

# LX-IP

## Multichannel RAVENNA/AES67 PCI Express Sound Card



User Manual  
June 2016

**For technical support,  
please contact your card supplier**

*Copyright 2014 Digigram. All rights reserved.*

*No portion of this manual may be reproduced without prior written consent from Digigram. The copyright protection claimed here includes photocopying, translation and/or reformatting of the information contained in this manual.*

*While every effort has been made to ensure accuracy, Digigram is not responsible for errors and omissions, and reserves the right to make improvements or changes in the products and programs described without notice.*

*Digigram, the Digigram logo, LX-IP RAVENNA are registered trademarks or trademarks of Digigram S.A. All other trademarks are property of their respective holders.*

**Digigram S.A.**

82/84 Allée Galilée, 38330 Montbonnot-Saint-Martin, FRANCE

Tel: +33 (0)4 76 52 47 47 • Fax: +33 (0) 4 76 52 18 44 • E-mail: [info@digigram.com](mailto:info@digigram.com)

**Digigram Asia Pte Ltd.**

60 Albert Street - #19-11OG Albert Complex Singapore 189969, Singapore

Tel : +65 6291 2234 • Fax : +65 6291 3433 • E-mail : [info\\_asia@digigram.com](mailto:info_asia@digigram.com)

## **Table of contents**

- [1. INFORMATION FOR THE USER](#)
- [2. IMPORTANT NOTICE](#)
- [3. FEATURES](#)
  - [Main hardware features](#)
  - [3.2. Main software features \(PC side\)](#)
  - [3.3. RAVENNA features](#)
- [4. REQUIREMENTS](#)
  - [4.1. Minimum hardware requirements](#)
  - [4.2. Software requirements](#)
  - [4.3. Supported operating systems](#)
- [5. SOFTWARE INSTALLATION AND CONFIGURATION](#)
  - [5.1. Installation under Windows operating systems](#)
  - [5.2. Microsoft volume mixer panel](#)
  - [5.3. ASIO driver configuration](#)
- [6. FIRMWARE UPDATE](#)
- [7. HOW TO CHECK THE INSTALLATION](#)
- [8. LX-IP principles](#)
  - [8.1. Embedded routing matrix](#)
  - [8.2. Sources](#)
  - [8.3. Destinations](#)
  - [8.4. Clock](#)
  - [Default routing matrix](#)
- [9. CONFIGURATION OF THE AoIP PARAMETERS](#)
  - [9.1. Default IP addresses of Eth ports](#)
  - [9.2. Network settings](#)
  - [9.3. Global audio and clock settings](#)
  - [9.4. Routing matrix](#)
  - [9.5. Creation of IP streams published to the network](#)
- [10. UNINSTALLING THE DRIVERS](#)
- [11. SPECIFICATIONS](#)
  - [11.1. Configuration](#)
  - [11.2. Inputs/Outputs](#)
  - [11.3. Connectors](#)
  - [11.4. RAVENNA / AES67](#)
  - [11.5. Control and routing](#)
  - [11.6. Development environments](#)
- [12. APPENDIX](#)

[12.1. LX-IP RAVENNA schematic diagram](#)

[12.2. Connectors](#)

[13. DRIVER RELEASE NOTES AND LIMITATIONS](#)

[13.1. LXIP Kit v01.01a004](#)

## 1. INFORMATION FOR THE USER

This device complies with part 15 of FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.



This equipment has been tested and found to comply with the limits for a CLASS B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions contained in this data sheet, may cause harmful interference to radio and television communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- reorient or relocate the receiving antenna
- increase the separation between the equipment and the receiver
- connect the equipment into an outlet on a circuit different from that of the receiver
- consult the dealer or an experienced radio / television technician.

**Note:** *Connecting this device to peripheral devices that do not comply with CLASS B requirements or using an unshielded peripheral data cable could also result in harmful interference to radio or television reception. To ensure that the use of this product does not contribute to interference, it is necessary to use shielded I/O cables. The user is cautioned that any changes or modifications not expressly approved by Digigram could void the user's authority to operate this equipment.*

**Warning:**

	<p><i>Electrostatic discharge (ESD) can damage several components on the board. To avoid such damage in handling the board, take the following precautions: Bring the device and everything that contacts it to ground potential by providing a conductive surface and discharge paths. As a minimum, observe these precautions:</i></p> <ul style="list-style-type: none"> <li>● <i>Disconnect all power and signal sources.</i></li> <li>● <i>Place the device on a grounded conductive work surface.</i></li> <li>● <i>Ground yourself via a grounding wrist strap or by holding a grounded object.</i></li> <li>● <i>Ground any tool that will contact the device.</i></li> </ul>	
---	---	---

## 2. IMPORTANT NOTICE

This card has been tested and found to comply with the following standards:

- International: CISPR22 Class B.
- Europe: EMC 89/336/CEE (1992) specifications.
- United States: FCC Rules-Part 15-Class B (digital device).

## 3. FEATURES

### Main hardware features

- PCI EXPRESS™ x1 (PCIe®) bus, compatible with PCIe® x1, x4, x8 or x16 slots.
- 2 Gigabit Ethernet RJ45 ports for RAVENNA I/O (dual port or Primary / Backup mode)
- 1 optional optical connector for MADI I/O (Factory option)
- 1 BNC for Word Clock In or Out
- Sampling frequency:  
From internal clock: 44.1 kHz, 48 kHz and 96 kHz (MADI)  
From network or Word Clock: 44.1 kHz, 48 kHz and 96 kHz (MADI)  
From MADI: 44.1 kHz, 48 kHz, 96 kHz
- Routing: zero latency on-board routing matrix between Audio Over IP channels, Digital Audio Workstation playback and record channels, and optional MADI channels

### 3.2. Main software features (PC side)

- Low latency WDM DirectSound, ASIO , and Alsa drivers.
- Card can be used through the following programming interfaces (APIs): DirectSound kernel streaming, DirectSound, WASAPI, ASIO, Alsa.
- 32 stereo DirectSound playback devices / 32 stereo DirectSound recording devices
- 64 mono ASIO playback channels / 64 mono ASIO recording channels
- 64 mono Alsa playback channels/ 64 mono ASIO recording channels
- Real-time, simultaneous record and playback in PCM (16 and 24 bits) of 64 mono I/O channels
- Embedded WEB server for IP audio configuration

### 3.3. RAVENNA features

- Up to 128/128 I/O (Mono) channels at 44.1 kHz or 48 kHz (64/64 I/O on each Gigabit Ethernet interface)
- Packet size from 128 down to 1 (ultra-low latency profile) audio samples per RAVENNA packet
- Full compliance in all respects with AES 67 (excepted SIP).
- PCM16 / PCM24 / PCM32 / AM824 (PCM24+AES3 channel status)
- PTPv2 (IEEE1588-2008) from network or internal clock or Word Clock or MADI input
- Local clock eligible as GrandMaster PTP
- Local clock precision : better than 10 ppm

## 4. REQUIREMENTS

### 4.1. Minimum hardware requirements

- PC with one free PCI Express slot (x1, x2, x4, x8, x16).
- Required CPU power and memory depend on the operating system and on the software applications used.

- LX-IP must be connected to a network equipment featuring a 1000 Mbps/s Ethernet interface, or a 100 Mbps/s Ethernet interface but this one will limit the number of streams.

## 4.2. Software requirements

LX-IP requires installation of the drivers included in the LX-IP Kit version 2.02 or higher. This kit includes:

- a WDM DirectSound driver
- an ASIO driver, which installation is optional

## 4.3. Supported operating systems

LX-IP runs under Windows 7, Windows 8, Windows 2008 Server, 32-bit and 64-bit versions, and Windows Server 2012, Windows 10, and Linux (not described in this manual).

# 5. SOFTWARE INSTALLATION AND CONFIGURATION

The installation of the software requires administrator rights on your computer.

Please visit the Digigram web site at [www.digigram.com](http://www.digigram.com) for the most recent driver.

In case you run a specific application developed or installed by a Digigram Partner, this application might require the use of a given driver version. In this case, make sure that the updated driver has been approved by your supplier.

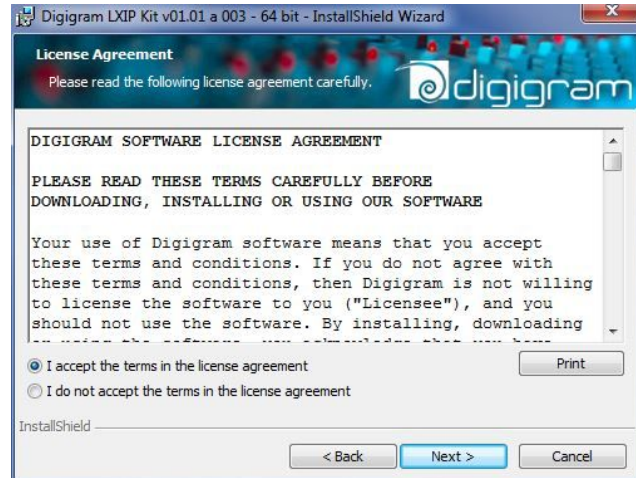
## 5.1. Installation under Windows operating systems

- Shut down your computer, insert the LX-IP card in a free PCI EXPRESS™ slot, and screw it on the frame of the computer.
- Start the computer.
- Once the Windows session is opened, click on “Cancel” when the “Found New Hardware” Wizard appears.
- Right click Double-click on the *LXIP Kit vxx.msi* icon to launch the driver installation.

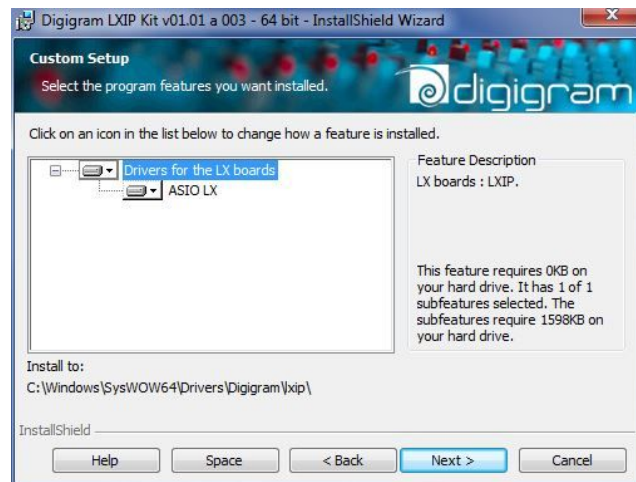
A “Welcome” message is displayed, click **Next** to continue.



The “License Agreement” window appears: read it, and click on **“I accept the terms in the license agreement”** to approve it.



In the “*Custom Setup*” window, the “Drivers for the LX board” are displayed. The WDM driver is always installed. The ASIO driver installation is optional and can be selected/unselected. It is selected by default. Click **Next**.

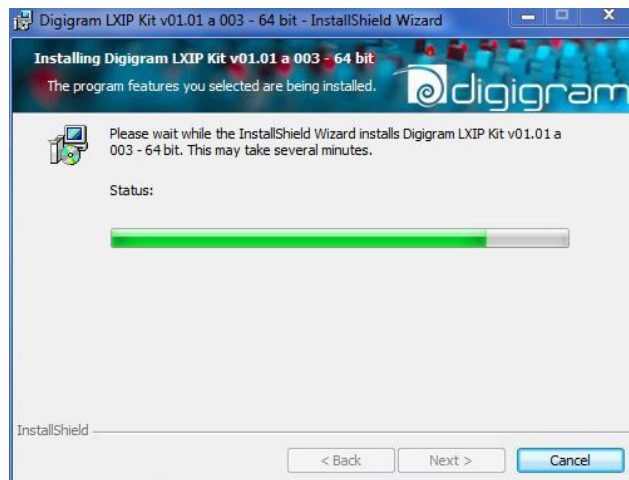


In the “*Ready to Install the Program*” window, click on **Install** to start copying the files.

A Windows message appears for the authorization to install the driver. Confirm the installation.







From the displayed “Digigram drivers” window, select the Stream granularity<sup>1</sup> of the card (number of samples processed at a time). The lower the granularity, the lower the audio latency.

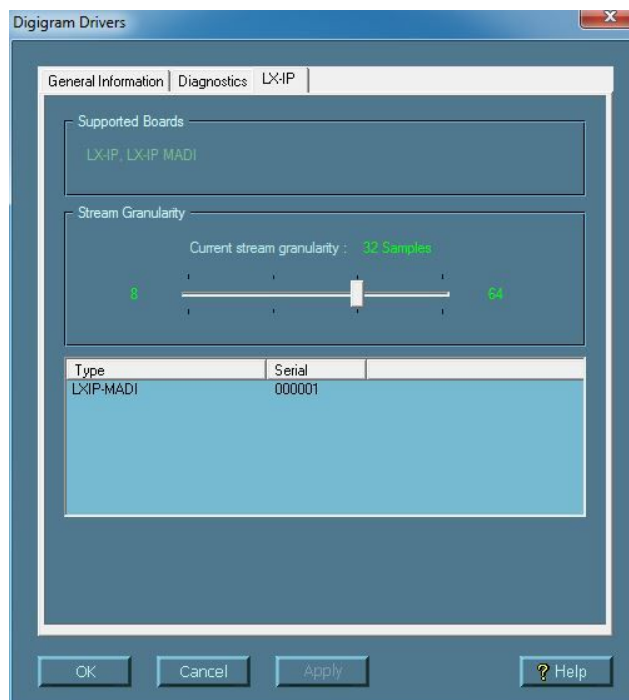
A granularity of 64 samples is the default value. When using DirectSound/Wasapi based software applications, the selection of a lower value may produce audio dropouts, depending on the PC configuration.

Under ASIO, granularity can be set to the minimum value (8 samples), as the ASIO driver uses one single 64-channel device.

When using the card, if audio dropouts are experienced, it may be necessary to increase the granularity.

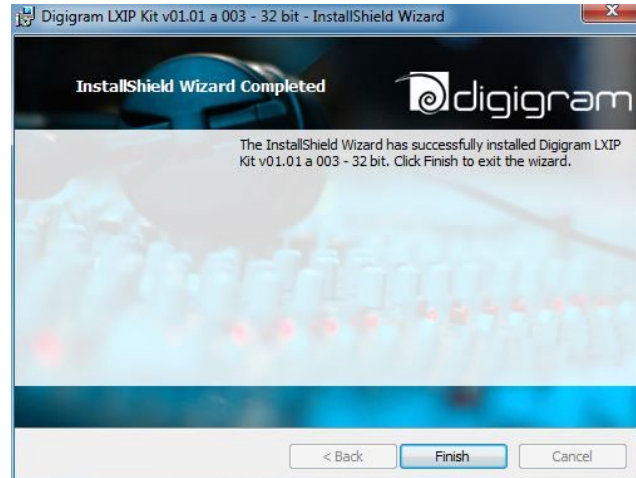
Granularity can be: 8, 16, 32, or 64 samples.

Click on **Ok**.



<sup>1</sup> The granularity corresponds to the computing unit of the card. It is expressed in samples.

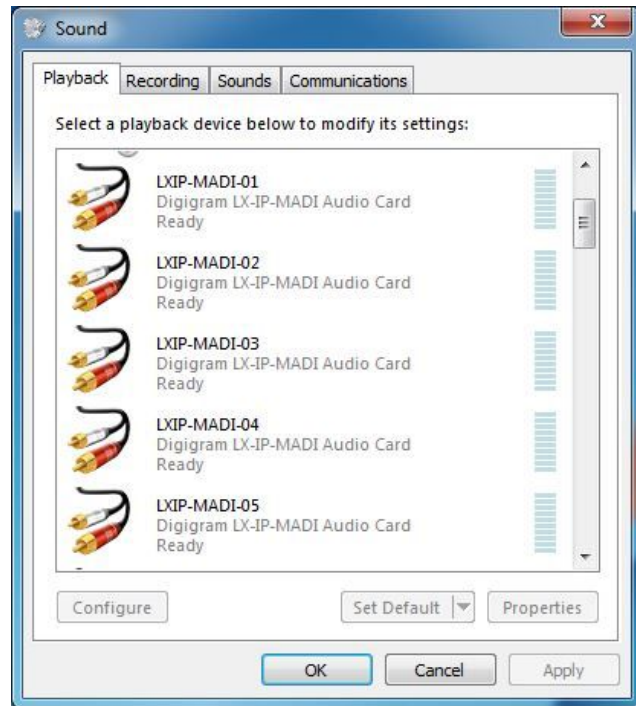
Click on the **Finish** button to complete the driver installation.



Once the driver is installed, the 32 stereo DirectSound devices are visible from the Windows “Sound” control panel, by clicking on the “Playback” tab, and “Recording” tab.

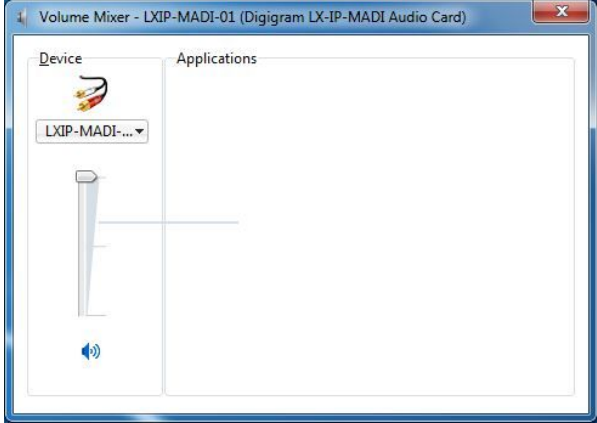
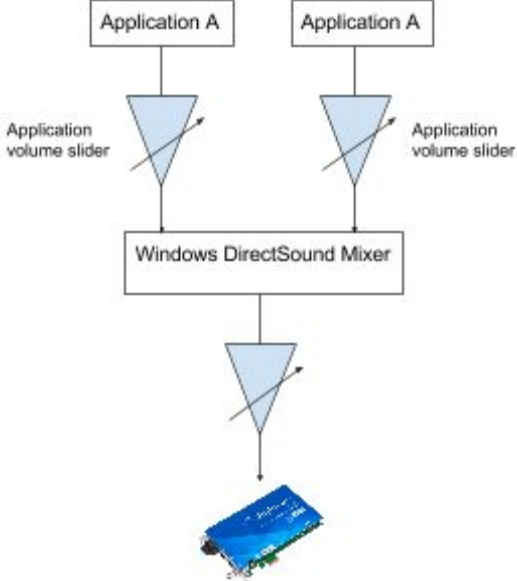
The vu-meters are displayed in front of each device.

Note that as long as Windows displays the vu-meters, the DirectSound devices are allocated. This means that they can't be allocated from another application that is not based on DirectSound.



## 5.2. Microsoft volume mixer panel

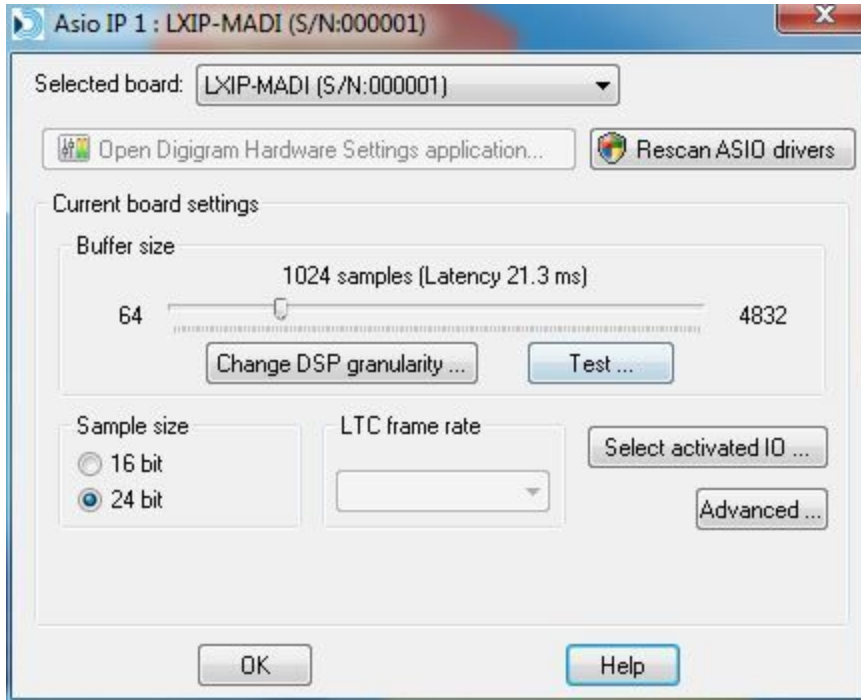
The Windows volume mixer can be displayed from the loudspeaker icon in the Windows task bar.

<p>The volume slider associated to the LX DirectSound device applies a digital gain to the audio samples sent to the card.</p> <p>In case some applications use the device, they appear in the “Applications” section of the Volume Mixer GUI, with a volume slider for each application.</p>	
<p>The volume slider associated to an application allows applying a digital gain to the audio samples played by the application, right before the Windows DirectSound mixer.</p> <p>The volume slider associated to the LX DirectSound device applies a digital gain to the audio samples coming from the DirectSound mixer, before they are sent to the card.</p>	

### 5.3. ASIO driver configuration

With the ASIO driver installed, the card's settings can be adjusted through its ASIO control panel. This panel can be started from **<Start>**, **<Programs>**, **<Digigram>**, **<ASIO ES Settings>**. It can also be launched directly from the ASIO applications, as most of them feature a “Preferences” or equivalent menu allowing to configure the ASIO devices to be used.

For help on how to use this control panel, please refer to its online help.



### Buffer size

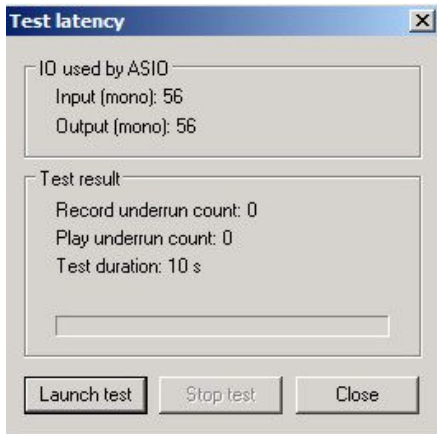
The buffer size determines the size in samples per buffer used by the Asio driver to transfer audio data from/to the board's Input/Output. The lower the buffer size, the lower the latency.

The range of the buffer size settings depends on the stream granularity defined in the Digigram Control Center.

You can access this parameter by clicking on the "**Change DSP granularity**" button.

Note that, audio dropouts may be experienced when using very small buffer size.

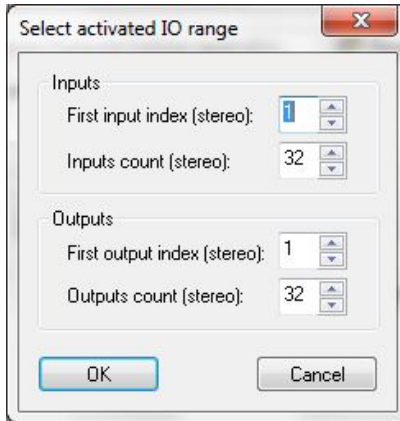
It is possible to check if audio dropouts are experienced by clicking on the "Test" button.



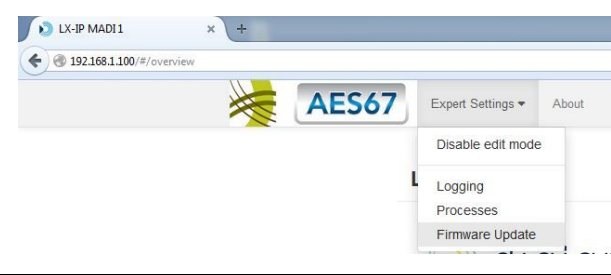

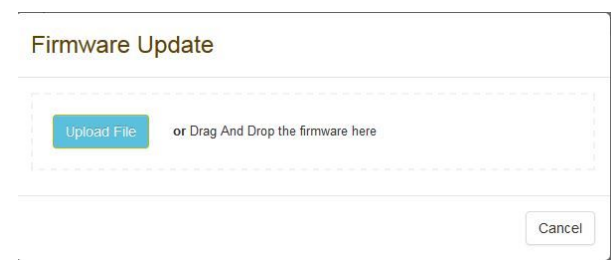
In case errors are reported, buffer size has to be increased.

### Select Activated IO

Clicking on this button allows selecting the channels that are managed by the ASIO driver. By default, all the channels are enabled.

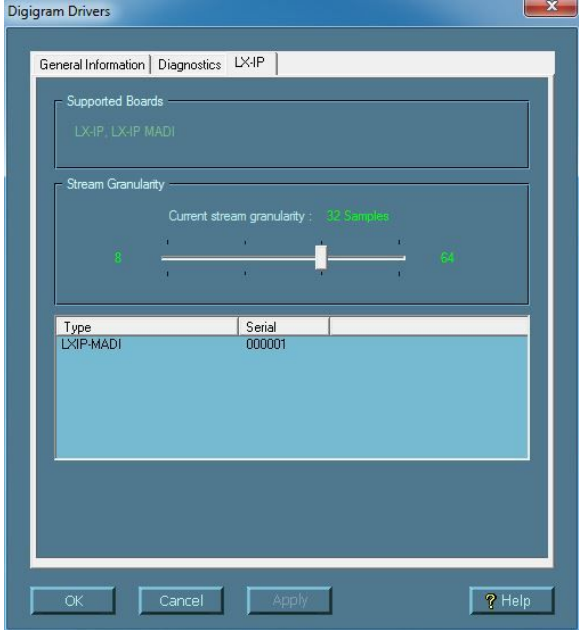


## 6. FIRMWARE UPDATE

<p>The LX-IP firmware can be updated from its WEB interface Default IP addresses are: Eth0: 192.168.0.100 Eth1: 192.168.1.100.</p> <p>From menu “Expert settings”, select Firmware update.</p>	 <p>The screenshot shows a web browser window titled 'LX-IP MADI1' with the address bar displaying '192.168.1.100/#/overview'. The page header includes the 'AES67' logo and navigation links for 'Expert Settings' and 'About'. A dropdown menu is open under 'Expert Settings', listing 'Disable edit mode', 'Logging', 'Processes', and 'Firmware Update'.</p>
<p>Drag and drop the firmware file, or select it by clicking on the “Upload File” button.</p> <p> : A reboot of the PC is necessary after the firmware update!</p>	 <p>The screenshot shows the 'Firmware Update' page. It features a dashed box for file upload, a blue 'Upload File' button, and the text 'or Drag And Drop the firmware here'. A 'Cancel' button is located at the bottom right of the page.</p>

## 7. HOW TO CHECK THE INSTALLATION

Once the card and the driver are installed according to the procedure described here-beforel, you can check that the card works correctly as follows.

<p>Start the “Digigram Control Center” panel from the menu <b>&lt;Start&gt;&lt;Programs&gt;&lt;Digigram&gt;</b>.</p> <p>The “General Information” tab lists all the Digigram driver packages installed on the computer, and their versions.</p>	
<p>The LXIP tab displays information about the LX-IP cards installed in the computer: card type, serial number, MAC address, firmware version.</p> <p>If the card is listed in the LX-IP tab, the driver is correctly installed.</p>	

You can check that audio can be played through the card by selecting the “Diagnostics” tab.

The icon of the installed card is displayed.

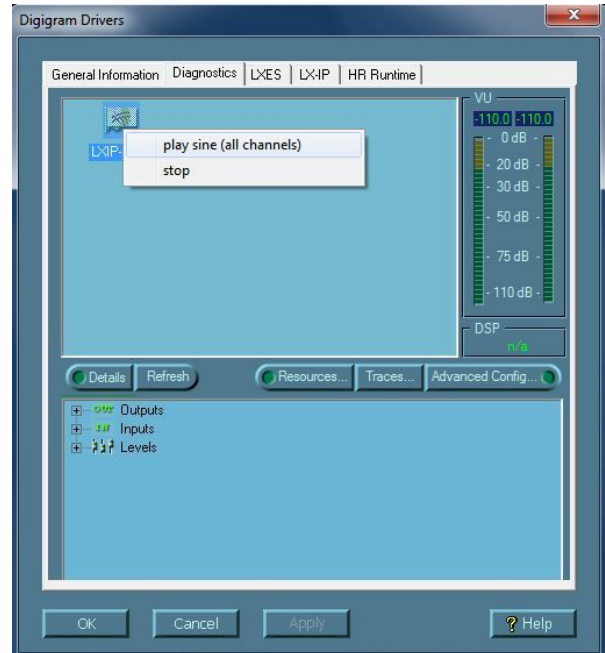
Right click on the card icon, and select “Play sine (all channels)”.

This plays in loop a sine signal on all the outputs of the card.

The vu-meters on the right should indicate a 0dB level.

To stop the playback, right click on the card icon, and select “stop”.

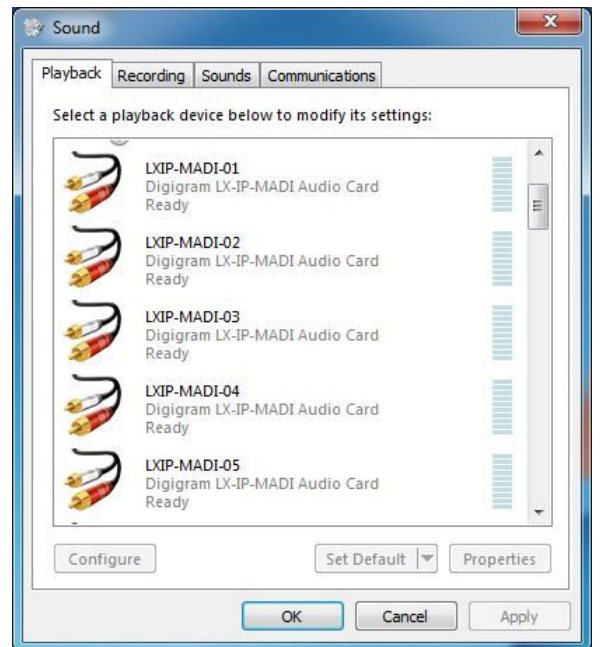
Note that vu-meters are not displayed with the first driver version.



The presence of the playout DirectSound devices can be checked from the Windows “Sound” control panel, in the “Playback” Tab.

Under Windows Seven and 8, the name of a device can be modified by right clicking on its name and selecting “Properties”.

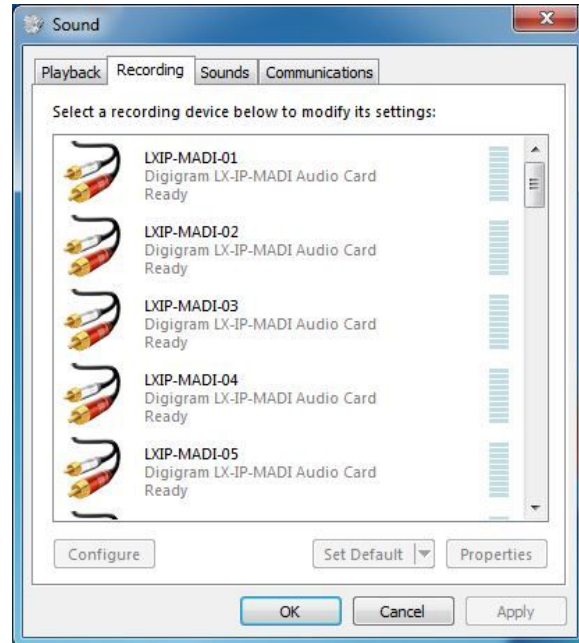
You can test the playback by right clicking on an LX-IP device and selecting “Test”. This plays the Windows tone test alternatively on the left and right channels. The vu-meter moves.





The presence of the recording DirectSound devices can be checked from the Windows “Sound” control panel, in the “Record” Tab.

Under Windows Seven and 8, the name of a device can be modified by right clicking on its name, and selecting “Properties”.



## Installation troubleshooting

### If the LX-IP card is not listed in the LX-IP tab

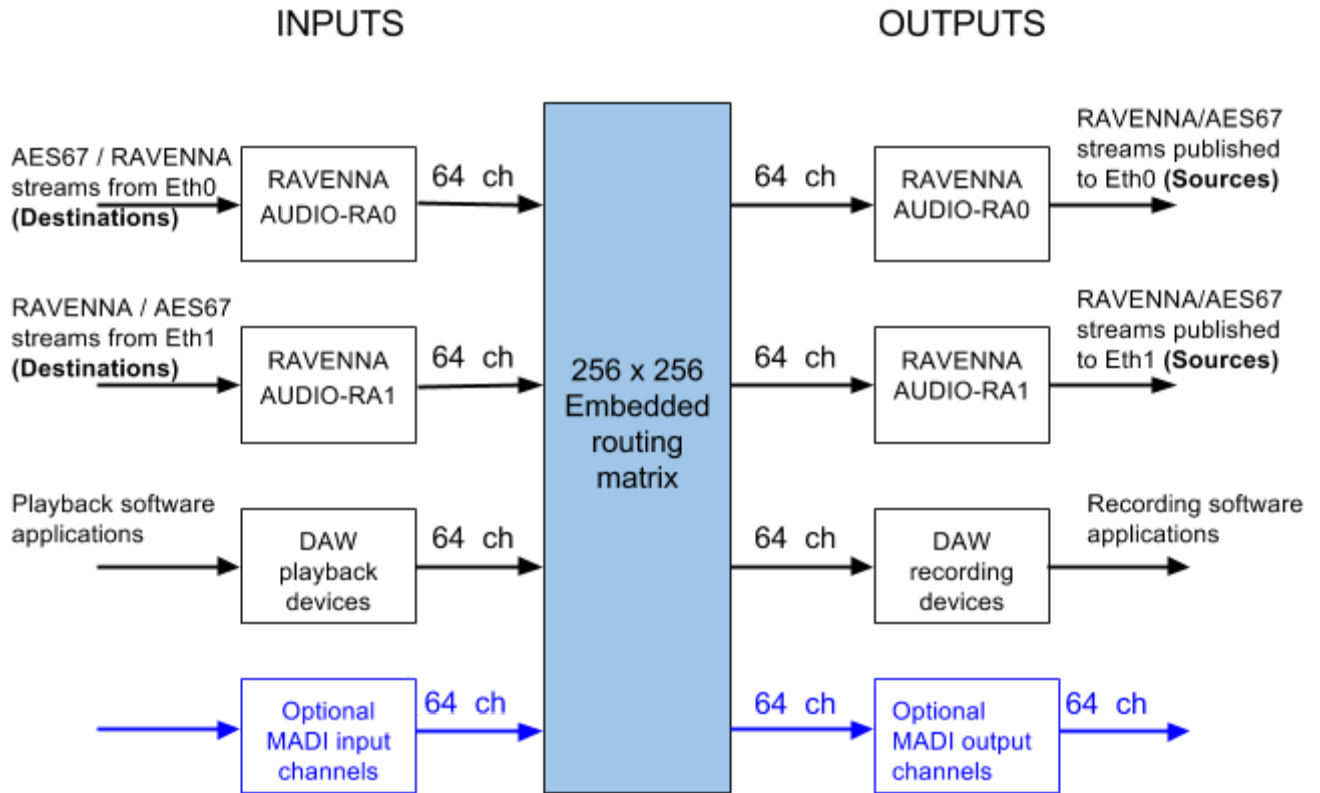
- Please check from the Windows Device Manager if the card is detected by the operating system.
- Right click on the icon “My computer” (from the Desktop, or from the Windows file browser).
- Select “Manage”, and “Device Manager”.
- The LX-IP card should be listed in the “Sound, video and game controller” section.
- If there is an exclamation mark in front of the card, this means that the driver is not installed correctly. Remove the LXIP Kit driver from the Windows Control Panel, Add/Remove programs, and install it again.
- If it is not listed, check in the “Other devices” section of the “device Manager”.

### If the card is not listed at all in the “Device Manager”, proceed as follows:

- Shut down the computer and remove the LX-IP card.  
Please be careful with electrostatic discharge when handling the card (*read section “Information for the user” of this document for more information*).
- Make sure the golden tracks of the LX-IP card PCI Express interface are clean; if not, you may use a dry rag to clean them.
- If there is another free PCI Express slot, insert the card in it, and power on the computer.
- Check again if the card is detected as described above.
- If the card is not detected in any PCI Express slot of this computer, you may try it in another computer.
- If the card is not detected, please contact your card supplier.

## 8. LX-IP principles

### 8.1. Embedded routing matrix



The inputs of the on-board routing matrix are:

- 64 channels coming from the input block "RAVENNA AUDIO-RA0". This block extracts the audio channels from the RAVENNA / AES67 streams that are declared to be received through the network interface Eth0. These streams to be received are named "Destinations".
- 64 channels coming from the block "RAVENNA AUDIO-RA1". This block extracts the audio channels from the RAVENNA / AES67 streams that are declared to be received through the network interface Eth1. These streams to be received are named "Destinations".
- 64 channels coming from the block "DAW". This block receives the audio channels that are played by the software applications through the playback devices and the driver of LX-IP.
- Optionally, 64 channels coming from the MADi input.

The outputs of the routing matrix are:

- 64 channels assigned to the output block "RAVENNA AUDIO-RA0". These channels are the audio sources of the AoIP streams published to the network through Eth0. these streams are named "Sources".
- 64 channels assigned to the output block "RAVENNA AUDIO-RA1". These channels are the audio sources of the AoIP streams published to the network through Eth1. these streams are named "Sources".
- 64 channels assigned to the output block "DAW". These channels are collected by the software applications through the recording devices that are exposed by the LX-IP driver.
- Optionally, 64 channels assigned to the MADi output.

## 8.2. Sources

Sources is the name given to the audio streams published to the network by AES67 / RAVENNA capable devices. For the LX-IP, sources are published to the network through the network interfaces Eth0 and Eth1. Streams which audio channels come from the output block “RAVENNA AUDIO-RA0” are sent through Eth0. Streams which audio channels come from the output block “RAVENNA AUDIO-RA1” are sent through Eth1.

## 8.3. Destinations

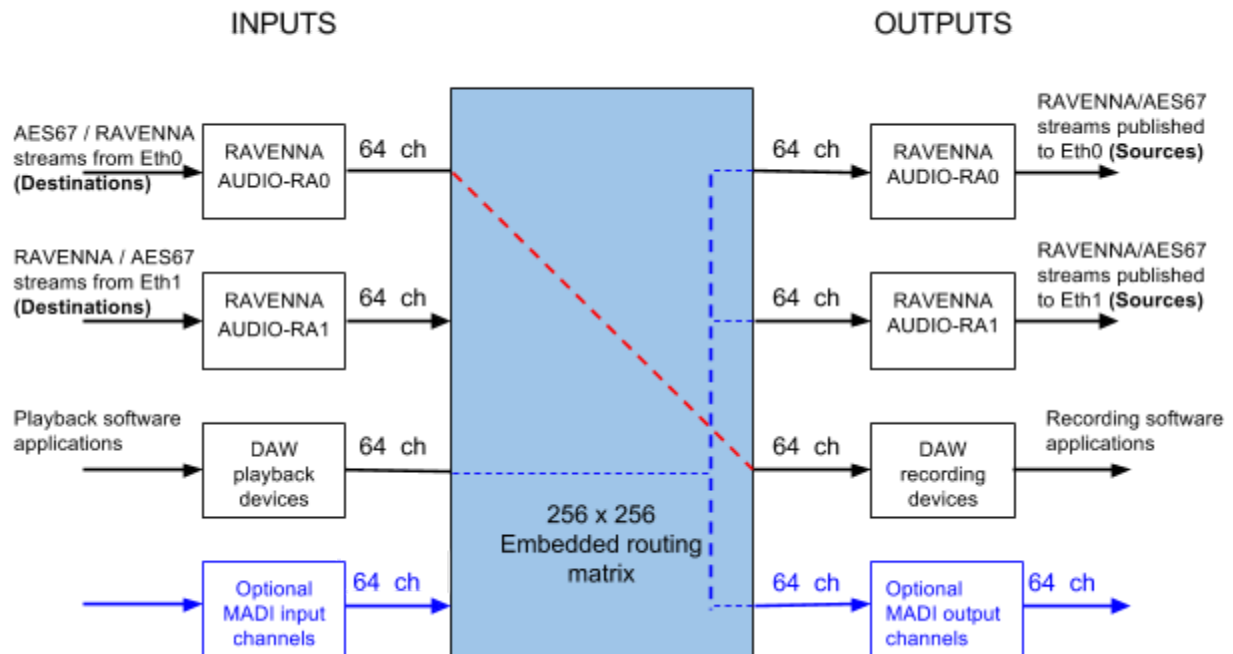
Destinations are the AoIP streams received from the network. Destinations can be received on Eth0 and Eth1 ports. The audio channels extracted from the Destinations received through Eth0 are available from the input block “RAVENNA AUDIO-RA0”. The audio channels extracted from the Destinations received through Eth1 are available from the input block “RAVENNA AUDIO-RA1”.

## 8.4. Clock

The LX-IP can be slaved to the PTP clock, or master PTP clock on the network. Slave to PTP clock: the source clock is the PTP clock. Master PTP Clock: the clock source has to be internal, WordClock, or MADl, and the card is elected as Master PTP on the network if its PTP clock has a higher priority than other potential Master PTP clock units on the network.

## Default routing matrix

The matrix default routing is as follows:



## 9. CONFIGURATION OF THE AoIP PARAMETERS

The network parameters of LX-IP can be configured through its embedded WEB server, which is accessible from any of the two Eth ports.

### 9.1. Default IP addresses of Eth ports

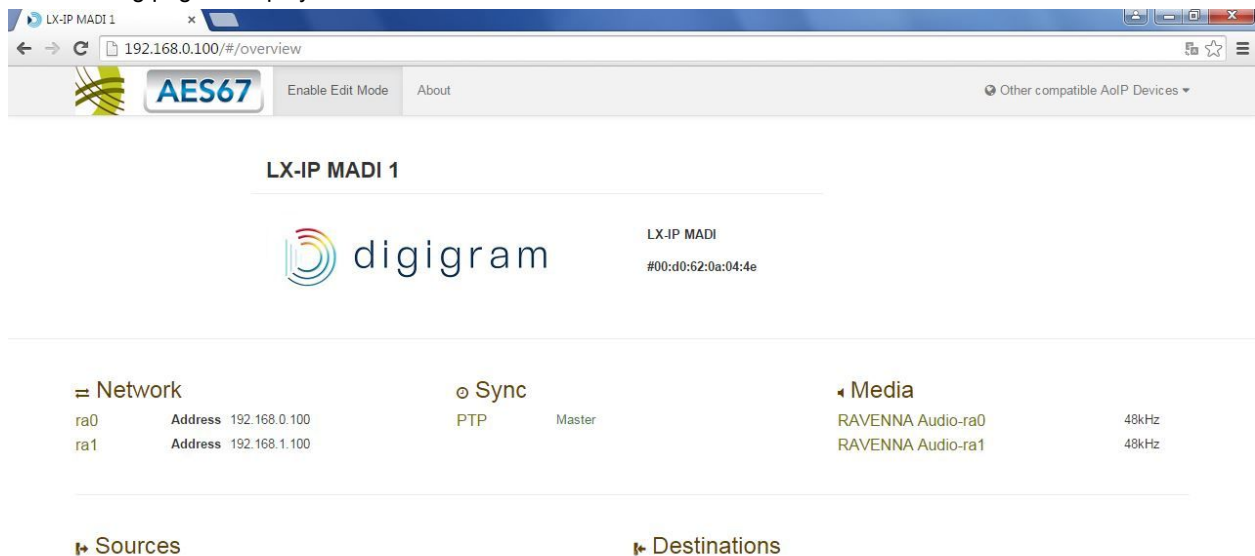
Eth0: 192.168.0.100

Eth1: 192.168.1.100

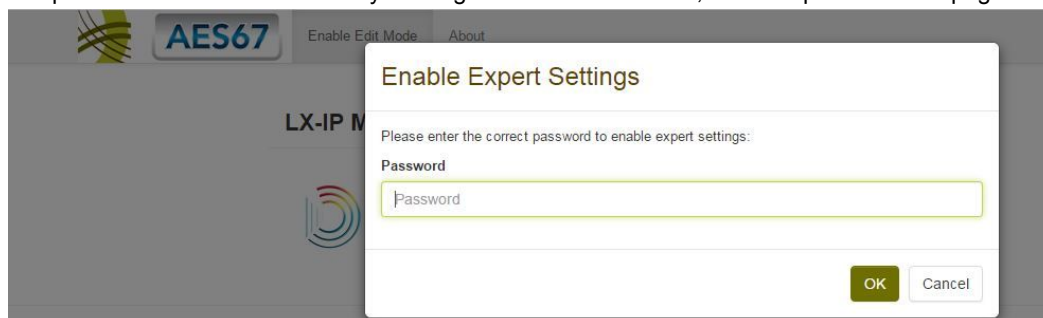
Port to access the WEB pages: 8081

From a PC connected to the AoIP network, and set to an IP address that belongs to the same subnetwork as the LX-IP card, enter the following in your WEB browser: **192.168.0.100:8081** for a connection to Eth0, or **192.168.1.100:8081** for a connection to Eth1.

The following page is displayed.

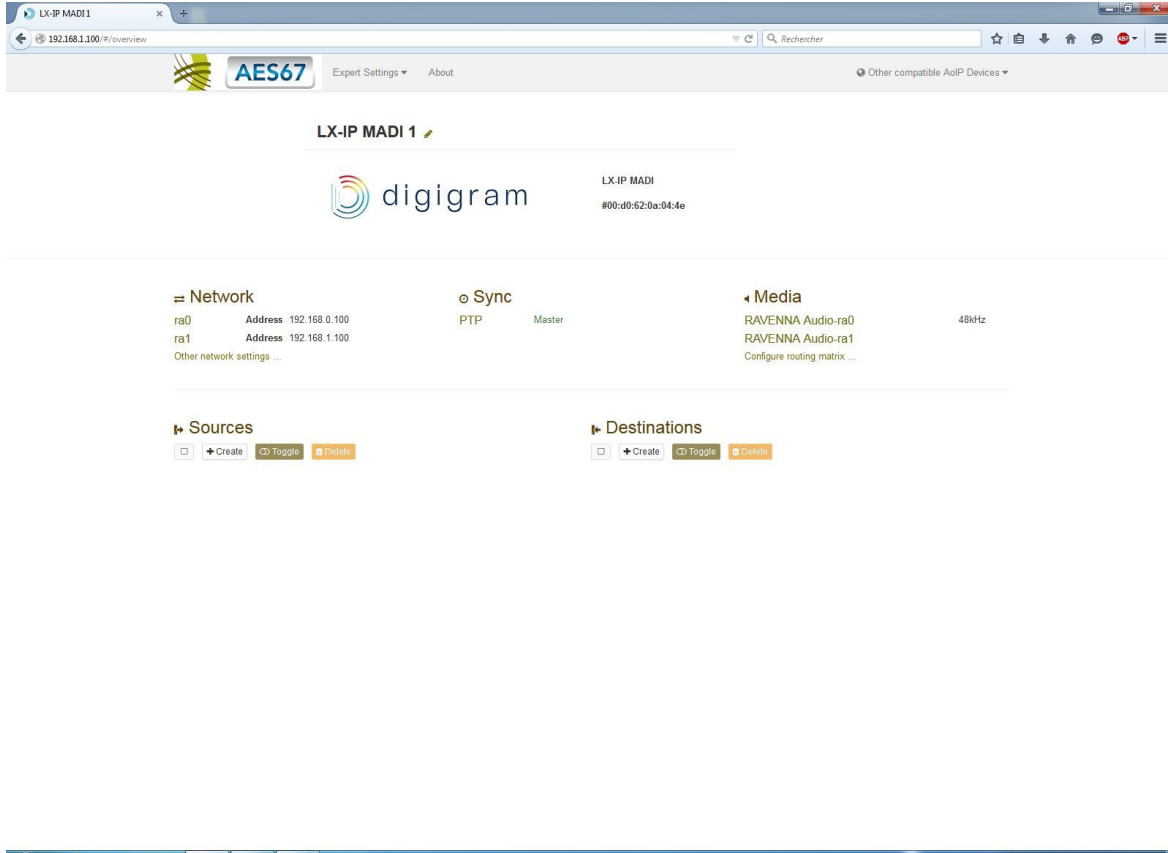


The parameters can be modified by clicking on Enable Edit Mode, on the top of the WEB page.



The requested password is: ravenna.

The following page is displayed;



## 9.2. Network settings

Click on "ra0" to configure the network parameters of network port Eth0.

<p><b>Interface ra0</b></p> <p>Configuration: <input type="text" value="Static"/></p> <p>Address: <input type="text" value="192.168.0.100"/> Network Mask: <input type="text" value="255.255.255.0"/></p> <p><input type="button" value="Apply"/> <input type="button" value="Cancel"/></p>	<p><b>Configuration:</b> Static or DHCP If configuration is set to static, the following two parameters must be set.</p> <p><b>Address:</b> IP address of the Eth0 interface.</p> <p><b>Network mask:</b> mask of the network the Eth0 interface belongs to.</p>
---	--

Similarly, click on "ra1" to configure the network parameters of network port Eth1.

Click on "other network settings" to configure the Hostname, and the gateway.

<div style="border: 1px solid black; padding: 5px;"> <h3 style="margin: 0;">Network Settings</h3> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Hostname</td> <td><input type="text" value="lx-ip-madi-1"/></td> </tr> <tr> <td>Gateway</td> <td><input type="text" value="0.0.0.0"/></td> </tr> <tr> <td>Default TTL</td> <td><input type="text" value="1"/></td> </tr> </table> <div style="text-align: right; margin-top: 10px;"> <input type="button" value="Apply"/> <input type="button" value="Cancel"/> </div> </div>	Hostname	<input type="text" value="lx-ip-madi-1"/>	Gateway	<input type="text" value="0.0.0.0"/>	Default TTL	<input type="text" value="1"/>	<p><b>Hostname:</b> This is the tname of the RAVENNA node, used to identify the device at a network level. This name must be unique on the network,; no spaces are allowed, no special characters.</p> <p><b>Gateway:</b> specify the network gateway IP address if there is one.</p> <p><b>Default TTL:</b> Time To Live value. It defines the number of routers the generated frames can cross..</p>
Hostname	<input type="text" value="lx-ip-madi-1"/>						
Gateway	<input type="text" value="0.0.0.0"/>						
Default TTL	<input type="text" value="1"/>						

## 9.3. Global audio and clock settings

The sampling frequency, the network packet size as well as the clock source can be configured by clicking on “RAVENNA Audio-ra0”, from the “Media” section.

The sampling frequency and the network packet size can be configured by clicking on “RAVENNA Audio-ra1”.

<div style="border: 1px solid black; padding: 5px;"> <h3 style="margin: 0;">RAVENNA Audio-ra0</h3> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Sample rate</td> <td><input type="text" value="48000"/></td> </tr> <tr> <td>Sync source</td> <td><input type="text" value="PTP"/></td> </tr> <tr> <td>PTP clock source</td> <td><input type="text" value="PTP Grand Master"/></td> </tr> </table> <div style="text-align: right; margin-top: 10px;"> <input type="button" value="Allocate"/> <input type="button" value="Close"/> </div> </div>	Sample rate	<input type="text" value="48000"/>	Sync source	<input type="text" value="PTP"/>	PTP clock source	<input type="text" value="PTP Grand Master"/>	<p><b>Audio block size:</b> this defines the number of samples per channel per network packet; the smaller the frame size, the lower the latency but the more susceptible to drop-outs. Values are from 1 to 128 samples.</p> <p><b>Sample rate:</b> this is the audio sample rate: 48000 Hz or 44100 Hz.</p> <p><b>Sync Source:</b> this defines the clock source of the LX-IP card. The clock source can be:</p> <ul style="list-style-type: none"> <li>• PTP: The LX-IP can be PTP Master or slaved to PTP</li> <li>• WordClock: received on the WordClock input of the card</li> <li>• MAD: the card automatically synchronizes on the detected MADI signal.</li> </ul> <p><b>PTP Clock source:</b> This defines the source of the PTP clock of the card. See “Use cases for clock configuration” below for setting the clock parameters.</p>
Sample rate	<input type="text" value="48000"/>						
Sync source	<input type="text" value="PTP"/>						
PTP clock source	<input type="text" value="PTP Grand Master"/>						

In case the clock source is configured to PTP , it is necessary to set the PTP clock parameters, by clicking on “PTP”, from the “Sync” section

<div style="border: 1px solid black; padding: 5px;"> <h3 style="margin: 0;">PTP Properties</h3> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Domain</td> <td><input type="text" value="0"/></td> </tr> <tr> <td>Prio1</td> <td><input type="text" value="128"/></td> </tr> <tr> <td>Prio2</td> <td><input type="text" value="128"/></td> </tr> <tr> <td>Announce interval</td> <td><input type="text" value="1 sec."/></td> </tr> <tr> <td>Sync interval</td> <td><input type="text" value="0.5 sec."/></td> </tr> <tr> <td>Slave only</td> <td><input type="checkbox"/></td> </tr> <tr> <td>Delay mechanism</td> <td><input type="text" value="E2E"/></td> </tr> <tr> <td>DSCP</td> <td><input type="text" value="56"/></td> </tr> </table> <div style="text-align: right; margin-top: 10px;"> <input type="button" value="Apply"/> <input type="button" value="Cancel"/> </div> </div>	Domain	<input type="text" value="0"/>	Prio1	<input type="text" value="128"/>	Prio2	<input type="text" value="128"/>	Announce interval	<input type="text" value="1 sec."/>	Sync interval	<input type="text" value="0.5 sec."/>	Slave only	<input type="checkbox"/>	Delay mechanism	<input type="text" value="E2E"/>	DSCP	<input type="text" value="56"/>	<p><b>Slave only:</b> when this option is checked, LX-IP is forced to run in PTP slave mode. In case this option is not check, the LX-IP card can be elected as Master PTP depending on its priority. A device is elected as master PTP if the priority of its PTP clock is the highest.</p> <p><b>Domain:</b> Time domain for PTP. This MUST be set to match the domain number of the related PTP Grandmaster.</p> <p><b>Prio1:</b> Internal PTP setting. This parameter is used to control the priority of Grandmaster selection</p> <p><b>Prio2:</b> Same as Prio1</p> <p><b>Announce Interval:</b> in seconds (1, 2, 4, 8 or 16). In Slave mode, this MUST be set to match the Announce Interval of the related PTP master clock. In Master mode, this determines the desired Announce Interval.</p> <p><b>Sync interval:</b> in seconds (0.5, 1 or 2). In Slave mode, this MUST be set to match the Sync Interval of the related PTP master clock. In Master mode, this</p>
Domain	<input type="text" value="0"/>																
Prio1	<input type="text" value="128"/>																
Prio2	<input type="text" value="128"/>																
Announce interval	<input type="text" value="1 sec."/>																
Sync interval	<input type="text" value="0.5 sec."/>																
Slave only	<input type="checkbox"/>																
Delay mechanism	<input type="text" value="E2E"/>																
DSCP	<input type="text" value="56"/>																

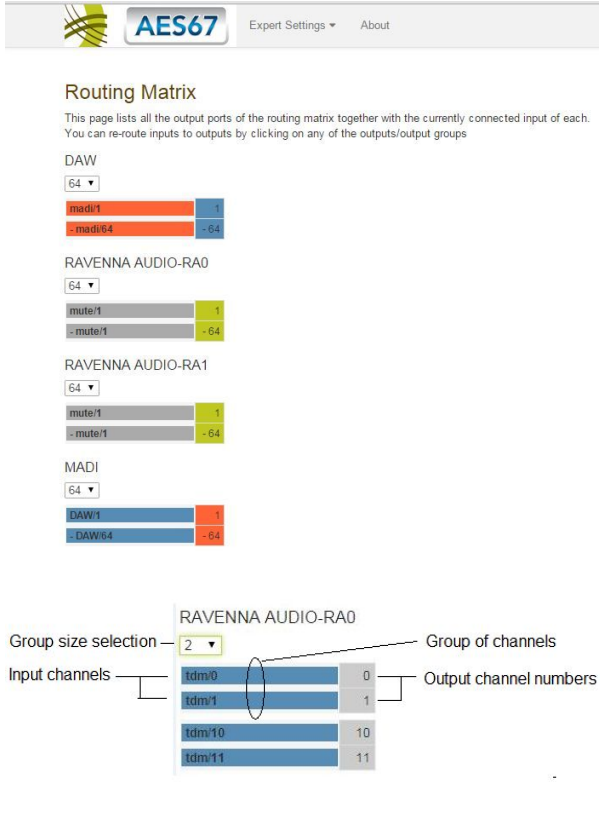
	<p>determines the desired Sync Interval.</p> <p><b>Delay request mechanism:</b> End to End (E2E) or Peer to Peer (P2P). This MUST be set to match the related PTP master clock.</p> <p>While E2E is a more universal setting, P2P provides higher clock sync precision but requires full support from all participating switches (between the node and related clock master.)</p>
--	---

## Use cases for clock configuration

LX-IP use cases	Sync source	PTP clock source	PTP properties	Destinations properties
Slave to the PTP clock from the network. This PTP clock is delivered by another device acting as Grand Master	PTP	PTP Grand Master	Slave only checked	
Master PTP on the network, with synchro source from the WordClock input	PTP	WordClock IN	“Slave only” unchecked	
Master PTP on the network, with synchro source from internal clock of the LX-IP	PTP	Internal	“Slave only” unchecked	
Master PTP on the network, with synchro source from MADI	PTP	MADI	“Slave only” unchecked	
Slave to MADI	MADI	NA	NA	Syntonized checked
Slave to WordClock	WordClock	NA	NA	Syntonized checked
Slave to the internal clock	Internal	NA	NA	Syntonized checked

## 9.4. Routing matrix

The embedded matrix can be configured by clicking on “Configure routing matrix”.



This view displays the three available output ports of the matrix, and the audio inputs that are allocated to each port.  
Each output port is 64 channels.

**DAW** : This section allows for the selection of the audio inputs that will be published to the Digital Audio Workstation software devices (DirectSound, ASIO, Alsa).

**RAVENNA AUDIO-RA0**: This section allows for the selection of the audio inputs that will be published to the network as IP audio streams through Eth0.


**RAVENNA AUDIO-RA1**: This section allows for the selection of the audio inputs that will be published to the network as IP audio streams through Eth1.

**MADI** (optional): This section allows for the selection of the audio inputs that will be published to the MADI output.

The allocated inputs can be configured channel per channel (select 1 in the drop down menu), per stereo channels, (select 2 in the drop down menu), per group of 8 consecutive channels (select 8 in the drop down menu), or per group of 64 consecutive channels (select 8 in the drop down menu).

The input channels are then listed by groups (1, 2, 8, or 64), with the number of the associated output channels in front of the input channel name.

---



This is an example of input channels allocated per groups of 8 channels to the the DAW output port.

The selected inputs are routed the the PC devices a software application can record from.

To configure the group of audio inputs to be allocated to a group on the output port, click on the group of channels.



### Routing Matrix

Please select any of the listed inputs (or input groups) to assign them to the selected output/output group:

Output(s)

DAW

- RAVENNA Audio-ra01
- RAVENNA Audio-ra02
- RAVENNA Audio-ra03
- RAVENNA Audio-ra04
- RAVENNA Audio-ra05
- RAVENNA Audio-ra06
- RAVENNA Audio-ra07
- RAVENNA Audio-ra08

Inputs

DAW

1	9	17	25	33	41	49	57
2	10	18	26	34	42	50	58
3	11	19	27	35	43	51	59
4	12	20	28	36	44	52	60
5	13	21	29	37	45	53	61
6	14	22	30	38	46	54	62
7	15	23	31	39	47	55	63
8	16	24	32	40	48	56	64

RAVENNA AUDIO-RA0

1	9	17	25	33	41	49	57
2	10	18	26	34	42	50	58
3	11	19	27	35	43	51	59
4	12	20	28	36	44	52	60
5	13	21	29	37	45	53	61
6	14	22	30	38	46	54	62
7	15	23	31	39	47	55	63
8	16	24	32	40	48	56	64

RAVENNA AUDIO-RA1

1	9	17	25	33	41	49	57
2	10	18	26	34	42	50	58
3	11	19	27	35	43	51	59
4	12	20	28	36	44	52	60
5	13	21	29	37	45	53	61
6	14	22	30	38	46	54	62
7	15	23	31	39	47	55	63
8	16	24	32	40	48	56	64

MADI

1	9	17	25	33	41	49	57
2	10	18	26	34	42	50	58
3	11	19	27	35	43	51	59
4	12	20	28	36	44	52	60
5	13	21	29	37	45	53	61
6	14	22	30	38	46	54	62
7	15	23	31	39	47	55	63
8	16	24	32	40	48	56	64

MUTE

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8

The inputs can then be selected on the right part of the window.  
Inputs can be selected from the four input ports:

**DAW:** This section allows for the selection of the audio inputs that come from the playback devices.


**RAVENNA AUDIO-RA0:** This section allows for the selection of the audio inputs that come from AoIP streams on Eth0.

**RAVENNA AUDIO-RA1:** This section allows for the selection of the audio inputs that come from AoIP streams on Eth1.

**MADI (optional):** This section allows for the selection of the audio inputs that come from the MADI input.

Note that for a given group, all the inputs come from the same input port.

**Mute:** Allows muting all the channels of the group.

Click on  on the top of the WEB page to display the main WEB page.

## 9.5. Creation of IP streams published to the network

To declare an RAVENNA/AES67 stream to be published to the network, click on "Create source" from the "Sources" section.

### Source Properties

Stream Settings

Name:

Payload: AES67 Standard Stereo Stream

Address: auto

Media Settings

Medium:

Consecutive tracks:

Recording tracks:

Your configuration results in 288 data bytes/packet.

### Stream settings

**Name:** Enter a name to identify the stream to be generated on the network (e.g. From My Automation). A default name is automatically entered, and is taken from the RAVENNA node Name (in the headline).

**Payload:** This is an internal RTP value which informs subscribers about the nature of the content. Possible values are:

- AES67 Standard Stereo Stream: AES67stereo stream
- RAVENNA 64-Channel stream: RAVENNA stream with 64 channels.
- RAVENNA 8-Channel stream: RAVENNA stream with 8 channels.
- RAVENNA AES/EBU Stereo Stream: AM824 format = 24-bit audio + 8-bit meta data as used with AES/EBU
- RAVENNA Stereo Stream: 24-bit samples
- Custom: allows defining an other format configuration (payload, number of channels, frame size, DSCP, and Payload ID)

Note for DSCP: Select a QoS (Quality of Service) value from the drop-down menu - EF (46), AF41 (34), AF31 (26) or Standard (0); the

<p>Payload: Custom</p> <p>Channel count: 2</p> <p>Codec: L24</p> <p>Frame size: 64</p> <p>DSCP: 46</p> <p>Payload ID: 98</p>	<p>default value is EF (46). This should match the priority settings used in your network for preferred real-time media packet forwarding.</p> <p><b>Address:</b> auto. This automatically assigns a multicast IP address to the generated stream.</p> <p><b>Media Settings</b></p> <p><b>Medium:</b> Select here the input port of the matrix from which the audio channel(s) are to be selected.</p> <p><b>Consecutive tracks:</b> If checked, channels of the stereo or multichannel stream are taken consecutively from the input port group that is selected. Otherwise, channels can be selected one by one from <b>recording tracks</b> fields.</p> <p><b>Recording tracks:</b> allows selecting the channels available from the selected input port of the matrix.</p>
--	--

## Receiving IP streams from the network

To declare an RAVENNA/AES67 stream to be received from the network, click on “Create destination” from the “Destinations” section.

<h3>Destination Properties</h3> <p>Stream Source</p> <p>Name Codec Sample rate Hz <span>Show raw SDP</span></p> <p>Channels</p> <p>Receiver Settings</p> <p>Label: (not labeled)</p> <p>Delay: 512</p> <p>Syntonized Mode: <input type="checkbox"/></p> <p>Channel count: 0</p> <p>Media Settings</p> <p>Medium: RAVENNA Audio-ra0</p> <p>Consecutive tracks: <input checked="" type="checkbox"/></p> <p>Play tracks</p> <p>Apply Cancel</p>	<p><b>Stream Source:</b> This drop down menu displays the list of available IP streams published on the RAVENNA/AES67 network. Select a stream from this list.</p> <p><b>Show raw SDP:</b> Allows displaying the details of the stream description.</p> <p><b>Receive settings</b></p> <p><b>Label:</b> displays the label of the selected stream.</p> <p><b>Delay:</b> Enter the amount of delay to be applied, in samples, before samples are played out (forwarded to the internal audio interface). The delay is referenced to the sampling time at the sender. Thus, it needs to be large enough to cover all possible influences, such as the packet assembly delay at the sender (frame size), transport delay, maximum packet jitter and packet disassembly delay at the receiver.</p> <p>TIP: Set the delay to be larger than the frame size specified by the sender. As a general rule, the delay value should be 2 x sender's frame size. So, if the sender's frame size = 128, set the delay = 256. If you experience drop-outs, increase the delay time.</p> <p><b>Syntonized mode:</b> This mode is to be checked in case the <b>Sync source</b> is not PTP.</p> <p><b>Channel count:</b> The channel count determines the number of channels to be routed from the selected stream to the internal audio interface. If 0 is entered, all available channels are used upon subscription.</p> <p><b>Media Settings</b></p> <p><b>Medium:</b> Select the output group of the routing matrix</p> <p><b>Consecutive tracks:</b> If checked, channels of the</p>
--	---

	<p>stream are played out on consecutive channels of the selected group. Otherwise, output channels can be selected one by one from <b>Play tracks</b> fields.</p> <p><b>Play tracks:</b> selection of the tracks of the output group.</p> <p>Click on <b>Apply</b> to confirm the setting changes.</p>
--	--

## 10. UNINSTALLING THE DRIVERS

- Open the **Windows Control Panel** and double-click on the **Programs and Features** icon.
- Select “*Digigram LX-IP Kit ...*”, and **Change/Remove**.
- Select **Uninstall**.
- Follow the instructions to finish removing the driver.

## 11. SPECIFICATIONS

### 11.1. Configuration

<b>Bus/Format</b>	PCI EXPRESS™ (PCIe®) x1 (x2, x4, x8, x16 compatible)
<b>Size</b>	111.15 mm x 167.65 mm x 20 mm
<b>Power requirements (+3.3 V / +12 V)</b>	0.4 A / 0.12 A
<b>Operating: temp / humidity (non-condensing)</b>	0°C / +50°C • 5% / 90%
<b>Storage: temp / humidity (non-condensing)</b>	-5°C / +70°C • 0% / 95%

### 11.2. Inputs/Outputs

<b>RAVENNA / AES67</b>	Up to 128/128 I/O (Mono) channels at 44.1 kHz or 48 kHz (64/64 I/O on each Gigabit Ethernet interface)
<b>MADI (Factory option)</b>	64/64 I/O (Mono) at 48 kHz 32/32 I/O (Mono) at 96 kHz
<b>Word Clock</b>	One BNC used either as Word Clock input or Word Clock output. Configured through WEB pages. Input : TTL , impedance selectable by jumper (75 Ohms / HighZ). Output : Max 5 Vpp, 75 Ohms output impedance
<b>Synchronization</b>	Word clock, 44.1 or 48kHz, with selectable input impedance (High Z / 75 ohms) (can be used if card delivers the master clock for the EtherSound network).
<b>Sampling frequencies</b>	Internal clock: 44.1 kHz, 48 kHz and 96 kHz (MADI) From PTP clock or Word Clock: 44.1 kHz, 48 kHz and 96 kHz (MADI) From MADI: 44.1 kHz, 48 kHz, 96 kHz
<b>Clock sources</b>	PTPv2 (IEEE1588-2008) from network, or internal clock or Word Clock or MADI input Local clock eligible as GrandMaster PTP Local clock precision : better than 10 ppm

### 11.3. Connectors

<b>RAVENNA/AES67</b>	2 Gigabit Ethernet RJ45 ports for RAVENNA I/O (dual port or Primary / Backup mode)
<b>MADI I/O</b>	1 multimode optical connector for MADI I/O (Factory option)
<b>Word Clock</b>	BNC
<b>Word Clock input impedance</b>	Jumper: High Z / 75 ohms

### 11.4. RAVENNA / AES67

<b>Supported audio payload formats</b>	PCM16 / PCM24 / PCM32 / AM824 (PCM24+AES3 channel status)
<b>Packet size</b>	From 128 down to 1 (ultra-low latency profile) audio samples per RAVENNA packet

<b>Clock source</b>	PTPv2 (IEEE1588-2008) from network or internal clock or Word Clock or MADI input Local clock eligible as GrandMaster PTP Local clock precision : better than 10 ppm
<b>AES67 compliance</b>	Full compliance in all respects with AES 67

## 11.5. Control and routing

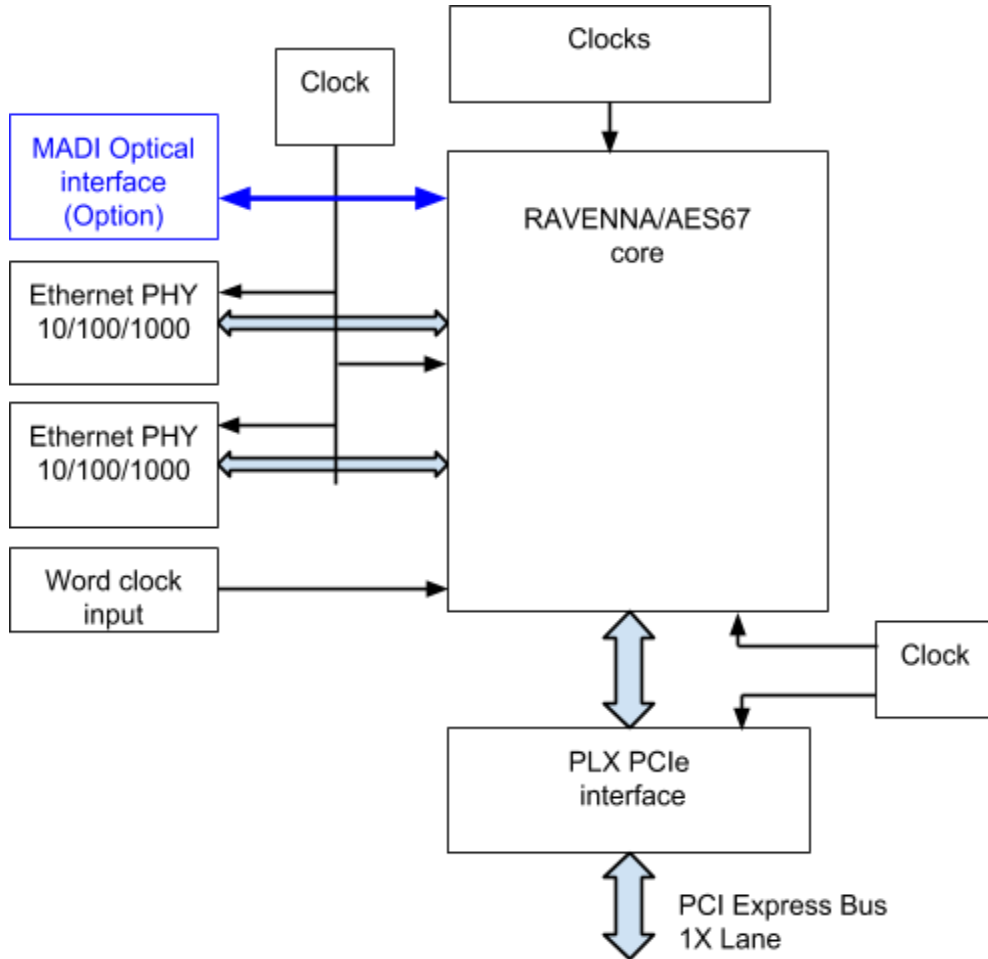
<b>Control</b>	HTTP (web pages from embedded server) EMBER+
<b>Routing</b>	Zero latency on-board routing matrix between RAVENNA, PC Rec/Play and optional MADI channels

## 11.6. Development environments

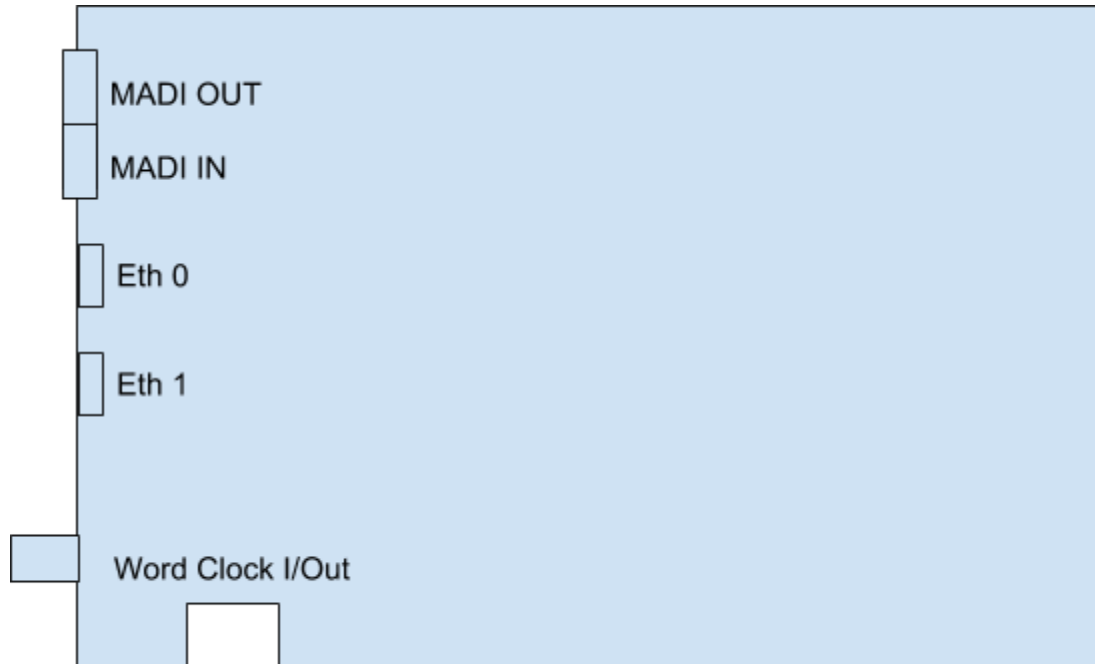
<b>Audio devices</b>	64/64 simultaneous Record/Play (Mono) channels to/from PC
<b>Latency</b>	Round trip time down to 1.1 ms (excluding IP network)
<b>Management</b>	Low latency WDM Kernel Streaming, DirectSound, WASAPI, ASIO, Alsa
<b>Supported operating systems</b>	Windows 10, 8 and 7 32/64bits, Windows server 2003/2008, Linux

## 12. APPENDIX



### 12.1. LX-IP RAVENNA schematic diagram



## 12.2. Connectors



Jumper – WordClock input impedance selection

- High impedance: 
- 75 ohms: 



## 13. DRIVER RELEASE NOTES AND LIMITATIONS

### 13.1. LXIP Kit v01.01a004

- The PTP parameters changes may sometimes not be taken into account. When this occurs, it is necessary to reset to factory settings, and create again the configuration. Please contact us for the "Reset to factory settings" procedure.
- PTP clock is not generated and is not received through port Eth1.
- Et0 and Eth1 must only be connected to a Gbit network (100 Mbits/s network connection makes the card fail at startup or when disconnecting/reconnecting the network).