TVU networks

TVUPack™

Set Up and Operating Guide
Models TM8100

Version 4.2

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Printed in U.S.A.

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FCC/CE Compliance

Federal Communications Commission (FCC) Regulation of ENG Mobile Systems

The FCC provides specific policies and procedures related to radio frequency (RF) emissions in mobile and portable devices. The FCC outlines test requirements and specific test procedures based on the type of device. These test requirements and procedures can also cover Specific Absorption Rates (SAR) for RF.

The TVUPack device has always conformed to all applicable FCC regulations covering mobile systems for electronic news gathering. All required tests for the TVUPack device as outlined in the regulations were performed by a third party testing lab which issued a certificate of compliance for the TVUPack. The certificate is applicable to both the FCC and CE. Additionally, the data modems used in TVUPack are commercially available off-the-shelf brands and have been FCC and carrier certified.

Supporting documentation demonstrating TVUPack's compliance with the applicable FCC regulations is available upon request. Please contact us at +1.650.969.6732 for assistance and questions regarding approved modem cards for use with TVUPack.

TVUPack Transmitter Components

The TVUPack includes these standard components:

- TVUPack
- Breakout Cable (Cable is located inside the TVUPack. See image below)
- Power Supply
- Wi-Fi Card
- BNC Cable or Firewire Cable
- Batteries
- Dual Battery Charger
- Operating Guide and User Manual

Optional components for the TVUPack are:

- Data Cards
- iPod
- V mount adapter
- Ethernet Cable
- AC Car Adapter
- Universal Adaptor
- Hotspot Card

Note: If any component is missing, please contact TVU Networks Customer Support at **support@tvupack.com or +1.650.440.4812.**

Location of Breakout Cable

TVUPack Receiver Components

The TVUPack Receiver includes these standard components:

- Server
- Power Cable
- Faceplate
- Rails (x2)
- Cable Management Arm Kit

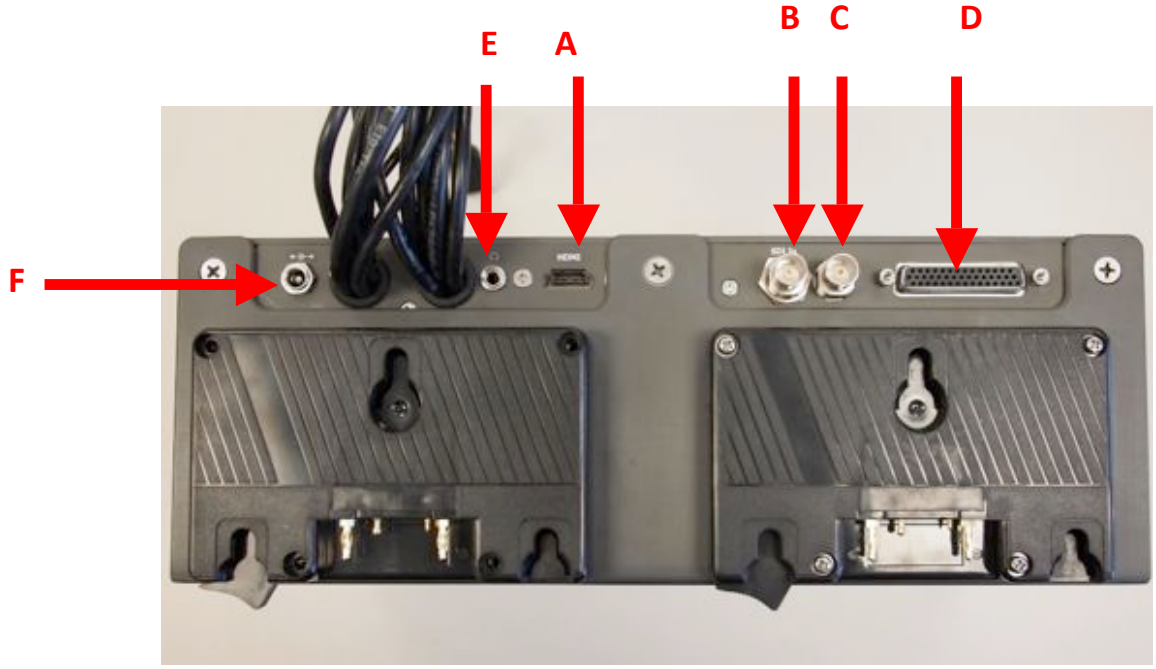
Optional components for the TVU Receiver are:

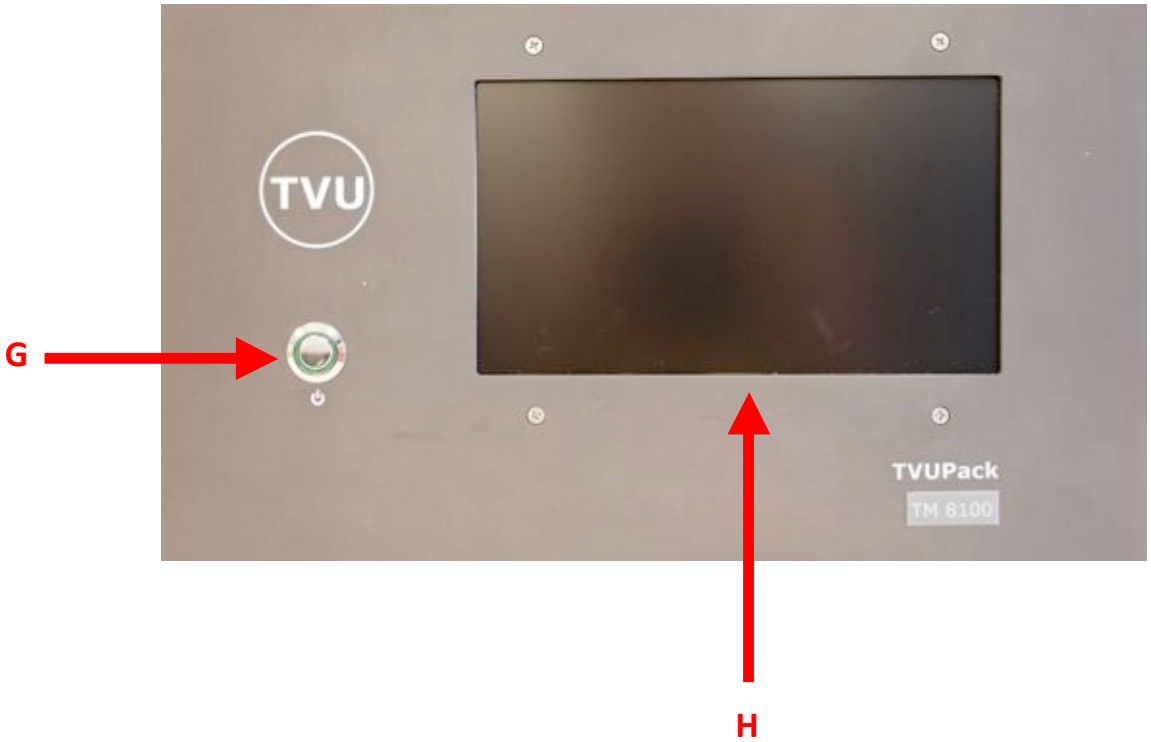
- IFB
- Keyboard and Mouse
- Universal Adaptor

TVUPack Receiver is not included for TVUPack Cloud service customers.

Note: If any component is missing, please contact TVU Networks Customer Support at **support@tvupack.com or +1.650.440.4812.**

TM8100 Features and Indicators





TM8100 Top and Front Views

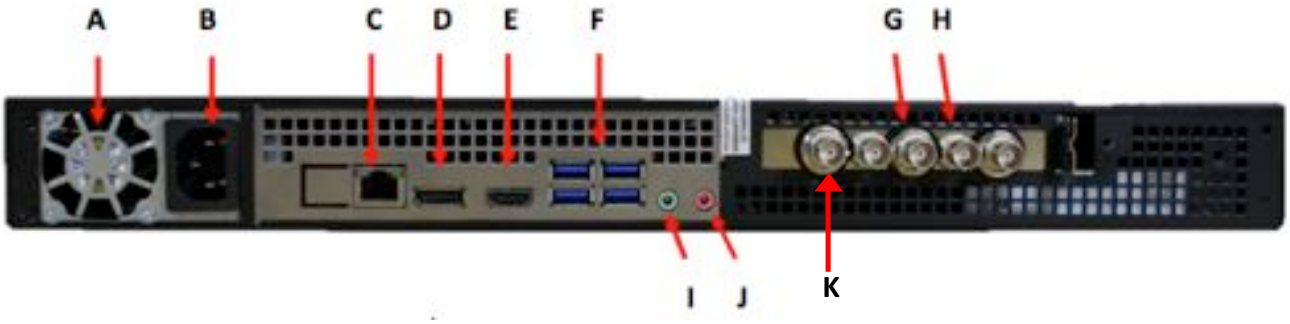
Label	TVUPack TM8100 Features and Indicators
A	**HDMI input:** Connects to a video camera
B	**SDI input:** SDI cable connection – signal input
C	**SDI output**: SDI video pass-through
D	**Analog input:** Analog input break out cable connection (composite, component, analog audio)
E	**IFB output:** IFB audio component – 3.5mm mini jack audio output
F	**DC power supply input jack:** Connects to power supply for use without battery—19VDC
G	**Power button:** Turns TVUPack on or off
H	**LCD display screen:** Displays image from video camera and used to configure data cards

TVUPack Transceiver Features and Indicators

TVUPack Transceiver Front Panel with Faceplate

Label	TVUPack Transceiver Front Panel Faceplate
A	Power Button

TVUPack Back Panel Connections (Standard SDI version)



Label	TVUPack Transceiver Back Panel Connections (SDI)
A	Vent; Do not block
B	AC Power
C	1 GigE Ethernet Port
D	Display Port: Connect the supplied Display Port to VGA adapter (see image below)
E	HDMI Display Port
F	USB Ports
G	SDI Output
H	SDI Input
I	Audio Output
J	Audio Input
K	Reference input: Allows for time sync with the television station's broadcasting system

VGA Adapter

TVU Receiver: Network and Firewall Configuration

TVU Networks recommends assigning a static IP address to the TVUPack receiver to ensure the network configuration remains stable. All the incoming ports referred to in this section are configurable. Please contact TVU Networks Customer Support if you wish to use a configuration other than the one specified in this documentation.

Please configure your firewall or router as follows:

1) Allow TCP outgoing from the TVU receiver on port 3970.
2) Allow UDP/TCP outgoing from the TVU receiver on port 123.
3) Permit all TCP/UDP incoming traffic for port 8088 to receiver.
4) Forward all traffic arriving on port 8088 of the external firewall interface to the IP address of the TVU Receiver.

This setup allows the TVUPack and receiver to automatically link with each other and permit video transport.

Recommended firewall configuration for TeamViewer
TVU Networks uses TeamViewer software to enable remote support and troubleshooting. To enable this software, please ensure that either port 80(TCP) or port 5938(TCP) are open for outbound connections.

Recommended firewall configuration for remote control of TVUPack receiver from iPod or smartphone
The TVUPack hotspot feature allows remote configuration of the TVUPack receiver settings from a smartphone. To enable this feature, permit all TCP/UDP incoming traffic for port 8288 to receiving terminal; forward all traffic arriving on port 8288 of the external firewall interface to the IP address of the TVU Receiver. This port is configurable.

Recommended firewall configuration for the FTP server
This feature allows files to be uploaded to the FTP server in the Receiver. To enable this feature, permit all TCP/UDP incoming traffic for port 21 to the receiving terminal; forward all traffic arriving on port 21 of the external firewall interface to the IP address of the TVU Receiver. This port is configurable.

Recommended firewall configuration for remote configuration of a TVUPack from the receiver
A TVUPack and its modems can now be configured from a remote location. To enable this feature, permit all TCP/UDP incoming traffic for port 22 to the receiving terminal; forward all traffic arriving on port 22 of the external firewall interface to the IP address of the TVU Receiver. This port is configurable.

Recommended firewall configuration for the Return Video Feed
This is a feature that can only be used on a TX3200 or GX3200 series Transceiver. It will allow camera operator in the field have the ability to watch a return video feed from the

studio of their Pack transmission or from an SDI input at the Transceiver. To enable this feature, please ensure that you permit all TCP/UDP incoming traffic for port 8488. This port is configurable.

In order to view a TVUPack feed remotely, ensure that port 10003 is open for all in-bound traffic.

To view an SDI feed remotely, make sure that port 10004 is open for all inbound traffic.

Note: these are default ports, configurable if required.

For more details, please contact TVU support by phone at +1.650.440.4812, by email at support@tvupack.com, or by skype at skype.tvupack

Datacards

The TVUPack supports 3G and 4G wireless cellular data cards. If you did not lease your data cards from TVU Networks, make sure that the cards you acquire are compatible with Linux and obtain the dial number, username, password and APN if applicable from the provider. For the latest supported data cards or for any other assistance with data card installation, contact Customer Support at support@tvupack.com or +1.650.440.4812.

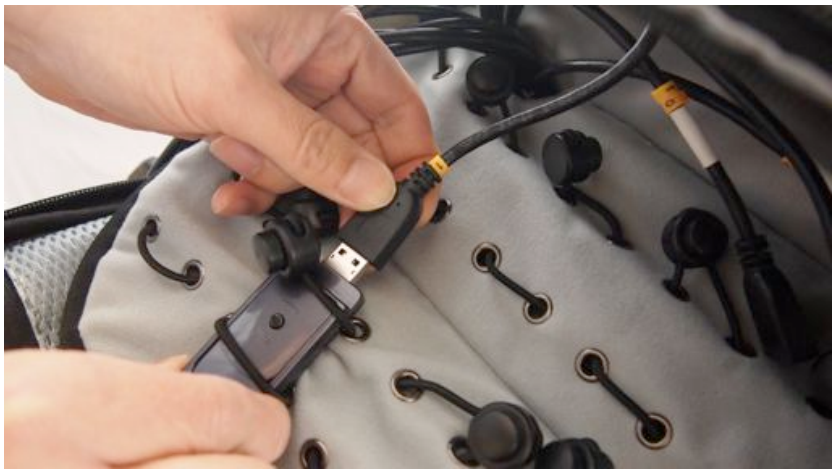
You may purchase cards from any mobile network provider. To ensure network diversity, we recommend you purchase at least 6 data cards from a minimum of 2 different mobile network providers. For example, your six data cards can be comprised of 3 AT&T plus 3 Verizon data cards or 2 AT&T plus 2 Verizon plus 2 Sprint data cards.

Examples of Compatible Data Cards

INTERNATIONAL CUSTOMER NOTICE:
In countries where 3G modems use removable SIM cards, TVU Networks currently supports these modems: Huawei E156G, EC169, E1750, E180, E176, E176G, E220, E230, E1550, E1551, E1552. If your operators provide other modem types, contact us about compatibility with the TVUPack.

Install the Datacards

Unzip and open the top front compartment on your TVUPack and secure your data cards by sliding them into the adjustable fasteners. Attach the first data card to the USB cable labeled “1”; the second data card to USB cable labeled “2”; followed by 3 and so on. Use USB cables numbered 1 - 8 to plug data cards sequentially into the attached USB ports. Do not use USB cables 9 - 10 (9 is reserved for Hotspot; 10 is reserved for Wi-Fi).



Sliding Data Card into Fastener

You can also apply Velcro (not included) to the back of each card and onto the TVUPack for added security.

Secured Data Card

To improve data card performance, try to avoid placing data cards from the same service provider next to each other.

Avoid Placing Data Cards from the Same Provider Next To Each Other

If you are using less than the maximum number of data cards, leave a space between each card where possible.

Leave a space between each card whenever possible

Cisco 5GHz MIMO WiFi Adapter

One additional feature with version 4.0 is support for the Cisco 5GHz MIMO WiFi Adapter (Cisco Model AE3000).

The AE3000 will replace the TPLink in the TM8100 and must be connected to the same dedicated WiFi slot.

Batteries

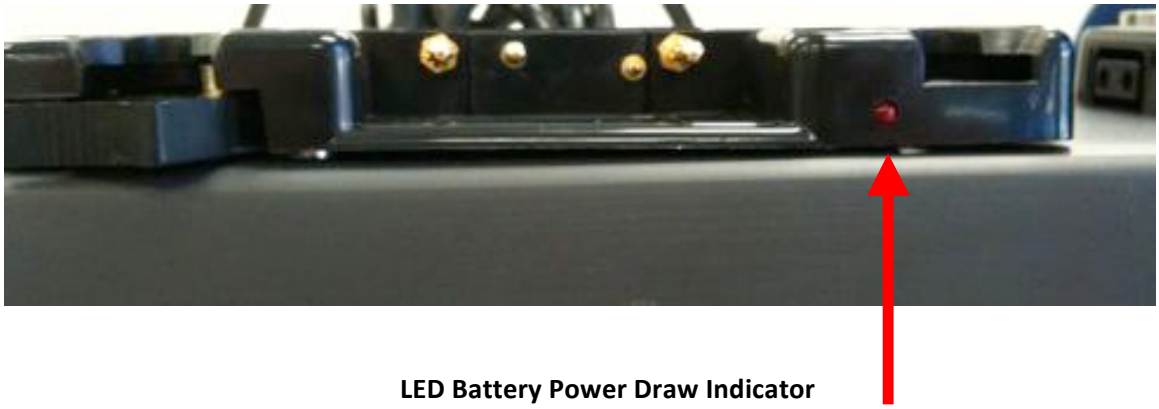
Attach the Batteries

With the LCD screen facing you, latch one or two fully charged batteries to the TVUPack by lining up the three gold screws on the bottom of the battery with the corresponding holes on the battery mount located on the top of the TVUPack. Slide the battery away from you until it locks into place.

If the TVUPack has V Mount battery plates installed, line up the battery appropriately with the plate and slide it in until it locks in place.

Note: Batteries used on TVUPack should have a maximum discharge current of at least 7A and rated at >100W, 14.8 V.

The red LED indicator on the left hand battery mount illuminates to indicate that power is being drawn from the alternate (right hand) battery when two batteries are latched. The illuminated LED is an indication that the left hand battery is discharged and no longer supplying power to the pack.



LED Battery Power Draw Indicator

To unlatch the battery, firmly press and hold down the black clip of the battery mount. Slide the battery towards you.

Battery Latch

Alternately, you may use the included power adapter to power the TVUPack without using the batteries. Please note: The adapter does not act as a battery charger. You must use the battery charger to charge your TVUPack batteries.

Hot Swapping Batteries

TVUPack batteries are hot-swappable. The battery mounts are designed to drain one battery at a time. When using two batteries, if one battery is drained it will automatically start to use the power from the second battery allowing constant recording. At this time, take out the drained battery and charge it.

Note: Batteries discharge individually beginning with the left one as you face the front of the TVUPack. Replace discharged batteries one at a time beginning with the left battery. The red LED light warns when the system is running on the second battery. At this point it is safe to swap the one on the left. Avoid swapping the charged battery from which the TVUPack is drawing power.

Powering the TVUPack

After attaching a battery or the power adapter to the TVUPack, simply press the round power button on the front of the unit to turn it on. The button will illuminate green indicating the unit is powered.

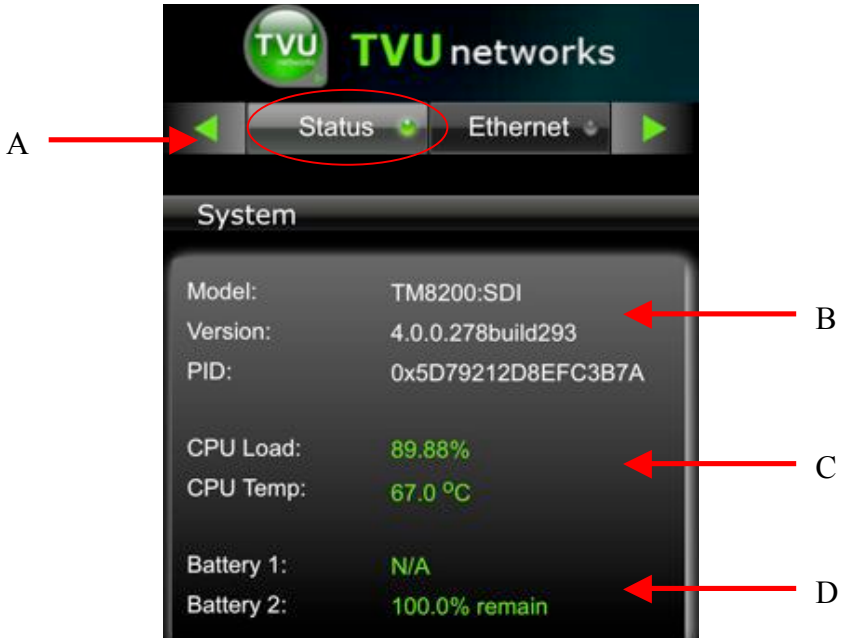
Transmitter Status Monitoring and Control from the Web

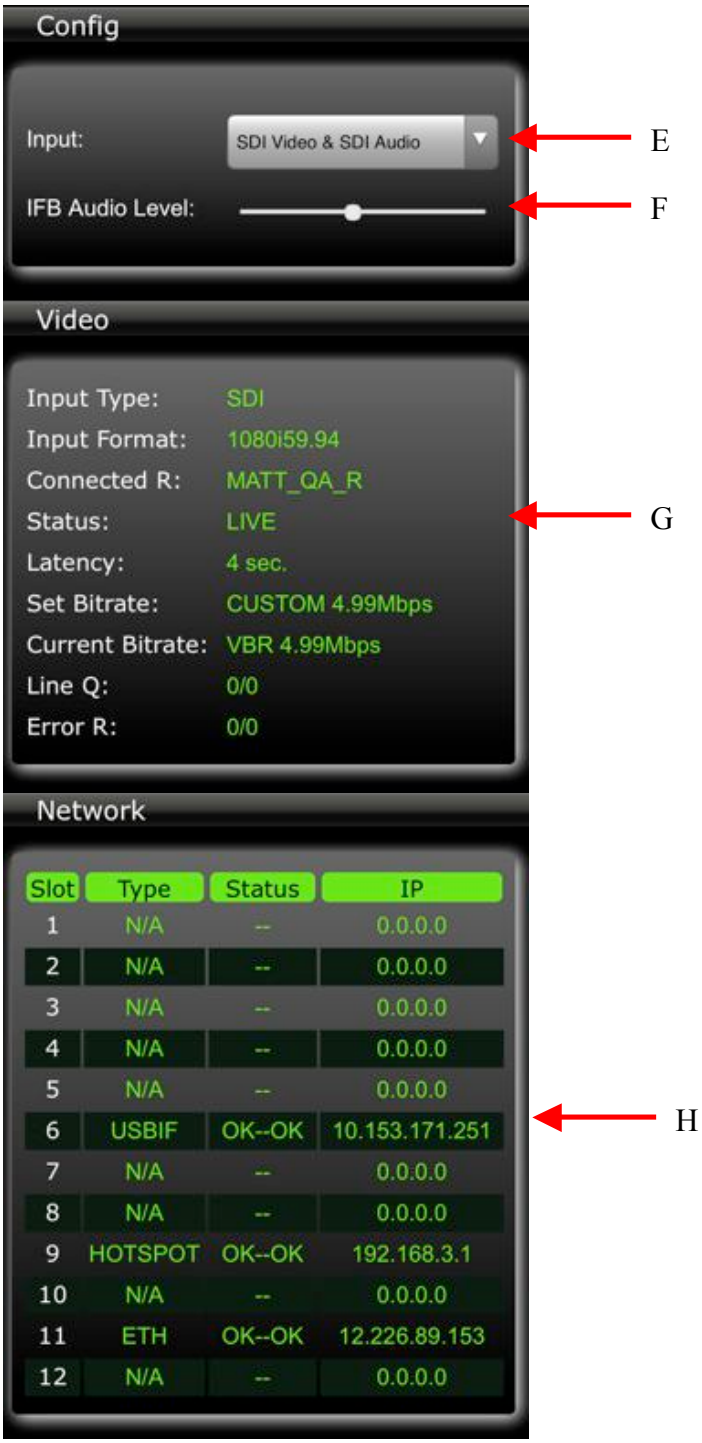
From a web browser, the TVU Transmitter status can be monitored and various parts of the transmission can be controlled. This interface can be accessed using a standard web browser connected to the TVUPack's Hotspot. See *Configuring the TVUPack for Hotspot (page 33)* for details on how to connect to the Hotspot.

Note: The images below are examples of how the screen would appear on an iPhone web browser

Transmitter Status

The Status tab provides system information.



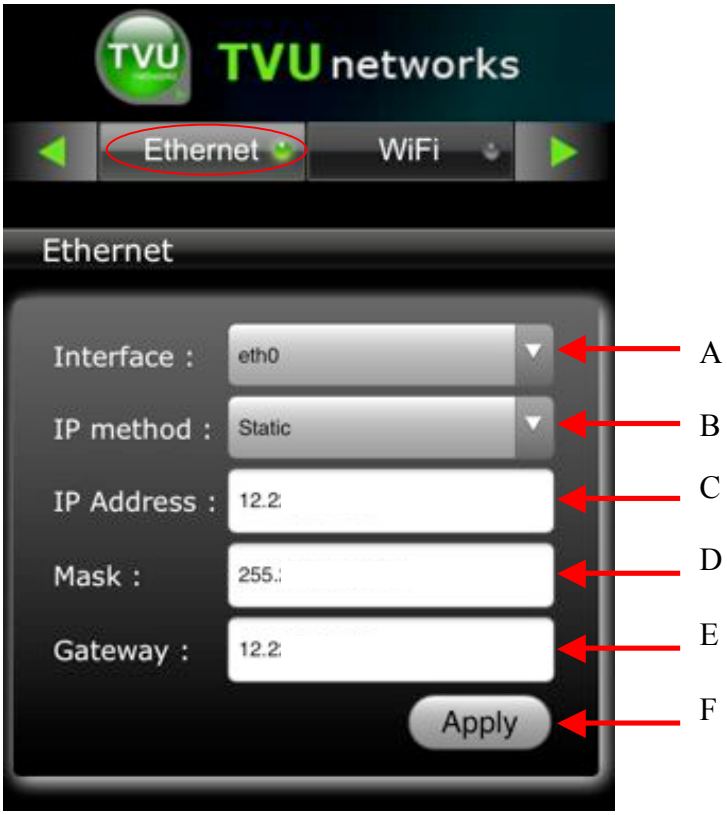


Label	**TVUPack Transmitter Status Screen Description**
A	Scroll bar that allows users to monitor and control all aspects of a transmission including datacards, Ethernet, Wi-Fi, BGAN, Receiver, and return video feed.
B	Information regarding a particular TVUPack such as model number, version number, and PID.
C	**CPU**: Current CPU capacity and temperature

Label	TVUPack Transmitter Status Screen Description
D	**Battery**: Main battery status
E	**Input**: Input source
F	**IFB Audio Level:** Change the audio level of the IFB function
G	**Video**: Transmission information and status
H	**Network**: Modem card information including type, connectivity, and IP address all organized by slot number

Ethernet

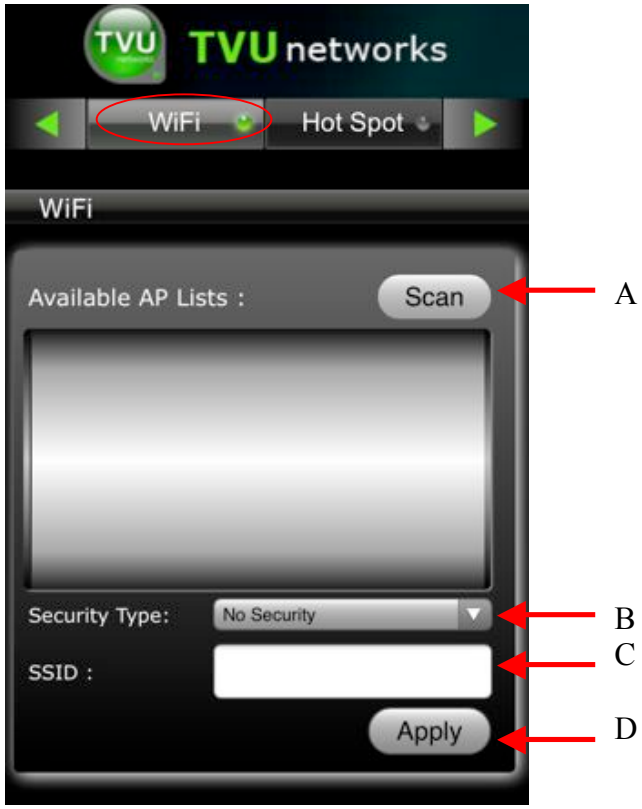
The Ethernet screen provides configuration and set-up information.



Label	TVUPack Transmitter Ethernet Status Screen Description
A	**Interface**: Select either Ethernet or USB from drop-down menu
B	**IP Method**: Select either Static or DHCP
C	**IP Address:** Entered manually if in Static mode; automatically generated if in DHCP mode
D	**Mask**: Entered manually if in Static mode; automatically generated if in DHCP mode
E	**Gateway**: Entered manually if in Static mode; automatically generated if in DHCP mode
F	**Apply**: Press Apply for the changes to take effect

WiFi

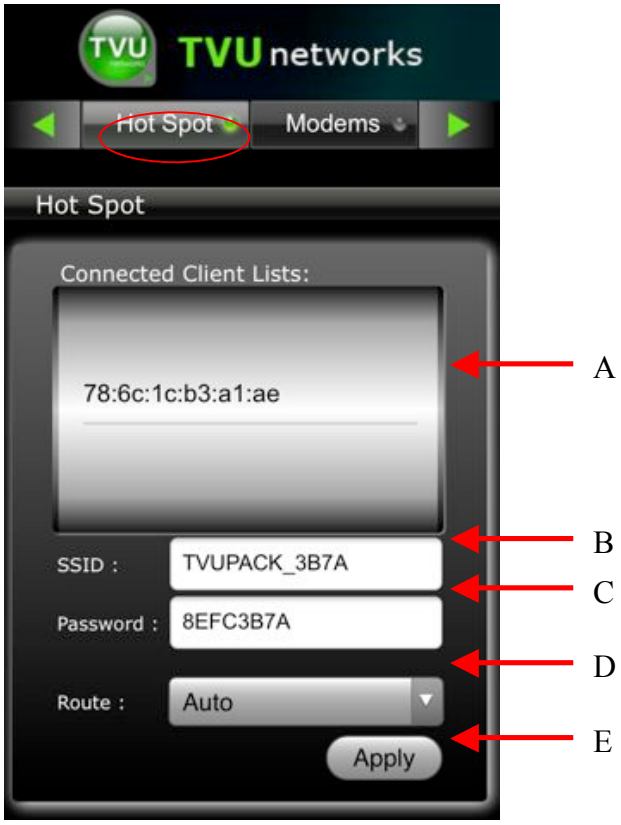
The WiFi screen provides configuration information and access to change the WiFi settings. The WiFi card should always be placed in port 9 on the TVU transmitter.



Label	TVUPack Transmitter Wi-Fi Status Screen Description
A	**Scan**: Scan for available networks and will display the list of available networks to select from the Available AP Lists box.
B	**Security Type:** Drop down menu displays the security type of the connection
C	**SSID**: Wireless network name
D	**Apply**: Press Apply for the changes to take effect

Hotspot

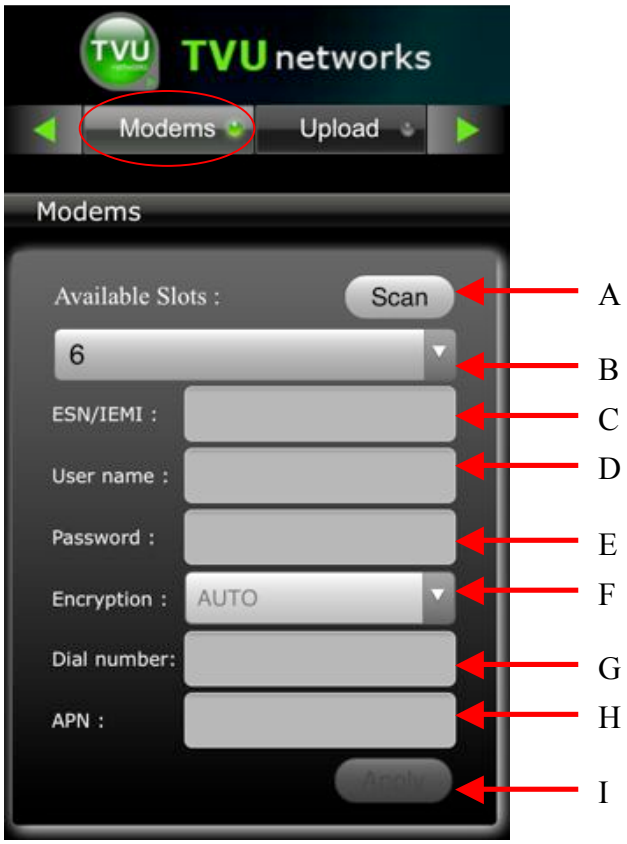
The Hotspot tab provides status information on clients connected via the Hotspot. The Hotspot card should always be placed in the USB port on the TVU Transmitter.



Label	TVUPack Transmitter Hot Spot Status Screen Description
A	**Connected Client Lists**: Displays list of devices connected via Hotspots
B	**SSID**: Allows you to customize the Hotspot SSID
C	**Password**: Allows you to customize Hotspot password (Note: the new password must be 8 characters and does not take affect until the system is rebooted).
D	**Route**: Choose a specific modem, WiFi network, or Ethernet connection, or choose Auto for the Hot Spot to be routed through a random modem connection.
E	**Apply**: Press Apply for the changes to take effect

Modems

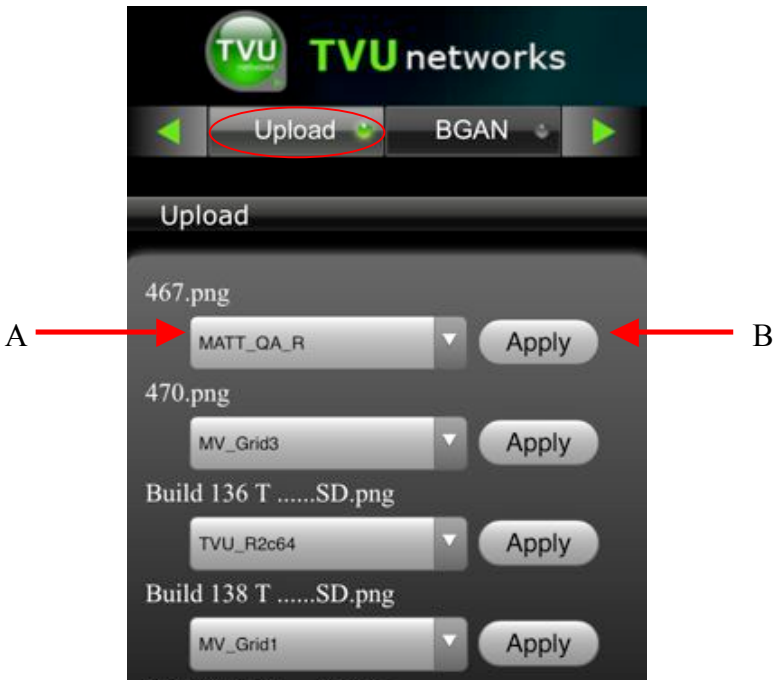
The Modem screen provides modem configuration information. Many cellular data cards are automatically detected by the TVUPack and will self-configure. If this is the case, no further action will be required. If a data card needs to be configured, you can use this tab to configure specific data cards.



Label	TVUPack Transmitter Modem Status Screen Description
A	**Scan**: Search for available modems
B	**Available Slots:** Drop-down list of slots that are available for configuration.
C	**ESN/IEMI:** A modem's unique identification number
D	**Username:** Obtain carrier user name information from the network carrier
E	**Password:** Obtain carrier password information from the network carrier
F	**Encryption:** Select the appropriate encryption standard from the drop-down menu
G	**Dial number:** Obtain carrier dial information from the network carrier
H	**APN**: Obtain APN information from the network carrier
I	**Apply**: Press to apply desired changes

Upload

The Upload screen gives you the ability to assign uploaded files to a particular receiver.



For each file uploaded, choose the specific receiver to which you would like the files to be uploaded from the drop down menu under to the file name (A). Then hit apply (B). For instructions on uploading files from a TVUPack Transmitter to the TVUPack Receiver, see *AutoSync File Transfer Using Wireless Hotspot,* or *Automatic Ingest of USB Memory Stick Content to TVUPack.*

BGAN

The BGAN tab provides BGAN transmission information.

Label	**TVUPack BGAN Status Screen Description**
A	**Device Name:** Displays the device name

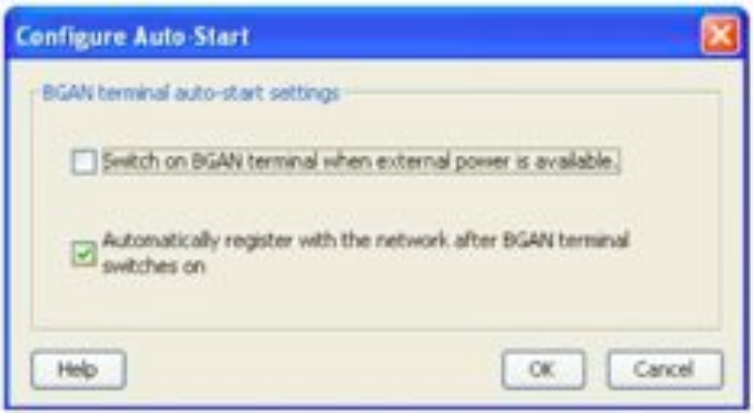
Label	TVUPack BGAN Status Screen Description
B	**Signal**: Displays the signal strength
C	**Linked**: Indicates if the BGAN is connected
D	**Link Type:** Indicates the BGAN link type
E	Drop down menu that allows for the selection of a specific streaming class

BGAN Configuration

The TVUPack TM8200 can support BGAN Hughes 9201 for automatic data connections. Follow these steps to set up the auto connection:

1. Set up the BGAN device to **Auto Register Network mode** by LaunchPad.

   A. To enable automatic registration, Select **Terminal > AutoStart mode**. The **Configure Auto-Start** screen is displayed:



   B. Check **Automatically register with the network after BGAN terminal switches on** and then click **OK**. Then power off the BGAN device.

2. Connect the BGAN to the TM8200 by Ethernet cable.

3. Pointing to satellite by the Web UI of the Pack configuration from iPad or IE, for Hughes 9201, it has signal strength indicators on the panel.

   Note: You may need to manually adjust the equipment location and orientation in order to confirm the signal strength is greater than 60%

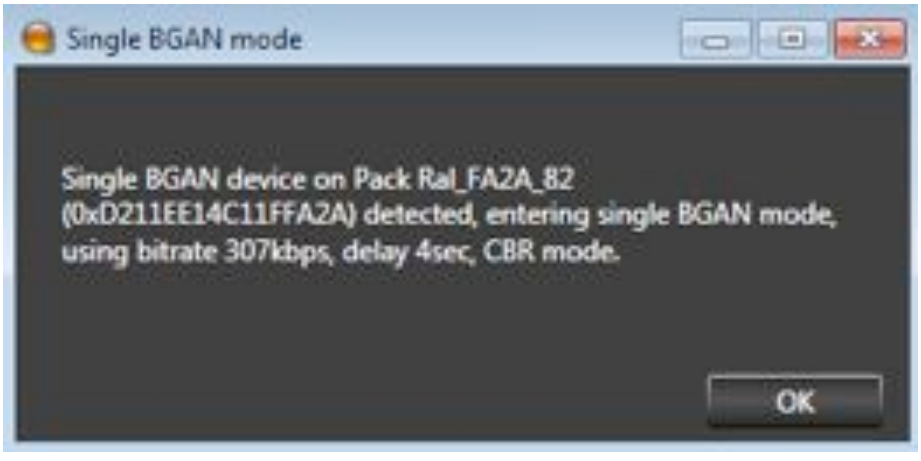
4. Set the link mode. “X-stream” is the default mode set up by the TVUPack automatically.

Note: If the interface connected with the BGAN device is consistently yellow and does not change to green after setting up the "Link Type", please check whether the BGAN equipment - when connected to a PC - can work normally with LaunchPad's X-stream mode.

5. Check on the TVUPack's screen to make sure the BGAN is connected.

6. Power off the BGAN device to close the connections.

If the BGAN is the only device connected with the Receiver, then the Receiver will automatically change the bitrate to 80% of the XStream with four seconds of delay at the CBR mode.

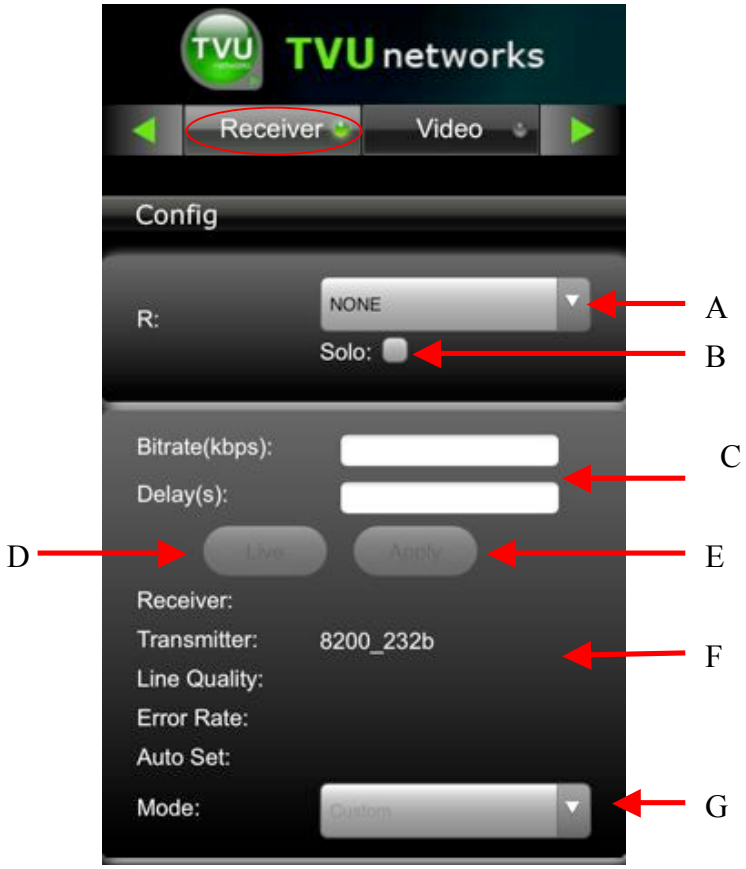


If there is no BGAN connected, the menu will display "No Device Detected" as seen below.

Note: If you require additional assistance, please contact TVU Networks Customer Support at +1 650 440 4812.

Receiver Status

It displays Line Quality and Error Rate information. Touch the Start/Stop Live button to control the live transmission. You use this screen to control Bit Rate and Delay by entering your data in the respective boxes and touching the **Apply** button to set them. This screen also allows you to choose the operational mode provided in the drop down menu at the bottom of the screen: **Interview**, **Normal**, **Fast Moving, SD, and Tape Feed**.



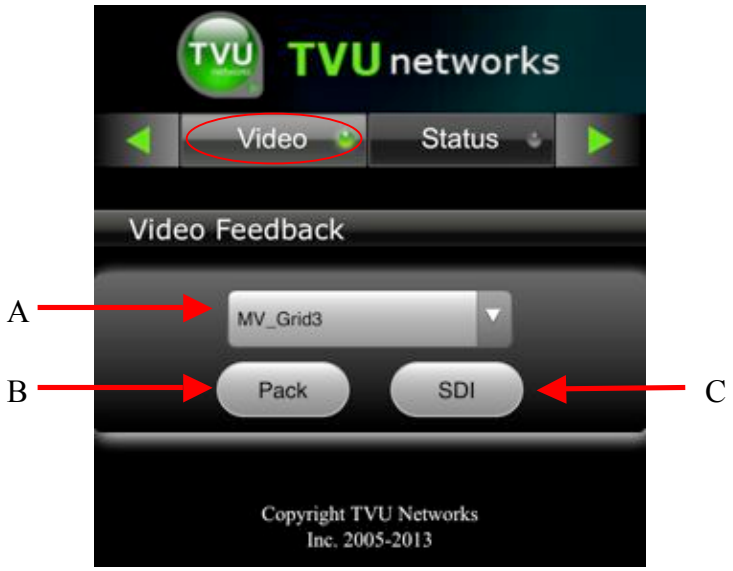
Label	Record Mode: Controls and Functions Description
A	**R:** Displays receiver name. To view a different available receiver, click the drop down menu to scroll through the options.
B	**Solo:** When checked, the particular TVUPack will only be shown as "online" on the receiver selected from the drop down menu.
C	**Bitrate/Delay**: Enter the desired transmission Bitrate and delay(s).
D	**Live/Stop Live**: Starts and stops the live transmission.
E	**Apply**: Applies changes made to bitrate, latency, or mode.
F	Displays current TVUPack Receiver ID, TVUPack Transmitter ID, Line Quality, Error Rate and Auto Set.
G	**Mode**: Select an optimized preset bit-rate and latency based on broadcast setting(s) by choosing a different mode.

Return Video Feed

This is a feature that can only be used on a TX3200, TX3000, or GX3200 series Transceiver. It will allow camera operator in the field have the ability to watch a return video feed from the studio of their Pack transmission or from an SDI input at the Transceiver. The return video feed can be sent from the Receiver to the Transmitter when in Live, Online or Standby modes. View the return video feed via the TVUPack Transmitter Hot Spot using any WiFi enabled iOS device with a standard Safari web browser. See *Configuring the TVUPack for HotSpot* for details on how to connect to a Hot Spot.

The latency of the return feed or SDI feed is about 3 seconds (under normal conditions) Resolution is 320x240 and includes 2-ch. of audio. The return feed / SDI feed is not intended as cue channel, but rather provides those in the field with a confidence monitor or the ability to monitor another source.

The user is able to select which Transceiver the Return Video Feed comes from. Use the drop down menu (A) to select the desired Transceiver (Figure 41).



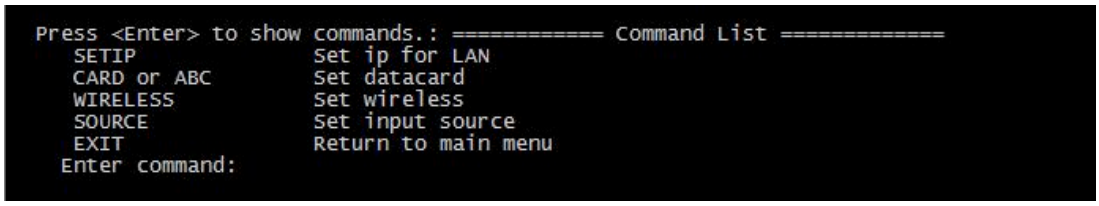
Label	TVUPack Video Feedback Status Screen Description
A	Displays available transmitters that can be streamed for video return purposes.
B	**Pack:** Provides a low-res return feed of your Pack transmission for monitoring purposes. Latency of the return feed is less than 3 seconds under normal conditions. You must select the receiver that is currently streaming your Pack from the drop down menu in order to see the feed. You cannot view other Pack feeds.
C	**SDI**: Provides a low-res return feed of the SDI input at the Transceiver for monitoring purposes. Latency of the return feed is less than 3 seconds under normal conditions.

Note: If you require additional assistance, please contact TVU Networks Customer Support at +1 650 440 4812.

Configure Datacards via Command Text

Many cellular data cards are automatically detected by the TVUPack and will self-configure. If this is the case, no further action will be required. Should a supported card require further configuration, this may be done manually by using a USB keyboard to enter the dialing settings. If you require assistance with card configuration, please contact TVU Networks Customer Support.

Make sure that your data cards are securely connected before attempting to configure them. Attach a USB keyboard to the TVUPack using ports 1-7. Type the letters “tvu” in lower case and press the Enter key. The TVUPack LCD screen should now display as indicated below. Your cards are ready to configure. You may also configure the cards using an iPod or wireless mobile smart device. See the Configuring the TVUPack for Hotspot set up section in this Operating Guide.



Command Display

Follow instructions on the "Enter command" prompt to configure your data card. Please note all commands are CASE SENSITVE

A. Type **CARD** and press **Enter**; the "Input slot ID to configure" prompt appears.

Slot Input Screen

B. Enter the slot number and press **Enter**; this example uses slot ID 1.

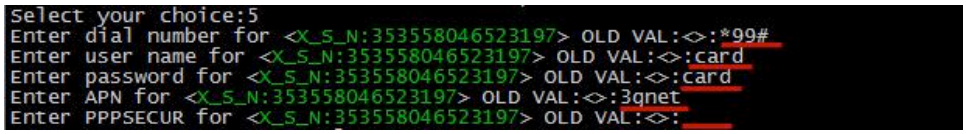
The "Select your choice" prompt and menu appear. The menu has these choices:

1. Refresh this card
2. Delete configure info of this card
3. Select slot
4. Exit
5. Set/Change dialing instruction of this card

Slot Information Screen

C. Select your menu number choice and press **Enter**; this example uses menu item "5: Set/Change dialing instruction of this card."

Note that the red underlined text on the screen is data input by the user:



User Input Data Screen

If all of your input data is correct, the screen appears as follows:

Completed Data Screen

D. To configure the next data card select menu item 3 and press **Enter**.

Note: The words in RED are the variables that have just been configured. If these are not correct, reconfigure this data card by choosing item “5.” Also, some service providers do not have Username, password or APN. If this is the case, continue to press Enter until the "Select your choice" prompt and menu appear.

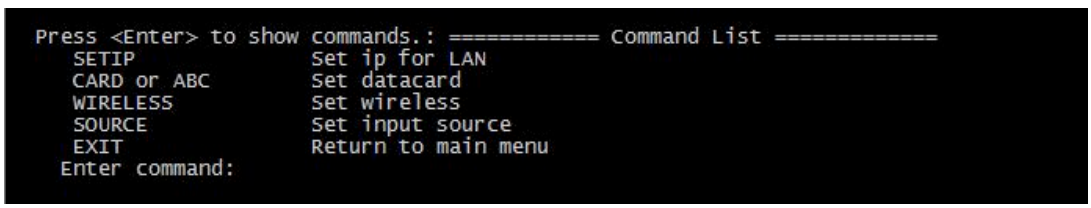
E. Select menu item "4. Exit" and press **Enter**.

After exiting the interface the status screen should show the cards dialing and connecting successfully. Your pack is now ready to broadcast live. If the cards do not come online or if you are having difficulty with configuring the data cards, please contact TVU Networks Customer Support for further assistance.

Set Ethernet IP Connection via Command Text

In addition to the data cards, the TVU Pack comes with a gigabit Ethernet interface. By default the eth0 interface will attempt to lease an IP address through DHCP and no further action will be required. If a static Ethernet address is required, follow these steps.

A. Start at the menu commands screen.



Command Display

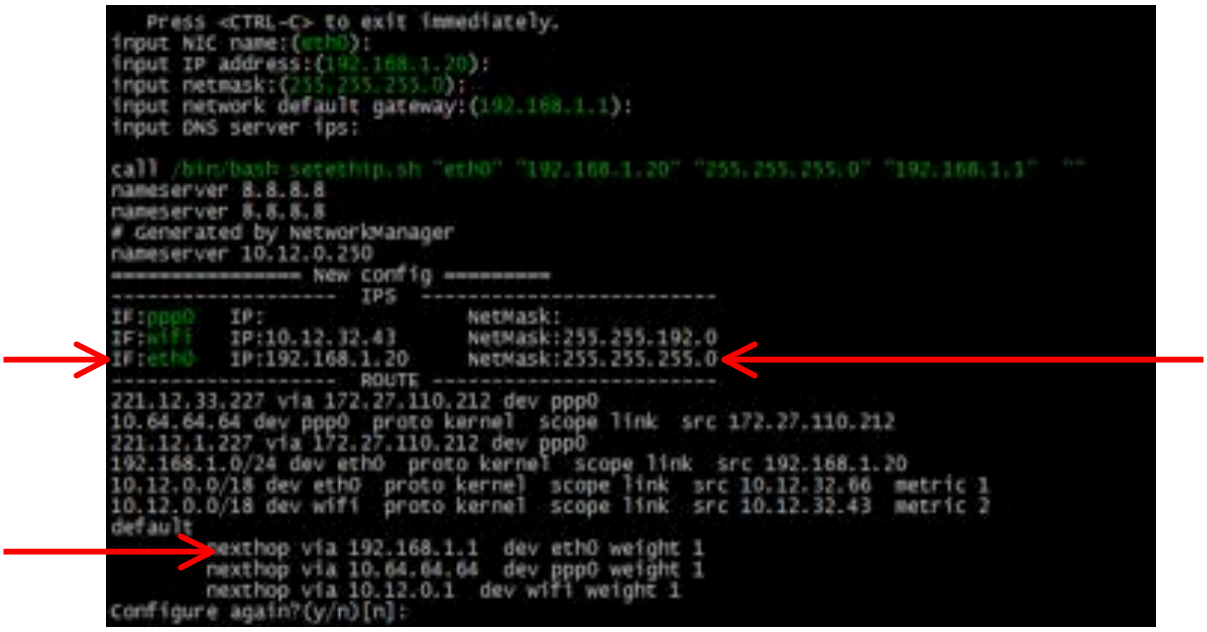
B. Type **SETIP** on the "Enter Command" prompt and press **Enter.**

Set IP Display

C. During the configuration script hitting enter will accept the existing value or default. Hit enter to accept NIC name eth0.

- Enter IP address
- Enter subnet mask
- Enter default gateway
- Enter DNS server IP address

D. The next screen shows the status of your connection. If the configuration was done correctly, your entered information should appear under the New Config portion of the screen (The red arrows in the image below indicates where to check for your entered information):



IP Status Screen

Your Ethernet connection should now be ready to use.

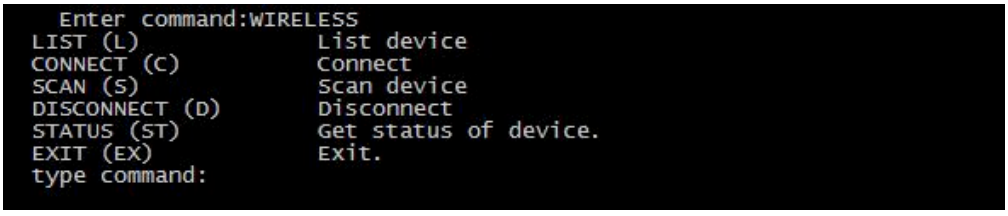
Configuring a WI-FI Connection via Command Text

To configure the TVUPack to connect to a wireless network, follow these steps:

1. Ensure the wireless USB card is present on USB slot 10
2. Connect a USB keyboard to any USB port 1 - 7
3. From the TVUPack status screen, type “tvu” in lower case and press **Enter** on your keyboard to display commands. Follow these steps to establish a connection:

   [Please Note: All typed commands are CASE SENSITIVE]

A. Type **WIRELESS** in the command line and press **Enter** to see a list of command options:

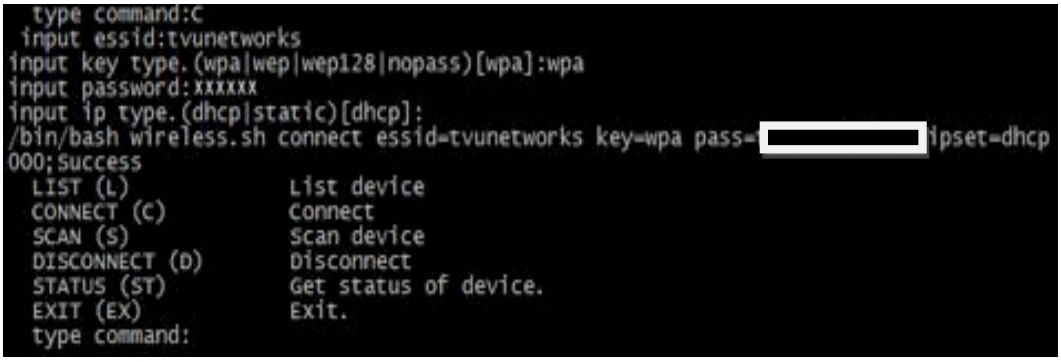


Wireless Command Screen

B. Type “**S”** in the command line to scan for active wireless networks in range and press **Enter.**

Active Link Screen

C. Type "**C**" in the command line and press **Enter** to connect to an available network**.** An input screen will appear and prompt you to enter the ESSID, encryption key type, password, and setting for DHCP or static IP address.



Input Screen

[Please Note: ESSID and Password entries are CASE SENSITIVE]

D. Enter the information requested on each line and press **Enter.**

In order to complete the set up process and establish your wireless connection, you must exit completely from this screen by entering **EX** for "exit" and pressing **Enter.** When you see the TVUPack status screen, your wireless connection set up is complete and the status screen should show an IP address in green for the connection called "WIRELESS"

Selecting the Video Input Source via Command Text

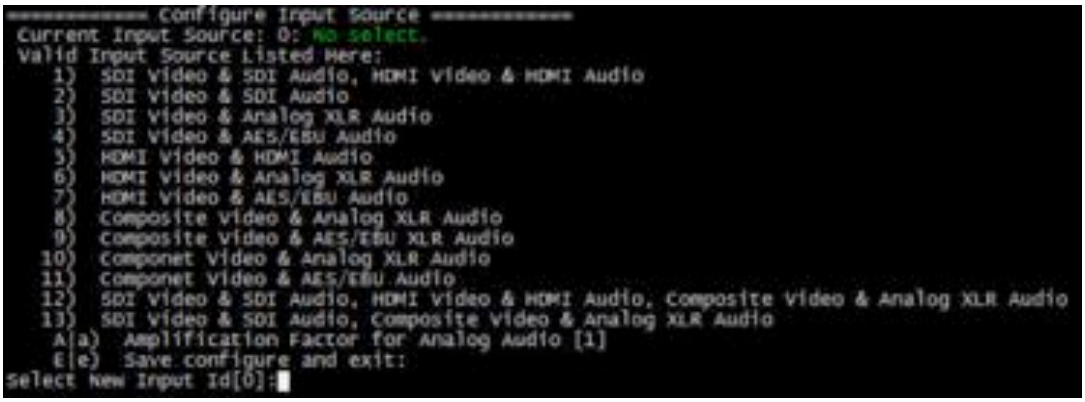
The TVUPack is shipped pre-configured to auto-detect either an SDI video with embedded audio or HDMI video / audio connection. To change this preset for another video audio source combination, perform the following actions.

1. Connect a USB keyboard to any USB port1 - 7
2. From the TVUPack status screen, type “tvu” and press **Enter** on your keyboard to display the command screen.

NOTE. All typed commands are CASE SENSITIVE.

A. Type **SOURCE** and press **Enter.**

A screen appears with a list of valid inputs:



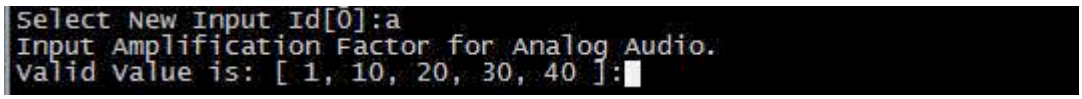
Input Source List Screen

B. Select a source from the list and press **Enter**. For example, select **9** from the list to change the input to detect analogue composite video and line level audio.
C. Type **E** and hit **Enter** to save the new configuration and exit.

Your video input source is now established and ready for broadcasting.

Analog Audio Amplification via Command Text

If the analog audio level is found to be too low, experiment with the amplification factor to boost the levels. Amplification can be set from the SOURCE menu.



Attaching the Video Camera

Connect the desired video output from your camera to the TVUPack. TVUPack TM8100 works with all cameras that feature a live HDMI (HD), SDI (SD or HD), component (SD) or composite (SD) output. With analog video inputs, connect up to 2 channels of analog audio (use INPUT CH1 & 2 on the breakout cable).

Note: If you want to use HD, your system must be HD enabled.

The TVU Pack TM2100 works with all cameras that feature a valid FireWire (SD - DV25) output.

Configuring the TVUPack for Hotspot (Optional)

You can use an iPod or smart mobile device for wireless monitoring and control of the TVUPack transmitter. To do this, you must first join the Pack's internal hotspot.

1) Ensure a hotspot card is in Slot 9
2) Search for the hotspot on your iPod/smart device. The SSID will be TVUPACK_XXXX where X is the last 4 digits of the packs PID.
3) Connect to the SSID using your iPod/smart device.
4) The password is the last 8 digits of the PID of the backpack (Note: All characters are uppercase).
5) Once the connection is established, open a web browser and go to http://192.168.3.1 to see pack status.

TM8100 LCD Display Status

Connected Video Input Status

When a camera is attached to the TVUPack and both are powered on, the following Video Preview and Transmission Status Screen will appear in the LCD screen:

Live Status Screen

Label	TVUPack Transmitter Live Status Screen Description
A	**Input Preview:** Shows the live picture from the camera and captured in TVUPack.
B	**Transmission Status Monitor:** Provides the current transmission status of the Pack. If the indicator is red, TVUPack is transmitting a "Live" picture. If the indicator is black/gray, TVUPack is not transmitting live and is on "Standby".
C	**File Upload Status Monitor:** Displays the progress of any file being uploaded from the TVUPack SSD hard drive to the TVUPack Receiver. Please note that uploading a file is not possible when the Pack is in "Live" mode.
D	**IFB Indicator:** Indicates whether or not the IFB function is on. The small red IFB box indicates that the IFB function is on and connected. If no red box appears, IFB is not connected or is off.
E	**System Status Monitor:** Displays the current system status for TVUPack including the Bit Rate (B/R), the current Latency transmission setting, the TVUPack Receiver the Pack is currently transmitting to, the current type of pre-set transmission Setting, the Video Input source, the Video Format. **Note:** System Status values will only appear when the Transmission is Live.

F

Label	TVUPack Transmitter Live Status Screen Description
F	**Data Card Status Monitor:** Shows the current number and status of all data cards connected to the TVUPack. The status of data cards connected to the Pack will appear as green, red or black. Green status indicates that the data card is connected. Red status indicates that the data card is attempting to dial. Black status indicates there is no card.
G	**TVUPack PID and Firmware Version Information:** Indicates the unit's identifying PID and version number and used when contacting TVU customer support.
H	**Battery Status:** Indicates the status of battery levels for installed batteries.
I	**Audio Input Level Monitor:** Dynamically displays the audio input level (DBFS) for TVUPack with graphical colors.

Standby Video Input Status

When no camera is connected to the TVUPack, the following is displayed in the LCD screen:

Label	TVUPack Transmitter Standby Video Input Status Screen Description
A	**Connection Status:** Shows the status and IP of each network connection. The status of data cards connected to the Pack will appear as green, red or black. Green status indicates that the data card is connected. Red status indicates that the data card is attempting to dial. Black status indicates there is no card
B	**Transmission Status Monitor:** Provides the current transmission status of the Pack. If the indicator is red, TVUPack is transmitting a "Live" picture. If the indicator is black/gray, TVUPack is not transmitting live and is on "Standby". If the status says "Online," the camera source is not connected.

C	**File Upload Status Monitor:** Displays the progress of any file being uploaded from the TVUPack SSD hard drive to the TVUPack Receiver. Please note that uploading a file is not possible when the Pack is in "Live" mode.
D	**Data Card Status Monitor:** Shows the current number and status of all data cards connected to the TVUPack. The status of data cards connected to the Pack will appear as green, red or black. Green status indicates that the data card is connected. Red status indicates that the data card is attempting to dial. Black status indicates there is no card.
E	**TVUPack PID and Firmware Version Information:** Indicates the unit's identifying PID and version number and used when contacting TVU customer support.
F	**Battery Status:** Indicates the status of battery levels for installed batteries.
G	**Audio Input Level Monitor:** Dynamically displays the audio input level (DBFS) for TVUPack with graphical colors.

Operating the TVUPack Receiver

The TVUPack Receiver has 3 operating modes: basic, advanced, and record. You can pair multiple TVUPacks to a Receiver, but can only receive video from one at a time. Depending on your specific license configuration, there can be up to 10 TVUPacks paired with your Receiver.

For owners of the TVUPack HD version, please contact TVU Customer Support at +1.650.440.4812 for instructions on setting up the pack for HD mode.

Live Viewing Mode

Live Mode: Controls and Functions

Label	Live Mode: Controls and Functions Description
A	**System Information:** Displays Receiver Name, PID (unique identifier for TVU Receiver), Build Version, Build Date and Record Time Remaining (if the optional Receiver record option is select).
B	**Status panel:** Displays error rate, line quality, and battery status**.** *See Figure 1*
C	**Transceiver Information:** Displays the input type and format, the output type and format, and IFB status. *See Figure 1*
D	**Refresh button:** Resets the video stream. *See Figure 1*

Label	Live Mode: Controls and Functions Description
E	**Stop buttons (x2):** Clicking on either Stop button ends the live transmission.
F	**Audio level light display**: The two light displays provide visual monitoring of your audio levels. This displays dBFS audio input level at the Receiver.
G	**Mode selection button and mode indicator lights:** Use this button to toggle through the receiver operational modes. *See Mode Selection (page 39) for more information*
H	**Operational mode selection buttons:** Use the operational mode buttons to choose an appropriate capture quality. Each mode has a default bit rate and delay. *See Figure 2*
I	**Bitrate and delay controls:** Sliding bars allow you to manually set the target bit rate and delay levels. *See Figure 2*
J	**Datacard monitor panel:** This monitor panel displays the current status of each data card. *See Figure 3*
K	**Monitor Histogram:** Displays throughput and IP address on each modem (mb/s). By right clicking on the histogram scale, you can configure the datacards of a particular transmitter. *See "Configuring Modem Cards from the Receiver Interface" on page 43.*
L	**Connection mode and Connection strength indication:** The connection mode is displayed when available in the dark gray box between the carrier name as well as the connection strength. *See Connection Mode and Connection Strength (page 41) for more information*
M	**Reset**: Provides a full power reset for a particular modem (TM8200 only). Use this feature when the modem is no longer able to connect or is having problems. On the TM8100, pressing "RESET" will force the modem to reconnect. *See **F** on Figure 60*
N	**Scale:** This drop down menu allows you to set the scale for the histogram graph. Once the scale has been changed, it will affect all of the histogram graphs displayed. Available selections are 1.2Mb/s, 2.4 Mb/s, 6Mb/s, and 12 Mb/s.
O	**Thumbnail of current video feed from TVUPack:** The left-hand column of the TVUPack monitor features an icon of the current feed. If a transmitter is live, a red box will appear around the thumbnail image.
P	**GPS information:** If a TVUPack transmitter is used with modems that support GPS, a display of the transmitter's location can be retrieved. *See GPS Locator (page 41) for more information*
Q	**IFB Indicator:** The IFB indicator is displayed below the transmitter's thumbnail picture. *See Figure 4*
R	**Stop buttons (x2):** Clicking on either Stop button stops the live transmission.

Status Panel

Arranged vertically on the right hand side of the receiver panel are a number of indicators designed to help an operator make quality and troubleshooting decisions. The status of the transmitter's batteries (TM8200 only) (A) is also displayed (Figure 1). See troubleshooting section for more information on interpreting these numbers.

Transceiver Information

Displays input type and input format of the transmitter, which are displayed as T Input and T Format respectively **(B)** (Figure 1). The output type and output format of the transmitter are shown as R Output and R Format. Lastly, the IFB status is displayed **(C).**

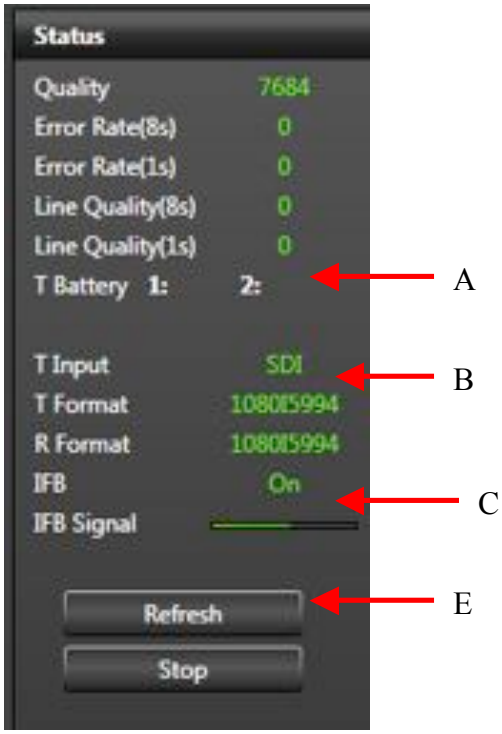


Figure 1

Refresh Button

If the video goes black or pixelates heavily and does not recover automatically within 15 seconds, click the Refresh button (E) to reset the video stream and reestablish the connection (Figure 1).

Mode Selection

The currently selected mode displays as a green-lighted tab. The modes that can be chosen are:

- Live: Live mode is the primary interface to be used during a Live transmission. When this tab is selected, the status of each of the datacard network connections is displayed under the “Monitor” section of the interface and the Bitrate, Delay, and Operational Mode buttons are displayed.

- Record: Record mode displays the store and forward interface for the preview, download, and management of Pack stored footage and files transferred via Auto Sync. Files transferred via FTP can also be accessed via this interface.

Operational Mode Selection

Depending on your news gathering environment, you can choose from the following preset bitrates and latencies (Figure 2):

- Interview: Bitrate 2048, delay 2 seconds.
- Normal: Bitrate 5120 delay 4 seconds.

- Fast Moving: Bitrate 5120, delay 8 seconds.
- SD: Bitrate 2048, delay 4 seconds.
- Tapefeed: Bitrate 10240, delay 10 seconds. This mode is optimized for content with multiple scene changes.

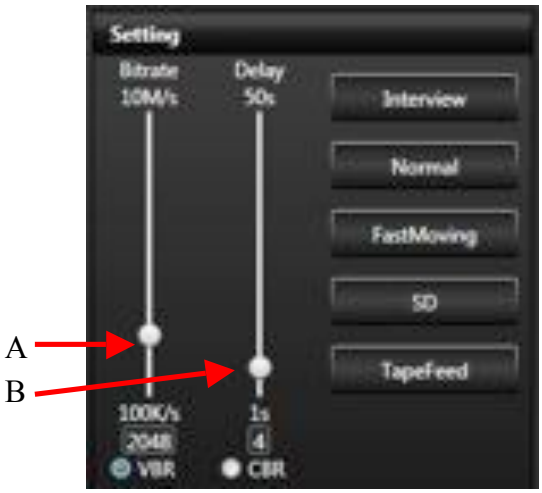


Figure 2

Bitrate and Delay Controls

The TVU Receiver has a smart VBR scaling system. This means that the unit will automatically adjust the bitrate in order to output the best quality picture based on the desire latency. In order to effectively take advantage of the smart VBR scaling system, set the latency that you desire **(B)** and then set the maximum bitrate you would like to utilize **(A)**(Figure 2). When in "Live" mode, the error rate and picture quality will automatically be adjusted based on the desired latency and the available bandwidth in order to produce the highest quality picture.

Datacard Monitor Panel

The check boxes associated with each cards' status bar enables or disables a particular datacard **(A)**(Figure 3). If unchecked, it will not be used to pass data. If checked on (default), it will be used. Individual read out panels show the carrier name (when available) of each active card **(B)**. The slot number of each datacard is indicated in front of the carrier name **(C).** To retrieve the IP Address of a particular datacard, mouse over the name of that datacard. If no name is automatically provided and is displayed as <name>, you can input your own name. However, this will reset upon reboot. The color indicators displayed within the carrier name panel indicates the following status:

- **Red:** Not connected
- **Green:** Connected
- **Yellow**: Dialing/Connecting
- **Gray**: Disconnected or unplugged

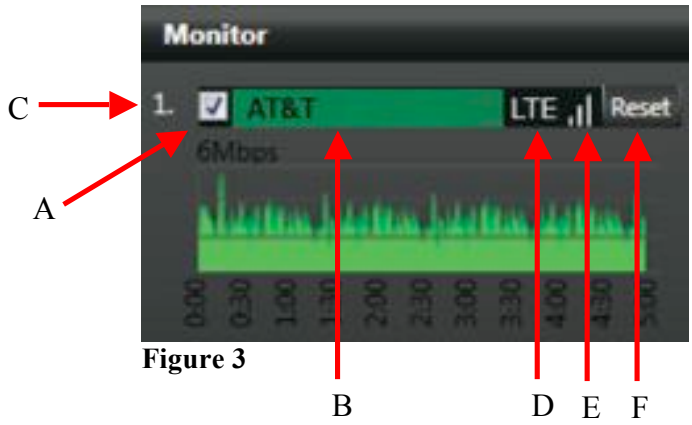


Figure 3

Connection Mode and Connection Strength Indicator

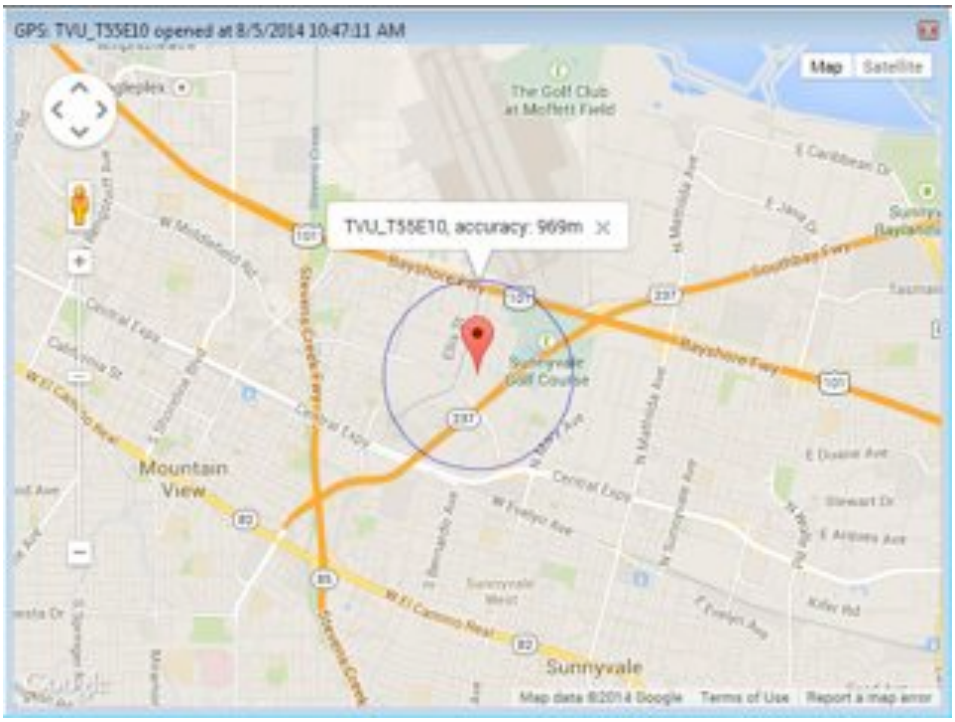
The connection mode (D) is next to the connection strength, which is indicated with three status bars (E)(Figure 3). If the bars are all gray, there is no connection. Three green bars indicate excellent connection strength.

GPS Locator

When the transmitter is online, its name will be underlined underneath its thumbnail image. By clicking on the underlined name, the GPS data for that individual transmitter will appear. To locate all online transmitters at once, click “Locate All” at the top of the thumbnail column.

The location pin will show the name of the TVUPack and the accuracy of the location. In order to improve the location accuracy, make sure the TVUPack is connected to a WiFi card.

Note: If there is no real-time GPS data for a particular TVUPack, cache GPS data will be used for that Pack and the location pin will be yellow.



IFB Indicator

The five-color indicators are as follows (Figure 4):

- **Red:** IFB function is in use
- **Red-Gray:** Either the transmitter has gone offline and the IFB will recover when it is back online or the transmitter goes live with a different receiver while you were speaking with the Pack via the IFB function
- **Green:** IFB function is connected but not in use
- **Green-Gray:** Either when the transmitter is live with another receiver or when the transmitter is using the IFB function to speak with another receiver
- **Gray**: IFB Function not available for this transmitter

Figure 4

To use the IFB function, click the IFB indicator so that it turns red. The IFB on/off status is also indicated in the "Status" panel on the left side of the interface. Additionally, if a particular TVUPack has an IFB function, the IFB is automatically turned on when that transmitter goes live. One the live transmission is stopped, the IFB function will be turned off.

Configuring Modem Cards from the Receiver Interface

The modems can be configured on the TVUPack Receiver Interface by taking the following steps:

1) Right click the histogram of the modem you would like to configure

2) A pop-up window will appear with the dial number, APN, and other necessary information

3) Hit “Apply” and the modem will be configured

Adding an External IP Source

On the left side of the Receiver interface, there is a section for external sources such as YouTube (A)(Figure 5A) In order to add an external source to the Receiver GUI, click the “+” on the section header (B).

Figure 5A

A pop-up screen will appear that will let you add an external source. Select the type of external source being added (A), insert the URL of the source and validate it (B), and name the source so that is easily recognized on the Receiver GUI (C)(Figure 5B). Finally, click "Add". A thumbnail icon of the added source will appear under the "External" section.

Figure 5B

Note: The information of the external source can be edited by clicking on the round tool icon in the bottom left corner of the thumbnail image.

Record / Viewing Mode

Record mode allows you to preview, download and delete stored footage.

Figure 64 Record / Viewing Mode Screen

Record Mode: Controls and Functions

Please refer to **Live Mode: Controls and Functions** for a description and explanation of functions.

Label	Record Mode: Controls and Functions Description
A	**Download tab**: Files monitor panel: The Download tab shows the status, name, size, and completion percentage of all your downloaded files. Use the four buttons at the bottom of this panel to manage these files: • Stop • Play • Delete • Download For more information on downloading files, see *AutoSync File Transfer Using Wireless Hotspot* or *Automatic Ingestion of USB Memory Stick Content to TVUPack (page 49)*
B	**FTP tab**: It is possible to upload video clips from an FTP to the TVUPack Receiver. The files uploaded to the FTP in the receiver will be displayed in this tab. Any type of file can be uploaded to the FTP server and most of the media files can be played back in the FTP tab and output to SDI. For further instructions, see *Uploading Media Content to the Receiver Using the FTP (page 50)*
C	**Operations mode tab:** This tab displays the current operation mode.
D	**Records control panel:** Each time a video source is switched on and off, the TVUPack automatically creates a new recording on its internal SSD in a FIFO loop. This record-

Label	Record Mode: Controls and Functions Description
	ing utilizes a completely different encoder than what is used for the Live transmission. This ensures that a high quality of version of any content (whether Live or not Live) is available. *See Records Control Panel for more information (Page 46)*
E	**Edit bar:** Use the start and end time triangular cursors on the green edit bar to select the footage to download by time.
F	**Stop buttons (x2):** Clicking on either Stop button stops the preview of footage or the file download.

Records Control Panel

The "Records" panel displays the number of recordings for each date on the scroll bar at the top. The green-circled numbers (A) that appear next to the dates show how many separate recordings have been captured on that day (Figure 6). Thumbnails of each recording (B) will display below the date bar. Each thumbnail also shows the start time for the clip. When you highlight a thumbnail, its start and end times appear in the left-hand column below the "Download All" button. Use the green edit bar below the thumbnails to mark "in" and "out" (C) on the recordings for extraction.

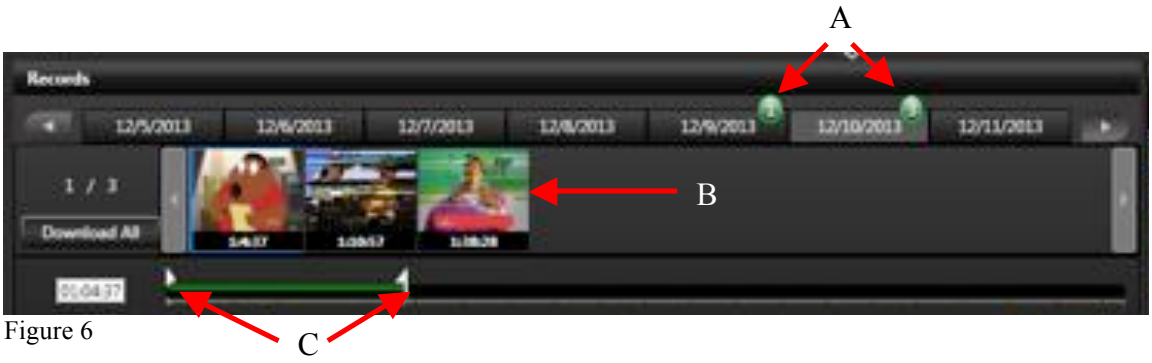


Figure 6

Viewing, Downloading and Deleting Stored Data

The TVUPack records all video it receives into a first in, first out drive. The last six hours of SD video or 1.5 hours of HD video are available for download from the TVUPack transmitter. After the storage limit is exceeded, the Pack records over the older video.

If the TVUPack is currently in Live mode, begin by selecting **Stop** in the upper left corner. This will stop the live streaming video feed and change the status to Preview. The thumbnail of the current feed will display a stopped camera icon, also indicating no transmission. The system is now ready for managing the stored data. If you need to go back into Live mode, the stored data that is being exported or downloaded will be paused. The process of exporting or downloading will resume once Live mode is disabled again.

Exporting an entire Video Clip

Take the steps outlined below to export an entire video clip (Figure 7A-8):

1. Click on the arrow **(A)** to open the File Export and Rename drop-down menu.

2. Select the clip **(B)** to display in the task list **(C)**.
3. Click on the drop-down menu arrow and select the Export format **(E).**
4. Rename the exported file in the Save As field **(F)**.
5. Click Export to start the file export process **(G)**.
6. Monitor the progress of the exported file **(D)**.

Figure 7A **Record Mode Controls and Functions Screen**

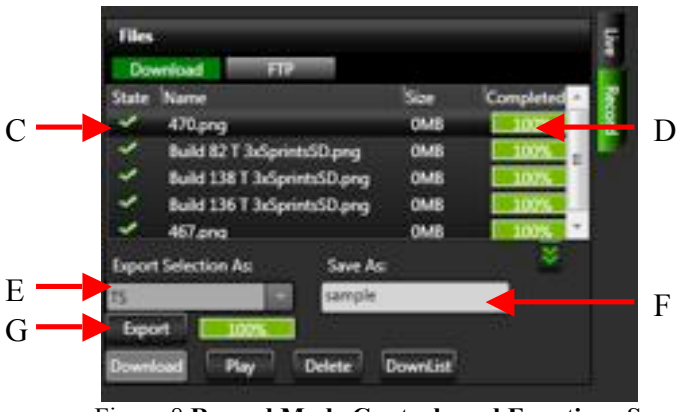


Figure 8 **Record Mode Controls and Functions Screen**

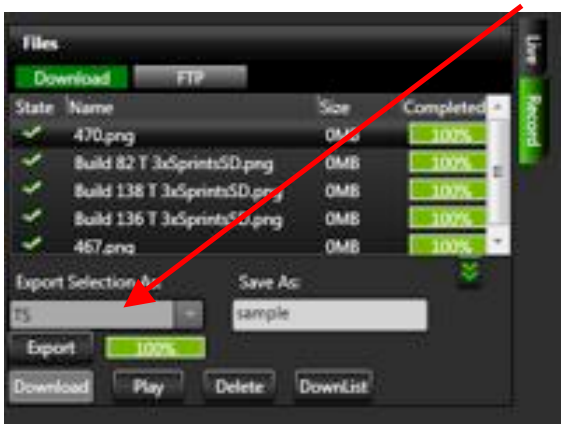


Figure 7B

To select individual frames in a clip to export, follow these steps (Figures 9-10):

1. Navigate through stored data history by day or hour **(A)**.
2. Slide the start cursor **(B)** to the start of the time selected (Mark in).
3. Slide the end cursor **(C)** to the end of the time selected (Mark out).
4. Thumbnails of the in and out points will be generated by the system after a few moments.
5. Once the in and out points are selected, use the editing buttons (**D**) to download, play, delete, or stop the process.
6. Select the Export format **(E)**.
7. Re-name the exported file and click the Export button **(F)** to start exporting.
8. Select Export **(G)** to begin the process of encoding the video on the pack for transmission to the receiver.
9. When the file reaches 100%, **(H)** transfer to the Receiver hard drive is complete and ready to be played out.
10. The file can be found under location C:\TVUTransporterR\download\0x_____ where the last section is the unique PID of the TVUPack. On a receiver paired with multiple packs there may be up to 10 of these folders.

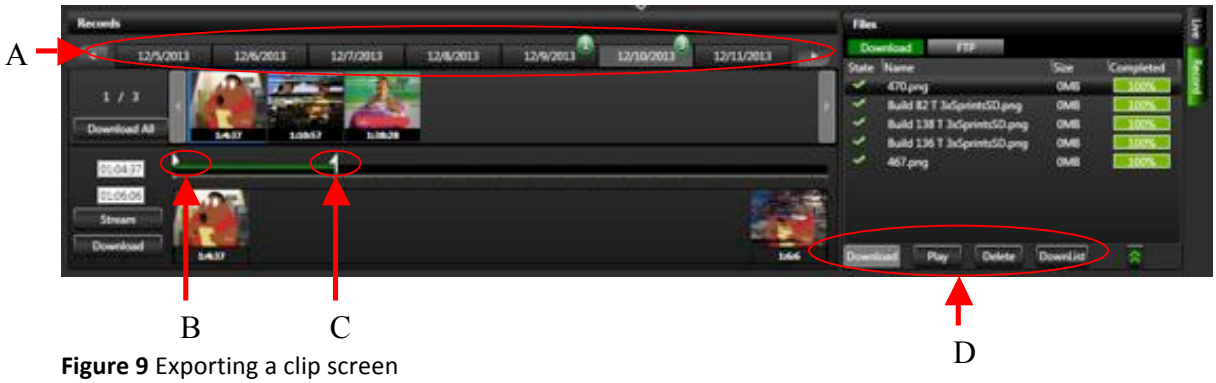


Figure 9 Exporting a clip screen

Figure 10 Exporting a clip screen

AutoSync File Transfer Using Wireless Hotspot

By using the TVUPack transmitter wireless hotspot feature and your laptop, you can automatically send files to the TVUPack Receiver.

1. Make sure the hotspot card is in Slot 9.

2. Search for the hotspot on your laptop. The SSID will be TVUPACK_XXXX where X is the last 4 digits of the packs PID.

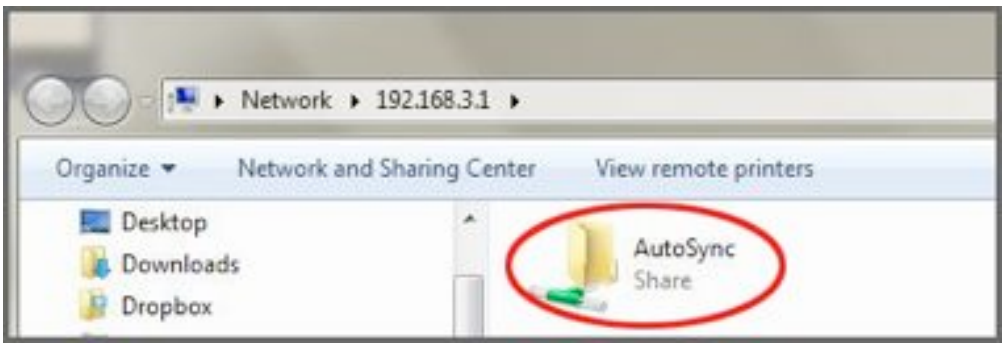
3. Connect to the SSID.

4. The password is the last 8 digits of the PID of the backpack (Note: All characters are uppercase).

5. Once the connection is established, obtain the IP address in the Connection Details.

6. Open a web browser and enter the IP address.

7. You should see the following:



8. Drag and drop files to be transferred into the AutoSync folder

Note: For assistance with other Operating Systems such as Mac OS, please contact TVU Customer Support at +1.650.440.4812.

Automatic Ingest of USB Memory Stick Content to TVUPack

You can wirelessly transmit digital content from the TVUPack transmitter to the TVUPack Receiver. To do so, simply place the content on a USB memory stick and then connect the stick to the spare USB port on the TM8200 encoder unit. TVUPack will auto-detect the memory stick and automatically transfer the contents to its internal SSD hard drive. The content will then be available for wireless transmission to the TVUPack Receiver. Please note that the supported disk format is FAT32 only.

Take the following steps to transfer content from a USB memory stick to TVUPack:

1. Create a directory named "autosyncimport" in the memory stick.

2. Copy the content you want transferred into the "autosyncimport" directory.

3. Plug the memory stick into any to the spare USB port on the TM8200 encoder unit.

4. Monitor the status of the file upload on the Pack's LCD screen. Do not unplug the USB memory stick during the file upload as this may cause the system to malfunction

Deleting uploaded stored content

Take the following steps to delete stored content:

1. On the TVUPack Receiver screen, select the Record tab **(A)** (Figure 11)

2. Select the file you would like to delete **(B)**

3. Click the Delete button **(C)**

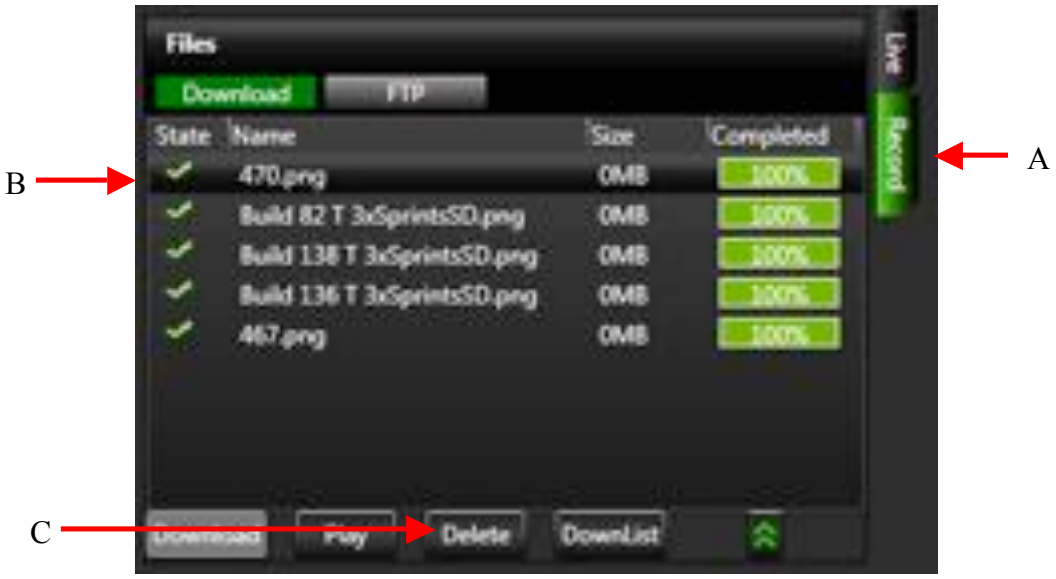


Figure 11

Uploading Media Content to the TVUPack Receiver Using the FTP

Take the following steps to upload media files from an FTP to the TVUPack Receiver

1. Log in to your usual FTP client

2. Retrieve the IP address of the TVUPack Receiver and plug it into the designated area on the FTP client

3. Type in the username and password of the TVUPack Receiver on the FTP. The username is the last four digits of the PID of the Receiver while the password is the last eight digits of the PID of the Receiver.

4. Drop the files you would like to upload into the FTP and they will be transferred to an FTP folder on the Local (C:) disk drive. These files will appear under the "Downloaded" tab on the TVUPack Receiver Interface.

TVU Test Pattern

When a live transmission stream is stopped by the user and goes offline, the preview screen on the receiver will display a TVU Test Pattern (Figure 12). When there is an unintentional interruption of the video stream, the preview screen on the TVU Receiver interface will go black for one minute and then switch over to the TVU Test Pattern.

Figure 12

Accessing the WebR

The TVU Receiver interface can be accessed from anywhere by using a standard webpage. In order to access the WebR, type in the follow URL: **http://[*The IP address of the receiver you would like to access*]:8288/webr**.

You will be brought to a login page. To login, the username is “tvu” and the password is the last 8 digits of the PID of the Receiver. Please note that all the characters are upper-case. This WebR has all the same features and functions as the Receiver GUI.

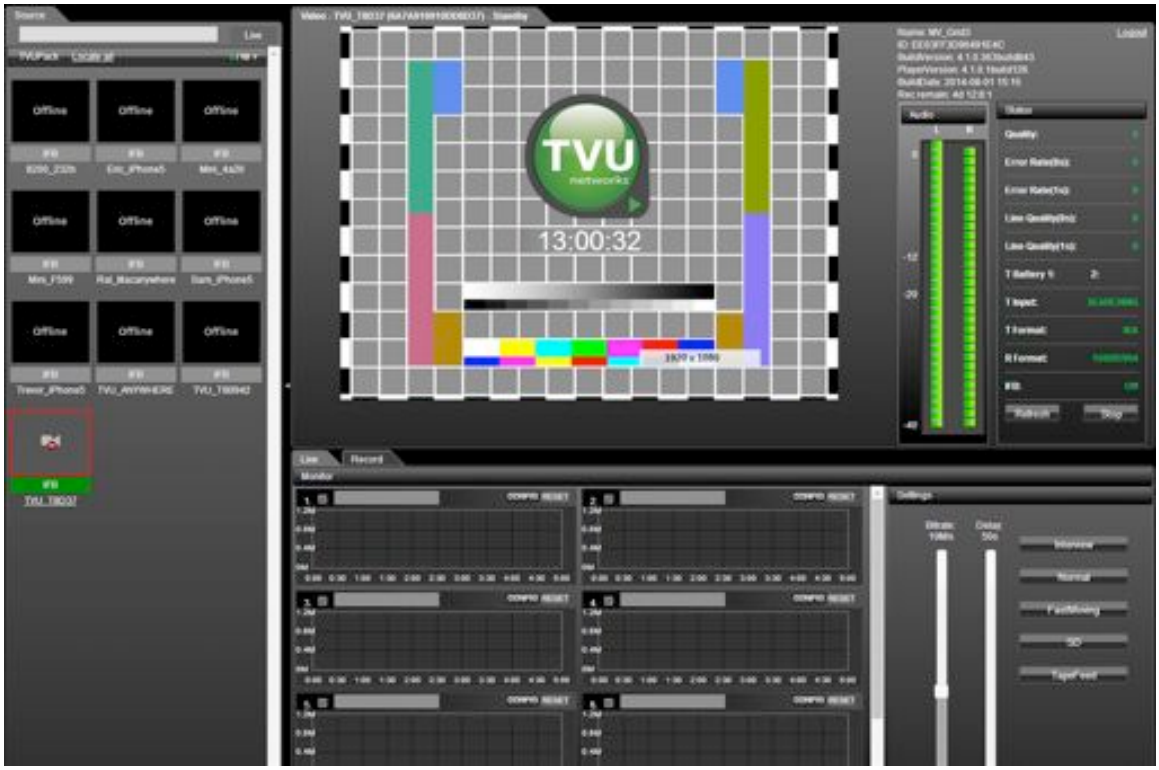


Figure 13 WebR interface

TVU Social

TVU Social allows broadcasters to post captured still images from a TVUPack's live video stream directly to social media networks such as Twitter with just the push of a button. By using the new TVU Anywhere Pro app on an iOS device to connect with the TVUPack transmitter via WiFi, field crews are able to easily capture and send images directly to supported social media platforms of their choice.

The TVU Anywhere Pro app can be downloaded for free from the App store on your iPhone, iPad or iPad Mini. Once the app is downloaded and you have launched the app, simply tap on the Twitter icon (A) on the TVU Anywhere Pro interface (Figure 14).

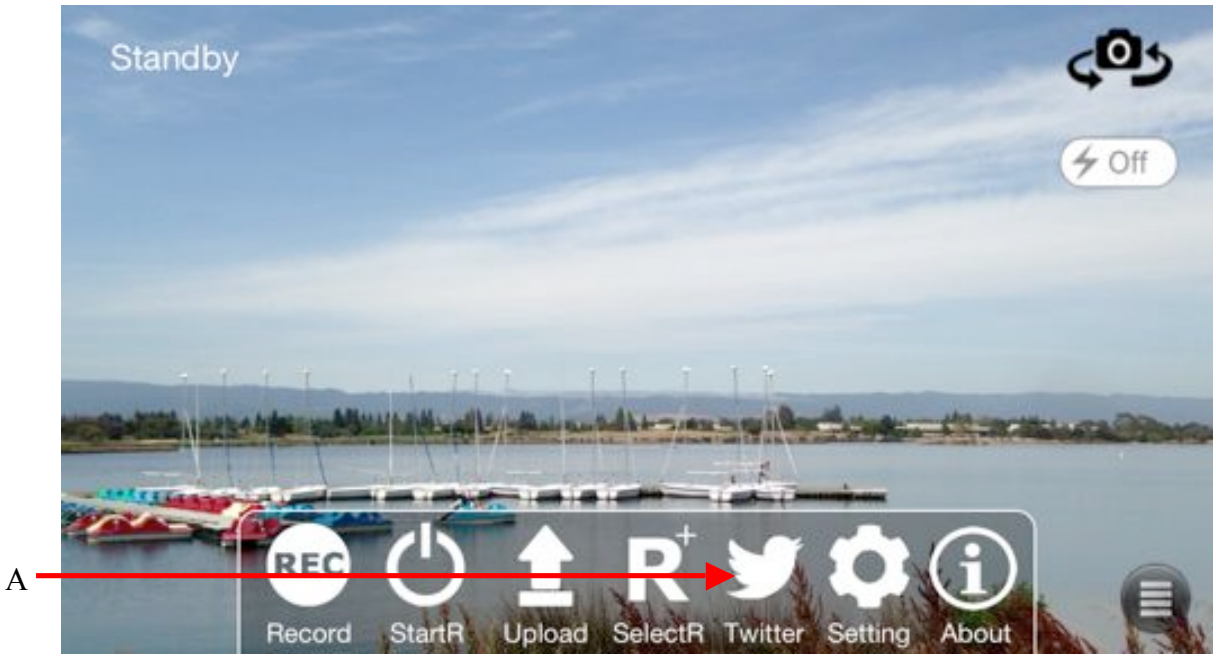


Figure 14

You will be directed to a new page where you can easily capture and post images to Twitter (Figure 15). You will be asked if TVU Anywhere Pro can access your Twitter account. Select "Allow" in order to enable this feature.

Note: Your iOS device must be connected to the TVUPack's HotSpot in order to capture of picture of the live transmission and post directly to Twitter. See page 46 for directions on how to connect your iOS device to the HotSpot.

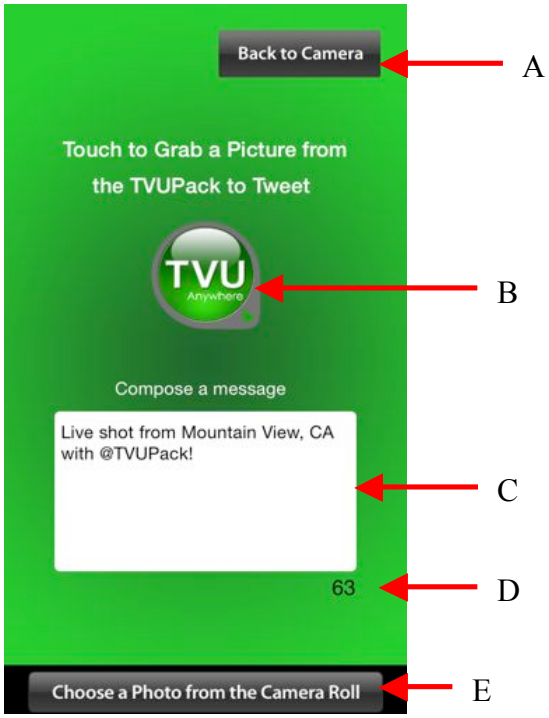


Figure 15

Label	TVUPack Anywhere Pro - Twitter Support
A	Go back to the TVU Anywhere Pro interface
B	Tap the TVU logo to grab a snapshot of a TVUPack live video stream. You can also shake your phone, and a picture will automatically be captured and posted to your Twitter account. (See note below)
C	Compose a Tweet in the message box
D	Character count
E	Choose a photo from your camera roll to Tweet. Note: You need to allow TVU Anywhere Pro to access your camera roll by selecting "Allow" when prompted in order to post to twitter.

Note: If you have multiple Twitter accounts logged in on your smart device, it will automatically post the snapshot of the TVUPack live video stream to the very first Twitter account that was added to your phone. When posting a picture from the camera roll, you will be prompted to choose a Twitter account.

TVU Social Media Manager Service (Optional)

TVU Networks also offers the TVU Social Media Manager Service, which broadcasters have access to a cloud based Web service that captures still JPEG images at regular intervals of the incoming live video streams from multiple TVUPacks in the field. This enables studio operators to select one or more JPEG images and post them directly to social media with the click of a button. These images are stored and can be used for future social media posts.

Once TVU Support provides you will your TVU Social Media Manger account information, you can log into the Web service here: www.tvupack.com/social

Once logged in, you will see the TVU Social Media Manager interface and your paired TVUPacks (Figure 16). TVU Support will add your TVUPacks to your TVU Social Media Manager account. If you would like to add another TVUPack to your account, please contact TVU Support.

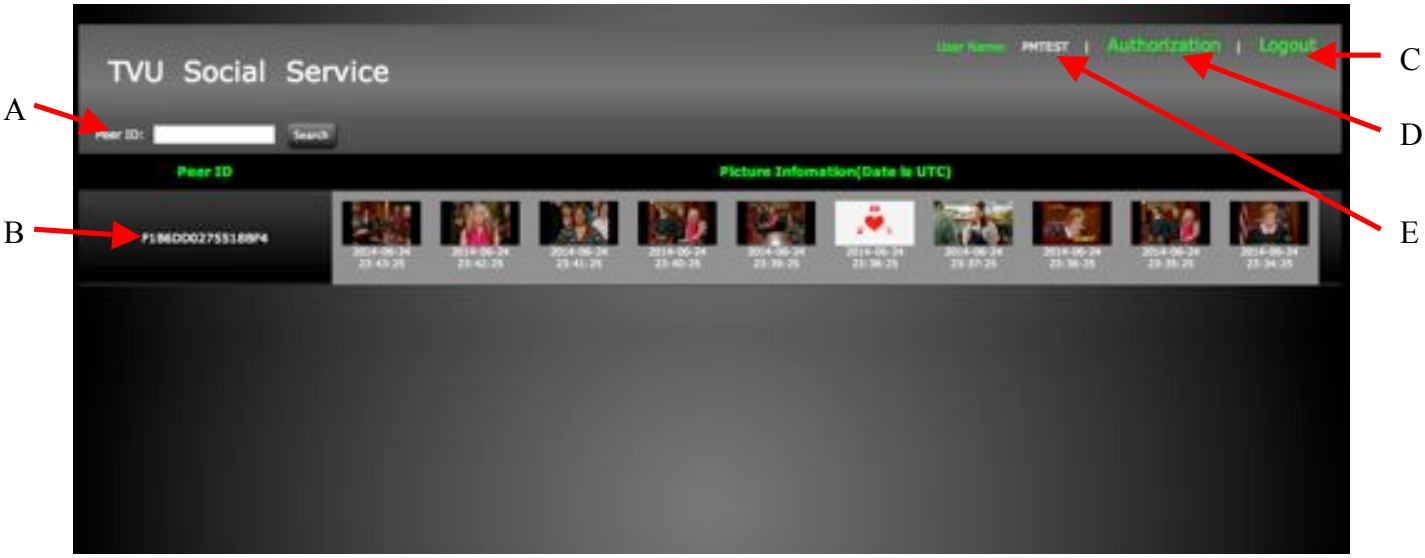


Figure 16

Label	TVU Social Media Manager - Twitter Support
A	Search for a specific TVUPack by typing in the Pack's PeerID number
B	Each paired TVUPack will be displayed with its PeerID number and then the stream of captured photos. The images are captured every one minute while the TVUPack is connected to a camera source. It does not matter if the TVUPack is "Live" or on "Standby".
C	Click to log out of the TVU Social Media Manager
D	Authorize your Twitter account so that you can post from the TVU Social Media Manager directly to your Twitter feed. Be sure to enable pop-up windows in order to authorize your account.
E	The username is displayed

To pair your Twitter account with the TVU Social Media Manager, click "Authorize". A pop- up window will appear that will allow you to authorize the TVU Social Media Manager to post to your Twitter feed (Figure 17). If you are not already logged into your account on your computer, you will be promoted to log into your account. If you are already logged into your account on your computer, simply hit "Authorize App".

Figure 17

To Tweet from the TVU Social Media Manager, simply click on the desired picture and you will be directed to a separate window in order to compose the Tweet (Figure 18)

Figure 18

Compose a message in the box below the image. The character count is also displayed under the message box on the right. Once you are ready, click “Tweet” and your image and text will be posted to your Twitter feed.

Inverse StatMux+ (beta) (Optional)

Inverse StatMux+ is an advanced version of TVU Networks' Inverse StatMux technology. With superior forward error correction technology, Inverse StatMux+ also has a higher throughput than the standard Inverse Statmux when under the same conditions. Additionally, with Inverse StatMux+, file transfers are between 2X and 4X faster than standard Inverse StatMux. This solution enables TVUPack to deliver resilient, HD professional broadcast-quality picture in even the most challenging wireless environments.

Once Inverse StatMux+ has been installed on a TVUPack, a "+" sign will appear next the version number on the TVUPack user interface (Figure 19) and a "IS+" will appear to the right of the PID when mousing over the thumbnail of a particular transmitter on the Receiver interface (Figure 20).

Figure 19

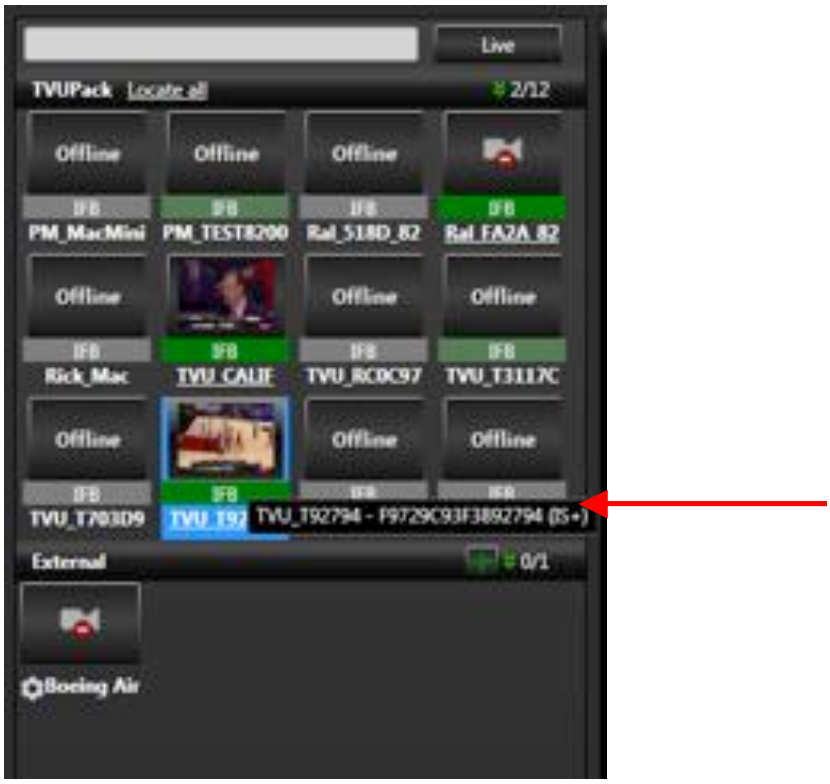


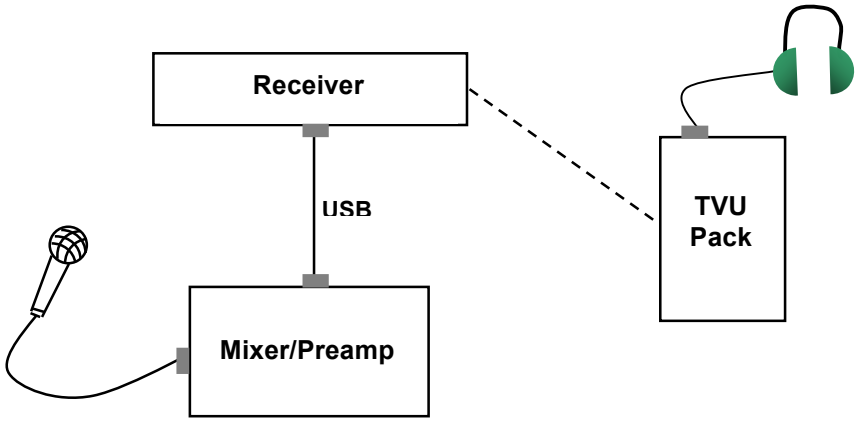
Figure 20

If you would like to enable Inverse StatMux+ (beta), please contact TVU Support:

Phone: +1.650.440.4812
Email: support@tvupack.com
Skype: skype.tvupack

Using the IFB Feature (Optional)

The Interruptible Feedback (IFB) feature allows your news operations center to speak directly to a TVUPack in the field without the need for telephone contact. The IFB option includes a mixer/preamp. The mixer has a USB port for connecting to your receiver and an XLR port for plugging in a microphone. Setting up this option is as simple as "plug and play."



On the TVUPack, connect a standard set of headphones to the 3.5mm audio jack on the body of the unit. (Located just to the left of the HDMI connector.)

Once the connection between the pack and the receiver is in Live mode, audio will start to pass in real time.

Using the Sony XMPilot Metadata Feature (HD) (Optional)

TVUPack supports Sony XMPilot Metadata when connected to a supported Sony camera. TVUPack wirelessly receives the Metadata from the camera and transmits it with the video footage to the TVUPack Receiver. The Metadata information is displayed with the accompanying video footage on the Receiver interface.

In addition, an embedded timecode in the SDI stream is extracted along with XMPilot planning and essence metadata, and transmitted to the receiver. It is then recorded along with the transmission video. Once received, the recorded video content at the receiver is transcoded into Sony XDCAM HD or HD422 format matching the camera media exactly (including directory structure, clip name, metadata and timecode). Content can be used immediately using standard Sony XDCAM workflows. Content can be replaced at anytime with original camera recorded content.

Note: This feature does require the optional HotSpot function to be enabled on your TVUPack.

TVPack XMPilot Metadata integration is an optional feature. For more information, please contact TVU Customer Support.

Take the following steps to use the XMPilot Metadata feature.

Note: The following instructions are based on integration with a Sony PMW-500 camcorder, but will be similar for other PMW series cameras that support the CBK-WA01.

1. Power on your TVU Pack to ensure that this feature has been enabled by TVU Customer Support and is functioning on your TVUPack and your Receiver. Make sure the TVUPack HotSpot feature is functioning normally. The TVU Customer Support Team can help you verify this. Also, make sure the Sony CBK-WA01 wireless adapter is connected to your camera and operating correctly.

2. In your camcorder's "WiFi Setting" menu, set the following functions:
   - SSID: TVUPACK-XXXX (where XXXX is the last 4-digits of your Pack's PID. This is the default SSID for the TVUPack HotSpot)
   - Network Type: Infra
   - Authentication: WPA
   - Encryption: AES
   - Key: (insert the last 8 digits of the TVUPack PID. All characters are upper-case.)

- WiFi: Enable

Once complete, make sure "Wi-Fi Status" shows connected. It may display signal strength bars in the menu.

3. In your camcorder's "Network Setting" menu, set the following functions:
   - DHCP: Disable
   - IP Address: 192.168.3.99
   - Subnet Mask: 255.255.255.0
   - Default Gateway: 192.168.3.1
   - User Name: admin
   - Password: pmw-500 (this may be different for other camcorders)

   IMPORTANT: If you have set a different default user name or password for your camcorder or you are not able to use the listed IP address, you must contact TVU Customer Support.

4. Once set, take your TVUPack live with your Receiver. You should see the following on the Preview Screen of the Receiver (this may take up to 2 minutes to appear initially)

5. When live, if you mouse over the Preview screen, you should see more details about the camcorder connected to the TVU Pack including: Planning metadata, camera recorder status, cameras model type and more

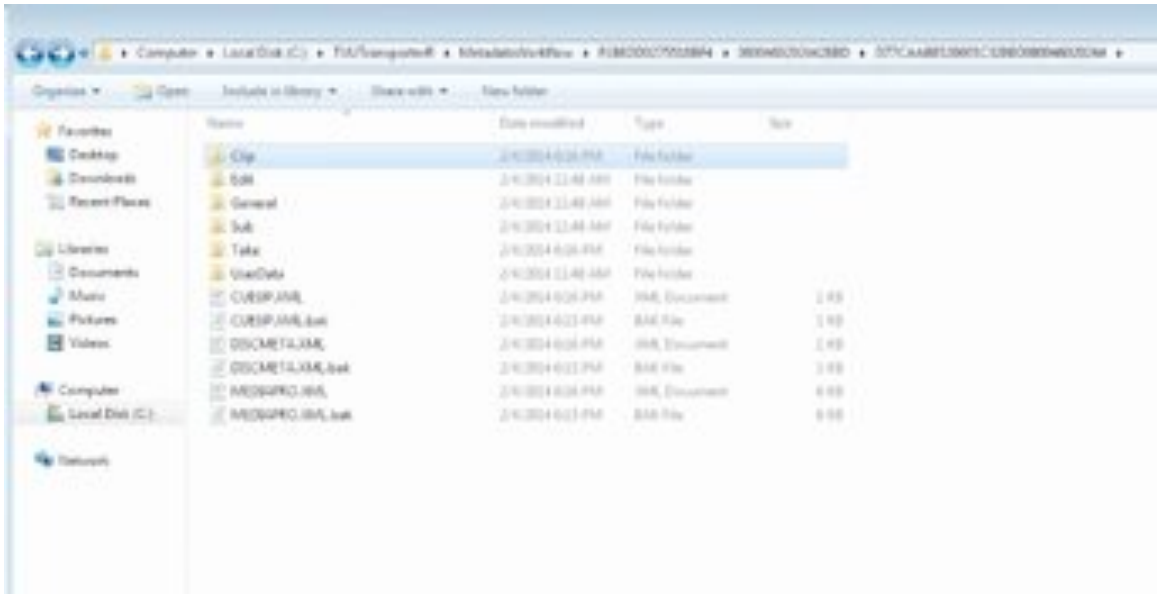
6. When the camcorder is in Record mode, the camcorder status overlay on the preview window will update to reflect Record. The metadata will also be updated.

7. When the TVUPack is in live mode, the in and out points of the camcorder's recording will automatically be passed to the receiver along with the camcorder generated time code. The transmission will also be automatically recorded at the receiver (H.264 at transmission quality).

8. Once a live shot is complete, the recorded content from the transmission on the receiver is broken up to exactly mirror the recorded content on the camcorder. The recorded content is automatically transcoded to Sony XDCAM HD or HD422 format (MPEG2 HD) and an identical copy of the XDCAM media directory structure is created including the same metadata, UMID and file structure.

   NOTE: The transcode step does take sometime. Duration depends on the amount of content.

9. The content is located in the following directory:
   C:/TVUTransportR/MetadataWorkflow/XXXXX



   NOTE: If the live shot spans multiple media cards, there will be multiple folders with the media ID as the folder name.

10. Editing, play-out, archive, etc. can be done immediately with the TVU created XDCAM content without having to wait for the original camcorder recorded content to return to the studio or be transferred via FTP. As the TVU created XDCAM content meets the XDCAM specification, it can be used within any application that supports the XDCAM format.

11. When the original source media from the camcorder is brought back to the studio, it can easily replace the TVU Receiver created XDCAM content as the content, file-name and directory structure, UMID and metadata match exactly.

TVUPack TM8100 Backpack

The TVU Networks silver colored backpack is custom designed to hold the TVUPack device. It comes completely pre-wired and ready for use. We do not recommend using any non-TVU Networks backpacks to hold the TVUPack device. Use the convenient back pocket to store the video camera cable and the power adapter.

Note: There is no need to take the unit out of the backpack. Everything you need to operate, charge and transmit video has been pre- assembled for your convenience.

For your safety, you should always use both the waist buckle and chest strap, and they should be buckled and tightened to size.

The TVUPack backpack comes with a rain cover built in.

Rain Cover Compartment

Rain Cover Fitted Over TVUPack

WARNING: Do not operate TVUPack while the rain cover is out. This will block the air flow and may cause damage.

Using Phylion Batteries

Fully charging a Phylion battery takes approximately eight hours. You may also fast charge the batteries to approximately 75% capacity in about four hours if the battery is completely discharged.

TVUPack Phylion AN-2000D rechargeable battery

TVUPack Phylion PL-1680A Battery Charger

Proper Battery Charging

A. Pull out dual metal base supports on the bottom of the charger and stand vertically upright with both supports firmly set on a flat surface

Charger Base Supports

B. Connect the included power cord to the charger and an electrical outlet

C. Insure the red Charge/DC button is on Charge mode by making sure the button is not depressed (Note: The DC feature is not used for TVUPack or TVUPack batteries. The charger's DC output is an unsupported feature by TVU Networks, and we do not recommend using it.)

D. Unlatch one of the batteries from the TVUPack, align the battery with the either the right or left side battery mount, and carefully slide it back until it is fully and firmly in place; the charger can charge up to two batteries at the same time

E. Turn on charger

The (L)eft and (R)ight labeled lights on the side of the charger will illuminate depending upon the current operation of the particular battery:

- Red Light: The battery is in the process of charging.
- Green Light: The battery is fully charged and ready for use.

To remove the battery from the charger, hold the handle on top of the charger, press the black clip on the battery mount to unlock and pull outward.

Do not use the battery charger to charge any other type or brand of batteries except the ones that were supplied with your TVUPack. Do not charge the TVUPack batteries with any battery charger except for the one that was supplied with your TVUPack.
The batteries will NOT charge when connected to the TVUPack.

Note: Batteries should be charged at least once a month for at least 10 minutes to ensure continued peak battery performance.

Battery Charge Indicator Button

By pressing the button on the front of the battery, you can see the level of charge left on the battery. When only one indicator is illuminated, charge the battery soon.

Note: The transportation of rechargeable Lithium-ion batteries is regulated. The following websites have more information: IATA (www.iata.org), US Department of Transportation (www.dot.gov) and FAA (ww.faa.gov).

Contacting TVU Networks

At TVU networks, we value our customers and are committed to ensuring a high level of satisfaction. Should you ever need assistance with your TVUPack, please contact us at one of our numbers below:

Technical Support:
Phone: +1.650.440.4812
Email: support@tvupack.com
Skype: skype.tvupack

Billing Questions:
Phone: +1.650.969.6732

Corporate Address:
857 Maude Avenue
Mountain View, CA 94043

Product Specifications**

TVUPack Transmitter

	TM2100	TM8100
Video/Audio Input	FireWire - 6-pin IEEE-1394	SD/HD-SDI w/ embedded audio (BNC), HDMI w/ embedded audio, Component (3xBNC), Composite (BNC) and Analog Audio (2x1/4" jacks), IFB (1/4" Jack – Optional)
Input Format	DV25, NTSC & PAL	SDI/HDMI/Component (1080-50i/59.94i, 720-50p/59.94p, NTSC/PAL), Composite (NTSC/PAL)
Storage	160GB SSD	160GB SSD
Data I/O Interface	Up to 8 USB data card interfaces (2.5G/3G/4G/WiMax/ Plus dedicated port for Hotspot & Wi-Fi.	Up to 8 USB data card interfaces (2.5G/3G/4G/WiMax/ Plus dedicated port for Hotspot & Wi-Fi.
Ethernet	One Gigabit Ethernet – RJ45. Additional Ethernet can be added via USB-.Ethernet dongle	One Gigabit Ethernet – RJ45. Additional Ethernet can be added via USB-.Ethernet dongle
Max Continuous Power	120W	120W
AC Power Adapter	100-240V AC	100-240V AC
DC Power Input Range	14.8-19V DC	14.8-19V DC
Battery System	Hot swappable dual battery packs with industry standard Gold Mounts (optional V-Mount configuration)	Hot swappable dual battery packs with industry standard Gold Mounts (optional V-Mount configuration)
External Battery	14.8V, Minimum100Wh, Gold Mount or optional V-Mount configuration	14.8V, Minimum100Wh, Gold Mount or optional V-Mount configuration
Battery Run Time	2.4 hours dual battery packs., up to 4 hours on extended	2.4 hours dual battery packs., up to 4 hours on extended
Weight	5kg (11lbs) with aluminum housing	5kg (11lbs) with aluminum housing
Dimensions (Pack)	~ 35x20x48cm (14"x8"x19") – LxWxH	~ 35x20x48cm (14"x8"x19") - LxWxH
Operating Temp	0 - 30°C (32 - 86°F)	0 - 30°C (32 - 86°F)

**** Specifications are subject to change without notice**

TVU Pack Receiver

	TR3100HD/3101HD*	TR3100SD/3101HD*
Electrical	Line Voltage: 100-240V AC, 50/60Hz 5.2 – 2.6A	Line Voltage: 100-240V AC, 50/60Hz 5.2 – 2.6A
Configuration	1RU, standard 19" rack mount (inc. slide rails, for round or square-hole mount)	1RU, standard 19" rack mount (inc. slide rails, for round or square-hole mount)
Audio / Video Output	BNC - SD/HD*-SDI (1080-50i/59.94i, 720-50p/59.94p, NTSC/PAL) w/ embedded audio (Optional analog output)	BNC - SD/HD*-SDI (1080-50i/59.94i, 720-50p/59.94p, NTSC/PAL) w/ embedded audio (Optional analog output)
Genlock	BNC - Tri-Level or BB	BNC - Tri-Level or BB
Display	DVI, VGA or HDMI	DVI, VGA or HDMI
IFB Input (optional)	External USB audio input with level control (mic/line), ¼" & XLR	External USB audio input with level control (mic/line), ¼" & XLR
Network I/O	2 independent 10/100/1000 BASE-T RJ45 Ethernet Interfaces, 2 x USB2.0,	2 independent 10/100/1000 BASE-T RJ45 Ethernet Interfaces, 2 x USB2.0,
Dimensions	~44x63x4.5cm (17.6"x25"x1.73") LxWxH	~44x63x4.5cm (17.6"x25"x1.73") LxWxH
Operating Environment	10 - 35°C (50 - 95°F), Humidity 20%	10 - 35°C (50 - 95°F), Humidity 20%

*** HD output on TR3100HD and TR3101HD models only**

Troubleshooting Video Quality Using the Status indicators in Live and Record Modes

**** Specifications are subject to change without notice**

The Status counters offer a visual indication of specific technical aspects of the current live session. By interpreting these numbers it is possible for an operator to troubleshoot and optimize the quality of a session.

Quality. This is the real time effective bitrate of the transmission. If the system is set to VBR (variable bit rate) mode, this number will fluctuate between the configured maximum bitrate and the lowest bitrate the data connections can currently sustain. The maximum target bitrate is set by either using a preset mode in normal operation, or by using the bitrate slider in advanced mode.

If the system is set to CBR (constant bitrate) this number will stay constant.

Error rate indicators.

Error rate 8s. This indicates the percentage of uncorrected errors taken over an 8 second average. The aim is for this number to always be at zero during transmission.

Error rate 1s. This indicates the uncorrected error rate over the last second. The aim is for this number to always be at zero during transmission.

All uncorrected errors can contribute to undesirable video glitches. Any error rate greater than 0 indicates that the data connection is unable to operate cleanly in the cur-

rent data environment. If attempting to operate in CBR (constant bitrate) mode try either lowering the required bitrate or switching to VBR to allow the system to adapt dynamically to conditions. If the system is already in VBR mode try increasing the delay to allow the error correction system more time to adapt to the network conditions.

Line quality indicators.

Line quality shows the current error correction levels required for error free transmission at the configured settings.

Line Quality 8s: This is the level of error correction (as an average over the last 8 seconds) required to sustain clean transmission.

Line Quality 1s: This is the current level of error correction the system is using to sustain a clean transmission.

The TVUPack uses multiple methods of error correction to ensure smooth clean video transmission in very challenging environments. Since the underlying network conditions are always a factor when working over multiple connections simultaneously, some error correction is always required. As a rule in difficult environments, the lower the latency, the more data is required for error correction to sustain a stable video transmission. This error correction, while highly effective, utilizes some of the limited bandwidth that is available in most situations. It is desirable where possible to limit the error correction required as it allows the system bandwidth for extra video quality.

Operational Example 1: TVUPack is being used in a poor data service environment.

In this scenario the receiver is set to Normal VBR mode, but the pack is inside a building with poor data service. The Quality indicator is seen to fluctuate between 2048 and 1000 as the signal strength and available data service varies. This indicates that the pack is using TVU's Inverse Statmux to measure the available bandwidth and maximize throughput on a continuous basis. If the video quality is fluctuating two approaches may be used at the receiver to improve the video output consistency and stability.

Suggestions

- Try increasing the delay in 1s increments to allow the pack extra time to compensate for the dips in available bandwidth.
- Try incrementally reducing the maximum bitrate so the fluctuations between high and low are less noticeable.

Operational Example 2: TVUPack is being used in an environment with excellent data service.

In this scenario the receiver is set to Normal VBR mode and all data cards are performing well. The Quality indicator stays constant at 2048 and rarely fluctuates. Under these

conditions it is possible that by switching to advanced mode and either increasing the bitrate (for improved video quality) or lowering the latency (for lower delay) may be practical. No action is required, but the system may be capable of enhanced performance if desired.

Suggestions

- Try increasing the bandwidth in 256k increments until the Quality indicator starts to become unstable and cannot sustain the new setting.
- Try decreasing the delay in 0.2 second increments until the Quality indicator becomes unstable and does not stay consistent at the maximum bitrate.

Operational Example 3: TVUPack is being used in an environment with average data service.

In this scenario the TVUPack is being used in an interview talkback situation. The desire is to minimize latency but the bandwidth available to the system is limited and the Quality indicator is fluctuating between 750 and 1800. Uncorrected errors are appearing in the video output.

Suggestions

- Try increasing the delay in 0.5 second increments until the uncorrected errors stop appearing.
- If delay is the most important factor, try decreasing the maximum bandwidth in 256k increments until the errors cease.

Operational Example 4:

In this scenario the receiver is set to Interview mode, but the pack is inside a building with poor data service. The line quality indicator increases up to approximately 50.00 but the Quality counter is down at 1000 and there are occasional errors. This indicates trouble on the underlying data networks.

Suggestion.

- Try increasing the delay in increments of 0.5 seconds to allow the system time to compensate for poor conditions on the cellular network.