



RAVENNA MODULE

Reference JAVA Applet

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Table of contents

CHAPTER 6: Remote Operation

| | |
|------------------------------------|----|
| Introduction | 4 |
| State | 5 |
| Device | 8 |
| PTP Clock | 11 |
| PTP Clock (Advanced Settings)..... | 12 |
| Network | 14 |
| Ravenna Input | 16 |
| Ravenna Output | 22 |
| Audio Interface | 26 |

CHAPTER 6: Remote Operation

Introduction

All functions of the device are accessible through an java applet. Most operating systems offer restricted access to java applications. Java may be downloaded at <http://java.com/en/download/>

Enter `http://<IP Adress>` (default IP: 192.168.0.1) in the navigation bar of your browser to open the control applet.

Confirm the query to start the Java applet.

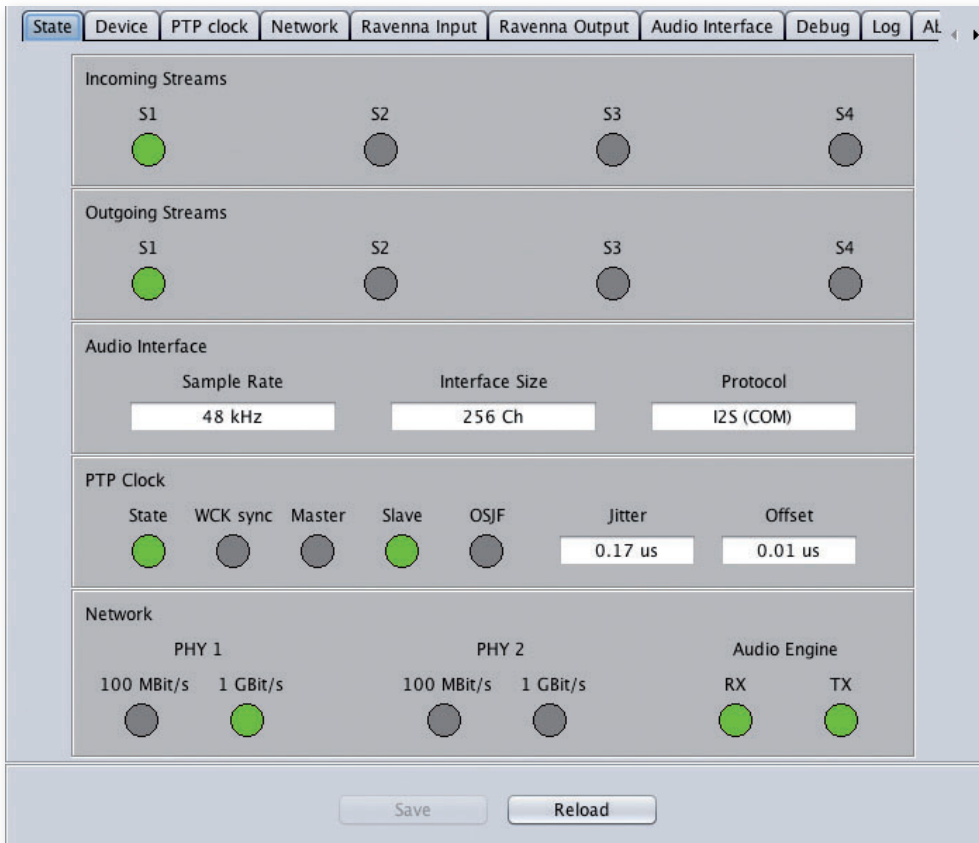


The java applet will be opened after some seconds.

The size of the window cannot be varied. The applet is organized in tabs, pulldown menus offer access to the values of a parameter. Some values use an input field (e.g. IP address). Use the arrows in the top right corner to navigate the tabs.

State

Overview about the state of the device and the streams. There is nothing to adjust here.



| | |
|--|--|
| INCOMING STREAMS S1 to S4 | State of incoming streams <input type="radio"/> (OFF) = stream not activated <input checked="" type="radio"/> (ON) = stream activated, receiving data <input type="radio"/> (blinking) = stream activated, not receiving data (unicast, connection not established) |
| OUTGOING STREAMS S1 to S4 | State of outgoing streams <input type="radio"/> (OFF) = stream not activated <input checked="" type="radio"/> (ON) = stream activated, sending data |
| AUDIO INTERFACE Sample Rate | Selected sample rate of module's main frame (44.1 / 48 / 88.2 / 96 / 176.4 / 192 kHz) |
| AUDIO INTERFACE Interface Size | Selected size of module's main frame (64 / 128 / 256 ch) |
| AUDIO INTERFACE Protocol | Selected protocol of module's main frame (I2S [COM] / TDM [COM] / NATIVE [GTP])* |

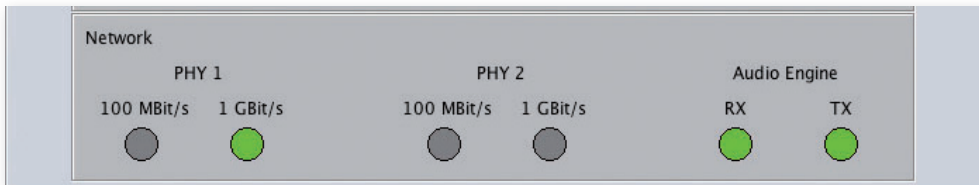
* GTP shall be used with MONTONE.42- see „Audio Interface“ on page 56.

State (continued)



| | |
|--|---|
| PTP CLOCK State | State of PTP-clock <ul style="list-style-type: none"> (ON) = PTP-clock ok (blinking) = PTP-clock ok, but jitter $\geq 20 \mu\text{s}$ |
| PTP CLOCK WCK Sync | Sync of module's PTP Clock according to the word clock of the main frame <ul style="list-style-type: none"> (OFF) = WCK sync not activated (ON) = WCK sync activated and PTP-clock master (blinking) = WCK sync activated, but not PTP clock master* |
| PTP CLOCK Master | Module is either PTP-clock master or clock slave <ul style="list-style-type: none"> (OFF) = not PTP-clock master (ON) = PTP-clock master |
| PTP CLOCK Slave | Module is either PTP-clock master or clock slave <ul style="list-style-type: none"> (OFF) = not PTP-clock slave (ON) = PTP-clock slave |
| PTP CLOCK OSJF (One Switch Jitter Filter) | Filtering of jittered PTP-clock packets <ul style="list-style-type: none"> (OFF) = OJSF not activated (ON) = OJSF activated and ok (blinking) = OJSF activated and too many jittered PTP-clock packets |
| PTP CLOCK Jitter | PTP-clock jitter per second |
| PTP CLOCK Offset | Offset relative to PTP-clock master |

* For proper signal operation both module and main frame shall be in sync.

State (continued)

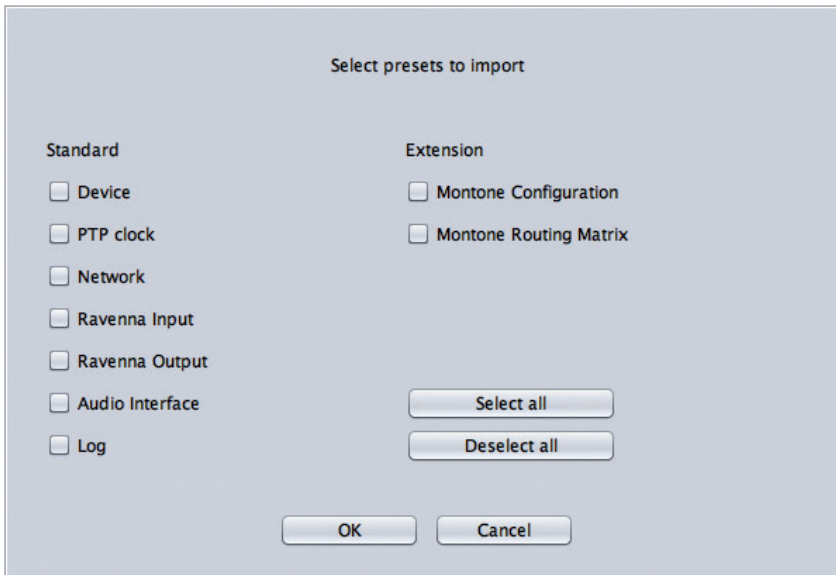
| | |
|-----------------------------------|--|
| NETWORK PHY 1 & 2 | Connection speed of network ports 1 & 2- either 100 Mbit/s or 1 Gbit/s ○ (OFF) = value not used ● (ON) = value used |
| NETWORK Audio Engine RX | State of module's audio engine- receiving ● (ON) = ok, receiving data ● (blinking) = not all received packets can be processed |
| NETWORK Audio Engine TX | State of module's audio engine- sending ● (ON) = ok, receiving data ● (blinking) = not all packets can be sent to the network |

Device

Basic device settings, such as mDNS Name, firmware update for the module and reset / reboot function.

| | |
|----------------------------|--|
| DEVICE NAME | Module's name in the network. Used e.g. for mDNS service.* |
| SOFTWARE VERSION | Module's software version. Is updated together with hardware version via network. |
| HARDWARE VERSION | Module's bitstream version. Is updated together with software version via network. |
| PRESET File open | Dialog to store the device settings to a file. Filetype: .rps |
| PRESET File save | Dialog to restore the device settings from a file. Filetype: .rps |

* The device name needs to be unique throughout the network.



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.

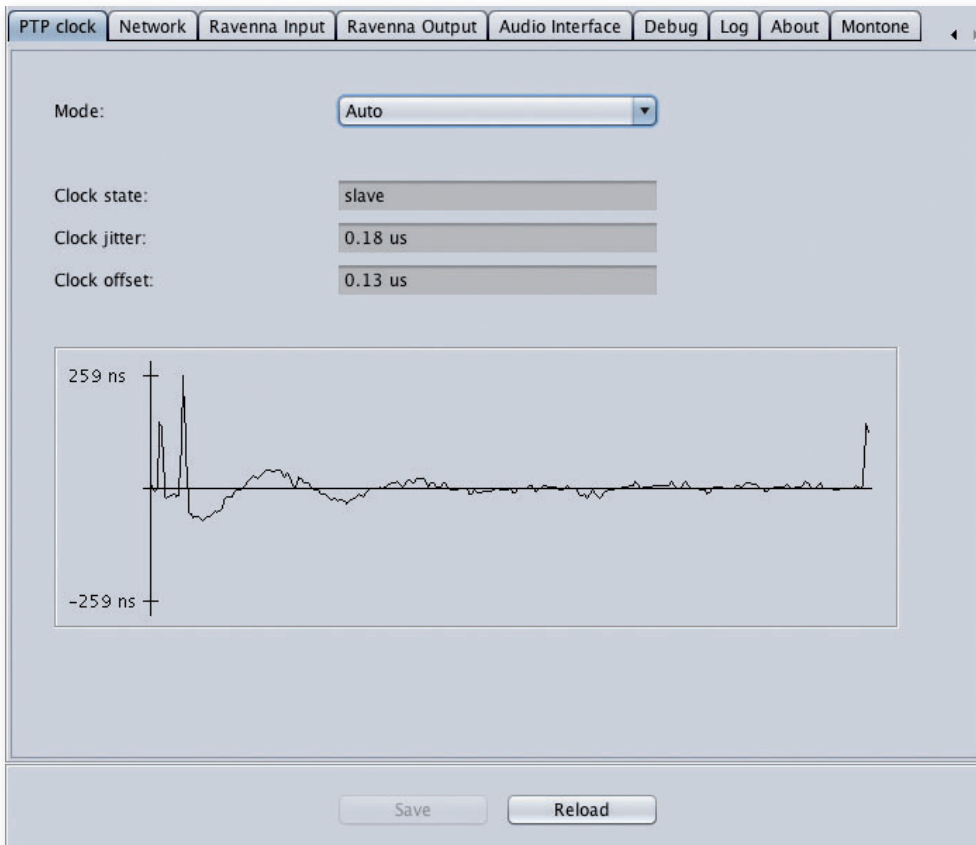
The screenshot shows a web interface with the following elements:

- Update file:** A text input field with two buttons: "Open file" and "Update".
- Manufacturer settings:** A button labeled "Reset".
- Device reboot:** A button labeled "Reboot".
- Bottom section:** Two buttons: "Save" and "Reload".

| | |
|---------------------------------------|---|
| UPDATE FILE Open file | Dialog to update module's firmware via network. Select file Filetype: .ravenna |
| UPDATE FILE Update | Starts the update process after the update file has been selected. |
| MANUFACTURER SETTINGS Reset | Factory reset. All device parameters incl. signal routing are set to factory defaults. Exception: MAC Adress and Audio Interface Protocol |
| DEVICE REBOOT Reboot | Device restart. Audio transmission will be interrupted. Java applet is not updated. For proper functionality close and re-open the network browser. |
| SAVE | Stores changes. |

PTP Clock

Precision Time Protocol- status information about clock. Master- slave configuration or auto-negotiation.



| | |
|--------------------------------|---|
| MODE Auto | PTP-clock master / slave configuration is auto negotiated between devices in the network. Module's master / slave state may change automatically. |
| MODE Auto Slave Only | PTP-clock slave configuration is preferred. Module clocks to another device in the network. |
| MODE Auto Master | PTP-clock master configuration is preferred. Module acts as network grandmaster. * |
| MODE Advanced | Manual configuration of PTP-clock. Requires detailed expertise with PTP- see "PTP Clock (Advanced Settings)" on page 42. |

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

PTP Clock (Advanced Settings)

| | |
|--------------------------|---|
| Clock type | Not used currently. |
| 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 |
| Priority1 | Priority setting for master announcement (the smaller the value the higher the priority) |
| Priority2 | 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 Switch Jitter Filter | Filter to discard PTP-clock packets with high jitter. |
| 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 | PTP-clock is always slave. |

PTP Clock (Advanced Settings)

| | |
|---------------------------|--|
| 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. |
| DSCP | Information for network switch about prioritization of PTP-clock packets (DiffServ). |
| 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 |
| Clock state | Information about current PTP-clock state: initialize error deactivated receiving data pre master master passive not calibrated slave |
| Clock jitter | PTP-clock jitter in seconds |
| Clock offset | Offset relative to PTP-clock master |
| Master to slave sec. | Absolute offset master-to-slave in seconds |
| Master to slave nanosec. | Absolute offset master-to-slave in nanoseconds |
| Slave to master sec. | Absolute offset slave-to-master in seconds |
| Slave to master nanonsec. | Absolute offset slave-to-master in nanoseconds |

Network

Settings for network access and definition transmission parameters.

| | |
|---|--|
| MAC ADDRESS | Module's MAC address (Media Access Control) |
| STATIC IP ADDRESS IP Adress | Module's IP Adress |
| STATIC IP ADDRESS Subnet Mask | Module's Subnetmask |
| STATIC IP ADDRESS DNS Server | IP Adress fo DNS server |
| IGMP | Definition or auto-select of IGMP version used to connect to a multicast router. (Internet Group Management Control) |

State Device PTP clock **Network** Ravenna Input Ravenna Output Audio Interface Log About Mc

MAC address:

Dynamic IP address (IPv4):

Static IP address (IPv4):

Protocol:

| | |
|---------------------------------------|--|
| DYNAMIC IP ADDRESS Protocol | DHCP / Zeroconf IP address is assigned by DHCP server. If no DHCP is available the IP address is determined via Zeroconf. |
|---------------------------------------|--|

Advance Mode:

TCP port HTTP:

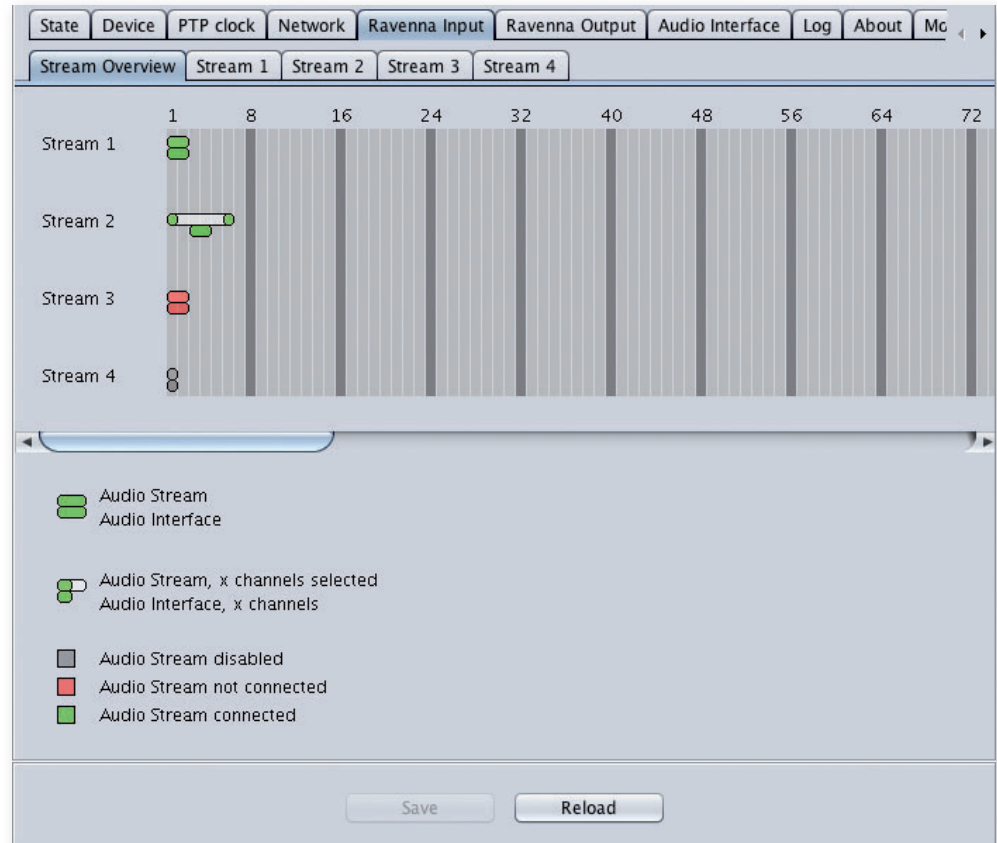
TCP port RTSP:

ICMP silent:

| | |
|--------------------------------------|---|
| ADVANCE MODE TCP Port HTTP | TCP port for HTTP (Hyper Text Transfer Protocol) |
| ADVANCE MODE TCP Port RTSP | TCP port for RTSP (Real Time Streaming Protocol) |
| ADVANCE MODE ICMP silent | Module's response to ICMP requests. (Internet Control Message Protocol) Silent active [default] = only ping requests are answered. |

RAVENNA Input

Overview about input streams.



Up to four 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 overview informs about the connection state of all input streams and how they are used.

Example:

- stream 2 is connected and contains 6 audio channels
- two of them are used (1 and 6)
- and mapped to channel 3 and 4 of the routing matrix.

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

Stream settings for receiving data and status display

The screenshot shows a software interface for configuring stream settings. At the top, there are several tabs: State, Device, PTP clock, Network, Ravenna Input, Ravenna Output, Audio Interface, Log, About, and Mc. Below these are sub-tabs for Stream Overview, Stream 1, Stream 2, Stream 3, and Stream 4. The main configuration area includes:

- Enable Stream:** A checkbox that is currently unchecked.
- Stream state:** A text field displaying "not connected".
- Offset fine:** A checkbox that is currently unchecked.
- Offset in samples:** A dropdown menu showing "1024 (21.333 ms)".
- Start channel:** A dropdown menu showing "3".
- Automatic configuration:** A checked checkbox.
- Protocol:** A dropdown menu showing "RTSP".
- Ravenna session:** A dropdown menu showing "ProducerCom_stream_1".
- URL:** A text field showing "r-name/ProducerCom%5Fstream%5F2".
- Advance Mode:** A checked checkbox.
- Audio channels:** A set of radio buttons for channels 1 through 6, with channel 1 selected.

At the bottom of the interface are two buttons: "Save" and "Reload".

| | |
|----------------------|--|
| ENABLE STREAM | Stores parameters and activates or deactivates the receiving of audio data. (Unicast: additionally the negotiation of the connection) |
| STREAM STATE | Information about stream state: connected not connected receiving data reading successfully timeout sample rate invalid error in transmission service not available (Unicast: the served stream is already received by another device) |
| RELOAD | Scans the network for available streams and updates the status display |

Stream settings and status display (continued).

Offset fine:

Offset in samples: 1024 (21.333 ms)

Start channel: 3

| | |
|--------------------------|---|
| OFFSET FINE | Enables adjustment of offset in increments of 1 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. |

* A sample offset of at least 2 x audio blocks per frame (payload) is recommended;
Stream: Audio blocks per frame = 16 (0.333 ms) ⇨ Offset ≥ 32 (0.667 ms)

Automatic configuration:

Protocol: RTSP

Ravenna session: ProducerCom_stream_1

URL: r-name/ProducerCom%5Fstream%5F2

Connect

Connect

| | |
|--------------------------------|---|
| AUTOMATIC CONFIGURATION | Configuration (SDP-file) of another RAVENNA device(s) that is (are) serving streams is recalled. |
| Protocol | Connection protocol (RTSP = Real Time Streaming Protocol) |
| RAVENNA Session (SDP) | Session of RAVENNA device that is serving streams. URL is transmit via MDNS. |
| URL | URL (Uniform Ressource Locator) of the session of RAVENNA device that is serving streams. (Example: rtsp://192.168.0.5/by-id/1) |
| CONNECT | Recalls the stream configuration of the selected session. |

Manual input stream configuration.

| | |
|--------------------------|-------------------------------------|
| Automatic configuration: | <input type="checkbox"/> |
| Unicast: | <input checked="" type="checkbox"/> |
| Protocol: | RTSP |
| URL: | rtsp://PrpducerCom.local:80/by-nam |

| | |
|----------------|---|
| UNICAST | Enables receiving of unicast streams. Inactive means receiving of multicast streams. |
| Protocol | Connection protocol (RTSP = Real Time Streaming Protocol) |
| URL | URL (Uniform Ressource Locator) of the session of RAVENNA device that is serving streams. |

| | |
|---------------------|--------------------------|
| Unicast: | <input type="checkbox"/> |
| Dst IP address: | 239.0.0.2 |
| Number of Channels: | 6 |
| RTP payload id: | 98 |
| RTP dst port: | 5004 |
| RTCP dst port: | 5005 |
| Audio Format: | L16 |
| Media Offset: | 0 |

| | |
|--------------------|---|
| Dst IP adress | Multicast IP adress of audio stream |
| 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. |
| RTP dst port | Stream's destination port for RTP |
| RTCP dst port | Stream's destination port for RTCP (Real-Time Control Protocol) |
| Audio Format | Stream's audio format (L16 / L24 / L32 / AM824)* |
| Media Offset | Offset between stream's timestamp and PTP-clock |

* L16 = 16 bit audio / L24 = 24 bit audio / L32 = 32 bit audio / AM824 = standardized according to IEC 61883, allows AES3 transparent transmission.

Manual input stream configuration- Advance mode



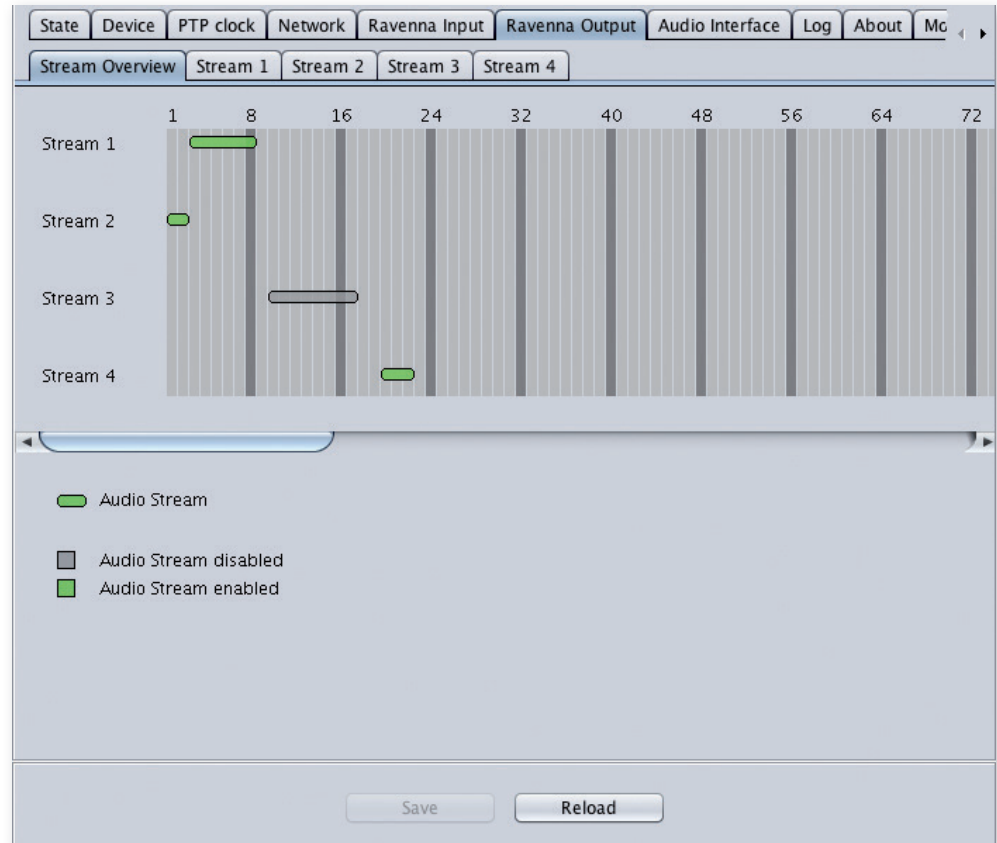
ADVANCE MODE

Allows to select individual audio channels from the stream that are transmit to the routing matrix.
Not available for manual configuration of unicast.

This page is left blank intentionally.

RAVENNA Output

Overview about output streams.



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

The overview informs about the activation state of all output streams and how they are used.

Example:

- stream 1 is enabled and contains 6 audio channels
- output channels 3 to 8 of the routing matrix are used as signal source

The stream dialog allows 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.

Stream settings for sending data.

The screenshot shows a web-based configuration interface for the Ravenna Output module. At the top, there is a navigation bar with tabs for State, Device, PTP clock, Network, Ravenna Input, Ravenna Output (selected), Audio Interface, Log, About, and Mc. Below this is a sub-navigation bar with tabs for Stream Overview, Stream 1 (selected), Stream 2, Stream 3, and Stream 4. The main configuration area contains the following settings:

- Enable Stream:
- Unicast:
- Rtp dst port:
- Rtcp dst port:
- Dst ip address (IPv4):
- Audio blocks per frame:
- Audio Format:
- Start channel:
- Number of channels:

At the bottom of the configuration area, there are two buttons: "Save" and "Reload".

| | |
|-----------------------|---|
| ENABLE STREAM | Stores parameters and activates or deactivates the sending of audio data. |
| UNICAST | If activated, the stream is sent in unicast mode*. |
| 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 | Stream's IP address for multicast (must be different for each stream). |

* A unicast stream can only be received by one RAVENNA 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.

Stream settings for sending data (continued).

| | |
|-------------------------|---------------|
| Audio blocks per frame: | 16 (0.333 ms) |
| Audio Format: | L16 |
| Start channel: | 3 |
| Number of channels: | 6 |

| | |
|-------------------------------|--|
| AUDIO BLOCKS PER FRAME | Number of blocks containing payload (audio) per ethernet frame.* |
| 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 six channels, starting at channel 3 is fed from channel 3 to 8 of the routing matrix. |
| NUMBER OF CHANNELS | Number of audio channels in the stream. |

*Audio block [bit] = sample x number of channels.

The block size depends on the audio format and the number of channels of a stream.

Ethernet frame = payload + overhead

Payload [byte] = number of audio blocks / (8 bit/byte)

The overhead has a fixed size (40 bytes), whereas the payload may vary.

High amount of payload (= larger packet sizes = higher number of audio blocks / packet) makes efficient use of network bandwidth.

To increase payload:

- a) raise number of channels per stream
- b) raise resolution (audio format)
- c) insert more audio blocks into a frame

Inserting more audio blocks into a frame increases the latency (packet time).

So depending on the number of channels of a stream there is a tradeoff between lower latency and less network traffic.

Maximum payload size of an RTP packet amounts to 1460 bytes at the standard ethernet MTU of 1500 bytes.

Examples (24 bit, 48 kHz):

| Number of channels | Number of audio blocks | Latency | Bandwidth efficiency | Payload |
|--------------------|------------------------|--------------|----------------------|-----------|
| 2 | 1 | 20.8 μ s | 0.4 % | 6 byte |
| 2 | 240 | 5000 μ s | 94 % | 1440 byte |
| 64 | 1 | 20.8 μ s | 13 % | 192 byte |
| 64 | 7 | 146 μ s | 88 % | 1344 byte |
| 128 | 3 | 62.5 μ s | 75 % | 1152 byte |

Higher packet time (= higher number of audio blocks per packet) requires additional buffering on receiving devices.

** L16 = 16 bit audio / L24 = 24 bit audio / L32 = 32 bit audio / AM824 = standardized according to IEC 61883, allows AES3 transparent transmission.

Audio Interface

Settings of module's audio engine.

| | |
|---------------------------------|--|
| SAMPLE RATE | Module's sample rate (44.1 / 48 / 88.2 / 96 / 176.4 / 192 kHz) |
| TTL | Describes the 'lifetime' of sent data (Time-To-Live). The data is discarded in the network when the maximum number of hops is exceeded. |
| DSCP | Definition of prioritization mechanism and priority class of RTP packets (stream data) in a network switch (Differentiated Services Code Point / DiffServ). Values: EF, CS6, CS7, AF41 |
| AUDIO INTERFACE SIZE | Size of module's audio engine (64 / 128 / 256 channels). A smaller engine increases capacity for concurrent processing of stream data. |
| AUDIO INTERFACE PROTOCOL | Describes communication protocol between module and main frame. I2S - used for PRODUCER.COM TDM (COM) - not used NATIVE (GTP) - used for MONTONE.42 |
| SYNC PTP CLOCK TO WCK | If active the module's PTP clock is derived from the currently selected clock of the main frame- see „Montone- Configuration“ on page 60. |



NOTE

The matching audio interface protocol is essential for proper operation.

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