RAVENNA Network Guide

For Merging Technologies Products

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1 Introduction

RAVENNA is a solution for real-time distribution of audio and other media content in IP-based network environments. It was designed primarily by a company called ALC NetworX. RAVENNA utilizes standardized network protocols and technologies and can operate in existing network infrastructures. Performance and capacity scale with the capabilities of the underlying network architecture.

For more information about RAVENNA technology **please see: Introduction to RAVENNA Technology on page 7** and:

<div align="center">http://ravenna.alcnetworx.com/</div>

Scope

This document contains information about Merging Technologies RAVENNA systems. It has an introduction to RAVENNA technology and details about the two helper applications **MT Discovery** and **Merging RAVENNA Easy Connect**.

For detailed information about the **Horus/Hapi/Nadac** interfaces and **Pyramix** and **Ovation** software please see their specific Guides.

> **Note:** ANEMAN (AudioNEtworkMANager) Supercedes Easy Connect and is recommended and bundled in our installers starting from Pyramix v11, Ovation v7, RAVENNA ASIO v11 and the latest VAD plugins). Documentation can be found on our ANEMAN site here:

<div align="center">https://aneman.net</div>

2 Read First!

Important! Do not connect anything other than RAVENNA devices to the Merging Technologies PCIe Ethernet Controller Card NET-MSC-GBEX1. The same applies when the connection from the card goes via a Merging certified network switch.

Important! Please avoid changing a network address or disconnecting Ethernet ports on your system when MassCore RAVENNA is running. It is possible that this will cause your Horus/Hapi connection to reset and result in gaps in your recording.

Maximum Cable Lengths

Note: The maximum length of network cable is 100 meters - 328 ft for CAT5E or CAT6 cables. If there is a requirement to extend connections beyond this100 meter limit you may take advantage of copper to fiber converters, which further extend the reach to 650 meters with multi-mode fibers and even several kilometers with single-mode fibers. Please refer to NET-TPL-MC210 on the Merging pricelist.

3 Introduction to RAVENNA Technology

Scope

The information in this chapter is provided as background of the philosophy and technology behind RAVENNA.

Overview

RAVENNA is a technology for real-time distribution of audio and other media content in IP-based network environments. Utilizing standardized network protocols and technologies, RAVENNA can operate on existing network infrastructures. RAVENNA is designed to meet the strict requirements of the pro audio market featuring low latency, full signal transparency and high reliability.

RAVENNA is suitable for deployment in many pro audio market segments including broadcast, live sound, studios the install market and location music recording. Possible fields of application include (but are not limited to) in-house signal distribution in broadcasting houses, theaters, concert halls and other fixed installations, flexible set-ups at venues and live events, OB van support, interfacility links across WAN connections and in production & recording applications.

In short, it represents a new take on the third generation form of audio interconnect, where the first generation of interconnect is analogue point-to point copper, the second generation uses digital codes representing the analogue signal, conveyed point to point over copper or fibre-optic cabling and the third generation also employs digital codes representing the analogue audio but transported as packets over network infrastructure.

RAVENNA is very well suited to areas where complex audio routing / mixing systems are deployed. For example; in-house distribution in broadcasting centres and WAN connections to satellite studios, OB vans, where hook up to venues with the same infra-structure becomes simple, in venues themselves for local signal distribution and connection to just such OB vehicles when required. For live events and concerts it offers highly flexible temporary installation possibilities and in theatres, opera houses and houses of worship it can provide low cost local signal distribution. Notwithstanding all of the above, RAVENNA is also an excellent candidate for relatively simple point to point interconnects such as computer to audio interface.

However, RAVENNA, leaving aside the other advantages touted, is an open standard based on the ubiquitous IP protocol. Specifically, protocol levels on or above layer 3 of the OSI reference model. Since RAVENNA is purely based on layer 3 protocols, it can operate in most existing network environments. Unlike layer 1 or layer 2 solutions, it does not, in principle, require its own network infrastructure. IP can be therefore be transported on virtually any LAN and is used as the base layer for communication across WAN connections (including the internet). Although in most cases Ethernet will be deployed as the underlying data link layer, IP is in general infrastructure-agnostic and can be used on virtually any network technology and topology. All the protocols and mechanisms used in RAVENNA are based on well established tend commonly used methods from the IT and audio industries and comply with various standards defined and maintained by the international standards bodies.

Basic Components
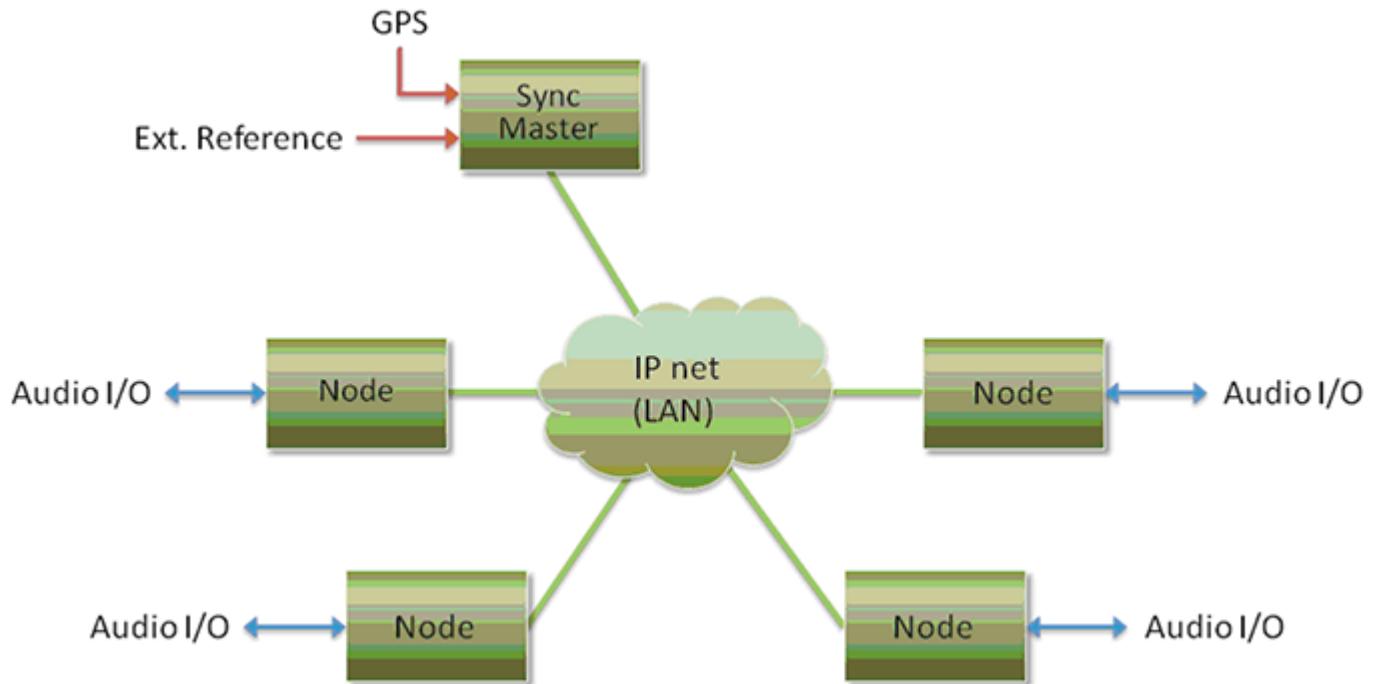
RAVENNA Network Basic Components Example

A RAVENNA system requires a carefully configured IP network, a master clock device and any number of RAVENNA enabled I/O nodes. The master clock can be either a dedicated device or any RAVENNA node capable of serving as a grandmaster. The preferred time domain reference is GPS. Simple streaming across a network can be achieved without any synchronization at all but in pro audio applications tight synchronization between all devices and streams is absolutely mandatory. While playback synchronization in most applications requires sample accuracy, one goal for RAVENNA is to provide superior performance by offering phase-accurate synchronization as an option thus rendering separate reference word clock distribution throughout a facility or venue redundant.

Flexibility

The system design approach allows for operation with or without centralized services for configuration / connection management. ALC NetworX recommends that basic device configuration (e.g. initial settings and setup of audio streams) should be executed via a web interface (http). However other methods may be used in addition or as an alternative.

Device discovery is accomplished with DNS-SD (via an mDNS or DNS service). In small networks, without DHCP / DNS servers, the zeroconf mechanism - a fully automatic, self-configuring method - is used for auto-IP assignment and service advertisement & discovery.

Streams available on the network are represented by SDP records with extended information (i.e. a clock domain identifier, RTP time stamp association etc.) Clients can connect to streams via RTSP or SDP/http.

Resilience

As you would expect RAVENNA supports redundancy. Although modern network infrastructures can be configured to guarantee a high level of transport security and reliable 24/7 operation for added security there is the option of full network redundancy. Each RAVENNA device can include two independent network interfaces which can be connected to independent physical networks. By duplicating any outgoing stream to both network links, any destination device will receive the full stream data on both network interfaces independently. If data from one link is corrupted, or one network link fails completely, the uncorrupted data is still present on the other link. Changeover in the event of the failure of a network link is automatic.

Streaming

Unicast

Unicast (one-to-one) is used in application scenarios such as an individual stream between two devices (e.g. a multi-channel stream between a console and a recorder/DAW). This uses a point-to-point connection between the sender and receiver. Since each additional receiver adds its own individual connection network traffic increases with every additional unicast stream.

Multicast

Multicast (one-to-many) streaming is used in scenarios where a single source is to be distributed to many potential recipients (e.g. program stream to journalists' desktops). At the sending end this only requires one connection per stream. Network switches are aware which participants (receivers) should receive any particular multicast and forward packets only to registered nodes. In multicast set-ups the network traffic only increases on the last (closest to receiver node) segment(s) of the network path.

Infrastructure

The network infrastructure must be able to transport IP packets and must support a number of standard operating protocols, e.g. RTP/RTPC for streaming since this is used widely and supports a wide variety of standard payload formats. Some of these formats are mandatory for all RAVENNA devices, others are optional. For example this protocol offers the possibility of standard media player applications subscribing to RAVENNA streams. Synchronization across all nodes is achieved via the IEEE1588-2008 (PTPv2 Precision Time Protocol). This is another standard protocol which can be used on IP. PTPv2 provides a means for synchronizing local clocks to a precision as defined in AES-11. Accurate synchronization can even be achieved across WAN connections when GPS is used as a common time domain.

Quality of Service

For the QoS (Quality of Service) protocol DiffServ has been chosen since it is widely supported by most modern managed switches. Since other traffic can co-exist with RAVENNA on the same network, RAVENNA traffic must be on the fast track. RAVENNA packets are assigned a high priority classification to ensure expedited transport across the network, while other packets with lower priority are treated as best-effort traffic. Even within RAVENNA there are different priorities assigned to different classes of traffic. Synchronization is assigned the highest priority, immediately followed by any real-time media traffic, while control and configuration traffic will be on a lower priority level. Any non-RAVENNA traffic would receive the lowest (standard) priority and be treated as best-effort traffic. Performance and capacity scale with the capabilities of the underlying network architecture.

4 MT Discovery

Overview

MT Discovery is a standalone application that searches your network(s) for Bonjour Services. It enables quick and easy access to Merging Technologies Web Services based on Bonjour, such as the Horus/Hapi/Nadac configuration page. These pages will be open in your computer's default browser. MT Discovery can be used to update the Horus/Hapi Firmware. Please refer to the Horus/Hapi/Nadac User Manual for detailed information about this procedure.

Note: The default web browser is determined by a computer setting, not from MT Discovery. It will most probably be one of the following applications:

- Microsoft Internet Explorer
- Apple Safari
- Mozilla Firefox
- Google Chrome.

Google Chrome or Apple Safari are recommended for use with Merging Technologies products.
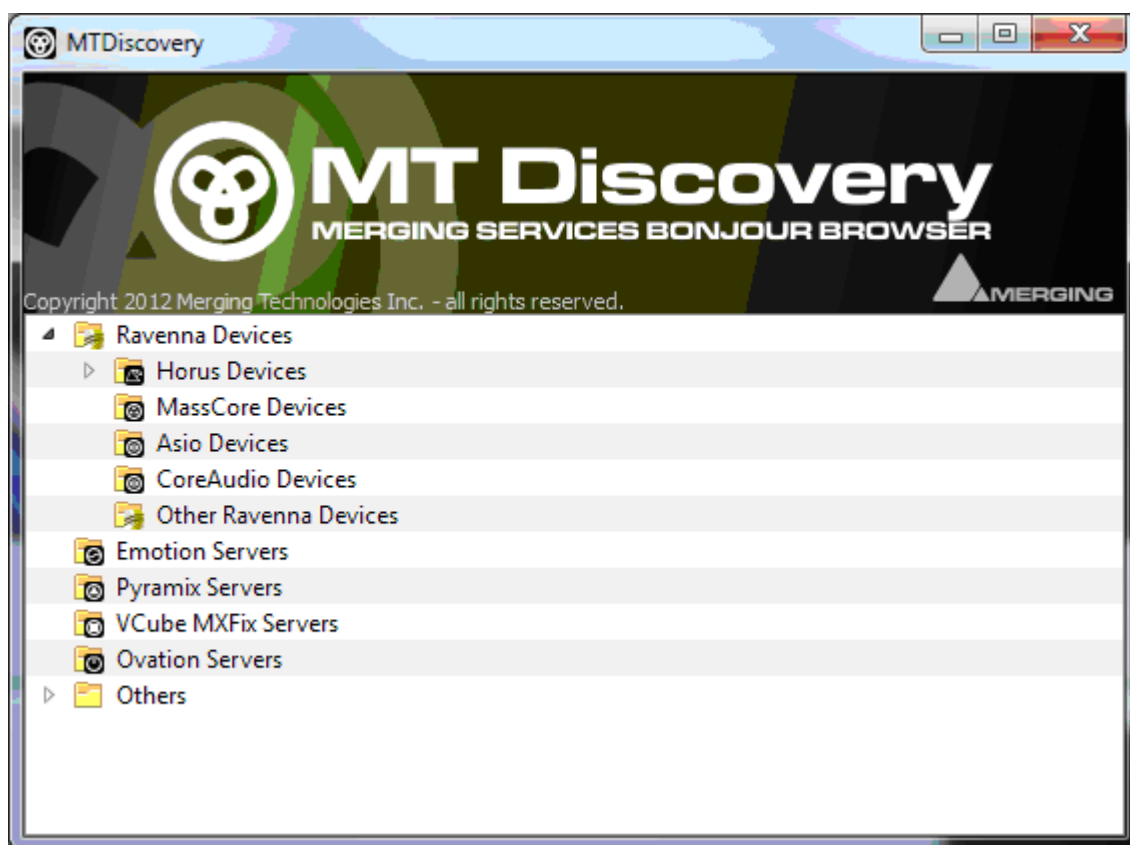
Using MT Discovery

Launch MTDiscovery

Launch the MT Discovery application from the Windows Start Menu:

All Programs > Merging Technologies > MT Discovery

or by clicking on the desktop icon.

MT Discovery Window

The MT Discovery application window displays a tree view of all the devices it finds on the Bonjour Network. It refreshes automatically when a device is connected or disconnected.

Groups

MT Discovery will sort all devices into groups automatically (displayed like folders), depending on the characteristics of the devices.

The different groups are:

* **RAVENNA Devices**

This group contains devices which have the RAVENNA protocol enabled and sorts them into different subgroups:

  * **Horus/Hapi/Nadac Devices**

  * **MassCore Devices**

  * **Asio/Core Audio Devices**

  * **Other RAVENNA Devices**.

* **Emotion Servers**

- **Pyramix Servers**

- **VCube MXFix Servers**

- **Ovation Servers**

- **Others**

The **Others** group contains all Bonjour devices that could not be identified by MT Discovery. Printers are likely to be found in here.

> **Note:** The number in brackets near a collapsed folder indicates how many devices this folder contains.

Actions

Right-clicking (**Ctrl+click** on Mac) on an item on the tree view displays a contextual menu, which lists the actions available for the item.

Open   Open is what you will want to do most of the time. It will show the main page of the device in your computer's default web browser. This can also be achieved by double-clicking on a device, or by hitting **Enter** when the device is selected.

Open Advanced   Open Advanced will attempt to display the main settings page of the device in the computer's default web browser. This can also be achieved by holding down **Ctrl** (**Cmd** on Mac) and double-clicking on a device, or by hitting **Ctrl + Enter** (**Cmd + Enter** on Mac) when the device is selected.

> **Note:** Some devices will not support this, and your web browser will report a **404 - page not found** error. In this case, we recommend you access the main page with command **Open**, described above, then browse to the setup page in your web browser directly.

Expand / Collapse Only available for Groups, shows/hides the contents of a folder in the tree view. This can also be achieved by clicking on the **+/-** sign on the left side, or by double-clicking on the Group name.

Color Coding

The color of RAVENNA Device entries indicates the network they are on. Same color = same network.
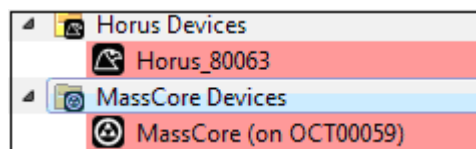
Device Network Color Coding

> **Note:** Horus/Hapi/Nadac and MassCore entries must be the same color in order to work together in RAVENNA mode.

Additional Information

The MT Discovery application is located in the following folder:

On Windows   **C:\Program Files\Merging Technologies\MTDiscovery**

On Mac   **TBA**

On Linux   **TBA**

5 Merging RAVENNA Easy Connect

Note: ANEMAN (AudioNEtworkMANager) Supercedes Easy Connect and is recommended and bundled in our installers starting from Pyramix v11, Ovation v7, RAVENNA ASIO v11 and the latest VAD plugins). Documentation can be found on our ANEMAN site here:

https://aneman.net

Overview

The **RAVENNA Easy Connect** utility is the default application installed with Pyramix v9 & v10, Ovation v6 & v7, RAVENNA ASIO v9 & v10 and legacy VAD plugins. Documentation can be found along with those installers. This utility enables Horus/Hapi users to connect the visible RAVENNA streams and route them accordingly to the desired I/Os.

Accessing Easy Connect

When Pyramix is launched with the VS3 Control Panel set to RAVENNA mode the RAVENNA Easy Connect utility is launched automatically and appears in the Windows system tray. Users who have installed the ASIO and Core Audio Drivers will also have the utility running in the respective tray.

Easy Connect Tray icon

Pyramix

The RAVENNA Easy Connect dialog is opened by:

View > Windows / Tools > RAVENNA Easy Connect

It can also can be opened by clicking on the Pyramix toolbar icon:
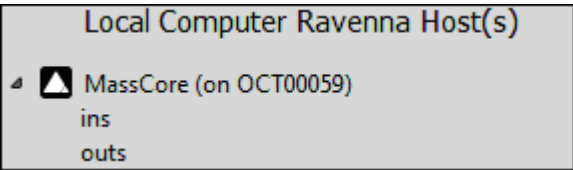
Pyramix Toolbar icon

Once the dialog is open the connection tree is displayed.

Easy Connect will see all the RAVENNA connections which are activated in the Horus/Hapi module pages (as RAVENNA).

Local Computer RAVENNA Host

The left-hand column of the Easy Connect window shows the connections used on your MassCore system, ASIO or Core Audio host.

**Easy Connect Local Ravenna Hosts**

Network Accessible RAVENNA Device

The top right-hand entry in the Easy Connect window shows the available Horus/Hapi units.


Easy Connect Network RAVENNARAVENNA

Expanding the Horus/Hapi entry displays the **ins** (inputs) and **outs** (Outputs) available. These can be connected or disconnected (from drop down menu). If a Module Output Source is not set to RAVENNA it will not appear in the Easy-Connect Inputs and Outputs list.
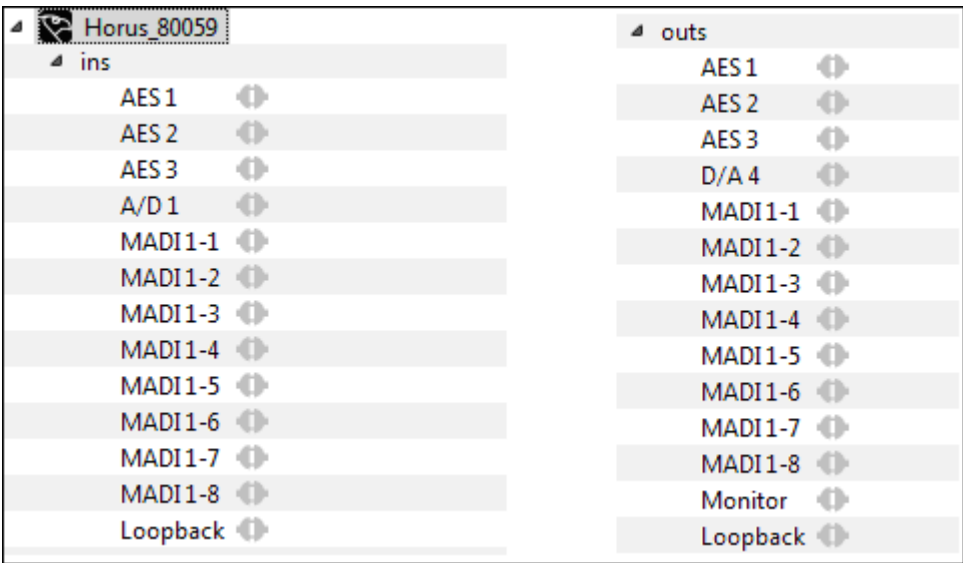
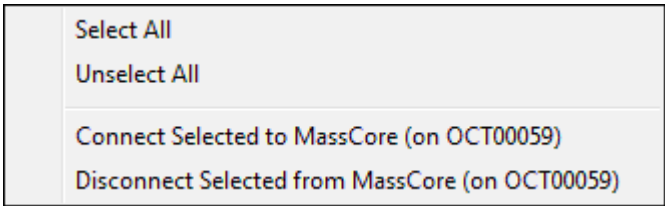**Easy Connect ins and outs**

Making a connection

Click on the module to be connected. It will be highlighted once clicked.
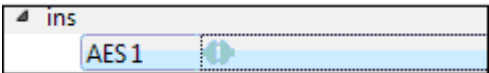
Easy Connect Selected I/O Module

Right-click to access the drop-down context menu. Here you can connect or disconnect the module I/O.
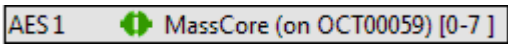

Easy Connect Context Menu

Alternatively use the buttons in the lower part of the Easy Connect window to perform the connection or disconnection

Easy Connect Connect & Disconnect buttons

Double-clicking on a RAVENNA module entry will Connect or Disconnect the module.

Once the module connection is made a Green icon will be displayed

Easy Connect Module Connection

Connection Status

 Not connected

 Connected correctly

 Connection Error (see message displayed at bottom of Easy Connect window for details)

 Partial connection

A **Partial connection** indicates that the connection to the MassCore, ASIO or Core Audio host cannot be made. Please verify that the MassCore, ASIO or Core Audio host is available in the left-hand Easy Connect column. If it is present select the problematic input or output and disconnect it, then reconnect it.

If the MassCore, ASIO or Core Audio host is not present please exit and restart the application.

> **Note:** Each Input and Output module is in blocks of 8 channels (except for Monitoring which is 2 channels)

Once connected the Inputs or Outputs will be available within the Pyramix Mixer for I/O connections.

Activated Connection Example
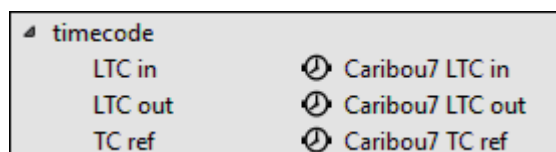Once a RAVENNA connection has been enabled it will be made available in the Pyramix Mixer.

In the example below the AD1 input has been enabled:

Easy Connect & Pyramix Connections
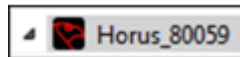
TimeCode Connections
Horus/Hapi TimeCode RAVENNA connections can also be enabled from RAVENNA Easy Connect :
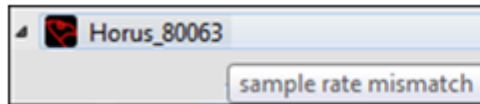

Easy Connect TimeCode Connections

Additional Details

A warning red sign on the Horus/Hapi logo along with a pop message will warn the user that the Horus and Pyramix project are not at the same sampling rate.

Configuration error: Roll the mouse over the Horus/Hapi red warning to display the exact error:


Easy Connect Sampling Rate Warning

Or look at the bottom of the dialog.

> **Note:** Horus/Hapi and Pyramix sampling rates MUST match in order to enable I/O connections through RAVENNA Easy Connect.
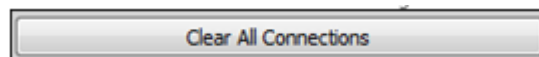
Clear All Connections

All current connections can be cleared by right-clicking on the RAVENNA Easy Connect icon in the Tray to access the context menu and selecting **Clear Connections**.
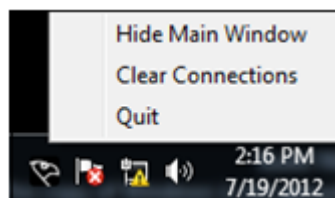
Easy Connect Tray Icon Context Menu

You can also clear all connections using the button at the bottom of the Easy Connect Window:


Easy Connect Clear All COnnections button

This will delete all the local RAVENNA connections made previously for all inputs and outputs. A confirmation pop-up window will appear. Click on **OK** to clear the connections or **Cancel** to abort.

Ctrl + Click on the **Clear All Connections** button will force a delete of **ALL** existing RAVENNA connections**.** Please be aware that this will clear connections that could be in use by other RAVENNA hosts. Ensure that you know what you are doing.

Lock to Pyramix Sampling Rate

RAVENNA Easy Connect also includes an option to lock the Horus/Hapi to the Pyramix sampling rate.
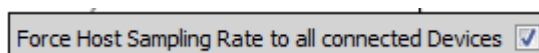
Easy Connect Sampling Rate Lock Check-

When active the MassCore system will always ensure that the Horus/Hapi connected to it follows its sampling rate setting.

> **Note:** When running with RAVENNA ASIO and Core Audio drivers the "Locked sampling rate" option is inactive, since Horus/Hapi is the sampling rate master in such a configuration

Always on top

An option to display The RAVENNA Easy Connect window can be set to **Always On Top** in top from right-click context menu.

Easy Connect Always On Top message

Working with multiple Horus/Hapi over a network

If you have multiple Horus/Hapi's in your environment they must all be connected to a Merging certified switch. **Please see: Network Switches on page 30**

Each Horus/Hapi will then appear in your RAVENNA Easy Connect utility where you will see the name of each Horus/Hapi online. You will be able to make each Horus'/Hapi I/O connections with the RAVENNA Easy Connect utility.

Troubleshooting
Sudden stoppage of RAVENNA Easy Connect

If the RAVENNA Easy Connect utility crashes or stops simply launch it again from the Windows Start menu under:

All Programs > Merging Technologies > RAVENNA Easy Connect > RAVENNAEasyConnect

6 TimeCode

TimeCode Setup

Horus/Hapi TimeCode Setup

TimeCode connections to Horus/Hapi are handled by Apple Bonjour.

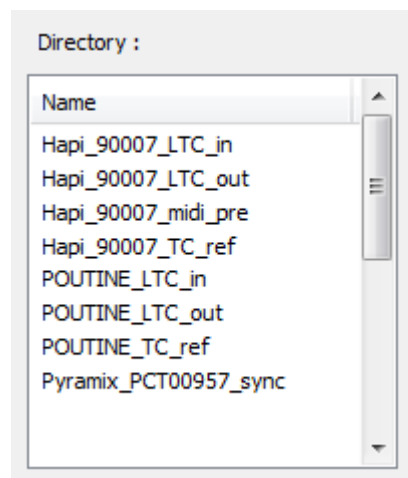### Apple Bonjour MIDI Connection Discovery

This may be seen in:

Settings > All Settings > Hardware > MIDI Sync

rtp MIDI (Windows third party utility.)

MIDI Network Setup (Mac OSX)

Directory :

MIDI Sync Page - Directory section

The list shows a real-time view of all the Apple MIDI participants discovered on the network.

Naming/Nomenclature

Horus/Hapi_<SERIAL>_LTC_in	Physical LTC input (seen as MTC) used to receive Timecode to DAW
Horus/Hapi_<SERIAL>_LTC_out	Physical LTC output (seen as MTC) used to send out Timecode to Horus/Hapi
Horus/Hapi_<SERIAL>_midi_pre	Used to remotely access the Horus/Hapi MicPre
Horus/Hapi_<SERIAL>_TC_ref	Internal connection used to synchronize to a Video ref source
<Computer Name>_LTC_in	MassCore virtual LTC input
<Computer Name>_LTC_out	MassCore virtual LTC output
<Computer Name>_LTC_ref	Internal connection used to synchronize to a Video ref source
Pyramix_<Computer Name>_sync	Pyramix shows a MIDI in/out connection for transferring MTC

Horus/Hapi LTC IN-OUT for Pyramix Native users

•   Ensure that the Project Frame Rate is set to match the incoming TimeCode.

•   Open **Settings > All Settings > Hardware > MIDI Sync**
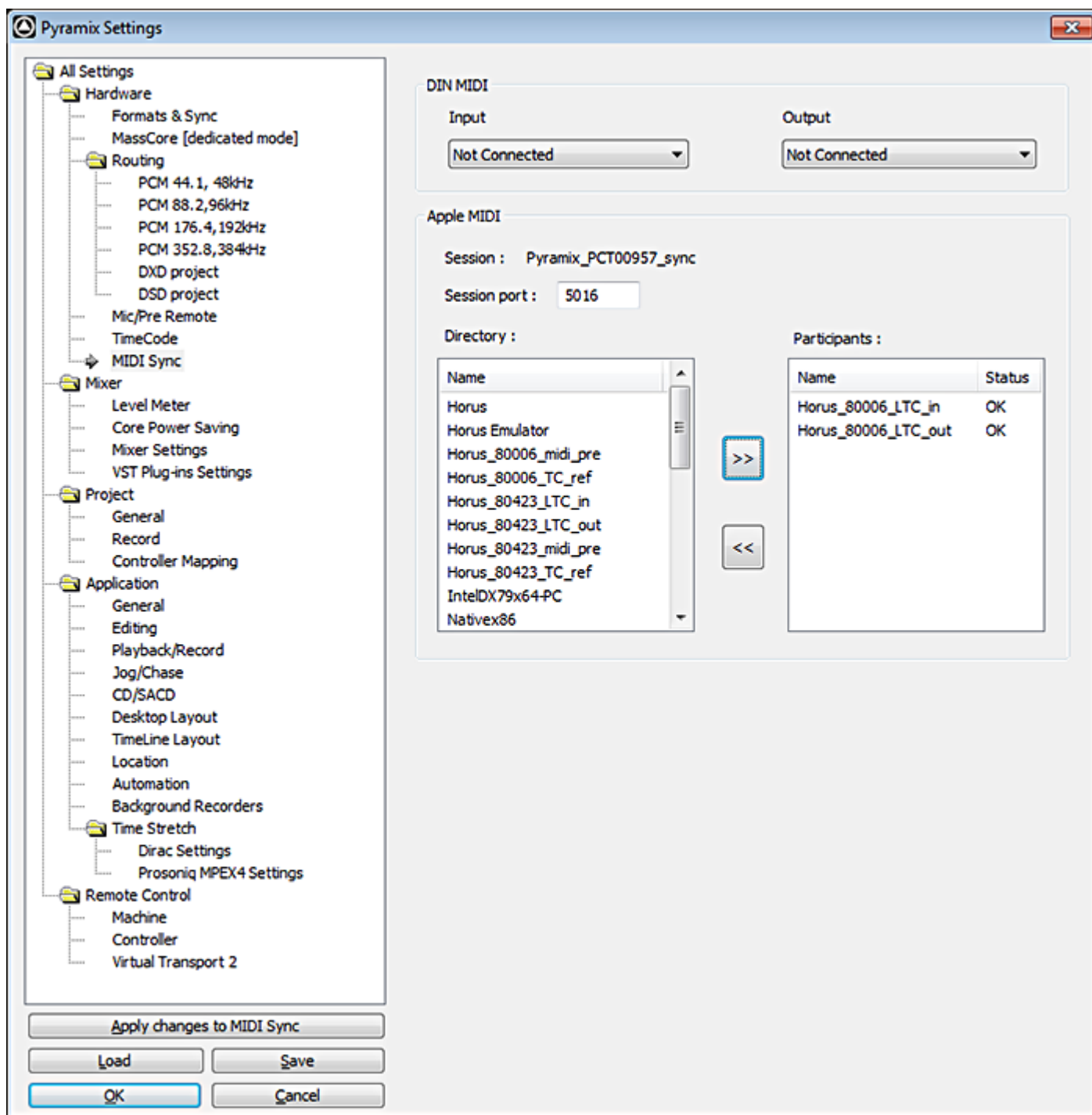
<div align="right">All Settings > Hardware > MIDI Sync</div>

•   Add the **Horus/Hapi LTC IN** and **Horus/Hapi LTC Out** entries to the **Participants :** list.

•   Click on **OK** to save the settings and close the window.

•   Open the Pyramix **Transport** window. **[Alt + T]**.

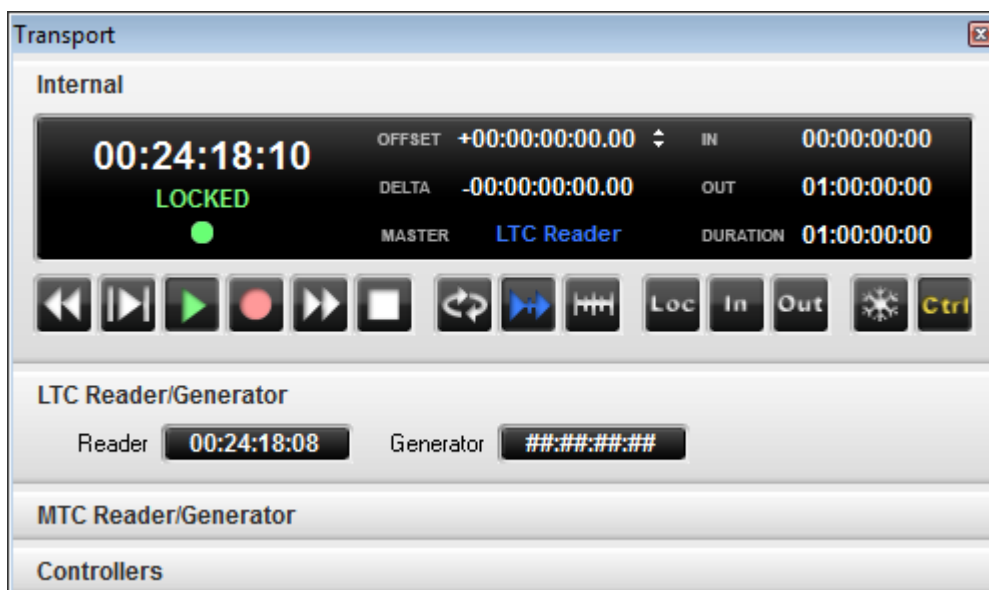•   Set the **Pyramix** to **Chase** the **MTC Reader**.

•   Pyramix will Generate MTC once a MIDI connection is on the **Participants :** list.
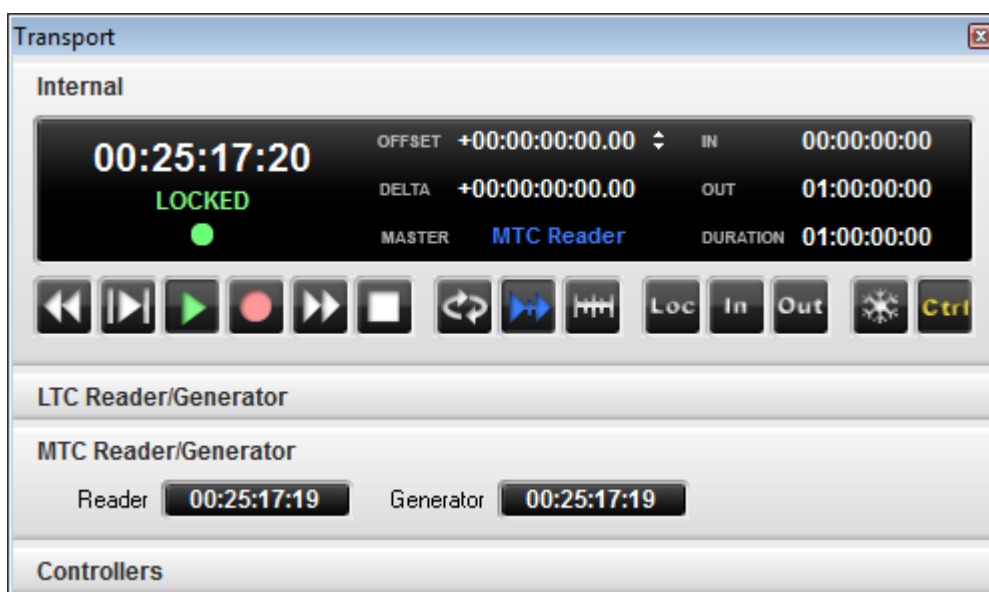
Transport window

Horus/Hapi LTC IN-OUT for MassCore users

MassCore users please refer to the **RAVENNA Network Guide**, use the **ANEMAN** or **Easy Connect** TimeCode connections and set the Pyramix Transport to **LTC Reader** chase mode.
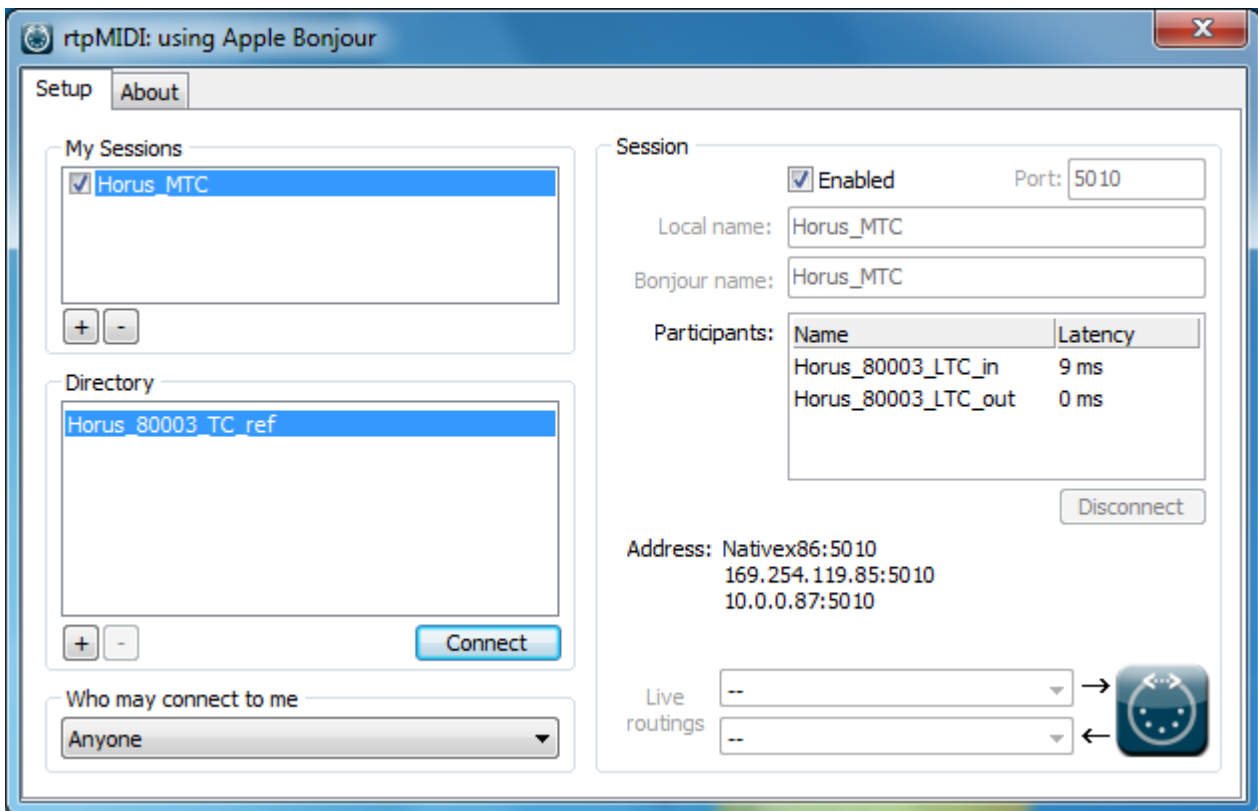

Transport window

Note: We recommend **NOT** using the **Settings > All Settings > MIDI Sync : Participant** entries.

Third Party DAW on Windows
First download and install **RTP MIDI** :

http://www.tobias-erichsen.de/wp-content/uploads/2012/08/rtpMIDI_1_0_11_227.zip

- Ensure the Horus/Hapi is connected to your computer. (I.e.visible in MT Discovery.)

rtpMIDI:using Apple Bonjour Setup tab

- In the **rtpMIDI**, **Setup** tab click on the **+** icon in the **My Sessions** section to create a new MIDI port.
- For ease of use, change its Local name and Bonjour name to **Horus/Hapi_MTC**.

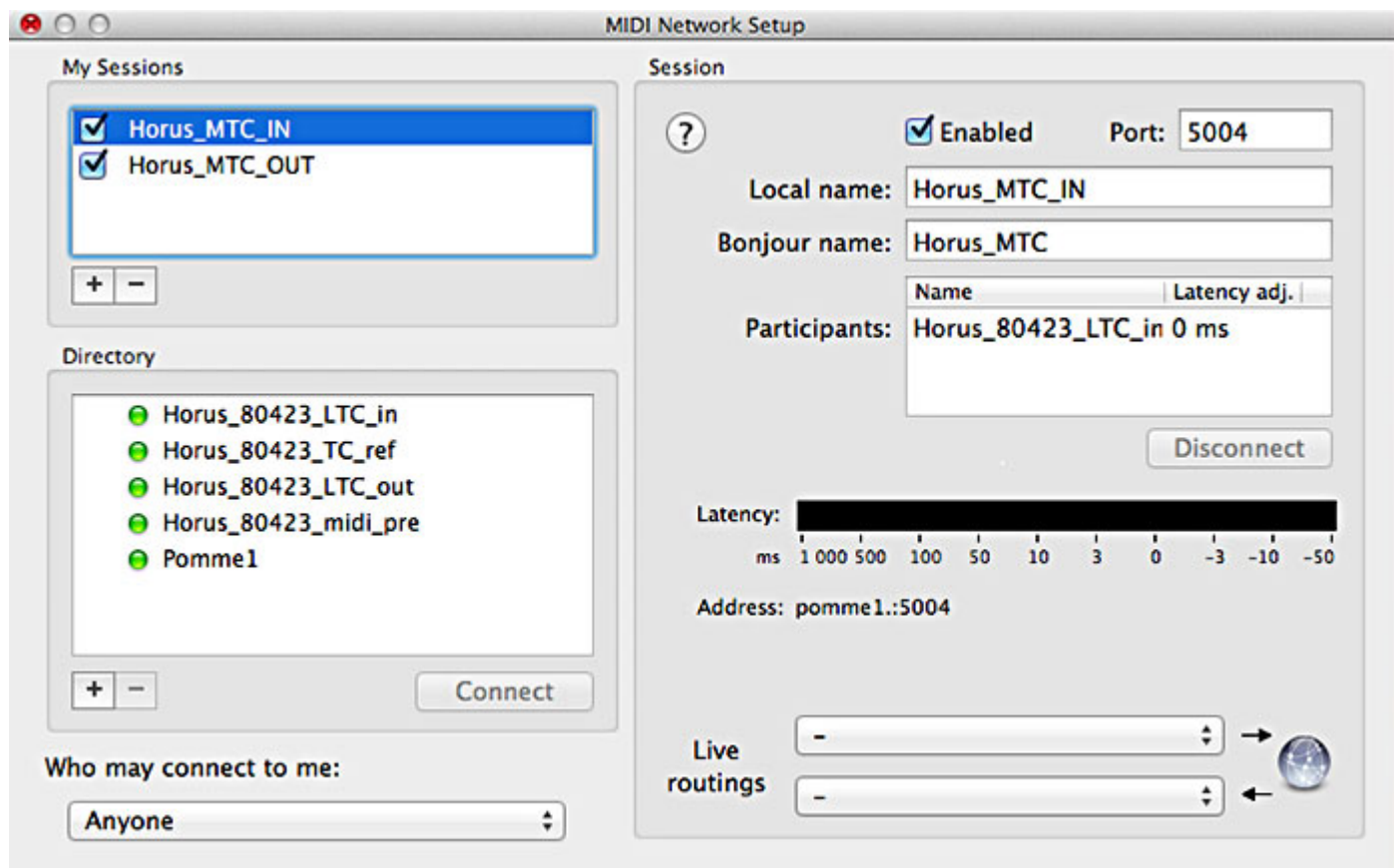The **Directory** section shows the available streams.

- Select the **Horus/Hapi_SerialNumber_LTC_in** and click on Connect to add it to the Participants list.
- Select **Horus/Hapi_SerialNumber_LTC_out** and also add it to the Participants list.
- Enable the **Session** by checking the **Enabled** box to make the **Horus/Hapi MTC** available.

Note: Once configured correctly, it is not necessary to launch **rtpMIDI,** it will run as a service automatically at Windows start up.

Note: Any changes in **rtpMIDI** configuration may require a restart of the audio application.

Third Party DAW on Mac OSX

• Launch **MIDI Network Setup**

OSX MIDI Network Setup

• In **MIDI Network Setup** click on the **+** icon under My Sessions section to create a new MIDI port.

• For ease of use, change its *Local name* and *Bonjour name* to **Horus/Hapi_MTC**.

The **Directory** section shows the available streams:

• Select the **Horus/Hapi_SerialNumber_LTC**_in and click on **Connect** to add it to the **Participants:** list.

• Now select **Horus(Hapi)_SerialNumber_LTC_out** and also add it to the **Participants :** list.

• Enable the **Session** by checking the **Enabled** box to make the **Horus/Hapi MTC** available.

Important! After a system restart you will need to reconnect the Participants.

Setup Examples

Pro Tools on Mac Example

•   Ensure that the **Project Frame Rate** is set to match the incoming TimeCode in the **Session Setup** window.

•   Open the ProTools **Peripherals** dialog:
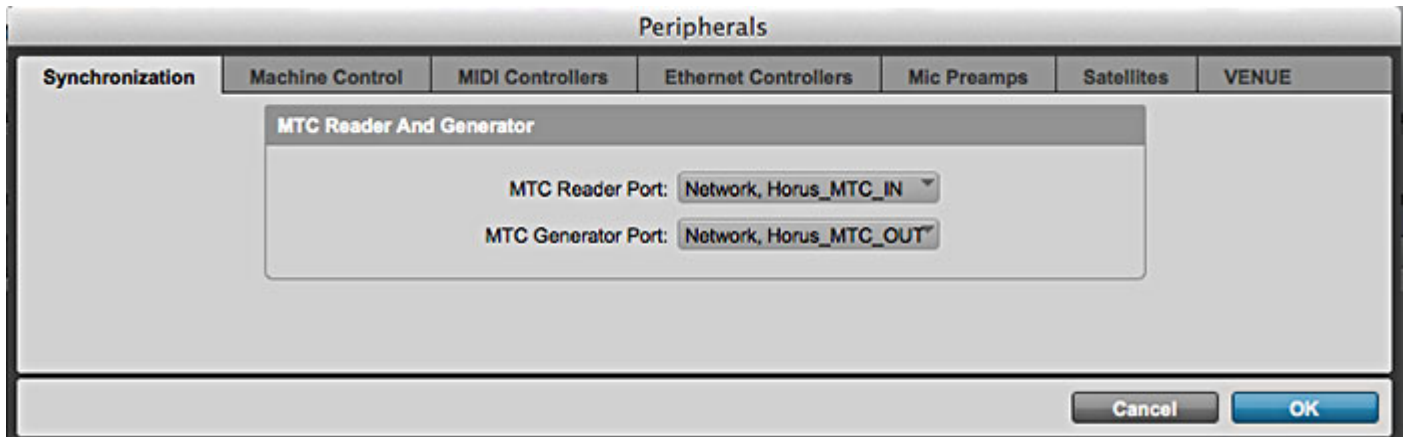
Pro Tools Peripherals dialog

•   Set MTC Reader Port to Horus(Hapi)_MTC and MTC Generator Port to Horus/Hapi_MTC if you require Pro Tools TimeCode on the Horus/Hapi LTC output.

•   Ensure the Session is set up correctly:
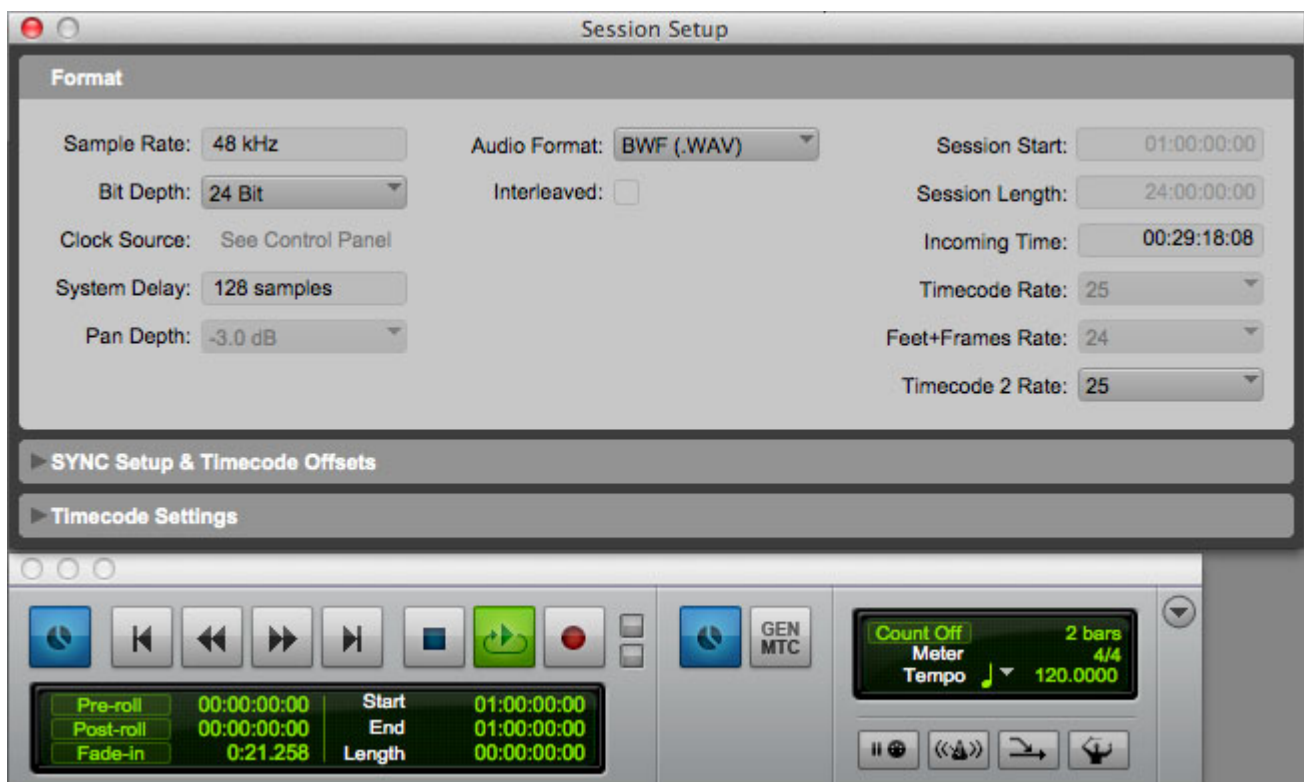
Pro Tools Session Setup

•   In the Transport window, activate the **Chase** Icon (and / or **GEN MTC** button if you require Pro Tools Time-Code on the Horus/Hapi LTC output).

Pro Tools on PC Example
Open the **Session Setup** dialog:

Pro Tools Session Setup

- Ensure that the Project Frame Rate is set to match the incoming Timecode in the **Session Setup** window.

- Open the **Peripherals** dialog.

- In the **Synchronization** tab set **MTC Reader Port:** to **Horus/Hapi_MTC**.

Pro Tools Peripherals : Synchronization tab

- If Pro Tools Timecode is required on the Horus/Hapi LTC output set **MTC Generator Port** to **Horus/Hapi_MTC**.
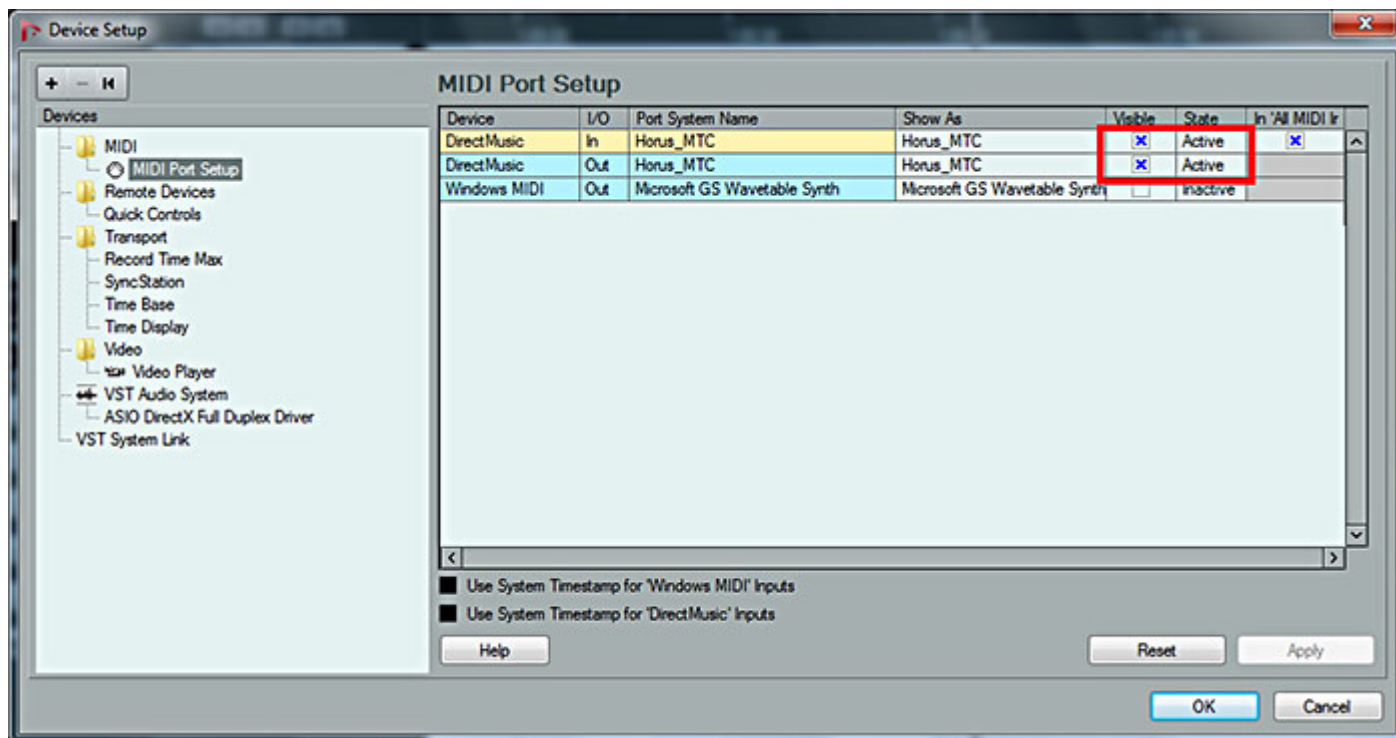

Pro Tools Transport window

- And in the **Transport** window, activate the **Chase** Icon (and / or **GEN MTC** button).

Nuendo 5 Example

First ensure that the Project Frame Rate is set to match the incoming Timecode.
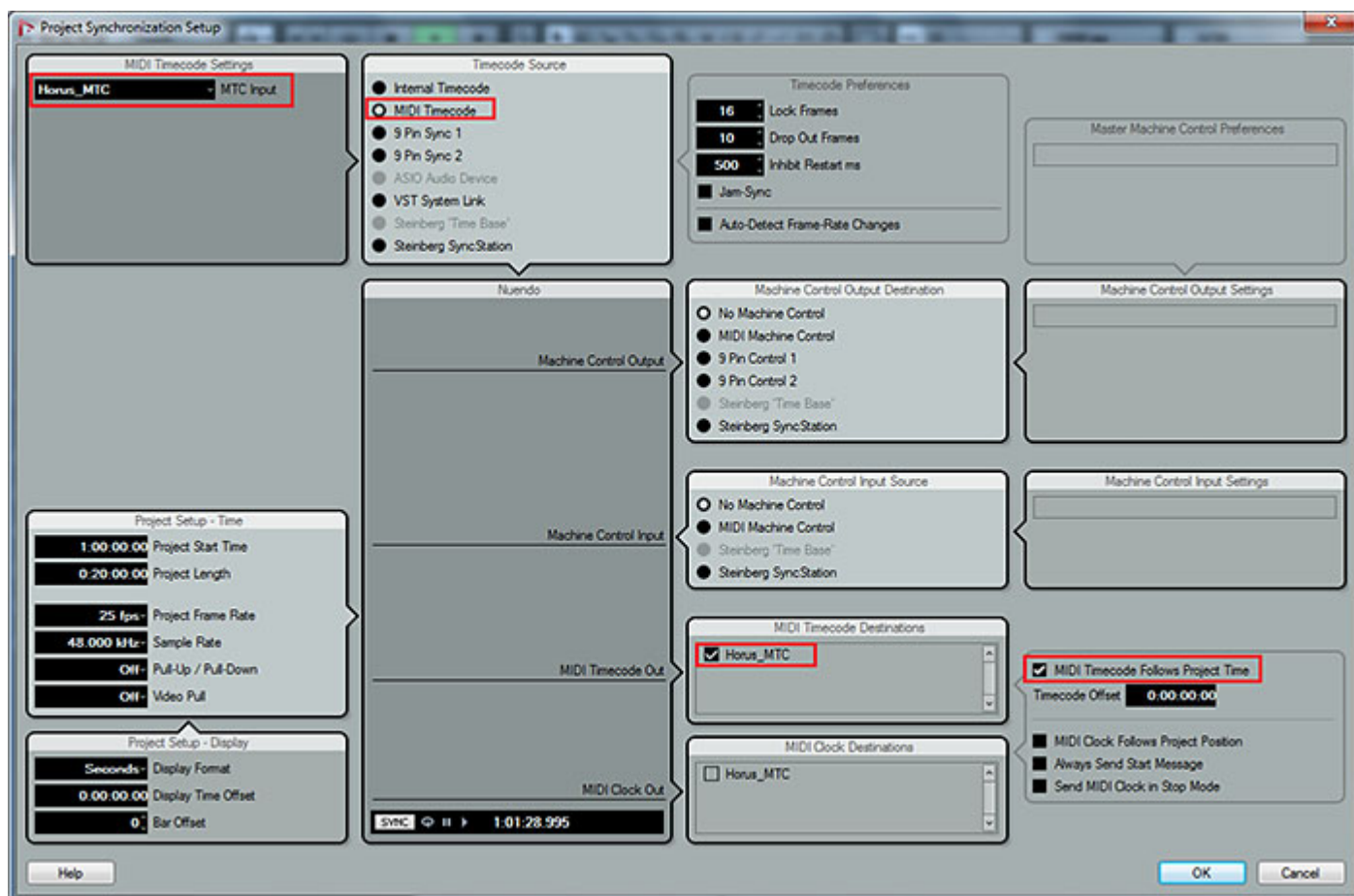
- Open the **Device Setup** dialog **Devices > Device Setup**:

Nuendo 5 Device Setup : MIDI Port Setup

- Activate the **Horus/Hapi_MTC** as MIDI **In** and MIDI **Out**.

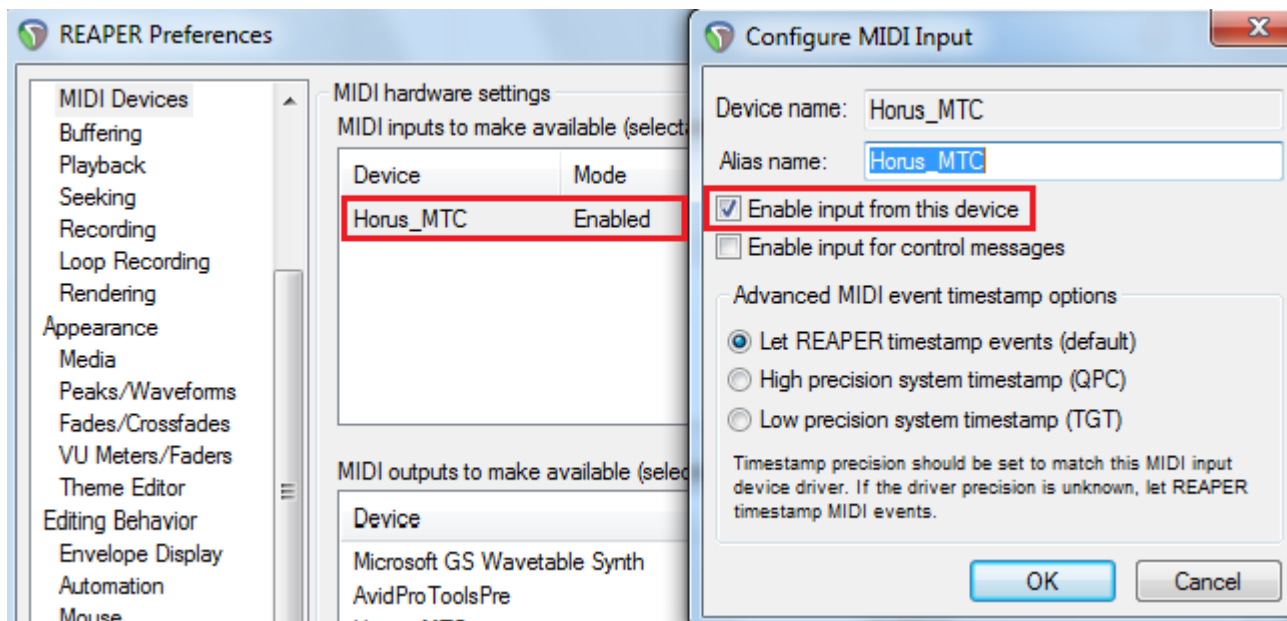• Open Transport > Project Synchronization Setup:

Nuendo 5 Project Synchronization Setup

• **Set MIDI Timecode** under **Timecode Source** and select **Horus/Hapi_MTC** under **MIDI Timecode Settings**.

• If Nuendo TimeCode is required on the Horus/Hapi LTC output, activate **Horus/Hapi_MTC** under **MIDI Timecode Destinations**. and check **MIDI Timecode Follows Project Time**.
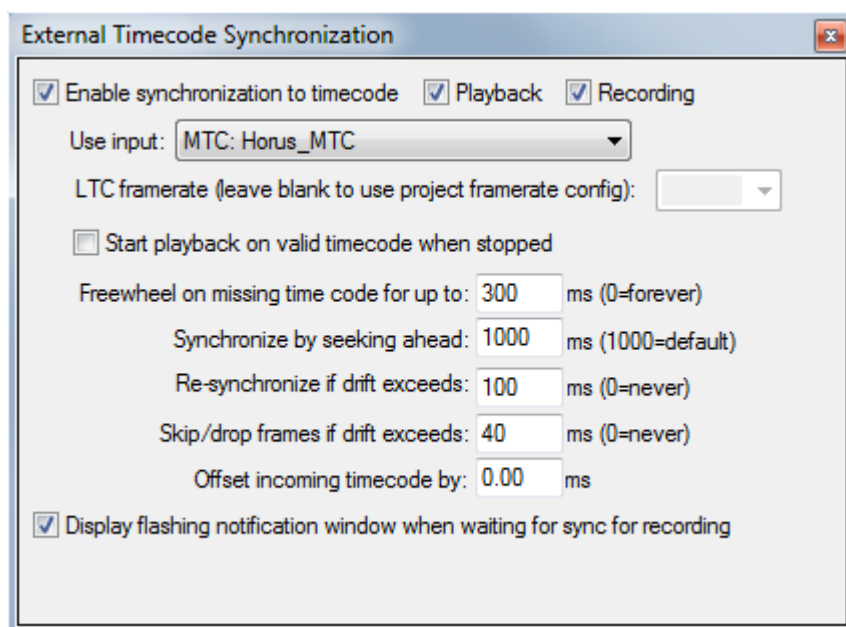
Reaper Example

- Ensure that the Project Frame Rate is set to match the incoming Timecode in the **Project Settings** page.

- Open **Preferences > Audio > MIDI Devices**

- Enable **Horus/Hapi_MTC** in the **MIDI inputs to make available...** section, and check the **Enable input from this device** box in the **Configure MIDI Input** window.

- Right-click on the **Transport** window and select **External Timecode Synchronization > Synchronization settings**.


Reaper External Timecode Synchronization settings

- In the **Use Input** field select **MTC: MTC_Horus/Hapi**.

- The **Enable Synchronization to Timecode** check box or **[ALT + Right-click]** on the **Play** button toggles external synchronization.

Magix Example

- Ensure that the Project Frame Rate is set to match the incoming Timecode in the **Project Settings** page.

- Open **System Options > MIDI**
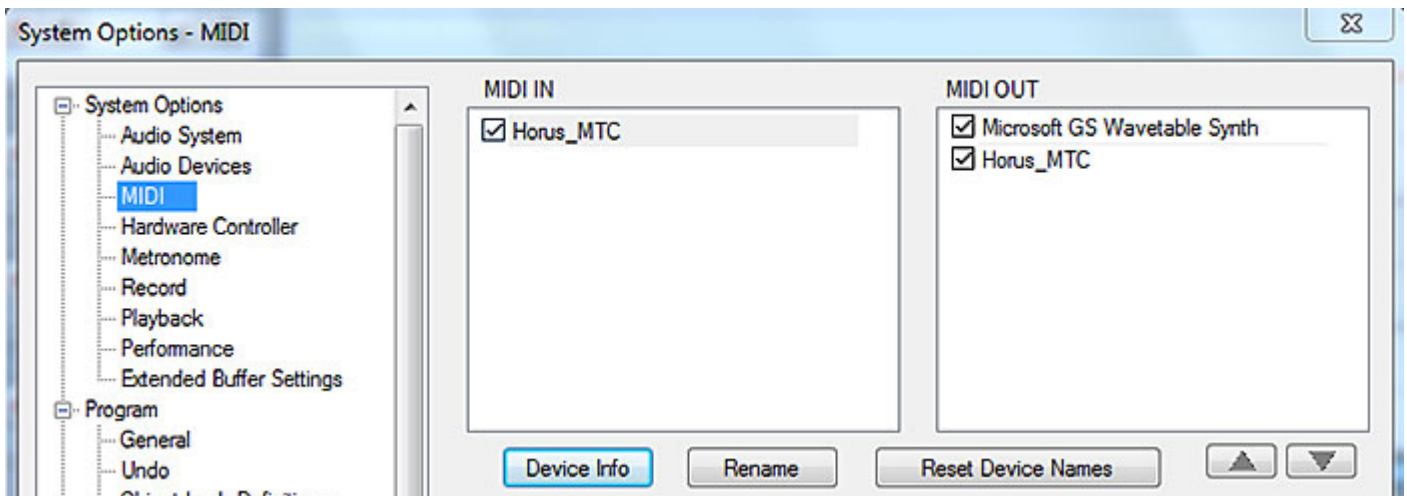
Magix System Options - MIDI

- Enable **Horus/Hapi_MTC** in the **MIDI IN** and **MIDI OUT** sections.

- Click on the **Sync** button in the Transport window to open the **Project Synchronization** window:
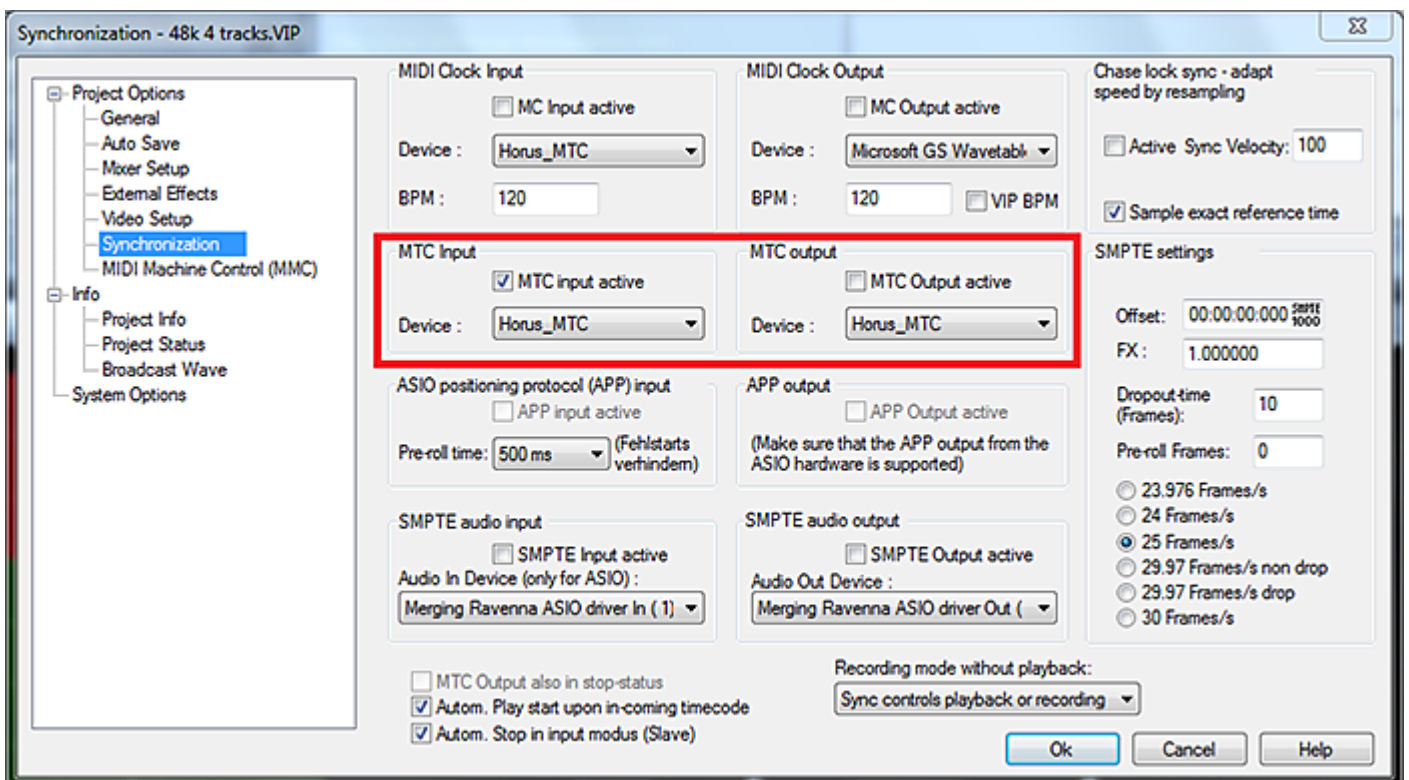
Magix Synchronization settings

- In the **MTC Input** and **MTC Output** sections, select **Horus/Hapi_MTC** as the **Device:**, and activate **MTC input active** or **MTC Output active**.

7 Network Switches

Certified switches

Please see the Merging Technologies website for supported network switches and their configuration.

Documentation can be found here:

http://www.merging.com/products/networked-audio/downloads

Connecting Multiple Horus' to the Switch

Once the switch is configured everything is prepared for connecting multiple Horus' to the switch ports.

1. Connect an RJ45 Ethernet patch cable (CAT5E or 6 STP) from the Merging PCIe Ethernet card (NET-MSC-GBEX1) to the switch.

2. Connect an RJ45 Ethernet patch cable (CAT5E or 6 STP) from each of your Horus devices Pri (primary) port to ports on the Switch.

3. Once you power up the Horus' one of the Horus' will automatically be chosen as Master PTP and the other Horus' will be PTP Slaves.

    Note: When several Horus' are on the same network then one of them will be elevated automatically to PTP Master and the others configured as PTP slaves (see Horus User Manual).

4. You are now ready to work in RAVENNA mode.

    Note: PTP sync does not permit synchronization to word clock or an audio input. However, this is not an issue since all Horus' will be synchronous.
    Only one Horus can lock to an external source; it then becomes the PTP master; other Horus' switch automatically to PTP slave (see Horus User Manual).

8 Contacting Merging

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http://www.merging.com

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