Axino
Multi-program IP Transport Stream Loudness Processor
Guide to Installation and Operation

M948-9900-103
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A **BELDEN** BRAND

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Safety Compliance

C US

This equipment complies with the requirements of the following standards for Safety of Information Technology Equipment:

- CSA C22.2 No. 60950-1-07 (2nd Edition)
- UL 60950-1 (2nd Edition),
- IEC/EN 60950-1 (2nd Edition)

WARNING: An appropriately listed/certified mains supply power cord must be used for the connection of the equipment to the mains voltage at either 120V~ or 240V~.

CAUTION: These servicing instructions are for use by qualified service personnel only.
To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified service personnel. Servicing should be done in a static-free environment.

Electromagnetic Compatibility

FC This equipment has been tested for verification of compliance with FCC Part 15, Subpart B requirements for Class A digital devices.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference, in which case the user will be required to correct the interference at his own expense.

CE This equipment has been tested and found to comply with the requirements of the directive 2004/108/CE:

- EN 55022 Class A radiated emissions
- EN 55022 Class A conducted emissions
- EN 61000-3-2 Harmonic current emission limits
- EN 61000-3-2 Voltage fluctuation and flicker limitations
- EN 61000-4-2 Electrostatic discharge immunity
- EN 61000-4-3 Radiated EMF immunity – RF
- EN 61000-4-4 Electrical fast transient immunity
- EN 61000-4-5 Surge immunity
- EN 61000-4-8 Power frequency magnetic field
- EN 61000-4-11 Voltage dips, short-interruption and voltage variation immunity
- ENV 50204 Related EMF Immunity - 900 MHz pulsed

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Additional Warnings:

Laser Safety: This product contains light emitting diodes (LEDs) which are classified for safety of use under EN 60825-1. This label identifies the presence and classification of these components.

Standalone Equipment – Laser source(s) employed:
CLASS 1 LASER PRODUCT
APPAREIL À LASER DE CLASSE 1

Installation: This product is intended for installation in a Restricted Access Location only.
To be installed in the field by trained personnel according to the instructions and warnings in the installation manual provided with the equipment. Due to the heavy weight of the product, the rack in which the product will be installed shall be anchored to the building structure

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1. Axino – Multi-program IP Transport Stream Loudness Processor

1.1 Introduction

The Axino is an EBU R128 and A/85 loudness monitoring device that can effectively identify potential loudness variations directly from compressed TV channels. The embedded Audio Loudness Analyzer eases the process of reviewing potential loudness excursions and helps quickly identify and report loudness problems.

When faulty channels are identified, the internal real-time loudness processor can be selectively enabled to correct both channel-to-channel and program-to-interstitial loudness issues. For instance, the built-in automatic loudness control (ALC) can eliminate excessive loud commercial advertisements.

Designed for multichannel operators and distributors, the Axino can monitor and process the highest number of programs on the market, with individual control of each program. To assist with loudness compliance, Axino logs measured loudness across all monitored channels. The logs can be later analyzed and conformance reports can be generated.

1.2 Key Features and Benefits

Identify loudness issues with loudness monitoring

- Loudness measurements using ITU-R BS.1770-2 for up to 50 (Axino-400) or 200 (Axino-410) audio programs.
- A/85 and EBU R128 loudness profiles
- Automatic long-term audio loudness mismatch alarming
- Easily catch loud commercials using the short-term loudness alarms
- Audio Loudness Analyzer tool helps quickly identify issues
- Reporting tool generates conformance proof

Designed for high performance IP transport streams

- Only selected audio PIDs are replaced within the TS; all other PIDs remain unchanged
- Fit your installation with SFP Ethernet ports for optical or electrical connectivity
- Flexible UDP unicast or multicast streaming
- IGMPv3 MSM and SSM for multicast traffic control
- Note – only constant-bitrate transport streams are supported

Easy to set-up and control

- Built-in web site for remote configuration and monitoring
- Integrates with iControl
- Convenient SNMP traps for third party monitoring software

Eliminate loudness variations

- Built-in real-time loudness correction using proprietary high-efficiency automatic loudness control (ALC)
- Selectively enable correction on a per PID basis for up to 50 (Axino-400) or 170 (Axino-410) audio programs.
- Eliminate loud commercials and normalize loudness across all TV channels

Safe In-Signal Path Operation

- Redundancy for device (1+1) guarantees service availability at all times
- Allow sharing licenses with redundant unit to save cost
- Automatic stream failover on backup port (SFP model only)

1.3 About this Manual

This manual introduces the concepts behind Axino, and then describes how to install, configure and use Axino.

Installing Axino – see Section 2.

Using Axino – see Section 3

Configuring Axino – see Section 4

More about Axino – see Sections 5 through 7

FAQ – see section 8

2 Getting Started

2.1 Preliminary IP configuration

In order to configure the Axino, the user must access a built-in web site. To access this site, the MNGT1 port must be used. The Axino is shipped with a default IP configuration and therefore the user will need to statically configure a PC to communicate with the Axino the first time.

Proceed as follows:

1. Power up the Axino (the power switch is located beneath the face plate)

Note: *For the AXINO-400-SFP and AXINO-410-SFP models, the SFP modules for the GBE1 to GBE4 ports should* ***never*** *be removed or installed while the unit is powered-on.*

ALWAYS power the unit down before removing or installing an SFP module.

2. Connect rear panel ethernet control port 1 (labeled MNGT1; see section 2.2 below) to a computer equipped with a browser, and configured with static IP address 10.0.3.101 and mask 255.0.0.0.

   Axino has a built in web server. It is shipped with these default IP addresses for its ports:

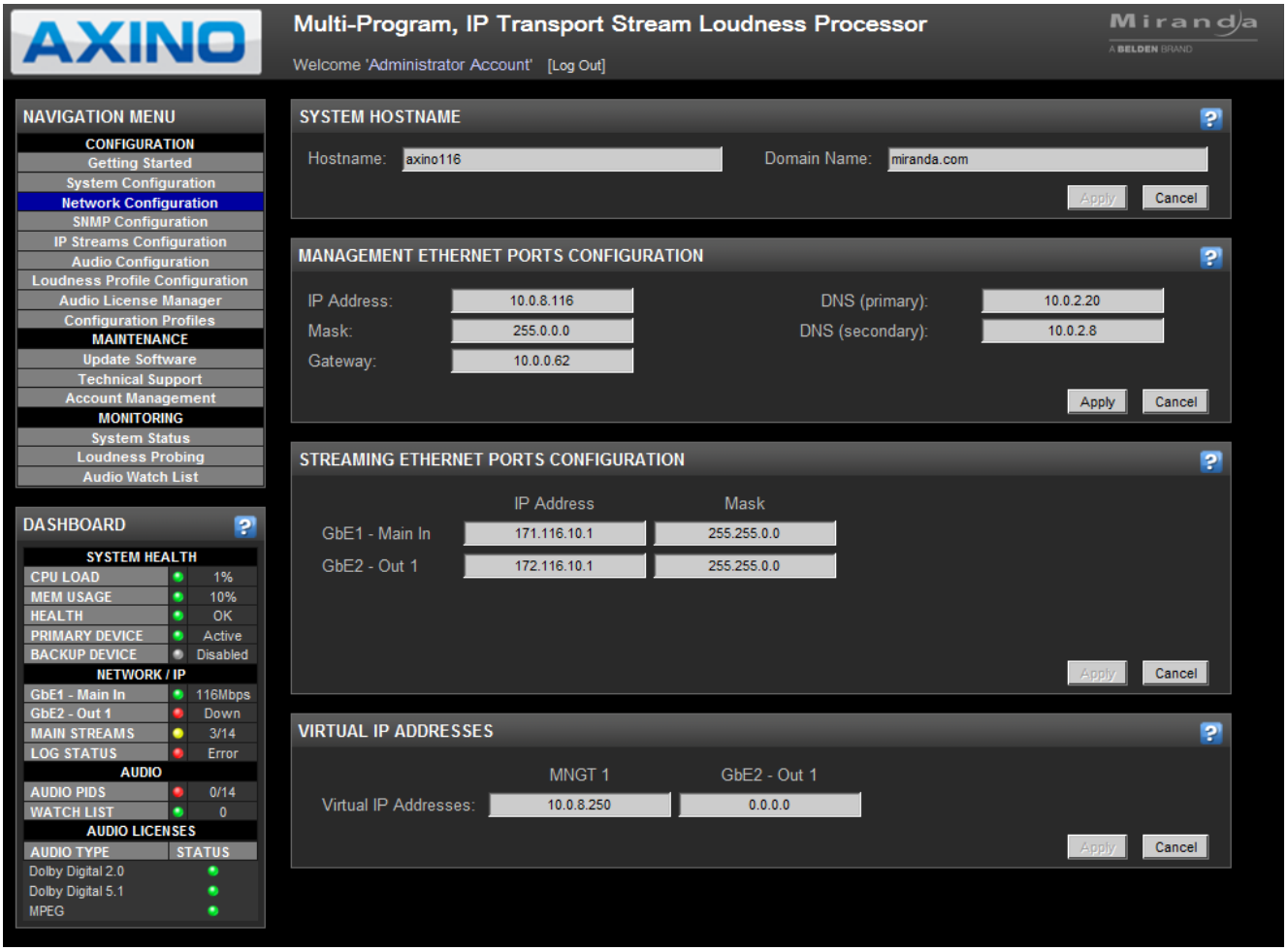
   - MNGT1 = 10.0.3.100 netmask 255.0.0.0
   - GbE1 = 172.30.3.100 netmask 255.0.0.0
   - GbE2 = 173.30.3.100 netmask 255.0.0.0
   - GbE3 = 174.30.3.100 netmask 255.0.0.0
   - GbE4 = 175.30.3.100 netmask 255.0.0.0

3. Browse to the Axino by typing the IP address 10.0.3.100 directly in the browser's address bar. Axino's User Login page will be displayed.

4. Enter a Username and Password, then click Login to open the Axino web page.

   The Axino is shipped with these default values:
   Username = admin
   Password = ChangeMe

5. In the Navigation Menu, select Network Configuration



6. Under Management Ethernet Ports Configuration, set up the IP Address, Mask and Gateway to conform to your network configuration, in consultation with your IT department if necessary.

7. Apply the new settings. As a result, the Axino will change its IP address, and will no longer communicate with the PC at address 10.0.3.100.

8. Disconnect the crossover cable and power down the Axino.

Axino is now ready to be installed in its operating location.

NOTE: If the IP address of the MNGT1 port was changed from the factory default value, and the new address has been lost, you can reset the Axino to the default port addresses listed above by pressing the POWER button three times in quick succession.

Alternatively, you can read the new address by removing the metal plate from the front of the VGA port on the back of the unit and connecting a VGA monitor. The IP configuration will be displayed on the screen.

2.2 Installation and Connection

The Axino is a 1 RU rack-mountable package, with all ports accessible from the rear. The pictures below show the port locations for all versions of the Axino.

Install the Axino at a convenient location, with access to the necessary data connections.

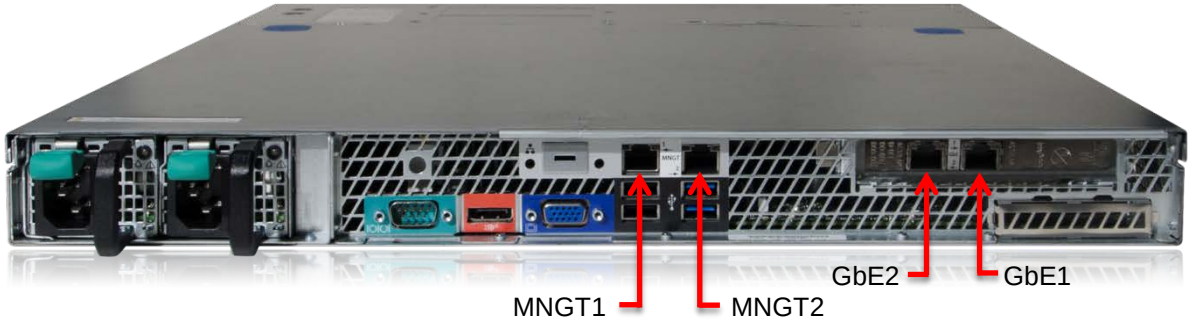
Rear panel port layout:

- MNGT1: Management port 1, for access to the Axino for configuration and control
- MNGT2: Management port 2, Used to connect 2 Axino units together (Primary and Backup) when using the device redundancy feature. Unused otherwise.
- GbE1: Gigabit Ethernet port 1, for streaming program I/O
- GbE2: Gigabit Ethernet port 2, for streaming program I/O
- GbE3: Gigabit Ethernet port 3, for streaming program I/O (on Axino 400-SFP and Axino-410-SFP only)
- GbE4: Gigabit Ethernet port 4, for streaming program I/O (on Axino 400-SFP and Axino 410-SFP only)

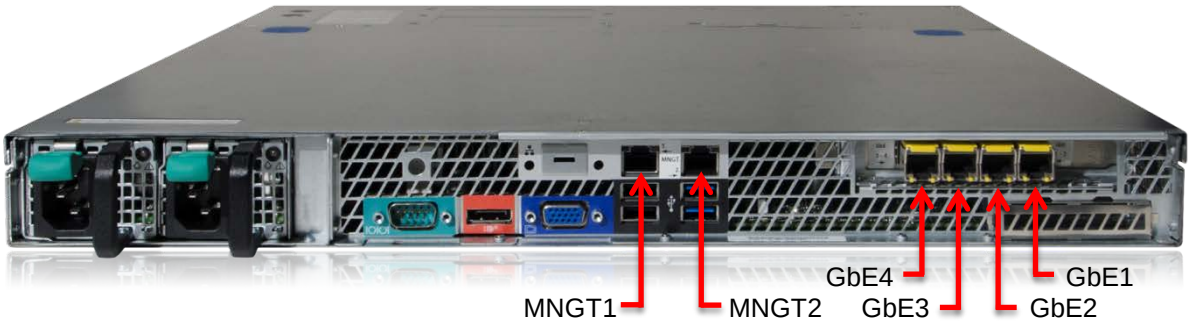
Connect the Axino to your LAN via the MNGT1 port. See Section 4 of this manual for detailed configuration instructions.

2.2.1 Axino 400 Rear Panel and port locations

Axino-400

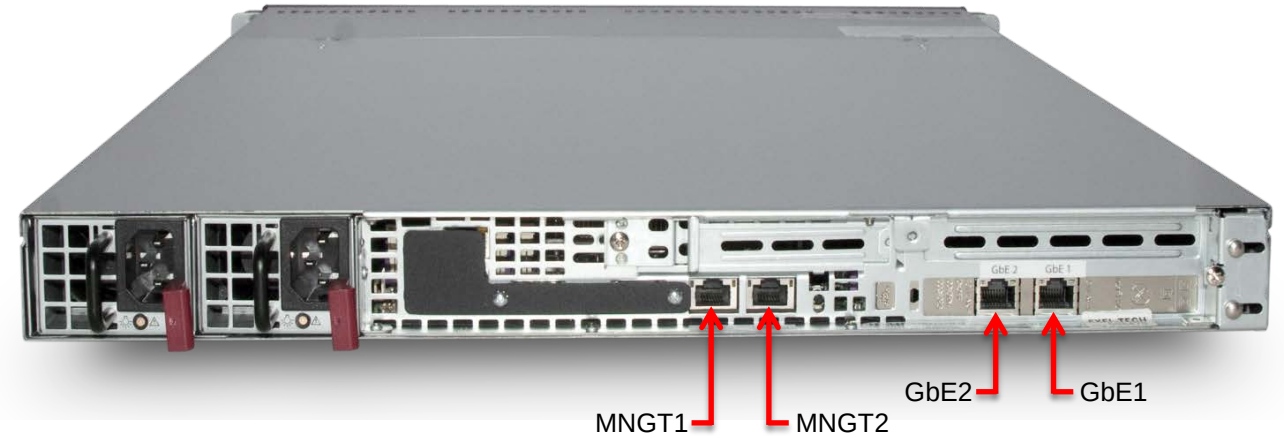


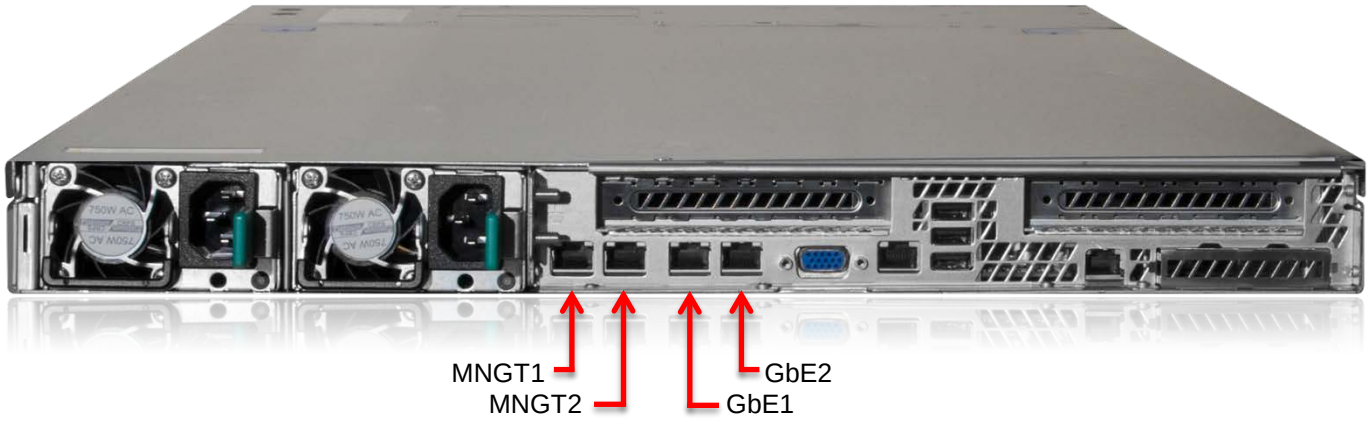
Axino-400-SFP



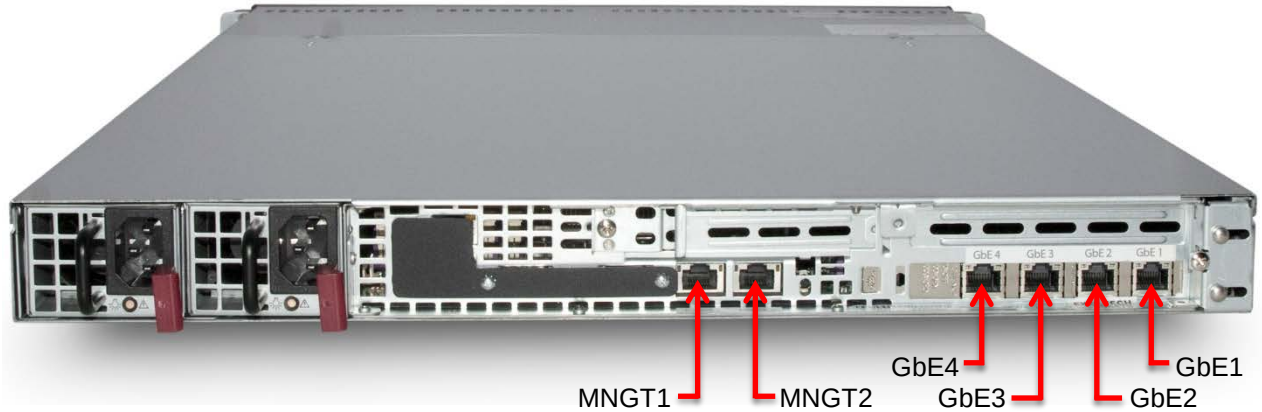
(Fiber or RJ45 on SFP modules)

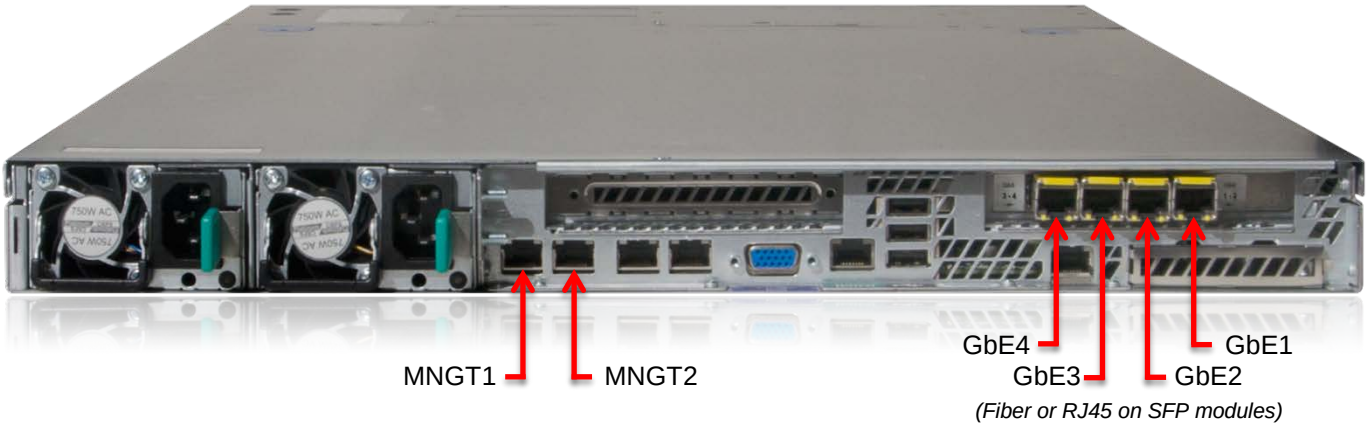
Axino-410
There are two different hardware configurations for the Axino-410. Both rear panels are shown here.





Axino-410-SFP
There are two different hardware configurations for the Axino-410-SFP. Both rear panels are shown here.




MNGT1
MNGT2
GbE4
GbE3
GbE2
GbE1
(Fiber or RJ45 on SFP modules)

3 Using Axino

Axino is a self-contained audio loudness measurement and correction tool, capable of processing many audio streams simultaneously. Input and output of program streams is handled by a pair of bidirectional GigE Ethernet ports. The control and user interface is realized through web pages from an on-board server. Two control ports are provided. Axino is a 1 RU rack-mountable package, with all interface ports on the rear panel.

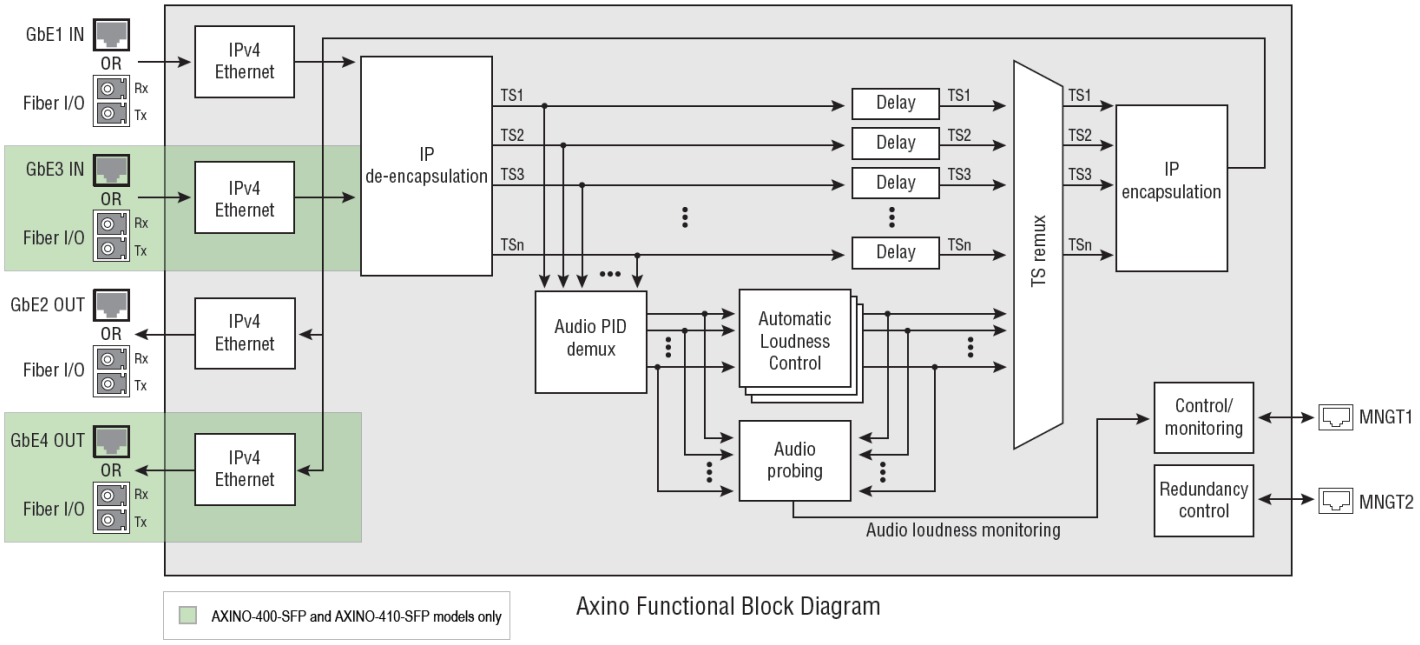


Figure 3.1 *Functional Block Diagram*

The block diagram illustrates the principle of Axino's operation.

- Multiple transport streams are de-encapsulated from the input data stream.
- Audio programs are demuxed from each transport stream
- Audio programs are probed and logged
- ALC is applied using Miranda's ALC algorithm when required
- The modified audio programs are re-inserted into the transport streams, which have been delayed to match the ALC timing
- The updated transport streams are encapsulated into the output data stream.

3.1 Measuring Loudness

Loudness is defined as the perceptual intensity of sound. A standard audio level meter can tell you the level of the audio signal, but perceived loudness is a complex matter, affected by such factors as the frequency distribution of energy in the signal and the duration of the sounds in addition to the physical intensity. Two sounds that measure the same on an audio level meter may be significantly different in perceived loudness when listened to.

Therefore, measuring loudness, a subjective perception, using objective methods is a complicated business. The audio signal is analyzed using an algorithm which may be very complex, and is usually proprietary. The user may have controls

that allow him to customize the analysis to some degree. However, the ATSC and EBU have both put in place a recommendation as how to measure loudness based on the ITU-1770. The Axino offers both methods.

Due to legislation in many countries, measuring loudness and keeping a history of it is required. Problems such as loud commercials or inter-channel loudness variations must be eliminated and hence monitored for compliance. The Axino is the ultimate tool for measuring and keeping a history of the loudness of audio programs

3.2 Controlling Program Loudness with Axino

An AC-3 compressed audio program stream contains metadata, one element of which is DIALNORM. This stands for "dialog normalization", and is a value inserted by the program producer as a reference which can be used by downstream processors to establish program volume levels so that volume can be consistent from program to program, and channel to channel. The value was originally intended to indicate the level of average spoken dialog within the encoded audio program, but the definition of dialnorm has been upgraded over time to deal with overall program content instead of just dialog levels.

Unfortunately, the promise of dialnorm has not been fully realized. There are several factors which make it a difficult concept to implement.

The program producer must determine the dialnorm value for the entire program segment. The relevant standards specify the process, which requires specific filtering and signal analysis. Not all producers are equipped to make these measurements accurately, if at all. As the program must contain dialnorm data, a producer who has done no analysis may insert a fixed value for all program material. If the analysis is made but is inaccurate, the perceived loudness may not reflect the calculated dialnorm value.

Further down the production chain, segments from different sources are integrated into a single program stream. It is at this point that inconsistent application of dialnorm comes into play, as the perceived loudness may jump at the crossover between segments. At the viewing location, switching between channels may result in similar loudness jumps. In each case, it is the viewer who is impacted by inconsistent volume levels.

Solving this problem cannot be done on an instantaneous basis, because of the short-term variability of audio levels within a program. What can be determined is a consistent, longer-term tendency for excessive loudness variations in a program stream. Once this tendency is identified, steps can be taken to eliminate it.

Compounding the problem for program aggregators is the large number of channels passing through their facilities. All of these channels need to be monitored for loudness problems, but not all will need active correction.

Axino addresses these issues efficiently and effectively:

- Axino allow the user to MONITOR the audio from many channels simultaneously.
- Axino IDENTIFIES and LOGS problematic audio streams.
- Axino can CORRECT inconsistent volume levels in problematic streams as required by the user.
- Axino does not affect stream integrity – audio is demuxed, analyzed and processed, and then re-inserted if corrections have been applied.

3.2.1 Monitoring and Alarming

Loudness Measurements

Audio loudness measurements can be done following two different algorithms: ATSC A/85 or EBU R128. Although they are similar in nature, they might return significantly different results. The Axino operates in one or the other mode for all audio PIDs. This selection can be made in the *Loudness Probing Configuration* menu.

Typically, a loudness meter will offer three readings:

Momentary Loudness:	Values returned by the ITU-1770 loudness probe which average the audio sample level over a period of 400ms every 100ms. As a result, 10 momentary loudness readings are generated every second. In Axino, these values are the foundation of the loudness logs. The values are logged in a file for later analysis by the Audio Loudness Analyzer. By themselves, momentary values are not really meaningful. They are used to derive the short-term and integrated loudness values.
Short-Term Loudness:	The momentary loudness values are averaged by a moving window of configurable length. For instance, if the window is set to 3 seconds, then the short-term loudness represents the average of the latest 30 momentary loudness samples. In Axino, the loudness values shown in the user interface are all short-term. It is normal for the short-term loudness to vary greatly outside the normal loudness tolerances particularly during movies. While a short-term deviation does not necessarily represent a problem, this measure is useful in catching loud commercials.
Integrated Loudness:	Also referred to as "long-term" loudness. This value is the average of all momentary loudness values taken over the course of a specific audio segment. An audio segment starts at the beginning of a TV program and stops at the end. For instance, the integrated loudness of a movie is the average of the loudness on its entire length. The integrated loudness of a commercial is the average loudness taken over its duration. In AC3 audio, the DIALNORM should be really close to the integrated loudness.

Both the A/85 and EBU R128 integrate the concept of *gating window*. The use of gating can significantly change the results especially on quiet programs. The idea behind gating is to ignore samples that are much lower than the expected target value. This effectively removes silences from calculations.

The Axino will measure the loudness of all incoming audio PIDs (input loudness). It also measures the loudness at the output of the correction modules (output loudness). The output loudness represents what is coming out of the Axino and is a verification of the ALC algorithm. If ALC is not enabled on the audio, the output loudness is the same as the input loudness.

Loudness Verification/Alarming

The Axino performs two distinct loudness verifications in order to generate alarms. One is based on the short-term loudness, the other on the integrated (long-term) loudness. In both case, the point of reference depends on the type of audio:

Audio Type	Input reference	Output reference
AC3	Incoming DIALNORM	User-configurable target value
MPEG	User-configurable target value	Same as input reference

The loudness tolerance values are always relative to the reference point. Therefore the reported loudness error is relative to this reference.

Short-Term Loudness

The short-term loudness values are verified against the user configurable tolerance. If then short-term loudness values are outside the tolerance range for a consecutive configurable period of time, an alarm is generated. The main purpose

of the short-term verification is to catch loud commercials. Setting the duration to 80% of the average commercial length with a tolerance of 3dB will catch most loud commercials. Note however than false alarms are possible. For example, action scenes in movies may last a few minutes. Those scenes tend to be much louder and thus may have a short-term loudness over the tolerance for a few minutes. To avoid this, the duration can be set to 10 minutes, but this setting will then not catch loud commercials of 30sec (too short).

Long-Term Loudness

The long-term loudness is useful to catch wrong DIALNORM or target loudness values. Technically, audio segment boundaries must be known in order to get an accurate reading. Because the Axino has no indication of the beginning or end of an audio segment, it approximates the segment boundaries by integrating loudness over a specified period of time. For instance, most TV schedules have programs starting at the hour or half-hour. Setting the Axino to integrate over 30 minutes with a reference at the hour will simulate the proper audio boundaries. Because the integration period is large, inaccuracies have virtually no effect on the end result. This method cannot catch loud commercials because their length is too small compared to the integration period. The effects of a loud commercial on the integrated loudness are negligible.

Choosing the integration period

A very long integration period tends to be more accurate when trying to catch those channels with consistently wrong DIALNORM. A very short integration period may make it possible to catch shorter loud audio segments. However, a short integration period may cause false alarms as the audio dynamics may be wide on a specific audio segment. Loud sub-segments are allowed within an audio program as long as the overall loudness matches the target value.

The recommendation is to set this setting so as to mimic program segments. The recommended setting is an integration of 30 minutes with a reference set at the half-hour.

Loudness Analysis

The ultimate tool to analyze and review loudness levels are the loudness logs. They contain all the necessary loudness values (namely momentary values) to re-calculate the integrated loudness over any specific interval in time. Therefore, the user can easily manually select the boundaries of an audio segment and look at the integrated loudness. The Audio Loudness Analyzer is a tool provided with Axino for this purpose. See page 12 for information about launching the Audio Loudness Analyzer.

3.2.2 Logging

Loudness logs are a powerful tool to identify audio loudness problems and report them to the content originator. Configuring and using the logs from the Axino is easy.

Step 1: Configuration

The logs are not stored in the Axino itself - they are saved onto a remote network shared drive. This allows for a quasi-infinite amount of data to be logged. Using IT backup systems, the logs can also be easily archived.

In order to enable the logs, the user must configure the remote network path properly. The Axino will accept any network share compatible with the CIFS standard. Linux and Windows shared path are compatible and will work. Simply access the System Configuration page (see section 4.2) to configure the shared drive that will be used to store the logs.

Do not configure multiple Axinos to log in the same shared folder! Conflicts will result and the logs may become corrupted. Create a separate shared folder or sub-folder for each Axino

The logs can be enabled on a per audio PID basis. The logging is enabled by default when a new PID is added to the list. To confirm this, access the Audio Configuration page (see section 4.6) and verify the log checkbox.

Step 2: Logging

The Axino generates folders named with the current date YYYY-MM-DD every day. It then creates a single log file per audio PID per day in that folder. The file name is built from the current date, PID number and an additional count in case the same PID & audio name appear more than once. The user does not really have to care much about finding log files as they can be accessed directly by clicking the audio in the user interface.

The Axino will log all momentary loudness values (10 times per second) along with special markers to ease later analysis. Note that one audio PID will generate ~11MB of data every 24h.

Step 3: Viewing

The logs can be viewed with the Miranda Audio Loudness Analyzer.

Simply access the Loudness Probing Status page or Audio Watch List and click on the icon  in the LOG column beside the audio you wish to analyze to launch the tool.

Note that Java is required to run the tool. The proper log file will be opened automatically showing the last hours of logs. Once the Audio Loudness Analyzer window is open, you can access its User Manual using the *Help-Manual* pulldown.

Step 4: Maintaining Logs

Since the logs reside on a remote network drive, maintaining the logs is made simple: off-the-shelve archiving software can be used. The logs history is limited only by the space available on the network shared drive. Due to the large size of each file, it is recommended to automatically compress the files the following day or once per week. Note however that compressing or archiving log files will make them inaccessible by the loudness analyzer tool.

3.2.3 Correcting

The Axino can adjust the audio loudness in real time so that, on average, the loudness is close to a specified target value.

How this works

The Axino incorporates the award-winning Miranda Automatic Loudness Control that can process multiple compressed audios with up to 6 channels (L, R, C, sL, sR, lfe) each. The algorithm constantly measures the incoming audio loudness and decides, depending on configuration, whether to apply a dynamic gain. See Loudness Profile Configuration (section 4.7.3) for more information about how the ALC can be customized so that it reacts quickly or slowly to incoming loudness variations.

Effects on the audio

Loudness control has an effect on the original dynamic range of the audio program. To limit this effect, it is important to make sure to use the proper configuration. A very fast and aggressive setting will remove most of the dynamic range and will produce a constant loudness. A smooth and slow setting will not affect the dynamic range as much but will not be able to react fast enough to loud commercials.

AC3 Audio services need to be re-encoded after the ALC is performed. During that process, because the AC3 DRC mode is not carried in the metadata, the user needs to specify a DRC mode to use during re-encode. This DRC mode is attached to the loudness profile selected for the AC3 audio service. This only applies to AC3 audio.

Configuration

1. First make sure to set the loudness profiles properly (see Loudness Profiles configuration)
2. Access the Audio configuration page and select the desired loudness profile for each audio PID.
3. Set the desired target loudness for the PID
4. Activate the ALC using the checkbox for each PID

3.2.4 Working with Alarm Logs

All the generated alarms are saved to a file in the root of the network path specified in the System Configuration page (see section 4.2). One file is created every 24 hours at midnight. The file names take the form *alarms_YYYY_MM_DD.log* where YYYY_MM_DD is the date. As the extension of the file suggests, it is a comma separated value file that can be opened in Excel.

Each log file contains the following columns:

Column Name	Description
Timestamp	Axino date and time (taking time zone into account) at which the alarm occurred
Src	Stream source IP & port on which the alarm occurred, if available
PID	Audio PID that generated the alarm, if applicable
TSID	TS_ID of the transport stream on which the alarm was generated
Audio Name	Name of the audio that generated the alarm
Program Number	Program number on which the audio PID resides
Alarm Name	The name of the alarm, as per table below
Status	State of the alarm: normal, error, critical, warning
Description	Text associated with the alarm that explains what happened

A list of the Alarm Names that may appear and details of the significance of each are given in the following table:

Alarm Name	Alarm Text	Explanation/Meaning
Audio PID Presence	PID OK	PID is present and valid
	Audio stream is encrypted	PID is encrypted and cannot be processed
	Ghost PID: no data present on PID	The PID is referenced from the PMT but no data found on the PID. Therefore this PID cannot be processed.
	Not referenced by any PMT	The PID is not referenced by any tables and does not exist
	The TS for that PID is not present	The stream on which the PID is carried is currently missing. As a result the PID is also missing hence not processed.
Server health: voltage	String from IPMI	The error reported is the string returned by the IPMI module. The string will clearly state what the problem is. In the case of a health error, contact Miranda customer support.
Server health: temperature	String from IPMI	
Server health: power supply	String from IPMI	
Server health: voltage	String from IPMI	
Server health: CPU usage	CPU usage under 78%	This means the Axino will operate normally
	CPU usage over 78%	This means the Axino may become faulty soon. The user should not configure any more PIDs to allow the CPU to stay below 78%.
Server health: memory usage	Memory usage under 80%	The memory usage is OK
	Memory usage over 80%	The Axino is about to lack memory. In such case, try to reduce the number of PIDs processed by the Axino.

Server health: gbe1 traffic	GbE1 traffic under 900 Mbps	Reports when the Ethernet stream traffic is higher than 900Mbps. If higher, the user should expect lost Ethernet packets which in turn will result in signal degradation.
	GbE1 traffic over 900 Mbps	
Server health: gbe2 traffic	GbE2 traffic under 900 Mbps	
	GbE2 traffic over 900 Mbps	
Loudness Log Path	Mounted network drive	The network path for the loudness logs is OK. This means loudness logs are working and being written.
	Error from errno	The network path is not working, hence loudness and alarms are not being logged.
Input Loudness (Long Term)	Mismatch of X dB	X will state the actual number. This entry is logged whenever a PID is analyzed and the long-term input loudness error falls outside the allowed mismatch tolerance.
	Integrated loudness value within mismatch tolerance	The PID that was previously in a loudness error state came back to normal. In other words, the PID is no longer in a long-term loudness error state.
	Loudness error reset	Unexpected loudness error reset. May be due to a re-configuration of the loudness profile.
	PID was deleted	The PID was removed from the Axino configuration and is no longer measured
	New loudness profile associated with PID	The loudness profile for the PID was changed. This means that the loudness error verification restarted.
	PID in error	The PID became in error making it impossible to probe loudness
	Manual Loudness Error Reset	Someone used the manual reset button from the audio loudness probing page on the Axino.
Output Loudness (Long Term)	Mismatch of X dB	X will state the actual number. This entry is logged whenever a PID is analyzed and the long-term output loudness error falls outside the allowed mismatch tolerance.
	Integrated loudness value within mismatch tolerance	The PID that was previously in a loudness error state came back to normal. In other words, the PID is no longer in a long-term loudness error state.
	Loudness error reset	Unexpected loudness error reset. May be due to a re-configuration of the loudness profile.
	PID was deleted	The PID was removed from the Axino configuration and is no longer measured
	New loudness profile associated with PID	The loudness profile for the PID was changed. This means that the loudness error verification restarted.
	PID in error	The PID became in error making it impossible to probe loudness
	Manual Loudness Error Reset	Someone used the manual reset button from the audio loudness probing page on the Axino.
Input Loudness (Short term)	Loudness value outside of mismatch tolerance	The short-term loudness value measured at the input was over the threshold value for at least the time indicated by the duration parameter.
	Loudness value within mismatch tolerance	The short-term loudness value is back within tolerance limits

Output Loudness (Short term)	Loudness value outside of mismatch tolerance	The short-term loudness value measured at the output was over the threshold value for at least the time indicated by the duration parameter.
	Loudness value within mismatch tolerance	The short-term loudness value is back within tolerance limits
Primary Input Stream Presence	Stream OK	Multicast/Unicast stream is detected on GbE1 (primary)
	No stream at input	Multicast/Unicast stream is missing on GbE1 (primary)
	Error receiving stream	Data present on multicast/unicast primary port but the stream is not a valid MPEG-TS.
Secondary Input Stream Presence	Stream OK	Multicast/Unicast stream is detected on GbE3 (backup)
	No stream at input	Multicast/Unicast stream is missing on GbE3 (backup)
	Error receiving stream	Data present on multicast/unicast backup port but the stream is not a valid MPEG-TS.
Stream redundancy	Primary stream restored	The stream is now taken from GbE1 (primary port)
	Backup stream engaged	The primary stream failed and the stream now comes from GbE3 (backup port)
Device redundancy	Switch to backup device	The primary device failed or a switch was forced to the backup device. As a result the backup device is now active.
	Return to primary device	The primary device is back online. As a result, the primary device became active and the backup device is standing

4 Configuration

Browse to the Axino via the MNGT1 port, using the IP address that was assigned to it in Section 2.1.

Note: Although the HTML interface should work in most browsers, it is recommended to use either Firefox 6.0 or Internet Explorer 8.0. Earlier versions are known to have display compatibility issues.

Axino's User Login page will be displayed.

Enter a Username and Password:

The Axino is shipped with these default values:

- Username = admin
- Password = ChangeMe

To change these values, see Account Management on page 42.

Click Login to open the Axino web page.

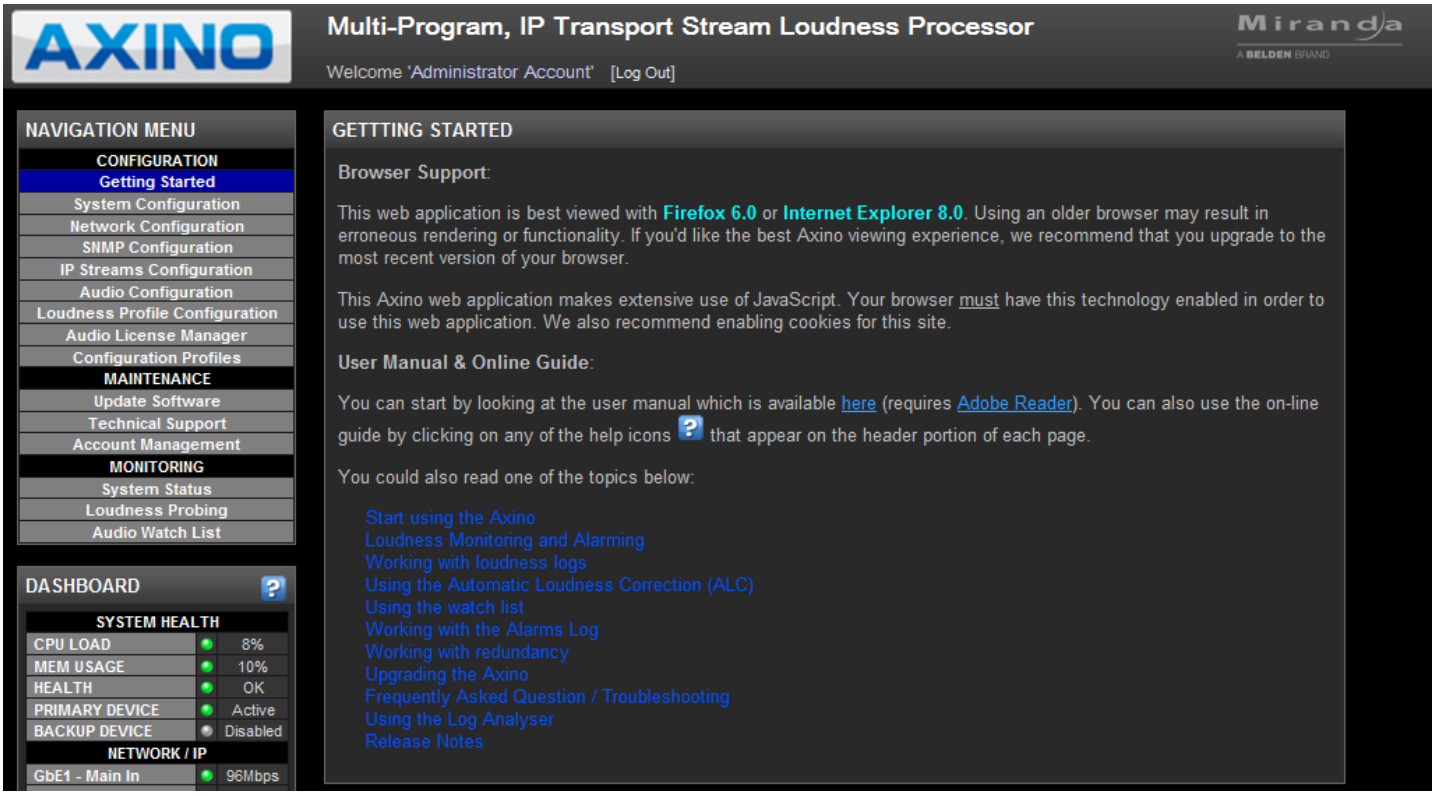
The Axino GUI consists of three panels:

- Navigation Menu – selects the contents of the main panel
- Dashboard – Shows the status of key operating parameters
- Main Panel – named as selected in the Navigation menu – the location of operating controls and settings

Via the Configuration section of the Navigation Menu, go to the various configuration panels to set up the Axino for operation.

4.1 Getting Started

The Getting Started panel provides information about using the available on-line resources to help the user understand and operate the Axino.



You may:

- Open the online version of this manual
- Click the help icon  in many of the main panels
- Click the links to selected help topics in this panel

4.2 System Configuration

The System Configuration panel gives access to system-level settings.

System Date and Time

The system date and time is used to identify the log files, so it should be set correctly.

Config Mode: The date and time can be entered manually, or can be updated from the network using an NTP server.

- Select MANUAL or NTP using the radio buttons

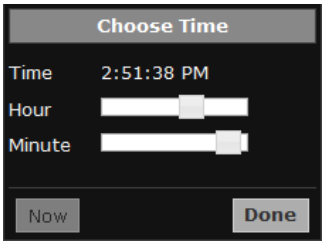
Manual Mode:

Date – click in the edit box and select the date in the calendar that appears.

Changing the system date requires a restart of the streaming services. A short service interruption will result

Time – click in the data box and use the sliders in the Choose Time window to set any desired time, or click Now at the bottom of the window to select the current time per your local computer's clock.

Time Zone – use the pulldown to select your local time zone, e.g. US/Eastern



NTP Mode:

If you have selected the NTP mode, enter the IP addresses of up to four NTP servers in the data boxes. The AXINO will scan through these and select the first valid time source it finds.

Click Apply when all settings have been entered, or Cancel to leave the settings unchanged.

Streaming Protocol

The Axino offers the ability to use RTP (Real-time Transport Protocol) instead of regular UDP (Universal Datagram Protocol) for streaming. Select this checkbox to use RTP on all sockets instead of UDP. The setting is global and applies to all multicast/unicast streams.

Loudness Logs

The loudness logs from this Axino provide a record of the measurements and actions of the Axino for all of the PIDs passing through it which have been marked for logging in the Audio Configuration panel. The logs are not stored on board Axino, but are placed in a storage location elsewhere on the network. From there they can be analyzed as required. See page 12 for information on how to launch the Audio Loudness Analyzer.

To set up the logging process, you must first create the shared folder structure on the remote shared drive (this cannot be done from the Axino) and then specify the path to the shared folder in this Loudness Logs dialog:

- Network Path – specify the path on the network to the shared folder you have set up to store the Axino logs.

  The network path takes the form of //<machine>/<shared name>/<folder> where:

  - <machine> is the IP address or the DNS name of the machine where the folder <shared name> exists. Make sure to either specify the domain in the name (ex: mymachine.mydomain) in the name or to configure the domain name properly (see Network Configuration).
  - <shared name> is the name given to the shared folder upon creation
  - <folder> is any subfolder within that share. Note the subfolder must already exist.

  For example, the shared path could be //10.0.3.4/AxinoLogs/Axino1 if the machine 10.0.3.4 has a shared folder named AxinoLogs with a subfolder Axino1 in it.
  Or if the machine name is "log" on a domain "hello.com": //log.hello.com/AxinoLogs/Axino1

Do not configure multiple Axinos to log in the same shared folder. Conflicts will result, and the logs could become corrupted. Create subfolders for each Axino.

- Username and password – these will be required for anyone to access the log files from the network.

  A user ID and password MUST be specified or the path will not be accepted. The user should make sure that the specified user name has full read-write access to the shared folder or the log files won't be written.
- Apply

Numeric Format Display

Use the pulldown to select whether the logs will display PIDs and TS_IDs in **Hexa**decimal or **Decimal** format

Note: The numerical display setting is saved as a cookie in the browser's cache. Cookies need to be enabled for this setting to work.

System Reboot

Click the button to restart the Axino.

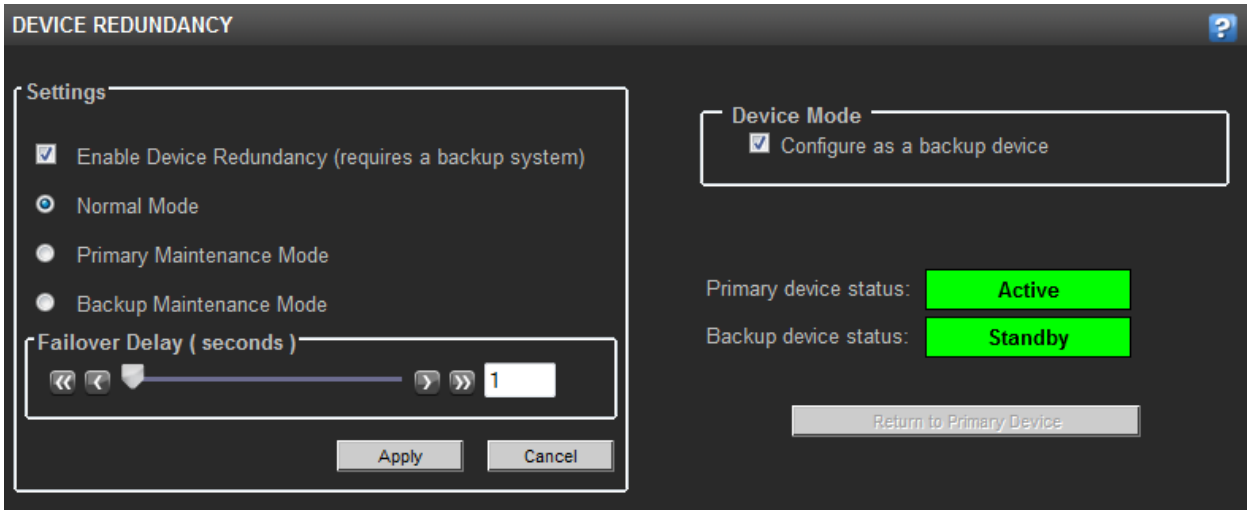
A system reboot will cause a service interruption for more than 1 minute

Device Redundancy

Device Redundancy implements the use of a second Axino unit to serve as a backup to the primary Axino in case of failure.

- A special version of the Axino, designated AXINO-4xx-BKP, is available for use in this application. This device shares licenses with the primary unit, and allows the implementing of a redundant system at lower cost.
- The MNGT2 port of the backup Axino must be connected to the MNGT2 port of the primary Axino, using a crossover cable.

The Device Redundancy configuration settings are found at the bottom of the System Configuration page.



Settings:

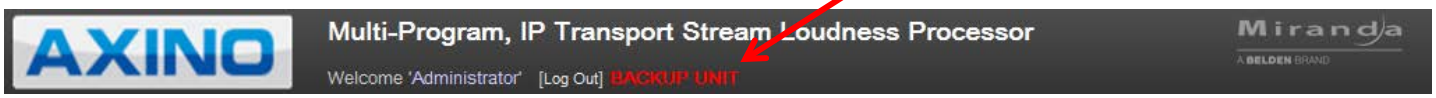
Enable Device Redundancy:	Select this checkbox to enable device redundancy. You must have a backup Axino connected to the MNGT2 port of the primary Axino Once Device Redundancy has been enabled, you can select the operating mode using the radio buttons
Normal Mode:	Automatically fail to the backup device in case the primary device loses all of its streams (e.g. if the link fails), or becomes unresponsive (e.g. power failure).
Primary Maintenance Mode:	Force the backup device to become active, allowing the primary device to be disconnected for maintenance.
Backup Maintenance Mode:	Force the primary device to remain active, preventing any switch to the backup device and allowing it to be disconnected for maintenance.
Failover Delay:	Set the delay between the failure of the primary device and the switch over to the backup device. Range: 0 to 30 sec.
Apply / Cancel:	Click Apply to confirm the selected settings and place them in force. Click Cancel to leave the previous settings unchanged.

Device Mode:

If you use a regular Axino as the backup unit in a device-redundant configuration, you must force it into backup mode using this checkbox.

The checkbox is forced into the selected mode when the backup device is an AXINO-4xx-BKP.

Note that you can always identify a backup device because its status is flagged at the top of the web page.



Device Status:

The *Primary Device Status* and *Backup Device Status* reporting boxes show the current status of these devices.

Primary Device Status

Active	Device is processing and streaming
Standby	Device is waiting and ready to take over streaming
Maintenance	Device is in maintenance mode. All traffic diverted to backup device
Problem	Device is unresponsive or broken.

Backup Device Status

Standby	Device is ready to take over in case the primary device fails
Active	Backup device currently streaming
Maintenance	Backup device is in maintenance mode. Switchover from primary device is not allowed.
Problem	Backup device is unresponsive or broken
Disabled	Device redundancy disabled

Return to Primary Unit:

Click this button to return the primary unit to service after a changeover.

- There is no automated return function; it must be done using this button
- The button is only enabled if the primary unit is in Standby mode.

4.3 Network Configuration

Navigate to Network Configuration.

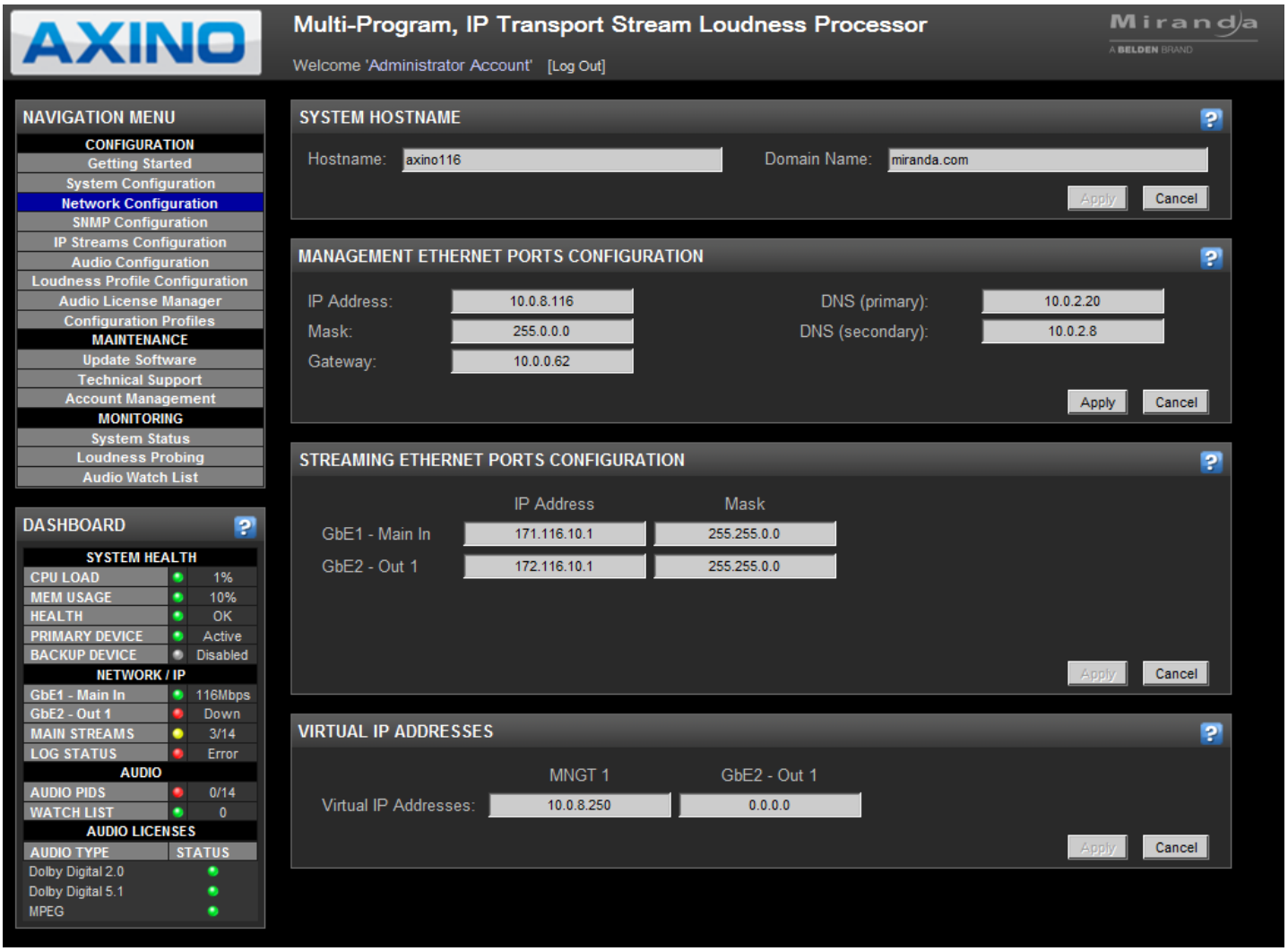
Some points to note:

Changing Network configuration will cause a service interruption. Make sure that the management port IP address and masks are set properly or risk not being able to access the Axino anymore. Should you lose connection with the Axino, connect the VGA port to a monitor. The IP addresses will be displayed.

Avoid using IP + mask combinations that would fall in the same subnet. The Axino will have trouble routing the packets to the right interface which may cause a total loss of communication with the Axino.

When using **virtual addresses,** do not change the physical IP address while the virtual address is active. You must set the virtual address to 0.0.0.0, change the physical IP address, and then reset the virtual IP address to its active value. Failure to follow this sequence could result in the loss of the Axino's output.

A switch, or any other equipment connected to the GigE Ethernet ports of the Axino ***must*** be set to ***Auto-Negotiate*** to avoid any network problems.



System Hostname

Hostname – Enter the name by which this Axino will be known on the management network.

- Name may contain only letters a – z (case insensitive), numbers 0 – 9, and hyphen.

Domain Name – enter the domain name of the local area network to which this Axino will be connected. This is useful only if you want to specify the network path to the shared folder in which you will save loudness logs (see Network Path) using a machine name rather than the IP address.

Management Ethernet Ports Configuration

The Management Ethernet Port (MNGT1) was configured before the Axino was installed in its operating location, in order to enable access to the device through the LAN. See Section 2.1 on page 3 for details. The settings may be changed here, if desired.

- This port is used to access the Axino user interface. It is also used for communication with a remote network shared drive for storing alarm and loudness logs.

Domain Name Server addresses

- Enter the IP addresses for a primary and a secondary DNS server that will be consulted by this Axino for IP address lookups.

Streaming Ethernet Ports Configuration

The functionality of the streaming ethernet ports is shown in the table:

Port Name	Description
GbE1	**Main In** – Primary streaming input interface. Use to receive the multicast/unicast transport streams.
GbE2	**Out 1** – Primary output interface. Normally feeds the primary network. All transport streams configured to be output will be sent through this port.
GbE3	**Backup In** – Only on AXINO-4xx-SFP models. Backup streaming input interface. When port redundancy is required, use this interface for backup streams. Note that the multicast address of the backup streams is assumed to be identical to the primary stream.
GbE4	**Out 2** – Only on AXINO-4xx-SFP models. Secondary output interface. Normally feeds the backup network. All output transport streams are mirrored to this interface. Note that only 1 multicast address can be configured for both GbE2 and GbE4.

The streaming ethernet ports must be configured to enable IP transport stream input and output. Consult your IT department, if necessary, to get the correct information.

- Enter the IP address and mask (by default, the gateway is the same as the one set for the MNGT1 port)

Virtual IP Addresses

Virtual IP Address – In order to allow a primary and a backup device to stream seamlessly to a downstream device, the IP source address must be the same for both. Therefore, the output ports of the primary and backup Axino must have the same virtual IP address when Device Redundancy is in use (see Device Redundancy on page **Error! Bookmark not defined.**).

- When the primary device has failed and the backup device is operating, the user interface can still be accessed from the MNGT 1 virtual IP address. Note, however, that nothing can be configured from the backup device.
- There are two output ports on each device, and these can be assigned different virtual IP addresses.
- The backup device will be automatically configured through its link with the primary device.
- To disable the use of the Virtual IP Address, set it to 0.0.0.0.; otherwise, it will still be active.
- Do not change the IP address while the virtual IP address is active; see the note above.

When settings have been entered, click Apply to put them into effect, or Cancel to discard the changes and leave the previous settings unchanged

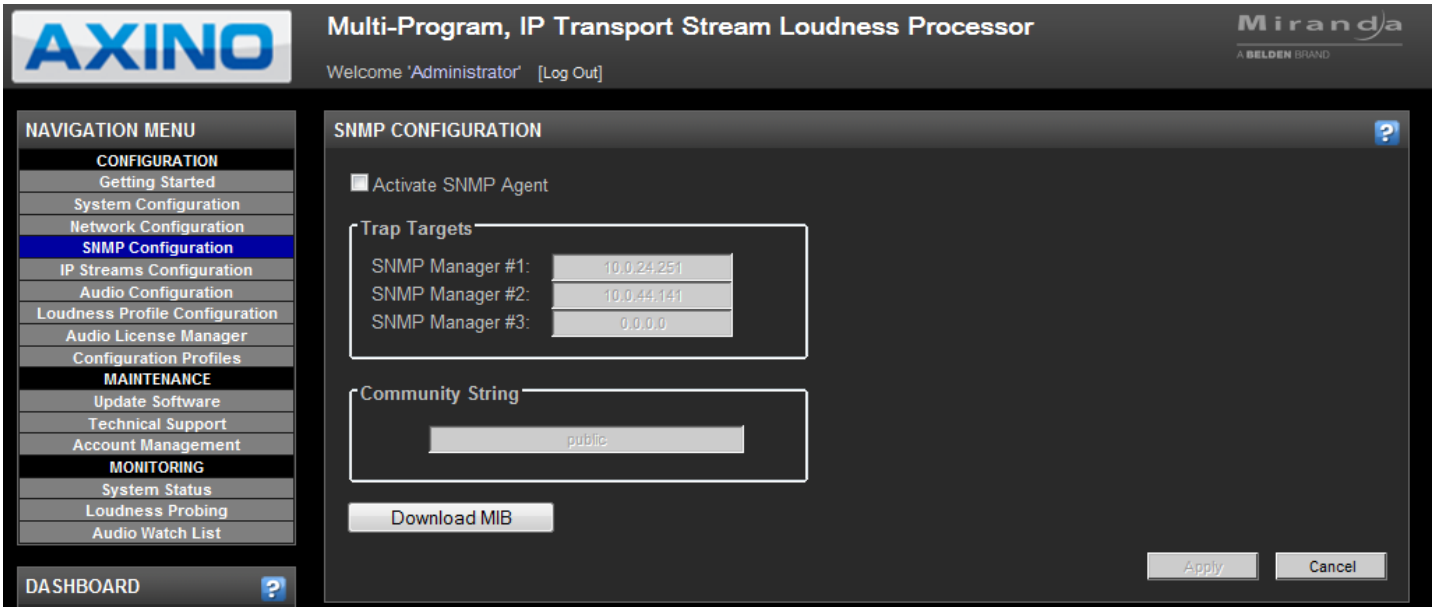
4.4 SNMP Configuration

Axino supports the use of Simple Network Management Protocol (SNMP) traps to notify external SNMP managers of significant events. For Axino, traps for the following events are sent:

- CPU % goes over 78%
- Memory usage goes over 78%
- System Health in error (Power supplies, Fans, Temperature, Voltages)
- A socket is missing
- A PID is missing
- A new PID was added to the watch list

Note: See the ***Annex – SNMP Traps implemented in Axino v2.10*** beginning on page 54 for a complete and detailed list of all SNMP traps implemented in this release of Axino.

Navigate to the SNMP Configuration pane to set up the SNMP process.

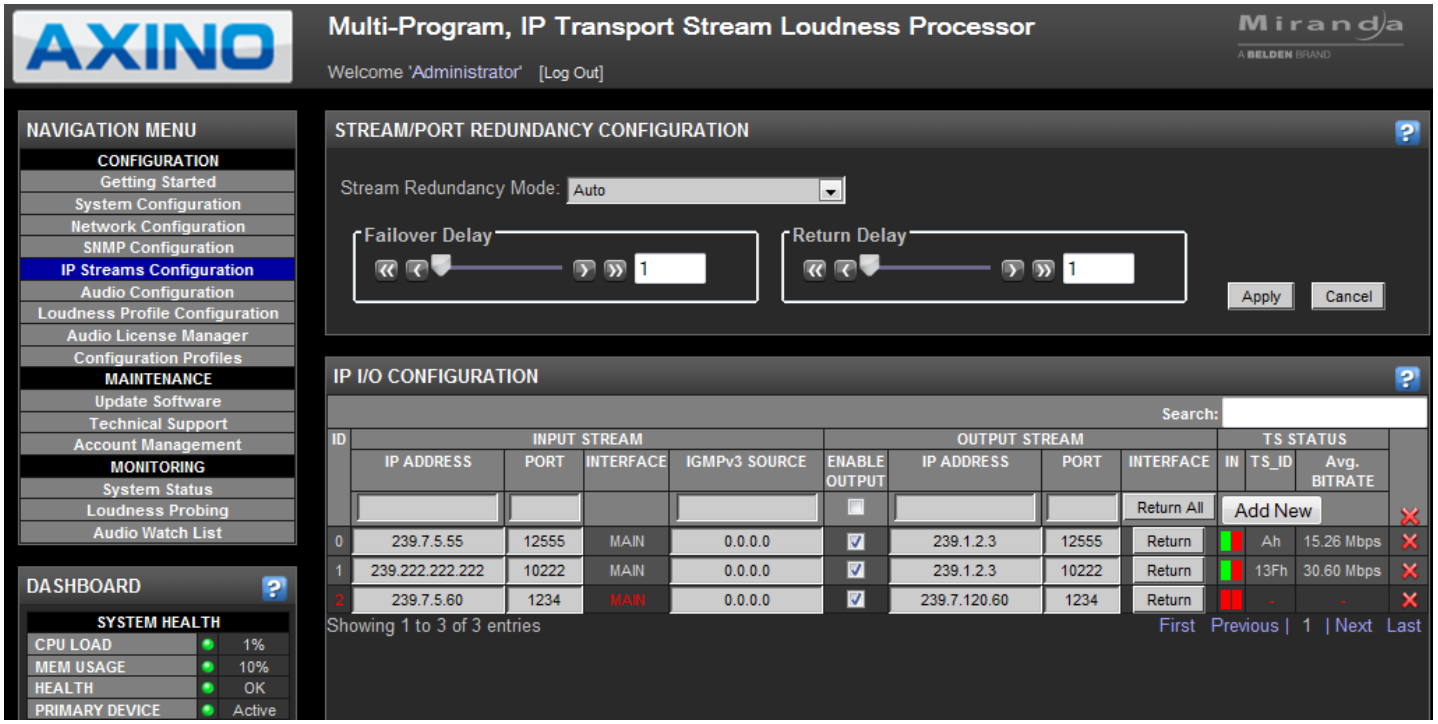


- Select the check box to activate the SNMP agent
- Trap Targets: Enter the IP addresses of up to three SNMP managers to which traps will be sent.
- Community String: a text string that acts as a password. It is used to authenticate messages between the management station (i.e. Axino) and the SNMP agent.
- Apply to confirm and activate any changes.
- Download MIB: send the MIB (Management Information Base) to your local computer.

Note that control of the Axino is not supported via SNMP.

4.5 IP Configuration

Navigate to IP Streams Configuration.



Stream Redundancy Mode

Use the pulldown to select among these modes:

Mode	Description
Off	Turn stream redundancy OFF. The GbE3 port will be ignored.
Manual - Main (GbE1)	Force all streams to come from the GbE1 interface. This is useful when maintenance is scheduled on the network to which GbE3 is connected.
Manual - Backup (GbE3)	Force all streams to come from the GbE3 interface. This is useful when maintenance is scheduled on the network to which GbE1 is connected
Auto	Automatic fail-over to the backup stream/port in case the primary stream disappears. The user must use the "return" button in order to "re-arm" the system and go back to the primary stream.
Auto & Return	Automatic fail-over to the backup and automatic return to the primary when it has returned after failure.

Failover Delay

The amount of time to wait after the primary stream has disappeared before switching to the backup stream.

- Range: 0 to 120 seconds

Return Delay

In Auto & Return mode, the amount of time to wait after the primary is back before switching back to it.

- Range: 0 to 120 seconds

Once the Stream Redundancy Mode, Failover Delay and Return Delay have been set, you must click Apply to confirm and apply your changes, or Cancel to discard the changes and return to the previous state.

Adding a new Input/output Stream

1. In the IP I/O Configuration table in the “Add New” line, enter the IP address and port where the input stream will be found.
2. If IGMPv3 is required, enter the IP address of the source for the specified multicast stream. Leave this field at 0.0.0.0 if IGMPv3 is not needed or to use the "deny none" filter mode.
3. If loudness corrections will be necessary on that stream at some point in time, enable the output by checking the "enable output" checkbox. It is not necessary to enable the output when only probing of loudness is performed.
4. If an output is necessary, specify the IP address, port and Ethernet interface to which the resulting processed stream should be sent
5. Click **Add New** to add the new stream to the table
6. Verify the TS status for the newly-added entry. It should be green with a non-zero bit rate.

Removing an Input/output Stream

To delete/remove an entry, simply click on the  icon next to the item.

Deleting a stream will also delete all the configured audio PIDs on that stream. To avoid this, edit the stream entry instead (see below).

Editing an Input/output Stream

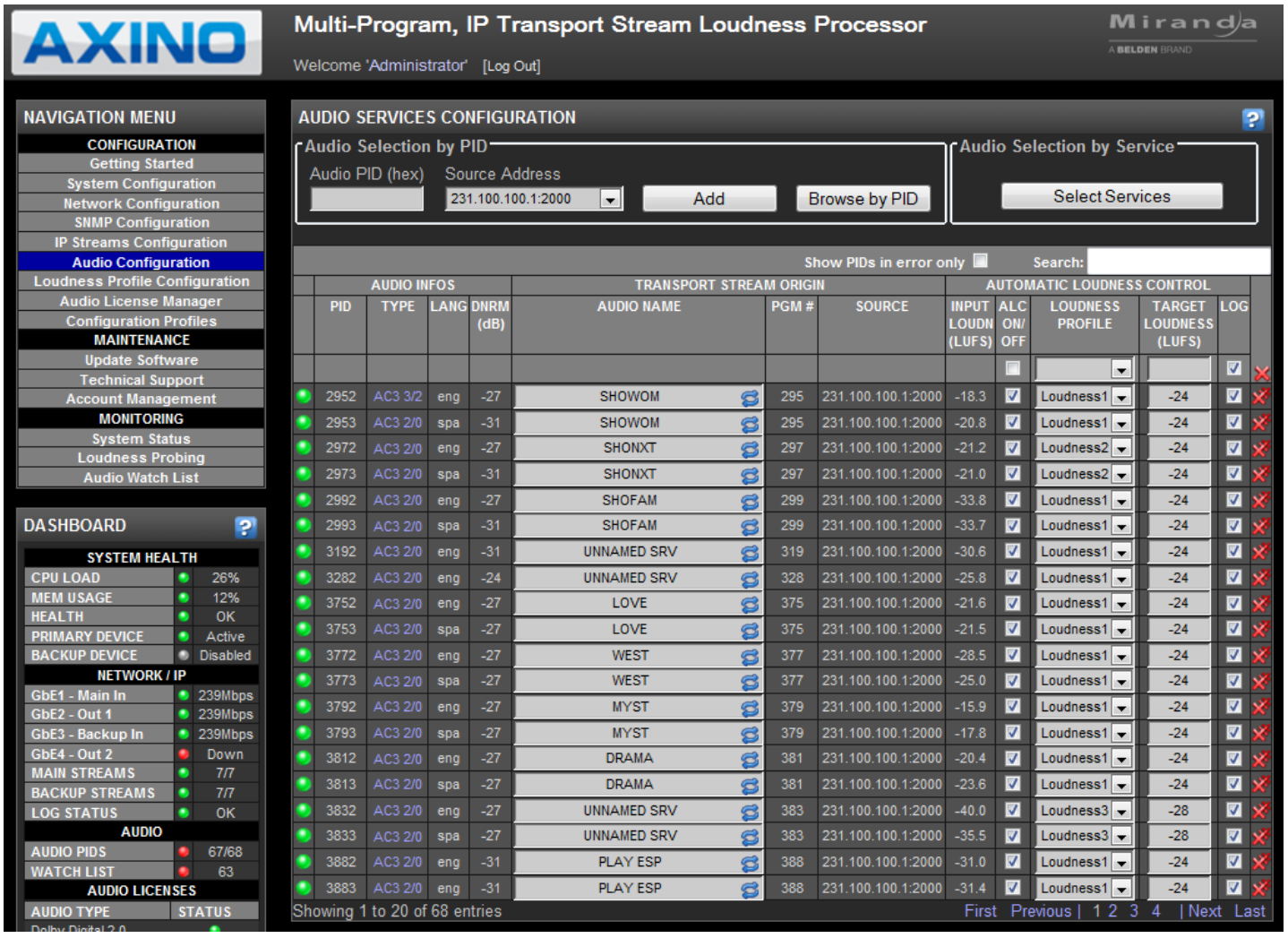
Each entry can be edited to avoid having all the audio PIDs configured on that entry removed. To edit an address or port, simply select the current value in the data box with the mouse and type the new address/port. To validate your entry, hit the enter key.

The ENTER key must be pressed to validate the entry. If the user clicks elsewhere without hitting ENTER, the entry reverts back to the original value

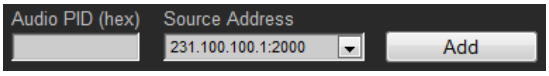
4.6 Audio Services Configuration

To select the audio services that will be processed by Axino, navigate to Audio Configuration.

The table in the lower part of the window lists all audio PIDs that are currently being processed by this Axino. *The Audio Selection by…* controls at the top allow you to add new PIDs to the list.



Audio Selection by PID

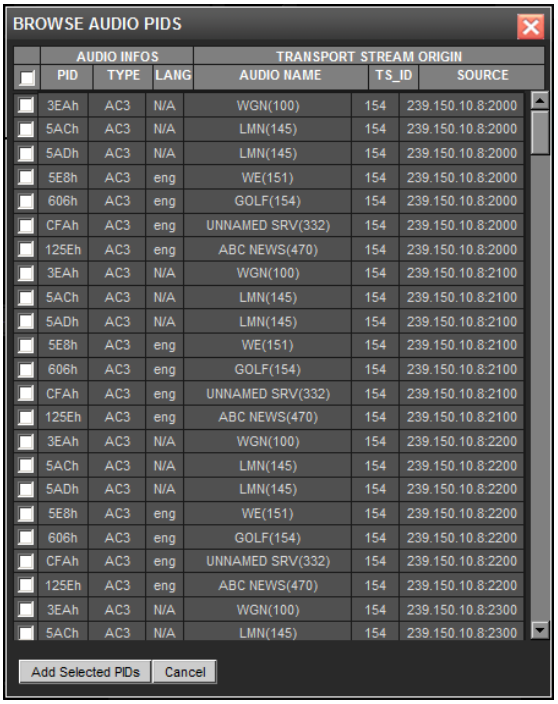


1) Add a PID manually – If you know the Audio PID (hex) and source address of the audio service you wish to add to the table:
   - Enter the PID in the Audio PID (hex) data box
   - Select the Source Address from the available streams using the pulldown
   - Click **Add**

   The table now includes the PIDs you have added.

2) Add a PID by browsing – To see all PIDs that have been detected in the available data streams, **Browse by PID** opens a pop-up window showing details of each PID.
   - Use the checkboxes on the left to select those that you would like to add to the list of audio services in the table.
   - **Add Selected PIDs,** or **Cancel** to close the window without making any changes.

   The table now includes the PIDs you have added.



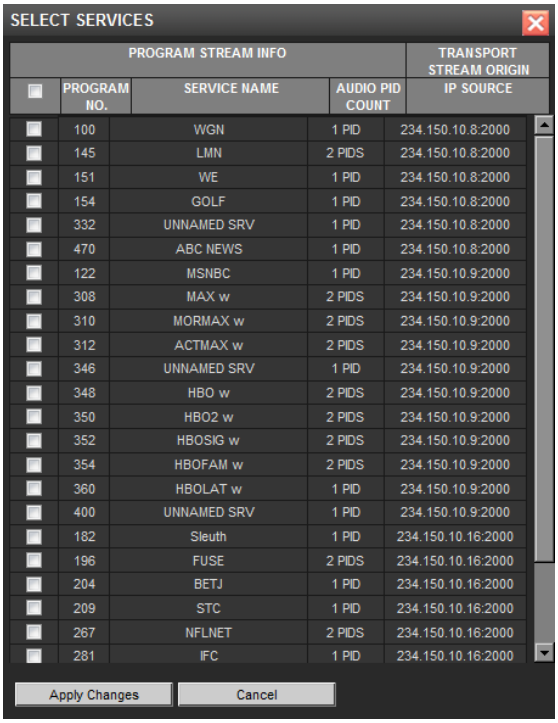
Audio Selection by Service

Click the Select button to open the Select Services window.

Use this window to select the audio PIDs to probe and/or correct by selecting the service to which they belong.

- Decide which service to probe/correct using the information the Program Stream info and the Transport Stream origin columns
- Select the checkbox on the left to designate a stream for probing and/or correcting.
- Apply your selection or cancel without changing the selection using the buttons at the bottom of the window.

The table now includes the PIDs you have added.



The table serves two purposes:

1) It displays detailed information about each PID that is monitored by Axino
2) It is the point of control for automatic loudness control (ALC) and logging.

The table may contain many PIDs. Two resources are provided to assist the user in managing the table:

- **Show PIDs in Error** – select this checkbox to limit the PIDs displayed in the table to those with detected loudness errors. This will make it easier to find those for which ALC and loudness logging are appropriate.
- **Search** – filters the list to display only those entries that contain the text shown in the search data box. To restore the full list to view, delete the contents of the data box.

Note that these only modify the displayed list, but all PIDs are still in the table.

Each PID is shown in a line in the table, with the following information:

Audio Infos

- Status icon – Gives information about the status of this audio PID:

   Present and valid.

   The TS for this PID is not present.

   Audio format not supported

   Ghost PID – no data present on this PID.

   Audio stream is encrypted.

   No ALC license available

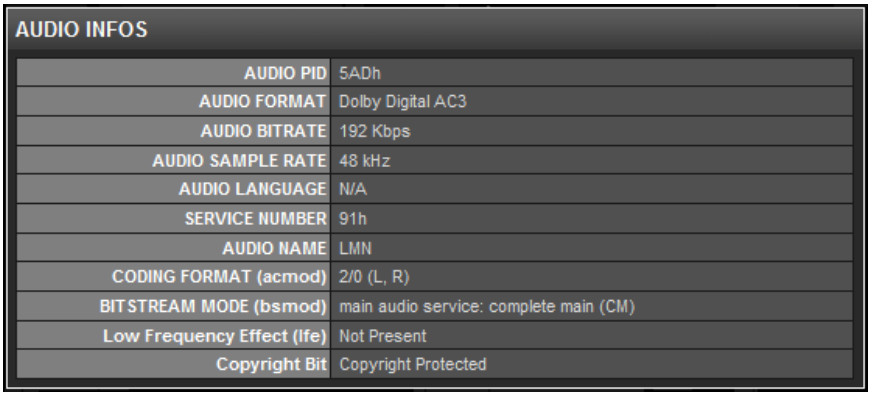
   No probing license available

   PID is not referenced by any PMT

  NOTE that you can restrict the table to show only those PIDs that are in error (i.e. the status icon is NOT green) using the checkbox at the top

- PID – the PID number as per the PMT tables
- Type – shows the coding and channel configuration where appropriate (e.g. 2/0, 3/2)

  Click on this field to show additional information about the PID, e.g.:



AUDIO INFOS	
AUDIO PID	5ADh
AUDIO FORMAT	Dolby Digital AC3
AUDIO BITRATE	192 Kbps
AUDIO SAMPLE RATE	48 kHz
AUDIO LANGUAGE	N/A
SERVICE NUMBER	91h
AUDIO NAME	LMN
CODING FORMAT (acmod)	2/0 (L, R)
BITSTREAM MODE (bsmod)	main audio service: complete main (CM)
Low Frequency Effect (lfe)	Not Present
Copyright Bit	Copyright Protected

- Lang – gives the language of the service, if known from the PMT descriptors (e.g. eng, spa, fre)
- DNRM (dB) – gives the encoded DIALNORM value in the incoming signal (AC3 only)

Transport Stream Origin

- Audio name – gives the MPEG service name of the service as per the SDT or VCT. User-editable if desired; click and drag or double-click on the name to highlight it, then type in a new name.
- PGM # – Program number indicated in the PMT
- Source – gives the IP address and port number of the source of this transport stream.

Automatic Loudness Control

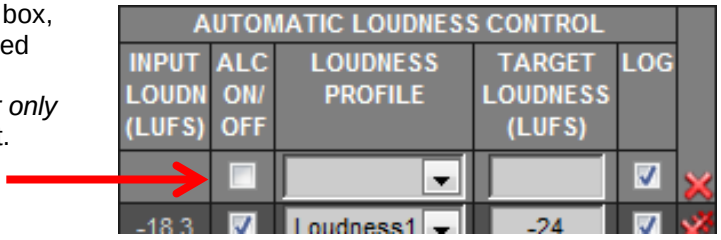
Here is where the ALC is configured for this PID.

- Input Loudness – this is the measured short term loudness of the input program, after application of DIALNORM.
- ALC ON/OFF – checkbox to enable or disable automatic loudness control for this PID.

  Note that ALC is only available for PIDs on streams that have been assigned an output in the IP I/O Configuration panel. This column will show N/A for any other PIDs.

  ALC can also be turned ON or OFF in the Audio Watch List panel (see section 6.4).
- Loudness Profile – select which of the ten available profiles to use when applying ALC to this program.
- Target Loudness (LKFS) – specify the loudness that is required at the output after ALC is applied.
- Log – select the checkbox to enable logging for this PID.

Note that all columns except Input Loudness have a data box, checkbox or icon at the top. Use these to apply the selected action to **all PIDs** in the list, including those that are not displayed because you have used the *Show PIDs in error only* checkbox or the *Search* data box to limit the displayed list.



Remove PIDs from the table:

You can remove PIDs from the table by clicking on the red X in the right-hand column. Two options are provided:

- Remove an individual PID from the table by clicking the ***red X icon*** in the column on the right of the table.
- Remove all PIDs associated with a program from the table by clicking on the ***multiple-red-X icon*** of one of the PIDs associated with that program in the column on the right of the table

4.7 Audio Loudness Probing and Control Configuration

To set up Axino's loudness probing and ALC configuration, navigate to Loudness Profile Configuration.

4.7.1 Loudness Meter Mode

Axino provides the primary international standard Loudness metering configurations, and also allows the user specify a custom metering. Use the Loudness Meter Mode pulldown to select the one to use:

- A/85 ITU BS.1770-1
- A/85 ITU BS.1770-2
- EBU R128G8
- EBU R128G10
- CUSTOM

  If you have selected CUSTOM, you can specify the *Relative Gating* and *Short-Term Window* using the options available in the pulldowns.

The selected standard is used for all loudness measurements on this Axino.

- *Note – Axino's loudness measurement has a lower limit of -60dB*

4.7.2 ALC Profiles

Once the loudness of the audio has been probed, and the need for ALC determined, Axino uses Miranda's Automatic Loudness Control (ALC) algorithm to modify the program to conform to the desired loudness. .

ALC is based on a profile that is set up to optimize results for a particular type of program material. Miranda supplies six pre-configured profiles, based on its experience with this algorithm:

- *Standard* **–** The ALC applies moderate dynamic range compression on the audio program content. The overall response time is also moderate, which allows the ALC to follow the target output loudness quite well. This preset is well-suited for most types of audio content. It is the default profile for Axino.

- *Movies* – The ALC allows a lot of dynamic range in the audio, and tends to be more tolerant.

- *News* – The ALC is very aggressive and allows virtually no audio dynamics. This setting is intended for News channels composed almost entirely of voice.

- *Music* – The ALC presents a very smooth profile that will have very little effect on the audio signal to avoid changing the dynamics of the music. This is suitable for music channels.

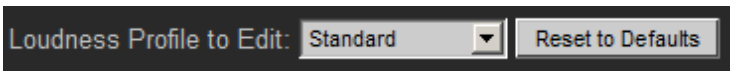
- *Light* **–** The ALC applies low dynamic range compression on the audio program content. The overall response time is relatively slow, which reduces the ALC ability to tightly follow the target output loudness. Using this preset, the program content will sound a little more dense, while keeping most of the original program dynamic range.

- *Heavy* **–** The ALC applies high dynamic range compression on the audio program content. The overall response time is relatively fast, which improves the ALC ability to tightly follow the target output loudness. Using this preset, the program output content will sound much more dense, less dynamic.

Each of these can be edited by the user using the controls provided, but a *Reset to Defaults* button is provided to restore the factory settings.

In addition, there are four user profiles (User1 to User4) that can be configured by the user.

Use the *Loudness Profile to Edit* pulldown to select which of the ten profiles will be controlled by the Loudness Profile section of the panel.



Note that all of the settings made in this panel can be saved by the user, and recalled as required. See the Configuration Profiles panel.

4.7.3 Loudness Profile Configuration

The Loudness Profile section of the panel provides resources to adjust the settings for the profile selected in the *Loudness Profile to edit* pulldown

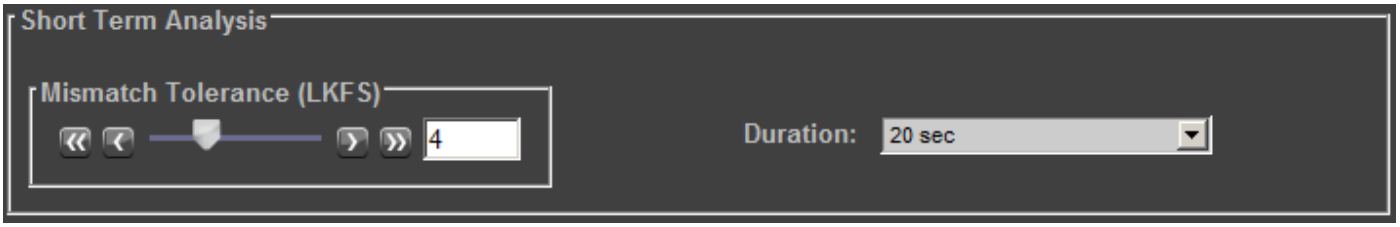
Note: you must click *Apply* at the bottom of the panel to activate any changes made in this panel. Moving to any other panel or selecting another profile will discard any unapplied changes and leave the settings as they were.

Audio Special Options

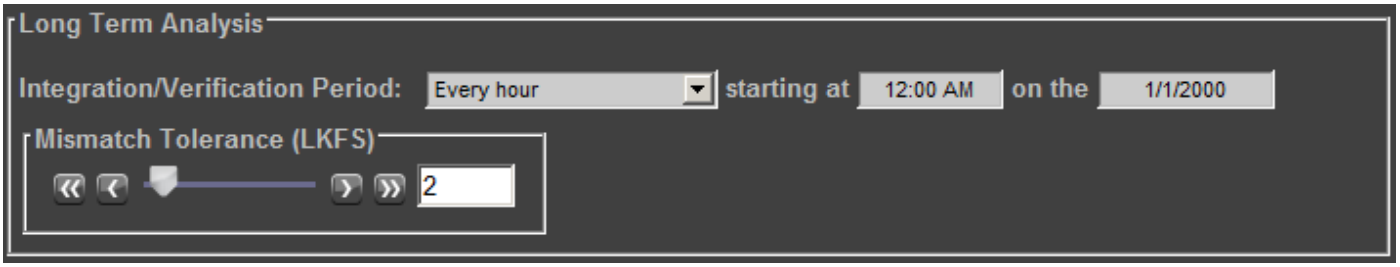
In the Dolby AC3 audio format, the Dynamic Range Control (DRC) mode/profile is not carried over metadata. Therefore, when the audio undergoes re-encoding, the DRC must be reconstructed entirely. For that purpose, the user should specify the DRC mode to be used. The most common setting is the Line mode. See Dolby Digital Professional Encoding Guidelines, Dolby Document No. S00/12972 Chapter 3 for further information.

Use the *AC3 Audio DRC Profile* pull-down to select the DRC operating mode: Off, Line mode or RF mode.

Loudness Analysis – Short Term and Long Term
This portion of the loudness profile configures how the Axino alarms on loudness mismatch. Short Term and Long Term analyses are carried out independently, and separate tolerances are set for each.



A very short integration period allows shorter loud audio segments such as commercials to be caught.
The Duration pulldown offers a variety of intervals ranging from 1 second to 10 minutes.



A very long integration period tends to be more accurate when trying to catch those channels with consistently wrong DIALNORM.

Use the *Integration/Verification Period* section of the panel to set up the schedule for probing.

The pulldown offers these options:

- Every 10 minutes
- Every 15 minutes
- Every 30 minutes
- Every hour
- Every 3 hours
- Every 6 hours
- Every 12 hours
- Every day
- Every 2 days
- Every 3 days
- Every 5 days
- Every week

In addition to the interval, you must specify the start time and date. Click on either the time or date window to open the calendar and time setting window.

To select the current day and time, click *Now* at the bottom of the window

To select another day and time:

- Navigate to the month of interest using the arrows in the header.
- Click on a day to select it
- Use the sliders to select the hour and minute to start – the time display changes as you move the sliders.

When finished, click Done

This updates the information in the Loudness Probing and Control Configuration window, but the setting is not functional until you click *Apply* in that window.

Mismatch Tolerance

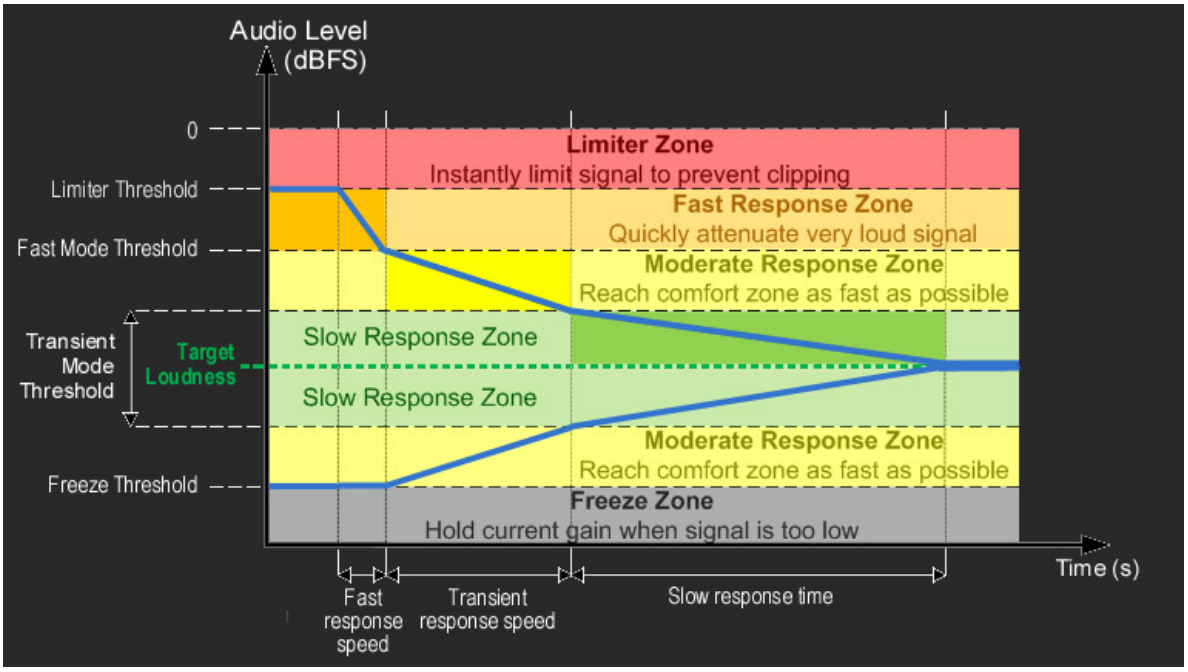
The Mismatch Tolerance is the difference (in LU for EBU; in LK for A/85) between the actual input loudness (after application of DIALNORM) and the desired output loudness that is considered by the user to be tolerable. Any PID whose loudness mismatch is higher than the threshold set here will be flagged and added to the watch list.
The mismatch tolerance should be selected to allow sufficient dynamics in the audio. If the setting is too low, it may lead to false alarms. A 3 dB / 3 LU tolerance fits most cases.

This threshold is associated with the profile, so a different threshold can be set for each profile.

Automatic Loudness Control (ALC) Settings

These controls are provided to set up the ALC response for the selected profile.

Tweaking loudness control is tedious, as the results will greatly depend on the audio dynamics. This is why the Axino offers pre-calibrated values based on general channel contents. If ALC customization is required, a look at the time-domain response of the ALC will help to explain the controls that are available:



ALC Pre-Amp Level

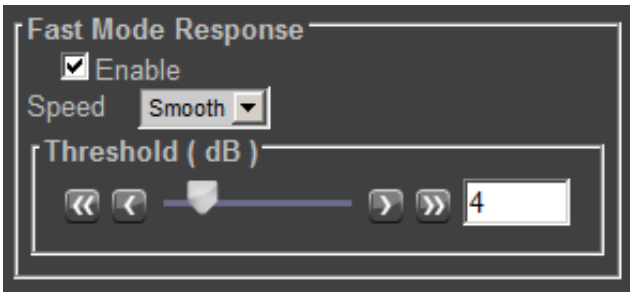
A pre-amp stage is available in front of the ALC to compensate for programs having an input loudness out of the ALC tracking range (very low or very high input loudness). The pre-amp level ranges from -20 dB to + 20 dB, in steps of 1 dB.

Fast Mode Response

The *Fast Mode Response* is optional and is enabled by checking the *Enable* box.

The ALC *Fast Mode Response* kicks in to reduce loudness quickly whenever the input loudness goes over the *Fast Mode Threshold*. The rate at which the level is reduced is selected by the Speed pulldown: Fast, Medium, or Smooth.

The *Fast Mode Threshold* is given in dB with respect to the target loudness and ranges from 2 to 12 dB, in dB steps.



Slow Response Time

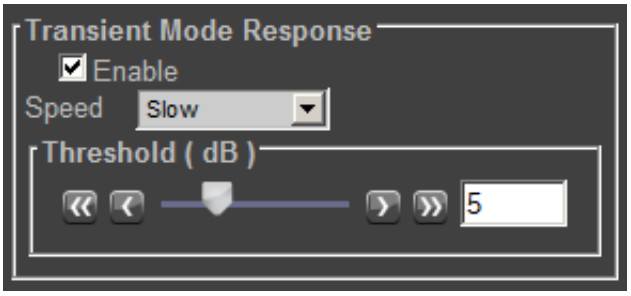
Outside of the *Fast* and *Transient* modes ranges, the ALC performs loudness correction slowly, following the *Response Time*. Response time values are: 5 sec, 10 sec, 15 sec, 20 sec, 30 sec, 45 sec, 1 min, 5 min, 10 min, 15 min, 20 min.

Freeze Threshold

The *Freeze Threshold* sets the threshold under which the ALC will stop increasing loudness. This avoids the unintentional boosting of quiet portions of programs (and noise). If the input program loudness is under the *Freeze Threshold* for more than 30 seconds, the ALC will smoothly return to 0 dB of loudness correction.

Transient Mode Response

The *Transient Mode Response* is optional and is enabled by checking the *Enable* box.



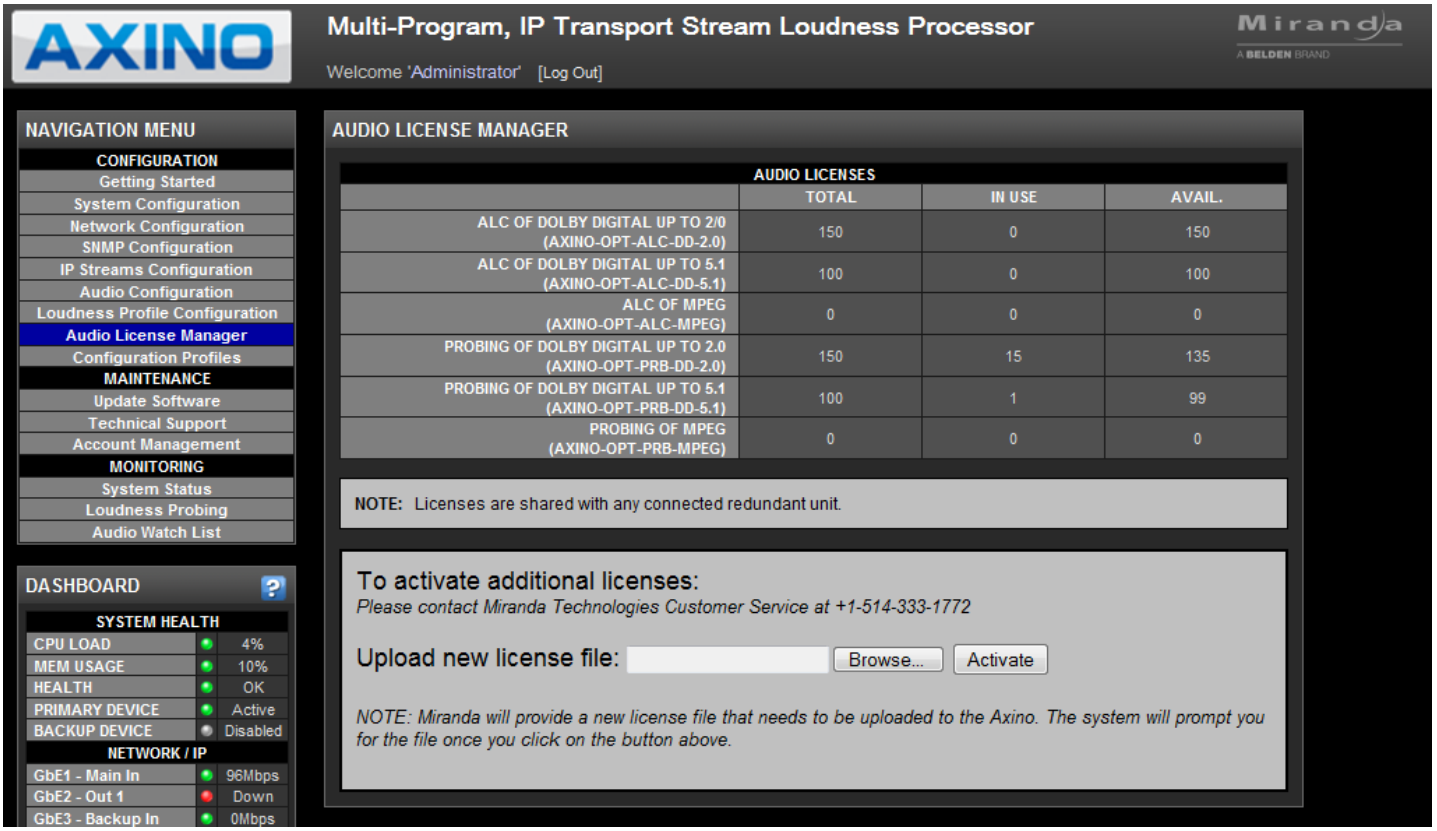
The ALC *Transient Mode Response* kicks in whenever the input loudness goes over or under the *Transient Mode Threshold*. The *Transient Mode Threshold* is symmetric with respect to the target loudness and ranges from 2 to 12 dB, in dB steps. When the input loudness is over the *Transient Mode Threshold*, loudness is reduced following the rate set by the *Speed* pull-down. When the input loudness is under the *Transient Mode Threshold*, loudness is increased, again following the *Speed* pull-down, which ranges from Slow (up to 15 seconds) to Fast (up to 4 seconds).

Limiter Threshold

The *Limiter Threshold* will limit the output loudness under the selected threshold. This avoids unintentional clipping of loud portions of programs. If the input program loudness is over the *Limiter Threshold*, the ALC will reduce the loudness very quickly, in 1 millisecond.

4.8 Audio License Manager

This panel displays the audio licenses for probing and ALC currently owned, along with the number in use, and consequently those still available.



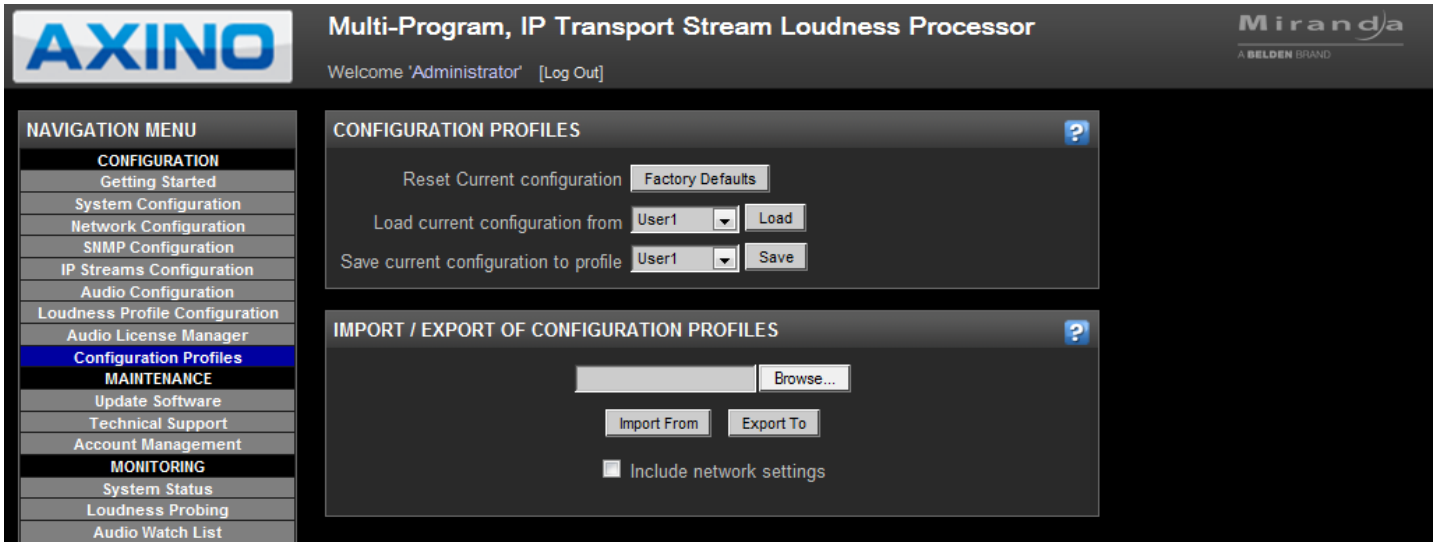
If additional licenses are needed to handle the workload of this Axino, contact Miranda Technologies Customer Service to obtain a new license file, and then use the lower portion of the panel to locate this file on your computer, and upload it to the Axino.

- Enter the path name if you know it, or use the Browse feature to locate the new license file
- Click Activate to upload the file and activate it on the Axino.

4.9 Configuration Profiles

This panel allows the configuration of the Axino to be saved, recalled, or reset to factory-specified values.

- In all cases, the complete configuration of the device is affected, except the Network Configuration.
- As an exception, the Network Configuration can optionally be recovered from an imported configuration profile.



Click Factory Defaults to restore Axino to the factory default settings
There are five user configuration registers (User1 to User5) on board the Axino.

- To save the current configuration to one of these registers, select it using the pulldown, and click Save. The previous contents of the register will be lost.
- To load a saved configuration into the Axino, select the register using the pulldown and click Load. The current configuration will be overwritten and not saved.

Import/Export of Configuration Files

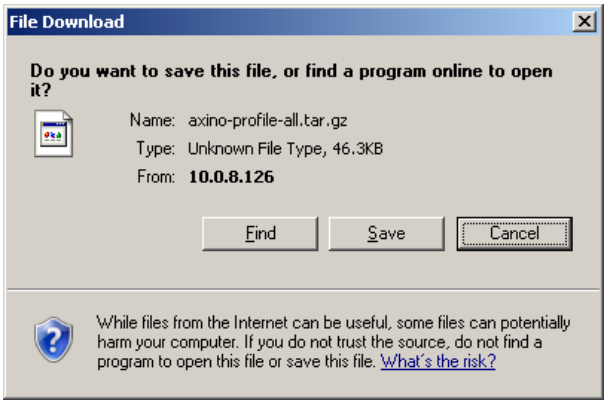
Configuration files can be stored external to the Axino, and reloaded into the Axino from the external site.

- The exported configuration file includes the network settings (IP address, etc)
- When importing a configuration profile, you must select the *Include Network Settings* checkbox if you want to include the network settings in the restored profile.

  If you select this option, be careful that you do not accidentally give two Axinos the same IP address on the network.

Exporting a configuration file to the external computer from Axino:

1. Click *Export To* and the *File Download* window will open.
2. Click *Save* and a standard *Save As* window will open.
3. Navigate to the desired location to save the file. It may be helpful to change the default file name (always `axino-profile-all.tar.gz`) to identify the Axino whose profile is being saved.
4. Click *Save* to download and save the file on the external computer.



Importing a configuration file to Axino from the external computer:

1. Click Browse… to open the *Choose File to Upload* window, and navigate to the configuration file on the local computer.
2. Click *Open* to load the path to the file into the Browse data box.
3. If you want to include network settings (IP address, etc) in the imported configuration, and are sure that this will not result in multiple Axinos with the same network settings, select the *Include Network Settings* check box.
4. Click *Import From* to load this configuration file into the Axino.

Reloading the user configuration,either from one of the User1 … User5 registers, or by importing a user configuration from an external computer, will require a restart of the application.

An interruption of service will result.

5 Maintenance

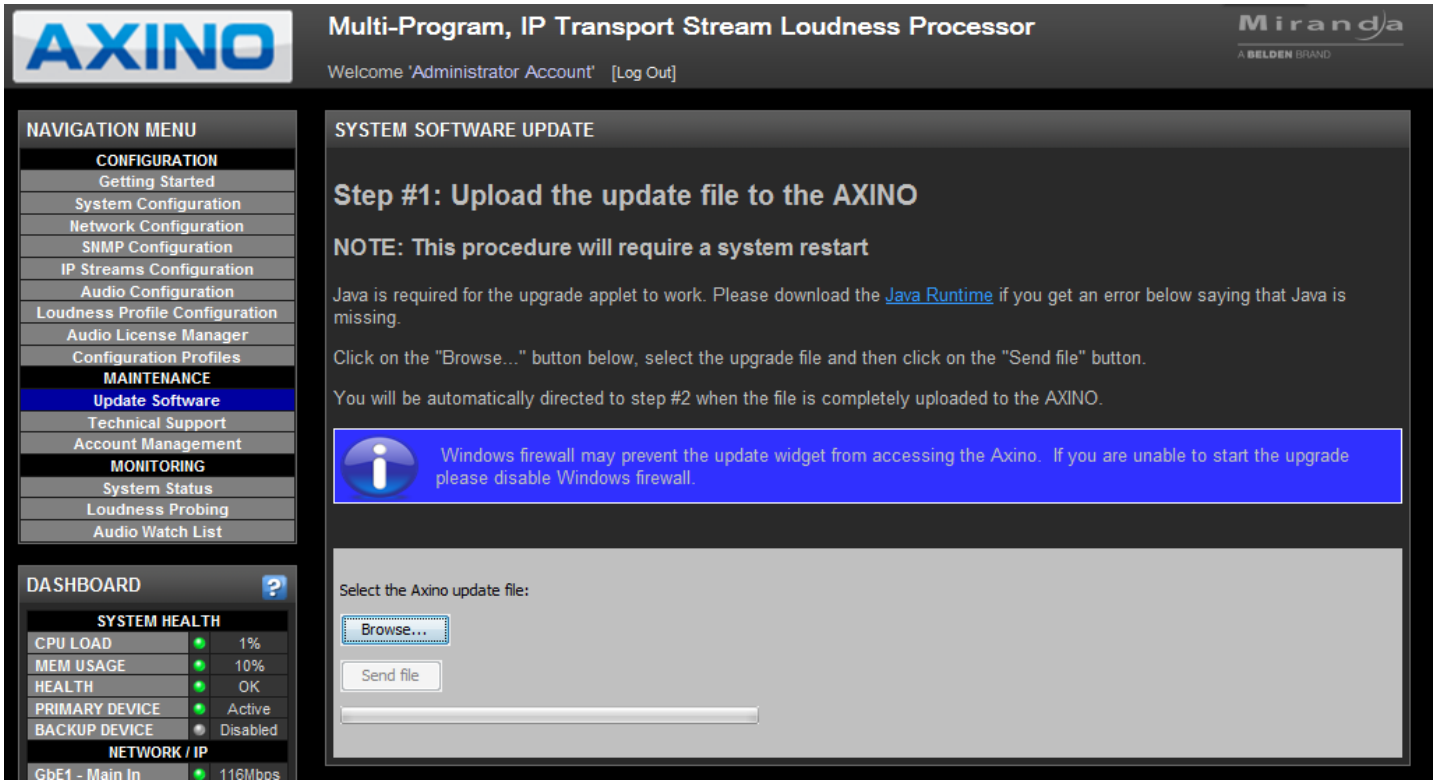
5.1 System Software Update

NOTE: Before starting a software update, you must obtain the update file from Miranda, and save it in a convenient location on your computer. Please contact Miranda Technologies Customer Service at 514-333-1772 for details.

NOTE: A system restart will be required to complete the update process. Do not update the Axino while it is online!

NOTE: Windows firewall on your computer may prevent the update widget from accessing the Axino. If you are unable to start the upgrade, disable the Windows firewall. Remember to restart the firewall after updating your Axino.

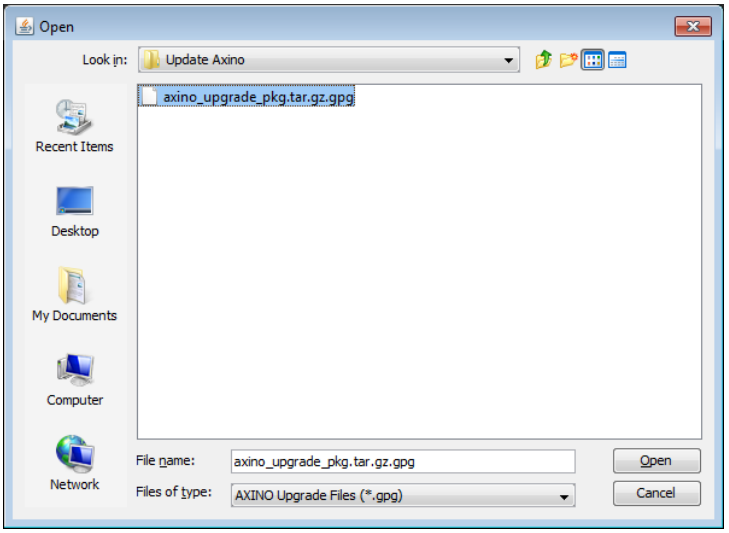
To update the system software for Axino, navigate to *Update Software*.



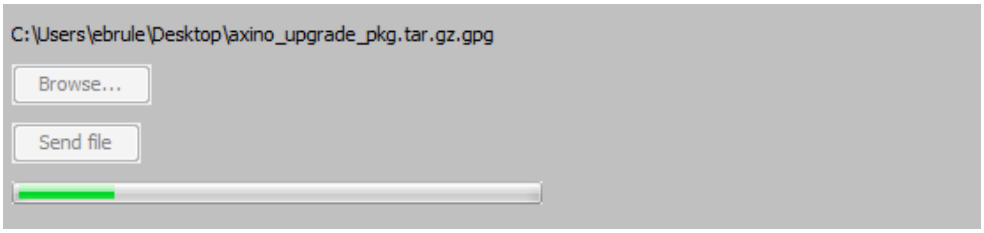
Click *Browse…* and select the update file on your computer.

- The file will be named **axino_upgrade_pkg.tar.gz.gpg**

Click *Open* to choose the file for Axino. The file path will appear in the Axino window.

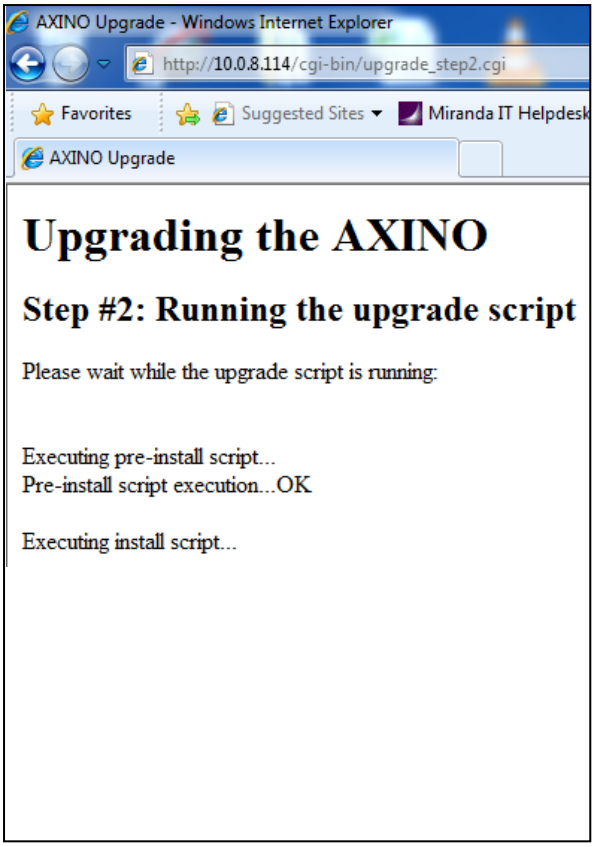


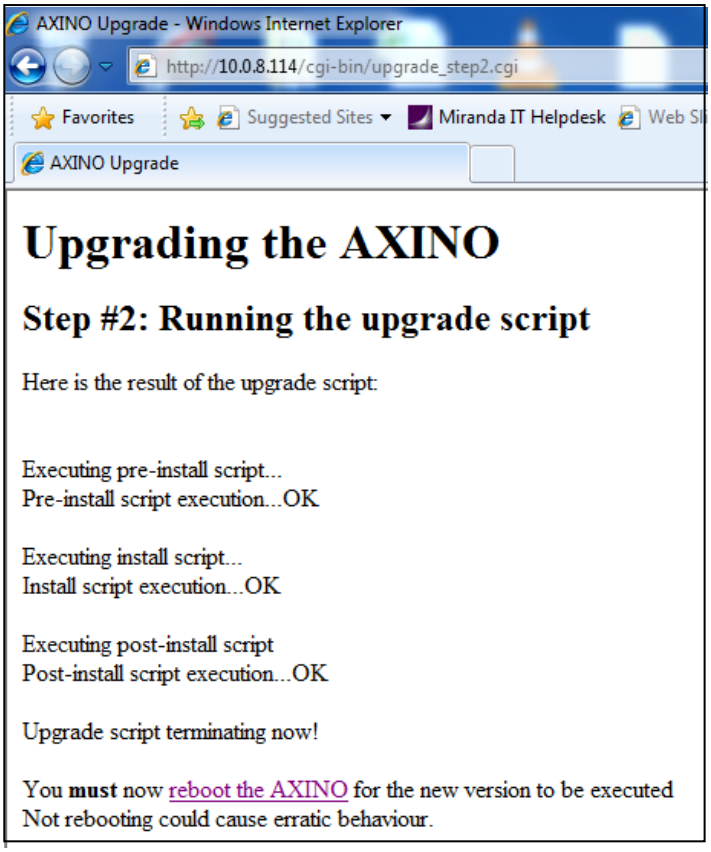
In the Axino window, Click Send File. The progress Bar will show the progress of the upload.



Once the file is completely uploaded to Axino, you will be taken to the next step, in a new browser window.

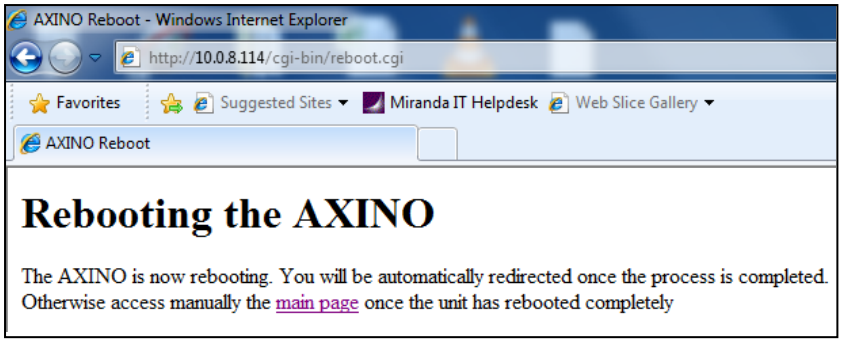
The new window, headed *Upgrading the AXINO, Step #2: Running the Upgrade Script*, follows the status of the execution of the upgrade script as a series of text progress reports.





Once the script has finished running, you will be prompted to reboot the Axino.

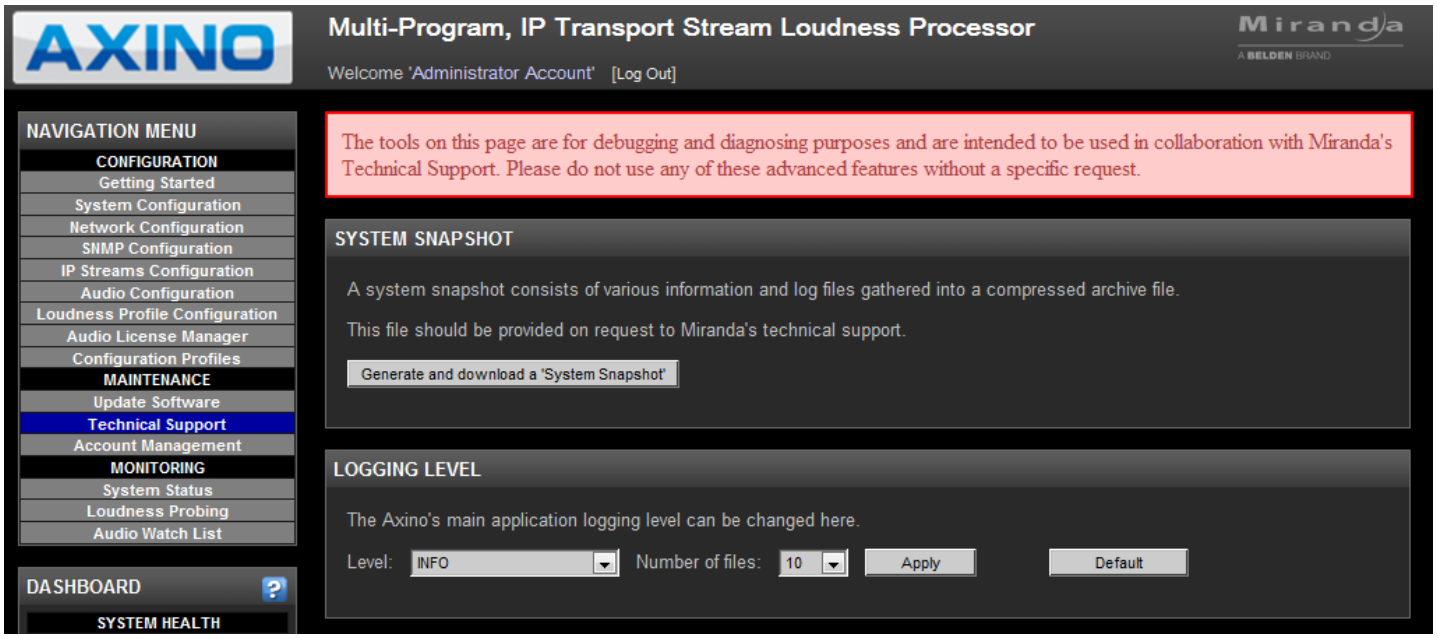
- Click the reboot the AXINO link at the bottom of the displayed progress report



Once the reboot is completed, you should be automatically returned to the Axino main page. A link is provided in case the automatic redirect is not successful.

5.2 Technical Support

To access some tools that can be used, in collaboration with Miranda Technical Support, to help in diagnosing system errors in Axino, navigate to Technical Support.



System Snapshot

A comprehensive snapshot of the state of the Axino system is generated and downloaded when the button is clicked. This file can be sent to Miranda Technical Support to assist in diagnosing any complex system problems.

Logging Level

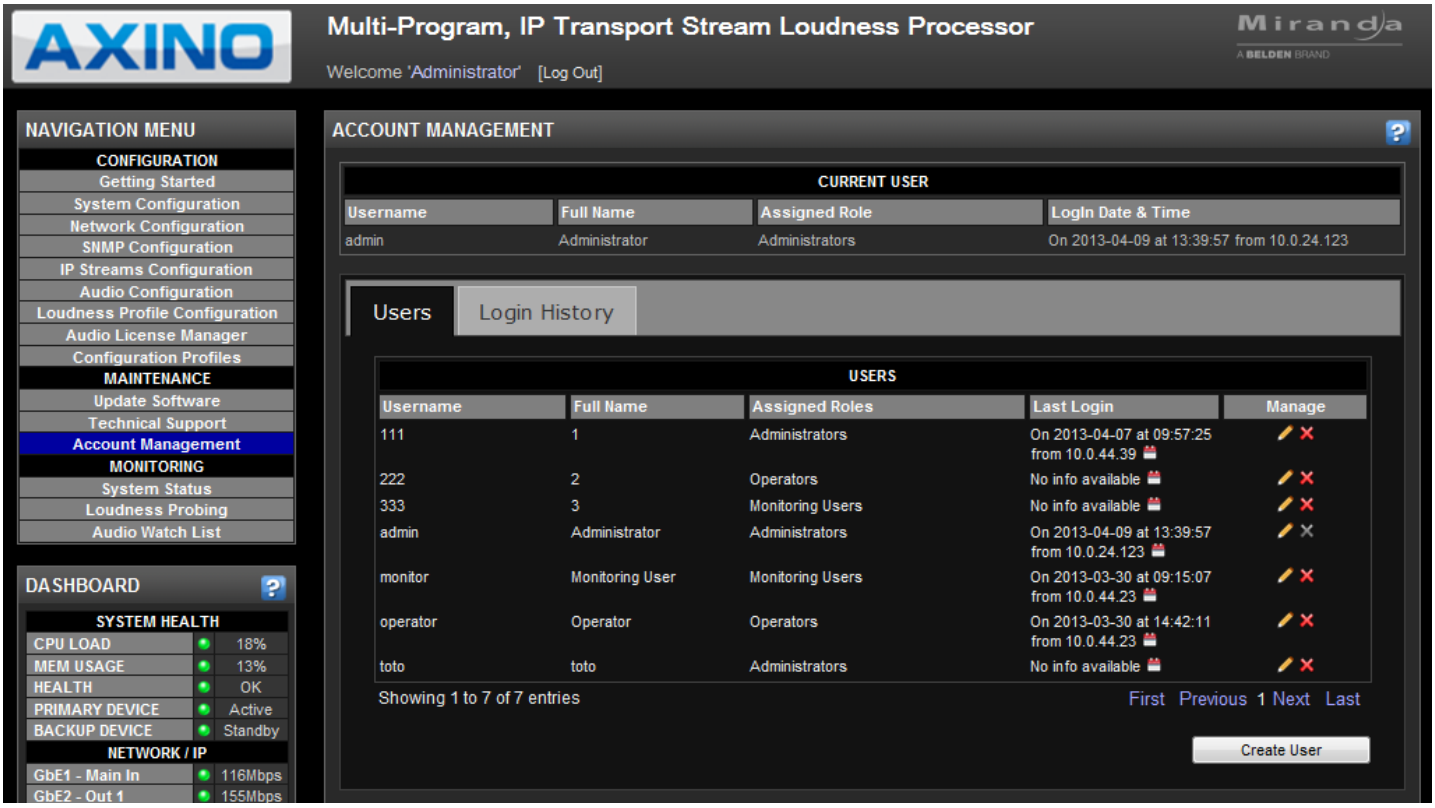
Sets the degree of severity of messages that will be logged in the debug file. This setting must only be modified in consultation with Miranda Technical Support.

Levels: [TRACE, DEBUG, INFO, NOTICE, WARN, ERROR, CRITICAL, ALERT, FATAL]

5.3 Account Management

Axino incorporates controlled access – all users must have an account and password which are required to login to the Axino.

Navigate *to Account Management* to see information about current user accounts, and to add/modify/delete accounts.



The Account Management page shows details of the current user at the top.

Each user has a defined role, which determines their accessibility to the Axino's operating functions, as follows:

- Administrators: Full privileges to access all aspects of Axino's operation, and modify any operating parameters. Only an Administrator can add, modify or delete user accounts.
- Operators: Can see most Axino pages, but cannot modify any settings except their own user account.
- Monitoring Users: Can see only the System Status, Loudness Probing and Watch List pages. Cannot modify any settings.

Users Tab

An Administrator can see all information for all users in this tab. An Operator or Monitoring User can see only the details of their own account.

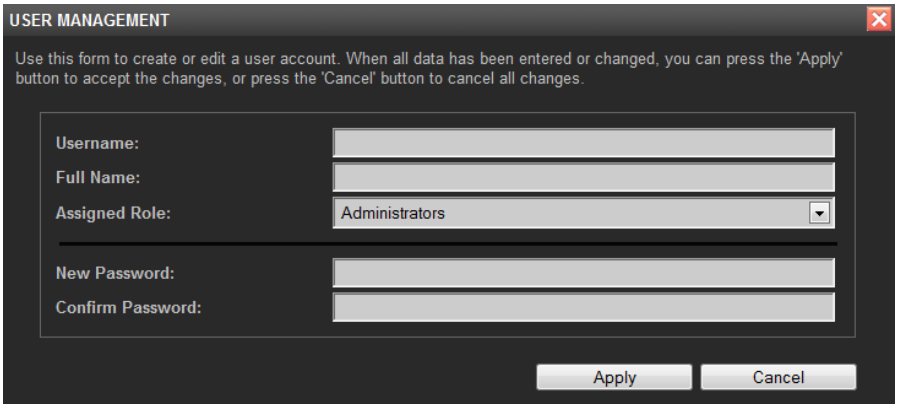
An Administrator can add, modify or delete user accounts.

- To create a new user: click the *Create User* button in the Users tab.
- To edit an existing user, click the pencil icon ( ) in the Manage column of the Users tab.
- To delete a user, click the red X icon ( ) in the Manage column of the Users tab.
- Click the icon in the Last Login column to see a list of recent logins by this user.

Note that all users can edit the details of their own account, but accounts of other users are hidden to all but administrators.

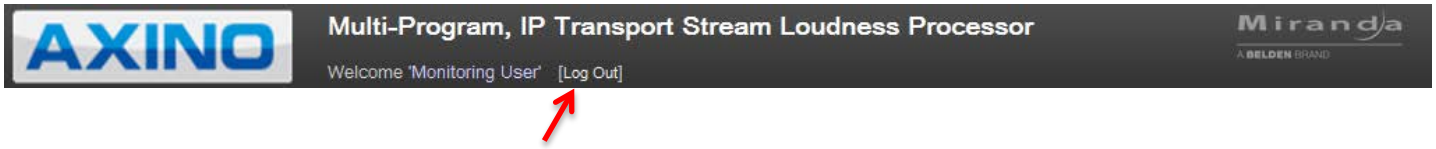
If you are creating a new user, or editing an existing user, the *User Management* window opens.

- It will be empty if you are creating a new user.
- It will be filled with current information if you are editing an existing user. There will also be a line for you to enter your old password



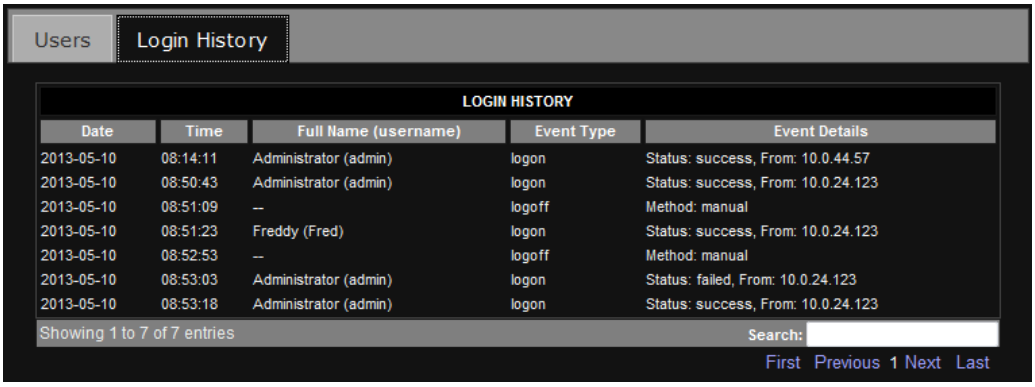
Once an account has been set up for a User, they will need their Username and Password to log in to the Axino.

Logging Out – a user can log out at any time by clicking on the Log Out link at the top of the main Axino window.



Login History tab

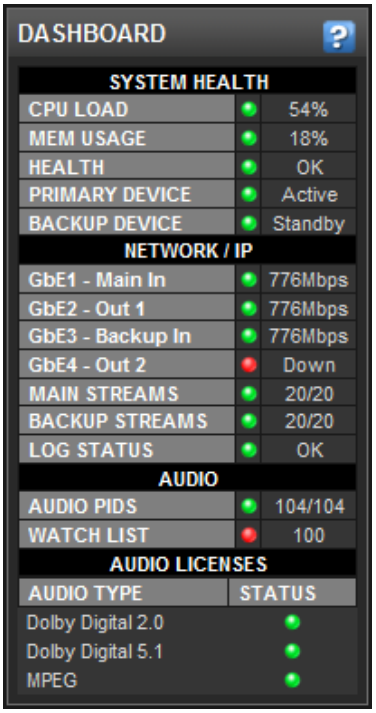
Click this tab to see a time-line listing of all user logins to this Axino (all users can see this).



6 Status Monitoring

6.1 Dashboard

The Dashboard provides an at-a-glance overview of the status of the Axino and its operation.



System Health

CPU LOAD	Current CPU average load Should not exceed 78% sustained
MEM USAGE	Current memory usage
HEALTH	Hardware system health (e.g. temperature, fans, etc.)
PRIMARY DEVICE	Operating status
BACKUP DEVICE	Operating status

Network / IP

GbE1 – Main In	Streaming data rate at the main input ethernet port
GbE2 – Out 1	Streaming data rate at the Out 1 ethernet port
GbE3 – Backup In	Streaming data rate at the backup input ethernet port
GbE4 – Out 2	Streaming data rate at the Out 2 ethernet port
MAIN STREAMS	(number of streams present) / (number of configured streams)
BACKUP STREAMS	(number of streams present) / (number of configured streams)
LOG STATUS	Status of shared loudness logs folder on external computer. If not OK, Axino logs will not be saved.

Audio

AUDIO PIDS	(number of valid audio PIDs currently probed) / (number of PIDs configured)
WATCH LIST	Number of audio PIDs currently on the watch list.

Audio Licenses

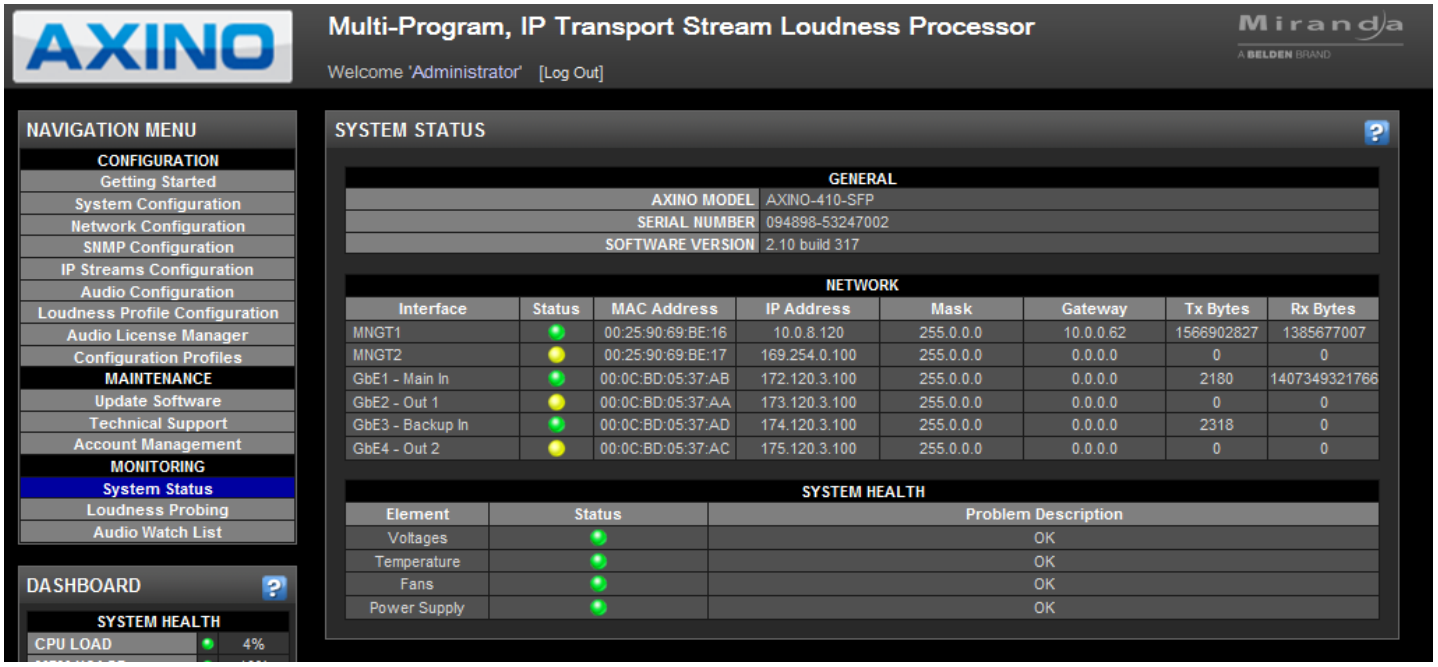
Shows the status of licenses for each audio type – Dolby Digital 2.0, Dolby Digital 5.1, MPEG.

To see the source of the information that appears in the dashboard, click the name of the parameter and you will be taken to the appropriate main panel.

Parameter	Main Panel	Described here
CPU LOAD	(appears only in the Dashboard)	
MEM USAGE	System Status	See section 6.2
HEALTH	System Status	See section 6.2
PRIMARY DEVICE	System Status	See section 6.2
BACKUP DEVICE	System Status	See section 6.2
GbE1 – Main In	System Status	See section 6.2
GbE2 – Out 1	System Status	See section 6.2
GbE3 – Backup In	System Status	See section 6.2
GbE4 – Out 2	System Status	See section 6.2
MAIN STREAMS	IP I/O Configuration	See section 4.5
BACKUP STREAMS	IP I/O Configuration	See section 4.5
LOG STATUS	System Configuration	See section 4.1
AUDIO PIDS	Audio Services Configuration	See section 4.6
WATCH LIST	Audio Watch List	See section 6.4
AUDIO TYPE	Audio License Manager	See section 4.8

6.2 System Status

The system status panel gives an overview of the current status of the Axino.



General

Lists the model, serial number and software version for this Axino

Network

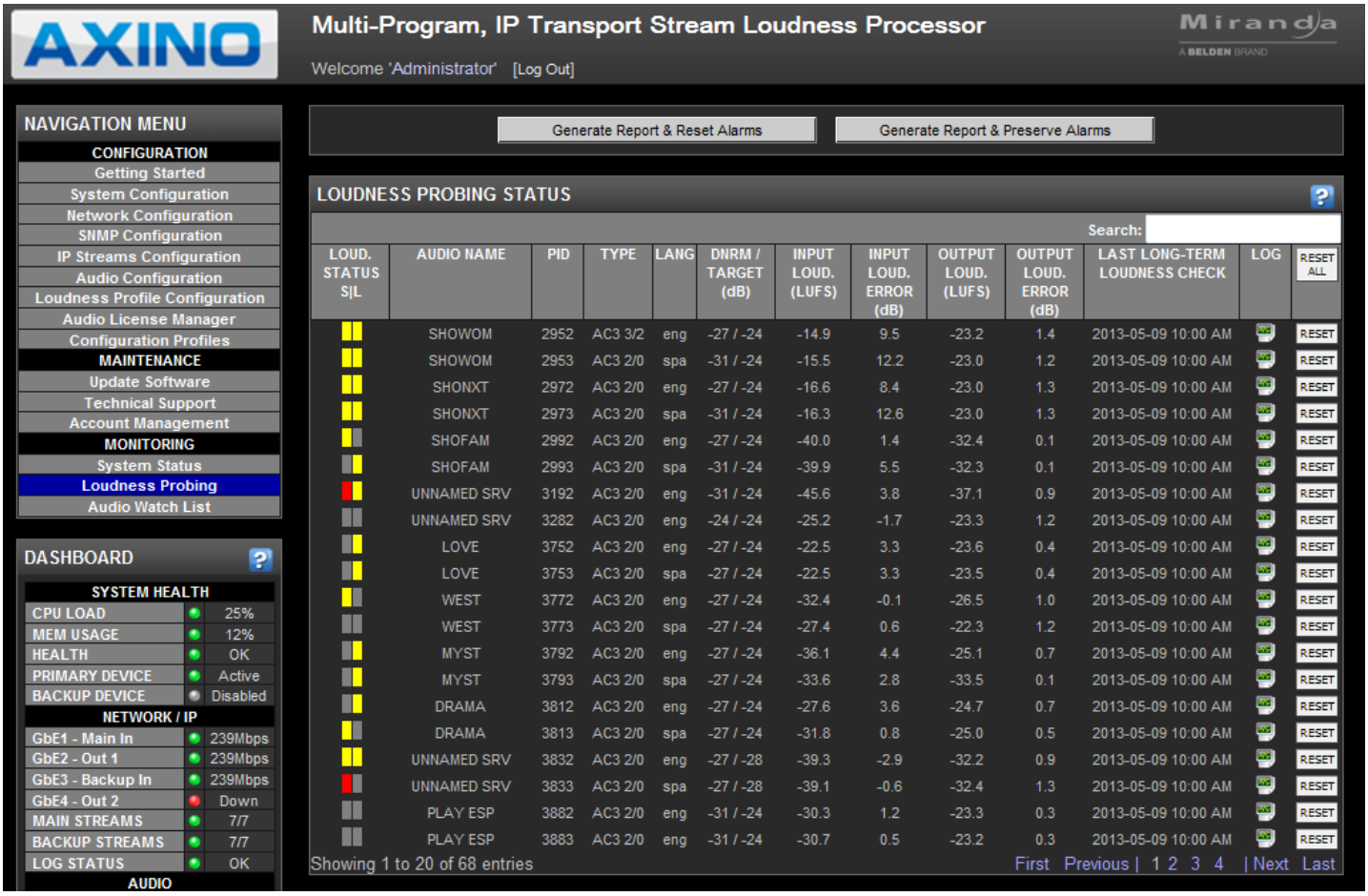
For each of the ethernet interfaces (two management ports and four streaming ports), the following information is shown:

Status — Green icon – port is active
Yellow icon – no carrier
Red icon – port is inactive

MAC Address	This is a unique, unchangeable address, shown for information only.
IP Address	The current IP address, as set in the Network Configuration panel
Mask	The current mask, as set in the Network Configuration panel
Gateway	The current Gateway address, as set in the Network Configuration panel
Tx Bytes	Transmit data transfer rate
Rx Bytes	Receive data transfer rate

6.3 Loudness Probing Status

This panel lists all the audios currently being probed, and shows the status of loudness measurements, alarms and correction.

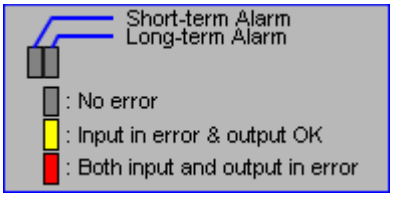


Generate Report… – the two buttons at the top of the page also appear in the *Audio Watch List* page. They are described in that section of this manual – see ***Reports*** on page 49.

Loudness Status S|L

The icon shows the Short Term Loudness Status on the left, and the Long Term Loudness Status on the right. The color shows the error status:

- Grey – both input and output are OK
- Yellow – input in error, but output OK (i.e. ALC is on and has corrected the error)
- Red – both input and output in error (i.e. ALC is OFF, or could not correct the error)



Audio Name, PID, Type, Lang and **Dialnorm/Target** all refer to information about the audio extracted from the incoming data stream.

Input Loudness

The current input loudness for the audio service measured according to the loudness measurement mode (ATSC A/85 or EBU R128).

- In A/85 mode, the value is averaged over a 10s period.
- In EBU mode, the value represents the short term loudness.
- For AC3 audio, the value does not take into account the DIALNORM, so the measured value is the uncorrected value. Therefore on average the value should be around the DIALNORM. Note that since it is a short-term value, it may differ greatly from the expected value at any particular time.

***Note** – Axino's probing can handle values as low as -60dB; any lower value will be reported as -60dB.*

Input Loudness Error

Current Loudness Error is the difference between the current integrated value over the selected period of time and the DIALNORM (AC3) or TARGET. The period of time is set in the loudness profile for that audio service.

Output Loudness

Output Loudness is the current loudness of the audio service at the output.

- In A/85 mode, the value is averaged over a 10s period.
- In EBU mode, the value represents the short term loudness.
- For AC3 audio, the value does not take into account the DIALNORM, so the measured value is the uncorrected value.

Therefore, on average the value should be close to the desired target loudness. Note that since it is a short-term value, it may be outside the tolerance or differ greatly from the target value at any particular time

Output Loudness Error

The value represents the error in dB of the integrated loudness after the ALC module with respect to the specified TARGET value. The period of time is the same as used for the input loudness measurement. This value is used to generate long-term loudness alarms whenever outside the configured tolerance range.

Last Long-Term Loudness Check

Shows the date and time of the last long-term loudness check

LOG

Click on the Audio Loudness Analyzer icon in the LOG column to begin the analysis of the loudness logs for the associated audio PID. The functioning of the analyzer and instructions for its use are given in its User Manual, which can be opened from the Help-Manual pulldown in the ALA toolbar.

Note that the icon is inactive if the path to the audio log files has not been configured as described in Network Path on page 19.

Reset / Reset All

As required by the EBU mode, the RESET button immediately resets the integrated loudness measure. The result is reflected in the difference between the integrated value and the target value.

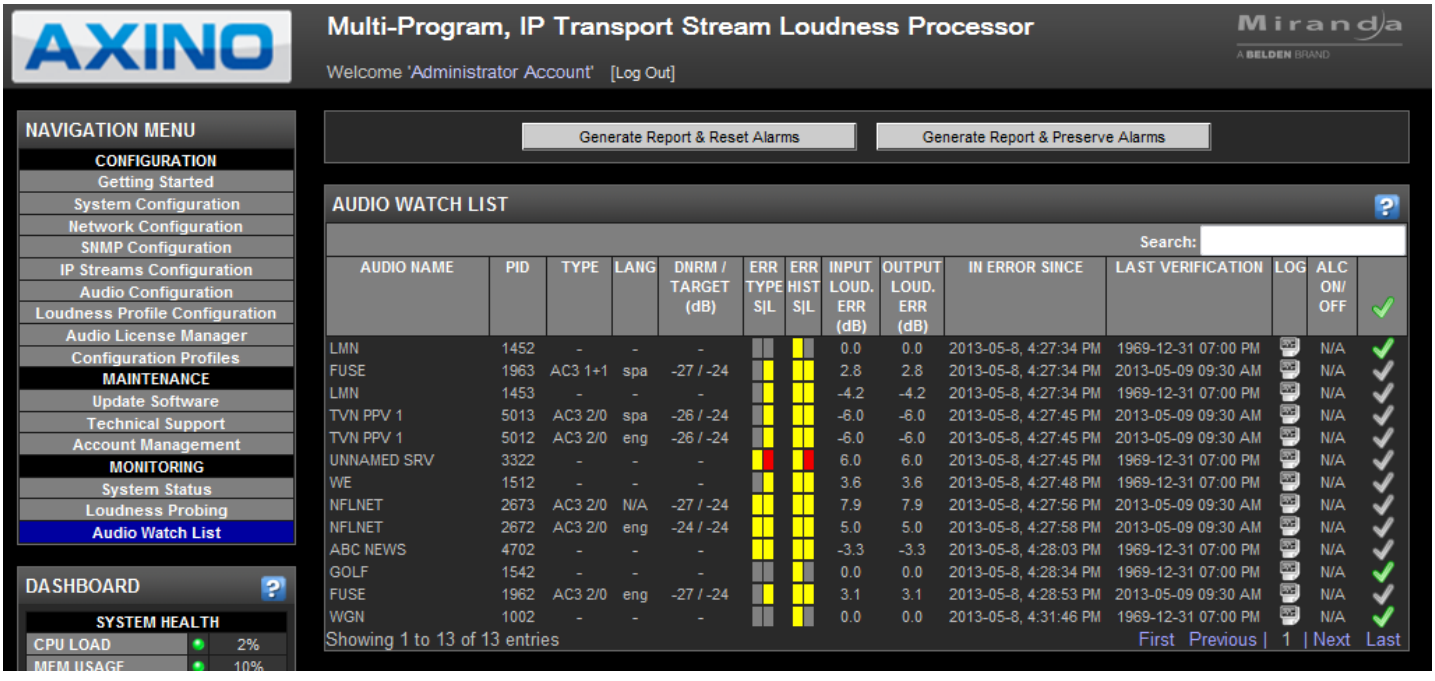
- Click the RESET button at the right side of the line for any audio to reset the integrated loudness measure for that audio.
- Click RESET ALL at the top of the right-hand column to reset the integrated loudness measure for all audios being probed.

6.4 Audio Watch List

What is the Watch List?
The Watch List shows every audio PID that potentially contains loudness errors according to the alarm settings of the loudness profile. In other words, the expected target loudness (ex. DIALNORM) does not match the actual loudness to within the specified Mismatch Tolerance (see section 4.7.3).

How it works...
Every time a scheduled loudness verification event occurs (see (see section 4.7.3), the PID integrated loudness value is compared to the DIALNORM (AC3 only) or TARGET loudness value. Should it be outside the specified Mismatch Tolerance, it is added to the watch list. On the next verification event, should the PID be back within tolerance, it is flagged for removal from the watch list. Note that every time a PID is put on the watch list an entry is logged in the alarm log located in the loudness log shared folder. This alarm log has the format `alarms_YYYY_MM_DD.csv`

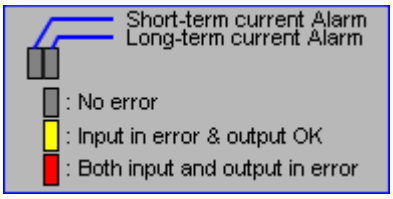
What should one do when a PID is listed?
The watch list shows you the time at which the PID was added to the list and the time of the last verification. When the integration period is short or the loudness error is small, consider analyzing the logs. The Axino has no knowledge of the audio segments and therefore cannot accurately determine the loudness of a single program. The Axino may interpret a loud action scene in a movie as being too loud even if this is perfectly normal. When the integration period is very long and the loudness error is fairly large, it generally indicates that the audio is not on expected target. For AC3 audio, it means that the DIALNORM is generally wrong. In such a case you should consider activating the ALC and leaving it ON as long as the PID appears on the watch list.



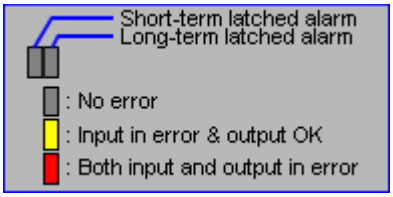
This panel lists all the audios currently placed on the watch list, and shows the status of loudness measurements, alarms and correction.

Audio Name, PID, Type, Lang and Dialnorm/Target all refer to information about the audio extracted from the incoming data stream.

Error Type S|L – Shows the short-term and long-term current alarms, using colored icons to indicate the alarm's status as shown in the figure.



Error History S|L – Shows the short-term and long-term latched alarms, using colored icons to indicate the alarm's status as shown in the figure.



Input Loudness Error – the long-term loudness difference between the DIALNORM or target value and the actual measured input loudness.

Output Loudness Error – the long-term loudness difference between the DIALNORM or target value and the actual measured output loudness. The output loudness is measured after ALC is applied. When ALC is disabled, the output and input loudness measurements are the same.

In Error Since – shows the date and time when this audio was first placed on the watch list

Last Verification – shows the date and time of the most recent verification

LOG – click on the icon in a row to launch the Audio Loudness Analyzer and perform an analysis of the log files for that PID. The functioning of the analyzer and instructions for its use are given in its User Manual, which can be opened from the Help-Manual pulldown in the ALA toolbar.

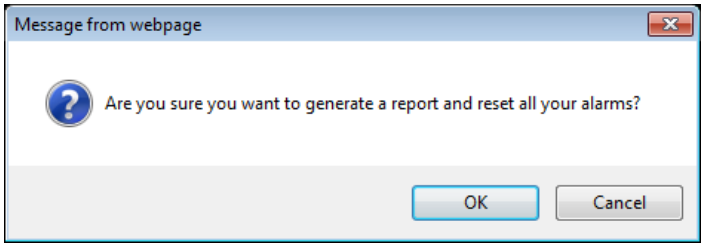
ALC ON/OFF – Turn ALC ON or OFF for this audio. Note that you may also turn ALC ON or OFF in the Audio Configuration panel (see section 4.6).

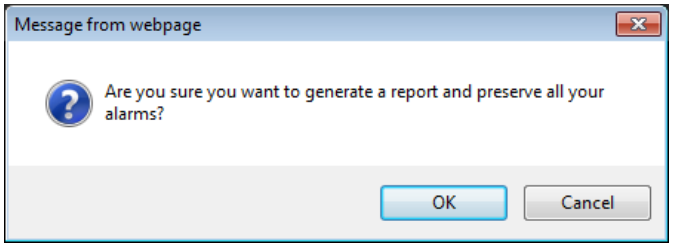
The column on the right will show a GREEN checkmark for any PID that is no longer in error and can be removed from the Watch List.

- Click on the green checkmark to remove the PID from the Watch List

Reports

The two buttons at the top of the page allow the user to generate a report summarizing the current status of the loudness probing on this Axino, and then to either reset or preserve the alarms. Clicking a button opens the appropriate dialogue:



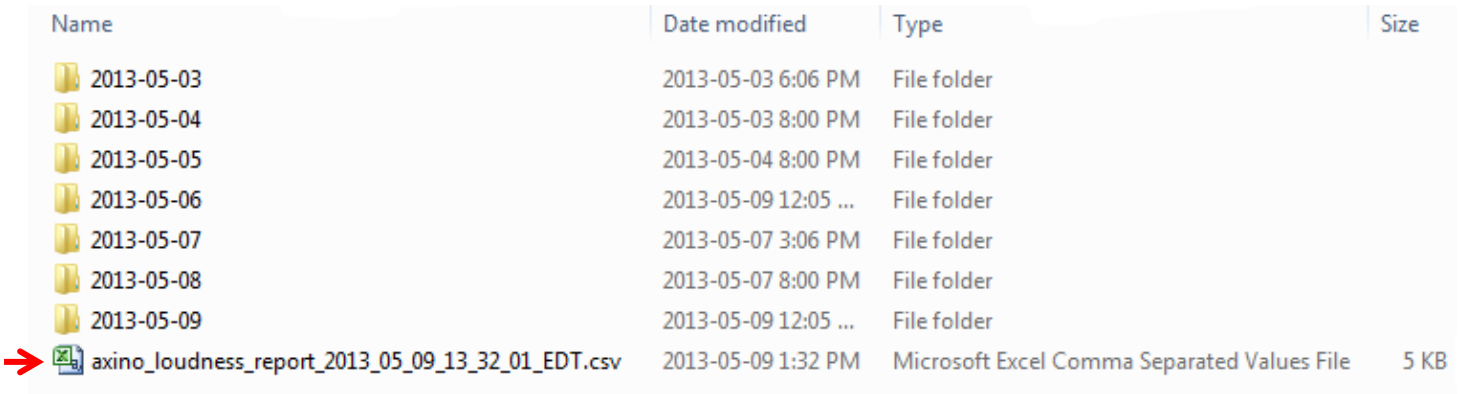


If you click OK, you will generate the report, and then either reset the alarms or leave them as is, per your selection.

The report that is generated will be saved in the same folder as the log files for this Axino.

The path to that folder is shown on the System Configuration page (see Network Path on page 19)

Once you have navigated to the folder on your desktop, you will see the report file:



The report name is: axino loudness report_YYYY_MM_DD_HH_MM_SS_TMZ.csv

Where: YYYY_MM_DD is the date on which the report was generated
HH_MM_SS is the time when the report was generated
TMZ is the time zone in which the report was generated

The file is a .csv document that will open in Microsoft Excel.

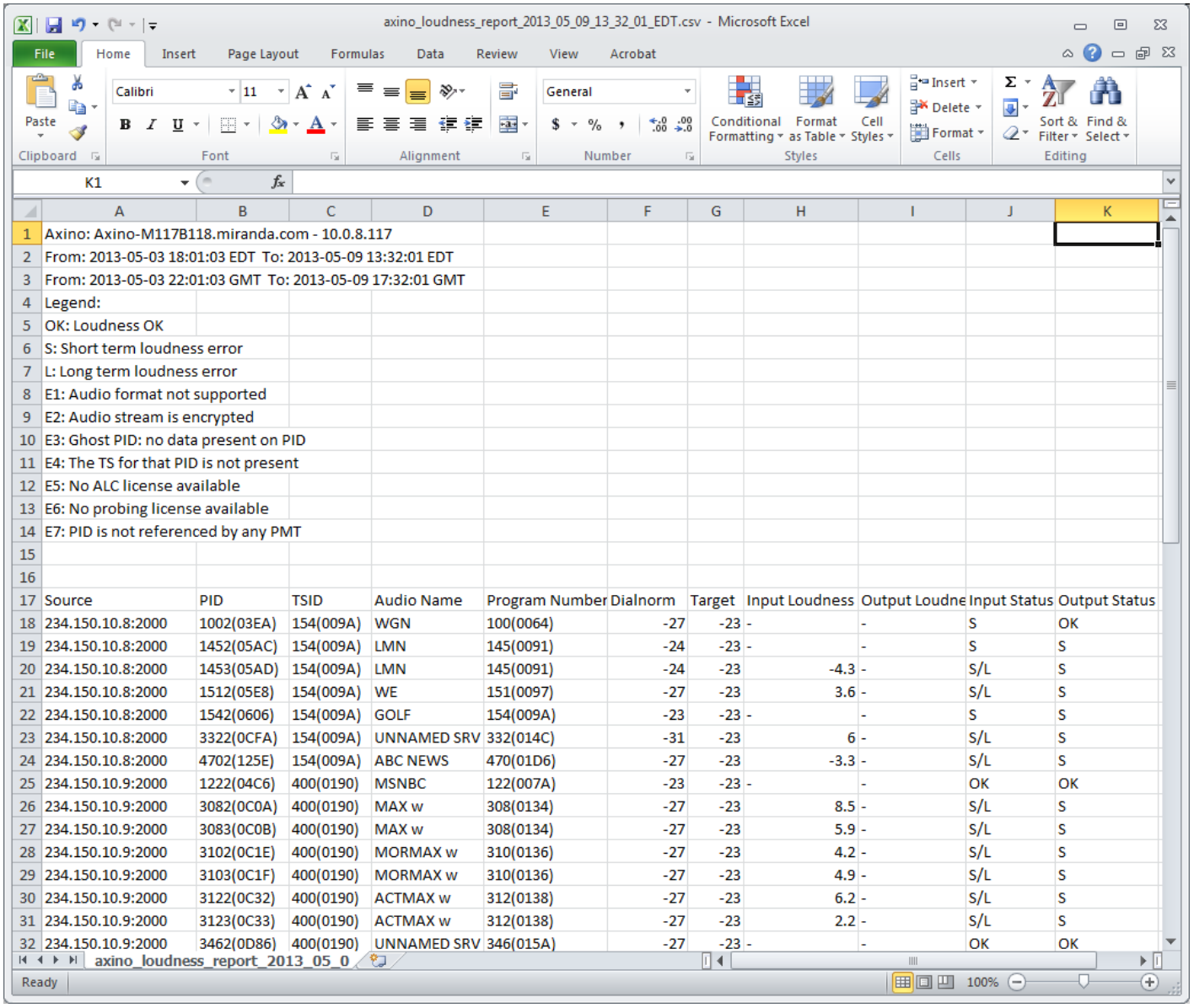
The report identifies:

- The IP address of the Axino that created the file
- The time period covered by the file, specified for both the local time zone, and GMT for international uses.

The report then lists the following for all PIDs that were being probed by this Axino at the time the report was generated:

- Source
- PID
- TSID
- Audio Name
- Program Number
- Dialnorm
- Target
- Input Loudness
- Output Loudness
- Input Status
- Output Status

These reports are a convenient way to save a snapshot of the audio probing and error correction status of the Axino at any time.



axino_loudness_report_2013_05_09_13_32_01_EDT.csv - Microsoft Excel

	A	B	C	D	E	F	G	H	I	J	K
1	Axino: Axino-M117B118.miranda.com - 10.0.8.117										
2	From: 2013-05-03 18:01:03 EDT To: 2013-05-09 13:32:01 EDT										
3	From: 2013-05-03 22:01:03 GMT To: 2013-05-09 17:32:01 GMT										
4	Legend:										
5	OK: Loudness OK										
6	S: Short term loudness error										
7	L: Long term loudness error										
8	E1: Audio format not supported										
9	E2: Audio stream is encrypted										
10	E3: Ghost PID: no data present on PID										
11	E4: The TS for that PID is not present										
12	E5: No ALC license available										
13	E6: No probing license available										
14	E7: PID is not referenced by any PMT										
15											
16											
17	Source	PID	TSID	Audio Name	Program Number	Dialnorm	Target	Input Loudness	Output Loudne	Input Status	Output Status
18	234.150.10.8:2000	1002(03EA)	154(009A)	WGN	100(0064)	-27	-23	-	-	S	OK
19	234.150.10.8:2000	1452(05AC)	154(009A)	LMN	145(0091)	-24	-23	-	-	S	S
20	234.150.10.8:2000	1453(05AD)	154(009A)	LMN	145(0091)	-24	-23	-4.3	-	S/L	S
21	234.150.10.8:2000	1512(05E8)	154(009A)	WE	151(0097)	-27	-23	3.6	-	S/L	S
22	234.150.10.8:2000	1542(0606)	154(009A)	GOLF	154(009A)	-23	-23	-	-	S	S
23	234.150.10.8:2000	3322(0CFA)	154(009A)	UNNAMED SRV	332(014C)	-31	-23	6	-	S/L	S
24	234.150.10.8:2000	4702(125E)	154(009A)	ABC NEWS	470(01D6)	-27	-23	-3.3	-	S/L	S
25	234.150.10.9:2000	1222(04C6)	400(0190)	MSNBC	122(007A)	-23	-23	-	-	OK	OK
26	234.150.10.9:2000	3082(0C0A)	400(0190)	MAX w	308(0134)	-27	-23	8.5	-	S/L	S
27	234.150.10.9:2000	3083(0C0B)	400(0190)	MAX w	308(0134)	-27	-23	5.9	-	S/L	S
28	234.150.10.9:2000	3102(0C1E)	400(0190)	MORMAX w	310(0136)	-27	-23	4.2	-	S/L	S
29	234.150.10.9:2000	3103(0C1F)	400(0190)	MORMAX w	310(0136)	-27	-23	4.9	-	S/L	S
30	234.150.10.9:2000	3122(0C32)	400(0190)	ACTMAX w	312(0138)	-27	-23	6.2	-	S/L	S
31	234.150.10.9:2000	3123(0C33)	400(0190)	ACTMAX w	312(0138)	-27	-23	2.2	-	S/L	S
32	234.150.10.9:2000	3462(0D86)	400(0190)	UNNAMED SRV	346(015A)	-27	-23	-	-	OK	OK

7 Specifications

ETHERNET PORTS

MANAGEMENT (MNGT1, MNGT2)

Physical:	Two (2) electrical Gigabit Ethernet on RJ45 connectors
Standards:	IEEE 802.3 10/100/1000 Ethernet

STREAMING (GbE1, GbE2, GbE3, GbE4)

Physical:	Two (2) electrical Gigabit Ethernet on RJ45 connectors (Axino-400 and -410) Four (4) SFP for optical or RJ45 (Axino 400-SFP and Axino-410-SFP)
Standards:	IEEE 802.3 10/100/1000 Ethernet
Transport:	UDP multicast/unicast 1-7 TS/IP IGMPv3 MSM & SSM
Performance:	Up to 900 Mbps of streaming on each port

TRANSPORT FORMATS

Standards:	IEC-13818-1 CBR MPEG Transport Streams Multi Program Transport Streams (MPTS) Single Program Transport Streams (SPTS) All Video Formats Supported (HD, SD, H.264, MPEG2…) VCT/SDT support for service names

PROCESSING

Audio formats:	MPEG2/MPEG1 layer 2 Dolby Digital AC-3 (all modes)		
Processing delay:	400 ms on entire MPEG-TS		
Processing power:	Axino 400 (& -SFP)	Monitoring only:	up to 50 AC3 5.1
		Processing:	up to 50 AC3 5.1
	Axino 410 (& -SFP)	Monitoring only:	up to 200 AC3 5.1
		Processing:	up to 140 AC3 5.1

PHYSICAL

Height:	1.7 in (43 mm) 1RU
Width:	17.2 in. (437 mm)
Depth:	25.6 in. (650 mm)
Weight:	40 lbs (18.1 kg)
Power Supply:	650 W (1+1) redundant power supply, hot-swappable
AC:	100-240 V, 60 – 50 Hz, 8-4 A
Operating temperature:	10°C to 35°C (50°F to 95°F)

8 FAQ

Q: Is it safe to activate/disable ALC when my system is live?
Yes. This procedure will perform an aligned "hot switch" between the unprocessed audio and the internal processor. This will be totally seamless (besides the audio loudness which of course may change according to settings) and will not cause glitches on the TS or audio stream.

Q: What does the Loudness Error represent and how is it measured?
The loudness error is the difference between a target value and the loudness integrated over a user-specified period of time. Basically, the input loudness values are integrated per the selected standard (A/85 or EBU) and compared to the desired target value. For AC3 audios, that target value is the DIALNORM. In this case (AC3 audio), the loudness error is simply a comparison of the DIALNORM with the measured loudness of the compressed stream.

Q: Why does changing the ALC target loudness produce no audible differences at the output for AC3 audios?
The answer is DIALNORM. The Axino will process the essence of the audio so that the actual loudness is close to the specified target value. At the same time, the Axino will replace the DIALNORM value in the AC3 stream with this target value. When this AC3 audio is decoded, the DIALNORM is applied to the signal effectively bringing it around -31dBFS. Because the DIALNORM tracks the actual loudness of the audio, the result at the decoder is always -31dBFS regardless of the target loudness value. This is why no perceptual differences can be heard at the output. This is precisely how the channel-to-channel loudness variation problem is resolved. By processing all channels, regardless of the target loudness setting for each, the end-user will always perceive the same level of audio.

Q: Why does one need to specify the DRC mode for AC3 audio?
Unfortunately the AC3 Dynamic Range Compression (DRC) mode is not carried in the BSI section making it impossible to know which DRC mode was originally set. Since the Axino will re-encode the AC3 audio, it needs to know which DRC mode to use while encoding.

Q: Is a PID on the Watch List necessarily at fault?
No. This is why it is called a "Watch list". The Axino has very little knowledge about audio segments and therefore cannot accurately determine the overall loudness of a single program. In fact, a loud commercial of 30 seconds will not likely affect the integrated loudness if the period of integration is 6 hours. Similarly, if the integrated period is 15 minutes and there is a movie playing with an action scene lasting 10 minutes the Axino may think the loudness is quite off. Therefore the watch list shows those PIDs that potentially have a mismatch between the expected loudness (ex: DIALNORM) and the actual loudness. To confirm, the logs must be opened and analyzed. Note however that a loudness error of 10dB when integrated over 24 hours is likely to indicate that the audio service is consistently too loud.

Q: Will the Axino properly handle DIALNORM changes within the same audio PID?
Yes. The Axino performs the integration of loudness post-dialnorm. This means that it applies the DIALNORM to the incoming audio before measuring. If the DIALNORM matches the actual loudness, the result will be an integrated loudness of -31dBFS regardless of the value of the DIALNORM. Therefore if the DIALNORM changes in the incoming PID but the actual loudness also changes, the post-dialnorm value would still be -31dBFS. Comparing the integrated loudness to -31dBFS will then reveal any DIALNORM-to-content mismatch.

Q: Why is there no output from the Axino?
Did you change your physical IP address while the virtual IP address was active? If so, the Axino output will be disabled. See the note on page 22 for additional information.

Annex – SNMP Traps implemented in Axino v2.10

The following table gives detailed information about SNMP traps implemented in Axino v2.10.

Notes:

- SNMP trap information may vary between Axino releases, so make sure that you have documentation appropriate to the software version you are using.
- All traps have the “FriendlyName” and “Severity” variables. These are not included in the following table for clarity.
- Traps where no details are shown in the Associated Variables and Description columns on the right are sent without associated variables.

Trap name	Trap description	As implemented in Axino v 2.10	
		Associated variables	**Description**
axinoInputSocketStatus	This trap is sent when the socket state changes.	axinoSocketStatusStreamStatus	Stream status (0=no input, 1=error, 2=ok)
		axinoTSInputIP	Input TS socket ip address
		axinoTSInputPort	Input TS socket port number
		axinoTSInputEthInterface	Input TS socket network interface(0 GbE1 (primary TS interface), 1 GbE3 (secondary
		axinoTSOutputIP	Output TS socket ip address (if 0.0.0.0 the input ts is not re-streamed on the network)
		axinoTSOutputPort	Output TS socket port number
		axinoTSOutputInterface	Output TS socket network interface(0 GbE2 (primary TS interface), 1 GbE4 (secondary)
		axinoTSInputProtocol	Stream input protocol (udp (0) , rtp (1))
		axinoTSOutputProtocol	Stream output protocol (udp (0) , rtp (1))
axinoPidStatus	This trap is sent if the PID state changes.	axinoAudioConfigPID	Actual audio PID
		axinoAudioConfigStatus	Config status: notEnoughInfo (-1) , ok (0) , missingTS (1) , missingPID (2) , unsupportedFormat (3) , encrypted (4) , ghost (5) , okButNoProbingLicense (6) , noProgramInList (7) , okButNoProcLicense (8))

		axinoAudioConfigType	Audio type string (ex: “AC3 2/0”)
		axinoAudioConfigAudioName	Audio name string
		axinoAudioConfigProgramNumber	Program Number
		axinoAudioConfigSourceIP	IP source address
		axinoAudioConfigSourcePort	IP source port
axinoWatchListInputShortTermAlarm	Watch list input short term alarm.	axinoAudioWatchListIndex	Watchlist table index
axinoWatchListOutputShortTermAlarm	Watch list output short term alarm.	axinoAudioWatchListAudioName	Audio name string
axinoWatchListInputLongTermAlarm	Watch list input long term alarm.	axinoAudioWatchListPID	Audio PID number
axinoWatchListOutputLongTermAlarm	Watch list output long term alarm.	axinoAudioWatchListType	Audio type string (ex: “AC3 2/0”)
		axinoAudioWatchListDNRMTarget	DNRM/Target
		axinoWatchListShortTermErrType	noError (0) , inputError (1) , outputError (2) , inputAndOutputError (3)
		axinoWatchListLongTermErrType	
		axinoWatchListShortTermErrHist	
		axinoWatchListLongTermErrHist	
		axinoAudioWatchListInputLoudnessErr	Input Loudness Error Value (string)
		axinoAudioWatchListOutputLoudnessErr	Output Loudness Error (string)
		axinoAudioWatchListInErrorSince	Time and date since in error (string)
		axinoAudioWatchListLastVerification	Time and date since last verification (string)
		axinoAudioWatchListALCEnable	ALC (disabled (0) , enabled (1))
		axinoAudioWatchListSourceIP	IP source address
		axinoAudioWatchListSourcePort	IP source port
axinoSecondaryInputSocketStatus	This trap is sent when the secondary socket state changes.	axinoSocketStatusSecondaryStreamStatus	Stream status (0=no input, 1=error, 2=ok)
		axinoTSInputIP	Input TS socket ip address
		axinoTSInputPort	Input TS socket port number
		axinoTSInputEthInterface	Input TS socket network interface(0 GbE1 (primary TS interface), 1 GbE3 (secondary
		axinoTSOutputIP	Output TS socket ip address (if 0.0.0.0 the input ts is not re-streamed on the network)
		axinoTSOutputPort	Output TS socket port number
		axinoTSOutputInterface	Output TS socket network interface(0 GbE2 (primary TS interface), 1 GbE4 (secondary)
		axinoTSInputProtocol	Stream input protocol (udp (0) , rtp (1))

		axinoTSOutputProtocol	Stream output protocol (udp (0) , rtp (1))
axinoStreamRedundancyReturn	This trap is sent when a stream on the secondary interface returns to the primary interface.	axinoSocketStatusSocketSource	primarygbe1 (0) , secondarygbe3 (1)
		axinoSocketStatusStreamStatus	noInput (0) , error (1) , ok (2) , notConfigured (255)
		axinoSocketStatusSecondaryStreamStatus	noinput (0) , error (1) , ok (2) , unknown (255)
		axinoStreamRedundancyMode	manualGbE1 (1) , manualGbE3 (2) , auto (3) , Keep autoreturn (4) , off (0)
axinoStreamRedundancyFailover	This trap is sent when a stream on the primary interface fails over to the secondary interface.	axinoSocketStatusSocketSource	primarygbe1 (0) , secondarygbe3 (1)
		axinoSocketStatusStreamStatus	Stream status (0=no input, 1=error, 2=ok)
		axinoSocketStatusSecondaryStreamStatus	noinput (0) , error (1) , ok (2) , unknown (255)
		axinoStreamRedundancyMode	manualGbE1 (1) , manualGbE3 (2) , auto (3) , autoreturn (4) , off (0)
axinoHighCPUUsage	Trap sent when CPU Usage goes over 78%.		
axinoNormalCPUUsage	This trap is sent if the CPU usage goes from over 78% to under 78%.		
axinoHighMemoryUsage	This trap is sent when the memory usage goes over 80%.		
axinoNormalMemoryUsage	This trap is sent when the memory user goes from over 80% to under 80%.		
axinoSystemHealthStatus	This trap is sent if a problem is detected with the fan, the power supply, the temperature or the voltage. This trap will also be sent if the system goes from error to normal.	axinoSystemHealthVoltage	
		axinoSystemHealthTemperature	
		axinoSystemHealthFan	
		axinoSystemHealthPowerSupply	
axinoHighTrafficGbE1	Trap is sent if traffic goes over 900 Mbps		

	on GbE1 (primary TS interface).		
axinoNormalTrafficGbE1	Trap is sent if traffic goes from over 900 Mbps to under 900 Mbps on GbE1 (primary TS interface).		
axinoHighTrafficGbE2	Trap is sent if traffic goes over 900 Mbps on GbE2 (primary TS interface).		
axinoNormalTrafficGbE2	Trap is sent if traffic goes from over 900 Mbps to under 900 Mbps on GbE2 (primary TS interface).		
axinoHighTrafficGbE3	Trap is sent if traffic goes over 900 Mbps on GbE3 (primary TS interface).		
axinoNormalTrafficGbE3	Trap is sent if traffic goes from over 900 Mbps to under 900 Mbps on GbE3 (primary TS interface).		
axinoHighTrafficGbE4	Trap is sent if traffic goes over 900 Mbps on GbE4 (primary TS interface).		
axinoNormalTrafficGbE4	Trap is sent if traffic goes from over 900 Mbps to under 900 Mbps on GbE4 (primary TS interface).		
axinoDeviceRedundancyStatusChanged	Trap sent when the redundancy state has changed.	axinoPrimaryDeviceStatus	redundancyDisabled (0) , initializing (1) , standby (2) , active (3) , unreachable (4) , noInputActive (5) , noInputStandby (6)
		axinoBackupDeviceStatus	redundancyDisabled (0) , initializing (1) , standby (2) , active (3) , unreachable (4) , noInputActive (5) , noInputStandby (6)