device, download the firmware file from our website and store it locally. Login to the web-based application and navigate to the Admin > Firmware tab. Click on the upload button located at the top right of the application. Select the firmware file from your local machine and wait for it to upload.

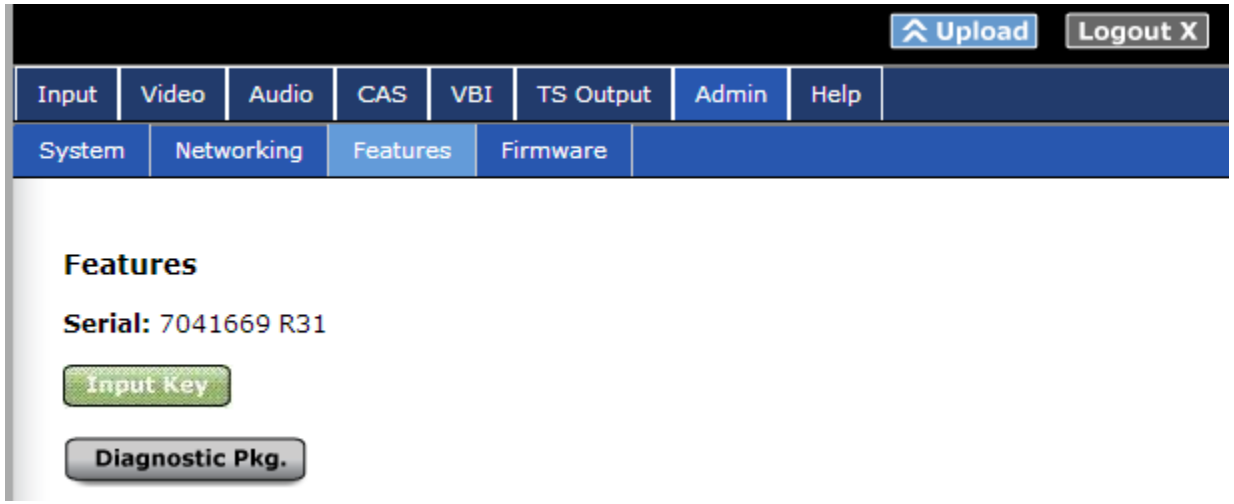


Once it has finished uploading, it will appear in the Available Versions list. Click on the Select button associated with the new file to reboot into the new version.



In Field Feature Upgrades

Unit features can be upgraded in the field via the web user interface. To purchase a permanent key, please provide your unit serial number from the Admin -> Features tab to your sales representative.



Key Instructions

An unlock key can be provided via email or verbally if internet access is not available. To enter the unlock key:

Step	Action
1	Click on the 'Input Key' button.

2	Enter the supplied key into the pop-up dialog box and click OK.
3	The feature status should change from 'Un-licensed' to 'Licensed'.
4	In some cases, a reboot of the unit may be required after enabling a feature key.

Chapter 6 - Appendix

Appendix A - GNU General Public License

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Appendix B - Technical Specifications

Base Model (RD30-01)

Inputs

DVB-ASI Input
Use: Input available for decode.
Standard: Asynchronous Serial Interface per EN500083-9
Input TS Rate: 250 Kb/s to 200 Mb/s
Packet Size: 188/204 byte
Modes: Burst, Byte and Inverted
Connector: BNC (75 Ohm)

IP Input
Use: Input available for unicast/multicast decode. TS input/output can share the same connector as required.
Standard: UDP, RTP and SMPTE 2022 COP3 FEC
Supports 1 to 7 TS packets per IP packet
Supports CBR, VBR and Null Stripped input
IGMP v1, v2 and v3 support
Input TS Rate: 250 Kb/s to 200 Mb/s
Connection speed: GigE (10/100/1000 Auto-Negotiate)
Receiver capability: 2 simultaneous MPEG over IP transport streams
Connector: x2 RJ45 (x2 total TSoIP connectors on the unit. Connectors are shared for Input/Output)

Sync Input
Use: Auto-detects Bi-Level and Tri-level sync for Genlock and 3D applications.
Connector: BNC (75 Ohm)
Input Impedance: 10 kOhm
Supported References: PAL-B/G/I/D/M/N Black Burst, 1080i @ 25, 29.97 and 30 fps, 1080p @ 23.97, 24, 25, 29.97 and 30 fps and 720p @ 50, 59.94 and 60 fps.

Outputs

SD-SDI / HD-SDI
note: Software key required to unlock full hardware support.
Two mirrored SDI outputs from Decoder
Standard: Video & Audio SMPTE 259M - SD, SMPTE 292M - HD
Up to 8 Channels of Embedded audio
SDI Ancillary support for:
Closed Captioning (CEA-708), AFD (SMPTE 2016), OP-47 (SMPTE RDD-08), SMPTE RDD-11, SCTE 127 (SMPTE 2031), EN301775 (SMPTE 2031), Time Code (SMPTE 12M-2)
SDI VBI waveform support:
Line 21 captions (CEA-608), TVG2x, AMOL-48/96 (SCTE 127), Teletext/WSS/VPS (EN301775)
Video Overlay Support: CEA-608, CEA-708, SCTE-20 and DVB-Subtitles with Auto-Scaling (EN 300 743)
Connector: Two BNC (75 Ohm)

CVBS
SD NTSC, PAL-M, PAL-B/G, PAL-N Composite Video Output
NTSC Pedestal selection: Black at 7.5 IRE or Black at 0 IRE
VBI waveform support:
Line 21 captions (CEA-608), TVG2x, AMOL-48/96 (SCTE 127), Teletext/WSS/VPS (EN301775)
Note: This output is only active when the SDI outputs are also set to SD, NTSC or PAL.
Connector: BNC (75 Ohm)

DVB-ASI Output
Standard: Asynchronous Serial Interface per EN500083-9
ASI Mirrored from DVB-ASI Input, IP Input, or RF Input with purchase of optional tuner package.
Packet Size: 188 byte
Connector: BNC (75 Ohm)

AES Audio
note: Software key required to unlock full hardware support.
Standard: AES3/EBU
4 pairs of decoded/passthrough audio
Connector: Four BNC (75 Ohm)

Analog Audio

note: Software key required to unlock full hardware support.
Four balanced pairs via two DB15 connectors. (2 pair per DB15)
Connector: Two DB15
Max Output Level: +24dBu @ 0dBFS
Total Harmonic Distortion+N: < 0.01% from 20Hz to 20KHz
Dynamic Range: > 104dB
SIgnal to Noise Ratio: > 80dB
Crosstalk: < -80dB from 20Hz to 20KHz
Frequency Response: +/- 0.5dB from 20Hz to 20KHz

Service Filtering
note: Software key required to unlock full hardware support.
Use: Up to 10 Service Filters may be defined. The Service filters can be applied to any of the 10 IP outputs or ASI output.*

IP Output
note: Software key required to unlock full hardware support.
Use: Output available for unicast/multicast transmit. TS input/output can share the same connector as required.
Standard: UDP, RTP and SMPTE 2022 COP3 FEC
Supports 1 to 7 TS packets per IP packet
Output TS Rate: 250 Kb/s to 200 Mb/s
Connection speed: GigE (10/100/1000 Auto-Negotiate)
Transmit capability: 10 simultaneous MPEG over IP transport streams
Connector: x2 RJ45 (x2 total TSoIP connectors on the unit. Connectors are shared for Input/Output)

Communications

Ethernet Port
Use: ethernet port used for network management
Format: Ethernet 10/100BaseT auto-negotiating
Communication Methods: WebUI, SNMP
Connector: RJ45

DB9 Relay Connector
Use: DB9 port used for alarm triggering / integration
Connector: DB9 Male

Video and Audio

Video Decode
note: Software key required to unlock full hardware support.
MPEG-2 SD (ISO/IEC 13818-2) Decode:
Format: 480i59.94, 576i50
Profiles: MP@ML

MPEG-2 HD (ISO/IEC 13818-2) Decode:
Format: 720p50, 720p59.94, 720p60, 1080i50, 1080i59.94, 1080i60, 1080p23.97, 1080p24, 1080p25, 1080p29.97, 1080p30
Profiles: MP@HL

MPEG-4 SD (ISO/IEC 14496-10) Decode:
Format: 480i59.94, 576i50
Profiles: Up to MP@L3

MPEG-4 HD (ISO/IEC 14496-10) Decode:
Format: 720p50, 720p59.94, 720p60, 1080i50, 1080i59.94, 1080i60, 1080p23.97, 1080p24, 1080p25, 1080p29.97, 1080p30
Profiles: Up to HP@L4.2

Video Bitrates (profile dependent):
MPEG-2: 1 - 100 Mb/s
MPEG-4: CABAC 1 - 80 Mb/s, CAVLC 1 - 100 Mb/s

Audio Processing
note: Software key required to unlock full hardware support.
MPEG 1 Layer 2 audio (4 pairs)
AAC-LC, HE-AAC v1, HE-AAC v2 (4 pairs)
Dolby Digital AC-3 / Dolby Digital+ E-AC-3 stereo downmix and passthrough (4 pairs)
Dolby E / Linear PCM Passthrough (4 pairs)

Physical and Operational

Physical / Environmental

1 RU - 14.6”D X 17.2”W X 1.72”H

Power
Input Voltage: 100 VAC - 240 VAC 50/60 Hz
Idle base unit power draw: 38-40 W
Base unit with active ASI input: 54-55 W
DVB-S/S2 model with active LNB 19 V @ 500 ma and active CAM adds: 10-12 W

Operational
- Ambient operating temperature: 0 C to 50 C.
- Ambient storage temperature: -40 C to 65 C.
- Non-condensing relative humidity range: < 95%

Certification / Compliance
RoHS Compliant

DVB-S/S2 Model (RD30-01-LB)

The LB option is a hardware option. This unit contains the same features as RD30-01 model listed above plus:

Inputs

DVB-CI Descrambling module
Interface: Adds two DVB-CI CAM slots (DVB-CI EN 50221)
Use: Descrambles decoded service only without purchase of RD30-CAM-KEY. RD30-CAM-KEY provides up to maximum amount of decryptable services supported by CAM module.
Maximum DVB-CI TS bitrate: 100 Mb/s
All major CA vendors supported

DVB-S/DVB-S2 tuner
note: Software key required to unlock full hardware support.
Use: Four switched L-Band inputs available for decode
Connector: F Type, Female
DVB-S EN 300 421 and DVB-S2 EN 302 307

Modulation Scheme support: QPSK / 8PSK / 16APSK / 32APSK
DVB-S QPSK: 1/2, 3/5, 2/3, 3/4, 5/6, 7/8
DVB-S2 QPSK: 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: 3/5, 2/3, 3/4, 5/6, 8/9, 9/10
DVB-S2 16APSK: 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
DVB-S2 32APSK: 3/4, 4/5, 5/6, 8/9, 9/10
Symbol rate range: 1 - 60 Msym/s
Automatic Modulation Coding and Symbol Rate detection capability
Supported Roll-of: 5%, 10%, 15%, 20%, 25%, 35%
Frequency range: 950 - 2150 MHz
Input Level: -65 dBm to -25 dBm
LNB Power and Control:
0, 13, 14, 18 and 19 VDC @ 450 mA
22 kHz (band selection according to universal LNB for ASTRA satellites)
VCM Demodulation Support
Multistream Support (Single ISI)
Maximum TS Bitrate: 160 Mb/s

Appendix C - 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 online.

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, 2014
For questions, please email slaquestions@adtecinc.com

- **SLA STANDARD***
  Services: Includes initial product orientation

Technical support M-F 8AM-8PM (EST)
Firmware and software upgrades
Includes repair expenses**
Includes ground shipping within US
International shipping is extra
Fees: Free for one year after purchase

- **SLA PRIORITY 24***
  Services: SLA Extended Warranty plus…
  Technical support 24x7x365
  Expedited shipping is extra

- **SLA PREMIUM 24***
  Services: SLA Priority 24 plus…
  Next business day advance loaners

- **SLA EXTENDED WARRANTY***
  Services: Extends warranty after year one
  Includes repair expenses
  Expedited shipping is extra

- **SLA LEGACY**
  Services: Includes initial product orientation
  Technical support M-F 8AM - 8PM (EST)
  Firmware and software upgrades
  Includes Duet, Soloist 2/ 2S, Mirage, edje1013/1015/2000/2100/2110.
  Most legacy products cannot be repaired

- **SLA SESSION SUPPORT**
  Services: Technical support M-F 8AM - 8PM (EST)
  Includes support for 5 days after first call

- **SE SUPPORT**
  Services: Event based on-site technical representation

*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. For details see adtecdigital.com/sales/terms