



# DVISn

Patent Pending

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## DVISn - Nano-sized Digital Video Insertion System RF Output

INSTALLATION & OPERATION MANUAL

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# SAFETY

## 1. Safety

**WARNING! FAILURE TO FOLLOW THE SAFETY PRECAUTIONS LISTED BELOW MAY RESULT IN PROPERTY DAMAGE OR PERSONAL INJURY. PLEASE READ AND COMPLY WITH THE FOLLOWING:**

**WATER AND MOISTURE:** Care should be taken to prevent entry of splashed or dripping water, other liquids, and physical objects through enclosure openings.

**DAMAGE:** Do not operate the device if damage to any components is suspected.

**POWER SOURCES:** Only connect the unit to a power supply of the type and capacity specified in the operating instructions or as marked on the device.

**GROUNDING OR POLARIZATION:** Electrical grounding and polarization means must not be defeated.

**POWER CORD PROTECTION:** Route power supply cord to prevent damage by external objects. Pay particular attention to the exit point from the device and plug.

**FUSING:** If your device is equipped with a fused receptacle, replace only with the same type fuse. Refer to replacement text on the unit for correct fuse type.

**SERVICE:** Do not attempt to service the device beyond procedures provided the operating instructions. All other servicing should be referred to qualified service personnel.

**MODIFICATIONS:** Modifications should not be made to the device or any of its components for applications other than those specified in the operating instructions.

**SAFETY CODES AND REGULATIONS:** The device should be installed and operated in compliance with all applicable local safety by-laws, codes and regulations.

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## PRODUCT OVERVIEW

### 2. Product Overview

DVIS series products are network-edge local content insertion devices for digital video networks. They deliver locally generated baseband analog content within a property provisioned with digital only TVs, STBs or DTAs, or where analog spectrum is not available.

- Security or surveillance camera feeds (MDUs, retirement homes)
- Text/character generator or local information channel (hotels, conference centers, gated communities)
- Insertion of encrypted digital channels to a commercial property lineup (e.g., insertion of specialty channels into a hotel lineup)
- Distribution of 'in-house' or private channels throughout a property (e.g., sports stadiums, network studios)

#### 2.1 DVISn Functional Diagram

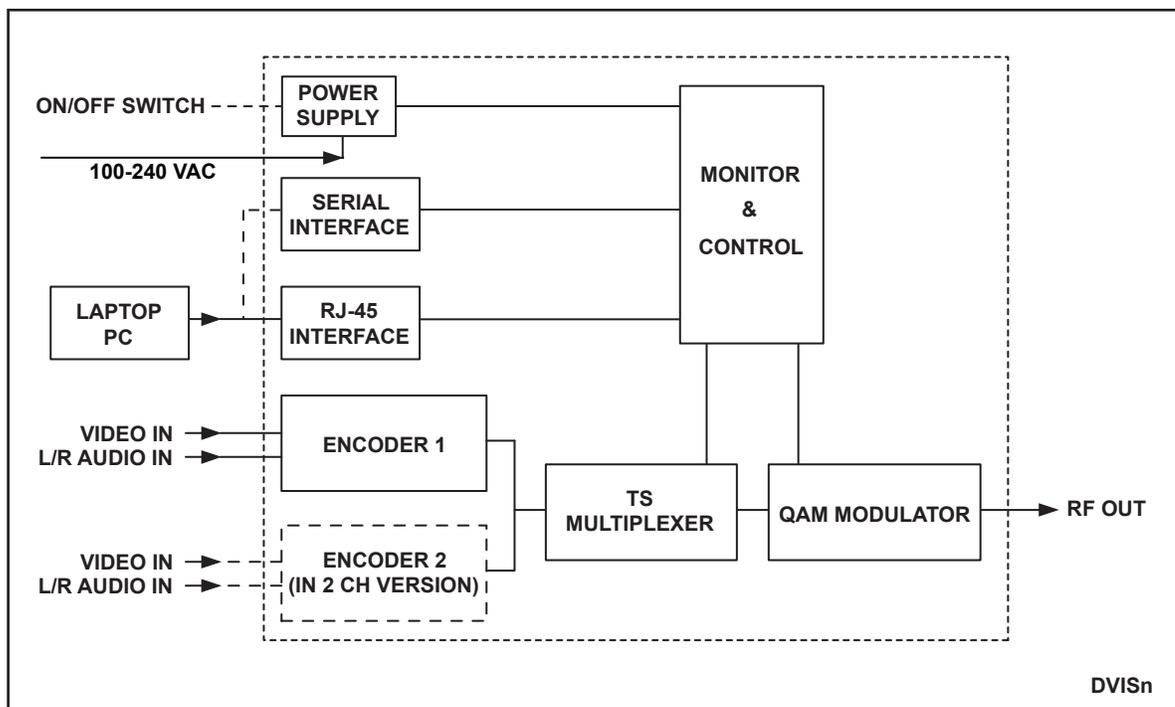


Figure 1: Functional Diagram

## 2.2 Theory of Operation

The DVISn can be used to insert local programming into the spectrum where there is a blank channel (no QAM or analog channel). This can be either a blank QAM or a QAM channel above the HFC plant end frequency (at the “band edge”).

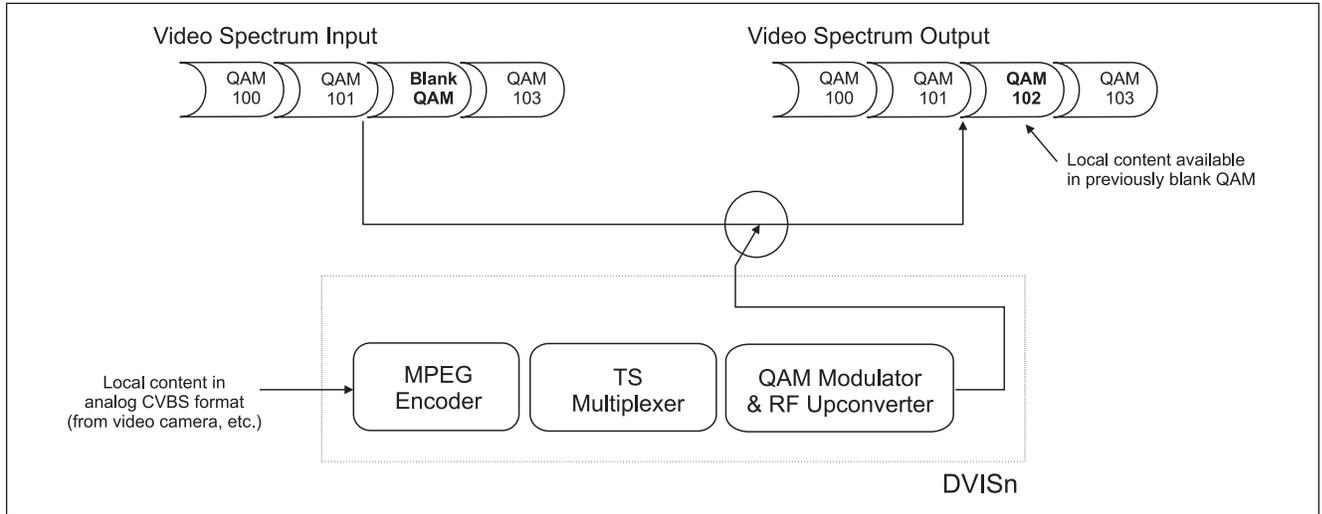


Figure 2: Insertion into Blank QAM

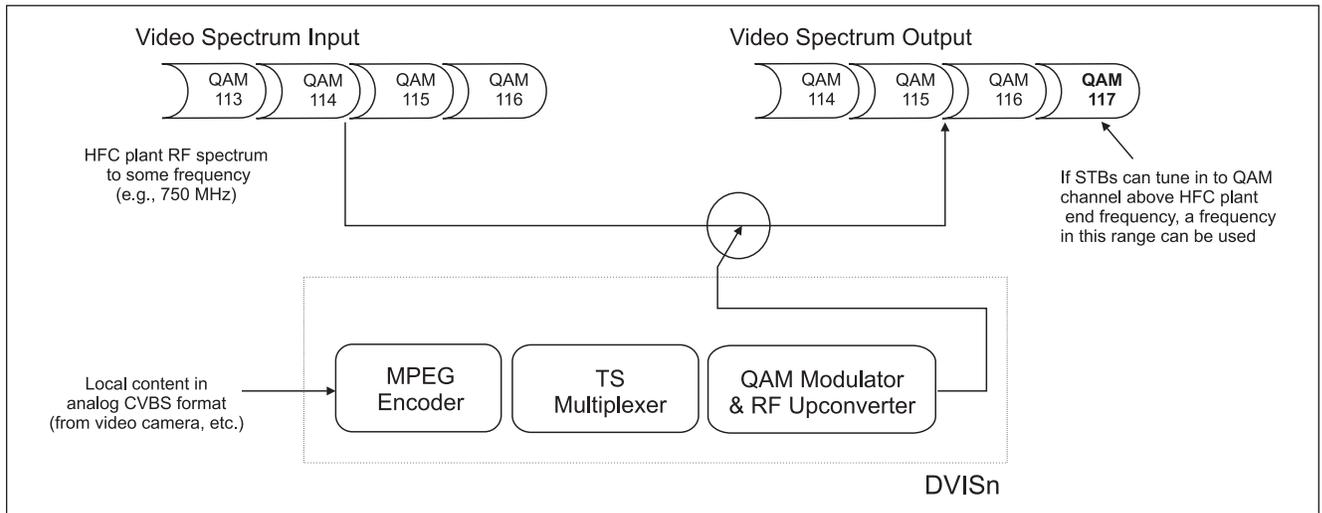


Figure 3: Insertion into QAM at Band Edge

## 2.3 Components and Interfaces

### 2.3.1 Front Panel



Figure 4: DVISn Unit

### 2.3.2 Inputs and Outputs



Figure 5: Input Connections



Figure 6: Output Connection

## 2.4 Specifications

DVSN - RF Output Platform	DVNANO1 & DVNANO2	DVNANO1E & DVNANO2E
<b>CHASSIS OVERVIEW</b>		
DIMENSIONS	2.3"H x 8.8"W x 4.8"D (5.84H x 22.35W x 12.19D cm), Wall Mount	
WEIGHT	2.2 lbs (1.0 kg)	
ENCODED PROGRAMS	1 or 2 Programs into 1 QAM Channel	
POWER SUPPLY	IEC Connector / 110-220 VAC, 50/60Hz	
POWER CONSUMPTION	25W Max.	
DEVICE MANAGEMENT	HTTP over Ethernet Network Interface (RJ45); 10/100 Mbps	
OPERATING TEMPERATURE	0°C to +50°C (+32°F to +122°F)	
HUMIDITY	0-95% (without condensation)	
<b>TS MULTIPLEXER</b>		
PACKET SIZE	188 Bytes	
TS SUPPORT	QBA, AF	
PROGRAM NUMBER & TS NUMBER	User Settable (Program #: 1-65535; TS ID: 1-65535)	
PSI / SI INFORMATION TABLE	PAT, PMT	
SETTABLE PIDs	PMT, PCR (0x0021-0x1FFE; dec. 33-8190)	
<b>QAM MODULATOR / RF UPCONVERTER</b>		
QAM MODULATION	ITU-T J.83 Annex B	ITU-T J.83 Annex A/C
MODULATION FORMAT	64, 256 QAM	16, 32, 64, 128, 256 QAM
RF QAM OUTPUT POWER AT RF OUT	30-56 dBmV	
ATTENUATION STEP SIZE	1 dB	
RF QAM FREQUENCY OUTPUT RANGE	57-1000 MHz	
SUPPORTED CHANNEL PLANS	Standard, HRC, IRC	--
FREQUENCY STEP	1 kHz	
RF QAM CHANNEL BANDWIDTH	6 MHz	3-8 MHz
EXCESS BANDWIDTH	12% (256 QAM), 18% (64 QAM)	15% (Annex A), 13% (Annex C)
SYMBOL RATE	5.360537 MSymb/s - 256 QAM 5.056941 MSymb/s - 64 QAM	2608 kbps - 3 MHz 3478 kbps - 4 MHz 4347 kbps - 5 MHz 5217 kbps - 6 MHz 6086 kbps - 7 MHz 6956 kbps - 8 MHz User Defined - max. 7MSymb/s
MER EQUALIZED <sup>(1)</sup>	> 40 dB <sup>(1)</sup>	
FREQUENCY OFFSET	< 2ppm	
SYMBOL RATE OFFSET	< +/- 50 Hz	
CARRIER SUPPRESSION	> 55 dB	
SIGNAL/NOISE	> 45 dB	
SPURIOUS	-60 dB	
TS PROCESSING	Null Packet Insertion & PCR Correction	
FEC	ITU-T J.83 Annex B	ITU-T J.83 Annex A/C
<b>RF INTERFACES</b>		
RF OUT	F, 75 Ω	
RF OUT RETURN LOSS	> 16 dB	
<b>ENCODER VIDEO SPECIFICATIONS</b>		
INPUT	CVBS, NTSC	CVBS, PAL
INPUT INTERFACE	1x BNC, 75 Ω (x2 on Dual Channel Version)	
ENCODING FORMAT	MPEG-2, 4:2:0, MP@ML	
ENCODING BIT RATE TYPE	CBR	
VIDEO ADJUSTMENTS	Brightness, Contrast, Saturation	
VIDEO PROCESSING	TBC	
SUPPORTED RESOLUTIONS	704x480, 544x480, 528x480, 480x480 and 352x480	704x576, 544x576, 528x576, 480x576 and 352x576
FRAME RATE	29.97 fps	25 fps
VIDEO ENCODING BIT RATE	1000-4000 kbps	
GOP STRUCTURE	IBBP - length 15	
VIDEO PID SETTING	0x0021-0x1FFE; dec. 33-8190	
<b>ENCODER AUDIO SPECIFICATIONS</b>		
INPUT	Analog Unbalanced	
INPUT INTERFACE	RCA (L/R) (x2 on Dual Channel Version)	
ENCODING FORMAT <sup>(2)</sup>	Dolby® Digital AC-3 <sup>(2)</sup>	MPEG-1 Layer II
SAMPLING RATE	48 kHz	
ENCODING BIT RATES	192 & 256 kbps	
AUDIO PID SETTINGS	0x0021-0x1FFE; dec. 33-8190	

NOTES:

(1) Measured with Rohde & Schwarz EFA (FW Ver 05.33).

(2) Dolby is a registered trademark of Dolby Laboratories. Manufactured under license from Dolby Laboratories.

Table 1: Specifications

## SET-UP & CONFIGURATION

### 3. Set-up and Configuration

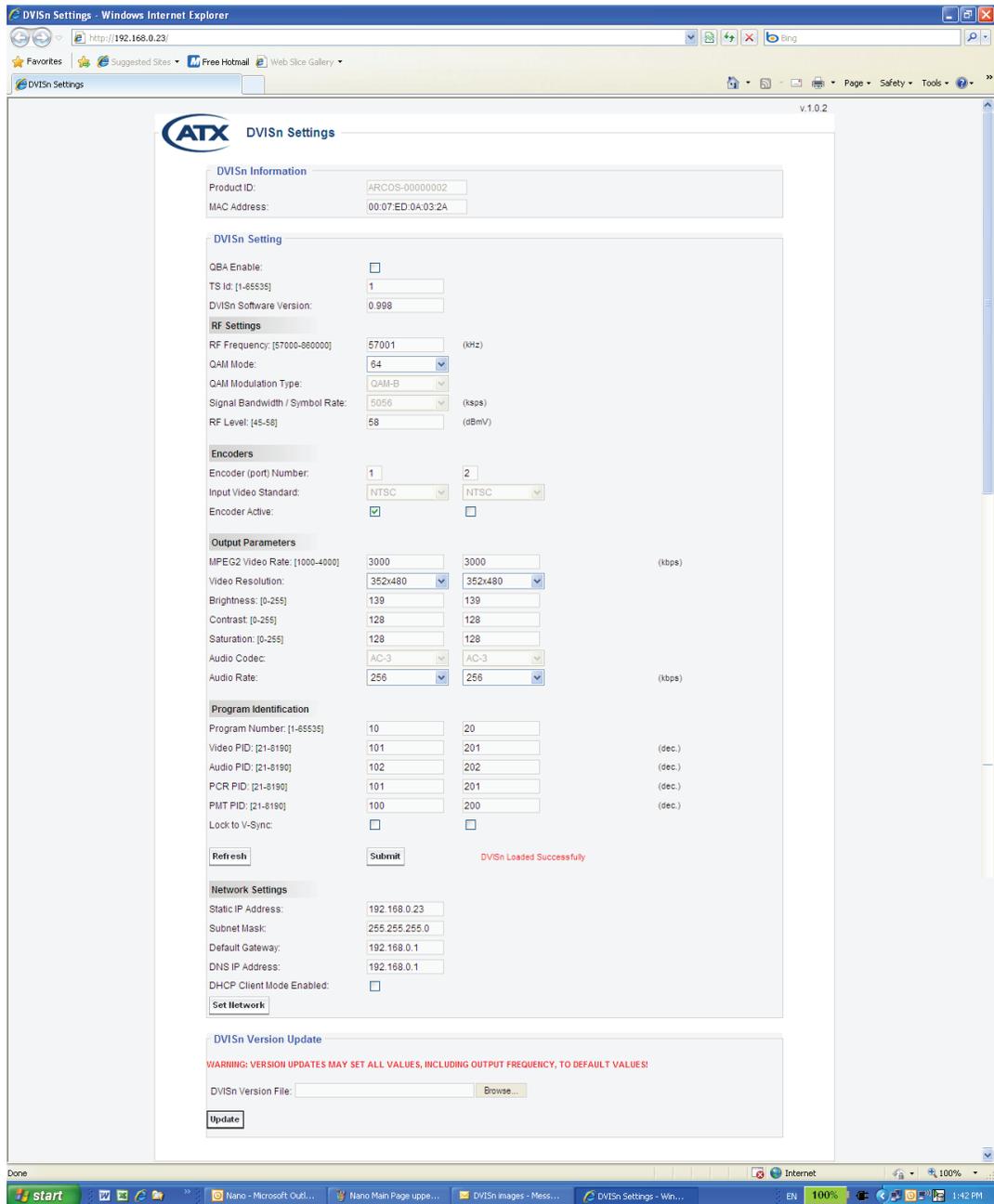
**IMPORTANT:** Do not connect the DVISn RF output signal to a network before reading these instructions and ensuring that the RF level of the output signal is set appropriately (see section 3.3, RF Output Connections).

#### 3.1 Connect PC to DVISn

Set-up of the DVISn unit requires a laptop or desktop PC running any OS supporting a web browser system and with available Ethernet connection (called the “management computer” in the following procedures). Network parameters of the management computer must be set appropriately for access to the DVISn remote management interface. The following procedures assume the use of Windows® OS and that the network address for the DVISn unit is set to the factory default setting (192.168.0.23). If a different OS or network address are used, adjust the procedures to suit.

1. Set the management computer’s Ethernet interface to a static IP address on the 192.168.0.x subnet.
  - a) From the Control Panel, open **Network Connections** and select the connection associated with the Ethernet adapter to be used for connecting to the DVISn (e.g., Local Area Connection).
  - b) Right click on the connection and select **Properties**.
  - c) Select **Internet Protocol (TCP/IP)** and click **Properties**.
  - d) Click the selection box beside **Use the following IP address** to enter a check mark in the box.
  - e) In the **IP address** field, enter 192.168.0.x (where x represents any number from 1-253 except 23).
  - f) In the **Subnet mask** field enter 255.255.255.0.
  - g) Click **OK** and then **OK** again in the previous window.
2. Connect the management computer’s Ethernet adapter to the DVISn Ethernet port using a CAT5e crossover cable (supplied with the unit).
3. Connect the video source and audio source (if required), and turn these external sources on.
4. Connect the DVISn to the main power supply and switch the unit on. The green LED labelled POWER lights to indicate that the unit is on.
5. Allow the unit to boot for 90 seconds. While the unit is booting, the cooling fan may start to work, stop after few seconds, then start to work again.
6. On the management computer, open a web browser and enter **http://192.168.0.23** in the address field.

- The GUI opens and displays the DVISn Settings screen, allowing system configuration.



## 3.2 Configuration

All system parameters are set on the DVISn Settings screen.

**NOTE:** Where only certain values are allowed, the values are listed in a drop-down box. Parameters that can not be changed are greyed out.

### 3.2.1 DVISn Information

Product ID:	Serial number of the unit.
MAC Address:	A MAC (Media Access Control) address is a unique identifier assigned to network adapters or network interface cards (NICs) by the manufacturer to uniquely identify them on a LAN.

### 3.2.2 DVISn Setting

QBA Enable:	This function is required when DVISn signals are sent to some legacy STBs.
TS Id:	A transport stream is a cable or RF transmission format that allows multiplexing of digital video and audio using a strict protocol that employs packet-based multiplexing. A Transport Stream ID is a number unique to each transport stream that identifies its origin (1-65535).
DVISn Software Version:	The version of the firmware file currently used by the DVISn.
<b>RF Settings</b>	
RF Frequency:	The RF frequency output range is 57 to 860 MHz, entered in kHz (57000-860000) without decimal points or commas.
QAM Mode:	QAM (Quadrature Amplitude Modulation) is a method for encoding digital data in which each combination of phase and amplitude represents a specific bit pattern. Higher levels of modulation provide higher data capacity but greater sensitivity to noise. QAM64 is typically used where system performance will not allow higher modulation levels while QAM256 is used by most cable operators.
QAM Modulation Type:	QAM-B employs the framing structure, channel coding, and modulation schemes defined in standard ITU-T J.83 Annex B for use in North America.
Signal Bandwidth/Symbol Rate:	Signal Bandwidth & Symbol Rate are fixed to selected QAM-B settings as per the SCTE standard.
RF Level:	Radio frequency signal level (45-58 dbmV).
Interleaver:	Interleaving mode is I/J 128/1
<b>Encoders</b>	
Encoder (port) Number:	DVISn units contain one or two encoders.
Input Video Standard:	The DVISn accepts video signals that conform to NTSC (National Television Systems Committee)
Encoder Active:	The check box lets you switch each encoder on and off. The Encoder Active checkbox must be checked in order for the port to perform any encoding action and to allow changes to other settings as required. .
<b>Output Parameters</b>	
MPEG-2 Video Rate:	MPEG-2 is a standard for a combination of lossy video compression and lossy audio data compression methods that reduce storage media and transmission bandwidth requirements. The video data rate is entered in kbps (1000 to 4000), without decimal points or commas.
Video resolution:	Video resolution refers to the number of discrete picture elements (pixels) in each horizontal line and the number of displayed horizontal lines in the picture (e.g., 720 pixels per line x 480 lines). Video resolution options are 720x480, 704x480, 544x480, 528x480, 480x480, and 352x480.
Brightness:	Allows modification of the video signal to increase or decrease brightness. There are 256 levels available (0-255).
Contrast:	Allows modification of the video signal to increase or decrease contrast. There are 128 levels available (0-127).

Saturation:	Allows modification of the video signal to increase or decrease saturation. There are 128 levels available (0-127).
Audio Codec:	A codec (compressor-decompressor) converts an audio signal to a specific file format or streaming audio format that reduces the required storage space or bandwidth. MPEG-1 supports stereo (two channel) signals while the AC-3 codec (licensed by Dolby Laboratories) supports 5.1 surround sound.
Audio Rate:	Sampling rate at which an audio signal is encoded. The higher the bit rate, the better the sound quality Audio rate options are 192, 256 and 384 kbps.
<b>Program Identification</b>	
Program Number:	A unique number assigned to each program (1-65535).
Video PID:	The video PID (Packet Identifier) is a hexadecimal 13 bit number from 21 to 8190 that uniquely identifies a video transport stream in an MPTS (multi-program transport stream) so that it can be filtered and routed appropriately.
Audio PID:	The audio PID (Packet Identifier) is a hexadecimal 13 bit number from 21 to 8190 that uniquely identifies an audio transport stream in an MPTS (multi-program transport stream) so that it can be filtered and routed appropriately.
PCR PID:	The PCR (Program Clock Reference) PID (Packet Identifier) is a hexadecimal 13 bit number from 21 to 8190 that uniquely identifies the time base for synchronization of individual frames or fields of the video stream and their associated audio.
PMT PID [21-8190]:	The PMT (Program Map Table) PID (Packet Identifier) is a hexadecimal 13 bit number that uniquely identifies a PMT in an MPTS (multi-program transport stream). The PMT contains a data structure specifying which PIDs carry the video, audio and data stream that collectively constitute the broadcast program.
Lock to V Sync:	Selects whether locking to vertical sync is enabled. This function is required when DVISn signals are sent to some legacy STBs.
<b>Network Settings</b>	
Static IP Address:	An IP (Internet Protocol) address is a numerical identification and logical address assigned to devices participating in a computer network utilizing the Internet Protocol for communication between nodes. When a computer is configured with a Static IP address it always uses the same IP address. When a computer is configured with Dynamic IP addressing it automatically procures an IP address when required.
Subnet Mask:	A subnet mask allows the flow of network traffic between hosts to be segregated based on a network configuration, improving network security and performance.
Default Gateway:	The node on the computer network chosen when an IP address does not belong to any other entities in the Routing Table. Usually the node connecting internal networks to the Internet and associated with a router and a switch.
DNS IP Address:	DNS (Domain Name System) servers translate human-readable domain names into machine-readable IP addresses and the reverse.
DHCP Client Mode Enabled:	DHCP (Dynamic Host Configuration Protocol) automates network-parameter assignment to network devices from one or more DHCP servers, making it easy to add new machines to a network.

When all settings have been completed, click **Submit** to activate the changes. If the settings are not activated and you close the screen, any new settings will not be applied and will be lost.

If all RF parameters are correct and the A/V ports are set up correctly, submission should enable the DVISn QAM modulator and your new QAM channel should be available at the RF output port.

### 3.3 RF Output Connections

The output power level at RF OUT is set between 45 and 58 dBmV in the DVISn Settings screen.

### 3.4 Legacy Set-Top Box Settings

For systems using older set-top boxes such as DCT2000 and older Motorola STBs based on Cisco® standards, ensure that Lock to V-sync and QBA Enable are selected on the DVISn Settings screen (a check mark appears in the box).

## FIRMWARE UPGRADE INSTRUCTIONS

### 4. Firmware Upgrade Instructions

The following procedures provide detailed instructions for upgrading DVISn firmware. They require a self-installing firmware file supplied by ATX and a laptop or desktop PC running any OS supporting a web browser with available Ethernet connection (called the “management computer” in the following procedures). They also assume that the DVISn has been installed and is operating properly.

#### 4.1 Save Firmware Update to PC

Save the firmware update file in a convenient location on the management computer. This file is in .tgz format and contains the version code for this update (at publication date, the version code is 0.998).

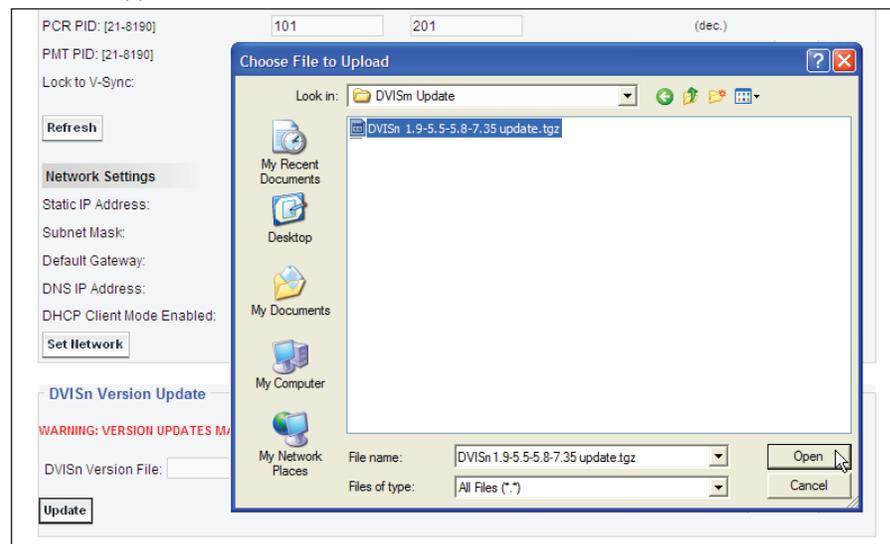
#### 4.2 Connect PC to DVIS/DVISn

Set appropriate network parameters on the management computer in order to access the DVIS remote management interface. For example, if the network address for the DVIS/DVISn is set to the factory default setting (192.168.0.23) and you are using a Windows based PC:

1. Set the management computer’s Ethernet interface to a static IP address on the 192.168.0.x subnet.
  - a) From the Control Panel, open **Network Connections** and select the connection associated with the Ethernet adapter to be used for connecting to the DVIS/DVISn (e.g., Local Area Connection).
  - b) Right click on the connection and select **Properties**.
  - c) Select **Internet Protocol (TCP/IP)** and click **Properties**.
  - d) Click the selection box beside **Use the following IP address** to enter a check mark in the box.
  - e) In the **IP address** field, enter 192.168.0.x (where x represents any number from 1-253 except 23).
  - f) In the **Subnet mask** field enter 255.255.255.0.
  - g) Click **OK** and then **OK** again in the previous window.
2. Connect the management computer’s Ethernet adapter to the DVIS/DVISn Ethernet port using a CAT5e crossover cable (supplied with the unit).
3. On the management computer, open a web browser and enter **http://192.168.0.23** in the address field.
5. The DVISn Settings screen appears.

##### 4.2.1 Upload Firmware to DVISn

1. In the **DVISn Version Update** box, click **Browse**, navigate to the location of the saved .tgz file and click **Open**. The file name and location appear in the DVIS Version File selection box.



3. Click **Update** to begin uploading the file to the unit. A progress bar indicates the percentage completion (0 to 100%).

When the upload is finished, file installation begins automatically. When installation has completed (which can take several minutes), the DVIS/DVISn reboots (indicated when the fan shuts off for a few seconds and then restarts). Wait 10-15 seconds after the fan restarts for the reboot to complete.

4. Check **DVISn Software Version** and verify that Version number is the same as the number in the name of the firmware update file.
5. Close the Web browser.

## SERVICE & SUPPORT

### 5. Service & Support

#### 5.1 Contact ATX Networks

Please contact ATX Technical Support for assistance with any ATX products. Please contact ATX to obtain a valid RMA number for any ATX products that require service and are in or out-of-warranty before returning a failed module to ATX.

##### TECHNICAL SUPPORT

Tel: 289.204.7800 – press 1  
Toll-Free: 866.YOUR.ATX (866.968.7289) USA & Canada only  
Email: [support@atx.com](mailto:support@atx.com)

##### SALES ASSISTANCE

Tel: 289.204.7800 – press 2  
Toll-Free: 866.YOUR.ATX (866.968.7289) USA & Canada only  
Email: [insidesales@atx.com](mailto:insidesales@atx.com)

##### FOR HELP WITH AN EXISTING ORDER

Tel: 289.204.7800 – press 3  
Toll-Free: 866.YOUR.ATX (866.968.7289) USA & Canada only  
Email: [orders@atx.com](mailto:orders@atx.com)  
Web: [www.atx.com](http://www.atx.com)

#### 5.2 Warranty Information

All of ATX Networks' products have a 1-year warranty that covers manufacturer's defects or failures.



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