

Axino

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

M948-9900-100

9 Nov 2011



Miranda

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Safety Compliance



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

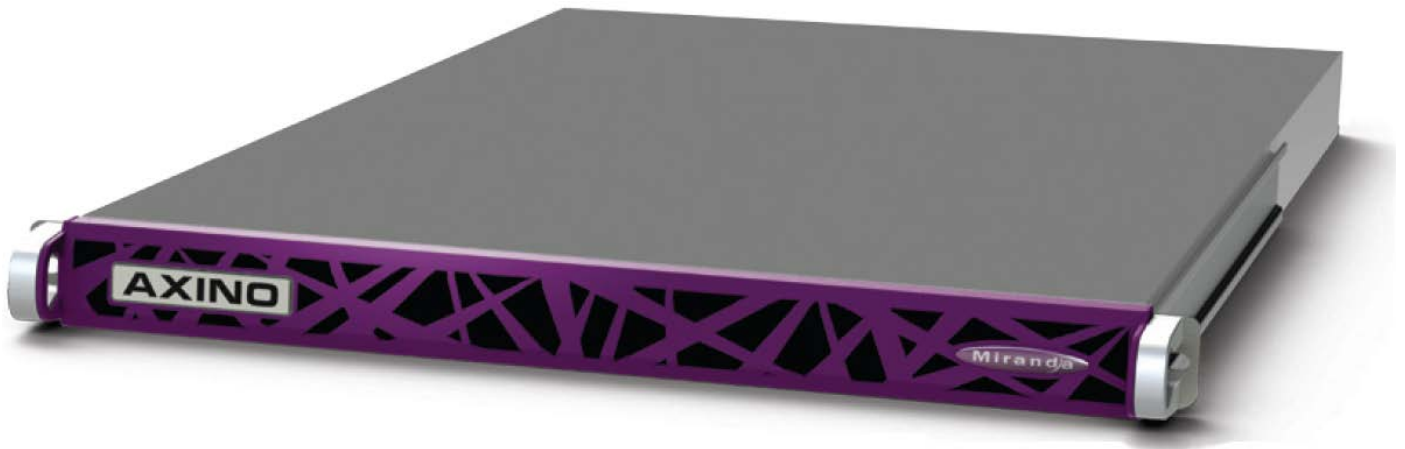
1.1 Introduction

Axino can perform high quality loudness control across hundreds of HD/SD programs carried over IP. Designed for cable, satellite & IPTV operators, it can monitor and process the highest number of programs on the market, with individual control of each program.

The loudness processor addresses all common loudness problems using Automatic Loudness Control, including excessive channel-to-channel and program-to-program variation. For instance, when installed downstream of the advert insertion, it will prevent excessively loud commercials, and will improve the quality of service for subscribers.

Axino can process multiple audio services from single or multiple programs carried over IP. The audio services are extracted, measured, processed for loudness, and re-inserted into the original program. The processor ensures that the audio loudness matches the desired target by constantly measuring and correcting the audio levels. The result is a smooth and consistent audio loudness at all times, and across all television channels.

To assist with loudness conformance, Axino logs measured loudness across all channels. These logs can be viewed graphically, and the contents analyzed to identify any problematic audio segments, and they can also provide proof of loudness compliance.



1.2 Features

High program count, automatic loudness control

- Cost-effective, high program count loudness processing for IP infrastructures
- Provides loudness control for hundreds of programs simultaneously
- Prevents excessive channel-to-channel and program-to-program loudness variation
- Prevent loud commercials
- Selectable loudness profiles to best suit each program
- Support of Dolby Digital (AC3) audio

Audio monitoring and logging

- Loudness measurement using ATSC A/85 or EBU R128 on all processed audio services
- Remote logging of loudness for conformity reports and data analysis
- Detect and alarm when the average loudness of a channel is outside the target range

Easy to set-up and control

- Two GigE Ethernet Control ports
- Built-in web page for configuration and monitoring
- Convenient SNMP traps for third party monitoring software

Designed for high performance IP transport streams

- Only selected audio PIDs are replaced within the transport streams; all other PIDs remained unchanged
- Dual Ethernet input/output ports for full bandwidth operation, and avoids duplicated TS on the same network, by inputting on the first port while outputting on the second port (TS bridging)
- Flexible UDP streaming with automatic 1 to 7 TS/IP handling
- Unicast or Multicast streaming
- IGMPv3 for better multicast traffic control

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 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)
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 four ports:

- MNGT1 = 10.0.3.100 netmask 255.0.0.0
- MNGT2 = 192.168.0.100 netmask 255.0.0.0
- GbE1 = 172.30.3.100 netmask 255.255.255.0
- GbE2 = 172.30.3.100 netmask 255.255.255.0

3. Browse to the Axino by typing the IP address 10.0.3.100 directly in the browser's address bar. Axino's web page will be displayed.
4. In the Navigation Menu, select Network Configuration

The screenshot displays the Axino web interface with a navigation menu on the left and four configuration panels on the right. The navigation menu includes sections for CONFIGURATION, MAINTENANCE, and MONITORING. The CONFIGURATION section has 'Network Configuration' selected. The MAINTENANCE section includes 'Update Software'. The MONITORING section includes 'System Status', 'Loudness Probing', and 'Audio Watch List'. The DASHBOARD section shows SYSTEM HEALTH (CPU LOAD 12%, MEM USAGE 11%, HEALTH OK) and NETWORK / IP (GbE1 LINK 164Mbps, GbE2 LINK 164Mbps, INPUT STREAMS 20/30). The four configuration panels are: MANAGEMENT ETHERNET PORTS CONFIGURATION (Ethernet Control Port 1 (MNGT1) and Ethernet Control Port 2 (MNGT2)), STREAMING ETHERNET PORTS CONFIGURATION (Primary Streaming Ethernet (GbE1) and Secondary Streaming Ethernet (GbE2)), and DOMAIN NAME SERVER (DNS) CONFIGURATION (Primary DNS Server and Secondary DNS Server). Each panel has 'Apply' and 'Cancel' buttons.

5. For Ethernet Control Port 1 (MNGT1), set up the IP Address, Mask and Gateway to conform to your network configuration, in consultation with your IT department if necessary.

6. You may also set up Ethernet Control Port 2 (MNGT2) at this time, as well as the two streaming internet ports, but this may be done after Axino is installed in its operating location if you wish.
NOTE – do not configure the ports in the same subnet.
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.



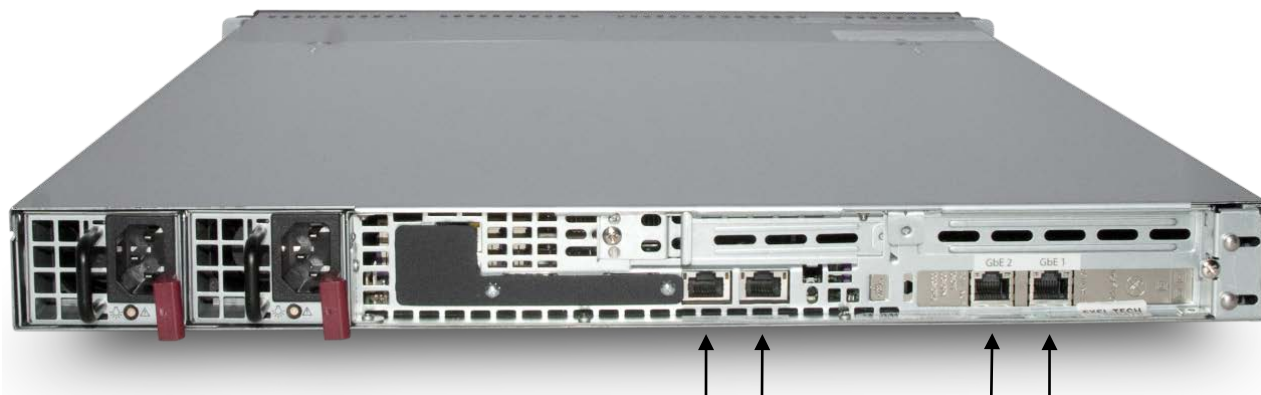
NOTE: If the IP address of the MNGT1 port was changed from the factory default value, and the new address has been lost, you can reset the Axino to the default port addresses listed above by pressing the POWER button three times in quick succession.

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

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

- The Axino is a 1 RU rack-mountable package, with all four ports accessible from the rear.



Rear panel port layout:

MNGT1 MNGT2 GbE2 GbE1

- MNGT1: Management port 1, for access to the Axino for configuration and control
- MNGT2: Management port 2, an alternate/backup management port
- GbE1: Gigabit Ethernet port 1, for streaming program I/O
- GbE2: Gigabit Ethernet port 2, for streaming program I/O

Connect the Axino to your LAN via the MNGT1 port.

See Section 4 of this manual for detailed configuration instructions.

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 four interface ports on the rear panel.

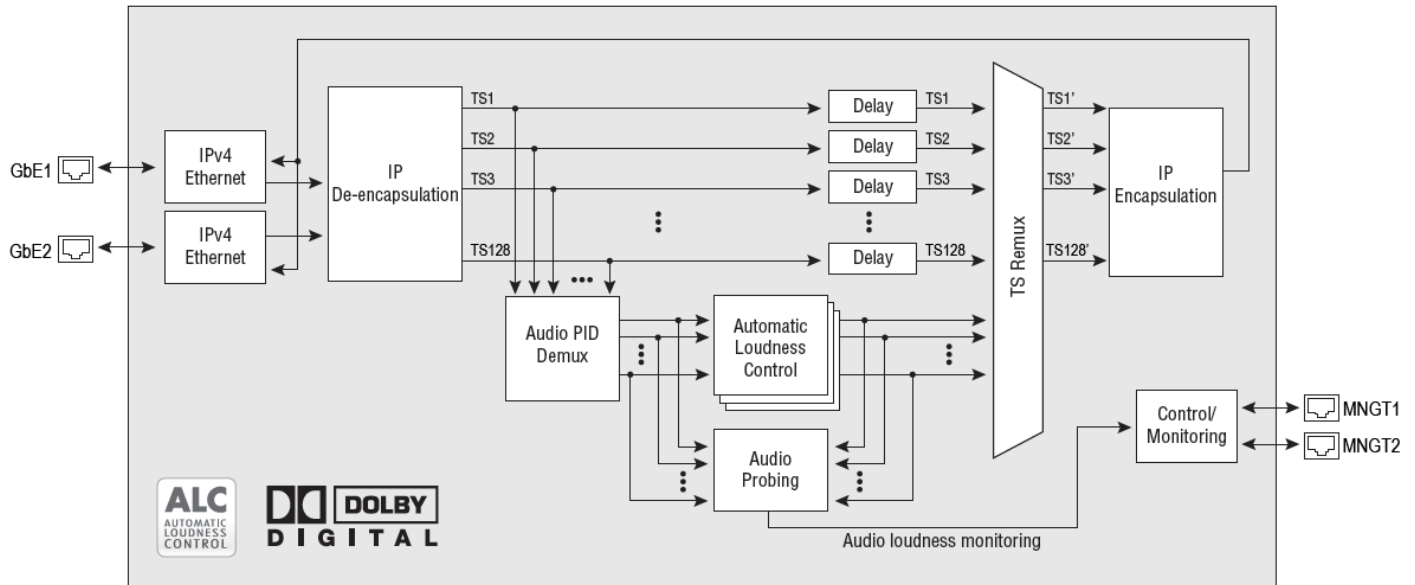


Figure 2.1 Functional Block Diagram

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

In theory, the loudness of a program (or commercial) is defined as the integrated loudness value over the entire audio segment. Therefore the momentary loudness values should be integrated starting at the beginning of a segment up to the end according to the methods described in the A/85 or EBU R128.

Because the Axino has no indication of the beginning or end of an audio segment, it can only verify the overall average loudness over a specified period of time. Therefore the audio loudness is integrated over that period of time and then compared to the DIALNORM (AC3 audio) or TARGET value using the specified tolerance. This method will

catch all PIDs with a loudness that is generally off. The period of time ranges from minutes to weeks depending on the desired level of alarming.

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 allows shorter loud audio segments such as commercials to be caught. 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.

Monitoring on the Axino works like this:

- The user specifies the period for loudness verification (hours, days, weeks)
- The loudness measurements are integrated over that period to get an average value
- The result is compared to DIALNORM (or target) with a given threshold tolerance for each period
- If a mismatch is found, the PID is put on a “watch list”
- An alarm is logged to signal the problem

3.2.2 Logging

The ultimate tool to confirm loudness levels is to use the loudness logs. They contain all the necessary loudness values to re-calculate the integrated loudness over any specific interval. Therefore, the user can easily manually select the boundaries of an audio segment and look at the integrated loudness.

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 and for convenient (password-protected) access even when Axino is offline. Using IT backup systems, the logs can 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 paths 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.

The logs can be enabled on a per audio PID basis. 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 audio name, PID number and an additional count in case the same PID & audio name appear more than once. For instance, the file name will follow this format: <SRV name>_<PID HEX>_NN.csv

The files can be opened even if they are currently accessed by the Axino. This makes it possible to open the current day's log. Note that due to network protocols there is a short delay before the current data appears in the log. A typical file for 24h will be 45MB in size.

Step 3: Maintaining Logs

Since the logs reside on a remote network drive, maintaining the logs is made simple – off-the-shelf archiving software can be used. The logs history limit is only set 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.

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) 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.

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. One file is created every 24h at midnight. The file names take the form *alarms_YYYY_MM_DD.csv* 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	Possible alarm descriptions	Explanation/Meaning
Input Stream Presence	Stream OK	The specified configured input stream (IP+port) is present and valid
	No stream at input	No valid TS packets are seen on the specified input stream (IP+port)
	Error receiving stream	Data present on UDP packets but it is not a valid TS
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.

(continued)

Alarm Name	Possible alarm descriptions	Explanation/Meaning
Input Loudness Error	Mismatch of X dB (added to watchlist)	X will state the actual number. This entry is logged whenever a PID is analyzed and the input loudness error falls outside the allowed mismatch tolerance.
	Integrated loudness value within mismatch tolerance (removed from watchlist)	The PID that was previously in a loudness error state came back to normal. In other words, the PID is no longer in a loudness error state. This also means the PID is removed from the watch list.
	Loudness error reset	Unexpected loudness error reset. May be due to a re-configuration of the loudness profile.
	PID was deleted (removed from watchlist)	The PID was removed from the Axino configuration and is no longer measured
	New loudness profile associated with PID (removed from watchlist)	The loudness profile for the PID was changed. This means that the loudness error verification restarted.
	PID in error (removed from watchlist)	The PID became in error making it impossible to probe loudness
	Manual Loudness Error Reset (removed from watchlist)	Someone used the manual reset button from the audio loudness probing page on the Axino.

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.

The Axino web page will be displayed. You can use the individual panels available through the Navigation Menu to configure and monitor all aspects of Axino's operation.

AXINO Multi-Program, IP Transport Stream Loudness Processor Miranda

NAVIGATION MENU

CONFIGURATION

- Getting Started
- System Configuration
- Network Configuration
- SNMP Configuration
- IP Streams Configuration
- Audio Configuration
- Loudness Profile Configuration
- Audio License Manager
- Configuration Profiles

MAINTENANCE

- Update Software

MONITORING

- System Status**
- Loudness Probing
- Audio Watch List

SYSTEM STATUS ?

GENERAL							
AXINO MODEL	AXINO-400						
SERIAL NUMBER	948-01-00000-119						
SOFTWARE VERSION	rev 0.01 build 97						

NETWORK							
Interface	Status	MAC Address	IP Address	Mask	Gateway	Tx Bytes	Rx Bytes
MNGT1	●	00:25:90:35:DE:B4	10.0.8.119	255.255.0.0	0.0.0.0	3638591668	2110140564
MNGT2	●	00:25:90:35:DE:B5	10.0.8.124	255.255.0.0	0.0.0.0	1351992407	316395491
GbE1	●	00:1B:21:AC:B1:0C	172.30.32.118	255.255.255.0	0.0.0.0	2119390404028	1093910085438
GbE2	●	00:1B:21:AC:B1:0D	10.0.3.8	255.255.255.0	0.0.0.0	747574452298	2685721546762

SYSTEM HEALTH		
Element	Status	Problem Description
Voltages	●	OK
Temperature	●	OK
Fans	●	OK
Power Supply	●	OK

DASHBOARD ?

SYSTEM HEALTH

CPU LOAD	●	3%
MEM USAGE	●	8%
HEALTH	●	OK

NETWORK / IP

GbE1 LINK	●	94Mbps
GbE2 LINK	●	164Mbps
INPUT STREAMS	●	5/5
LOG STATUS	●	OK

AUDIO

AUDIO PIDS	●	9/14
WATCH LIST	●	7

AUDIO LICENSES

LICENSE TYPE	TOTAL	AVAIL
PROBE AC3 2.0	0	0
PROBE AC3 5.1	200	191
ALC AC3 2.0	0	0
ALC AC3 5.1	100	94

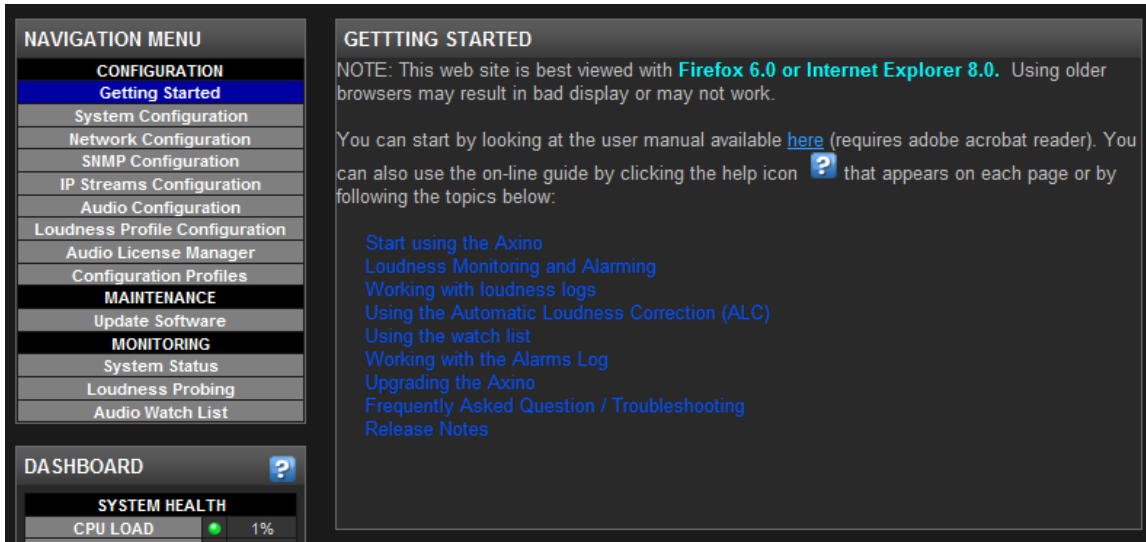
The Axino GUI consists of three panels:


- 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

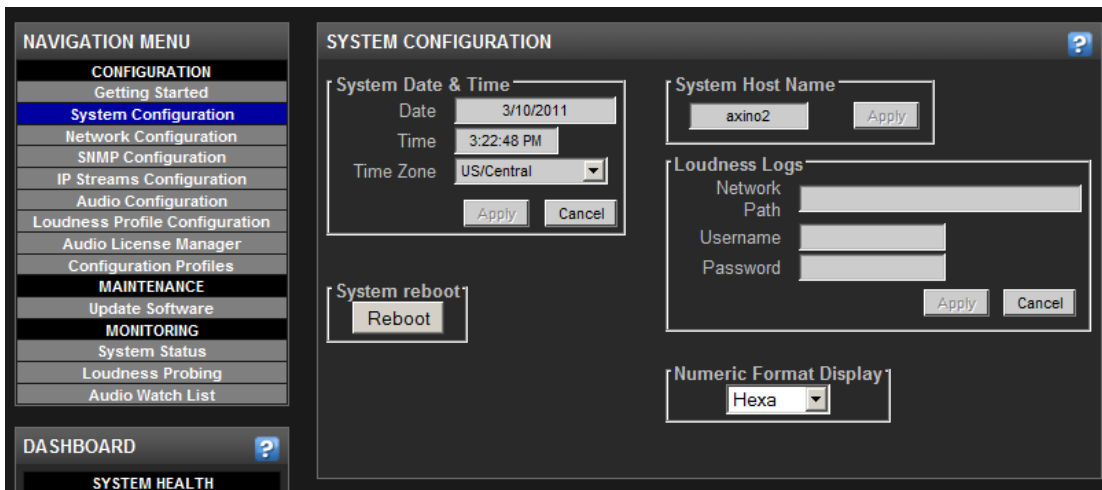
The Getting Started panel provides information about using the available on-line resources to help the user understand and operate the Axino.



- 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.

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. .

System Host Name

Assign the name which this Axino will assume on the management network.

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 in the network. From there they can be analyzed as required. To set up the loudness log repository:

- Identify a path on the network to a location where the Axino logs will be stored
 - The network path takes the form of //<ip>/<shared name> where <ip> is the IP address of the machine where the folder <shared name> exists. For example, the shared path could be //10.0.3.4/AxinoLogs if the machine 10.0.3.4 has a shared folder named AxinoLogs. Note that the network path cannot specify sub-folders in the shared folder; only the root shared folder can be specified
- Provide a username and password which will be required for anyone to access the log files from the network.
 - A user ID and password **MUST** be specified or this will fail. 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 **Hexadecimal** 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

4.3 Network Configuration

Navigate to Network Configuration.

The MNGT1 port was configured before the Axino was installed in its operating location, in order to enable access to the device through the LAN.

The MNGT2 port can be configured now, as an alternate access port for controlling the device. It makes sense for this port to have access from a different subnet, in case of network problems.

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

The streaming ethernet (CbE1 and GbE2) ports should be configured now, 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)
- Apply the new settings

Domain Name Server (DNS) Configuration

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

The screenshot displays the configuration interface for the Axino device. On the left is a navigation menu with sections for CONFIGURATION, MAINTENANCE, and MONITORING. The 'Network Configuration' option is highlighted. The main area is divided into three configuration panels:

- MANAGEMENT ETHERNET PORTS CONFIGURATION:** Contains two panels. 'Ethernet Control Port 1 (MNGT1)' has IP Address 10.0.8.118, Mask 255.255.0.0, and Gateway 0.0.0.0. 'Ethernet Control Port 2 (MNGT2)' has IP Address 10.47.7.118 and Mask 255.255.0.0. Both have 'Apply' and 'Cancel' buttons.
- STREAMING ETHERNET PORTS CONFIGURATION:** Contains two panels. 'Primary Streaming Ethernet (GbE1)' has IP Address 172.30.3.100 and Mask 0.0.0.0. 'Secondary Streaming Ethernet (GbE2)' has IP Address 172.30.3.101 and Mask 0.0.0.0. Both have 'Apply' and 'Cancel' buttons.
- DOMAIN NAME SERVER (DNS) CONFIGURATION:** Has 'Primary DNS Server' and 'Secondary DNS Server' both set to 0.0.0.0. It includes 'Apply' and 'Cancel' buttons.

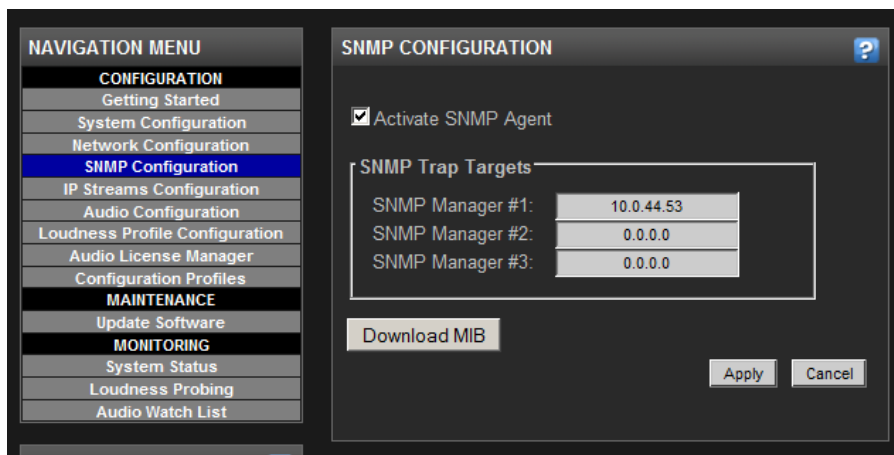
At the bottom left, a 'DASHBOARD' section shows system health metrics: CPU LOAD (12%), MEM USAGE (11%), HEALTH (OK), GbE1 LINK (164Mbps), GbE2 LINK (164Mbps), and INPUT STREAMS (20/30).

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

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



- Select the check box to activate the SNMP agent
- Enter the IP addresses of up to three SNMP managers to which traps will be sent.
- Apply to confirm and activate any changes.
- Download MIB to 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.

Adding a new Input/output Stream

1. In the table header, enter the IP address and port where the input stream will be found.
2. Select the Ethernet interface (GbE1 or GbE2) from which the input stream should be taken
3. 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.
4. 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.
5. If an output is necessary, specify the IP address, port and Ethernet interface to which the resulting processed stream should be sent

6. Click **Add New** to add the new stream to the table
7. Verify the TS status for the newly-added entry. It should be green with a non-zero bit rate.

IP I/O CONFIGURATION												
ID	INPUT STREAM				ENABLE OUTPUT	OUTPUT STREAM			TS STATUS			
	IP ADDRESS	PORT	INTERFACE	IGMPv3 SOURCE		IP ADDRESS	PORT	INTERFACE	IN	TS_ID	Avg. BITRATE	
			GbE1		<input type="checkbox"/>			GbE1			<input type="button" value="Add New"/>	<input type="button" value="X"/>
0	239.255.200.0	2000	GbE2	0.0.0.0	<input checked="" type="checkbox"/>	239.254.200.0	2000	GbE1	<input checked="" type="checkbox"/>	1h	7.99 Mbps	<input type="button" value="X"/>
1	239.255.200.1	2000	GbE2	0.0.0.0	<input checked="" type="checkbox"/>	239.254.200.1	2000	GbE1	<input checked="" type="checkbox"/>	1h	7.99 Mbps	<input type="button" value="X"/>
2	239.255.200.2	2000	GbE2	0.0.0.0	<input checked="" type="checkbox"/>	239.254.200.2	2000	GbE1	<input checked="" type="checkbox"/>	1h	7.99 Mbps	<input type="button" value="X"/>
3	239.255.200.3	2000	GbE2	0.0.0.0	<input checked="" type="checkbox"/>	239.254.200.3	2000	GbE1	<input checked="" type="checkbox"/>	1h	7.99 Mbps	<input type="button" value="X"/>
4	239.255.200.4	2000	GbE2	0.0.0.0	<input checked="" type="checkbox"/>	239.254.200.4	2000	GbE1	<input checked="" type="checkbox"/>	1h	7.99 Mbps	<input type="button" value="X"/>
5	239.255.200.5	2000	GbE2	0.0.0.0	<input checked="" type="checkbox"/>	239.254.200.5	2000	GbE1	<input checked="" type="checkbox"/>	1h	7.99 Mbps	<input type="button" value="X"/>
6	239.255.200.6	2000	GbE2	0.0.0.0	<input checked="" type="checkbox"/>	239.254.200.6	2000	GbE1	<input checked="" type="checkbox"/>	1h	7.99 Mbps	<input type="button" value="X"/>
7	239.255.200.7	2000	GbE2	0.0.0.0	<input checked="" type="checkbox"/>	239.254.200.7	2000	GbE1	<input checked="" type="checkbox"/>	1h	7.99 Mbps	<input type="button" value="X"/>
8	239.255.200.8	2000	GbE2	0.0.0.0	<input checked="" type="checkbox"/>	239.254.200.8	2000	GbE1	<input checked="" type="checkbox"/>	1h	7.99 Mbps	<input type="button" value="X"/>
9	239.255.200.9	2000	GbE2	0.0.0.0	<input checked="" type="checkbox"/>	239.254.200.9	2000	GbE1	<input checked="" type="checkbox"/>	1h	7.99 Mbps	<input type="button" value="X"/>
10	239.255.200.10	2000	GbE2	0.0.0.0	<input checked="" type="checkbox"/>	239.254.200.10	2000	GbE1	<input checked="" type="checkbox"/>	1h	7.99 Mbps	<input type="button" value="X"/>
11	239.255.200.11	2000	GbE2	0.0.0.0	<input checked="" type="checkbox"/>	239.254.200.11	2000	GbE1	<input checked="" type="checkbox"/>	1h	7.99 Mbps	<input type="button" value="X"/>
12	239.255.200.12	2000	GbE2	0.0.0.0	<input checked="" type="checkbox"/>	239.254.200.12	2000	GbE1	<input checked="" type="checkbox"/>	1h	7.99 Mbps	<input type="button" value="X"/>
13	239.255.200.13	2000	GbE2	0.0.0.0	<input checked="" type="checkbox"/>	239.254.200.13	2000	GbE1	<input checked="" type="checkbox"/>	1h	7.99 Mbps	<input type="button" value="X"/>
14	239.255.200.14	2000	GbE2	0.0.0.0	<input checked="" type="checkbox"/>	239.254.200.14	2000	GbE1	<input checked="" type="checkbox"/>	1h	7.99 Mbps	<input type="button" value="X"/>
15	239.255.200.15	2000	GbE2	0.0.0.0	<input checked="" type="checkbox"/>	239.254.200.15	2000	GbE1	<input checked="" type="checkbox"/>	1h	7.99 Mbps	<input type="button" value="X"/>
16	239.255.200.16	2000	GbE2	0.0.0.0	<input checked="" type="checkbox"/>	239.254.200.16	2000	GbE1	<input checked="" type="checkbox"/>	1h	7.99 Mbps	<input type="button" value="X"/>
17	239.255.200.17	2000	GbE2	0.0.0.0	<input checked="" type="checkbox"/>	239.254.200.17	2000	GbE1	<input checked="" type="checkbox"/>	1h	7.99 Mbps	<input type="button" value="X"/>
18	239.255.200.18	2000	GbE2	0.0.0.0	<input checked="" type="checkbox"/>	239.254.200.18	2000	GbE1	<input checked="" type="checkbox"/>	1h	7.99 Mbps	<input type="button" value="X"/>
19	239.255.200.19	2000	GbE2	0.0.0.0	<input checked="" type="checkbox"/>	239.254.200.19	2000	GbE1	<input checked="" type="checkbox"/>	1h	7.99 Mbps	<input type="button" value="X"/>

Showing 1 to 20 of 30 entries

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 edit box 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.

AUDIO SERVICES CONFIGURATION

Audio Service Selection

Audio PID: Source Address:

Show PIDs in error only Search:

PID	AUDIO INFOS			TRANSPORT STREAM ORIGIN			AUTOMATIC LOUDNESS CONTROL				
	TYPE	LANG	DNRM (dB)	AUDIO NAME	PGM #	SOURCE	INPUT LOUDN (LKFS)	ALC ON/OFF	LOUDNESS PROFILE	TARGET LOUDNESS (LKFS)	LOG
34h	AC3 3/2	eng	-24	CKM-HDI	1	238.1.1:1234	-25.2	N/A	Standard	-24	✓ X
35h	AC3 2/0	eng	-24	CKM-HDI	1	238.1.1:1234	-22.9	N/A	Standard	-24	✓ X
1ABAh	AC3 3/2	eng	-24	Unknown	684	239.4.4:1234	-25.3	N/A	Standard	-24	✓ X
1ABBh	AC3 2/0	spa	-24	Unknown	684	239.4.4:1234	-21.6	N/A	Standard	-24	✓ X
1ABCh	AC3	por	-	Unknown	684	239.4.4:1234	-	N/A	Standard	-24	✓ X
1F42h	AC3 2/0	eng	-27	Unknown	800	239.4.4:1234	-25.6	N/A	Standard	-24	✓ X
1F43h	AC3 2/0	spa	-27	Unknown	800	239.4.4:1234	-25.6	N/A	Standard	-24	✓ X
3EAh	AC3 2/0	N/A	-27	WGN	100	239.4.4:1234	-25.1	N/A	Standard	-24	✓ X
4B2h	AC3 2/0	eng	-24	UNNAMED SRV	120	239.4.4:1234	-21.8	N/A	Standard	-24	✓ X
5ACh	AC3 2/0	N/A	-24	LMN	145	239.4.4:1234	-24.3	N/A	Standard	-24	✓ X
5ADh	AC3 2/0	N/A	-24	LMN	145	239.4.4:1234	-27.3	N/A	Standard	-24	✓ X
5E8h	AC3 2/0	eng	-27	WE	151	239.4.4:1234	-23.8	N/A	Standard	-24	✓ X
606h	AC3 2/0	eng	-23	GOLF	154	239.4.4:1234	-20.4	N/A	Standard	-24	✓ X
607h	AC3 1+1	spa	-31	GOLF	154	239.4.4:1234	-60.0	N/A	Standard	-24	✓ X
7A0h	AC3 2/0	eng	-24	MTV2	195	239.4.4:1234	-23.8	N/A	Standard	-24	✓ X
A34h	AC3 2/0	eng	-27	ESPNews	261	239.4.4:1234	-28.9	N/A	Standard	-24	✓ X
CFAh	AC3 1+1	eng	-31	UNNAMED SRV	332	239.4.4:1234	-26.8	N/A	Standard	-24	✓ X
CFBh	AC3 1+1	spa	-31	UNNAMED SRV	332	239.4.4:1234	-60.0	N/A	Standard	-24	✓ X
125Eh	AC3 2/0	eng	-27	ABC NEWS	470	239.4.4:1234	-32.3	N/A	Standard	-24	✓ X
406h	AC3 2/0	eng	-23	MSNBC	122	239.4.4:7:1234	-22.6	N/A	Standard	-24	✓ X

Showing 1 to 20 of 53 entries First Previous | 1 2 3 | Next Last

Audio Service Selection

If you know the Audio PID and source address of the audio service, enter them in the data boxes and **Add**.

To see all PIDs that have been detected in the available data streams, **Browse Detected PIDs** opens a 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, and **Add Selected PIDs**

Once an audio PID has been added to the list, you can set up the ALC configuration for the PID. Note that each PID must be configured independently.

- Remove a PID from the list by clicking the red X in the Delete column on the right of the table.
- Remove all PIDs in the list by clicking the red X in the header of the Delete column









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

BROWSE AUDIO PIDS

PID	AUDIO INFOS			TRANSPORT STREAM ORIGIN		
	TYPE	LANG	SERVICE NAME	TS_ID	SOURCE	
<input type="checkbox"/> 24h	AC3	N/A	Unknown(2)	1h	239.7.7:14:1234	
<input type="checkbox"/> 25h	AC3	N/A	Unknown(2)	1h	239.7.7:14:1234	
<input type="checkbox"/> 71Eh	AC3	eng	Sleuth(182)	14Fh	239.7.7:15:1234	
<input type="checkbox"/> 71Fh	AC3	spa	Sleuth(182)	14Fh	239.7.7:15:1234	
<input type="checkbox"/> 7AAh	AC3	eng	FUSE(196)	14Fh	239.7.7:15:1234	
<input type="checkbox"/> 7ABh	AC3	spa	FUSE(196)	14Fh	239.7.7:15:1234	
<input type="checkbox"/> 962h	AC3	eng	BETJ(204)	14Fh	239.7.7:15:1234	
<input type="checkbox"/> 82Ch	AC3	aaa	STC(209)	14Fh	239.7.7:15:1234	
<input type="checkbox"/> 82Dh	AC3	aaa	STC(209)	14Fh	239.7.7:15:1234	
<input type="checkbox"/> A70h	AC3	eng	NFLNET(267)	14Fh	239.7.7:15:1234	
<input type="checkbox"/> A71h	AC3	N/A	NFLNET(267)	14Fh	239.7.7:15:1234	
<input type="checkbox"/> AFCh	AC3	eng	IFC(281)	14Fh	239.7.7:15:1234	
<input type="checkbox"/> D18h	AC3	eng	SORPRESA(335)	14Fh	239.7.7:15:1234	
<input type="checkbox"/> D19h	AC3	spa	SORPRESA(335)	14Fh	239.7.7:15:1234	
<input type="checkbox"/> 122Ch	AC3	eng	RLTV(465)	14Fh	239.7.7:15:1234	
<input type="checkbox"/> 12B8h	AC3	eng	BETGos(479)	14Fh	239.7.7:15:1234	
<input type="checkbox"/> 1394h	AC3	eng	TVN PPV 1(501)	14Fh	239.7.7:15:1234	
<input type="checkbox"/> 1395h	AC3	spa	TVN PPV 1(501)	14Fh	239.7.7:15:1234	
<input type="checkbox"/> 406h	AC3	eng	MSNBC(122)	190h	239.7.7:16:1234	
<input type="checkbox"/> C0Ah	AC3	eng	MAX w(308)	190h	239.7.7:16:1234	
<input type="checkbox"/> C0Bh	AC3	spa	MAX w(308)	190h	239.7.7:16:1234	
<input type="checkbox"/> C1Eh	AC3	eng	MORMAX w(310)	190h	239.7.7:16:1234	
<input type="checkbox"/> C1Fh	AC3	spa	MORMAX w(310)	190h	239.7.7:16:1234	

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 (AC3 only for this release) and channel configuration (e.g. 2/0, 3/2)

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

AUDIO INFOS	
AUDIO PID	24h
AUDIO FORMAT	Dolby Digital AC3
AUDIO BITRATE	112 kbps
AUDIO SAMPLE RATE	48KHz
AUDIO LANGUAGE	N/A
SERVICE NUMBER	2h
AUDIO NAME	Unknown
CODING FORMAT (acmod)	3/2
BITSTREAM MODE (bsmod)	main audio service: complete main (CM)
Low Frequency Effect (lfe)	Present
Copyright Bit	Protected by Copyrights

- 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.
- 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.

4.7 Audio Loudness Probing and Control Configuration

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

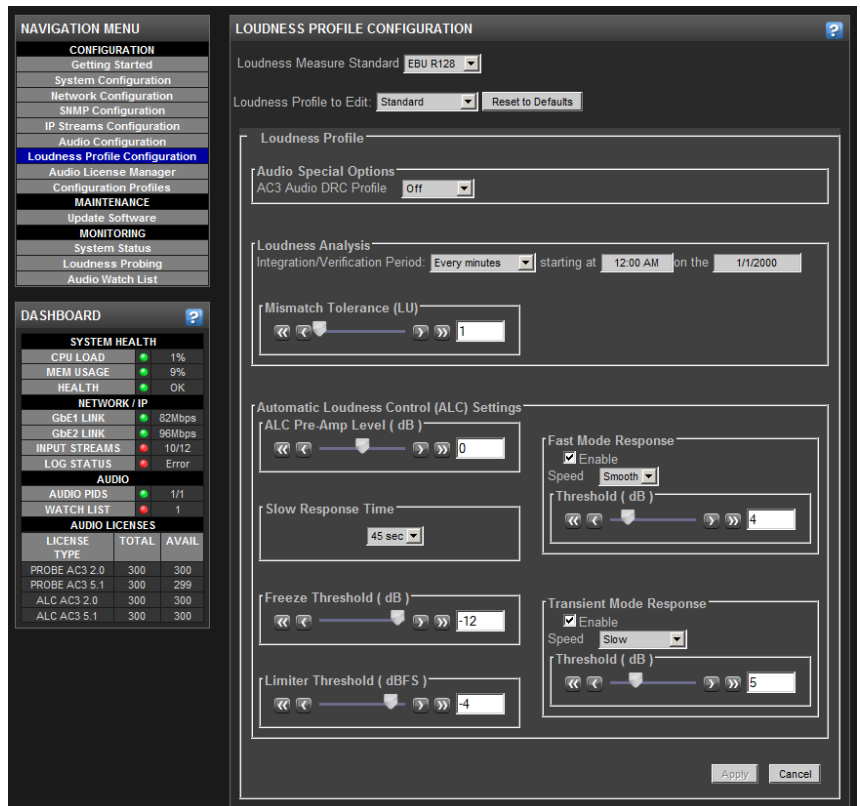
4.7.1 Loudness Measure Standard

Loudness Measurement can be based on either of two standards; use the Loudness Measure Standard pulldown to select the one to use:

- ATSC A/85
- EBU R128

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. .

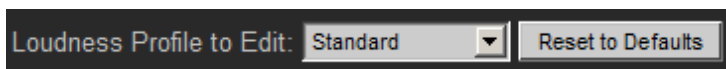
ALC is based on a profile that is set up to optimize results for a particular type of program material. Miranda supplies six pre-configured profiles, based on its experience with this algorithm.

- *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 pulldown

Note that 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. You will be prompted to save changes before you can move.

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.

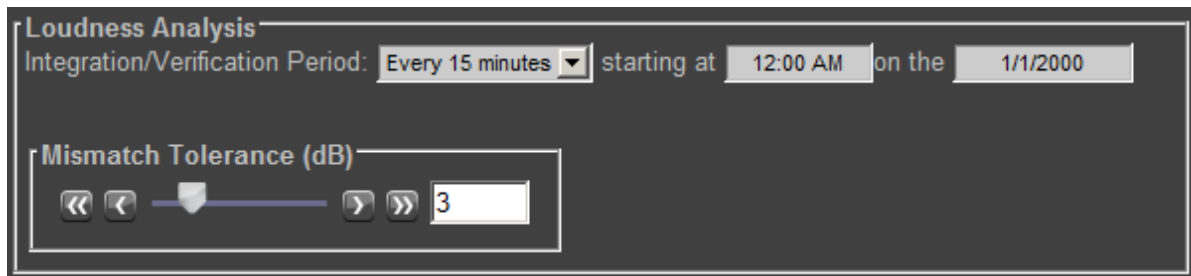
Use the *AC3 Audio DRC Profile* pull-down to select the DRC operating mode: Off, Line mode or RF mode.



Loudness Analysis

This portion of the loudness profile configures how the Axino alarms on loudness mismatch. The user should specify a time interval and a start time and date for loudness integration/average period and verification.

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 allows shorter loud audio segments such as commercials to be caught. 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.



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.

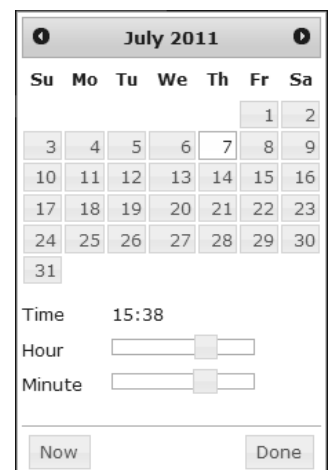
To select the current day and time, click *Now* at the bottom of the window

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

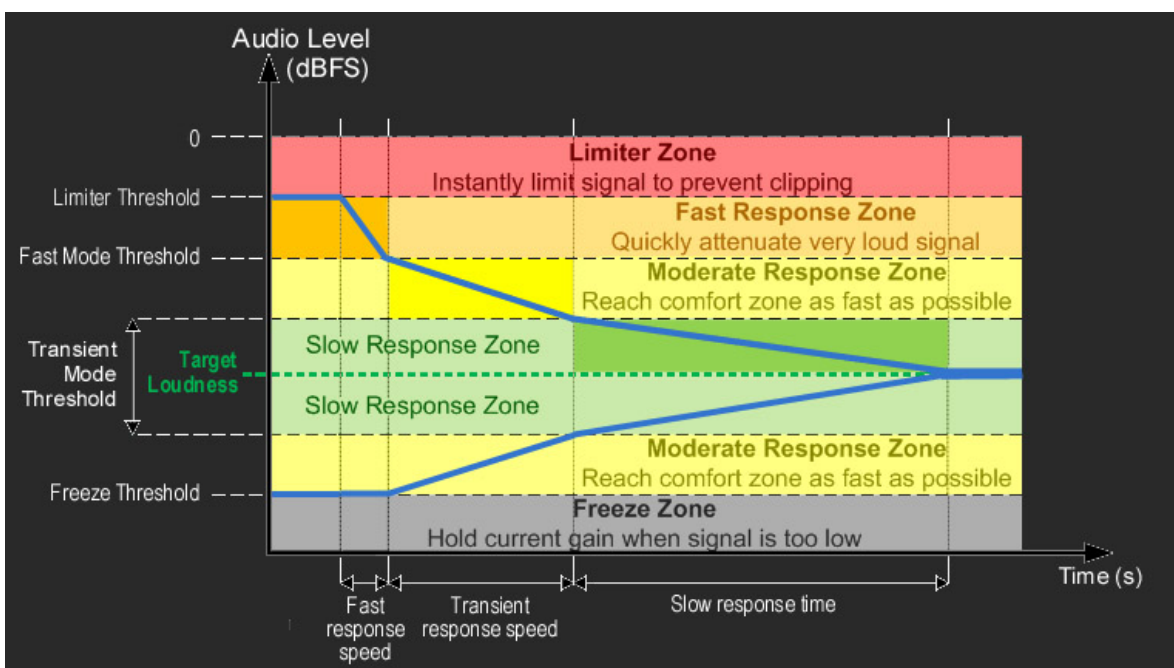
The Mismatch Tolerance is the difference (in LU for EBU; in dB for A/85) between the actual input loudness (after application of DIALNORM) and the desired output loudness that is considered by the user to be tolerable. Any PID whose loudness mismatch is higher than the threshold set here will be flagged 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

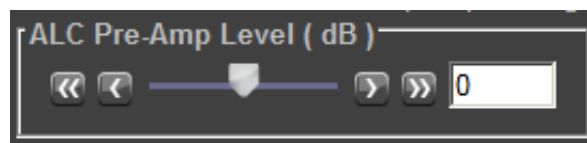
These controls are provided to set up the ALC response for the selected profile.

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.

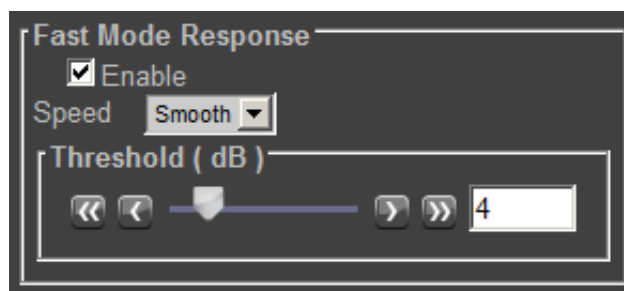


Fast Mode Response

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

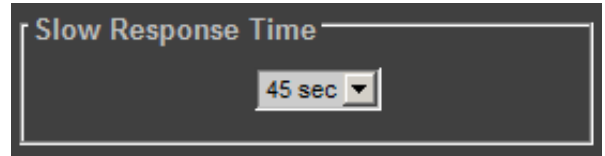
The ALC *Fast Mode Response* kicks in to reduce loudness quickly whenever the input loudness goes over the *Fast Mode Threshold*. The rate at which the level is reduced is selected by the Speed pulldown: Fast, Medium, or Smooth.

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



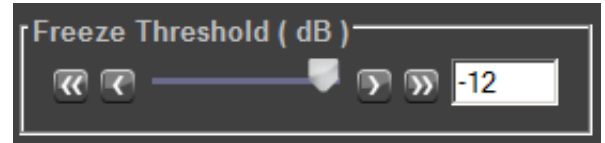
Slow Response Time

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

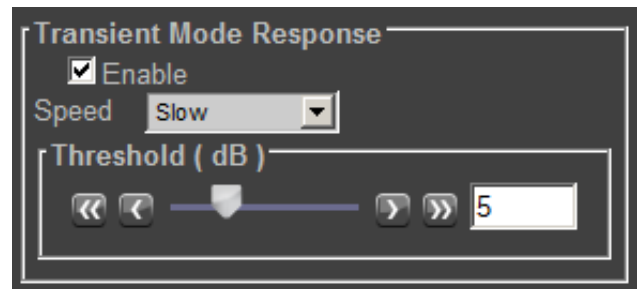
The *Freeze Threshold* sets the threshold under which the ALC will stop increasing loudness. This avoids the unintentional boosting of quiet portions of programs (and noise). If the input program loudness is under the *Freeze Threshold* for more than 30 seconds, the ALC will smoothly return to 0 dB of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



Transient Mode Response

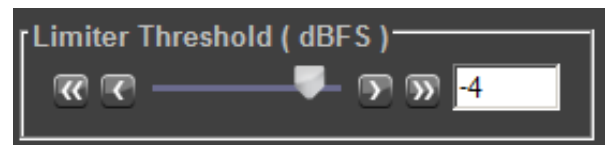
The *Transient Mode Response* is optional and is enabled by checking the *Enable* box.

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

NAVIGATION MENU

- CONFIGURATION**
- Getting Started
- System Configuration
- Network Configuration
- SNMP Configuration
- IP Streams Configuration
- Audio Configuration
- Loudness Profile Configuration
- Audio License Manager**
- Configuration Profiles
- MAINTENANCE**
- Update Software
- MONITORING**
- System Status
- Loudness Probing
- Audio Watch List

DASHBOARD ?

SYSTEM HEALTH

- CPU LOAD ● 2%
- MEM USAGE ● 9%
- HEALTH ● OK

NETWORK / IP

- GbE1 LINK ● 74Mbps

AUDIO LICENSE MANAGER

AUDIO LICENSES			
	TOTAL	IN USE	AVAIL.
ALC OF DOLBY DIGITAL UP TO 2.0 (AXINO-OPT-ALC-DD-2.0)	300	0	300
ALC OF DOLBY DIGITAL UP TO 5.1 (AXINO-OPT-ALC-DD-5.1)	300	0	300
PROBING OF DOLBY DIGITAL UP TO 2.0 (AXINO-OPT-PRB-DD-2.0)	300	0	300
PROBING OF DOLBY DIGITAL UP TO 5.1 (AXINO-OPT-PRB-DD-5.1)	300	1	299

To activate additional licenses:
Please contact Miranda Technologies Customer Service at +1-514-333-1772

Upload new license file:

NOTE: Miranda will provide a new license file that needs to be uploaded to the Axino. The system will prompt you for the file once you click on the button above.

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

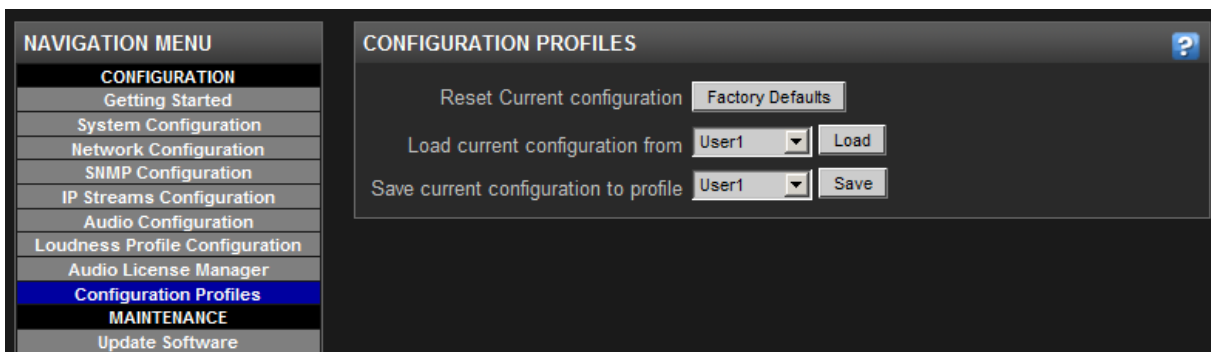
If additional licenses are needed to handle the workload of this Axino, contact Miranda Technologies Customer Service to obtain a new license file, and then use the lower portion of the panel to locate this file on your computer, and upload it to the Axino.

- 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.



Click Factory Defaults to restore Axino to the factory default settings

There are five user configuration registers (User1 to User5) on board the Axino.

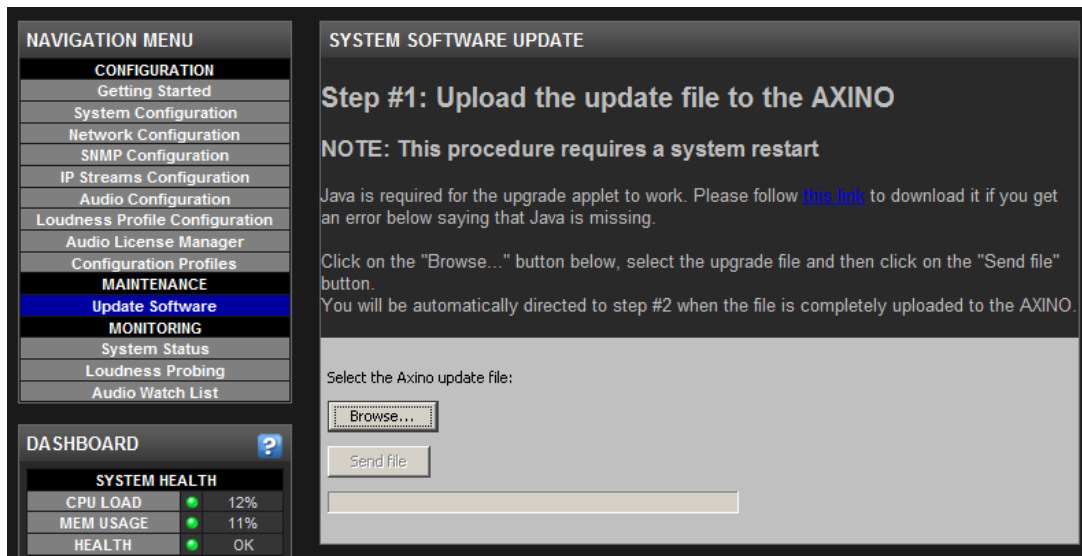
- To save the current configuration to one of these registers, select it using the pulldown, and click Save. The previous contents of the register will be lost.
- To load a saved configuration into the Axino, select the register using the pulldown and click Load. The current configuration will be overwritten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

5 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.

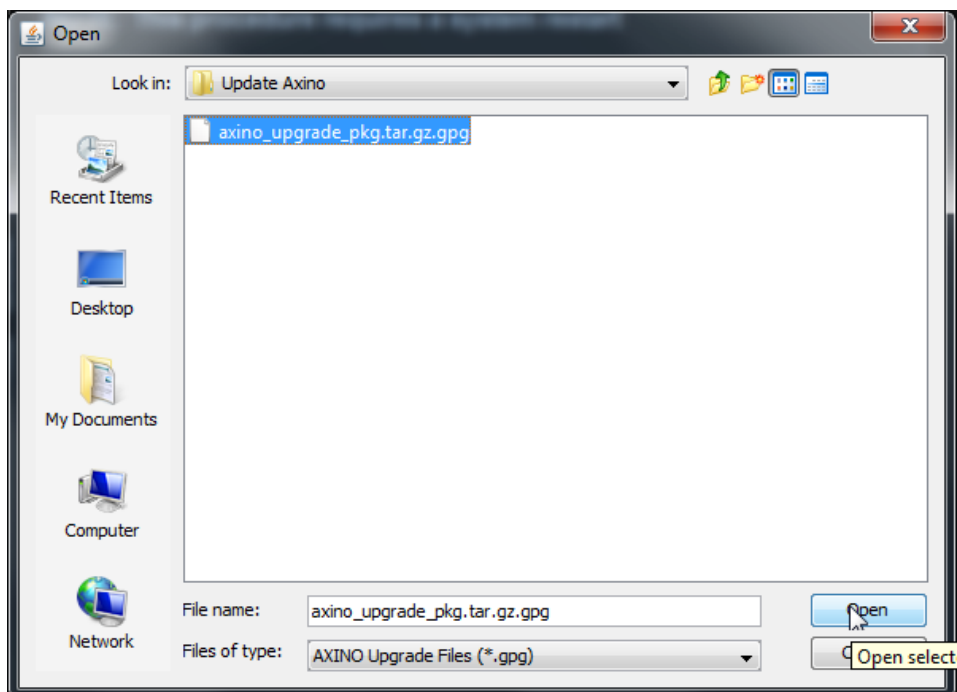
NOTE: A system restart will be required to complete the update process. Do not update the Axino while it is online!

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

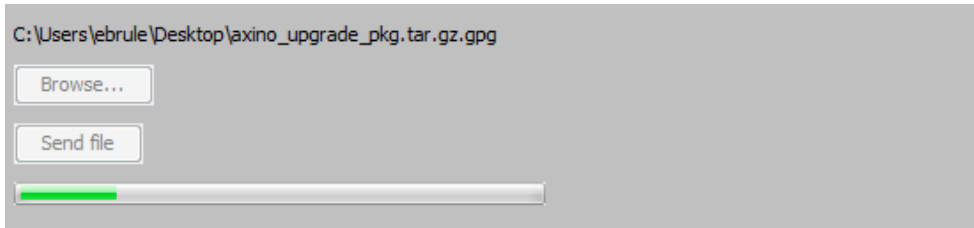


Click Browse... and select the update file on your computer.

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

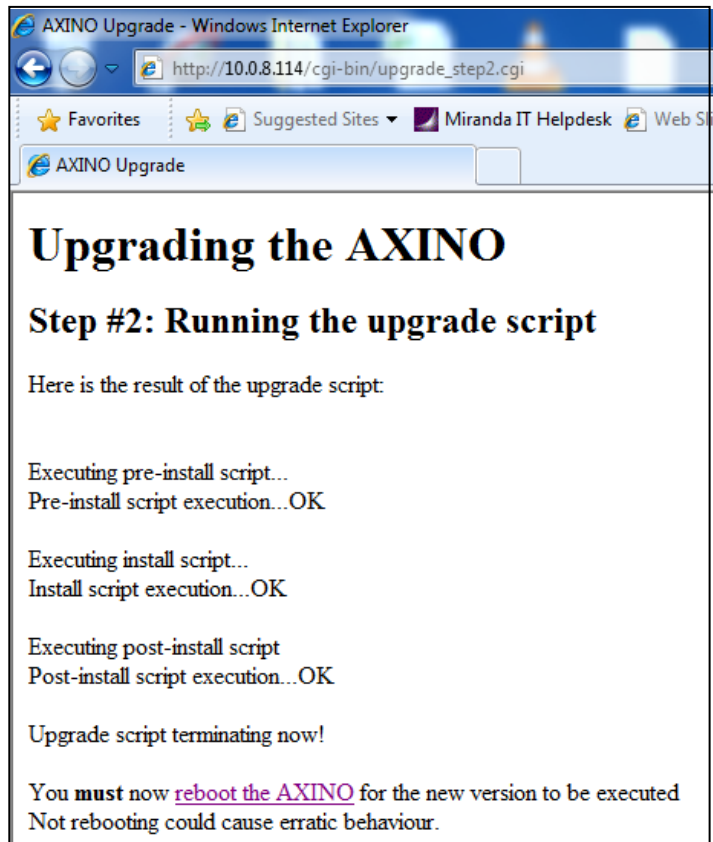
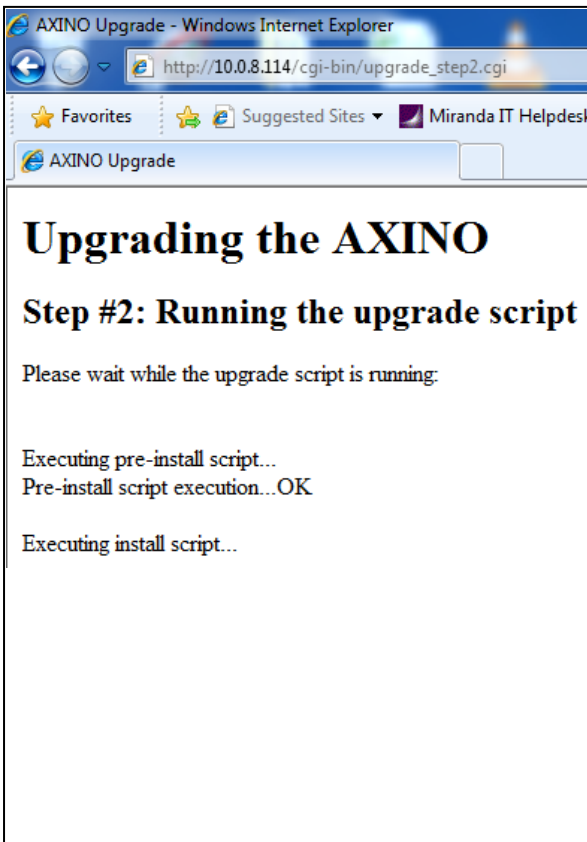


In the Axino window, Click Send File. The progress Bar will show the progress of the upload.



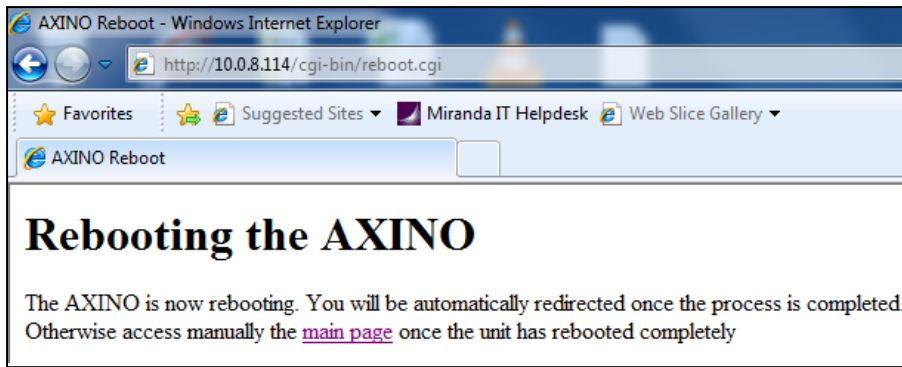
Once the file is completely uploaded to Axino, you will be taken to the next step, in a new browser window.

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.

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.)

Network / IP

GbE1 TRAFFIC Streaming data rate at Axino's two streaming ethernet ports
GbE2 TRAFFIC

INPUT 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

For each audio license type, lists the total that have been enabled, and the number that remain available.

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.

DASHBOARD		
SYSTEM HEALTH		
CPU LOAD	●	1%
MEM USAGE	●	8%
HEALTH	●	OK
NETWORK / IP		
GbE1 TRAFFIC	●	40Mbps
GbE2 TRAFFIC	●	0Mbps
INPUT STREAMS	●	1/1
LOG STATUS	●	OK
AUDIO		
AUDIO PIDS	●	1/1
WATCH LIST	●	0
AUDIO LICENSES		
LICENSE TYPE	TOTAL	AVAIL
PROBE AC3 2.0	350	350
PROBE AC3 5.1	350	349
ALC AC3 2.0	100	100
ALC AC3 5.1	100	100

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
GbE LINK	System Status	See section 6.2
INPUT STREAMS	IP I/O Configuration	See section 4.4
LOG STATUS	System Configuration	See section 4.1
AUDIO PIDS	Audio Services Configuration	See section 4.5
WATCH LIST	Audio Watch List	See section 6.4

6.2 System Status

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

SYSTEM STATUS							
GENERAL							
AXINO MODEL		AXINO-400					
SERIAL NUMBER		948-01-00000-119					
SOFTWARE VERSION		rev 0.01 build 93					
NETWORK							
Interface	Status	MAC Address	IP Address	Mask	Gateway	Tx Bytes	Rx Bytes
MNGT1	●	00:25:90:35:DE:B4	10.0.8.119	255.255.0.0	0.0.0.0	165619931	582246923
MNGT2	●	00:25:90:35:DE:B5	--	--	--	--	--
GbE1	●	00:1B:21:AC:B1:0C	172.30.32.118	255.255.255.0	0.0.0.0	183549537438	938294257667
GbE2	●	00:1B:21:AC:B1:0D	--	--	--	--	--
SYSTEM HEALTH							
Element	Status	Problem Description					
Voltages	●	OK					
Temperature	●	OK					
Fans	●	OK					
Power Supply	●	OK					

General

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

Network

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

Status	Green icon – port is active 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.

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

NAVIGATION MENU		LOUDNESS PROBING STATUS																			
CONFIGURATION		Search: <input type="text"/>																			
Getting Started		AUDIO NAME	PID	TYPE	LANG	DIALNORM (dB)	INPUT LOUDNESS (LKFS)	ALC GAIN (dB)	OUTPUT LOUDNESS (LKFS)	CURRENT LOUD.ERR. (dB)	LAST LOUDNESS RESET	LOUDNESS ALARM	ALC STATUS	LOUDNESS ERROR RESET							
System Configuration		NFLNET	A70h	AC3 2/0	eng	-24	-16.9	-	-	6.2	2011-10-4, 10:39:58 AM			Reset							
Network Configuration		NFLNET	A71h	AC3 2/0	N/A	-27	-17.0	-	-	9.2	2011-10-4, 10:39:58 AM			Reset							
SNMP Configuration		IFC	AFCh	AC3 2/0	eng	-20	-29.3	-	-	-8.8	2011-10-4, 10:39:58 AM			Reset							
IP Streams Configuration		SORPRESA	D18h	AC3 2/0	eng	-31	-21.8	-	-	9.0	2011-10-4, 10:39:58 AM			Reset							
Audio Configuration		SORPRESA	D19h	AC3 1+1	spa	-31	-60.0	-	-	-29.0	2011-10-4, 10:39:58 AM			Reset							
Loudness Profile Configuration		RLTV	122Ch	AC3 2/0	eng	-31	-26.6	-	-	4.1	2011-10-4, 10:39:58 AM			Reset							
Audio License Manager		BETGos	12B8h	AC3 2/0	eng	-24	-22.5	-	-	1.5	2011-10-4, 10:39:58 AM			Reset							
Configuration Profiles		TVN PPV 1	1394h	AC3 2/0	eng	-26	-27.5	-	-	-2.3	2011-10-4, 10:39:58 AM			Reset							
MAINTENANCE		TVN PPV 1	1395h	AC3 2/0	spa	-26	-27.5	-	-	-2.3	2011-10-4, 10:39:58 AM			Reset							
Update Software		CKMI-HDI	34h	AC3 3/2	eng	-24	-25.0	-	-	-1.0	2011-10-4, 10:39:58 AM			Reset							
MONITORING		CKMI-HDI	35h	AC3 2/0	eng	-24	-22.6	-	-	1.5	2011-10-4, 10:39:58 AM			Reset							
System Status		Showing 41 to 51 of 51 entries (filtered from 53 total entries)																			
Loudness Probing													First	Previous		1	2	3		Next	Last
Audio Watch List																					

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.

Current 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.

ALC Gain

When the ALC is ON, this is the current gain (correction) applied to the audio in dB.

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 differ greatly from the target value at any particular time

Loudness Alarm

The current loudness error is determined every "period" as configured in the loudness profile. If the value differs by more than the Mismatch Tolerance value, an alarm is flagged for the audio service. It is then added to the Audio Watch List. The icon will turn RED when an alarm is flagged.

ALC Status

If the ALC is turned ON for this audio, the icon is GREEN.

Loudness Error Reset

As required by the EBU mode, this button will immediately reset the integrated loudness measure. The result is reflected in the loudness error, which is the difference between the integrated value and the target value.

Last Loudness Reset

Shows the last time the loudness error was reset (date and time)

6.4 Audio Watch List

NAVIGATION MENU		AUDIO WATCH LIST ?									
CONFIGURATION		Search: <input type="text"/>									
Getting Started		AUDIO NAME	PID	TYPE	LANG	DIALNORM	LOUDNESS ERROR (dB)	IN ERROR SINCE	LAST VERIFICATION	ALC STATUS	ALC ON/OFF
System Configuration		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
Network Configuration		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
SNMP Configuration		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
IP Streams Configuration		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
Audio Configuration		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
Loudness Profile Configuration		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
Audio License Manager		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
Configuration Profiles		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
MAINTENANCE		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
Update Software		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
MONITORING		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
System Status		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
Loudness Probing		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
Audio Watch List		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
DASHBOARD ?		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
SYSTEM HEALTH		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
CPU LOAD		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
MEM USAGE		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
HEALTH		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
OK		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
NETWORK / IP		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
GbE1 LINK		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
164Mbps		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
GbE2 LINK		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
164Mbps		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
INPUT STREAMS		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
20/30		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
LOG STATUS		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
Error		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
AUDIO		UNNAMED SRV	24h	AC3 3/2	N/A	-27	9.0	2011-10-3, 1:30:00 PM	2011-10-4, 10:30:00 AM		<input checked="" type="checkbox"/>
AUDIO PIDS		Showing 1 to 20 of 20 entries									
20/20		First Previous 1 Next Last									
WATCH LIST											
20											

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 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 automatically removed 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.

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 all refer to information about the audio extracted from the incoming data stream.

Loudness Error – Shows the current loudness error

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

ALC Status – the icon will be GREEN when ALC is on.

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).

7 Limitations

The following limitations apply to the current release of Axino:

- Only AC3 (all acmod) Audio Types are currently Supported
- Network Time Protocol (NTP) is not yet available
- Gateway only available for the MNGT1 port. Additional static routes not yet available.
- Port redundancy and unit N+1 and 1+1 redundancy not yet available

For more limitations and pending bugs, please consult the latest product release notes accessible from the Axino.

8 Specifications

ETHERNET PORTS

MANAGEMENT (MNGT1, MNGT2)

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

STREAMING (GbE1, GbE2)

Physical: Two (2) Electrical Gigabit Ethernet with RJ45 connectors
Standards: IEEE 802.3 10/100/1000 Ethernet
Transport: UDP multicast/unicast 1-7 TS/IP
IGMPv3 MSM & SSM
Performance: Up to 900Mbps of streaming on each port

TRANSPORT FORMATS

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

PROCESSING

Audio formats: Dolby Digital AC-3 (all modes)
Processing delay: 400ms on all entire MPEG-TS

PHYSICAL

Height: 1.7 in (43 mm) 1RU
Width: 17.2 in. (437mm)
Depth: 25.5 in. (648mm)
Weight: 40 lbs (18.1Kg)
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)

9 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.