User's Guide

Digiface Ravenna

Portable RAVENNA via USB!

USB 3.0 Digital I/O System
128 Channels RAVENNA / AES67 Interface
64 Channels MADI Interface
2 Channel Analog Stereo Monitor
24 Bit / 192 kHz Digital Audio
128 x 128 Matrix Router
Stand-Alone Operation

Safety Instructions and Proper use

Read the manual carefully and completely before using the device. Pay attention to the following information on how to use and operate the Digiface Ravenna safely. Improper use can lead to loss of warranty claims (see warranty statement on page 72).

Proper Use

The Digiface Ravenna is a digital interface for professional audio applications for use with CE approved class B computers.

To comply with the European CE standard, the Digiface Ravenna must be used with CE approved Class B computers. All connecting cables must be shielded. The computer and all cables connected to the Digiface Ravenna must be properly grounded. Operation with non-certified computers and cables may cause interference to other devices as well as the Digiface Ravenna.
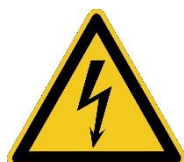
Do not open chassis

No user serviceable parts inside. Refer service to qualified service personnel.

To reduce the risk of fire or electric shock do not expose this device to rain or moisture. Prevent moisture and water from entering the device. Never leave a pot with liquid on top of the device. Do not use this product near water, i. e. swimming pool, bathtub or wet basement. Danger of condensation inside – don't turn on before the device has reached room temperature.

Installation

Surface may become hot during operation – ensure sufficient ventilation. Avoid direct sun light and do not place it near other sources of heat, like radiators or stoves. When mounting in a rack, leave some space between this device and others for ventilation.

Unauthorized servicing/repair voids warranty. Only use accessories specified by the manufacturer.

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▷ **General**

1. Introduction

Thank you for choosing the Digiface Ravenna. This unique, compact and portable audio interface is capable of transferring USB digital audio data and MADI from/to Mac or PC to the professional media network RAVENNA. Numerous unique features, a well thought-out configuration dialog, an outstandingly versatile mixer and monitoring solution, and a complete integration of RAVENNA guarantee a quick, comfortable and efficient use of the Digiface Ravenna.

The package contains drivers for Windows 7 / 8 / 10 / 11 and macOS (11 or up, Intel / M1 / M2).

2. Package Contents

Please check that your Digiface Ravenna package contains each of the following:

- Digiface Ravenna
- Cable USB 3.0, 1.8 m (6 ft)
- Switched power supply, lockable connector, DC 12 V 24 W
- Power cord

3. System Requirements

- Windows 7 or up, macOS (11 or up)
- USB 3 port, or
- USB 2.0 port (requires computer with at least Intel Core i5 CPU, reduced channel count)

4. Brief Description and Characteristics

- All settings can be changed in real-time
- Buffer sizes/latencies from 32 up to 8192 samples selectable
- Supports the network standards RAVENNA, AES67, ST 2110-30 / -31, ST 2022-7
- 128 channels RAVENNA, 64 channels MADI @ 48 kHz
- 64 channels RAVENNA, 32 channels MADI @ 96 kHz
- 32 channels RAVENNA, 16 channels MADI @ 192 kHz
- 2 channels analog monitoring
- 4 x Gigabit ethernet port, 100 Mbit/s compatible
- Clock sources MADI, word clock, internal or RAVENNA (PTP)
- TotalMix for latency-free submixes and perfect ASIO Direct Monitoring
- TotalMix FX: 4096 channel mixer with 46 bit internal resolution
- DIGICheck DSP: Level meter in hardware, peak- and RMS calculation
- Stand-alone mode with RAVENNA to MADI and vice versa converter functionality
- USB error analysis, displayed in the Settings dialog

5. First Usage – Quick Start

5.1 Connectors – LEDs

The **front** of the Digiface Ravenna features four Gigabit Ethernet ports, 2 BNC sockets for word or MADI I/O, a state LED, and the headphone output.

The four **network sockets**, RJ45 format, support both 100 Mbps and 1 Gbps. The integrated LEDs show the states *connected* (yellow) and *data traffic* (green). The four ports can be used in switched (4) or redundancy (2) mode (Primary/Secondary).

The **State LED** beside the BNC input shows Lock and Sync state for the word or MADI input signal.

Phones is a low impedance line output. It provides a sufficient and undistorted volume even when used with headphones.

In case this output should operate as Line output, an adapter TRS plug to RCA phono plugs, or TRS plug to TS plugs is required.

The pin assignment follows international standards. The left channel is connected to the tip, the right channel to the ring of the TRS jack/plug.
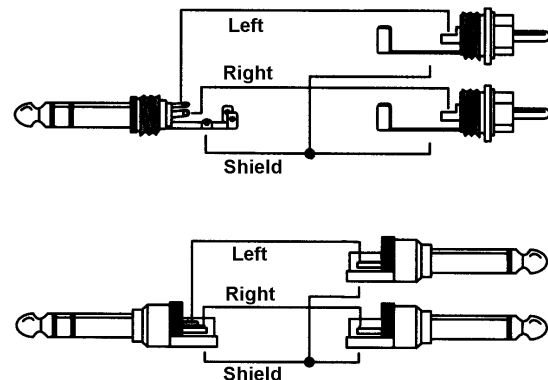
The **rear** of the Digiface Ravenna features the USB 3 port, a status LED, a power supply connector, and a hook to remove strain from the connectors. The LED indicates both power supply (USB bus power, green), as well as the USB status (yellow: USB 2, blue: USB 3).

USB 3.0: Standard USB socket for connection to the computer. Please make sure the Digiface Ravenna can have the full voltage/current delivered from the computer by using hi-quality USB cables (like the one included). USB extension cables and USB hubs should be avoided. When connected to USB 2 the channel count is reduced to 64 channels (no MADI).

The Digiface Ravenna uses USB bus power. In case of USB 3 this is usually sufficient to run the interface. But using all 4 network connections plus headphones can draw more current than the USB 3 spec suggests (900 mA). The Digiface Ravenna therefore ships with a power supply for stable operation even at highest load.

5.2 Quick Start

After the driver installation (chapter 6 / 13) the Digiface Ravenna has to be connected to a RAVENNA network. A RAVENNA network consists of a connection to at least one other RAVENNA equipped device. The web browser based GUI, RAVENNA Remote, enables configuration of the RAVENNA module. Some basic and OS-specific options are available in the Settings dialog of the MADIface series driver.

Level adjustment of the analog output Phones is done in TotalMix FX. The output is optimized for phones, but can also be used as line output

TotalMix FX remembers all settings, and loads these automatically when the Digiface Ravenna drivers are loaded.

Stand-alone Operation

The Digiface Ravenna can be used stand-alone, powered by the included power supply. Alternatively USB bus power from a USB power wall wart or USB battery can be used. When not connected to a computer host the device operates as **64 channel MADI to/from RAVENNA converter**. All channels are transferred to the other format unchanged, both ways.

To make most use of the additional phones output, a submix of all MADI and RAVENNA input channels can be set up in computer-connected operation, and stored in the Digiface Ravenna for stand-alone operation. To store the current *Submix Phones* go to *Options, Store current State into Device* in TotalMix FX.

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▷ **Installation and Operation - Windows**

6. Driver and Firmware

6.1 Driver Installation

To simplify installation it is recommended to first install the drivers before the unit is connected to the computer. But it will also work the other way round.

RME is constantly improving the drivers. Please download the latest drivers from the RME website. Driver version 4.30 or higher is available via **http://rme.to/downloads**. Unzip the downloaded file and start the driver installation with *rmeinstaller.exe.*

Start *rmeinstaller.exe* and follow the instructions of the installer. After installation connect computer and Digiface RAVENNA using a USB 3.0 cable. Windows detects the new hardware as **Digiface Ravenna** and installs the drivers automatically.

After a reboot, the icons of TotalMix FX and Settings dialog appear in the notification area.
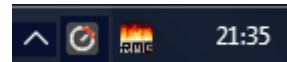
Driver Updates do not require to remove the existing drivers. Simply install the new driver over the existing one.

The Digiface Ravenna includes a module from German company DirectOut which provides all the RAVENNA network technology. Configuration is done by an integrated webserver, so via any browser in the network.

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Chapter 25.1 explains how to find the ideal USB port.

Possible reasons why a Digiface Ravenna is not found after driver installation:

- The USB port is not active in the system (check the Device Manager)

- The USB cable is not, or not correctly inserted into the socket. Check that the LED beside the USB port is lit, it indicates power.

- The Digiface Ravenna does not receive any or not enough power. Remove current-consuming hard drives from nearby ports. Avoid USB extension cables and USB hubs.

6.2 Uninstalling the Drivers

A de-installation of the driver files is not necessary – and not supported by Windows anyway. Thanks to full Plug & Play support, the driver files will not be loaded after the hardware has been removed. If desired these files can then be deleted manually.

Unfortunately Windows Plug & Play methods do not cover the additional autorun entries of TotalMix, the Settings dialog, and the registration of the ASIO driver. These entries can be removed from the registry by a software de-installation request. This request can be found (like all de-installation entries) in *Control Panel, Software.* Click on the entry 'RME MADIface'.

6.3 Firmware Update

The Flash Update Tool updates the firmware of the Digiface Ravenna to the latest version. It requires an already installed driver.

Download the latest version from the RME website at **http://rme.to/usbe**. Unzip the downloaded file and start the program **fut_usb.exe** under Windows, or **USB Series Flash Tool** under Mac. The Flash Update Tool displays the current revision of the Digiface Ravenna's firmware and whether it needs an update or not. If so, then simply press the 'Update' button. A progress bar will indicate when the flash process is finished (Verify Ok).

After the update the unit needs to be reset. This is done by unplugging the Digiface Ravenna for a few seconds. A reboot of the computer is not necessary.

When the update fails (status: failure), the unit's Safety BIOS will be used from the next boot on, the unit stays fully functional. The flash process should then be tried again.
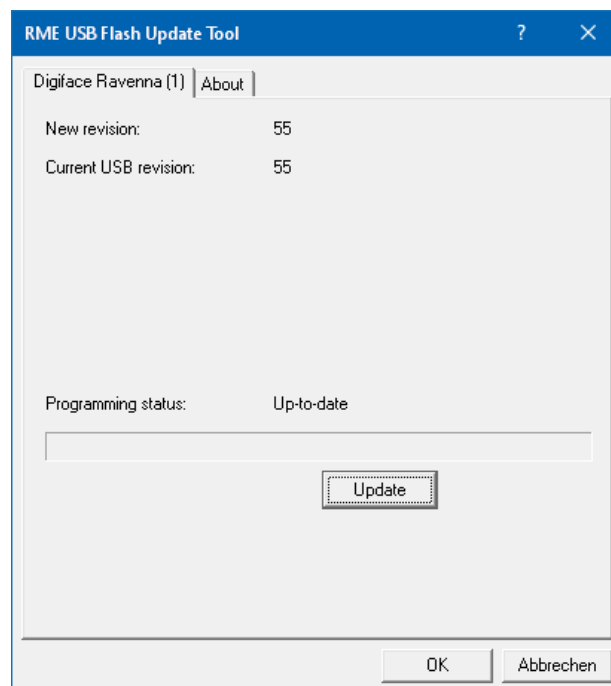
The manufacturer of the RAVENNA module, DirectOut, also publishes firmware updates. The current firmware version can be checked in the module's web GUI and if necessary also updated there.

Please check with DirectOut's website:

https://www.directout.eu/

7. Configuring the Digiface Ravenna

7.1 Settings Dialog

Configuration of the Digiface Ravenna is done via its own settings dialog. The panel *Settings* can be opened:

- by clicking on the fire symbol in the Task Bar's notification area

The mixer of the Digiface Ravenna, TotalMix FX, can be opened:
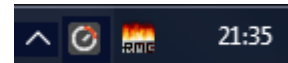
- by clicking on the circle symbol in the Task Bar's notification area

The following is available in the Settings dialog:

- ASIO Latency
- USB error analysis
- Configuration of the WDM devices
- Configuration of the hardware
- State of input
- Display of current sample rate

Any changes made in the Settings dialog are applied immediately - confirmation (e.g. by clicking on OK or exiting the dialog) is not required.

The tab **About** includes information about the current driver and firmware version plus four more options:

Lock Registry
Default: off. Checking this option brings up a dialog to enter a password. Changes in the Settings dialog are no longer written to the registry. As the settings are always loaded from the registry when starting the computer, this method provides an easy way to define an initial state for the Digiface Ravenna.

Enable MMCSS for ASIO activates support with higher priority for the ASIO driver. Note: At this time, activating this option seems to be useful only with the latest Cubase/Nuendo at higher load. With other software this option can decrease performance. The change becomes active after an ASIO reset. Therefore it is easy to quickly check which setting works better.

Limit ASIO to 32 Channels
Some software crashes when presented with more than 32 ASIO channels. This workaround removes all higher channels, which can still be accessed and used via TotalMix FX.

Sort ASIO Devices
Changes the order only of the ASIO channels when using more than one interface.
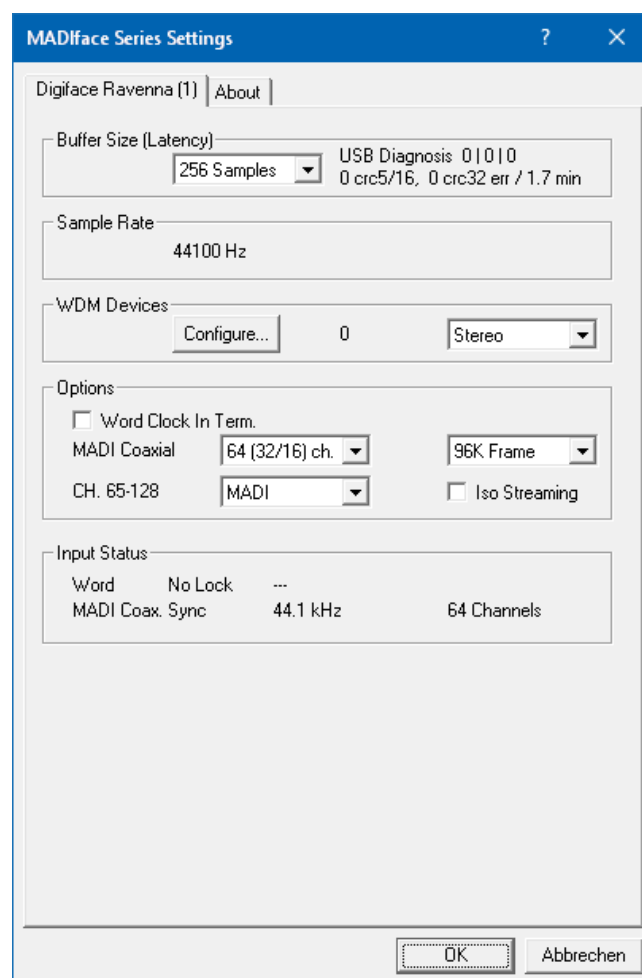
Buffer Size
The setting *Buffer Size* determines the latency between incoming and outgoing ASIO and WDM data, as well as affecting system stability (see chapter 7.1).

USB Diagnosis shows specific USB transmission errors (CRC5, usually 0) and general errors. If the unit detects a record or playback error the number shown will no longer be 0. An audio reset is performed automatically. The counter is reset on start of playback/record. More information can be found in chapter 25.1.

Sample Rate
Display of the currently active sample rate. Its setting / change takes place exclusively via the RAVENNA Remote. Neither WDM nor ASIO programs can change the sample rate.

WDM Devices
Allows to freely set which I/Os are available as WDM devices, whether these are stereo or multi-channel devices (up to 8 channels), and whether one or multiple of the currently active WDM devices should have the *Speaker* property. Digiface Ravenna provides a maximum of 32 stereo WDM devices, or 16 multichannel devices. More details are found in chapter 7.2.

Options
Word Clock In Term.
Checking this option terminates the word clock input internally with 75 Ohms.

MADI Coaxial
Defines the format of the MADI output signal. MADI can be a 56 or 64 channel signal. Sample rates in Double Speed range (64/88.2/96 kHz) can be transmitted by the normal 48K Frame, or using a native 96K Frame.

Channel 65 – 128
Determines the operation of the two BNC sockets. The BNC input and output can serve as word clock or MADI I/O.

Ravenna: Uses all 128 USB channels. BNC therefore works as word clock I/O.

MADI: Transmits MADI I/O via channels 65-128, Ravenna uses 1-64. Word clock is not available, because the two sockets are used for MADI coaxial.

Iso(chronous) Streaming (USB 3 only)
The Digiface Ravenna uses a special transmission mode with error correction in record mode. In case the default mode does not work *Isochronous Streaming* can be tried. This is the standard's native mode for audio transmission and should work with any USB 3 controller. See also chapter 25.1.

Input Status
Word / MADI
Indicates presence of a valid signal at the word clock / MADI input (Lock, No Lock) and whether the signal is synchronous (Sync). The third column shows the sample rate detected by the hardware (coarse recognition, 32 kHz, 44.1 kHz, 48 kHz etc.), or the current channel format (56/64 channels).

7.2 WDM Configuration

The WDM Devices configuration has one button to enter the edit dialog, a status display showing the number of currently enabled WDM devices, and a listbox to select between *Stereo* or *Multi-Channel* devices.

The number represents both record and playback devices, so '1' means one input and one output device.

The screenshot to the right shows the stereo WDM devices available with the Digiface Ravenna. Here the first four stereo devices had been activated. Any can be activated. Also only higher numbered devices might be active. For example using 25+26 for system based audio does not require to activate the prior stereo devices. Only Ravenna (25+26) will show up in the Windows Sound control panel.

The checkbox *All* to the right allows for a quick check/uncheck of all devices.
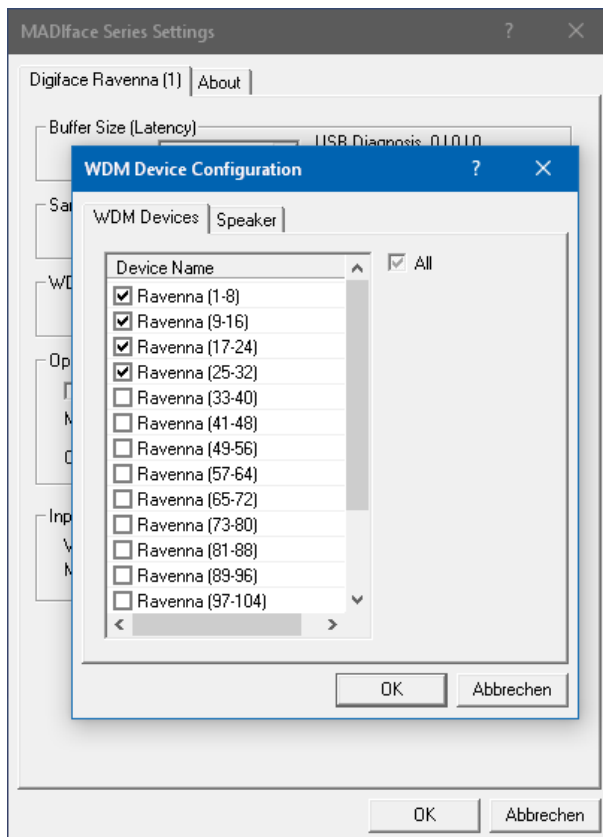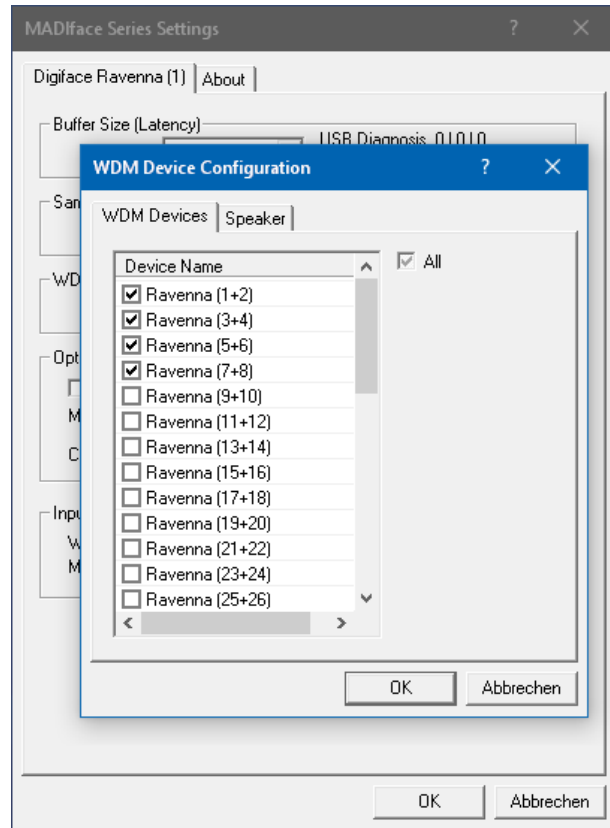
The screenshot to the left shows the multi-channel WDM devices available with the Digiface Ravenna after selecting 'Multi-Channel' in the WDM Devices listbox and hitting *WDM Configure*. In this example the devices *DRavenna 1-8, 9-16, 17-24* and *25-32* are active.

Using a multi-channel WDM device allows for the use of multi-channel playback with specialized software as well as Surround sound from DVD or Blu-Ray player software.

Please note that configuring the WDM device to a specific surround mode in the control panel Sound requires the device to have the Speaker property. See next page.

Again the checkbox *All* to the right allows for a quick check/uncheck of all devices.

Changing to the tab Speaker presents a list of all currently activated WDM devices. Any of these can now get the Speaker property.

Please note that defining more than one device as Speaker usually makes no sense, and the speakers also don't get numbered or renamed in Windows, so it is impossible to find out which one is which.

After leaving the dialog with OK the WDM devices are reloaded so Windows sees their new properties. In the Windows Sound control panel the modes Stereo and 7.1 can now be checked by selecting the playback device and clicking the *Configure* button.

7.3 RAVENNA Remote

All settings related to the RAVENNA* network, such as clock, streams and status information, are done with the web interface of the module. No additional driver or software installation is required for the RAVENNA Remote.

The RAVENNA Remote offers user-editable device and channel designations, device status information, real-time network monitoring, including device-level latency, PTP jitter and customized event logging. With presets, RAVENNA network configurations can be quickly and easily backed up and restored.

All information on using and configuration of the RAVENNA module are found in the attached user guide, **RAV2 Software manual**.

Further FAQs, setup documents and more information about RAVENNA are available at

https://www.ravenna.com/resources

https://www.directout.eu/download/operating-instructions/?wpdmdl=7337&re-fresh=630f28fe5e4241661937918

Note: The Digiface Ravenna is basically a USB audio interface. Access to the RAVENNA module requires access to the RAVENNA network, i.e. a network connection. Typically, if access is to be gained from the computer to which the Digiface Ravenna is connected, the computer's network port must be connected to one of the Digiface Ravenna's network ports via a network cable.

* RAVENNA and the RAVENNA logo are registered trademarks of ALC NetworX GmbH.

8. Operation and Usage

8.1 Playback

In the audio application being used, Digiface Ravenna must be selected as output device. This can often be found in the *Options, Preferences* or *Settings* menus as *Playback Device, Audio Devices, Audio* etc.

Increasing the number and/or size of audio buffers may prevent the audio signal from breaking up, but also increases latency i.e. output is delayed. For synchronized playback of audio and MIDI (or similar), be sure to activate the checkbox 'Get position from audio driver'.

Note: This is a network audio interface. In a network, clock definition is of particular importance. Therefore neither WDM nor ASIO are allowed to influence the sample rate. That setting is done exclusively by the RAVENNA Remote.

8.2 DVD-Playback (AC-3/DTS)

AC-3 / DTS
Popular DVD software players can send their audio data stream to any AC-3/DTS capable receiver via the Digiface Ravenna.

! *The sample rate must be set to 48 kHz in the RAVENNA Remote, or the software will only playback a stereo 2-channel downmix via SPDIF.*

In some cases the Digiface Ravenna output device has to be selected in >*Control Panel / Sound / Playback*< and be set as *Default,* or the software will not recognize it.

The DVD software's audio properties now show the options 'SPDIF Out' or similar. When selecting it, the software will transfer the non-decoded digital multi-channel data stream to a Digiface Ravenna output channel.

Warning: This 'SPDIF' signal sounds like chopped noise at highest level.

Multichannel
PowerDVD and WinDVD can also operate as software decoder, sending a DVD's multichannel data stream directly to the analog and digital outputs of the Digiface Ravenna. For this to work select the WDM playback device 'Loudspeaker' of the Digiface Ravenna in >*Control Panel/ Sound/ Playback* < as 'Standard'. Additionally a Multi-channel WDM device is required, whose property of 7.1 Loudspeaker playback can be verified under >*Configuration*<.

PowerDVD's and WinDVD's audio properties now list several multichannel modes. If one of these is selected, the software sends the decoded analog multichannel data to the Digiface Ravenna. On some software it is not necessary to select the Loudspeaker in the Sound panel.

8.3 Channel Count under WDM

The Digiface Ravenna supports a maximum of 64 channels for stereo WDM, and 128 channels in multichannel WDM. Configuration is done via the Settings dialog - WDM Devices, as Stereo or Multi-channel (8-channel) devices.

In Double Speed mode the number of available channels is halved for both RAVENNA and MADI. In Quad Speed mode the number of available channels is reduced to 16 channels for both RAVENNA and MADI.

8.4 Multi-client Operation

RME audio interfaces support multi-client operation. Several programs can be used at the same time. The formats ASIO and WDM can even be used on the same playback channels simultaneously. As WDM uses a real-time sample rate conversion (ASIO does not), all active ASIO software has to use the same sample rate.

However, a better overview is maintained by using the channels exclusively. This is no limitation at all, because TotalMix allows for any output routing, and therefore a playback of multiple software on the same hardware outputs.

Inputs can be used from an unlimited number of WDM and ASIO software at the same time, as the driver simply sends the data to all applications simultaneously.

RME's sophisticated tool *DIGICheck* is an exception to this rule. It operates like an ASIO host, using a special technique to access playback channels directly. Therefore DIGICheck is able to analyse and display playback data from any software, no matter which format it uses.

8.5 Digital Recording

Unlike analog soundcards which produce empty wave files (or noise) when no input signal is present, digital interfaces always need a valid input signal to start recording. Taking this into account, RME added a comprehensive I/O signal status display to the Digiface Ravenna, showing sample frequency, lock and sync status in the Settings dialog, and a status LED directly at the unit.

The sample frequency shown in the Settings dialog is useful as a quick display of the current configuration of the unit and the connected external equipment. If no sample frequency is recognized, it will read 'No Lock'.

This way, configuring any suitable audio application for digital recording is simple. After connection the Digiface Ravenna displays the current and external sample frequency. This parameter can then be changed in the application's audio attributes (or similar) dialog.

8.6 Clock Modes - Synchronization

In the digital world, a device must be either Master (clock source) or Slave (clock receiver). Whenever several devices are linked within a system, there must always be a single master clock.

! *A digital system can only have one master! If the Digiface Ravenna's clock mode is set to 'Internal', all other devices must be set to 'Slave'.*

This also applies in a network. Typically, a single device is defined as a clock master (Grand Clock), controlling both the network and all connected devices. The Digiface Ravenna can be synchronized as slave over incoming network streams, or an attached word clock, or MADI signal. As master, it uses its internal clock, becoming the clock master of the entire network.

RME's exclusive **SyncCheck** technology (first implemented in the Hammerfall) enables an easy to use check and display of the current clock status. *Input Status* indicates whether there is a valid signal (Lock, No Lock) for the coaxial input, or if there is a valid *and* synchronous signal (Sync).

9. Operation under ASIO

9.1 General

Start the ASIO software and select **ASIO MADIface USB** as the audio I/O device or the audio driver.

The Digiface Ravenna supports *ASIO Direct Monitoring* (ADM).
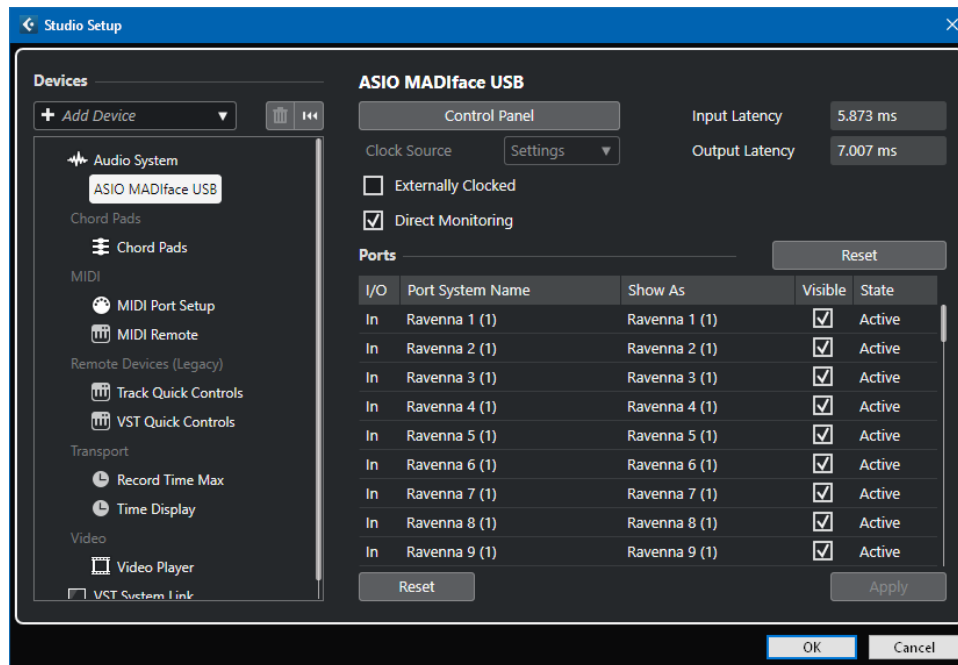
9.2 Channel Count under ASIO

In Single Speed Speed (44.1 and 48 kHz) 128 input and output channels each are available. Double Speed (88.2 and 96kHz) reduces the number of available channels to 64 each. Quad Speed (176.4 and 192kHz) reduces the number of available channels to 32 each.

Note: When changing the sample rate range between Single, Double and Quad Speed the number of channels presented from the ASIO driver will change too. This may require a reset of the I/O list in the audio software.

9.3 Known Problems

If a computer does not provide sufficient CPU-power and/or sufficient USB-bus transfer rates, then drop outs, crackling and noise will appear. Such effects can often be avoided by using a higher buffer setting/latency in the Settings dialog of the Digiface Ravenna. Furthermore PlugIns should be deactivated temporarily to make sure they do not cause these problems. More information can be found in chapter 25.1.

Another common source of trouble is incorrect synchronization. ASIO does not support asynchronous operation, which means that the input and output signals not only have to use the same sample frequency, but also have to be in sync. All devices connected to the Digiface Ravenna must be properly configured for Full Duplex operation. As long as SyncCheck (in the Settings dialog) only displays *Lock* instead of *Sync*, the devices have not been set up properly!

The same applies when using more than one Digiface Ravenna. They all have to be in sync. Else a periodically repeated noise will be heard.

Digiface Ravenna supports *ASIO Direct Monitoring* (ADM). Please note that not every program supports ADM completely or error-free. The most often reported problem is the wrong behaviour of panorama in a stereo channel. Also try to avoid setting the TotalMix FX hardware outputs (third row) to mono mode. This will most likely break ADM compatibility.

10. Using more than one Interface

The current driver supports up to three RME USB devices of the MADIface series. All units have to be in sync, i.e. have to receive valid digital sync information.

- If the Digiface Ravenna is set to clock mode internal, all others have to be set to clock mode slave, and have to be synced from the master. The clock modes of all units have to be set up correctly in the MADIface Settings dialog.

- If all units are fed with synchronous signals, i.e. all units show *Sync* in their Settings dialog, all channels can be used at once. This is especially easy to handle under ASIO, as the ASIO driver presents all units as one.

Note: TotalMix is part of the hardware of each RME unit. Up to three mixers are available, but these are separated and can't interchange data. Therefore a global mixer for all units is not possible.

11. DIGICheck Windows

The DIGICheck software is a unique utility developed for testing, measuring and analysing digital audio streams. Although this Windows software is fairly self-explanatory, it still includes a comprehensive online help. DIGICheck 5.96 operates as multi-client ASIO host, therefore can be used in parallel to any software, with both inputs and outputs (!). The following is a short summary of the currently available functions:

- **Level Meter**. High precision 24-bit resolution, 2/8/128 channels. Application examples: Peak level measurement, RMS level measurement, over-detection, phase correlation measurement, dynamic range and signal-to-noise ratios, RMS to peak difference (loudness), long term peak measurement, input check. Oversampling mode for levels higher than 0 dBFS. Vertical and horizontal mode. Slow RMS and RLB weighting filter. Supports visualization according to the K-System.
- **Hardware Level Meter** for **Input**, **Playback** and **Output**. Reference Level Meter freely configurable, causing near zero CPU load, because calculated from the Digiface hardware.
- **Vector Audio Scope**. World wide unique Goniometer showing the typical afterglow of a oscilloscope-tube. Includes Correlation meter and level meter.
- **Spectral Analyser.** World wide unique 10-, 20- or 30-band display in analog bandpass filter technology. 192 kHz-capable!
- **Totalyser**. Spectral Analyser, Level Meter and Vector Audio Scope in a single window.
- **Surround Audio Scope.** Professional Surround Level Meter with extended correlation analysis, ITU weighting and ITU summing meter.
- **ITU1770/EBU R128 Meter**. For standardized loudness measurements.
- **Bit Statistics & Noise**. Shows the true resolution of audio signals as well as errors and DC offset. Includes Signal to Noise measurement in dB and dBA, plus DC measurement.
- **Channel Status Display**. Detailed analysis and display of Channel Status data within the MADI stream.
- **Global Record.** Long-term recording of all channels at lowest system load.
- **Completely multi-client.** Open as many measurement windows as you like, on any channels and inputs or outputs!

DIGICheck is constantly updated. The latest version is always available on our website **www.rme-audio.com**, section **Downloads / Software**.

12. Hotline – Troubleshooting

The input signal cannot be monitored in real-time

- ASIO Direct Monitoring has not been enabled within the DAW, and/or monitoring has been disabled globally (TotalMix Options).

Playback works, but record doesn't

- Check that there is a valid signal at the input. If so, the current sample frequency is displayed in the Settings dialog.
- Check whether the Digiface Ravenna has been selected as recording device in the audio application.
- Check whether the sample frequency set in the audio application ('Recording properties' or similar) matches the input signal.

Crackle during record or playback

- Increase the number and size of buffers in the 'Settings' dialog or in the application.
- Try different cables (coaxial) to rule out any defects here.
- Check that cables/devices have not been connected in a closed loop. If so, set the system's clock mode to 'Master'.
- Check the Settings dialog for displayed Errors.

Driver installation and Settings dialog/TotalMix work, but a playback or record is not possible

- While recognition and control of the device are low bandwidth applications, playback/record needs the full USB transmission performance. Therefore, defective USB cables with limited transmission bandwidth can cause such errors.

Where do I set the sample rate?

- In the RAVENNA Remote, for the device that is currently the Grand Master Clock for the whole RAVENNA network. ASIO, WDM or Core Audio have no control over that.

Is it possible to change the sample rate when using MADI only?

- Not possible.

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Digiface Ravenna

▷ **Mac OS X – Installation and Operation**

13. Driver and Firmware

13.1 Driver Installation

After the Digiface has been connected to the computer install the drivers.

RME is constantly improving the drivers. Please download the latest drivers from the RME website at **http://rme.to/downloads**. Unzip the downloaded file and start the driver installation by double-clicking **Fireface USB.pkg**.

During driver installation the programs **Fireface USB Settings** and **Totalmix** (TotalMix FX) are copied to the Applications folder. They will automatically start into the dock if a Digiface Ravenna is connected. A reboot of the computer is not required.

Driver Updates do not require to remove the existing drivers. Simply install the new driver over the existing one.

Possible reasons why a Digiface Ravenna is not found after driver installation:

- The USB port is not active in the system (check in System Report, USB)

- The USB cable is not or not correctly inserted into the socket

13.2 Uninstalling the Drivers

In case of problems the driver files can be deleted manually by dragging them to the trash bin:

/Applications/Fireface USB Settings
/Applications/Totalmix
/System/Library/Extensions/FirefaceUSB.kext
/Users/username/Library/Preferences/de.rme-audio.TotalmixFX.plist
/Users/username/Library/Preferences/de.rme-audio.Fireface_USB_Settings.plist
/Library/LaunchAgents/de.rme-audio.firefaceUSBAgent.plist

Under the latest Mac OS the User/Library folder is not visible in the Finder. To unhide it start Finder, click on the menu item *Go*. Hold down the option (alt) key, then click on *Library*.

With the latest DriverKit drivers, the whole driver is the RME Settings app found in Applications. Deleting this app also removes the driver from the system.
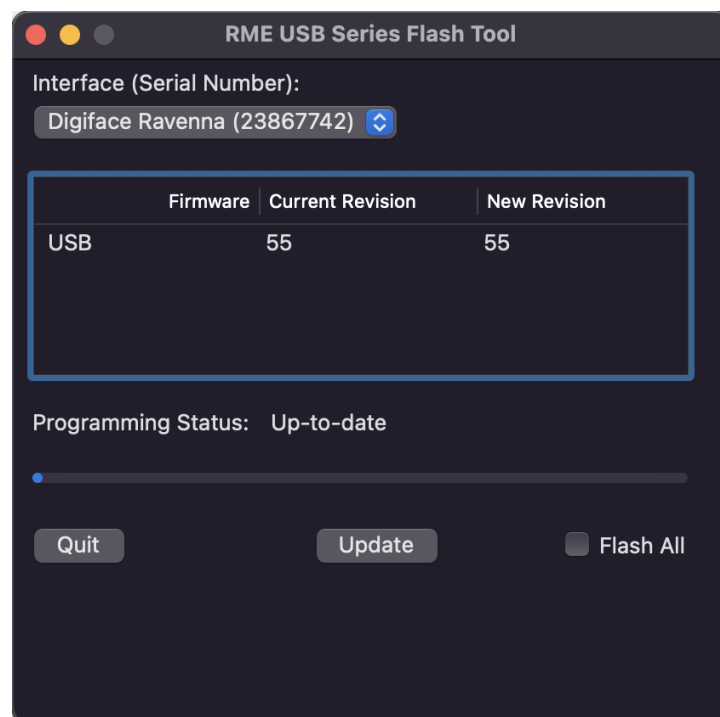
13.3 Firmware Update

The app **RME USB Series Flash Tool** updates the firmware of the Digiface Ravenna to the latest version. It requires an already installed RME USB driver.

After its start the program displays the current revision of the Digiface Ravenna firmware, and whether it needs an update or not. If so, simply press the 'Update' button. A progress bar will indicate when the flash process is finished (Verify Ok).

After the update the unit needs to be reset. This is done by unplugging the Digiface Ravenna for a few seconds. A reboot of the computer is not necessary.

To reduce the time needed for the flash process the tool updates only the parts of the firmware that are present in a newer version. The option *Flash All* forces the tool to update all parts.

When the update fails (status: failure), the unit's Safety BIOS will be used from the next boot on, the unit stays fully functional. The flash process can then be tried again on a different computer.

RME USB Series Flash Tool

Interface (Serial Number):

Digiface Ravenna (23867742)

Firmware	Current Revision	New Revision
USB	55	55

Programming Status: Up-to-date

Quit   Update   ☐ Flash All

The manufacturer of the RAVENNA module, DirectOut, also publishes firmware updates. The current firmware version can be checked in the module's web GUI and if necessary also updated there.

Please check with DirectOut's website:

https://www.directout.eu/

14. Configuring the Digiface Ravenna

14.1 Settings Dialog

Configuring the Digiface Ravenna is done via its own *Settings* dialog. Start the app **Fireface USB Settings**. The mixer of the Digiface Ravenna can be configured by starting the app **Totalmix**.

The following is available in the *Settings* dialog:

- Configuration of digital I/Os
- Hardware configuration
- Current sample rate
- State of input

Any changes performed in the Settings dialog are applied immediately - confirmation (e.g. by exiting the dialog) is not required.

Use the drop down menu **Properties For** to select the unit to be configured.

On the right of it the current firmware and driver version is shown.

Sample Rate
Display of the currently active sample rate. Its setting / change takes place exclusively via the RAVENNA Remote. Neither macOS nor apps can change the sample rate.

Options
Word Clock Termination
Checking this option terminates the word clock input internally with 75 Ohms.

MADI Format
Defines the format of the MADI output signal. MADI can be a 56 or 64 channel signal. Sample rates in Double Speed range (64/88.2/96 kHz) can be transmitted by the normal 48K Frame, or using a native 96K Frame.

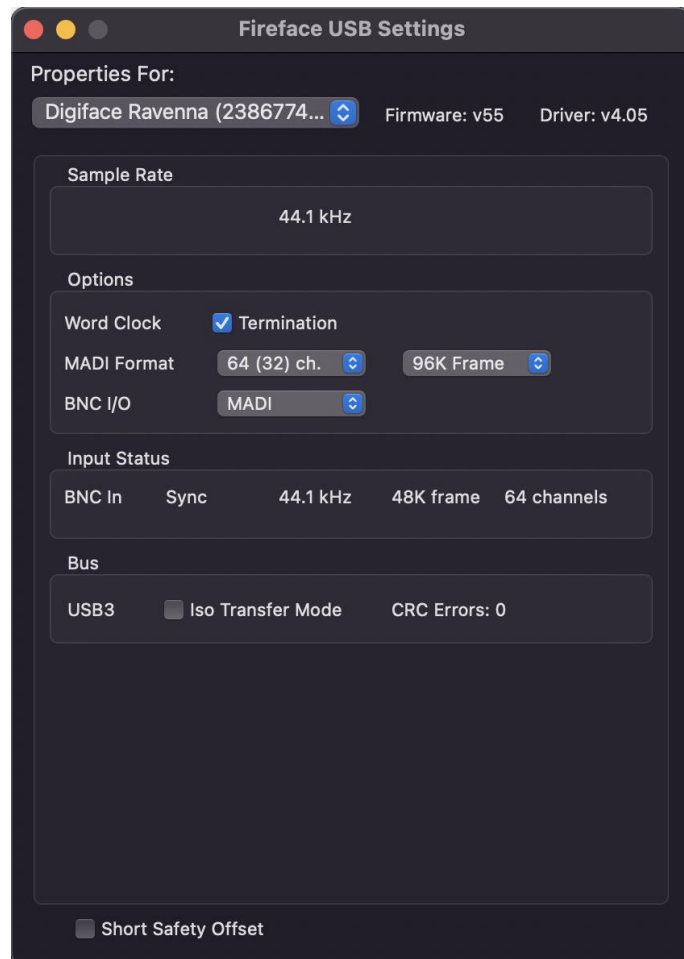**BNC I/O**
The BNC input and output can be used as word clock I/O or MADI I/O.

Input Status
Word / MADI
Indicates presence of a valid signal at the word clock or MADI input (Lock, No Lock) and whether the signal is synchronous (Sync). The third column shows the sample rate detected by the hardware (coarse recognition, 44.1 kHz, 48 kHz etc.), and the current channel format (56/64 channels).

Bus (USB 3 only)
The Digiface Ravenna uses a special transmission mode with error correction in record mode. In case the default mode does not work *Isochronous Streaming* can be tried. This is the standard's native mode for audio transmission and should work with any USB 3 controller (chapter 25.1).

To the right USB3 transmission errors detected by the hardware will be shown.

14.2 RAVENNA Remote

All settings related to the RAVENNA* network, such as clock, streams and status information, are done with the web interface of the module. No additional driver or software installation is required for the RAVENNA Remote.

The RAVENNA Remote offers user-editable device and channel designations, device status information, real-time network monitoring, including device-level latency, PTP jitter and customized event logging. With presets, RAVENNA network configurations can be quickly and easily backed up and restored.

All information on using and configuration of the RAVENNA module are found in the attached user guide, **RAV2 Software manual**.

Further FAQs, setup documents and more information about RAVENNA are available at

https://www.ravenna.com/resources

https://www.directout.eu/download/operating-instructions/?wpdmdl=7337&re-fresh=630f28fe5e4241661937918

Note: The Digiface Ravenna is basically a USB audio interface. Access to the RAVENNA module requires access to the RAVENNA network, i.e. a network connection. Typically, if access is to be gained from the computer to which the Digiface Ravenna is connected, the computer's network port must be connected to one of the Digiface Ravenna's network ports via a network cable.

* RAVENNA and the RAVENNA logo are registered trademarks of ALC NetworX GmbH.

14.3 Channel Count under Core Audio

In Single Speed Speed (44.1 and 48 kHz) 128 input and output channels each are available. Double Speed (88.2 and 96kHz) reduces the number of available channels to 64 each. Quad Speed (176.4 and 192kHz) reduces the number of available channels to 32 each.

It is not possible to change the number of Core Audio devices without a reboot of the computer. So when the Digiface Ravenna changes to Double Speed (88.2/96 kHz) or Quad Speed mode (176.4/192 kHz) all channels stay present, but are partly inactive.

14.4 Various Information

The driver of the Digiface Ravenna requires at least macOS 11.

Programs that don't support card or channel selection will use the device chosen as **Input** and **Output** in the **System Preferences – Sound** panel.

Via **Launchpad – Other – Audio MIDI Setup** the MADIface can be configured for the system wide usage in more detail.

Programs that don't support channel selection will always use channels 1/2, the first stereo pair. To access other inputs, use the following workaround with TotalMix: route the desired input signal to output channels 1/2. In the channel settings of outputs 1/2 activate *Loopback*. Result: the desired input signal is now available at input channel 1/2, without further delay/latency.

Use **Configure Speakers** to freely configure the stereo or multichannel playback to any available channels.

15. Using more than one Interface

OS X supports the usage of more than one audio device within the audio software. This is done via the Core Audio function **Aggregate Devices**, which allows to combine several devices into one. This function is found in the **Audio MIDI Setup – Audio Window**. Click the **+** sign in the lower left.

The current driver supports up to three RME USB devices of the MADIface series. All units have to be in sync, i.e. have to receive valid sync information (by feeding synchronized signals).

- If the Digiface Ravenna is set to clock mode Master (Internal), all others have to be set to clock mode Slave, and have to be synced from the master. The clock modes of all units have to be set up correctly in the MADIface Settings dialog.

- If all units are fed with a synchronous clock, i.e. all units show *Sync* in their Settings dialog, all channels can be used at once.

Note: TotalMix is part of the hardware of each unit. Up to three mixers are available, but these are separated and can't interchange data. Therefore a global mixer for all units is not possible.

16. DIGICheck NG Mac

The DIGICheck software is a unique utility developed for testing, measuring and analysing digital audio streams. Although this Mac software is fairly self-explanatory, it still includes a comprehensive online help. DIGICheck 0.90 operates in parallel to any software, showing all input data. The following is a short summary of the currently available functions:

- **Level Meter**. High precision 24-bit resolution, 2/8/128 channels. Application examples: Peak level measurement, RMS level measurement, over-detection, phase correlation measurement, dynamic range and signal-to-noise ratios, RMS to peak difference (loudness), long term peak measurement, input check. Oversampling mode for levels higher than 0 dBFS. Vertical and horizontal mode. Slow RMS and RLB weighting filter. Supports visualization according to the K-System.
- **Hardware Level Meter** for **Input**, **Playback** and **Output**. Reference Level Meter freely configurable, causing near zero CPU load, because calculated from the MADIface hardware.
- **Vector Audio Scope**. World wide unique Goniometer showing the typical afterglow of a oscilloscope-tube. Includes Correlation meter and level meter.
- **Spectral Analyser.** World wide unique 10-, 20- or 30-band display in analog bandpass filter technology. 192 kHz-capable!
- **Totalyser**. Spectral Analyser, Level Meter and Vector Audio Scope in a single window.
- **Surround Audio Scope.** Professional Surround Level Meter with extended correlation analysis, ITU weighting and ITU summing meter.
- **ITU1770/EBU R128 Meter**. For standardized loudness measurements.
- **Bit Statistics & Noise**. Shows the true resolution of audio signals as well as errors and DC offset. Includes Signal to Noise measurement in dB and dBA, plus DC measurement.
- **Completely multiclient.** Open as many measurement windows as you like, on any channels and inputs or outputs!

DIGICheck is constantly updated. The latest version is always available on our website **www.rme-audio.com**, section **Downloads / Software**.

17. Hotline – Troubleshooting

Playback works, but record doesn't:

- Check that there is a valid signal at the input. If so, the current sample frequency is displayed in the Settings dialog.
- Check whether the Digiface Ravenna has been selected as recording device in the audio application.
- Check whether the sample frequency set in the audio application ('Recording properties' or similar) matches the input signal.

Crackle during record or playback:

- Increase the number and size of buffers in the application.
- Try different cables (coaxial or optical) to rule out any defects here.
- Check that cables/devices have not been connected in a closed loop. If so, set the system's clock mode to 'Master'.
- Check the Settings dialog for displayed Errors.

Driver installation and Settings dialog/TotalMix work, but a playback or record is not possible

- While recognition and control of the device are low bandwidth applications, playback/record needs the full USB transmission performance. Therefore, defective USB cables with limited transmission bandwidth can cause such an error scheme.

Where do I set the sample rate?

- In the RAVENNA Remote, for the device that is currently the Grand Master Clock for the whole RAVENNA network. ASIO, WDM or Core Audio have no control over that.

Is it possible to change the sample rate when using MADI only?

- Not possible.

User's Guide

Digiface Ravenna

▷ **TotalMix FX**

18. Routing and Monitoring

18.1 Overview

The Digiface Ravenna includes a powerful digital real-time mixer, *TotalMix FX,* based on RME's unique, sample-rate independent TotalMix technology. It allows for practically unlimited mixing and routing operations, with all inputs and playback channels simultaneously, to any hardware outputs. The Digiface does not have a DSP, so there are no FX available.
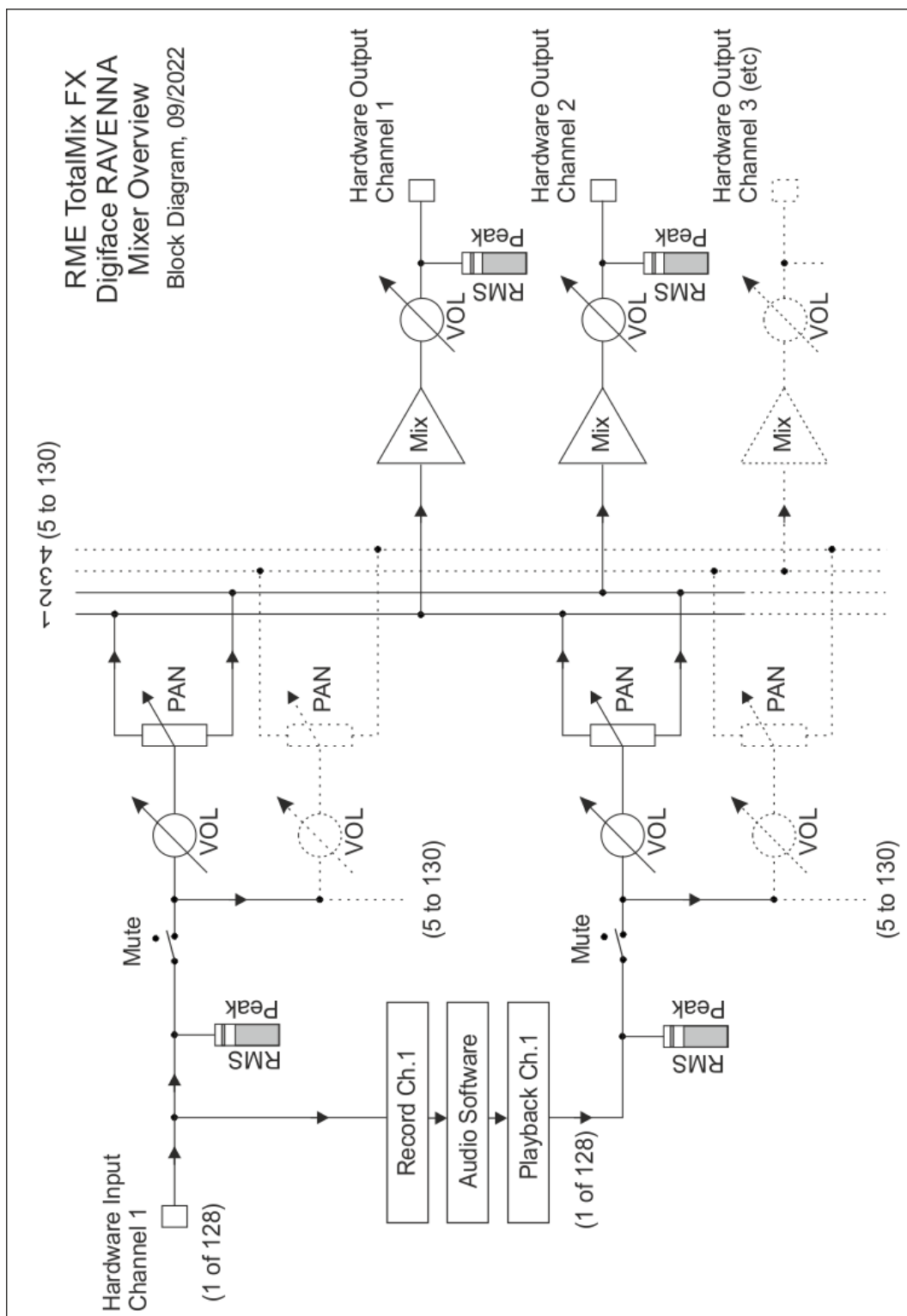
Here are some typical applications for TotalMix:

- Setting up delay-free submixes (headphone mixes). The Digiface Ravenna allows for up to 65 fully independent stereo submixes. On an analog mixing desk, this would equal 130 Aux sends.

- Unlimited routing of inputs and outputs (free utilisation, patchbay functionality).

- Distributing signals to several outputs at a time. TotalMix offers state-of-the-art splitter and distributor functions.

- Simultaneous playback of different programs via a single stereo output. The ASIO multi-client driver supports the usage of several programs at the same time. When done on different play-back channels TotalMix provides the means to mix and monitor these on a single stereo out-put.

- Mixing of the input signal to the playback signal (complete ASIO Direct Monitoring). RME not only is *the* pioneer of ADM, but also offers the most complete implementation of the ADM functions.

- Integration of external devices. Use TotalMix to insert external effects devices, be it in the playback or in the record path. Depending on the current application, the functionality equals insert or effects send and effects return, for example as used during real-time monitoring when adding some reverb to the vocals.

Every single input channel, playback channel and hardware output features a Peak and RMS level meter, calculated in hardware. These level displays are very useful to determine the presence and routing destinations of the audio signals.

For a better understanding of the TotalMix mixer you should know the following:

- As shown in the block diagram (next page), the record signal usually stays unaltered. TotalMix does not reside within the record path, and does not change the record level or the audio data to be recorded (exception: loopback mode).

- The hardware input signal can be passed on as often as desired, even with different levels. This is a big difference to conventional mixing desks, where the channel fader always controls the level for all routing destinations simultaneously.

- The level meter of inputs and playback channels are connected pre-fader, to be able to visually monitor where a signal is currently present. The level meters of the hardware outputs are connected post-fader, thus displaying the actual output level.

RME TotalMix FX
Digiface RAVENNA
Mixer Overview
Block Diagram, 09/2022

Hardware Output
Channel 1

Hardware Output
Channel 2

Hardware Output
Channel 3 (etc)

Peak
RMS
VOL

Peak
RMS
VOL

VOL

Mix

Mix

Mix

1 2 3 4 (5 to 130)

PAN

PAN

PAN

PAN

VOL

VOL

VOL

VOL

(5 to 130)

(5 to 130)

Mute

Mute

Peak
RMS

Peak
RMS

Record Ch.1

Audio Software

Playback Ch.1

Hardware Input
Channel 1

(1 of 128)

(1 of 128)

18.2 The User Interface

The visual design of the TotalMix mixer is a result of its capability to route hardware inputs and software playback channels to any hardware output. The Digiface Ravenna provides 128 input channels, 128 software playback channels, and 130 hardware output channels:
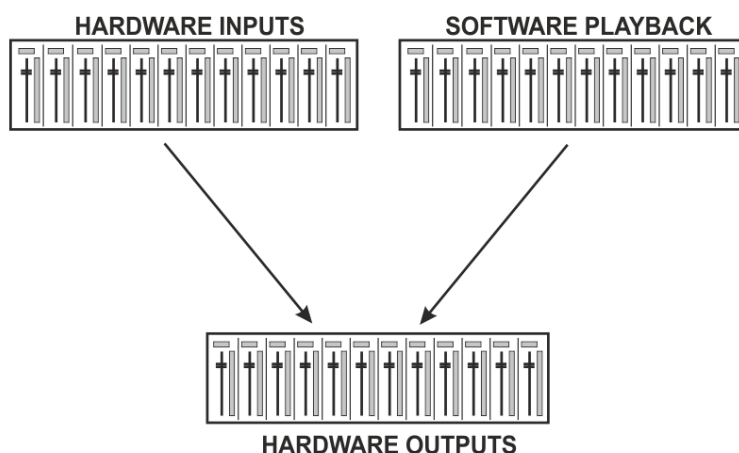
TotalMix can be used in the above view (View Options **2 Rows**). However, the default is a vertical alignment in three rows as known from an Inline desk, so that the row *Software Playback* equals the *Tape Return* of a real mixing desk:

- Top row: Hardware inputs. The level shown is that of the input signal, i. e. fader independent. Via fader and routing field, any input channel can be routed and mixed to any hardware output (bottom row).

- Middle row: Playback channels (playback tracks of the audio software). Via fader and routing field, any playback channel can be routed and mixed to any hardware output (third row).

- Bottom row (third row): Hardware outputs. Here, the total level of the output can be adjusted. This may be the level of connected loudspeakers, or the necessity to reduce the level of an overloaded submix.
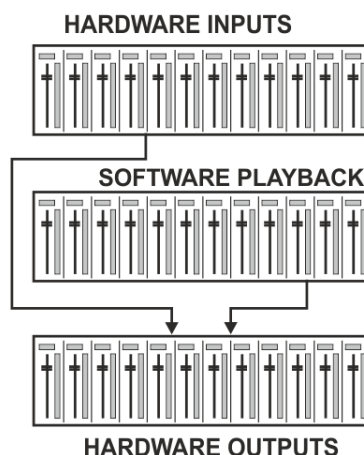
Usage in mode Submix View (Default)

Click on the Hardware Output channel in the third row where the audio signal is supposed to show up. This channel turns brighter, means it is selected as current submix. Now move the faders up from all sources – these are the input and playback channels, in the first and second row. That's it. The input (monitoring) and playback (DAW software) audio signals are now available at that very output, which can be verified immediately from the level meters reacting accordingly.

The following chapters explain step by step all functions of the user interface.

18.3 The Channels

A single channel can be switched between mono and stereo mode. The mode is set in the channel settings panel (tool symbol).

Channel name. The name field is the preferred place to select a channel by a mouse click. A double click opens a dialog to assign a different name. The original name will be shown when activating the option *Names* in the *View Options*.

Panorama. Routes the input signal freely to the left and right routing destination (lower label, see below). The level reduction in center position is -3 dB.

Mute and Solo. Input channels and playback channels each have a mute and solo button.

Numerical level display. Shows the current RMS or Peak level, updated twice per second. OVR means overload. The setting Peak/RMS is changed in the View Options.

Level meter. The meter shows both peak values (zero attack, 1 sample is enough for a full scale display) by means of a yellow line, and mathematically correct RMS values by means of a green bar. The RMS display has a relatively slow time constant, so that it shows the average loudness quite well. Overs are shown in red at the top of the bar. In the Preferences dialog (F2) the Peak Hold time, the over detection and the RMS reference can be set.

Fader. Determines the level of the signal routed to the current routing destination (lower label). Please note that this fader is not *the* fader of the channel, but only the fader of *the current* routing. Compared to a standard mixing desk TotalMix does not have a channel fader, but only Aux Sends, as many as there are hardware outputs. Therefore TotalMix can create as many different submixes as there are hardware outputs. This concept is understood best in the Submix View, but more on that later.

Below the fader the **Gain** is shown in a numerical display field, according to the current fader position. The fader can be:

➢ dragged with the left mouse button pressed

➢ moved by the mouse wheel

➢ set to 0 dB and −∞ by a double click. The same happens with a single click plus held down Ctrl key.

➢ adjusted in fine mode by mouse drag and mouse wheel when holding the Shift key down

A Shift-click on a fader adds the fader to the **temporary fader group**. All faders now marked yellow are ganged, and move simultaneously in a relative way. The temporary fader group is deleted by a click on the F symbol in the upper right of the window.
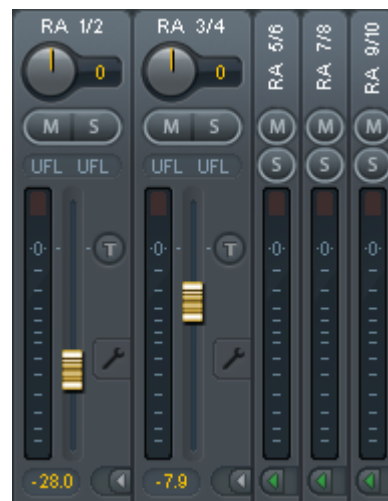
The **arrow symbol** at the bottom minimizes the channel width to that of the level meters. Another click maximizes it again. A mouse click with held Ctrl key causes all channels to the right to enlarge and minimize at once.

The lowest field shows the current **routing target**. A mouse click opens the routing window to select a routing target. The list shows all activated routings of the current channel by arrows in front of the listed entries, the current one is shown in bold letters.

An arrow is only shown with an activated routing. A routing is seen as activated when audio data is sent. As long as the fader is set to −∞ the current routing will be shown in bold letters, but not have an arrow in the front.

Trim Gain. After a click on the **T** symbol one channel's faders are all synchronized. Instead of changing only a single routing the fader affects all the channel's active routings. For a better overview the faders currently not visible are indicated by orange triangles beside the fader path. When moving the fader the triangles also move to a new position, equalling the fader's new settings.

Note that the fader button is set to the highest routing gain of all routings so that best control is offered. The gain (fader knob position) of the currently active routing (the submix selected in the third row) is shown as white triangle.

Background: TotalMix has no fixed channel fader. In case of the Digiface Ravenna there are 65 stereo Aux sends, shown alternately as single fader within the channel strip. The high number of Aux sends enables multiple and fully independent routings.

In some cases it is necessary to synchronize the gain changes of these routings. An example is the post fader function, where a change of the singer's volume shall be performed identical to the volume change of the signal sent to the reverb device, so that the reverb level keeps its relation to the original signal. Another example is the signal of a guitar that is routed to different submixes, means hardware outputs, which gets much too loud during the solo part, and therefore needs to be reduced in volume on all outputs simultaneously. After a click on the Trim button this can be done easily and with a perfect overview.

As all channel's routings change simultaneously when Trim is active, this mode basically causes the same behaviour as a trim pot within the input channel, affecting the signal already before the mixer. That's how this function got its name.

In View Options / Show the function Trim Gains can be globally switched on and off for all channels. This global Trim mode is recommended when using TotalMix FX as live mixing desk.

The Context Menu. With a right click on the input, playback and output channels their context menus provide advanced functionality (these menus are also available in the Matrix, but only directly on the channel labels). The entries are self-explanatory and automatically adjust to where the click is performed. The input channels offer *Clear, Copy input* and *paste the input mix*. On a playback channel *Copy, Paste and Clear the playback mix* are available. On an output channel *Copy* and *Mirror* functionality for the current submix is offered.

18.3.1 Settings

A click on the tool symbol opens the channel's **Settings** panel with differing elements.

Stereo. Switches the channel to mono or stereo mode.

Width. Setting the stereo width. 1.00 equals full stereo, 0.00 mono, -1.00 swapped channels.

MS Proc. Activates M/S processing within the stereo channel. Monaural information is sent to the left channel, stereo information to the right.

Phase L. Inverts the phase of the left channel by 180°.

Phase R. Inverts the phase of the right channel by 180°.

Note: the functions Width, MS Proc, Phase L and Phase R affect all routings of the respective channel.

Besides Stereo/Mono, Phase L und Phase R the settings of the Hardware Outputs have three more options:

Talkback. Activates this channel as receiver and output of the Talkback signal. This way Talkback can be sent to any outputs, not only the Phones in the Control Room section. Another application could be to send a certain signal to specific outputs by the push of a button.

No Trim. Sometimes channels need to have a fixed routing and level, which should not be changed in any case. An example is the stereo mixdown for recording of a live show. With *No Trim* active, the routing to this output channel is excluded from the Trim Gains function, therefore is not changed unintentionally.

Loopback. Sends the output data to the driver as record data. The corresponding submix can be recorded then. This channel's hardware input sends its data only to TotalMix, no longer to the recording software.

Another difference to the input and playback channels is the **Cue** button instead of Solo. A click on Cue sends the respective Hardware Output's audio to the **Main** Out. With this any hardware output can be controlled and listened to through the monitoring output very conveniently. Using the option *Assign / Cue to* in the Control Room section, Cue can also be used with any of the Phones outputs.

18.4 Section Control Room

In the section Control Room the menu Assign is used to define the **Main Out** which is used for listening in the studio. For this output the functions Dim, Recall, Mono and Talkback are automatically applied.

Additionally the channel will be shifted from the Hardware Outputs into the Control Room section, and renamed *Main*. The same happens when assigning Main Out B or the Phones. The original name can be displayed by the function *Names* in the View Options - *Show* at any time.

Phones 1 to 4 will have Dim (set in Settings) and a special routing applied when Talkback is activated. Also putting them beside the Main Out increases the overview within the output section greatly.

Dim. The volume will be reduced by the amount set in the Settings dialog (F3).

Recall. Sets the gain value defined in the Settings dialog.

Speak. B. Switches playback from Main Out to Main Out B. The faders of the channels Main and Speaker B can be ganged via Link.

Mono. Mixes left and right channel. Useful to check for mono compatibility and phase problems.

Talkback. A click on this button will dim all signals on the *Phones* outputs by an amount set up in the Preferences dialog. At the same time the control room's microphone signal (source defined in Preferences) is sent to the *Phones*. The microphone level is adjusted with the channel's input fader.

External Input. Switches Main monitoring from the mix bus to the stereo input defined in the Settings dialog (F3). The relative volume of the stereo signal is adjusted there as well.

Assign. Allows to define the Main Out, Main Out B, and up to four Phones outs. The listbox includes all 130 hardware output channels.

The output for the Cue signal, which is usually Main, can also be set to one of the Phones outputs 1-4. This setting also controls the PFL monitoring.
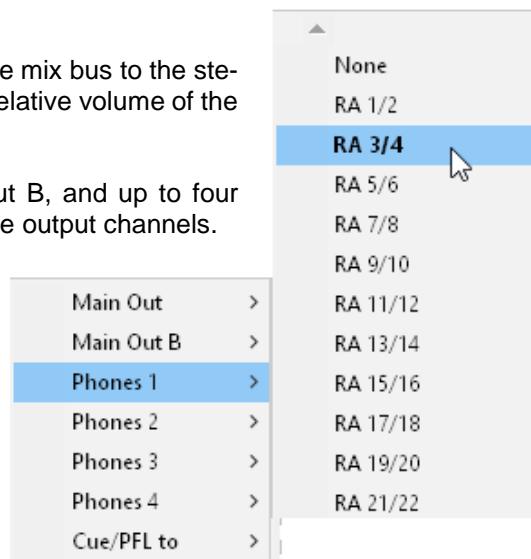
18.5 The Control Strip

The Control Strip on the right side is a fixed element. It combines different functions that are either required globally, or constantly used, and therefore should not be hidden in a menu. Still using the menu entry *Window, Hide Control Strip*, the Control Strip is shifted out of the visible area to gain more space for other elements.

The areas described in the following chapters can be minimized by a click on the arrow in their title bar.

Device selection. Select the unit to be controlled in case more than one is installed on the computer.

FX. Not functional with the Digiface Ravenna.

Undo / Redo. With the unlimited Undo and Redo changes of the mix can be undone and redone, at any time. Undo/Redo does not cover graphical changes (window size, position, channels wide/narrow etc.), and also no changes to the Presets.

Undo/Redo also operates across Workspaces. Therefore a completely differently set up mixer view can be loaded via Workspace, and with a single click on Undo the previous internal mixer state is returned – but the new mixer view stays.

Global Mute Solo Fader.

Mute. Global Mute operates in a pre fader style, muting all currently activated routings of the channel. As soon as any Mute button is pressed, the *Mute Master* button lights up in the Control Strip area. With this button all selected mutes can be switched off and on again. One can comfortably set up a mute group or activate and deactivate several mute buttons simultaneously.

Solo. As soon as any Solo button is pressed, the *Solo Master* button lights up in the Control Strip area. With this button all selected Solos are switched off and on again. Solo operates as Solo-in-Place, post fader style, as known from common mixing desks. A typical limitation for mixing desks, Solo working only globally and only for the Main Out, does not exist in TotalMix. Solo is always activated for the current submix only.

Fader. A Shift-click on a fader adds the fader to the **temporary fader group**. All faders now marked yellow are ganged, and move simultaneously in a relative way. The temporary fader group is deleted by a click on the F symbol.
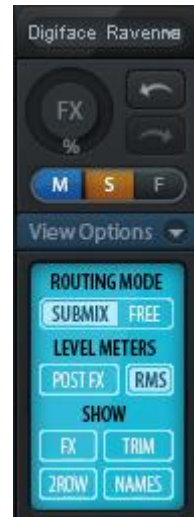
18.5.1 View Options

View Options. This area combines different functions of routing, the level meters and the mixer view.

Routing

➢ **Submix:** The Submix view (default) is the preferred view and delivers the quickest overview, operation and understanding of TotalMix. The click on one of the Hardware Output channels selects the respective submix, all other outputs are darkened. At the same time all routing fields are set to this channel. With Submix view, it is very easy to generate a submix for any output: select the output channel, adjust the fader and pans of first and second row – finished.

➢ **Free:** The Free view is for advanced users. It is used to edit several submixes simultaneously, without the need to change between them. Here one works with the routings fields of the input and playback channels only, which then show different routing destinations.

Level Meters

➢ **Post FX.** Not functional with the Digiface Ravenna.

➢ **RMS Level.** The numerical level display in the channels displays peak or RMS.

Show

➢ **FX.** Not functional with the Digiface Ravenna.

➢ **Trim.** Activates all Trim buttons on all channels. TotalMix thus behaves like a conventional, simple mixing desk. Each fader affects all active routings of the channel simultaneously, as if the fader were a trim-pot in the hardware input.

➢ **2 Row.** Switches the mixer view to 2 rows. Hardware Inputs and Software Playbacks are placed side by side. This view saves a lot of space, especially in height.

➢ **Names.** Display of the original names of channels when they had been renamed by the user.

18.5.2 Snapshots - Groups

Snapshots. Snapshots include all mixer settings, but no graphical elements like window positions, window size, number of windows, visible settings, scroll states etc. Only the state wide/narrow of the channels is registered. Moreover the Snapshot is only temporarily stored. Loading a Workspace causes the loss of all stored Snapshots, when these all had not been saved before in a Workspace, or separately via *File / Save Snapshot as*. Via File / Load Snapshot the mixer states can be loaded individually.

Eight different mixes can be stored under individual names in the Snapshot section. A click on any of the eight buttons loads the corresponding Snapshot. A double click on the name field opens the dialog *Input Name* to edit the name. As soon as the mixer state is changed the button starts flashing. A click on Store lets all buttons flash, whereby the last loaded one, the base of the current state, flashes inversely. The storage finishes by clicking the desired button (means storage place). The storage process is exited by another click on the flashing Store button.

The area Snapshots can be minimized by a click on the arrow in the title bar.

Groups. The area Groups provides 4 storage places each for fader, mute and solo groups. The groups are valid per Workspace, being active and usable in all 8 Snapshots. But with this they are also lost when loading a new workspace, in case they have not been saved before in a different Workspace.

Note: The Undo function will help in case of an accidental overwrite or deletion of the groups.
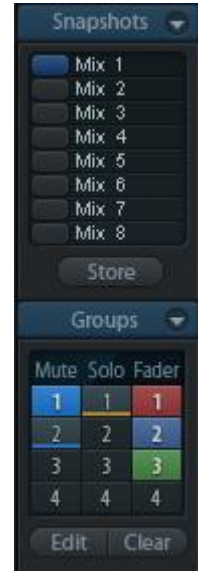
TotalMix uses flashing signals to guide you through the group setup. After a click on Edit and click on the desired storage place all desired functions for this group have to be activated or selected. The storage process is finished by another click on Edit.

When setting up a fader group, make sure to not add faders that are at the most top or lowest position, except all faders of that group have this position.

The Mute groups operate – other than the global mute – exclusively for the current routing. This way you can not mute signals on all outputs unintentionally. Instead signals can be muted on specific submixes by the push of a button.

A solo group operates exactly like the global solo, signals outside the current routing are not affected.

18.5.3 Channel Layout - Layout Presets

To maintain overview within TotalMix FX channels can be hidden. Channels can also be excluded from being remoted. Under *Options / Channel Layout* a dialog lists all I/Os with their current state. Selecting one or several channels enables the options to the right:

➢ **Hide Channel in Mixer/Matrix.** The selected channels are no longer shown in TotalMix FX, nor are they available via MIDI or OSC remote control.
➢ **Hide Channel in MIDI Remote 1-4.** The selected channels are hidden for MIDI remote (CC and Mackie Protocol).
➢ **Hide Channel in OSC Remote 1-4.** The selected channels are hidden for OSC remote control.

Hidden channels in Mixer/Matrix are still fully functional. An existing routing/mixing/FX processing stays active. But as the channel is no longer visible it can not be edited anymore. At the same time the hidden channels are removed from the list of remote controllable channels, to prevent them from being edited unnoticed.
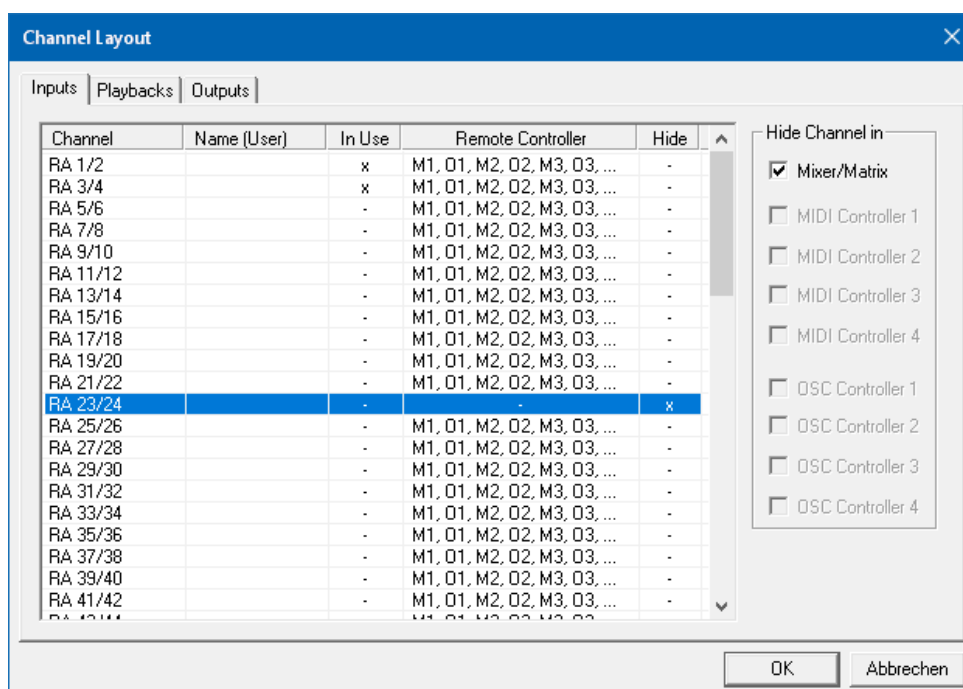
Hidden channels in *MIDI Remote x* are removed from the list of remote controllable channels. Within an 8-channel block of a Mackie compatible control they are skipped. The control therefore is no longer bound to consecutive orders. For example it will control channels 1, 2, and 5 to 11, when channels 3 and 4 are hidden.

The same can be done for OSC. With unnecessary channels made invisible for the OSC remote the more important channels are available as one block on the remote.

The dialog can be called directly from TotalMix by a right mouse click on any channel. The corresponding channel will then be preselected in the dialog.

Rows Inputs, Playbacks and Outputs are set up individually by the tabs at the top. *In Use* shows which channels are currently used in the mixing process. In the above example channel 23/24 have been made invisible. If these are not used this is an easy way to remove them from the mixer completely.

A double click onto any line opens the edit field for the *Name (User)* column. Enter jumps to the next line. The names of the channels in the Control Room section can only be changed this way.

After finishing those settings the whole state can be stored as **Layout Preset**. A click on *Store* and the desired memory slot makes the current channel layout recallable anytime. The button *All* makes all channels temporarily visible again.

With a simple click on a button it will then be possible to easily switch views of only the channels involved with the mixing of the drum section, the horn section, the violins, or any other useful view. An optimized remote layout can be activated here as well, with or without visible changes. Double-click the default slot name to enter any other name.

! *Layout Presets are stored within the Workspace, so make sure to save the current state before loading a different Workspace!*

The button *Sub* activates another useful special view. When in *Submix view*, Sub will cause all channels to disappear that are not part of the currently selected Submix/Hardware Output. Sub temporarily shows the mix based on all channels from Inputs and Playback row, independent from the current Layout Preset. That makes it very easy to see and to verify which channels are mixed/routed to the current output. Sub makes checking and verifying of mixes, but also the mix editing itself, a lot easier, and maintains perfect overview even with lots of channels.

18.5.4 Scroll Location Markers

Another feature to improve overview and working with TotalMix FX are scroll location markers (TotalMix view only). These are displayed automatically when the horizontal size of the TotalMix FX window is smaller than the channel display requires. Shown on the right side of the scrollbar of each row they have four elements:

➢ **Arrow to the left.** A left mouse click let the channels scroll to the very first one, or most left.
➢ **1.** Marker number 1. Scroll to the desired position and perform a right mouse click on 1. A dialog comes up with precise information. Once stored, a left mouse click will scroll the channels to the stored position.
➢ **2.** Marker number 2. See 1 for details.
➢ **Arrow to the right.** A left mouse click let the channels scroll the last one, or most right.
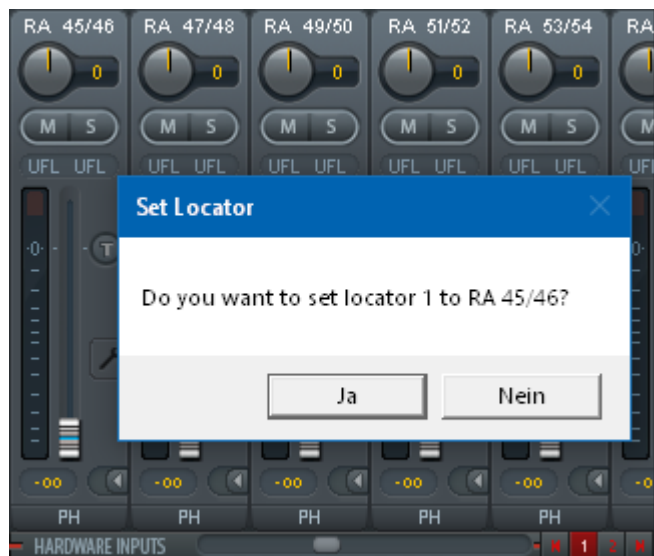
Location markers are stored in the Workspace.

Application Examples

While originally added to improve navigation in the HDSPe MADI FX (having 196 channels that never fit on any screen), the scroll location markers are also helpful with units having less channels:

• When the TotalMix FX window is intentionally made small in width, so only a few channels are shown.
• When some or all Settings panels are open. Then all settings are always visible, but require a lot of space horizontally.

18.6 Preferences

The dialog Preferences can be opened via the *Options* menu or directly via F2.

Level Meters

➢ **Full scale samples for OVR.** Number of consecutive samples to trigger an over detection (1 to 10).

➢ **Peak Hold Time.** Hold time of the peak value. Adjustable from 0.1 up to 9.9 s.

➢ **RMS +3 dB.** Shifts the RMS value by +3 dB, so that full scale level is identical for Peak and RMS at 0 dBFS.

Mixer Views

➢ **FX Send follows highest Submix.**

➢ **FX Send follows Main Out.** Not available for the Digiface Ravenna - no FX.

➢ **Center Balance/Pan when changing Mono/Stereo.** When switching a stereo channel into two mono channels the pan-pots are set fully left and right. This option will set them to center instead.

➢ **Disable mouse wheel operation.** Prevents unintentional changes when using the mouse wheel.

➢ **Disable double click fader action.** Prevents unintentional gain settings, for example when using sensitive touchpads.

➢ **Store channel open/close in Layout Preset.** Also loads the state of the channel panels (Setting/EQ/Dyn).

Dynamic Meters

Not available for the Digiface Ravenna.

Snapshots

➢ **Do not load - Main Volume, Main/Phones Volumes, Control Room Settings.** The selected values stored in the Snapshot are not loaded, so the current setting is not changed.

Device Handling

➢ **Always init DSP devices with TotalMix FX settings.** For the Digiface Ravenna: always on, as the unit does not store any. When connecting to a computer TotalMix FX will immediately load its settings into the Digiface.

➢ **Count MADI Channels per port.** Not available for the Digiface Ravenna.

➢ **Disable ASIO Direct Monitoring.** Disables ASIO Direct Monitoring (ADM) for the Digiface Ravenna within TotalMix FX.

Graphics

➢ **Use D2D (Change requires restart).** Default on. Can be deactivated to use a compatible but CPU-taxing graphics mode, in case graphics problems show up.

➢ **Brightness correction.** Set TotalMix FX screen brightness to your taste, matching the monitor setting or the environment.

Store Setting for

➢ **All Users (Restart required).** See next chapter.

Special Options

➢ **Lock User Interface.** Default off. Can be activated to freeze the current mix state. Faders, buttons and knobs relating to the mix state can not be moved anymore.

➢ **Enter Password (Windows only).** Secures the locked user interface with an additional password.

18.6.1 Store for Current or All Users

TotalMix FX stores all settings, workspaces and snapshots for the *current user* in:

XP: C:\Documents and Settings\ Username\Local Settings\ Application Data\TotalMixFX

Since Vista: C.\Users\Username\AppData\Local\TotalMixFX

Mac Current User: user/Library/Application Support/RME TotalMix FX

Mac All Users: /Library/Application Support/RME TotalMix FX

Current User ensures that when workstations are used by several people they all find their own settings. In case the settings should be identical or given for any user, TotalMix FX can be changed to use the *All User* directory. An admin could even write protect the file **lastDigiface Ravenna1.xml**, which results in a complete reset to that file's content whenever TotalMix FX is restarted. The xml-file is updated on exit, so simply set up TotalMix as desired and exit it (right mouse click on the symbol in the notification area).

18.7 Settings

The dialog Settings can be opened via the *Options* menu or directly via F3.

18.7.1 Mixer Page

On the mixer page some typical settings for the mixer operation are set, like Talkback source, Dim amount when Talkback is active, the stored main volume or the input used for the External Input function.

Talkback
- ➢ **Input.** Selects the input channel of the Talkback signal (microphone in control room). Default: None.
- ➢ **Dim.** Amount of attenuation of the signals routed to the *Phones* in dB.

Listenback
- ➢ **Input.** Selects the input channel of the Listenback signal (microphone in recording room). Default: None.
- ➢ **Dim.** Amount of attenuation of the signals routed to the *Main Out* in dB.

Main Out
- ➢ **Recall.** User defined listening volume, activated by the Recall button at the unit or in TotalMix.
- ➢ **Dim.** Amount of attenuation for the Main Out in dB.
- ➢ **External Input.** Selects the stereo input that replaces the mix signal on the Main Out when activated. The volume of the stereo signal is adjusted by the slider Gain.

Solo/PFL Mode
- ➢ **Live Mode, PFL replaces Solo.** PFL means Pre Fader Listening. This feature is very useful when operating TotalMix in a live environment, as it allows to quickly listen/monitor any of the inputs by hitting the Solo button. Monitoring happens on the output set for the Cue signal via the Assign dialog.
- ➢ **Exclusive Solo/PFL Mode.** Only a single Solo or PFL can be active at a time. Activating a different one automatically deactivates the previous one.
- ➢ **2-Row Mode with only Input in first row.** The Software Playback channels are shifted to the lower row, beside the Hardware Outputs.
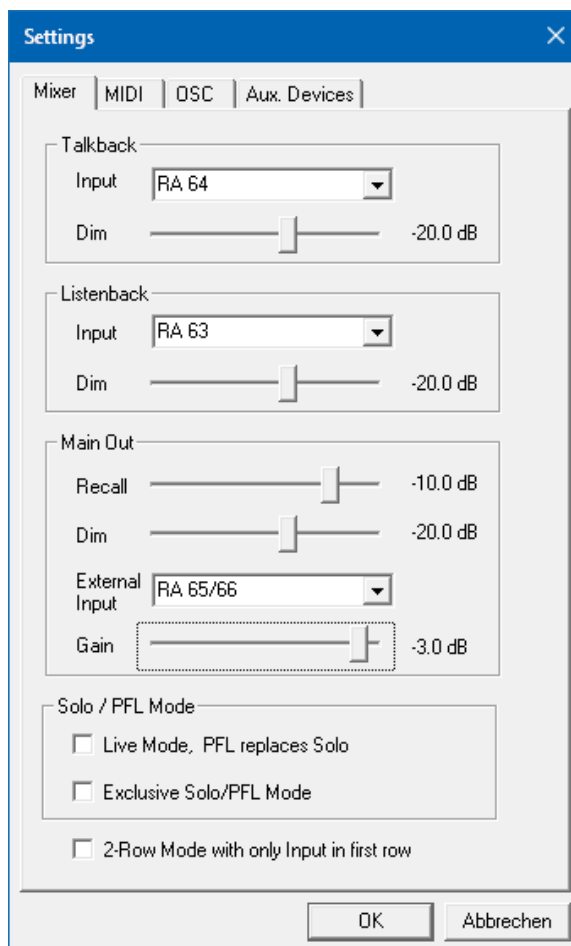
18.7.2 MIDI Page

The MIDI page has four independent settings for up to four MIDI remote controls, using CC commands or the Mackie Control protocol.

Index
Select one of four settings pages and thus remote controls. Settings are remembered automatically. To activate or deactivate any of the four remote controls check or uncheck 'In Use'.

MIDI Connection
> **MIDI In.** Input where TotalMix receives MIDI remote data.
> **MIDI Out.** Output where TotalMix sends MIDI remote data.
> **Disable MIDI in background.** Deactivates MIDI Remote Control as soon as another application is in the focus, or when TotalMix has been minimized.

Mackie Control Options
> **Enable Protocol Support.** When disabled TM FX will only react on the Control Change commands of chapter 21.5.
> **Extender to.** Sets the current remote to be an extender to the main remote. Both remotes will be shown as one block and navigate simultaneously.
> **Map Stereo to 2 Mono Channels.** One fader controls one (mono) channel. Should be disabled when stereo channels are used.
> **Submix Selection in Input/Playback Row.** Enables a selection of the submix when in first row, without having to change to the third row first. However, when using both mono and stereo channels first and third row usually do not match anymore, so the selection often becomes unclear this way.
> **Enable full LCD support.** Activates full Mackie Control LCD support with eight channel names and eight volume/pan values.
> **Send User defined Names.** Channel names defined by the user will be sent to the remote device via MIDI and – if supported – shown in its display.
> **Send Level Messages.** Activates the transmission of the level meter data. *Peak Hold* activates the peak hold function as set up for the TotalMix level meters in the preferences.
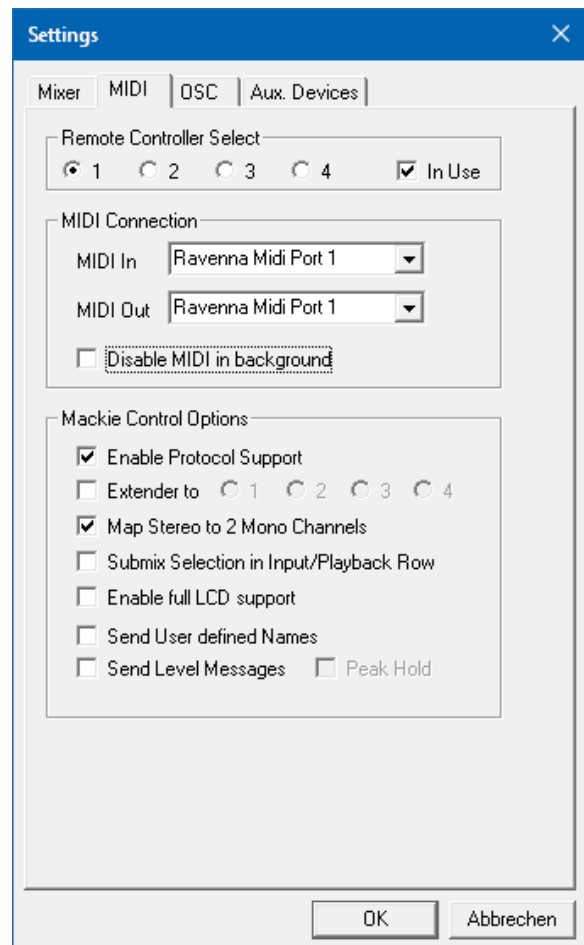
Note: When MIDI Out is set to NONE then TotalMix FX can still be controlled by Mackie Control MIDI commands, but the 8-channel block is not marked as remote target.

18.7.3 OSC Page

The OSC page has four independent settings for up to four MIDI remote controls via Open Sound Control (OSC). This is a network based remote protocol that can be used for example by Apple's iPad with the app *TouchOSC* or *Lemur* to wirelessly remote control TotalMix FX running on a Mac or Windows computer.

Index
Select one of four settings pages and thus remote controls. Settings are remembered automatically. To activate or deactivate any of the four remote controls check or uncheck 'In Use'.

TotalMix FX OSC Service
➢ **IP.** Shows the network address of the computer running TotalMix FX (local host). This address must be entered on the remote side.
➢ **Host Name.** Local computer name.
➢ **Port incoming.** Must match the remote entry 'Port outgoing'. Typical values are 7001 or 8000.
➢ **Port outgoing.** Must match the remote entry 'Port incoming'. Typical values are 9001 or 9000.

Remote Control
➢ **IP or Host name.** Enter the IP or host name of the remote control. Please note that the IP number usually works better than the host name.

Options
➢ **Send Peak Level.** Activates the transmission of the peak level meter data. *Peak Hold* activates the peak hold function as set up for the TotalMix level meters in the preferences.
➢ **Lock Remote to submix.** When activated the current remote control can only modify the submix selected from the drop-down list. This prevents havoc in multi-remote monitoring environments.
➢ **Number of faders per bank.** Available choices are 8 (default), 12, 16, 24, 32 and 48. Note that when working in underperforming networks, especially wireless, a higher number of faders might not work as smooth as expected.

18.7.4 Aux Devices

The RME OctaMic XTC is a highly flexible hi-quality 8-channel microphone, line and instrument preamp with integrated AD-conversion to ADAT, AES/EBU and MADI, plus 4 channels of DA-conversion for monitoring. It can be used as universal front-end for the Digiface Ravenna and other interfaces.

To simplify operation the most important parameters of the XTC (gain, 48V, phase, mute, AutoSet) can be controlled directly from the TotalMix FX input channels. This special remote control uses MIDI of any format (DIN, USB, MIDI over MADI). A remote control via RAVENNA is not supported.

Device Settings
➢ **Digital Channels.** Select where the OctaMic XTC sends its 8 analog channels to. With the Digiface Ravenna these are the 8-channel MADI blocks 65-128.
➢ **Device.** At this time only the OctaMic XTC is supported and can be chosen.
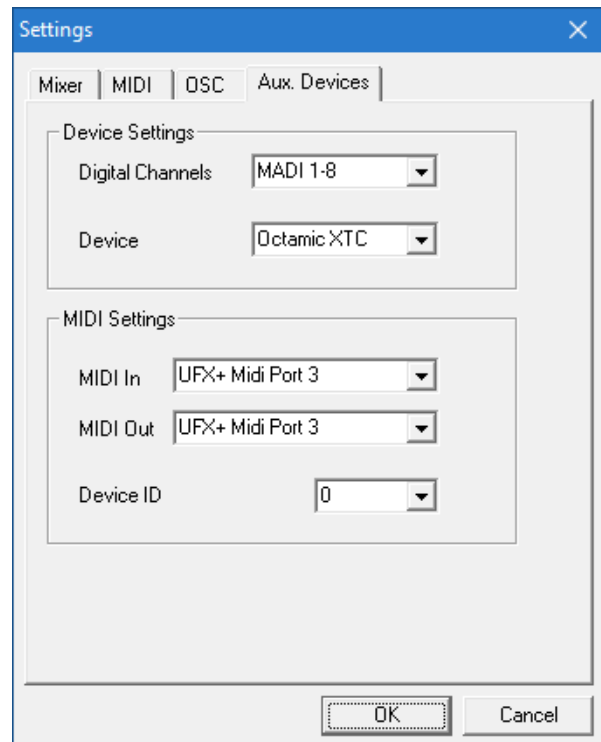
MIDI Settings
➢ **MIDI In.** Set the currently used MIDI connection to the OctaMic XTC.
➢ **MIDI Out.** Set the currently used MIDI connection to the OctaMic XTC.
➢ **Device ID.** Default 0. This setting relates to the current choice in Digital Channels.

When using more than one OctaMic XTC these must have different Device IDs (configuration is done at the OctaMic XTC). *Aux Devices* supports to set different Device IDs to the 8-channel blocks as well. Storing the setting is done automatically when selecting a Device ID. To check the current assignments toggle the two 8-channel blocks.

The screenshot to the right shows what happens as soon as the above settings have been confirmed with OK. The MADI channels show new elements for phantom power, Inst/PAD, Gain and AutoSet. Control operates bidirectional, so changing the gain at the unit will be mirrored in the TotalMix channels. Changing the gain in TotalMix FX will set the gain in the unit, which is also shown on the unit's display.

For the remote to work the XTC's currently used MIDI I/Os have to be set to *Control*. More details are found in the manual of the OctaMic XTC.

18.8 Hotkeys and Usage

TotalMix FX has many hotkeys and mouse/hotkey combinations to speed up and simplify the usage. The below description refers to Windows. On Mac substitute *Ctrl* in the below list with the command key (⌘).

The **Shift** key enables a fine-tuning of the gain with all faders and in the Matrix. On all knobs it will speed up the setting.

A click on a **fader** with held down **Shift** key adds the fader to the temporary fader group.

A click in the **fader path** with held down **Ctrl** key will let the fader jump to 0 dB, at the next click to −∞. Same function: Double click of the mouse.

Clicking on one of the **Panorama** or **Gain** knobs with held down **Ctrl** key lets the knob jump tp center position. Same function: Double click of the mouse.

Clicking on the **Panorama** knob with held down **Shift** key lets the knob jump to fully left, with **Shift-Ctrl** to fully right.

Clicking on one of the channel settings buttons (slim/normal, settings) with held down **Shift** key lets all channels to the right change their state. For example all settings panels can be opened/closed simultaneously.

A **double click** of the mouse on a knob or its numerical field opens the according *Input Value* dialog. The desired value can then be set by keyboard.

Dragging the mouse from a parameter field increases (move up) or decreases (move down) the value in the field.

Ctrl-N opens the dialog *Function Select* to open a new TotalMix window.

Ctrl-W opens the dialog *File Open* of the operating system to load a TotalMix Workspace file.

The key **W** starts the dialog *Workspace Quick Select* for a direct selection or storage of up to 30 Workspaces.

The key **M** switches the active window to Mixer view. The key **X** switches the active window to Matrix view. **Ctrl-M** opens a new Mixer window, **Ctrl-X** opens a new Matrix window. Another Ctrl-M or Ctrl-X closes the new window again.

F1 opens the online help. The Level Meter setup dialog can be opened with **F2** (same as in DIGICheck). The dialog Preferences is opened with **F3**.

Alt-F4 closes the current window.

Alt and **number** keys 1 to 8 (not on the numeric keypad!) will load the corresponding Workspace from the Workspace Quick Select feature (hotkey W).

18.9 Menu Options

Deactivate Screensaver: When active (checked) any activated Windows screensaver will be disabled temporarily.

Always on Top: When active (checked) the TotalMix window will always be on top of the Windows desktop.
Note: This function may result in problems with windows containing help text, as the TotalMix window will even be on top of those windows, so the help text isn't readable.

Enable MIDI / OSC Control: Activates external MIDI control of the TotalMix mixer. In Mackie Protocol mode the channels which are currently under MIDI control are indicated by a colour change of the name field.

Submix linked to MIDI / OSC controller (1-4). The 8-channel group follows the currently selected submix, means Hardware Output, when a different submix is chosen on the remote as well as when doing this in TotalMix. When using multiple windows it can be useful to deactivate this feature for specific windows. The view will not change then.

Preferences: Opens a dialog box to configure several functions of the level meters and the mixer. See chapter 18.6.

Settings. Opens a dialog box to configure several functions like Talkback, Listenback, Main Out and the MIDI Remote Control. See chapter 18.7.

Channel Layout. Hide channels visually and exclude them from remote. See chapter 18.5.3.

ARC & Key Commands. Opens a dialog to configure the computer's keyboard keys F4 to F8, and the buttons of the optional ARC USB.

Reset Mix. Offers several options to reset the mixer state:

➤ **Straight playback with all to Main Out.** All Playback channels are routed 1:1 to the Hardware Outputs. Simultaneously all playbacks are mixed down to the Main Out. The faders in the third row are not changed.

➤ **Straight Playback.** All Playback channels are routed 1:1 to the Hardware outputs. The faders in the third row are not changed.

➤ **Clear all submixes.** Deletes all submixes.

➤ **Clear channel effects.** Not valid for the Digiface Ravenna.

➤ **Set output volumes.** All third row faders will be set to 0 dB, Main and Speaker B to -10 dB.

➤ **Reset channel names.** Removes all names assigned by the user.

➤ **Set all channels mono.** Reconfigures all TotalMix FX channels to mono mode.

➤ **Set all channels stereo.** Reconfigures all TotalMix FX channels to stereo mode.

➤ **Set inputs mono / outputs stereo (ADM).** Preferred setup for best ASIO Direct Monitoring compatibility. In most cases mono hardware outputs will break ADM. Mono inputs are in most cases compatible. If not wrong panning might occur.

➢ **Total Reset.** Playback routing 1:1 with mixdown to Main Out. Switches off all other functions.

Operational Mode. Choice of Full Mode or DAW mode. See chapter 18.5.

Network Remote Settings. See chapter 18.5.

Store Current State into Device. Current Submix Phones is used for stand-alone operation.

18.10 Menu Window

Zoom Options 100%, 135%, 200%. Depending on the size of the monitor and the current resolution TotalMix FX might be much too small and the controls too tiny to easily operate them. Together with the 2 Row mode these options give a lot of different window sizes that suit all monitors and resolutions currently existing.

Hide Control Strip. Shifts the Control Strip out of the visible area to gain more space for other elements.

19. The Matrix

19.1 Overview

The mixer window of TotalMix looks and operates similar to mixing desks, as it is based on a conventional fader stereo design. The matrix display presents a different method of assigning and routing channels, based on a single channel or monaural design. The matrix view of the Digiface Ravenna has the look and works like a conventional patchbay, adding functionality way beyond comparable hardware and software solutions. While most patchbays will allow you to connect inputs to outputs with just the original level (1:1, or 0 dB, as known from mechanical patchbays), TotalMix allows you to use a freely definable gain value per crosspoint.

Matrix and TotalMix are different ways of displaying the same processes. Therefore both views are always synchronized. A change in one view is immediately reflected in the other view.

19.2 Elements of the Matrix View

➢ **Horizontal labels.** All hardware outputs

➢ **Vertical labels.** All hardware inputs. Below are all playback channels.

➢ **Green 0.0 dB field.** Standard 1:1 routing

➢ **Dark grey field with number.** Shows the current gain value as dB

➢ **Blue field.** This routing is muted

➢ **Red field.** Phase 180° (inverted)

➢ **Dark grey field.** No routing.

To maintain overview when the window size has been reduced, the labels are floating. They won't leave the visible area when scrolling.

A right mouse click on the labels brings up the context menu with the same options as in the mixer view: Copy / Mirror / Paste /Clear input channels and submixes.

19.3 Operation

Using the Matrix is a breeze. It is very easy to identify the current crosspoint, because the outer labels light up in orange according to the mouse position.

➢ If input 1 is to be routed to output 1, use the mouse and click one time on crosspoint **1** / **Out 1** with held down Ctrl key. Two green 0.0 dB field pop in, another click removes them.
➢ To change the gain (equals the use of a different fader position, see simultaneous display of the mixer view), drag the mouse up or down, starting from the gain field. The value within the field changes accordingly. The corresponding fader in the mixer view is moving simultaneously, in case the currently modified routing is visible.
➢ On the right side is the Control Strip from the mixer window, adapted to the Matrix. The button for the temporary fader group is missing as well as all View options, as they don't make sense here. Instead the button *Mono Mode* lets you decide whether all the actions performed in the Matrix are valid for two channels or just one.

The Matrix not always replaces the mixer view, but it significantly enhances the routing capabilities and - more important - is a brilliant way to get a fast overview of all active routings. It shows you in a glance what's going on. And since the Matrix operates monaural if desired, it is very easy to set up specific routings with specific gains.

20. Tips and Tricks

20.1 ASIO Direct Monitoring (Windows)

Programs that support ADM (ASIO Direct Monitoring - Samplitude, Sequoia, Cubase, Nuendo etc.) send control commands to TotalMix. This is directly shown by TotalMix. When a fader is moved in the ASIO host the corresponding fader in TotalMix will move too. TotalMix reflects all ADM gain and pan changes in real-time.

But: the faders only move when the currently activated routing (the selected submix) corresponds to the routing in the ASIO host. The Matrix on the other hand will show any change, as it shows all possible routings in one view. For best ADM compatibility use mono inputs and stereo outputs. This setup can be activated globally under Options, Reset Mix.

20.2 Copy a Submix

TotalMix allows you to copy complete submixes to other outputs. In case a complex submix is needed with only a few changes on a different output, the whole submix can be copied to that output. Right click with the mouse on the original submix output, means Hardware Output. In the context menu select Copy Submix. Then right click on the new submix output, choose Paste Submix in the context menu. Now fine tune the submix.

20.3 Doubling the Output Signal (Mirror)

If a mix should be sent out via two (or more) different hardware outputs simply mirror that mix to any number of other outputs. A right click on the original output brings up the option to *Copy/Mirror <name>*. Another right click on the new output, then selecting *Mirror of Output <name>* will paste the whole submix and then synchronize it automatically to any future changes. The outputs now always send out the same signals, but their main volume (faders) stay fully independent.

20.4 Delete a Submix

The easiest and quickest way to delete complex routings is by selection of the according output channel in the mixer view by a right mouse click, and selection of the menu entry *Clear Submix*. As TotalMix FX includes an unlimited undo the delete process can be undone easily.

20.5 Copy and Paste everywhere

The above three tips use functions found in the right click context menu available on all channels of the TotalMix FX mixer view. These menus are also available in the Matrix, but only directly on the channel labels. They are self-explanatory and automatically adjust to where the click is performed. The input channels offer *Clear, Copy input* and *Paste the input mix*. On a playback channel *Copy, Paste* and *Clear the playback mix* are available. On an output channel *Copy* and *Mirror* functionality for the current submix is offered.

These options are very advanced and mighty tools to quickly do the impossible. Still there is no need to fear breaking something, as a simple click (or several) on the Undo button will get you back to where you started!

20.6 Recording a Submix - Loopback

TotalMix includes an internal loopback function, from the Hardware Outputs to the recording software. Instead of the signal at the hardware input, the signal at the hardware output is sent to the record software. This way, submixes can be recorded without an external loopback cable. Also the playback from a software can be recorded by another software.

The function is activated by the **Loopback** button in the Settings panel of the Hardware Outputs. In loopback mode, the signal at the hardware input of the corresponding channel is no longer sent to the recording software, but still passed through to TotalMix. Therefore TotalMix can be used to route this input signal to any hardware output. Using the subgroup recording, the input can still be recorded on a different channel.

As each of the 64 stereo hardware outputs can be routed to the record software, and none of these hardware inputs get lost, TotalMix offers an overall flexibility and performance not rivalled by any other solution.

The risk of feedbacks, a basic problem of loopback methods, is low, because the feedback can not happen within the mixer, only when the audio software is switched into monitoring mode.
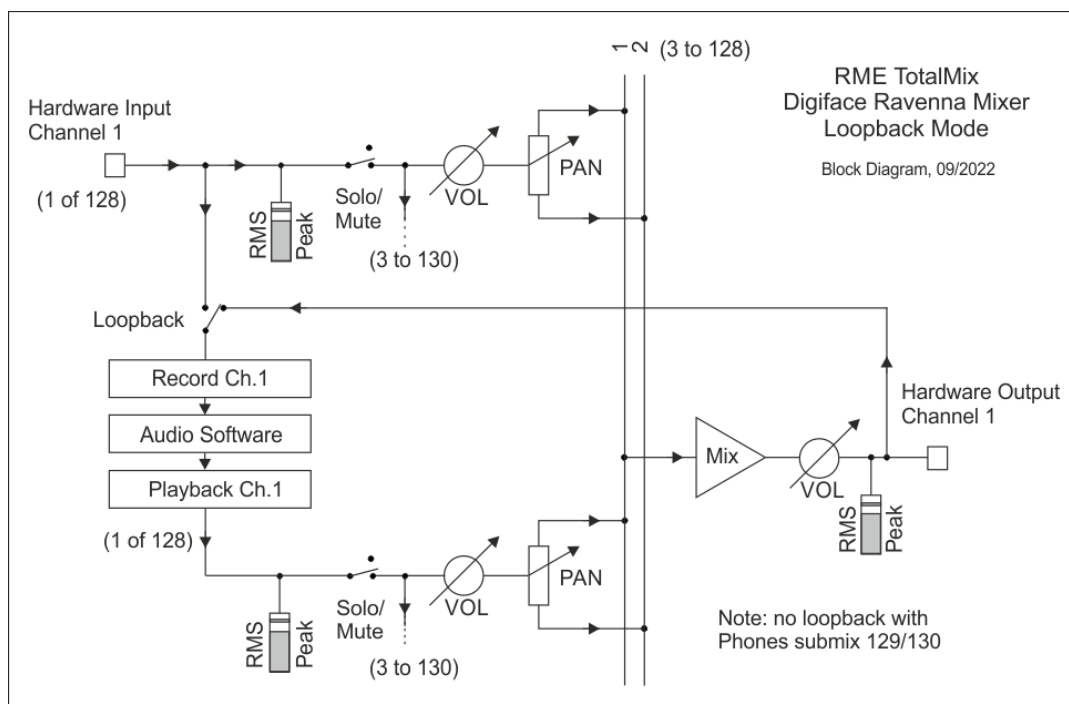
The block diagram shows how the software's input signal is played back, and fed back from the hardware output to the software input.

Recording a Software's playback
In real world application, recording a software's output with another software will show the following problem: The record software tries to open the same playback channel as the playback software (already active), or the playback one has already opened the input channel which should be used by the record software.

This problem can easily be solved. First make sure that all rules for proper multi-client operation are met (not using the same record/playback channels in both programs). Then route the playback signal via TotalMix to a hardware output in the range of the record software, and activate Loopback for recording.

Mixing several input signals into one record channel
In some cases it is useful to record several sources into only one track. For example when using two microphones recording instruments and loudspeakers, TotalMix' Loopback mode saves an external mixing desk. Simply route/mix the input signals to the same output (third row), then re-define this output into a record channel via Loopback. This way any number of input channels from different sources can be recorded into one single track.

20.7 MS Processing

The mid/side principle is a special positioning technique for microphones, which results in a mid signal on one channel and a side signal on the other channel.

These information can be transformed back into a stereo signal quite easily. The process sends the monaural mid channel to left and right, the side channel too, but phase inverted (180°) to the right channel. For a better understanding: the mid channel represents the function L+R, while the side channel represents L-R.
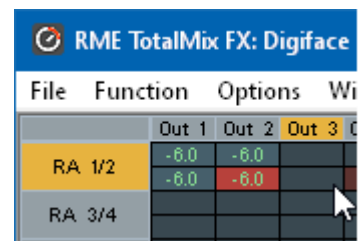
During record the monitoring needs to be done in 'conventional' stereo. Therefore TotalMix also offers the functionality of a M/S-decoder. Activation is done in the Settings panel of the Hardware Input and Software Playback channels via the **MS Proc** button.

The M/S-Processing automatically operates as M/S encoder or decoder, depending on the source signal format. When processing a usual stereo signal, all monaural information will be shifted into the left channel, all stereo information into the right channel. Thus the stereo signal is M/S encoded. This yields some interesting insights into the mono/stereo contents of modern music productions. Additionally some very interesting methods of manipulating the stereo base and generating stereo effects come up, as it is then very easy to process the side channel with Low Cut, Expander, Compressor or Delay.

The most basic application is the manipulation of the stereo width: a change of the level of the side channel allows to manipulate the stereo width from mono to stereo up to extended.

20.8 Program start options (Windows only)

Under Windows TotalMix FX supports command line options. Appending the file name of a workspace loads it. Example: *TotalMixFX.exe path\startworkspace.tmws.* For automated loading, the parameter */nc* can be used to suppress the confirmation dialog of loading the workspace.

21. MIDI Remote Control

21.1 Overview

TotalMix can be remote controlled via MIDI. It is compatible to the widely spread Mackie Control protocol, so TotalMix can be controlled with all hardware controllers supporting this standard. Examples are the Mackie Control, Tascam US-2400 or Behringer BCF 2000.

Additionally, the stereo output faders (lowest row) which are set up as *Main Out* in the Control Room section can also be controlled by the standard **Control Change Volume** via **MIDI channel 1**. With this, the main volume of the Digiface Ravenna is controllable from nearly any MIDI equipped hardware device.

MIDI Remote Control always operates in View *Submix* mode, even when the View Option *Free* is currently selected in TotalMix FX.

21.2 Mapping

TotalMix supports the following Mackie Control surface elements*:

Element:	Meaning in TotalMix:
Channel faders 1 – 8	volume
Master fader	Main Monitor channel's faders
V-Pots 1 – 8	pan
pressing V-Pot knobs	pan = center
CHANNEL LEFT or REWIND	move one channel left
CHANNEL RIGHT or FAST FORWARD	move one channel right
BANK LEFT or ARROW LEFT	move eight channels left
BANK RIGHT or ARROW RIGHT	move eight channels right
ARROW UP or Assignable1/PAGE+	move one row up
ARROW DOWN or Assignable2/PAGE-	move one row down
EQ	Master Mute
PLUGINS/INSERT	Master Solo
STOP	Dim Main Out
PLAY	Talkback
PAN	Mono Main Out
FLIP	Speaker B
DYN/INSTRUMENT	TrimGains
MUTE Ch. 1 – 8	Mute
SOLO Ch. 1 – 8	Solo
SELECT Ch. 1 – 8	Select
REC Ch. 1 – 8	select output bus (Submix)
RECORD	Recall
F1 - F8	load Snapshot 1 - 8
F9	select Main Out
F10 - F12	select Cue Phones 1 - 3

*Tested with Behringer BCF2000 Firmware v1.07 in Mackie Control emulation for Steinberg mode and with Mackie Control under Mac OS X.

21.3 Setup

Open the Settings dialog (menu Options or F3). On the MIDI tab Select the MIDI Input and MIDI Output port where your controller is connected to.

When no feedback is needed select NONE as MIDI Output.

Check *Enable MIDI Control* in the Options menu.

21.4 Operation

The channels being under Mackie MIDI control are indicated by a colour change of the name field, black turns to brown.

The 8-fader block can be moved horizontally and vertically, in steps of one or eight channels.

In Submix View mode, the current routing destination (output bus) can be selected via REC Ch. 1 – 8. This equals the selection of a different output channel in the lowest row by a mouse click when in Submix View. In MIDI operation it is not necessary to jump to the lowest row to perform this selection. This way even the routing can be easily changed via MIDI.

Full LC Display Support: This option in Preferences (F3) activates complete Mackie Control LCD support with eight channel names and eight volume/pan values. When *Full LC Display Support* is turned off, a brief information about the first fader of the block (channel and row) is sent. This brief information is also available on the LED display of the Behringer BCF2000.

Disable MIDI in Background (menu Options, Settings) disables the MIDI control as soon as another application is in the focus, or in case TotalMix has been minimized. This way the hardware controller will control the main DAW application only, except when TotalMix is in the foreground. Often the DAW application can be set to become inactive in background too, so that MIDI control is switched between TotalMix and the application automatically when switching between both applications.

TotalMix also supports the 9th fader of the Mackie Control. This fader (labelled Master) will control the stereo output fader (lowest row) which is set up as *Main Out* in the Control Room section.

Extender support (Settings, tab MIDI) enables the use of the special Extender mixing desk, but also the addition of any other Mackie compatible remote. Setting the main remote as number 2 and the extender as number 1 will cause the extender to be on the left side. Using this function the remotes will be shown as one fader block and navigate as one.

21.5 MIDI Control

The hardware output set up as *Main Out* can be controlled by the standard **Control Change Volume** via **MIDI channel 1**. With this, the main volume of the Digiface Ravenna is controllable from nearly any MIDI equipped hardware device.

Even if you don't want to control all faders and pans, some buttons are highly desirable to be available in 'hardware'. These are mainly the *Talkback* and the *Dim* button, and the monitoring options (listen to Phones submixes). Fortunately a Mackie Control compatible controller is not required to control these buttons, as they are steered by simple Note On/Off commands on MIDI channel 1.

The notes are (hex / decimal / keys):

Dim: 5D / 93 / **A 6**
Mono: 2A / 42 / **#F 2**
Talkback: 5E / 94 / **#A 6**
Recall: 5F / 95 / **B 6**
Speaker B: 32 / 50 / **D3**

Cue Main Out: 3E / 62 / **D 4**
Cue Phones 1: 3F / 63 / **#D 4**
Cue Phones 2: 40 / 64 / **E 4**
Cue Phones 3: 41 / 65 / **F 4**
Cue Phones 4: 42 / 66 / **#F 4**

Snapshot 1: 36 / 54 / **#F 3**
Snapshot 2: 37 / 55 / **G 3**
Snapshot 3: 38 / 56 / **#G 3**
Snapshot 4: 39 / 57 / **A 3**
Snapshot 5: 3A / 58 / **#A 3**
Snapshot 6: 3B / 59 / **B 3**
Snapshot 7: 3C / 60 / **C 4**
Snapshot 8: 3D / 61 / #**C 4**

Trim Gains: 2D / 45 / **A 2**
Master Mute: 2C / 44 / **#G2**
Master Solo: 2B / 43 / **G2**

Note: Switching off Mackie Protocol support in *Settings / Mackie Control Options* will also disable the above simple MIDI note commands, as they are part of the Mackie protocol.

Furthermore all faders of all three rows can be controlled via simple **Control Change** commands. The format for the Control Change commands is:

Bx yy zz

x = MIDI channel
yy = control number
zz = value

The first row in TotalMix is addressed by MIDI channels 1 up to 4, the middle row by channels 5 up to 8 and the bottom row by channels 9 up to 12.

16 Controller numbers are used: 102 up to 117 (= hex 66 to 75). With these 16 Controllers (= faders) and 4 MIDI channels each per row, up to 64 faders can be controlled per row.

Examples for sending MIDI strings:

- Set input 1 to 0 dB: B0 66 68
- Set input 5 to maximum attenuation: B1 6A 0
- Set playback 1 to maximum: B4 66 7F
- Set Output 3 to 0 dB: B8 68 68

Note: Sending MIDI strings requires to use programmer's logic for the MIDI channel, starting with 0 for channel 1 and ending with 15 for channel 16.

Further functions:

- Trim Gains On: BC 66 xx (BC = MIDI channel 13, xx = any value)
- Trim Gains Off: BC 66 xx or select a submix

Select submix (fader) in third row:
- channel 1/2: BC 68/69 xx
- channel 3/4: BC 6A/6B xx
etc.

21.6 Loopback Detection

The Mackie Control protocol requires feedback of the received commands, back to the hardware controller. So usually TotalMix will be set up with both a MIDI input and MIDI output. Unfortunately any small error in wiring and setup will cause a MIDI feedback loop here, which then completely blocks the computer (the CPU).

To prevent the computer from freezing, TotalMix sends a special MIDI note every 0.5 seconds to its MIDI output. As soon as it detects this special note at the input, the MIDI functionality is disabled. After fixing the loopback, check *Enable MIDI Control* under Options to reactivate the To-talMix MIDI.

21.7 OSC (Open Sound Control)

Besides simple MIDI notes, the Mackie Protocol and Control Change commands, TotalMix FX can also be controlled by the Open Sound Control, OSC. For details on setup and usage see chapter 18.7.3.

An OSC implementation chart can be downloaded from the RME website:

http://www.rme-audio.de/downloads/osc_table_totalmix_new.zip

RME offers a free iPad template for the iOS app TouchOSC (by Hexler, available in the Apple App-Store):

http://www.rme-audio.de/downloads/tosc_tm_ipad_template.zip

The RME forum hosts further information, more templates (iPhone…) and lots of useful user feed-back.

22. DAW Mode

Users that work exclusively with their DAW software, and don't want to use TotalMix FX for additional routing tasks, need a way to be sure that TotalMix FX currently doesn't change the DAW's routing. While *Reset Mix* can do so, those users would be better served with a very simple surface that offers the interface's hardware controls (gain, phantom control, instrument…), but guarantees a straight 1:1 routing for all playback channels, and has no hardware monitoring of the input channels (which is then done by the DAW software).

For such cases TotalMix FX includes an alternative operating mode. It can be booted into the so called *DAW mode*. This simplified interface is for anyone performing all monitoring and routing within the DAW. The DAW mode restarts TM FX into a light version with just two rows, no playback row, and no mixing faders in the input row. Routing is 1:1 only. Just the hardware controls (if existing) and hardware output levels are available.

To change the current mode go to the menu, Options, and click on *Operational Mode*. Choices are *Full Mode* (default, mixer active, all routing options available), and *Digital Audio Workstation Mode* (straight playback routing, no input mix).

Several useful, advanced features are still available in TotalMix FX in DAW mode:
➢ Talkback, External Input
➢ Phones definition and handling with Talkback
➢ Speaker A / B
➢ All FX (EQ, Dynamics, Echo, Reverb – not for the Digiface Ravenna)
➢ Mute and Solo
➢ Cue / PFL

23. TotalMix Remote

TotalMix Remote is a remote control for TotalMix FX v1.50 and up, to control the hardware mixer and effects in RME audio interfaces. TotalMix Remote mirrors the current state of the host system on the iPad and Windows/Mac computers - the entire mixing state, the complete routing, all FX settings, up to the level meters, and everything in real-time. TotalMix Remote supports up to three hosts with multiple interfaces each, allowing Apple's popular iPad and Windows/Mac computers to adjust all the mixer and FX settings from a distance, via Ethernet and WiFi.

Supported Hardware

TotalMix Remote communicates with TotalMix FX 1.50 or up. Any RME hardware that can be used with TotalMix FX is supported automatically.

Quick Start

On the host (the computer with the connected audio interface) go to the TotalMix FX menu *Options, Network Remote Settings*. Click *Enable TotalMix Remote Server* to start this service. Under Windows a Firewall warning will come up. Allow TotalMix FX or it won't work. This dialog also shows the host's IP, like 192.168.1.45.

Make sure both host and remote computer / iPad reside in the same network. Start TotalMix Remote on the remote computer / iPad (not on the host!). On the iPad, tap on the gear symbol in the upper right corner, then on *Host Connection Settings*. On Windows / Mac either the dialog comes up automatically or can be called from the *Search Connected Hosts* dialog. Type in the **host's** IP address (like 192.168.1.45) into the IP field of *Host Connection 1*, and make sure it is activated. The port defaults to 7009 and usually must not be changed. In case this port is unexpectedly occupied a warning message will be issued. Choose a different port then. Under Windows a Firewall warning will come up. Allow TotalMix Remote or it won't work.

Tap Done on top or click Ok. In the mixer view the state should change from *offline* to *connected* within a few seconds.

The Add button provides access to the user-management that can be configured in detail. Here users can be defined, with and without a password, and the rights can be assigned to viewing only, changing a specific sub-mix, or full access. For example, using Total-Mix FX as a monitor controller for all band members, user-management prevents the bassist from changing the guitarist's monitor mix. Or the drummer making himself too loud. Etc.

Tip

The remotes have the option *Sync Channel Layouts* active as default (in Preferences). This option transfers the Layout Presets and the current Channel Layout state from host to remote. Apart from the channel width state this option makes a mirror-style setup most easy. But when using the remote as individual setup, make sure to disable this option to have independent Layout Presets on the remote.

Limitations

• Mixer View & GUI. When connected the remote computer / iPad will immediately have the complete routing and FX settings of the host, including mono and stereo channels, but not the host's GUI setup, like panel states open/closed of Settings/EQ/Dynamic, FX panel visibility, 2-Row or 3-Row mode and channel width. Channel width states can be stored as usual per Snapshot and completely as Workspace, locally on the remote computer. They need to be loaded manually after loading a Workspace on the host in case a 100% identical view is required.

• Workspaces. The Remote shows the Quick Workspaces (hotkey W on Windows/Mac) stored on the host, and allows to remotely load them. It is not possible to save complete Workspaces with mixer state from the Remote, or on the Remote. The Workspaces saved locally include GUI information only (Channel state wide/narrow, Channel Layouts, window size and position) and further local settings, to be able to have personalized views on the remote computer, independent from the view on the host.

• Real-time behaviour. Can suffer when the network is overloaded or the WiFi reception is insufficient. Level Meters will stutter then and faders do not move smoothly.

• Background operation on iPad - is not possible. This should not be a problem as the Remote doesn't need to do anything in background, and when called up very quickly reconnects and synchronizes its state.

• State. Is shown in the upper right corner (offline or connected), or the Mac/Windows title bar.

Downloads

Remote Windows
http://www.rme-audio.de/download/tmfx_win_remote.zip

Remote Mac
http://www.rme-audio.de/download/tmfx_mac_remote.zip

iPad
From the Apple App Store, search for 'TotalMix Remote'. This app is free.

User's Guide

Digiface Ravenna

▷ **Technical Reference**

24. Technical Specifications

Gigabit Ethernet Port
- RJ45
- 100 Mbit/s, 1 Gbit/s
- Standard port LEDs: yellow connected, green data transmission
- Supports straight and crossover cables (Auto MDI-X)
- Network-based remote control of the unit (TotalMix Remote)

RAVENNA Modul
- Supports RAVENNA, AES67, ST 2110-30 / -31, ST 2022-7
- Network Layer 3
- Modes: Switched and Redundancy according to ST 2022-7
- 32 streams
- 128 channels Single Speed, 64 channels Double Speed, 32 channels Quad Speed
- Clock sources: PTP, Internal
- Sample Rates: 44.1, 48, 88.2, 96, 176.4, 192 kHz, +/-12.5 %
- Routing: Channel-based routing matrix
- Configuration: Browser GUI, globcon control, NMOS IS-04 / IS-05

MADI Input
- Coaxial via BNC, 75 Ohm, according to AES10-1991
- High-sensitivity input stage (< 0.2 Vpp)
- Accepts 56 channel and 64 channel mode, plus 96k Frame
- Standard: up to 64 channels 24 bit 48 kHz
- S/MUX: up to 32 channels 24 bit 96 kHz
- S/MUX4: up to 16 channels 24 bit 192 kHz
- Lock range: 25 kHz – 54 kHz

MADI Output
- Coaxial via BNC, 75 Ohm, according to AES10-1991
- Output voltage 400 mVpp
- Cable length: up to 50 m
- Generates 56 channel and 64 channel mode, plus 96k Frame
- Standard: up to 64 channels 24 bit 48 kHz
- S/MUX / 96k Frame: up to 32 channels 24 bit 96 kHz
- S/MUX4: up to 16 channels 24 bit 192 kHz

Output Analog Phones 129/130
- Dynamic range (DR): 110 dB RMS unweighted, 113 dBA
- Frequency response @ 44.1 kHz, -0.5 dB: 0 Hz – 20.8 kHz
- Frequency response @ 96 kHz, -0.5 dB: 0 Hz – 45 kHz
- Frequency response @ 192 kHz, -1 dB: 0 Hz - 89 kHz
- THD @ -1 dBFS: - 96 dB, 0.0016 %
- THD+N @ -1 dBFS: -95 dB, 0.0017 %
- Channel separation: > 100 dB
- Output: 6.3 mm TRS jack, unbalanced
- Output impedance: 2 Ohm
- Output level at 0 dBFS, 1 kOhm load: +9.5 dBu
- Max power @ 0.1% THD: 50 mW

Digital
- Clocks: Internal, RAVENNA (PTP), word, MADI
- Supported sample rates: 44.1 kHz up to 192 kHz

Word Clock In
- BNC, not terminated (10 kOhm)
- Switchable internal termination 75 Ohm
- Automatic Double/Quad Speed detection and conversion to Single Speed

Word Clock Out
- BNC
- Max level: 5 Vss
- Level with termination 75 Ohm: 4.0 Vss
- Internal impedance: 10 Ohm

24.1 Firmware

The Digiface Ravenna is internally based on programmable logic. By re-programming both function and behaviour of the unit can be changed at any time.

At the time of writing this manual the Digiface Ravenna is shipped with firmware 55. The firmware version is displayed in the Settings dialog as well as the Firmware Update Tool.

The firmware of the RAVENNA module is currently at **hw 029 sw 094**. Updates are performed via the RAVENNA Remote, the update file is also available from the RME website.

24.2 General

- Power supply: USB bus power or external power supply
- Typical power consumption: 3 Watts
- Current at 5 V bus power operation: 600 mA
- Max power consumption: 6 Watts (1.2 A)
- Dimensions (WxHxD): 170 x 26 x 84 mm (6.69" x 1.02" x 3.3")
- Weight: 500 g (1.1 lbs)
- Temperature range: +5° up to +50° Celsius (41° F up to 122°F)
- Relative humidity: < 75%, non condensing

25. Technical Background
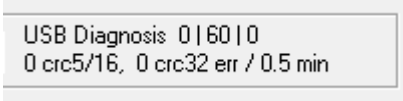
25.1 USB Audio

USB audio is in several ways different from PCI based audio interfaces. Thanks to the high speed of **USB 3**, typical problems of streamed (isochronous) data transmission can be circumvented. RME's proprietary USB 3 technology makes it possible to achieve performance similar to PCI Express, *IF* all participating components work perfectly. At this time USB 3 has got a bad reputation because many layouts, cables and connectors are designed badly and lower the maximum throughput. Typical problems are not or randomly detected devices, devices that fail as soon as data is transmitted, transmission errors and following (as required by the USB 3 standard) the reset of the host controller, guaranteeing a drop out for several seconds.

It is therefore not possible to guarantee reliable and highest performance of USB 3 operation with any computer and cable just because they claim to support USB 3. The real performance has to be evaluated on a per USB 3 port (!) and per cable base.

To make this as easy as possible, and to quickly signal problems, RME added an *extensive error detection and analysis* into the Digiface Ravenna hardware, detecting errors during transmission via USB 2 and 3, and displaying them in the Settings dialog. Additionally the Digiface Ravenna provides a special mechanism to continue recording and playback in case of drop-outs, and to correct the sample position in real-time.

While some errors shown here might not cause audible clicks and do not stop record/playback, the golden rule applies: *only zero errors are acceptable*. If errors show up use a different USB 3 port and exchange the USB 3 cable. Never use simple USB 3 cable extensions!

```
USB Diagnosis 0 | 60 | 0
0 crc5/16,  0 crc32 err / 0.5 min
```

Digiface RAVENNA USB 3 Compatibility Information

- ➢ Fully compatible to **Intel's USB 3** implementation which - on current Windows and Mac computers - is part of the chipset. USB 3 sockets that are connected via an internal cable (not directly soldered onto the motherboard) can cause transmission errors (these are shown in the Settings dialog).
- ➢ Fully compatible to **AMD's USB 3** implementation. USB 3 sockets that are connected via an internal cable (not directly soldered onto the motherboard) can cause transmission errors (shown in the Settings dialog).
- ➢ Compatible to **NEC / Renesas USB 3**. Real-world performance and error-free operation depend on the firmware version, driver version and the PCB layout of the respective extension card/motherboard.
- ➢ Compatible to **Fresco USB 3** chip.
- ➢ Compatible to **Via VL912**, very often used in USB 3 hubs

- ➢ **ASMedia** – mostly not compatible
- ➢ **Etron EJ168A** - not compatible
- ➢ **Texas TUSB7340** - not compatible
- ➢ **Via VL800/805** - not compatible

The Digiface Ravenna is capable of using two different transmission modes to record data. It defaults to *Bulk Mode*, which improves reliability of USB 3 audio tremendously and helps with both less than perfect cabling as well as critical layouts around the USB 3 chip. The standard's default is *Isochronous Streaming*, which is unreliable as per the standard (errors are to be expected!), unreliable in real-world operation, and not correctly supported by popular USB 3 chips. In very seldom cases, bulk mode can not keep up with the strict timing required for continuous audio streaming. Then, to make the Digiface Ravenna work at all, isochronous mode must be used. To make this standard mode available the Settings dialog includes an option to activate *Isochronous Streaming.*

The Digiface Ravenna also supports **USB 2**, where the number of record and playback channels are halfed due to the limited bandwidth (up to 48 kHz: 64 channels, up to 96 kHz: 32 channels, up to 192 kHz: 16 channels). The number of channels accessible via TotalMix FX, the network ins and outs and MADI I/O, stays identical to USB 3 operation. Good performance and click-free operation even at low buffer sizes are indeed possible on current computers. However, using older computers a simple stereo playback might cause a CPU load of more than 30%.

Best USB 2 performance is achieved by connecting the Digiface Ravenna to its own bus, which should be no big problem as most USB 2.0 interfaces are a double bus design. A check in the Device Manager can be done as follows:

Connect the Digiface Ravenna to a USB 2 port
➢ Start the Device Manager, View set to Devices by Connection
➢ Select ACPI x86-based PC, Microsoft ACPI-Compliant System, expand PCI Bus

This branch normally includes two entries of a *USB2 Enhanced Host Controller*. A USB Root Hub can be seen, which then connects all USB devices, including the Digiface Ravenna. By reconnecting to a different port this view shows at which of the two controllers the Digiface Ravenna is connected. With multiple devices it can be checked if they are connected to the same controller.

Furthermore this information can be used to operate an external USB drive without disturbing the Digiface Ravenna, by simply connecting the drive to the other controller.

It can also be used to check where and in what combination USB 3 is used. In fact many modern motherboards have an additional chip to the mostly found Intel chipset, adding further USB 3 ports. But documentation is often unclear about which port/socket is connected to which chip. By connecting the Digiface Ravenna and using the procedure above one can easily see the current connection, ensuring the Digiface Ravenna is really connected to the Intel chipset and not to some other flaky one.

Especially with notebooks it can happen that all internal devices and all the sockets/ports are connected to the same controller, with the second controller not used at all. In that case all devices have to use the same bus and will interfere with each other.

A computer blocked for a short time – no matter if ASIO or WDM – will lose one or more data packets. Such problems can only be solved by increasing the buffer size (latency).

25.2 MADI Basics

MADI, the serial **M**ultichannel **A**udio **D**igital **I**nterface, has been defined already in 1989 as an extension of the existing AES3 standard following several manufacturers' wish. The format also known as AES/EBU, a balanced bi-phase signal, is limited to two channels. Simply put, MADI contains 28 of those AES/EBU signals in serial, i. e. after one another, and the sample rate can still even vary by +/-12.5%. The limit which cannot be exceeded is a data rate of 100 Mbit/s.

Because an exact sampling frequency is used in most cases, the 64 channel mode was introduced officially in 2001. It allows for a maximum sample rate of 48 kHz + ca. 1%, corresponding to 32 channels at 96 kHz, without exceeding the maximum data rate of 100 Mbit/s. The effective data rate of the port is 125 Mbit/s due to additional coding.

Older devices understand and generate only the 56 channel format. Newer devices often work in the 64 channel format, but offer still no more than 56 audio channels. The rest is being eaten up by control commands for mixer settings etc.

For the transmission of the MADI signal, proved methods known from network technology were applied. Most people know unbalanced (coaxial) cables with 75 Ohms BNC plugs, they are not expensive and easy to get. The optical interface is much more interesting due to its complete galvanic separation, but for many users it is a mystery and quite expensive

With MADI, sample multiplexing is often used as well to offer sample rates higher than 48 kHz. The MADIface supports all formats. 96 kHz can be received and transmitted both as 48K Frame (using S/MUX) and as native 96K Frame. In 48K Frame Double Speed mode, the MADIface distributes the data of one channel to two consecutive MADI channels. This reduces the available channel count from 64 to 32.

As the transmission of double rate signals with 48K Frame is done at standard sample rate (Single Speed), the MADI ports still operate at 44.1 kHz or 48 kHz.

In fact, technical reasons require to use this method beyond 96 kHz. A 192K or 384K Frame format would not be fully compatible to the MADI standard. Therefore 192 kHz is supported as S/MUX4 only. So in 48K Frame Quad Speed mode, a MADI device distributes the data of one channel to four consecutive MADI channels. This reduces the available channel count from 64 to 16.

As the transmission of quad rate signals with 48K Frame is done at standard sample rate (Single Speed), the MADI ports still operate at 44.1 kHz or 48 kHz.

25.3 Terminology

Single Speed
Sample rate range originally used in Digital Audio. Typical applications are 32 kHz (digital radio broadcast), 44.1 kHz (CD), and 48 kHz (DAT).

Double Speed
Doubles the original sample rate range, in order to achieve higher audio quality and improved audio processing. 64 kHz is practically never used, 88.2 kHz is quite rare in spite of certain advantages. 96 kHz is a common format. Sometimes called **Double Fast**.

Quad Speed
Controversially discussed way of ensuring hi-end audio quality and processing by quadrupling the sample frequency. 128 kHz is non-existent, 176.4 kHz is rare, if at all then 192 kHz is used, e.g. for DVD Audio.

Single Wire
Standard audio data transfer, where the audio signal's sample rate is equal to the rate of the digital signal. Used from 32 to 192 kHz. Sometimes called **Single Wide**.

Double Wire
Before 1998 there were no receiver/transmitter circuits available that could receive or transmit more than 48 kHz. Higher sample rates were transferred by splitting odd and even bits across the L/R channels of a single AES connection. This provides for twice the data rate, and hence twice the sample rate. A stereo signal subsequently requires two AES/EBU ports.

The Double Wire method is an industry standard today, however it has a number of different names, like **Dual AES**, **Double Wide**, **Dual Line** and **Wide Wire**. The AES3 specification uses the uncommon term *Single channel double sampling frequency mode*. When used with the ADAT format, the term S/MUX is commonly used.

Double Wire not only works with Single Speed signals, but also with Double Speed. As an example, Pro Tools HD, whose AES receiver/transmitter only work up to 96 kHz, uses Double Wire to transmit 192 kHz. Four channels of 96 kHz turn into two channels of 192 kHz.

Quad Wire
Similar to Double Wire, with samples of one channel spread across four channels. This way single speed devices can transmit up to 192 kHz, but need two AES/EBU ports to transmit one channel. Also called **Quad AES**.

S/MUX
Since the ADAT hardware interface is limited to Single Speed, the Double Wire method is used for sample rates up to 96 kHz, but usually referred to as S/MUX (Sample Multiplexing). An ADAT port supports four channels this way. With MADI S/MUX is used as well, to transmit up to 96kHz although the 48K Frame format is used.

S/MUX4
The Quad Wire method allows to transmit two channels at up to 192 kHz via ADAT. The method is referred to as S/MUX4. With MADI S/MUX4 is used as well, to transmit up to 192 kHz although the 48K Frame format is used.

Note: All conversions of the above described methods are lossless. The existing samples are just spread or re-united between the channels.

48K Frame
Most often used MADI format. Supports up to 64 channels at up to 48 kHz.

96K Frame
Frame format for up to 32 channels at up to 96 kHz. The advantage of this format against 48K Frame using S/MUX: the receiver can detect the real (double) sample rate on its own and immediately. With 48K Frame and S/MUX, the user has to set up the correct sample rate in all involved devices manually.

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Digiface Ravenna

▷ **Miscellaneous**

26. Warranty

Each individual Digiface Ravenna undergoes comprehensive quality control and a complete test at IMM before shipping. The usage of high grade components should guarantee a long and trouble-free operation of the unit.

If you suspect that your product is faulty, please contact your local retailer.

Audio AG grants a limited manufacturer warranty of 6 months from the day of invoice showing the date of sale. The length of the warranty period is different per country. Please contact your local distributor for extended warranty information and service. Note that each country may have regional specific warranty implications.

In any case warranty does not cover damage caused by improper installation or maltreatment - replacement or repair in such cases can only be carried out at the owner's expense.

No warranty service is provided when the product is not returned to the local distributor in the region where the product had been originally shipped.

Audio AG does not accept claims for damages of any kind, especially consequential damage. Liability is limited to the value of the Digiface Ravenna. The general terms of business drawn up by Audio AG apply at all times.

27. Appendix

For RME news, driver updates and further product information check http://www.rme-audio.com

Distributor: Audio AG, Am Pfanderling 60, D-85778 Haimhausen, Tel.: +49 (0)8133 / 918170

Manufacturer: IMM electronics GmbH, Leipziger Strasse 32, D-09648 Mittweida

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28. Declaration of Conformity

CE

This device has been tested and found to comply with the limits of the European Council Directive on the approximation of the laws of the member states relating to electromagnetic compatibility according to RL2014/30/EU, and European Low Voltage Directive RL2014/35/EU.

FCC

This device complies with Part 15 of the 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.

> Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Responsible Party in USA:
Synthax United States, 6600 NW 16th Street, Suite 10, Ft Lauderdale, FL 33313
T.:754.206.4220

Trade Name: RME, Model Number: Digiface Ravenna

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, may cause harmful interference to radio 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 receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.

Caution: To comply with the limits of the Class B digital device, pursuant to Part 15 of the FCC Rules, this device must be operated with computer equipment certified to comply with Class B limits. All cables used to connect to the computer and peripherals must be shielded and grounded. Operation with non-certified computers or unshielded cables may cause interference to radio or television reception.

Note on Disposal

According to the guide line RL2002/96/EG (WEEE – Directive on Waste Electrical and Electronic Equipment), valid for all european countries, this product has to be recycled at the end of its lifetime.

In case a disposal of electronic waste is not possible, the recycling can also be done by IMM electronics GmbH, the manufacturer of the Digiface Ravenna.

For this the device has to be sent **free to the door** to:

> IMM electronics GmbH
> Leipziger Straße 32
> D-09648 Mittweida
> Germany

Shipments not prepaid will be rejected and returned on the original sender's costs.

RAV2 Software Manual

Table of contents

RAV2 Module Software

Introduction

RAV2 is an audio network module for RAVENNA / AES67.

All functions of the device are accessible through a browser based interface (hmtl5 / javascript). The size of the window and the zoom level can be varied. The page is organized in tabs, pulldown menus or hyperlinks offer access to the values of a parameter. Some values use an input field (e.g. IP address).

Connecting Audio Network

To access the control page:
- connect the network with one port
- enter http://<IP Address> (default IP @ PORT 1: 192.168.0.1) in the navigation bar of your browser

Two independent network interfaces (NICs) can be configured in the switch configuration. Port 1 is fixed assigned to NIC 1.

NOTE

If NIC 1 and NIC 2 are connected to the same switch, they must be configured to different subnets - see "Network Settings" on page 7.

Status - Overview

The tab 'STATUS' is divided into several sections:
- SYNC — monitoring sync state, clock selection, links to I/O settings
- NETWORK — display network info, link to network settings
- DEVICE — monitoring device info, link to device settings, phones level control
- INPUT STREAMS — monitoring and control input streams, link to input stream settings
- OUTPUT STREAMS — monitoring and control output streams, link to output stream settings

Hyperlinks open a popup window to adjust related settings. Most settings are updated immediately without further notification. To exit a popup window click the button in the top right corner.

Mouse overs are used to display further information (e.g. connection speed of network link).

NOTE

The web user interface updates itself when changes are applied by other instances (other browsers, external control commands).

Status - Sync
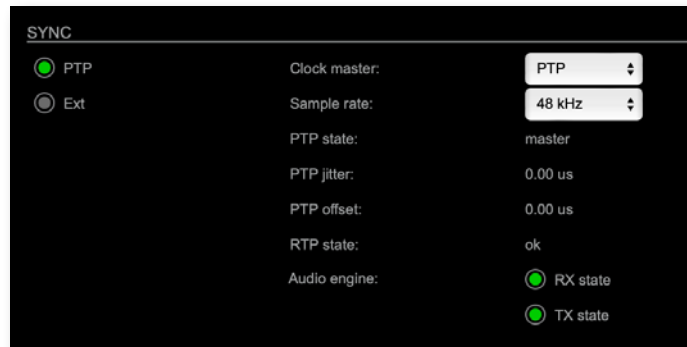
PTP, Ext	Displays clock source and state for the main frame: ○ (OFF) = not locked ● (ON) = locked and in sync with clock master ☼ (blinking) = locked but not in sync with clock master
Clock master	Pulldown menu to select clock source of the main frame (PTP, extern)
Sample rate	Pulldown menu to adjust sample rate of the main frame (44.1 / 48 / 88.2 / 96 / 176.4 / 192 kHz).
PTP state	State of PTP (Master / Slave).
PTP jitter	PTP-clock jitter per second
PTP offset	Offet relative to PTP-clock master
RTP state	Status of packet processing (OK, Error*)
Audio engine RX state	State of module's audio engine- receiving ● (ON) = ok, receiving data ☀ (blinking) = not all received packets can be processed
Audio engine TX state	State of module's audio engine- sending ● (ON) = ok, sending data ☀ (blinking) = not all packets can be sent to the network
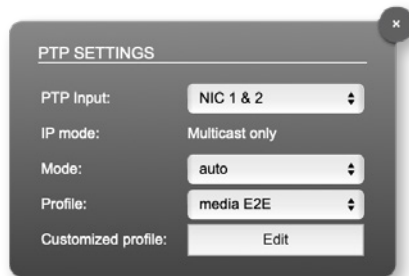
* Error: packet time stamps are out of bounds.
Possible reasons: stream offset may be too small or transmitter or receiver are not synced properly to the Grandmaster.

Hyperlinks:

PTP Settings

PTP Input	NIC selection for PTP clock input. 'NIC 1 & 2' means input redundancy.
IP Mode	PTP via multicast, unicast or in hybrid mode. *
Mode	PTP-clock master / slave configuration is auto negotiated between devices in the network. Module's master / slave state may change automatically.
Profile	PTP profile selection (default E2E, default P2P, media E2E, media P2P, customized)
Customized profile	Edit opens the tab 'ADVANCED' to adjust the custom profile.

See „Advanced- PTP Clock Setting" on page 31 for more details.

Status - Network

Name	Module's name in the network. Used e.g. for mDNS service. The name needs to be unique throughout the network.
NIC 1 / NIC 2	Monitoring state of network interface controller ◯ (OFF) = not connected 🟢 (ON) = connected with the network
MAC address	Hardware identification of network interface controller.
IP address	IP address of device
Sync	Selected NIC for PTP sync
GMID	Grand Master ID (PTP)

Hyperlinks
- Name / IP address (p 7)

Mouse over:
- LED NIC 1- indicating link state and connection speed
- LED NIC 2- indicating link state and connection speed

NOTE

If NIC 1 and NIC 2 are connected to the same switch, they must be configured to different subnets - see "Network Settings" on page 7.

Network Settings

The two network interface controllers (NIC 1 / NIC 2) are configured individually.

Device name	Input field - Module's name in the network. Used e.g. for mDNS service. The name needs to be unique throughout the network.
Dynamic IP address (IPv4)	Switch to enable the device's DHCP client. IP address is assigned by DHCP server. If no DHCP is available the IP address is determined via Zeroconf.
Static IP address (IPv4)	Switch to disable the device's DHCP client. Manual configuration of network parameters.
IP address (IPv4)	Module´s IP Address
Subnet mask (IPv4)	Module's subnet mask
Gateway (IPv4)	IP address of gateway
DNS server (IPv4)	IP address of DNS server
Apply	Button to confirm changes. Another popup window will appear to confirm a reboot of the module.
Direct routing	IP addresses of devices outside the subnet, to enable multicast traffic; e.g. Grandmaster or IGMP querier. Mark checkbox to activate.

Status - Device
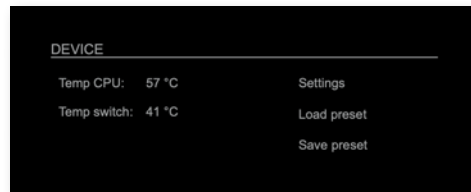
Temp CPU	Display temperature of CPU core in degree Celsius. It may reach 95 ℃ without effecting the performance of the device.
Temp switch	Display temperature of network switch in degree Celsius
Settings	Opens a popup window to configure the device.
Load preset	Opens a dialog to store the device settings to a file. Filetype: .rps
Save preset	Opens a dialog to restore the device settings from a file. Filetype: .rps

Hyperlinks:
- Settings (p 8)
- Load preset (p 9)
- Save preset

Settings
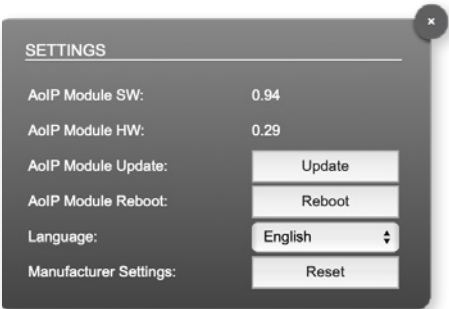
AoIP Module SW	Module´s software version. It is updated together with hardware version via network.
AoIP Module HW	Module´s bitstream version. It is updated together with software version via network.
AoIP Module Update	Opens a dialog for selection of the update file - see "RAV2- Firmware Update" on page 42.
AoIP Module Reboot	Restart of the AoIP module. Confirmation required. Audio transmission will be interrupted.
Language	Menu language (english, german).
Manufacturer Settings Reset	Restore device settings to factory defaults. Confirmation required.

Load Preset
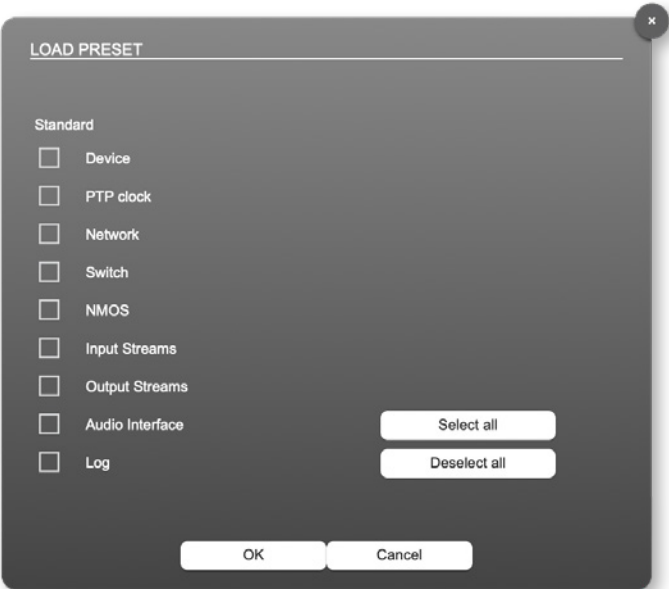
The device configuration can be stored to a single file (.rps).
Restoring the configuration a dialog prompts for selection of individual settings.
This enhances flexibility at setup changes when a particular adjustment shall be preserved or just a single adjustment shall be restored.

Status - Input Streams

The module can subscribe up to 32 streams. The overview displays the basic information of each stream. The input stream name can be set manually (discovery protocol: manually, see page p 19) overriding the SDP's stream name information.

A backup stream can be defined as source after an adjustable timeout. A central active / inactive switch allows to toggle the stream state of all input streams at once.

01 to 32	State of incoming streams
	⬜ (OFF)　　=　stream not activated
	🟢 (ON)　　=　stream activated, receiving data
	🟡 (ON)　　=　stream activated, receiving data via one NIC only (input redundancy)
	🔴 (blinking) =　stream activated, not receiving data (unicast, connection not established)
01 to 32 Name	Name of stream gathered from SDP or set manually in the stream settings dialog.
01 to 32 xx ch	Number of audio channels transported by the stream

01 to 32 ❚❚ ■ ▶	Click to activate or deactivate single stream. ▶ = stream activated ■ = stream deactivated ❚❚ = stream not active, defined as backup-stream
INPUT STREAMS ■ ▶	Click to activate or deactivate all streams. ▶ = activate all streams ■ = deactivate all streams (requires confirmation)

Backup Streams

Example:

Backup stream (input 3) that will act as source in the audio matrix if the current session (input 1) fails. Switch-over occurs after the defined timeout (1s).

Stream 3 is marked accordingly in the status view

Input 1 failed and Input 3 becomes active after the timeout.

NOTE

In case the main input fails the main stream is stopped (IGMP LEAVE) before the backup stream is being activated. This behaviour ensures that the required network bandwidth does not increase in case of a failure.
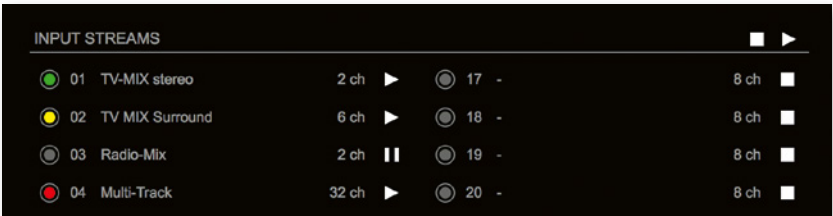
Hyperlinks:
- Name (p 14)

Mouse over:
- LED- indicating stream state

NOTE

Source-Specific Multicast (SSM) support for IGMP v3, v2 and v1 (SSM via protocol only in IGMP v3, SSM via internal filtering is applied for IGMP v2 and v1) - see "Source Specific Multicast" on page 19.

Input Stream Settings

Up to 32 input streams can be subscribed. Each stream is organized in a 'RAVENNA session' (SDP = Session Description Protocol) that describes the stream parameters (audio channels, audio format, etc.).

The stream settings allow to adjust the processing of the received audio data (offset, signal routing). The receiving of stream data starts once the stream has been enabled.

The settings displayed vary depending on the selected discovery protocol.

TIP

A sample offset of at least doubled packet time (samples per frame) is recommended
Example: Samples per frame = 16 (0.333 ms) ⇨ Offset ≥ 32 (0.667 ms)

It may be helpful to alter the stream discovery protocol if an expected stream can't be discovered by the device.

Activate stream	Stores parameters and activates or deactivates the receiving of audio data. (Unicast: additionally the negotiation of the connection)
Stream input	Selects one or both NICs used for stream input. Both NICs means input redundancy.
Backup Stream	Selects a backup stream that will act as source in the audio matrix if the current session fails. Switch-over occurs after the defined timeout.
Backup Stream Timeout	Defines timeout [1 s to 120 s] before switch-over to backup stream.
Stream name	Name of stream gathered from SDP

Stream state	Information about stream state:
	    connected
	    not connected
	    receiving data
	    read successfull
	    error

Stream state message	Status info related to stream state.
Stream state offset max	Measured value (maximum). A high value indicates that the media offset of the source might not match the adjusted media offset of the device.
Stream state offset min	Measured value (minimum). The offset should not become negative.
Stream state ip address src NIC 1 / NIC 2	Multicast address of input stream subscribed at NIC 1 / NIC 2. Unicast transmission: IP address of sender.
Stream state connection lost NIC 1 / NIC 2	counter indicates the number of incidents where the network connection was lost (link down)
Stream state packet lost (Events) NIC 1 / NIC 2	counter indicates the number of lost RTP packets
Stream state wrong timestamp (Events) NIC 1 / NIC 2	counter indicates the number of packets with invalid timestamp
Offset fine	Enables adjustment of offset in increments of one sample.
Offset in samples	Modules output delay of received audio data (input buffer).

Start channel	Assignment of first stream channel in the audio matrix. E.g. stream with two channels, starting at channel 3 is available at channel 3 & 4 of the routing matrix.
Discovery protocol	Connection protocol or manual setup. RTSP = Real Time Streaming Protocol SAP = Session Announcement Protocol
Session NIC 1	Selection of discovered streams at NIC 1
Session NIC 2	Selection of discovered streams at NIC 2

Stream Discovery in AoIP environments is a colorful mixture of different mechanisms. To serve a successful stream management RAV2 provides a bunch of options, not making operation easier but effective.

Discovery RTSP (Session)

Discovery RTSP (URL)

URL	URL (Uniform Ressource Locator) of the session of the device that is serving streams. Examples: rtsp://192.168.74.44/by-id/1 or rtsp://PRODIGY-RAV-IO.local:80/by-name/Stage_A
Receive SDP	Recalls the stream configuration of the defined session(s).

NOTE

In case the automatic stream announcement and discovery of RAVENNA streams fails or cannot be used in a given network, the stream's SDP file can also be obtained via an RTSP URL.

Discovery SAP

SAP is used in Dante environments.

Discovery NMOS

Session	[MAC Address of sender] stream name @NIC
Refresh	Initiates a scan for available streams.

NMOS is suited for use in SMPTE ST 2110 environments.

Manual Setup

Stream name (manual)	Stream name for display in status view and matrix. Can be specified individually, different than the name gathered from the SDP.
Number of channels	Number of audio channels in the stream
RTP-Payload-ID	RTP-Payload-ID of the audio stream (Real-Time Transport Protocol). Describes the format of the transported content.
Audio Format	Stream's audio format (L16 / L24 / L32 / AM824)
Media Offset	Offset between stream's timestamp and PTP-clock
Dst IP address	Multicast IP address of audio stream
SSM	Activate Source Specific Multicast filter for this stream.*
Src IP address	IP address of sending device.*
RTP dst port	Stream's destination port for RTP
RTCP dst port	Stream's destination port for RTCP (Real-Time Control Protocol)

* An RTP packet contains the IP address of the sender (source IP) and the stream's multicast address (destination IP). With SSM activated the receiver only accepts RTP packets of a certain destination IP that are originated by a sender with the specified source IP.

NOTE

RTP Payload ID must match between sender and receiver.

Status - Output Streams

The device can send up to 32 streams. The overview displays the basic information of each stream.

01 to 32	State of outgoing streams ⚪ (OFF) = stream not activated 🟢 (ON) = stream activated, sending data 🟡 (ON) = stream activated, stream output via both NICs selected, but one NIC is not linked to the network.
01 to 32 Name	Name of stream defined in the settings
01 to 32 xx ch	Number of audio channels transported by the stream
01 to 32 ■ ▶	Activate or deactivate stream. ▶ = stream activated ■ = stream deactivated
OUTPUT STREAMS ■ ▶	Click to activate or deactivate all streams. ▶ = activate all streams ■ = deactivate all streams (requires confirmation)

Hyperlinks:
- Name (p 22)

Mouse over:
- LED- indicating stream state

TIP

AES67 Streams
To create output streams for interoperability in AES67 environments please consult
the information document Info- AES67 Streams.

TIP

SMPTE 2110-30 /-31 Streams
To create output streams for interoperability in SMPTE ST 2110 environments
please consult the information document Info- ST2110-30 Streams.

Both documents are available at http://academy.directout.eu.

Output Stream Settings

```
02 - OUTPUT STREAM SETTINGS

Activate Stream:                         ☐
Stream Output:                           NIC 2          ▲▼


Stream name (ASCII):                     Ambience
     RTSP URL (HTTP tunnel) (by-name):   rtsp://PRODIGY-RAV-IO-20079e.local:80/by-name/Ambience
     RTSP URL (HTTP tunnel) (by-id):     rtsp://PRODIGY-RAV-IO-20079e.local:80/by-id/2
     RTSP URL (by-name):                 rtsp://PRODIGY-RAV-IO-20079e.local/by-name/Ambience
     RTSP URL (by-id):                   rtsp://PRODIGY-RAV-IO-20079e.local/by-id/2


     SDP:                                v=0
                                         o=- 2 2482002937 IN IP4 192.168.74.44
                                         s=Ambience
                                         t=0 0
                                         m=audio 5004 RTP/AVP 98


Unicast:                                 ☐
RTP payload ID:                          98
Samples per Frame (packet time):         45 (0.94 ms)   ▲▼
Audio format:                            AM824          ▲▼
Start channel:                           9              ▲▼
Number of channels:                      8              ▲▼


NIC 1                                    NIC 2

RTP dst port:        5004                RTP dst port:        5004
RTCP dst port:       5005                RTCP dst port:       5005
Dst IP address (IPv4):  239.69.1.3       Dst IP address (IPv4):  239.69.1.4
```

Up to 32 output streams can be sent to the network. Each stream is organized in a session (SDP = Session Description Protocol) that describes the stream parameters (audio channels, audio format, etc.).

Each stream may be labelled with an individual stream name (ASCII) which is useful for enhanced comfort at organizing the setup.

The stream settings allow to adjust the processing of the sent audio data (blocks per frame, format, signal routing, ...). The sending of stream data starts once the stream has been enabled.

Once the stream is active, the SDP data is displayed and may be copied from the window or downloaded via http://<rav-io>/sdp.html?ID=<stream no.>.

Activate stream	Stores parameters and activates or deactivates the receiving of audio data. (Unicast: additionally the negotiation of the connection)
Stream Output	Selects one or both NICs used for stream output. Both NICs means output redundancy.
Stream name (ASCII)	Individually defined name of an output stream. It is used in the URL which is indicated in different ways below.*
RTSP URL (HTTP tunnel) (by-name) / (by id)	Current used RTSP-URL of stream with HTTP port used for RTSP, stream name or stream id.
RTSP URL (by-name) / (by id)	Current used RTSP-URL of stream with stream name or stream id.
SDP	SDP data of the active stream.
Unicast	If activated, the stream is sent in unicast mode.**
RTP payload ID	Stream's payload id
Samples per Frame	Number of blocks containing payload (audio) per ethernet frame - see packet time on p 14.
Audio format	Stream's audio format (L16 / L24 / L32 / AM824) ***
Start channel	Assignment of first stream channel from the audio matrix. E.g. stream with eight channels, starting at channel 3 is fed from channel 3 to 10 of the routing matrix.
Number of channels	Number of audio channels in the stream.
RTP dst port	Stream's destination port for RTP
RTCP dst port	Stream's destination port for RTCP (Real-Time Control Protocol)
Dst IP address (IPv4)	Stream's IP address for multicast (should be unique for each stream).

*   Only ASCII characters are allowed.

**   A unicast stream can only be received by one device. If a device is already receiving the stream, further connection calls by other clients are answered with ‚service unavailable' (503). The release time after disconnect or interruption of the client's connection amounts to about 2 minutes.

*** L16 = 16 bit audio / L24 = 24 bit audio / L32 = 32 bit audio / AM824 = standardized according to IEC 61883, allows AES3 transparent transmission (SMPTE ST 2110-31).

Advanced - Overview

The tab 'ADVANCED' is divided into several sections:

- PTP SETTINGS   - definition of PTP source, mode and profile
- PTP PROFILE
  CURRENT
  SETTINGS   - definition of a customized PTP profile
- CURRENT PTP
  MASTER   - monitoring PTP characteristics
- PTP STATISTIC   - monitoring device's PTP state, jitter and delay
- PTP CLOCK SETTINGS - definition of adaption algorithms to reduce jitter
- NETWORK ADVANCED
  SETTINGS   - definition of network and QoS characteristics
- PTP JITTER   - graphical display of measured PTP jitter

Advanced - PTP Settings

PTP Input	Selects one or both network ports used for PTP input. Both ports means input redundancy. *
IP Mode	Multicast = Sync messages and delay request are sent as multicast message to every node within the network. Hybrid = Sync messages are sent as multicast, delay requests are sent as unicast messages directly to the Grandmaster or Boundary Clock.** Unicast = Sync messages are sent as unicast, delay requests are sent as unicast messages directly to the Grandmaster or Boundary Clock.***

* Using redundant PTP-operation a switch-over is triggered not only at signal loss of the Grandmaster but depends on the quality of the PTP clock. Changes (e.g. clock class) are observed permanently and the algorithm decides for the best signal present.

** Hybrid Mode reduces the workload for all nodes in the network as they do not receive the (unnecessary) delay requests from other devices anymore.

*** Unicast Mode may help when multicast routing is not possible within the network. As an opposite to the Hybrid Mode it increases the workload of the grandmaster since sync messages must be sent to each single slave individually.

Mode	auto	= PTP-clock master / slave configuration is auto negotiated between devices in the network. Module's master / slave state may change automatically.
	slave only	= PTP-clock slave configuration is preferred. Module clocks to another device in the network
	preferred master	= PTP-clock master configuration is preferred. Module acts as network grandmaster. Priority values are adjusted automatically to ensure Grandmaster status. *
	master only	= PTP-clock master is forced. **
Profile	Selects predefined PTP profile (default E2E, default P2P, media E2E, media P2P) or activates customized PTP profile.	

*   If more than one device announces as PTP-clock master the network Grandmaster is determined following the Best Master Clock Algorithm (BMCA).

** 'Master only' configures the device to act as Unicast Grandmaster. This setting is available only with PTP Mode set to 'unicast'

NOTE

PTP profile ‚customized' allows for individual adjustment of the PTP parameters. If profile is set to ‚media' or ‚default' the PTP parameters cannot be altered and are displayed only. Factory default setting is PTP Media Profile E2E.

Advanced - PTP Unicast
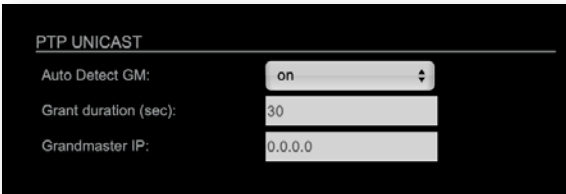
Auto Detect GM	on = enables the automatic detection of the grandmaster * off = IP address of grandmaster needs to be defined manually
Grant duration (sec)	Time period during which the slave receives sync messages from the grandmaster.**
Grandmaster IP	IP address of the grandmaster. ***

*   'Auto Detect GM' is a proprietary function and might not be supported by 3rd party GMs.

**   Depending on the temporary workload of the grandmaster the negotiation may fail.

*** This value is used only with 'Auto Detect GM' set to <off>.

About PTP Unicast

Since the BMCA is not available with PTP unicast, the PTP properties of the devices require some extra configuration.

Example:

Grandmaster	IP Mode Unicast, Mode Master only
Slave(s)	IP Mode Unicast, Mode Slave Only, Auto Detect GM ON, Grant Duration 30 sec

Advanced - PTP Profile Customized Settings

The settings become available with PTP profile set to 'customized'.

Clock class	PTP-clock's class according to IEEE 1588 [read only]
Accuracy	PTP-clock's accuracy according to IEEE 1588 [read only]
Clock domain NIC 1	PTP-clock's domain at NIC 1
Clock domain NIC 2	PTP-clock's domain at NIC 2
Priority 1	Priority setting for master announcement (the smaller the value the higher the priority)
Priority 2	If value 'Priority1' (and other PTP-clock parameters) of more than one device in the network match: Priority setting for master announcement (the smaller the value the higher the priority)
Announce	Intervall of sending announce-packets for auto-negotiation.
Sync	Intervall of sending sync-packets to the PTP-clock slaves in the network.
Min delay request	Intervall of sending End-To-End packets of PTP-clock slave to PTP-clock master. To determine the offset slave-to-master.
Min pdelay request	Intervall of sending Peer-To-Peer packets between two PTP-clocks. To determine the offset master-to-slave and slave-to-master.
Announce receipt timeout	Number of missed announce-packets (threshold) to reinitialize the negotiation of PTP-clock master.

One step clock	Timestamp of PTP-clock is integrated in PTP-sync-packets. No follow-up packets are sent. No = Two step clock is used
Slave only	Yes = PTP-clock is always slave.
Delay mechanism	E2E - Offset slave-to-master is determined by End-To-End packets. P2P - Offset master-to-slave and slave-to-master is determined by Peer-To-Peer packets.

Advanced - Current PTP Master

Monitoring display only.

| Clock class	PTP-clock's class according to IEEE 1588
Accuracy	PTP-clock's accuracy according to IEEE 1588
Clock domain	PTP-clock's domain at selected NIC
Priority 1	Priority setting for master announcement (the smaller the value the higher the priority)
Priority 2	If value 'Priority1' (and other PTP-clock parameters) of more than one device in the network match: Priority setting for master announcement (the smaller the value the higher the priority)
GMID	ID of current Grandmaster
Sync	Selected NIC for PTP clock
IPv4	IP address of Grandmaster

Advanced - PTP Statistic

Monitoring display only.

PTP state	Information about current PTP-clock state: intialize error deactivated receiving data pre master master passive not calibrated slave
PTP jitter	PTP-clock jitter in microseconds (µs)
PTP offset	Offset relative to PTP-clock master
PTP master to slave	Absolute offset master-to-slave in nanoseconds
PTP slave to master	Absolute offset slave-to-master in nanoseconds
Current PTP time (TAI):	Date and time information from GPS source*
Current PTP time (TAI) (RAW):	RAW TAI from GPS source*

* Temps Atomique International- if no GPS source is available for PTP time-stamping,the date / time display starts at 1970-01-01 / 00:00:00 after every reboot of the device.

Advanced - PTP Clock Setting
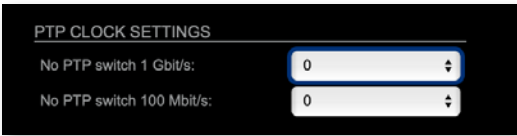
No PTP Switch 1 Gbit/s	Adapted PTP-clock algorithm to reduce clock jitter using 1 GB network switches without PTP support. Max. number of 1 Gbit/s switches: less than 10
No PTP Switch 100 Mbit/s	Adapted PTP-clock algorithm to reduce clock jitter using 100 MB network switches without PTP support. Max. number of 100 Mbit/s switches: 1

Advanced - Network Advanced Settings

IGMP NIC 1	Definition or auto-select of IGMP version used to connect to a multicast router at NIC 1.
IGMP NIC 2	Definition or auto-select of IGMP version used to connect to a multicast router at NIC 2
TCP port HTTP	TCP port for HTTP
TCP port RTSP	TCP port for RTSP
TTL RTP packets	Time-To-Live of RTP packets - default: 128
DSCP RTP packets	DSCP marking of QoS of RTP packets - default: AF41
DSCP PTP packets	DSCP marking for QoS of PTP packets - default: CS6*
Multi stream rx	If activated, the device allows to subscribe to the same multicast stream more than one time - default: off
MDNS announcement	Announcement of streams via MDNS can be controlled to optimize network traffic or CPU load. Values: Off, RX, TX or RX/TX **
SAP announcement	Announcement of streams via SAP can be controlled to optimize network traffic or CPU load. Values: Off, RX , TX or RX/TX **
Network settings Apply	Confirms and saves changes being made. Reboot required.

* AES67 specifies EF, but some implementations use EF for Audio streaming. To avoid overlapping of RTP and PTP packets in the same queue CS6 has been chosen as default.
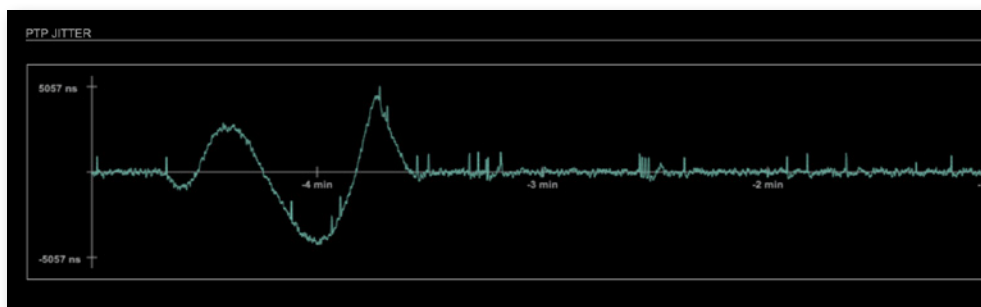
** RX = receive, TX = transmit, RX/TX = receive and transmit

NOTE

Source-Specific Multicast (SSM) support for IGMP v3, v2 and v1 (SSM via protocol only in IGMP v3, SSM via internal filtering is applied for IGMP v2 and v1) - see "Source Specific Multicast" on page 19.

Advanced - PTP Jitter

Graphical display of measured PTP jitter.

NOTE

An error message next to Jitter measurement is displayed if delay requests are not being answered by Grandmaster.

NMOS - Overview

NMOS provides a family of specifications related to networked media for professional applications. It is produced by the Advanced Media Workflow Association (AMWA).

Support for NMOS is introduced with the AoIP Module version SW 0.17 / HW 0.46 according to the specifications:
- IS-04   Discovery & Registration
- IS-05   Device Connection Management

IS-04 allows control and monitoring applications to find the resources on a network. Resources include Nodes, Devices, Senders, Receivers, Sources, Flows…

IS-05 provides a transport-independent way of connecting Media Nodes.

More information: https://specs.amwa.tv/nmos/

NMOS port - NIC1 & NIC2

The port entries for NIC1 and NIC2 are pre-configured by default.
Modifications are possible but not necessary.

NMOS port (NIC1 + NIC2)	Port address. Reboot required after modification.

Search mode NMOS registry

Multicast	use mDNS to determine and connect to the registry server
Unicast	use DNS-SD to connect to the registry server
Registry domain name	DNS resolvable domain name of the registry server
Manually	
Registry IP address	
Registry port	
Version	Support of NMOS API version

NMOS - Additional Settings

Disable stream during config	Automatically disable and re-enable streams when settings are changed via NMOS (recommended)
Seed id	Unique identifier, subordered entities are derived from the seed id.
Generate new seed id Generate	Generates a new unique identifier. Reboot required.

NMOS uses a logical data model based on the JT-NM Reference Architecture to add identity, relationships and time-based information to content and broadcast equipment. Hierarchical relationships group related entities, with each entity having its own identifier.

The identifiers are persistent across restarts of the device in order to make them useful over a period of time longer than a single production deployment.

New identifiers may be generated manually if required.

This page is left blank intentionally.

Logging

The tab 'LOGGING' displays logging depending on the 'Log Settings'. The logging can be enabled individually for different protocols, each of with an adjustable filter. An adjustable log level specifies the information detail of each entry.

To save a log the content of the view can be copied and pasted to a text document.

Log Level

0	log data
1	level and log data
2	protocol, level and log data
3	protocol, process-id of requesting process, process-id of running process, level and log data
4	protocol, process-id of requesting process, process-id of running process, level, processor time in ticks and log data
5	protocol, process-id of requesting process, process-id of running process, level, processor time in ticks, file name and line and log data

Protocol Types

ARP	Address Resolution Protocol
BASE	Basic operation of module
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
FLASH	Process for updating the module
IGMP	Internet Group Management Protocol
MDNS	Multicast Domain Name System
NMOS	Network Media Open Specification
PTP	Precision Time Protocol
RS232	Serial Protocol
RTCP	Real Time Control Protocol
SAP	Session Announcement Protocol
TCP	Transmission Control Protocol
Zeroconf	Zero Configuration Protocol

Log Filter

NONE	logging disabled
ERROR	error occurred
WARNING	warnings- condition that may lead to unwanted behavior or an error
INFO 1	log info* + warning + error
INFO 2	log info* + warning + error
INFO 3	log info* + warning + error
INFO 4	log info* + warning + error

* increasing amount of log info starting from ‚INFO 1'

Log Operation

Save log	Downloads the current log entries to a text-file (log.txt).
Clear log	Deletes all log entries without further prompt.
Scroll lock	Interrupts automatic scrolling of the list view to allow copying the content to a text file via copy & paste. If scrolling is stopped for a longer period of time the display may not list all entries.

Statistic

The tab 'STATISTIC' displays an overview of the CPU load of the particular processes, an error counter and a monitor display to indicate the incoming (RX) and outgoing (TX) network traffic on both network ports individually.

| Details	Displays a list of input streams and related events (connection lost, packet lost, wrong timestamp) of received audio packets.
Reset	Resets the packet statistic

See "Protocol Types" on page 39.

Tools

The tab 'TOOLS' offers a generator to ping any IP address (IPv4) from either NIC 1 or NIC 2. The result is displayed at the 'Output'.

IP address (IPv4)	Enter IP address (IPv4) to be pinged
Interface	Select NIC 1 or NIC 2
Start	Sends ping to the specified IP address from selected NIC.

RAV2 - Firmware Update

The RAV2 module is updated via network.

Open the control page of the module and navigate to the tab STATUS and click SETTINGS in the top right corner (p 8).
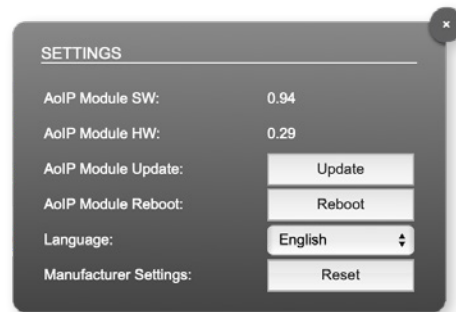
Click 'Update' and browse to the update file after unzipping first.
Example: rav_io_hw_0_29_sw_0_94.update

Folllow the instructions displayed.

WARNING!

It is strongly recommended to backup the device configuration (Save Preset) before running any update.

Switch
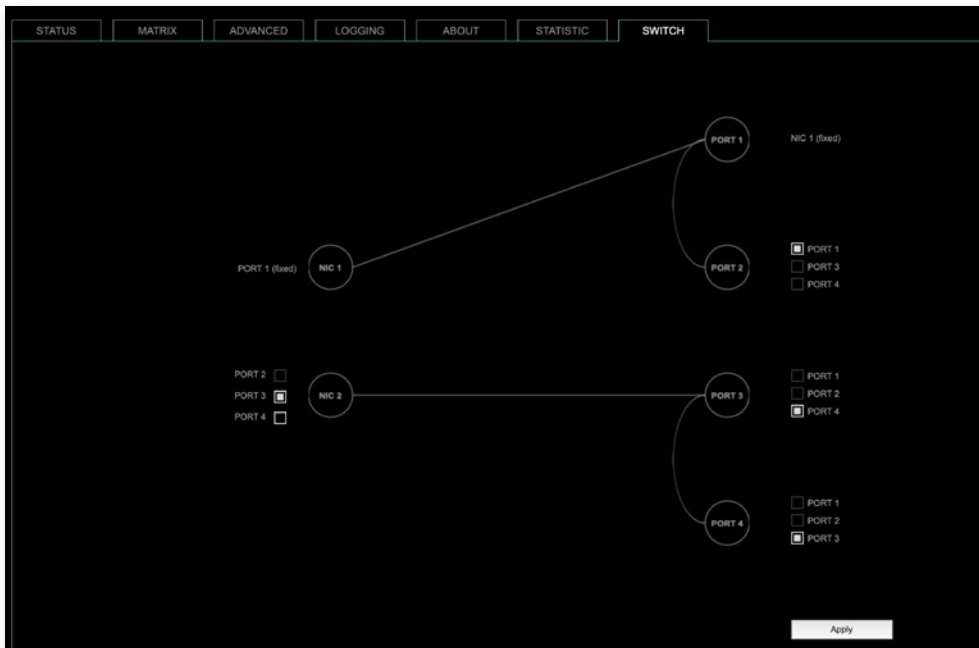
The device features four RJ45 sockets managed by two independent network interfaces (NIC 1 / NIC 2).

Port 1 is fixed assigned to NIC 1.
Port 2, 3 and 4 can be assigned to either NIC 1 or NIC 2 on the SWITCH tab

NOTE

To access the module's control page it is required to connect the management network to one of the ports that is directly attached to a NIC - see next pages.

To give the very best PTP synchronisation performance, the switch incorporates advanced timestamping between the external PORTS and the internal NICs.
As a consequence, the on-board switch cannot be used to connect other PTP devices via a single shared connection to the wider network.

Please connect all other PTP devices directly to your system's network switch.

NOTE

If NIC 1 and NIC 2 are connected to the same switch, they must be configured to different subnets - see "Network Settings" on page 40.
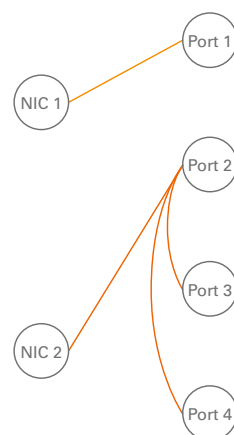
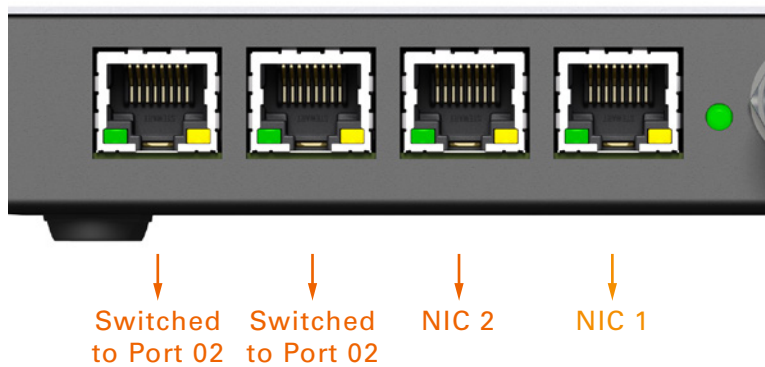**SWITCH - Configurations (exemplary)**

Switched to Port 02   Switched to Port 01   NIC 2   NIC 1
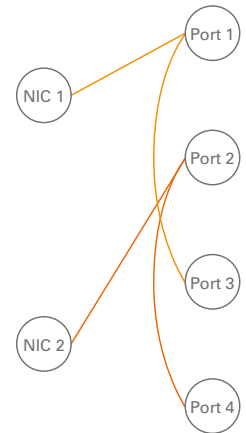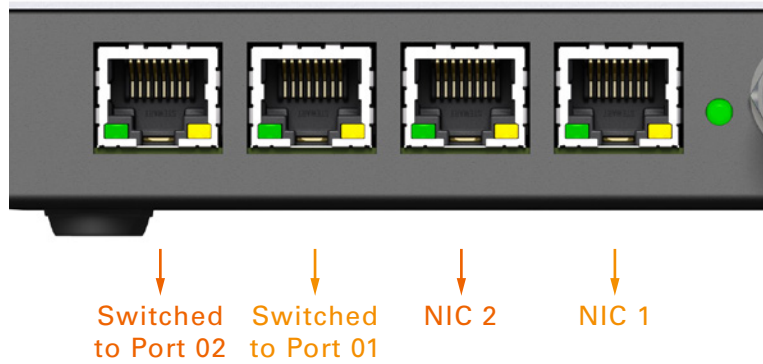
RAVENNA Audio & Control via Port 1 and Port 2
Extra ethernet traffic via Port 3 (NIC 1) and Port 4 (NIC 2)
Default Setting

Switched to Port 03   NIC 2   Switched to Port 01   NIC 1
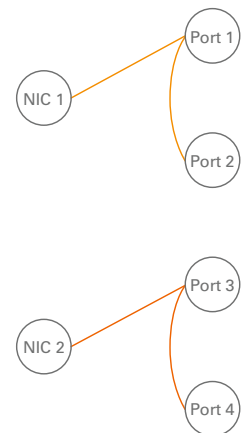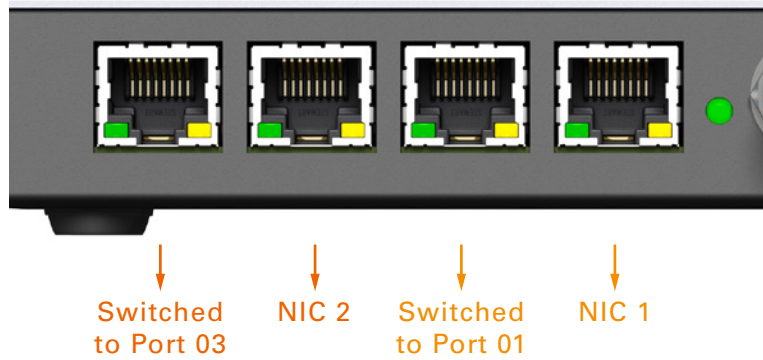
RAVENNA Audio & Control via Port 1 and Port 3
Extra ethernet traffic via Port 2 (NIC 1) and Port 4 (NIC 2)

RAVENNA Audio & Control via Port 1 and Port 2
Extra ethernet traffic via Port 3 (NIC 2) and Port 4 (NIC 2)
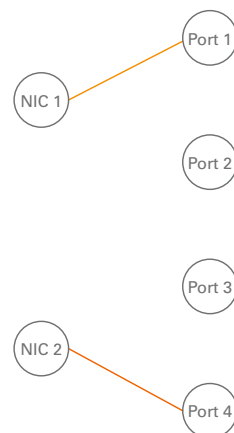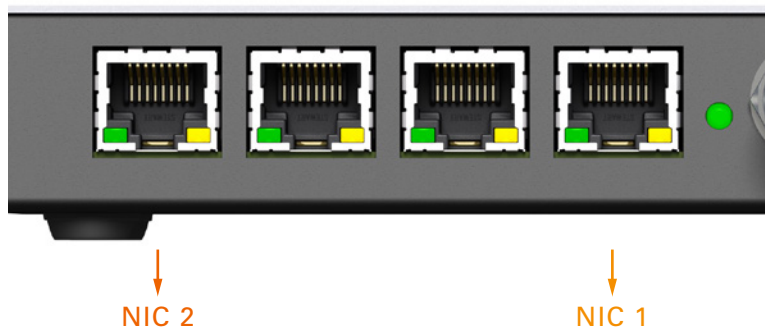
RAVENNA Audio & Control via Port 1 and Port 4
Port 2 and Port 3 not active.