



## RAVENNA ASIO Guide

For Merging Technologies Network Interfaces

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# RAVENNA ASIO Guide

## For Merging Technologies Network interfaces

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# RAVENNA ASIO

## For Merging Technologies Network Interfaces



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Date: October 12, 2021

# 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:

<http://ravenna.alcnetworx.com/>

## *Scope*

This document is intended to get you up and running RAVENNA in ASIO with your Merging Technologies network interface on your PC Windows system. For more detailed information about the **Horus, Hapi, Anubis** and **Pyramix** and **Ovation** software please see their specific Guides.

## 2 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.

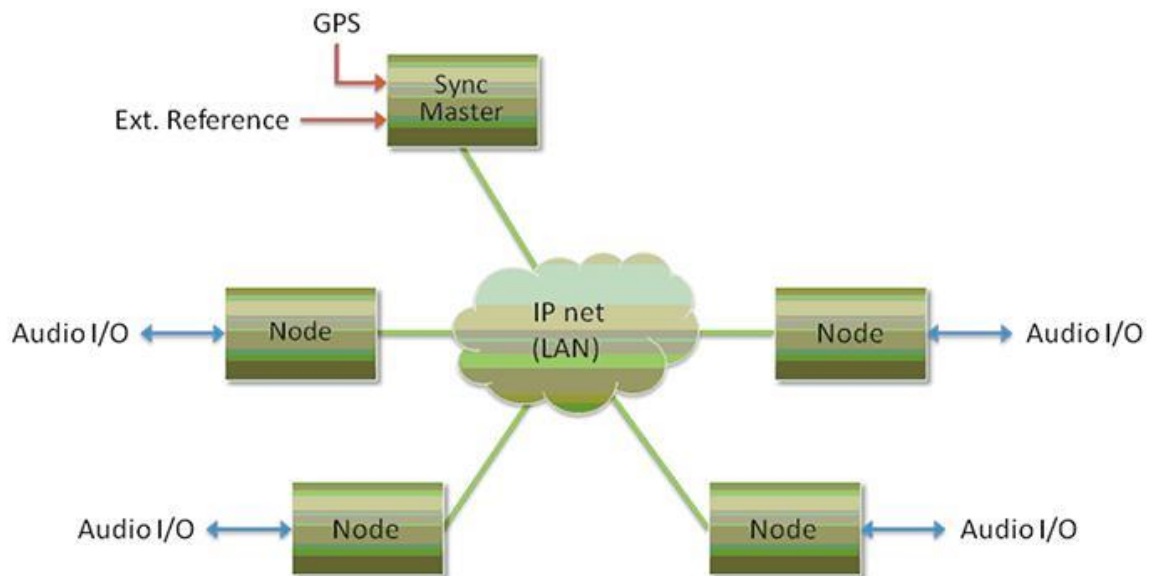
RAVENNA is suitable for deployment in many pro audio market segments including broadcast, live sound, studios the install market and location music recording. Possible fields of application include (but are not limited to) in-house signal distribution in broadcasting houses, theaters, concert halls and 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 analog signal, conveyed point-to-point over copper or fiber-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 centers 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 and 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 NetworkX 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/RTCP for streaming since this is used widely and supports a wide variety of standard pay-load 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.

## 3 Merging RAVENNA ASIO Driver

### Overview

The RAVENNA ASIO Driver is intended for owners of Horus, Hapi or MERGING+ANUBIS hardware using Windows 7 Professional 64-bit or Windows 10 Professional 64-bit who wish to work in ASIO RAVENNA mode.

### ASIO

Steinberg's Audio Stream Input/Output (ASIO) provides audio stream connectivity between software applications and audio hardware on Windows.

### System Requirements

Wintel platforms tend to increase in number of cores, speed and performance at a tremendous rate. New and faster processors are released almost on a monthly basis.

We maintain a list of up to date PC configurations in the Support Section of our website at:

<http://www.merging.com/pages/pconfig>

Refer to the Merging RAVENNA recommendations (Minimum CPU requirement - QuadCore)

**Important:** As of the RAVENNA ASIO Driver v12 it is mandatory that your Horus or Hapi firmware are updated to version 3.9.4.x and above

### Certified PC Operating Systems (OS)

The ASIO driver v13 was certified under Windows 7 Professional 64-bit and Windows 10 Professional 64-bit Anniversary (1607), Creator (1703), Fall Creator (1709), Spring Creator (1803), October (1809), May 2019 (1903), November 2019 (1909) update, update 2004, update 20H2 and Update 21H1.

**Note #1:** We highly recommend users to defer the Windows updates, so that it does not harm your system

<https://confluence.merging.com/display/PUBLICDOC/Windows+10+Defer+Updates>

**Note #2:** If you need a 32-bit install you MUST remain with RAVENNA ASIO Driver v9.1. MERGING+ANUBIS is not supported under the 32bit ASIO Driver.

The ASIO driver is NOT supported under XP or Vista and Windows 11 is not supported.

**Warning:** NEVER attempt to install the Driver on Windows NT Server.

### Notes

- The RAVENNA ASIO driver v13 supports sampling rates from 44.1kHz up to 352.8 kHz/DXD, 384kHz, DSD64, DSD128 and DSD256
- Windows 7 - 64bit and Windows 10 - 64bit
- ASIO is not multi-client. I.e. it cannot be used with multiple applications at the same time. Only one application at a time can use the ASIO Driver on the same system.
- The new 13 ASIO Driver is multi-client.
- A separate sound card for other general work is recommended
- As of the v11.0 our Driver supports the AES67 (48 frame) mode
- As of the v12.0 our Driver supports the AES67 (6 and 12 frame) mode, but requires Horus and Hapi firmware 3.9.4.x and above. Warning: Few systems can sustain 6 and 12 samples.

**New with the optional "Infrastructure Pack" key as of ASIO v13**

- ST2022-7 Support
- NMOS Support
- Virtual Machine Support

**Numbers of inputs and outputs available**

- 1fs (44.1kHz / 48kHz) = 128 I/O
- 2fs (88.2 kHz / 96kHz) = 64 I/O
- 4fs (176.4 kHz / 192 kHz) = 32 I/O
- 8fs- 352.8 kHz / 384 kHz / DSD64 / DSD 128 / DSD 256 = 16 I/O

**Tips**

- Ensure the ASIO clock is activated (set to Auto) under the Network Interface menu **setup > advanced**
- Sampling rate setting changes must be done on the Network Interface.
- The ASIO host will follow the Network Interface sampling rate changes
- Disable your Antivirus and your Windows Public Firewall

**Note:** The MassCore PCIe Ethernet card NET-MSC-GBEX1 cannot be used with the RAVENNA ASIO driver since it is specific to MassCore. For Native use on PCs with PCI-e slots the Merging Technologies NET-INT-GBEX1 card is available. (Please contact your Merging Technologies Sales Partner for details.)

**RAVENNA ASIO v13 Driver Specifications Table**

| Driver Specifications                                                                                                                                                         | RAVENNA ASIO Driver v13                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| Requirements                                                                                                                                                                  | At least one Merging Network Interface hardware (Horus, Hapi or Anubis)                    |
| Operating System                                                                                                                                                              | Windows 7 (64bit) Windows 10* (64bit)                                                      |
| Latency                                                                                                                                                                       | 48 - 64 - 96 -128 - 192- 256 - 384 - 512 -768 -1024 samples (6/12/48 mode - 16/32/64 mode) |
| Sampling Rate Supported                                                                                                                                                       | 44.1/48/kHz, 88.2/96kHz, 176.4/192kHz, 352.8/384khz, DSD64, DSD128, DSD256                 |
| I/O @ 44.1/48kHz                                                                                                                                                              | 128 Inputs and Outputs <sup>2</sup>                                                        |
| I/O @ 88.2/96kHz                                                                                                                                                              | 64 Inputs and Outputs <sup>2</sup>                                                         |
| I/O @ 176.4/192kHz                                                                                                                                                            | 32 Inputs and Outputs <sup>2</sup>                                                         |
| I/O @ 352.8/384kHz & DSD                                                                                                                                                      | 16 Inputs and Outputs <sup>2</sup>                                                         |
| MIDI Pre Amps                                                                                                                                                                 | Available with Pyramix and some third party applications supporting the Avid PRE protocol  |
| Infrastructure pack (optional key)                                                                                                                                            | ST2022-7, NMOS and Virtual Machine Support (available as of ASIO v13 and higher)           |
| Bundled applications                                                                                                                                                          | Mt Discovery                                                                               |
| <sup>1</sup> Legacy ASIO Driver version 9 supports Windows 7 -32 bit                                                                                                          |                                                                                            |
| <sup>2</sup> The I/O performance will vary with the system configuration                                                                                                      |                                                                                            |
| * ANEMAN comes as a separate installer, we recommend to install ANEMAN from <a href="https://www.merging.com/support/downloads">https://www.merging.com/support/downloads</a> |                                                                                            |

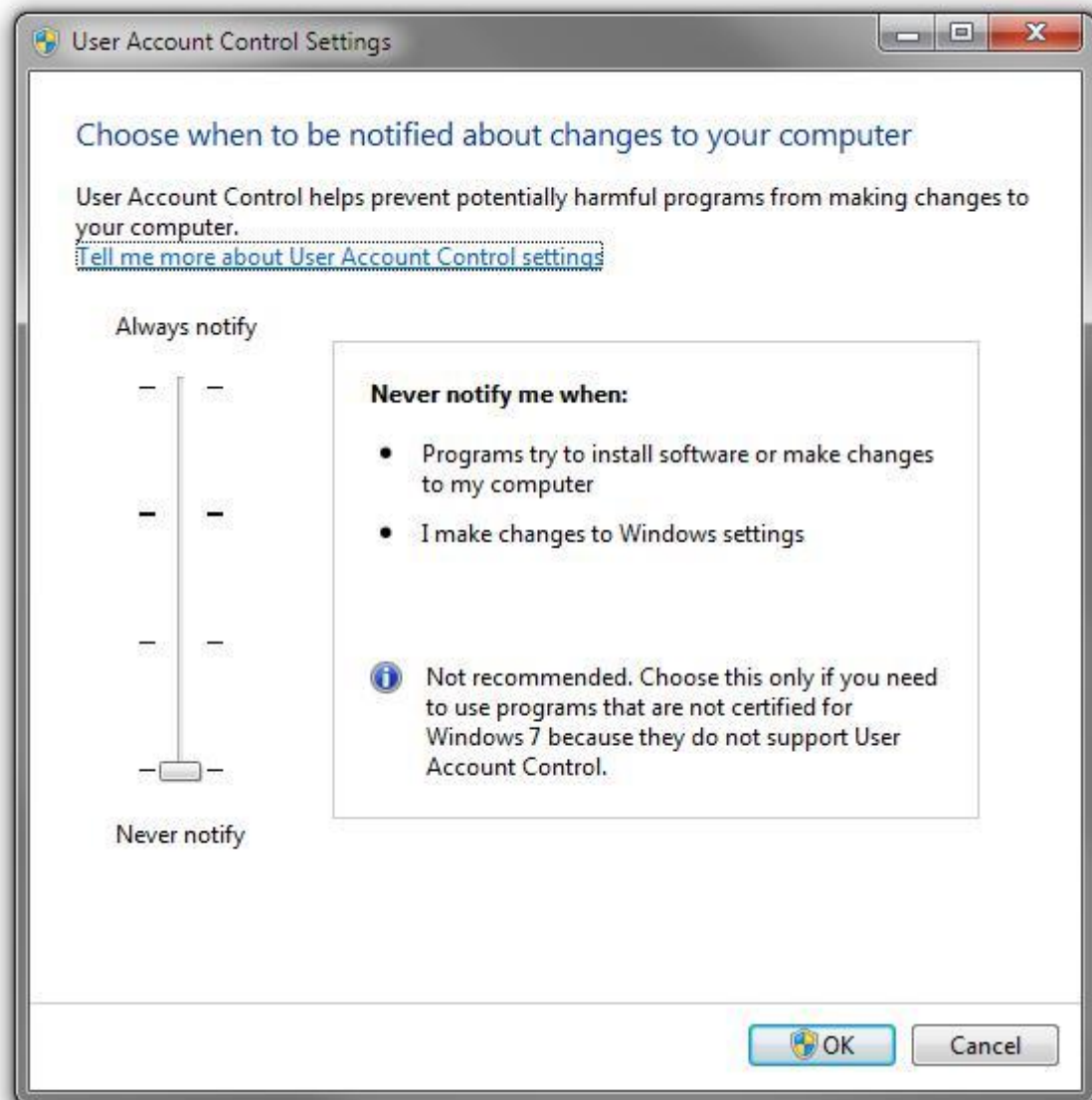
## Installing the RAVENNA ASIO Driver

### Prerequisites

The Merging RAVENNA ASIO Driver can be installed on PC systems which do not have Pyramix installed, but at least one Horus / Hapi is required before the Driver will function if other RAVENNA devices are present.

### Installation Procedure

1. Disable Windows UAC. (User Account Control) Set it to **Never Notify** and restart the PC.



Windows User Account Control Settings

**Note:** We also recommend disabling the Windows Firewall and any Antivirus software when working in RAVENNA.

2. Download the latest Merging RAVENNA ASIO Driver from:  
<http://www.merging.com/horus/download>
3. Be aware that separate 32bit and 64 bit versions are available and certified under Windows 7 only. Verify your current OS configuration and then download and install the appropriate RAVENNA ASIO driver version.

**Note:** The installer may warn of pending requirements (Bonjour) Accept and proceed with these installations.

4. When installation is complete accept the software license agreement
5. Restart the computer.
6. When the PC has rebooted open the RAVENNA ASIO Panel.

**Windows Start Menu - All Programs > Merging Technologies > RAVENNA ASIO**

#### RAVENNA ASIO Panel

The screenshot shows the 'RAVENNA ASIO Panel' window with the title 'Merging/Ravenna ASIO Settings' and version 'v13.1.0 build 4638'. The settings are as follows:

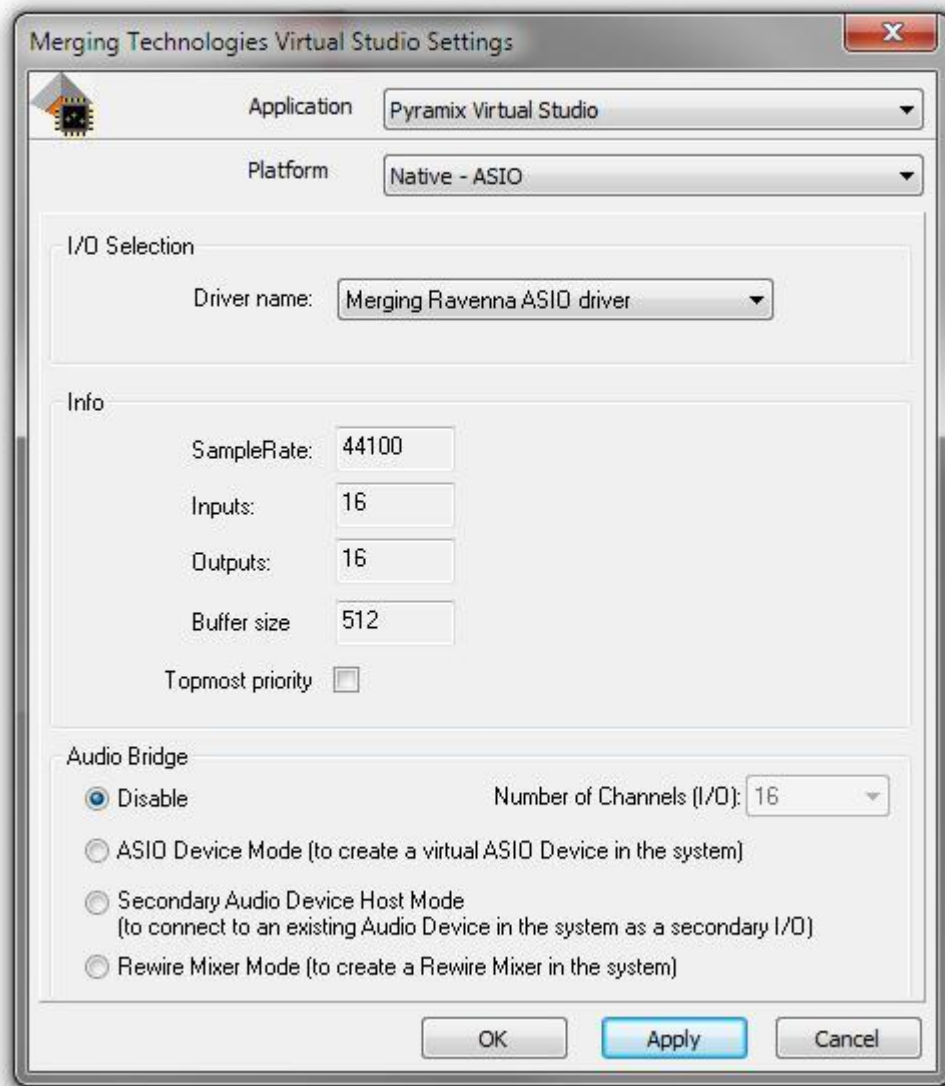
- Pri. Adapter:** Intel(R) Gigabit CT Desktop Adapter #2 (169.254.201.75)
- Sec. Adapter:** None
- Buffer size:** 192 [smpl] @ 44.1kHz/48kHz
- Latency:** ☒ 6/12/48 (AES67) note: set Horus/Hapi/Anubis' latency accordingly  
☐ 16/32/64
- Number of Channels:**

|              | 44.1/48k | 88.2/96k | 176.4/192k | 352.8/384k/DSD |
|--------------|----------|----------|------------|----------------|
| Inputs: 128  | 128      | 64       | 32         | 16             |
| Outputs: 128 | 128      | 64       | 32         | 16             |
- Status:**
  - Driver: 48kHz
  - State: Running

An 'Apply' button is located at the bottom right of the panel.

7. Configure Merging RAVENNA ASIO Settings:
  - **Pri. Adapter:** lists all available network ports. Select the network port the Horus / Hapi is connected to.
  - **Sec. Adapter:** The secondary network adaptor gets enabled with the Infrastructure Pack key for ST2022-7 (redundancy) support.
  - **Buffer size:**
    - In 48 (AES67) Framing Mode: Buffer sizes available are: 768 - 384 - 192 - 96 - 48 [smpl]. Based on 1fs (44.1kHz/48kHz) A buffer size of 128 or 256 samples is recommended.
    - In 64 Framing Mode: Buffer sizes available are: 1024 - 512 - 256 - 128 - 64 [smpl]. Based on 1fs (44.1kHz/48kHz) A buffer size of 128 or 256 samples is recommended
  - **Latency Frame Mode:** Select the Frame mode in use
    - AES67 based on 6/12/48 samples
    - RAVENNA based on 16/32/64 samples
 You devices should all be on the same frame mode multiples
  - **Number of Channels - Inputs or Outputs:**
    - Maximum of 128 Inputs and Outputs @1fs
    - Maximum of 64 Inputs and Outputs @2fs
    - Maximum of 32 Inputs and Outputs @4fs
    - Maximum of 16 Inputs and Outputs @8fs

- **Status - State:** Shows the Driver sampling Rate and the connected ASIO Host or **no ASIO Host connected**
8. Configure the application you wish to use (Pyramix or other DAW) so that the I/O connections use the Merging RAVENNA ASIO Driver
  9. For Pyramix users the VS3 Control Panel must first be opened and the **Merging RAVENNA ASIO driver** selected under **I/O Selection -Driver name:**



VS3 Control Panel

10. Ensure that the Horus, Hapi or Anubis is connected to correct Gigabit Ethernet port and launch the DAW application.

**Note:** VS3 Control Panel Error. If you encounter an error such as: **NIC Adapter not present** ensure that the Horus / Hapi is NOT connected to the MassCore NET-MSC-GBEX1 Ethernet interface card. (Not supported for RAVENNA ASIO.) A Horus, Hapi or Anubis should be connected to the system gigabit Ethernet port selected in the **RAVENNA ASIO Control Panel**. Also ensure that the VS3 Control Panel is configured to use ASIO.

## TimeCode over Physical MIDI (MTC)

Horus/Hapi firmware supports the transport of TimeCode over physical MIDI (MTC) using the DIN connectors on the Sync breakout cable (part code: CON-D15-VTC). TimeCode is transmitted to the workstation via the network (RAVENNA connection).

### Horus/Hapi Hardware Prerequisite

Please refer to the Horus or Hapi User Manuals to find details: The Ethertube dip switches (1 & 2) must be set to OFF to enable physical MIDI support over the Sync Breakout cable. (part code: CON-D15-VTC).

*Note: Anubis MIDI users should refer to the Anubis User Manual*

### Setup

Horus / Hapi MIDI DIN in/out connectors be used from within any DAW running on a PC.

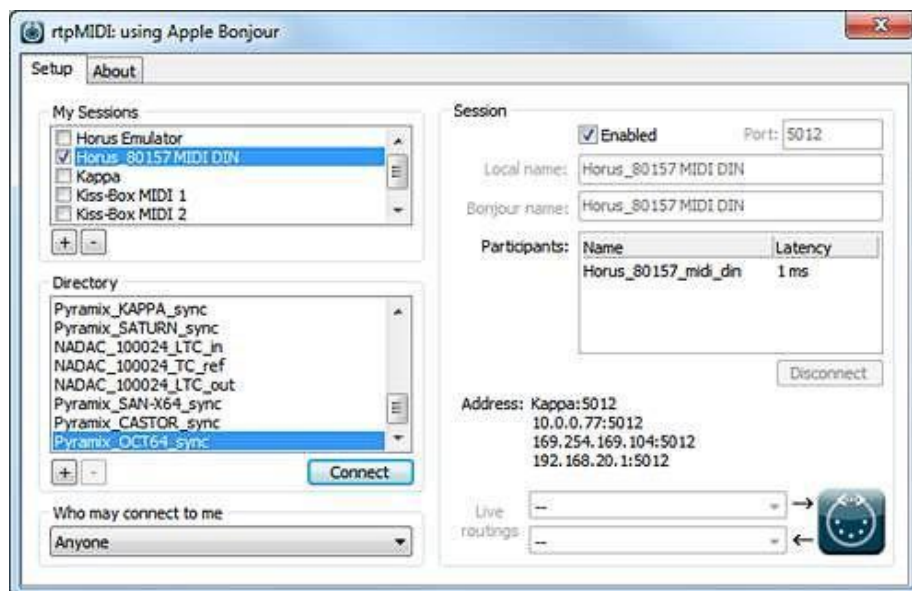
Note : **Pyramix** users can apply the same configuration in the Settings > MIDI Sync menu, without installing rtpMIDI

In order to setup a Horus / Hapi MIDI port in Windows follow this procedure:

1. Check the Horus / Hapi firmware version, firmware **3.1.0 b28867** or above is required.
2. Connect Horus / Hapi to the system through the Ethernet port.
3. Download **rtpMIDI** from here:

<https://www.tobias-erichsen.de/software/rtpmidi.html>

4. Install **rtpMIDI**.
5. Start **rtpMIDI**.



VS3 Control Panel

6. In the **My Sessions** section (top left) click on the + button to add a new entry.
7. In the **Session** section (right) rename the entry in the **Local name** field to e.g. **Horus\_80157 MIDI DIN**.
8. In the **Directory** section (bottom left) select the **Horus\_80xxx\_midi\_din** module entry to add it to the Participants list.
9. At the top of the **Session** section check the **Enabled** box to enable the session.
10. Check that the **Latency** field is close to 0 ms. If not, open the **MTDiscovery** application and check that the Horus is connected.
11. Close the **rtpMIDI** control panel

## ***Bundled Applications and Documentation***

Additional applications and documentation are installed with the Merging RAVENNA ASIO drivers.

Look in the Windows Start menu - All Programs > Merging Technologies > to find the entries below:

### **> Documentation**

The folder contains documentation on all applications and utilities.

### **> MTDDiscovery**

MT Discovery is a standalone application that searches your network for Bonjour Services. It allows quick and easy access to Merging's Web Services based on Bonjour, such as the Horus configuration page. These pages will open in your computer's default browser.

Users can also use MT Discovery for Horus / Hapi remote access and in order to update their Horus / Hapi Firm-ware. **Please see: MT Discovery on page 26**

### **> ANEMAN** (Must be installed separately as of the ASIO v11.1)

ANEMAN is the first cross platform / cross vendor Audio NETwork MANager.

Please download and install the latest ANEMAN in order to manage and monitor your AoIP devices from [www.aneman.net/#download](http://www.aneman.net/#download)

Merging recommends the use of ANEMAN in order to manage all RAVENNA I/O connections, please refer to the ANEMAN User Manual installed along with the driver for more details.

Note: Anubis requires ANEMAN v1.1.7 and higher.

### **> RAVENNA Easy Connect**

Discontinued and no longer installed along the ASIO Driver. Use ANEMAN

*Warning: RAVENNA Easy Connect does not support MERGING+ANUBIS*

### **> Merging RAVENNA ASIO Driver panel**

This will open the **RAVENNA ASIO Driver Settings** for configuration

**Note:** The custom installation of the RAVENNA ASIO drivers allows for the MTDDiscovery and RAVENNA Easy Connect applications to be omitted from the installation.

## Troubleshooting

Refer to: <https://confluence.merging.com/display/PUBLICDOC/RAVENNA+ASIO+Troubleshooting>

### RAVENNA ASIO Panel

Please close the DAW application before making changes. Restart the DAW after accepting the changes.

**Note:** Sampling Rate changes must be made on the Horus, Hapi or Anubis. The DAW will follow the Horus, Hapi or Anubis sampling rate.

### Buffer size recommendations

Merging recommends setting the buffer size of 64, 128 or 256 samples when in 64 framing mode

Merging recommends setting the buffer size of 48, or 96 or 192 samples when in 48 (AES67) framing mode

*Note: Buffer size recommendations might vary with the system configuration and sampling rate used.*

### Latency and clicks

Audible pops and clicks can occur when using some third-party audio interfaces or depending on the speed of the processor. To avoid this problem increase the Hardware Buffer size for the device. You should aim for the lowest possible I/O buffer size value that doesn't introduce clicks, pops, and crackles in the audio.

### No Playback, no I/Os

There is a potential problem when changing sampling rate. (DAW cursor locked or mismatched sampling rate) In such a case ensure the DAW (Pyramix) is exited first then change the sampling rate on the RAVENNA ASIO panel before re-launching the DAW. (Pyramix) Now check that the Project sampling rate and Horus / Hapi sampling rate match the RAVENNA ASIO panel sampling rate. Re-start if necessary.

On the Horus / Hapi make sure that the ASIO Clock is enabled (**auto**) under the Horus / Hapi page: **SetUp > Advanced**

If the problem persists then force a **Clear all Connections** in **Easy Connect (Ctrl + Click on Clear All Connections)**, restart the PC and Horus / Hapi and make the connections again.

## Firewall and Antivirus

### Windows Firewall

The Windows Firewall can block communication between MassCore and Horus / Hapi. As mentioned in the install procedure we recommend disabling the Public Network Firewall

#### Procedure

1. Go to **Windows Control Panel > Windows Firewall**.
2. Click on **Turn Windows Firewall on or off**
3. Go to the **Public Network** section and select **Turn Off Windows Firewall**

### Antivirus

Merging also recommends disabling any Antivirus, as mentioned in the install procedure. Some Antivirus software such as Avast have been known to block the Horus / Hapi discovery and RAVENNA I/O Connections.

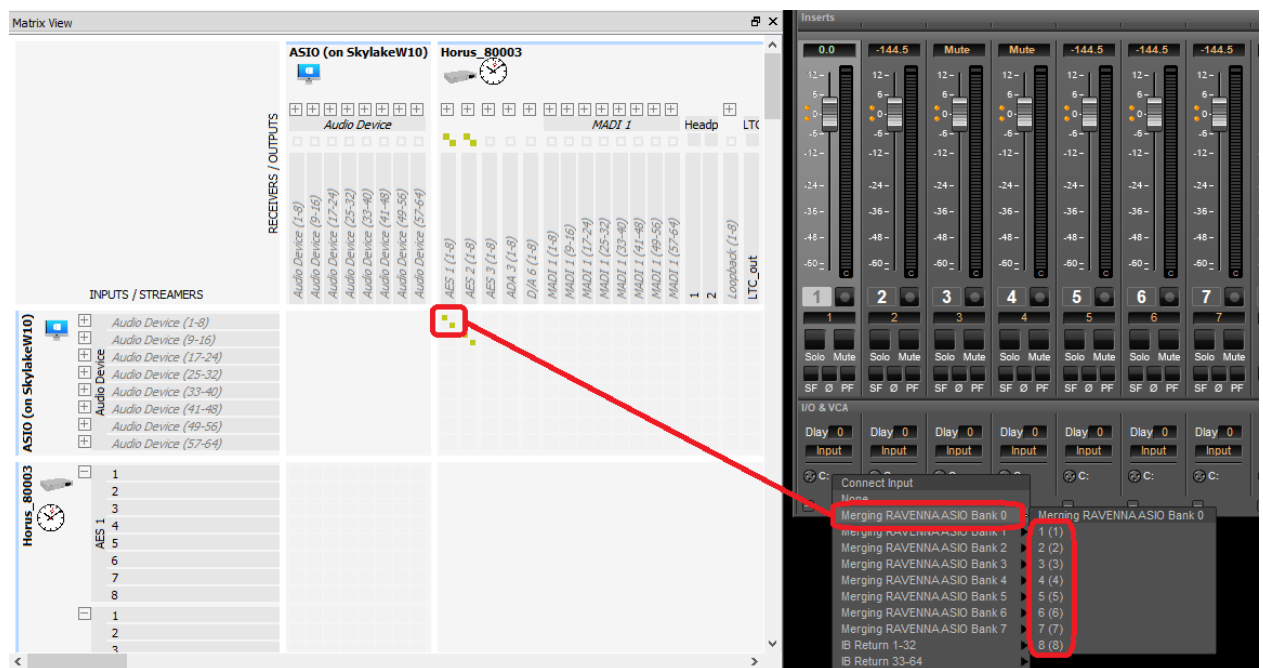
## RAVENNA ASIO Driver Error When Launching VS3 Control Panel

If you have an error such as unable to bind to the network interface check that Windows UAC (User Account Control) was disabled, as mentioned in the install procedure. Set it to **Never Notify** and restart the PC.

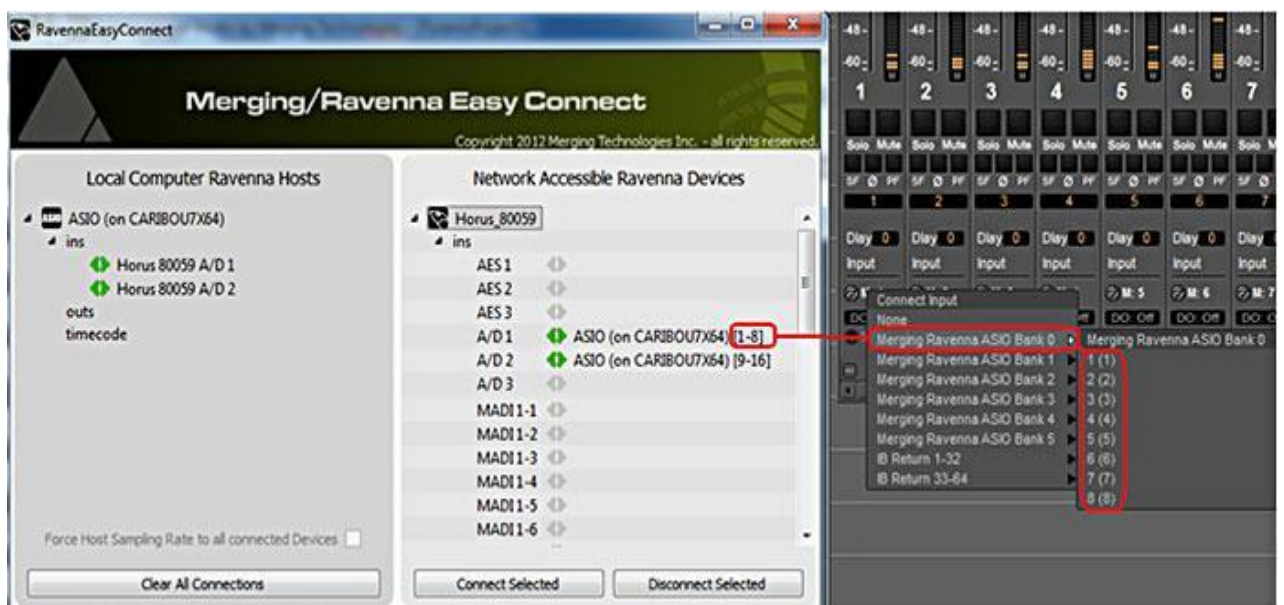
## I/O Connection Naming & Channel Count

When using the RAVENNA ASIO driver the connections enabled in **ANEMAN** or **Easy Connect** do not display the module name or connection count in the Pyramix Mixer.

For example: If the RAVENNA ASIO Panel has 48 I/Os selected a fixed count of 48 I/O channels (at 1fs) will appear in the Pyramix Mixer. The module naming will be generic. It is necessary to refer to the Easy Connect connections numbering in order to identify the I/O routing.



ANEMAN and Pyramix Routing



RAVENNA Easy Connect and Pyramix Routing

## RAVENNA ASIO Latencies

| Recommended RAVENNA ASIO latencies in 64 Sample mode |             |             |                 |
|------------------------------------------------------|-------------|-------------|-----------------|
| Sampling Rate                                        | Buffer Size | Recommended | Not Recommended |
| 44.1 kHz                                             | 64 smpl     |             | √*              |
|                                                      | 128 smpl    | √           |                 |
|                                                      | 256 smpl    | √           |                 |
|                                                      | 512 smpl    | √           |                 |
|                                                      | 1024 smpl   |             | √               |
| 48 kHz                                               | 64 smpl     |             | √*              |
|                                                      | 128 smpl    | √           |                 |
|                                                      | 256 smpl    | √           |                 |
|                                                      | 512 smpl    | √           |                 |
|                                                      | 1024 smpl   |             | √               |
| 88.2 kHz                                             | 64 smpl     |             | √*              |
|                                                      | 128 smpl    | √           |                 |
|                                                      | 256 smpl    | √           |                 |
|                                                      | 512 smpl    |             | √*              |
|                                                      | 1024 smpl   |             | √*              |
| 96 kHz                                               | 64 smpl     |             | √*              |
|                                                      | 128 smpl    | √           |                 |
|                                                      | 256 smpl    | √           |                 |
|                                                      | 512 smpl    |             | √*              |
|                                                      | 1024 smpl   |             | √*              |
| 176.4 kHz                                            | 64 smpl     | √           |                 |
|                                                      | 128 smpl    | √           |                 |
|                                                      | 256 smpl    |             | √*              |
|                                                      | 512 smpl    |             | √*              |
|                                                      | 1024 smpl   |             | √*              |
| 192 kHz                                              | 64 smpl     | √           |                 |
|                                                      | 128 smpl    | √           |                 |
|                                                      | 256 smpl    |             | √*              |
|                                                      | 512 smpl    |             | √*              |
|                                                      | 1024 smpl   |             | √*              |
| DXD(352.8/384kHz)<br>& DSD                           | 64 smpl     | √           |                 |
|                                                      | 128 smpl    | √           |                 |
|                                                      | 256 smpl    |             | √*              |
|                                                      | 512 smpl    |             | √*              |
|                                                      | 1024 smpl   |             | √*              |

\* Potential noise or clicks

In AES67 (48 samples) mode the recommended buffer size are 48, 96 or 192 samples  
The performance will vary with the system configuration and hardware

## RAVENNA ASIO DRIVER I/O vs. System Capabilities Typical Capabilities

Refer to the link below for more details on some recommended configurations

<http://www.merging.com/support/pc-config>

| RAVENNA ASIO DRIVER v10/v11/v12 on a <b>Laptop MacBookPro Intel IRIS Graphics Retina</b><br>(2015-i7-Bootcamp Windows7-64bit) |                         |                          |                         |                            |                                        |
|-------------------------------------------------------------------------------------------------------------------------------|-------------------------|--------------------------|-------------------------|----------------------------|----------------------------------------|
| Sampling Rate                                                                                                                 | INPUTS<br>Channel Count | OUTPUTS<br>Channel Count | CPU LOAD<br>Basic Mixer | Recommended<br>BUFFER SIZE | Result                                 |
| 48 kHz                                                                                                                        | 128 Inputs              | 128 Outputs              | Core 12%                | Buffer 128 smpl            | Validated (dependent on configuration) |
| 96 kHz                                                                                                                        | 64 inputs               | 64 outputs               | Core 11 %               | Buffer 128 smpl            | Validated (dependent on configuration) |
| 192 kHz                                                                                                                       | 32 inputs               | 32 outputs               | Core 10%                | Buffer 128 smpl            | Validated (dependent on configuration) |
| DXD*                                                                                                                          | 16 inputs               | 16 outputs               | Core 10 %               | Buffer 128 smpl            | Validated (dependent on configuration) |
| DSD 64*                                                                                                                       | 16 inputs               | 16 outputs               | Core 4 %                | Buffer 128 smpl            | Validated (dependent on configuration) |
| DSD 128*                                                                                                                      | 16 inputs               | 16 outputs               | Core 5 %                | Buffer 128 smpl            | Validated (dependent on configuration) |
| DSD 256*                                                                                                                      | 16 inputs               | 16 outputs               | Core 4 %                | Buffer 128 smpl            | Validated (dependent on configuration) |

\* Thunderbolt External Drive recommended

| RAVENNA ASIO DRIVER v10/v11 on a <b>Laptop MacBookPro Pre-Retina</b><br>(i5-3210M – DualCore- Bootcamp Windows7 - 64bit) |                         |                          |                         |                            |                             |
|--------------------------------------------------------------------------------------------------------------------------|-------------------------|--------------------------|-------------------------|----------------------------|-----------------------------|
| Sampling Rate                                                                                                            | INPUTS<br>Channel Count | OUTPUTS<br>Channel Count | CPU LOAD<br>Basic Mixer | Recommended<br>BUFFER SIZE | Result                      |
| 48 kHz                                                                                                                   | 64 Inputs**             | 64 Outputs**             | Core 15%                | Buffer 256 smpl            | Recommend 64** IO max       |
| 96 kHz                                                                                                                   | 48 inputs**             | 48 outputs**             | Core 14 %               | Buffer 256 smpl            | Recommend 48** IO max       |
| 192 kHz                                                                                                                  | 24 inputs**             | 24 outputs**             | Core 14%                | Buffer 256 smpl            | Recommend 24** IO max       |
| DXD*                                                                                                                     | 16 inputs               | 8 outputs*               | Core 12 %               | Buffer 128 smpl            | Recommend 16 In 8** Out max |
| DSD 64*                                                                                                                  | 16 inputs               | 8 outputs*               | Core 4 %                | Buffer 128 smpl            | Recommend 16 In 8** Out max |
| DSD 128*                                                                                                                 | 16 inputs               | 8 outputs*               | Core 5 %                | Buffer 128 smpl            | Recommend 16 In 8** Out max |
| DSD 256*                                                                                                                 | 16 inputs               | 8 outputs*               | Core 5 %                | Buffer 128 smpl            | Recommend 16 In 8** Out max |

\* Thunderbolt External Drive recommended

\*\* More outputs can cause glitches. Reduce the RAVENNA ASIO Panel to Outputs count

| RAVENNA ASIO DRIVER v10/v11 on a <b>Desktop PC</b> (i5-4590 - Z97X-UD3H - Windows7 - 64bit) |                         |                          |                         |                            |                                        |
|---------------------------------------------------------------------------------------------|-------------------------|--------------------------|-------------------------|----------------------------|----------------------------------------|
| Sampling Rate                                                                               | INPUTS<br>Channel Count | OUTPUTS<br>Channel Count | CPU LOAD<br>Basic Mixer | Recommended<br>BUFFER SIZE | Result                                 |
| 48 kHz                                                                                      | 128 Inputs              | 128 Outputs              | Core 10%                | Buffer 128 smpl            | Validated (dependent on configuration) |
| 96 kHz                                                                                      | 64 inputs               | 64 outputs               | Core 9 %                | Buffer 128 smpl            | Validated (dependent on configuration) |
| 192 kHz                                                                                     | 32 inputs               | 32 outputs               | Core 8%                 | Buffer 128 smpl            | Validated (dependent on configuration) |
| DXD*                                                                                        | 16 inputs               | 16 outputs               | Core 6 %                | Buffer 128 smpl            | Validated (dependent on configuration) |
| DSD 64*                                                                                     | 16 inputs               | 16 outputs               | Core 4 %                | Buffer 128 smpl            | Validated (dependent on configuration) |
| DSD 128*                                                                                    | 16 inputs               | 8 outputs*               | Core 6 %                | Buffer 128 smpl            | Recommend 16 In 8** Out max            |
| DSD 256*                                                                                    | 16 inputs               | 8 outputs*               | Core 5 %                | Buffer 128 smpl            | Recommend 16 In 8** Out max            |

\* RAID 0 (SSD) Recommended for performance and RAID 10 (SSD) recommended for redundancy

\*\* More can cause glitches, reduce the RAVENNA ASIO Panel to 64 Outputs (Equals 8 Outs in DXD/DSD)

**Warning:**

- Some system configurations will not be able to support such Input / Output counts. This will depend largely on system configuration.
- If you experience noise or glitches reduce the IO count in the RAVENNA ASIO Panel and enable only what is needed.
- If you still experience noise or glitches try different Buffer Sizes in the RAVENNA ASIO Panel.
- If using **Video** in a Pyramix Timeline the recommended buffer size is 256 samples minimum to avoid potential clicks in playback.
- The Merging recommended system specifications for Pyramix Native (RAVENNA ASIO) are available here:  
<http://www.merging.com/support/pc-config>

## 4 Horus, Hapi and Anubis Preamp Remote Control

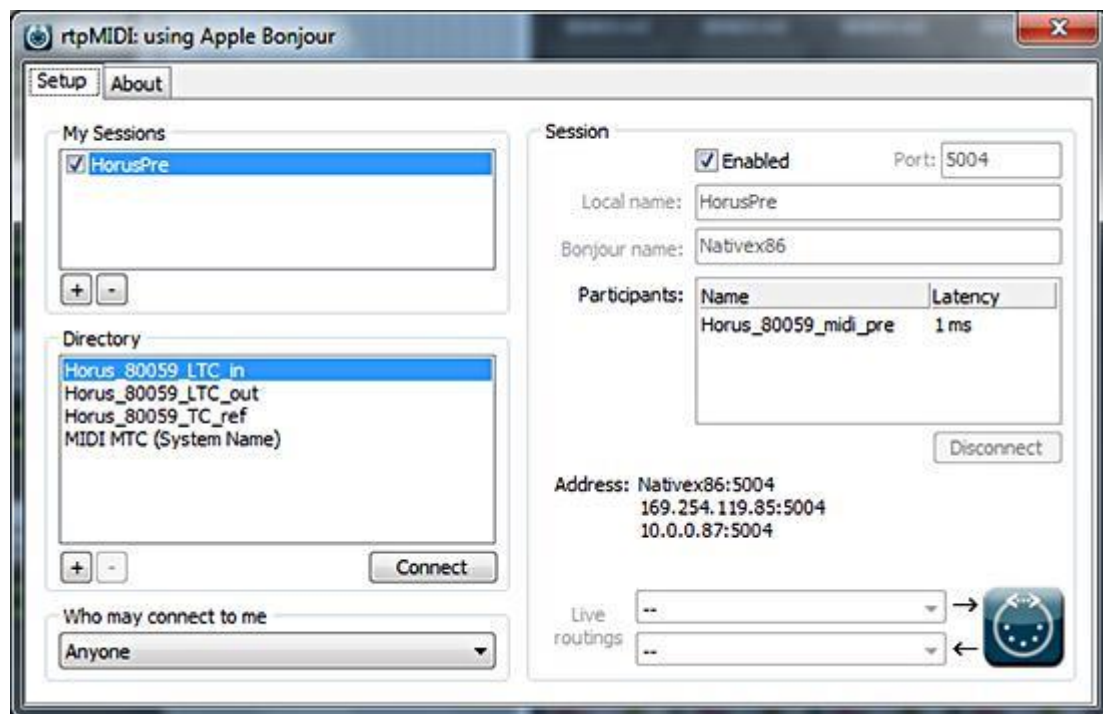
### Pro Tools on PC

Horus, Hapi and Anubis analog preamps can be controlled directly from within Avid Pro Tools running on a PC. In order to set Pro Tools up for Horus/Hapi/Anubis preamp control follow this procedure:

1. Check the Horus / Hapi firmware version and update if necessary, to **v19734** or above.
2. Connect Horus / Hapi / Anubis to the system running Pro Tools through the Ethernet. port.
3. Download **rtpMIDI** from here:

<https://www.tobias-erichsen.de/software/rtpmidi.html>

4. Install **rtpMIDI**
5. Start **rtpMIDI**

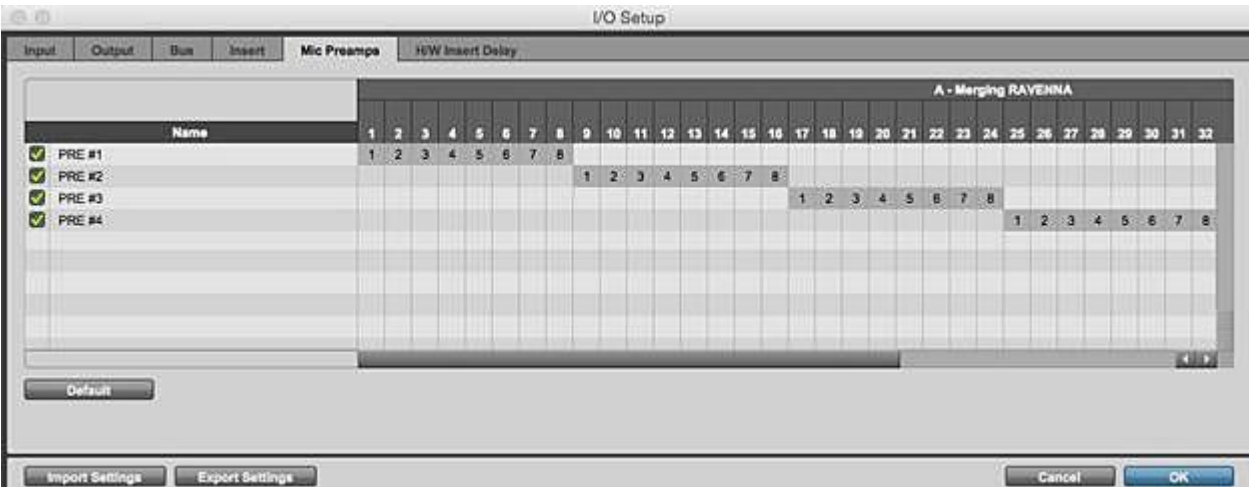


rtpMIDI control panel

6. In the **My Sessions** section (top left) click on the + button to add a new entry.
7. In the **Session** section (right) rename the entry in the **Local name:** field to **HorusPre**.
8. In the **Directory** section (bottom left) select the **Horus\_80xxx\_midi\_pre** module entry to add it to the **Participants** list.
9. At the top of the **Session** section check the **Enabled** box to enable the session.
10. Close the **rtpMIDI** control panel.
11. Open the **MTDiscovery** application and check that the Horus is connected.

Within Pro Tools

12. Open the Pro Tools **I/O Setup** panel:



Pro Tools I/O Setup - Mic Preamps tab

13. In the **Mic Preamps** tab enable **Horus PRE #1** etc. check the boxes to the left of the entries.

14. Click on **OK** to close the I/O Setup panel.

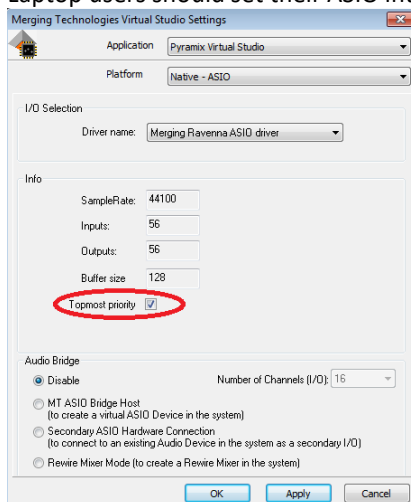
The Horus / Hapi / Anubis Preamp controls will be available within Pro Tools when the Horus / Hapi / Anubis Preamps are connected to the Pro Tools Mixer Strip Inputs.

## 5 Pyramix Native

### Pyramix RAVENNA Native Configuration Recommendations

See also [Network card recommendations](#) on this page

- Windows 7 and Windows 10 - 64bit supported as of Pyramix and RAVENNA ASIO v11.
- Please refer to our [Windows configuration guides](#) to optimize the system performances.
- Administrator rights are required to configure VS3 Control Panel and the RAVENNA ASIO panel.
- The buffer size of your ASIO interface should be a multiple of 64 samples (64,128,256,512,1024,2048,4096).  
For RAVENNA / AES67 Network, the Merging RAVENNA ASIO driver can be set to multiples of 48 (AES67) or 64 samples (RAVENNA).
- Configure your [Antivirus and Merging Technologies Softwares](#) or turn it off
- Configure your Windows Firewall [Windows Firewall Troubleshooting](#) or turn it off for Public Networks
- Put Windows UAC (User Account Control) to the lowest level (disabled).
- Disable the WIFI (disable the Wireless adaptor not only the WIFI connection)
- Disable Bluetooth if active (under Windows Device Manager)
- Set Windows Automatic-Update to "notify me" or don't let Windows check for Updates while running critical real-time operations on Windows 7.  
Set the updates to restart outside active hours on Windows 10.
- Avoid active internet connection while running Pyramix
- Avoid connecting audio interfaces to USB or Firewire hubs, plug it directly into your computer.
- We recommend to activate HyperThreading if allowed by your CPU.
- Power management features must be configured to get a stable system.
- In Windows Control Panel > Power Options, make sure you select the "High Performance" power plan or "Ultimate Performance" on Windows 10 (very common that Powerful laptop are at times in energy saving mode, create a High Performance power plan).
- Avoid using battery power, rather have you power cable connected
- Make sure all unnecessary programs are closed. They can tie up useful resources.
- Turn off any software utilities that run in the background, such as Windows Messenger, calendars, and disk maintenance programs.
- Laptops usually have small graphical resources, Merging recommends you pay extra caution when using the Fixed Cursor option.
- Verify the performance of your Native system :  
On Windows 7 by running the DPC Latency checker: [http://www.thesycon.de/eng/latency\\_check.shtml](http://www.thesycon.de/eng/latency_check.shtml)  
On Windows 10, DPC latencies can be monitored with Latency Mon  
: <http://www.resplendence.com/download/LatencyMon.exe>
- Laptop users should set their ASIO interface to Topmost Priority in VS3 Control Panel :



*Recent laptop owners are often confronted to performance problems when the CPU load reaches around the middle point of load, then random CPU jumps causing sudden glitches are possible. This has also been seen when benchmarking with Non-Merging Applications on recent laptops.*

## 6 General Troubleshooting

### Merging Online Public Database

<https://confluence.merging.com/>

#### RAVENNA: Horus / Hapi / Anubis & Network configuration

1. First check the IP address of the Horus / Hapi / Anubis device in **Setup page > Advanced > Network**. To be able to see each other, the Ethernet port and the Horus / Hapi must be in the same range of addresses. (for example 192.168.xxx.xx).
2. The Horus / Hapi IP address can be set and checked in the Horus / Hapi **Setup page > Advanced > Network**.

**Note:** Some laptops require an Ethernet card driver update (2012) in order to work with Horus / Hapi/RAVENNA in certain address ranges.

#### Working With Multiple Horus / Hapi or Anubis Over a Network

Please refer to the RAVENNA Network Guide (for Merging Technologies Products) for all details about configuration and setup.

#### RAVENNA Connections:

If you cannot connect devices in RAVENNA Easy Connect make sure that you have the latest Horus / Hapi / Anubis Firmware and the latest ASIO driver.

#### Latency and Buffers

Small buffers have the advantage of low latency in the record monitor path, but also are more taxing on the computer's CPU and could contribute to audio dropouts in during record or playback.

Larger buffers have the advantage of making the ASIO Driver more immune to audio dropouts during playback and recording but can cause a noticeable delay when monitoring inputs during recording. In some client applications, performing various tasks will interrupt the ASIO Driver and may result in clicks and pops in audio playback or recording. Choosing a different buffer size can help alleviate this problem.

## 7 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 configuration page. These pages will be open in your computer's default browser. MT Discovery can be used to update the Horus / Hapi or Anubis Firmware instead of using ANEMAN.

Please refer to the Horus / Hapi User Manual or Anubis 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

**Note:** The information in this chapter refers to Windows. Mac implementation is similar.

### 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 Devices**
- **Hapi Devices**
- **Anubis Devices**
- **MassCore Devices**
- **ASIO 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.

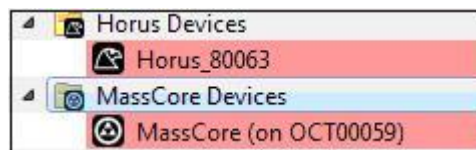
**Open Advanced** Open Advanced will attempt to display the main settings page of the device in the computer's default web browser. This can also be achieved by holding down **Ctrl** (**Cmd** on Mac) and double-clicking on a device, or by hitting **Ctrl + Enter** (**Cmd + Enter** on Mac) when the device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

|                   |                                                          |
|-------------------|----------------------------------------------------------|
| <b>On Windows</b> | <b>C:\Program Files\Merging Technologies\MTDiscovery</b> |
| <b>On Mac</b>     | <b>TBA</b>                                               |
| <b>On Linux</b>   | <b>TBA</b>                                               |

## 8 ANEMAN

ANEMAN is the first cross platform / cross vendor Audio NEtwork MANager

[www.merging.com/products/networked-audio/aneman](http://www.merging.com/products/networked-audio/aneman)

Merging recommends the use of ANEMAN in order to manage all RAVENNA I/O connections, please refer to the ANEMAN User Manual installed along with the driver for more details.

ANEMAN is the RAVENNA Easy Connect replacement, it manages the RAVENNA I/O connections.

**Important:** The ANEMAN installer is no longer included in the RAVENNA ASIO Installer. Please download and install the latest ANEMAN in order to manage and monitor your AoIP devices from [www.aneman.net/#download](http://www.aneman.net/#download)

## 9 Contacting Merging

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**For all documentation inquiries or suggestions for improvement:**

<http://www.merging.com>

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