Power Core RP

User Guide

Version: 6.4.0/1

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www.lawo.com/downloads

Table of Contents

1. Introduction

Welcome to **Power Core^{RP}**.

About this Manual

This document describes all aspects of the system, including the installation, configuration, operation and maintenance. The specification is valid for mc^2 Version 6.4.0.x.

Look out for the following which indicate:

Notes - points of clarification.

Tips - useful tips and short cuts.

Attention - alert you when an action should *always* be observed.

Utility Software

The following utility software is supplied with the device:

- **AdminHD** - to configure the mc^2 system.
- **VisTool RP** - to remotely operate Power Core^{RP} and set up the device.

Further Information

Mechanical drawings and data sheets (including weights and dimensions) are available from the **Download-Center** (after login).

We also recommend that you carefully observe the release notes delivered with your system.

Lawo User Registration

For access to the **Download-Center** and to receive regular product updates, please register at:

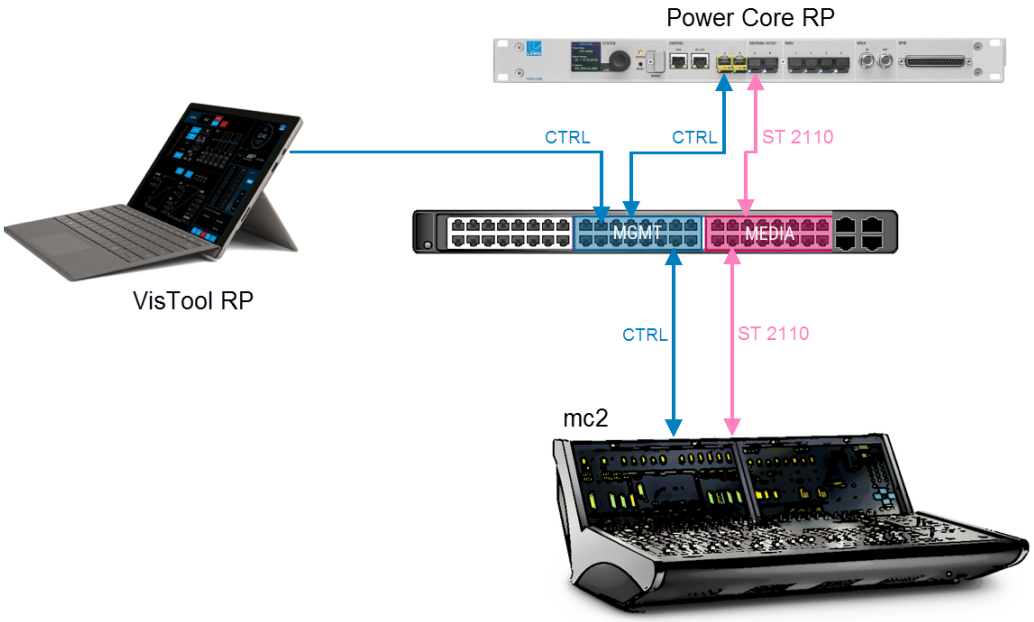
www.lawo.com/user-registration.

2. Important Safety Instructions

Please observe all of the instructions provided in the "General Safety Information for Lawo Equipment" booklet delivered with your devices. Double-click here to open the same information (as a pdf).

3. Product Overview

System Overview



Power Core^{RP} is a remote production solution for mc^2 audio consoles with integrated modular IO, DSP and IP streaming capabilities. Typically, it is used to create low-latency mixes locally at the production venue (e.g. for monitors or IFBs). Up to four Power Core^{RP} devices can be controlled from one mc^2.

Each Power Core^{RP} connects to the Media Network to transfer audio over IP, and to the Management Network to transfer control data. The MEDIA connection streams audio to and from the mc^2 system (for matrix assignment and console monitoring). The MGMT connection allows the console to remotely control DSP within Power Core via RPx (Remote Production) channels.

In addition to mc^2 console integration, Power Core^{RP} can be controlled from VisTool RP, a screen-based graphical user interface running on a networked PC.

Power Core^{RP} Local Resources

Each 1RU, 19-inch unit comes with a fixed DSP configuration of 64 mono input channels and 16 stereo auxes, plus stereo PFL and Listen buses for monitoring. The local IO is flexible, via plug-in expansion IO cards on the rear panel. Options include Mic/Line In, Line In (only), Line Out (only) or AES3 In/Out. Signals from the local IO cards and 16 mono tie-lines (from the mc^2) are assigned to the 64 input channels in a fixed manner.

Remote Control from VisTool RP

From the GUI's “Mixer” page, you can adjust the fader levels and DSP parameters for the 64 input channels and 16 auxes. Other pages include the Start page (for metering and setup options), RX and TX Matrix pages (for audio assignments to and from the IO cards) and Monitoring page (for local listen/PFL and talk to aux functions).

Remote Control from the Console

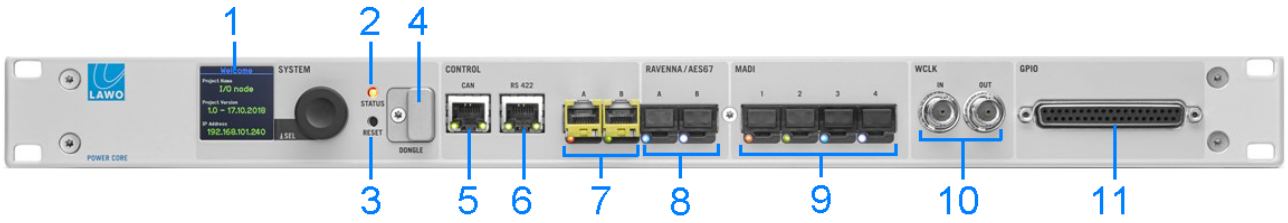
By assigning RPx input and aux channels to mc^2 fader strips, you can remotely adjust the Power Core^{RP} DSP resources from the console's fader strips or Central Control Section.

4. The Hardware

This chapter describes the hardware components and options.

4.1 Controls, Connectors & Indicators

4.1.1 Front View



1 SYSTEM Display & Menu Control

The front panel display can be used to edit local device parameters such as the IP address.

2 STATUS LED

The STATUS LED indicates the health of the device and sync status. If the LED is blinking at regular intervals, then the device is working properly; the LED color indicates the sync status.

3 RESET button - warm start

Press this button to perform a warm start. The button is recessed to prevent accidental operation.

A warm start will reboot the device. Do *NOT* perform a warm start while live on air!

4 DONGLE

Use this port to connect the USB memory stick containing your system's WIBU license. A safety cap is available to prevent accidental removal of the dongle. If fitted, you will need a T10 star tool to remove the cap.

5 CAN

The CAN bus connector is not used by mc^2 systems. It can be left unconnected.

6 RS 422

The serial connector is not used by mc^2 systems. It can be left unconnected.

7 CONTROL A & B (via SFP)

The two CONTROL ports provide a connection to the device's control system (for administration and control).

In an mc^2 installation, only the CONTROL A port is used. It connects the device to the Management Network and provides access to the Web UI.

8 RAVENNA/AES67 A & B (via SFP)

The two RAVENNA/AES67 interfaces stream audio to and from an IP network.

In an mc^2 installation, the ports connect to the Media Network, and the streams are set up automatically according to the AdminHD configuration. The streams are fully compatible with the SMPTE ST2110-30/31, AES67 and RAVENNA standards. By connecting both interfaces (A and B) to discrete network paths, redundant streaming can be configured via SMPTE ST2022-7 Seamless Protection Switching.

The streaming network *must* be properly managed and configured.

9 MADI 1 to 4 (via SFP)

The four MADI ports are not supported by mc^2 systems.

10 WCLK IN & OUT

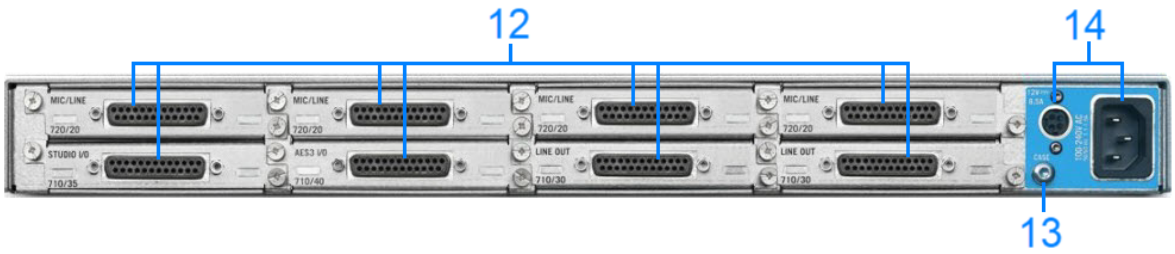
In an mc^2 installation, Power Core *must* be synchronized to PTP arriving from the streaming network. Thus, WLCK IN is usually left unconnected.

WCLK OUT always provides an output of the current system reference.

11 GPIO

This connector provides 8 x GPI (optocouplers) and 8 x GPO (silent and self-healing CMOS relays) for local signaling and switched functions.

4.1.2 Rear View



12 Expansion Card Slots x 8 (optional)

Up to 8 plug-in IO cards can be fitted to the expansion slots at the rear of the frame. All cards are hot-pluggable. Options include: MIC/LINE, LINE IN, LINE OUT, STUDIO IO and AES3 IO.

Note that MADI and DANTE IO cards are not supported by mc^2 systems.

13 CASE

The CASE grounding screw should be used to ground the frame.

14 12V DC Input & AC Mains Input

Every device comes with dual power feeds: AC and DC. To use the DC input, you will need an external 12V DC power supply. The 955/50-80 power supply can be ordered separately.

If both inputs are connected, then AC provides the main and DC the redundant power supply.

Power Core *MUST* be connected to the mains using the power cable supplied with the system.

4.1.3 The Front Panel Display

The front panel display and rotary control can be used to view or edit device parameters. The same parameters can be accessed via the Web UI.

There are four navigation levels:

1. Page Select.

Turn the encoder to scroll through the available pages. Push down to select the highlighted page.

2. Parameter Select.

Turn the encoder to scroll through the available parameters. Push down to select the highlighted parameter, or return to the previous level (if nothing is highlighted).

3. Parameter Edit.

Turn the encoder to scroll through the parameter fields/characters. Push down to edit the highlighted character, or return to the previous level (if nothing is highlighted).

4. Character Edit.

Once a character is highlighted, turn the encoder to change its value. Push down to accept the change.

Once all characters have been edited, push down and hold to save the changes. Alternatively, push down (when no character is highlighted) to cancel and return to the previous level.

You can use the following commands to insert, delete or clear all characters:

- Select the up arrow to insert a new character.
- Select the down arrow to delete the selected character.
- Select "¤" to clear all.

If you push down and hold the encoder during boot-up, the device will reset to a default firmware image and empty configuration.

4.1.4 The Status LED

The **STATUS** LED indicates the health of the device and sync status.

➢ **LED Static**

If the LED is lit and static, then either the device is booting or there is an internal problem:

Static LED	System Status
Off	System powered off
White	System starting
Color (not white)	System failure

➢ **LED Blinking**

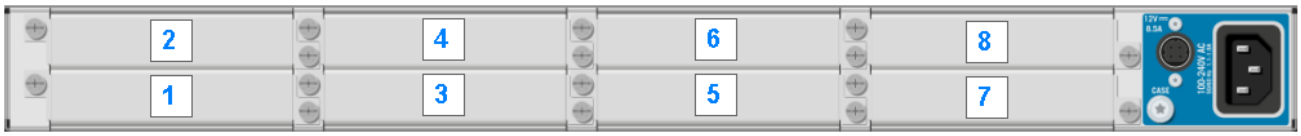
If the LED is blinking at regular intervals, then the device is working properly and the LED indicates the sync status.

Note that if the LED is blinking from white to a color, then this indicates that Power Core is running as a PTP Master. The table below describes the possible states:

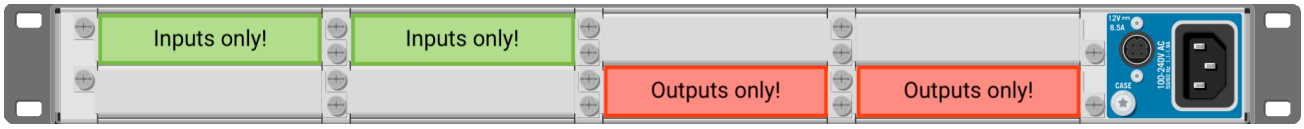
Blinking LED	Sync Status
Blue <-> Off	Synchronized to PTP master
Yellow <-> Off	Trying to sync to PTP master
Red <-> Off	Synchronized to internal clock
Green <-> Off	Synchronized via Wordclock
Magenta <-> Off	Synchronized via MADI
Red <-> white	Device is PTP Master, sync source = internal
Green <-> white	Device is PTP Master, sync source = Wordclock
Magenta <-> white	Device is PTP Master, sync source = MADI

4.2 IO Cards

Rear Panel Expansion Slots "Empty"



Expansion Slot Conditions



Up to eight IO cards can be fitted to the expansion slots at the rear of the unit. You will need to know the expansion slot number (shown above) to check the card's status in the Web UI.

All IO cards are hot-pluggable, and break out on DB-25 connectors that are wired according to the AES59 (TASCAM) standard.

Due to heat emissions, a maximum of four MIC/LINE IN cards are allowed per Power Core. These *must* be fitted to even numbered expansions slots only (the top row).

In addition, to allow the transfer of audio for console monitoring and matrix tie-lines, you *must* adhere to the slot conditions shown above. Other IO card variations are permitted if Power Core is operating as an IO node only.

If changes are made to the number or type of IO cards, then you will need to edit the mc^2 system configuration using AdminHD.

IO Card Options

8x MIC / LINE IN
Maximum four per Power Core

STUDIO I/O
2 Mic / Line in, 2 Line outputs, 2 HP outputs

8x ANALOG LINE IN
Eight mono / four stereo inputs per card

4x AES3 I/O
Four digital inputs and outputs (SRC on inputs)

8x ANALOG LINE OUT
Eight mono / four stereo outputs per card

Name	Part Number	Description	Max. per Frame
MIC / LINE IN	710/20	8 x mono Mic/Line in	4 (even slots only)
LINE IN	710/25	8 x mono (or 4 stereo) Line in	8
LINE OUT	710/30	8 x mono (or 4 stereo) Line out	8
STUDIO IO	710/35	2 x mono Mic/Line in 2 x mono (or 1 stereo) Line out 2 x stereo Phones out	8
AES3 IO	710/40	4 x stereo AES3 in (with SRC) 4 x stereo AES3 out	8
AES3 IO	710/41	as for the 710/40 but with bit transparency	8

5. Installation

This chapter describes how to install the device.

5.1 Packing List

Included

Power Core^{RP} ships with the following accessories:

- 1 x 2m IEC power cable (country-specific) - to connect AC mains to the frame.
- 1 x USB license dongle (250-5998-000).
- Dust caps for the Network Interface and MADI SFP cages - these will be mounted in the frame.

Note that the license code (for the USB dongle) can be found on the delivery note.

Optional

The following accessories must be ordered separately:

- 1 x external 12V DC power supply (955/50-80) with 2m IEC power cable (country-specific) - to connect 12V DC power to the frame.
- 1 x USB license dongle safety cap.
- SFP modules for the CONTROL and RAVENNA/AES67 ports. In an mc^2 installation, only the CONTROL A port is used. To achieve streaming redundancy, you will need to connect both of the RAVENNA/AES67 ports.

5.2 Preparation

Unpacking

Power Core is delivered in its own box with all accessories. If you have ordered IO cards for the rear expansion slots, SFP modules or a 12V DC power supply, then these will be packaged separately (in the same box).

Please check the contents of the shipping boxes, and in the event of any transport damage, contact your local Lawo representative or email support@lawo.com. A list of serial numbers for all components is included with the shipment. Please keep this list for your records.

Rack-Mounting

Front View

Rear View

Recessed Rack Adapters

Power Core is designed to be mounted in a 19-inch rack. Please install supporting slide bars to hold the weight of the unit, and use the locking devices provided. For recessed rack-mounting, use standard, third-party, 1RU recessed rack adapters such as the ones shown above. When fitting the rack adapters and slide bars, you must make sure that there is sufficient airflow around the device for cooling.

Connectors are located at the front and rear of the unit. Therefore, when using 19-inch racks with doors please leave enough room for the cables.

If you have IO cards to install, then these should be fitted *BEFORE* installing the unit into the rack.

Dimensions and Weight

Width	483 mm (19”)
Height	44.0 mm (1 RU)
Depth (inc locking devices)	385 mm
Weight (without expansion IO cards)	4.5 kg

A dimension drawing is included in the Appendices.

Temperature and Cooling

Power Core is equipped with temperature-controlled fans for minimum noise emission. Ventilation holes are provided on the left and right. There must be sufficient airflow around the device for cooling.

DO NOT obstruct the side ventilation holes as to do so will prevent efficient cooling.

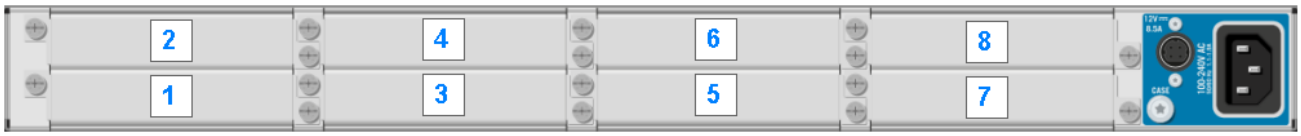
The current temperature of the device's internal components can be checked on the front panel display. The recommended tolerances can be found in the data sheet for the Power Core main frame. In particular, the temperature of the FPGA chip must NOT exceed 85° C.

Power Consumption & Electrical Voltage

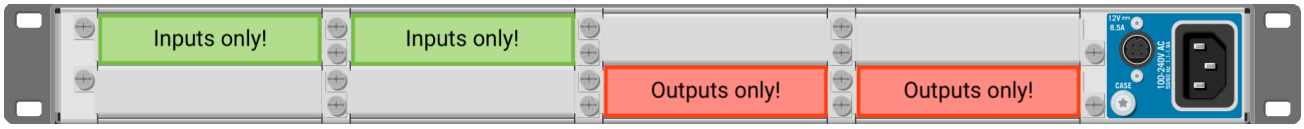
Please see the 12V DC Power Supply appendix.

5.3 Fitting the IO Cards

Rear Panel Expansion Slots "Empty"



Expansion Slot Conditions



Power Core^{RP} is delivered with a metal cover plate fitted to each expansion slot. To use your IO cards, they must be installed into the frame.

A maximum of four MIC/LINE IN cards are allowed per Power Core. These *must* be fitted to even numbered expansions slots only (the top row). In addition, to allow the transfer of other audio to and from Power Core^{RP} you *must* adhere to the slot conditions shown above.

The following procedure can be used fit a new IO card or exchange an IO card once the unit is operational. All cards are hot-pluggable, and so the exchange can be performed while the device is powered.

To remove and replace the screws you will need a small flat-blade screwdriver (not supplied).

The IO cards carry highly sensitive electronic components, and should be handled with care. *ALWAYS* observe the following procedures:

- Discharge yourself before touching an IO card.
- Wear conductive safety-shoes and grounding wristbands to reduce the risk of electrostatic discharging.
- DO NOT bend the cards.

1. Using a Phillips PH1 driver, unfasten the two diagonally opposite screws which hold the card, or cover plate, in place.
2. Gently pull out the card from the frame, or remove the cover plate:

Spare cover plates should be stored safely so that they can be reused later if a card is removed.

3. Insert the new card into the slot, and gently slide it into the frame:

Make sure that the card glides smoothly into the side guide-rails and sits flush with the rear panel casing.

If you are hot plugging a card, then after a few seconds, the card will boot. You can check the status of the new card from the Web UI (go to the **System** -> **States** page).

4. Now fasten the two screws to fix the card in place.

CAUTION: *ALWAYS* secure the IO card using the screws provided. This protects the operator from contact with live parts; protects the card from being pulled out unintentionally; and reduces the emission of electro-magnetic radiation.

5. When you have fitted all the IO cards for your system, check that all cards are screwed into the frame and that any empty slots are closed with metal cover plates.

The installation is now complete, and you can wire your audio devices to the IO card connectors.

5.4 SFP Modules

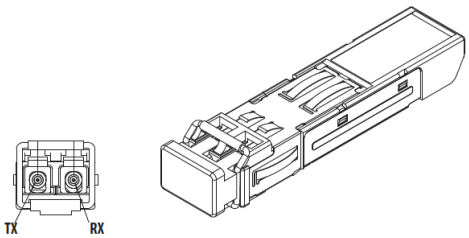
To use the CONTROL and RAVENNA/AES67 ports, you must fit an SFP module. All SFPs must be Lawo-certified (as listed below). SFPs are not included and must be ordered separately. You will need one SFP for each port.

➢ **Network Interface SFP Modules**

SFP Module Description	Part Number
1000 Base-SX: 850nm, -7dBm, multi-mode fibre, 550m	981/60-10
1000 Base-LX: 1310nm, -3dBm, single-mode fibre, 10km	981/60-20
1000 Base-ZX: 1550nm, 0dBm, single-mode fibre, 80km	981/60-30
1000 Base-T: RJ45, copper, 100m	981/60-60

Installing the SFPs

The SFP modules are hot-pluggable, and so they can be fitted or exchanged while the device is powered.



1. Remove the dust caps from both the port and SFP module.

Store these carefully so that they can be replaced if a module is removed.

2. Push the SFP module into the rectangular slot.
3. Press gently and firmly until the module locks into position.

Attention: Before removal, please unlock SFP modules to avoid mechanical damage to the slots.
If a module is removed, please refit the port's dust cap to protect the internal components.
You *must* use the correct fiber type for your remote device. Using the wrong fiber type or exceeding the maximum optical input power can result in malfunction of, or damage to, the optical device.

5.5 Grounding & Power

Power Core (rear view)

5.5.1 Grounding

Although operator protection is guaranteed, it is best to establish an additional ground for EMC reasons. A grounding screw is provided below the **DC IN** connector on the rear of the frame.

1. Use the M4x8 **CASE** screw to fasten the grounding cable to the housing.

Power Core must be on the same potential as all other system devices.
For Scandinavian countries, ALWAYS use a grounded mains connection, to prevent the device from being grounded through Ethernet or other signal connections.

Grounding of Audio Interfaces

For compliance with AES3, digital interfaces should be connected to a field ground.

For microphones, the ground from the device should connect directly to the microphone via the cable shielding, otherwise phantom power cannot be transferred. Take care that the shielding does not connect to the field ground, to prevent interference and loss of signal quality.

5.5.2 Power

Power Core comes with dual power feeds: AC and DC. If both inputs are connected, then the two feeds provide main and redundant power.

AC Input

The frame includes an integrated wide-ranging AC power supply, and is delivered with a 2m IEC power cable (country-specific).

1. Using the IEC cable provided, connect your mains to the **100-240V** AC input on the rear panel.

The device *MUST* be connected to the mains using the power cable supplied with the system.

Power Core has no on/off switch and starts automatically when power is applied.

DC Input

To use the DC input, you will need the external 12V DC power supply (955/50-80). This is optional and must be ordered separately. The PSU is delivered with its own IEC power cable (country-specific).

For dimensions, weight and electrical specification, see the 12V DC Power Supply appendix.

➢ To connect DC power to the frame:

1. Connect the 12V DC power supply to the **DC IN** connector on the rear panel.
2. Using the IEC cable provided, connect your AC mains to the PSU.

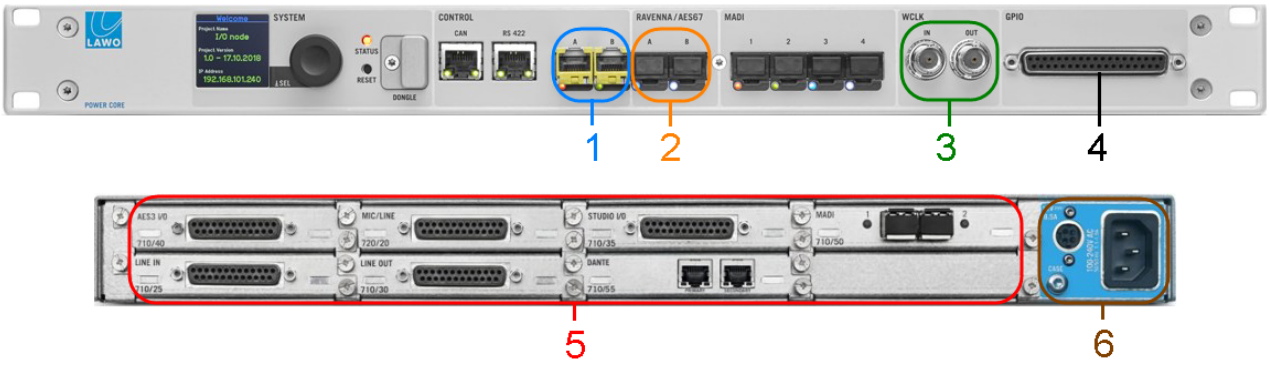
The PSU *MUST* be connected to the mains using the power cable supplied.

5.6 Wiring

Power Core^{RP} should be wired as follows. Please see Connector Pin-Outs for wiring information.

To set up the device, only CONTROL A (1) and Power (6) are required.

Power Core (front and rear)



1 CONTROL Network (via SFP)

The two CONTROL ports provide a network connection to the Power Core^{RP} control system. In an mc^2 installation, only CONTROL A is used. Once the initial setup is complete, the port should connect to the same Management Network as the mc^2 control system.

The connection can be made either directly or via a network switch. When connecting via a network, then this can be shared with other devices, such as in the regular "house network" of a typical broadcast facility. Routers are permitted as long as the minimum requirements below are met. By using routers, or similar devices, the latency of the communication will increase. The network *MUST* meet or exceed the following requirements:

- At least 100MBit/s; 1 GBit/s preferred
- Full Duplex

> It is important to keep the Management Network separate from the Media Network connected to the AoIP ports (2).

To use the port you must fit a Lawo-certified SFP module (as described earlier). The SFP determines the cable type, maximum distance and connector.

Each port has an LED which indicates the following information:

LED Color	Meaning
Off	link down
Green	link up, speed = 100MBit/s
Blue	link up, speed = 1000MBit/s

2 Media Network (via SFP)

The two RAVENNA/AES67 interfaces connect the AoIP streams to the Media Network. In an mc^2 installation, the streams are set up automatically according to the AdminHD configuration.

The streams are fully compatible with the SMPTE ST2110-30/31, AES67 and RAVENNA standards. Optionally, you can use both interfaces (A and B) to support redundant streaming via SMPTE ST2022-7, Seamless Protection Switching.

The connections *must* be made via a network switch and *not* directly to another streaming port. You can find more details about the data network requirements and suitable components in the "Lawo IP Networking Guide".

> The Media Network *must* be properly configured and managed. i.e. it must use a suitable network architecture; all components must support multicast (as opposed to unicast); a proper Quality of Service (QoS) must be configured; and so on.
>
> Please *DO NOT* attempt to connect the streaming ports using an unqualifying IP network, as correct operation cannot be guaranteed.

To use each port, you must fit a Lawo-certified SFP module (as described earlier). The SFP determines the cable type, maximum distance and connector.

Each port has an LED which indicates the following information:

LED Color	Meaning
Off	link down
Green	link up, speed = 100MBit/s
Blue	link up, speed = 1000MBit/s

3 WCLK IN & OUT (BNC)

In an mc^2 installation, Power Core *must* be synchronized to PTP arriving from the streaming network. Thus, WLCK IN is usually left unconnected.

WCLK OUT always provides an output of the current system reference.

In both cases, connections are made using standard 75 ohm BNC connectors. The maximum cable length depends on the equipment you are connecting to.

See Synchronization for more details.

4 GPIO (SUB-D37)

The GPIO connector provides 8 x GPI (optocouplers) and 8 x GPO (silent and self-healing CMOS relays) for local signaling and switched functions:

- GPI = 8 x optocouplers (3-36 VDC / 8mA @ 36V)
- GPO = 8 x silent CMOS relays (50V AD/DC / 0.5A AC; 1.0A DC).

The connector is a 37-pin D-type.

5 DIGITAL & ANALOG IO

All rear panel IO cards break out on DB-25 connectors that are wired according to the AES59 (TASCAM) standard.

All MIC/LINE IN connections are electronically balanced and floating (suitable for balanced or unbalanced use). They feature a discrete class-A preamplifier with superb performance at both low (mic) and high (line) levels. In addition to variable microphone pre-amp gain, each input comes with switchable 48V phantom power, a high-pass filter and 20dB PAD. The maximum analog input level (with the PAD enabled) is +24dBu.

All LINE IN and LINE OUT connections are electronically balanced and floating (suitable for balanced or unbalanced use). For LINE OUTs, the maximum analog level can be adjusted to +12, +15, +18, +21 or +24 dBu relative to digital full scale (dBFS). This is a factory-configured setting; +24dBu is recommended.

All AES3 IO connections conform to the stereo AES3 standard. The inputs have sample rate conversion (SRC).

6 Grounding & Power

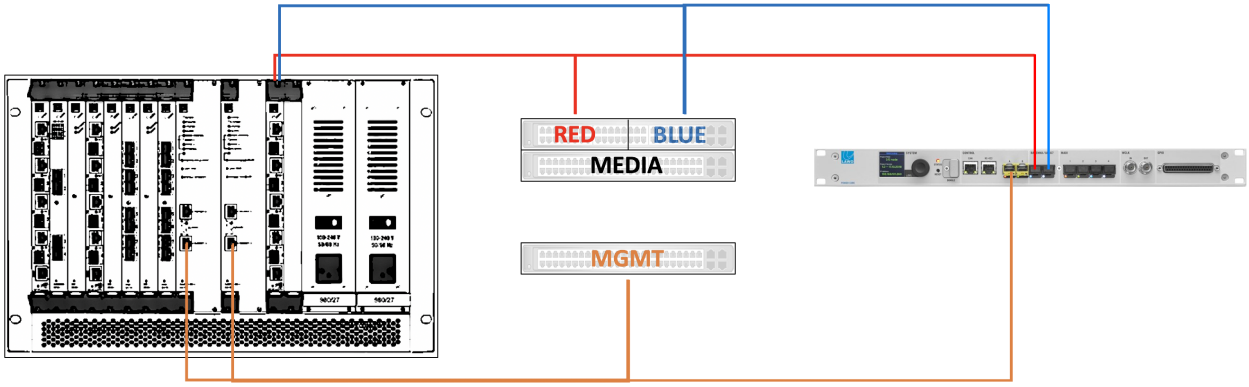
See Grounding & Power.

5.7 Network Interconnects

Audio is transferred between Power Core^{RP} and the Nova73 via the Media Network. The streams between the devices are set up automatically according to the AdminHD configuration. To achieve redundant streaming using SMPTE ST2022-7, you must use both interfaces on Power Core^{RP} and an odd/even port pair on the 981/61 module. This can be used to create the two discrete network paths (shown in red and blue below).

For Power Core^{RP}, the CONTROL A port *must* connect to the Management Network[1] (to allow remote operation of the device from the mc^2 control system).

A setup supporting Power Core^{RP} could look like the following.



[1] The Management Network connection is optional when Power Core is operating as an IO node, as all the necessary control data can be accessed via the streaming ports. In this instance, it should be installed if you wish to separate the RAVENNA control data from the Media Network.

5.8 Synchronization

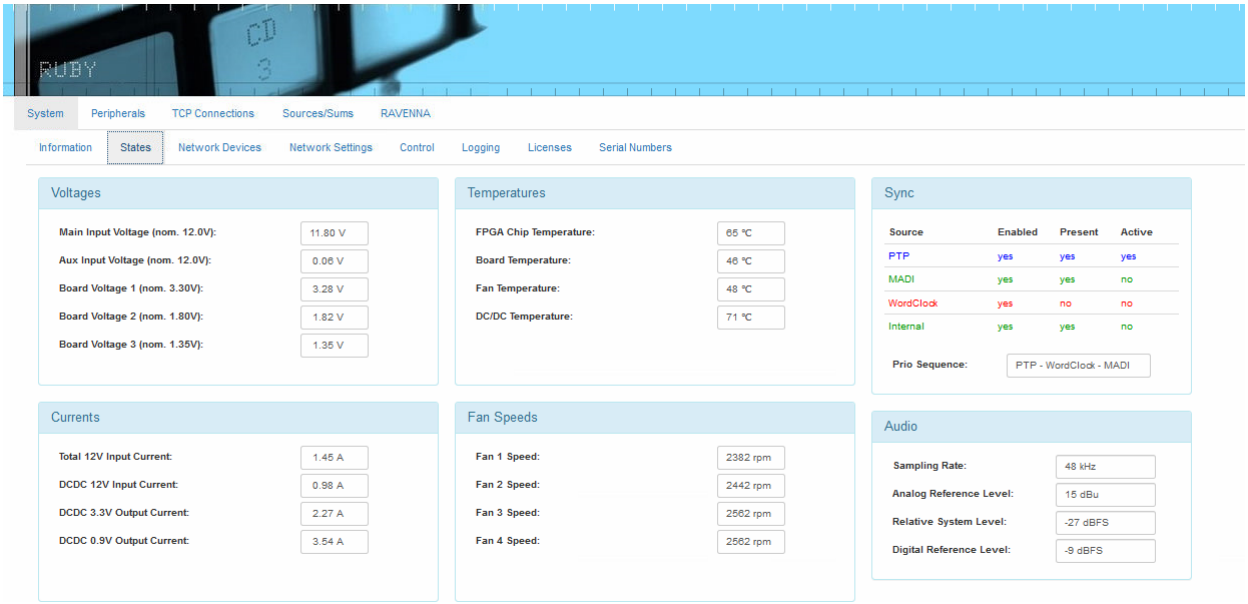
Sync Reference Options

In an mc^2 installation, Power Core^{RP} *must* be synchronized to PTP arriving from the streaming network.

Checking the Sync Status

The sync status can be checked from the front panel by looking at the STATUS LED (as described earlier).

Alternatively, you can open a Web UI connection and select the **System** -> **States** page:



On the right, you will see each of the **Sync** sources and whether they are Enabled (in the configuration), Present (a valid signal has been detected), and Active. The color coding indicates:

- **Blue** = sync source is enabled, present and active.
- **Green** = sync source is enabled and present, but not currently active.
- **Red** = sync source is enabled but not present.

The **Prio Sequence** box shows the priority of the external sync sources as defined by the configuration - in our example, PTP, Wordclock and then MADI.

Sync Output

The front panel WCLK OUT connector always provides an output of the current system reference.

6. System Setup

This chapter describes how to set up Power Core^{RP} for use with an mc^2 system and VisTool RP.

6.1 Introduction

Power Core^{RP} is supplied with a VisTool RP installer which includes two components: **VisTool RP** and **VisTool RP Admin**. The former is used to control Power Core^{RP} from a networked PC (via a GUI). The latter is used to update the device firmware. To launch VisTool RP for remote operation, you must activate the "VisTool RP" license.

Power Core^{RP} ships from the factory with the correct DSP configuration, and so there is no need to upload a configuration to the device itself. To unlock the DSP resources, you must activate the "AP IO Node" license onto the USB dongle (supplied). After inserting the dongle, Power Core will automatically reboot and load the appropriate settings. You will then need to open a Web UI connection to the CONTROL A port to configure the correct network settings, and use **VisTool RP Admin** to update the device firmware.

For the mc^2 configuration, there are two parts. First, to use Power Core as a remote stagebox / IO node, the system configuration files (config.tcl and gui_config.tcl) must be adjusted using **AdminHD**. Second, to control Power Core^{RP} DSP from the mc^2 console, the device must be specified in the system's .tcl files.

The rest of this chapter describes the setup procedure in more detail.

6.2 Installing the VisTool Software

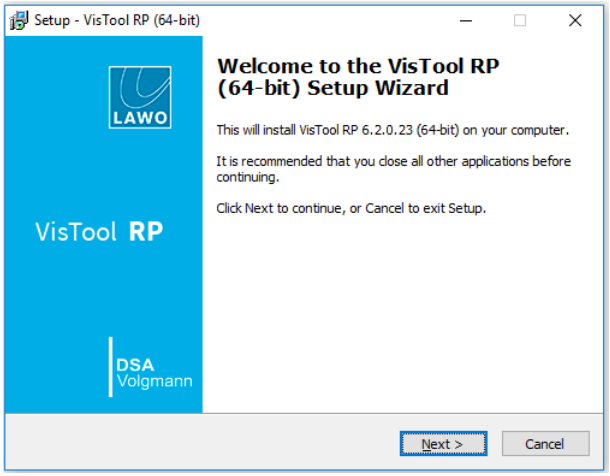
Start by installing **VisTool RP** onto a Windows host PC.

The PC must meet the minimum system requirements for VisTool MK2. These can be found on the Lawo broadcast website at: https://lawobroadcast.com/vistool-specs/

The PC must be connected to the same Management Network as the Power Core CONTROL A port.

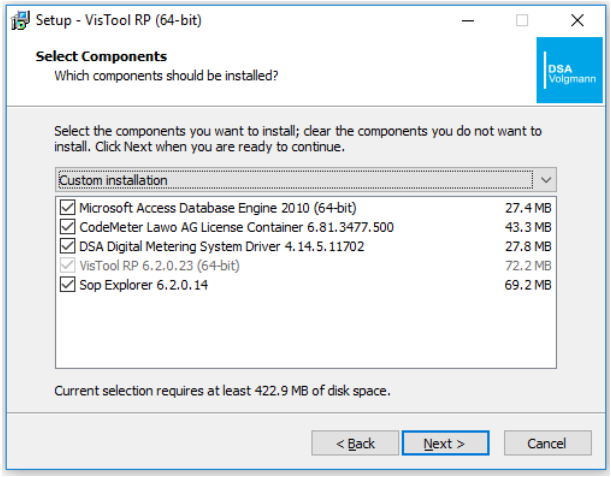
The latest version of the **vistool_rp.exe** installer is available from the **Downloads** area at www.lawo.com (after **Login**). Go to "Support -> Downloads -> Audio Production Consoles -> Software -> Current Release -> Power_Core_RP" and download the installer.

1. Copy the installer onto your PC.
2. Double click on the installer icon - this starts the 'VisTool RP Setup Wizard':



3. Follow the Wizard's instructions accepting the default options provided.

At the 'Select Components' window, please accept all default options to install or update the components:

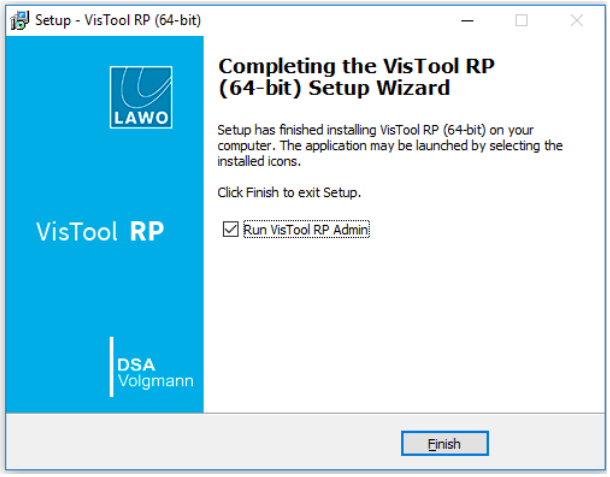


Note that the **CodeMeter Runtime** software is necessary for licensing. If it is already installed, then you can deselect this option and use an existing Cm container for the license storage. Or, keep the option selected to update the CodeMeter release and create a new Cm container.

4. When you reach the 'Summary' window, check the options and click **Install** - the software components are installed onto your computer; this may take a few minutes.

By default, files are installed in the location: 'C:\Program Files\VisTool RP'.

5. When all of the components have been installed, the following window will appear:

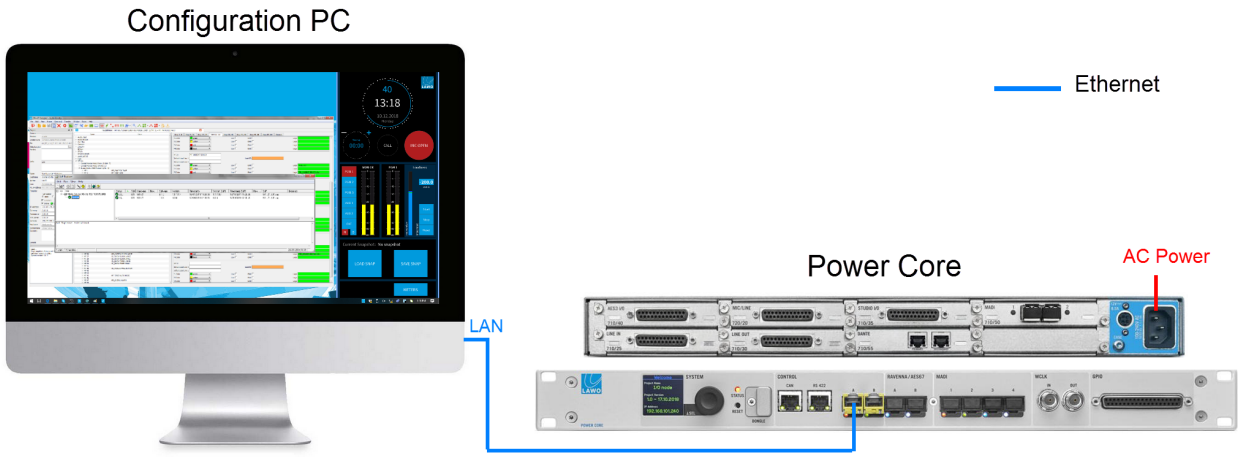


Select **Finish** to complete exit the setup wizard and launch the **VisTool RP Admin** tool. This will be used later to update the firmware version running on the Power Core^{RP} device.

If you have any problems with the software installation, please contact your local Lawo representative or email support@lawo.com.

6.3 System Connections (Required for Setup)

In order to boot and configure Power Core, the following connections must be made: Ethernet to the VisTool RP PC and AC power.



1. Start by connecting the PC's **LAN** port *directly* to the Power Core **CONTROL A** port.

To set up the system, you should make a direct connection (as shown above). This can be modified later to connect via a network. See Wiring: Control for cabling and network requirements.

Take care to use the **CONTROL A** port and *not* either of the **RAVENNA/AES67** ports (which are used for streaming).

2. Using the IEC cable provided, connect the mains supply to the **100-240V** AC input on Power Core.

The AC mains connections *MUST* be made using the power cable supplied with the system.

6.4 Powering On & Checking the Device

Power Core (front view)

Power Core has no on/off switch and starts automatically when power is applied. You will see the boot-up progress on the front panel:

- First, the display and **STATUS** LED are black and unlit.
- Then, the Lawo logo appears and the **STATUS** LED lights in white.
- As soon as boot-up is complete, the **Welcome** page appears and the **STATUS** LED starts to blink; its color reflects the sync status.

If the **STATUS** LED does not start to blink, then the device has an internal problem. Please try a restart as a first step.

At the end of the boot-up process, the system loads the state of all settings at the last shut down (known as the warm start data). It means that when you turn on, you will get back to wherever you were[1] at the last power off.

[1] The last known PTP Master/Slave mode may not be reinstated if Power Core is set to operate as PTP Slave only.

The hardware is now ready to be configured - this takes approximately 20 seconds from power on.

> **Please note**: if you perform a cold start, then the system ignores the warm start data and resets to the default values stored in the configuration.

6.5 Configuring the Network Settings on the PC

To establish a network connection to Power Core, you will need to configure the network settings for the PC's LAN port. The exact steps vary depending on your OS version.

The IP Address must be unique, and set within the same range as that of Power Core's CONTROL A port. The Subnet Masks should be identical.

You can check the current network settings from Power Core's front panel display. The defaults are:

- **IP Address** = 192.168.101.240
- **Subnet Mask** = 255.255.255.0
- **Gateway** = 0.0.0.0

Test the connection by opening a web browser application and typing in the default IP address = **192.168.101.240**. If the connection is successful, then the Web UI "Login" screen will appear.

If there is a problem opening the page, then first check your web browser (see Web UI for the browser requirements). Then check the network cabling and IP settings of the control PC and Power Core.

If you are connecting via a larger network, you may need to consult your network administrator to gain access to the Lawo device.

6.6 Licensing

The system requires two licenses: one for VisTool and one for Power Core.

The "VisTool RP" license (VISRP) can be installed into a local container (on your host PC), a remote container (on a networked server), or onto a USB dongle (for portability). If you wish to use a dongle, then this must be ordered separately.

For Power Core, the "AP IO Node" license (APION) must be installed onto the USB dongle supplied with the system and connected to the front panel DONGLE port.

In both cases, the licenses are activated and managed by the CodeMeter Runtime licensing system from WIBU systems. The license codes can be found on the delivery note shipped with the system.

6.6.1 About the Dongles

All dongles are specially-configured USB memory sticks which can be purchased from either Lawo or WIBU systems. The dongles supplied for hardware and software products ship with different file systems, so it is important not to mix up the dongle types. If you have purchased a dongle for a VisTool RP, then this will have a metal "LAWO logo" tag attached as shown below. Multiple software products can be licensed from a single dongle. The dongle supplied for Power Core^{RP} is stand-alone (with no metal tag).

USB Dongle (for Lawo software)

6.6.2 Preparing for Activation

To activate a license, you will need:

- A PC with an internet connection (and USB port if using a dongle). If your PC does not have an internet connection, then the offline activation method can be used.
- The WIBU systems USB memory stick (if using a dongle).
- The license code. This can be found on the delivery note shipped with the system. It takes the form of a 25-digit ticket number such as the one shown below.

License Code Example

Ticket:
7MAMJ-8HZ95-N9VW5-3MKX6-LWUYM

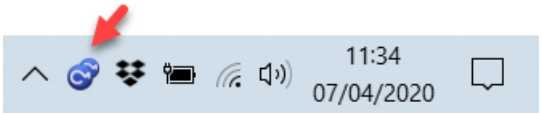
Once activated, it is strongly recommended that you backup your licenses (using the **CodeMeter** WebAdmin portal). This will allow you to restore a license if the original is lost or damaged.

6.6.3 Installing CodeMeter Runtime

To activate a license, your PC must be installed with **CodeMeter Runtime** (from WIBU systems). The correct version was installed earlier together with VisTool RP.

You can check the installation by looking in the Windows taskbar where you should see the following icon.

CodeMeter Runtime Cm container



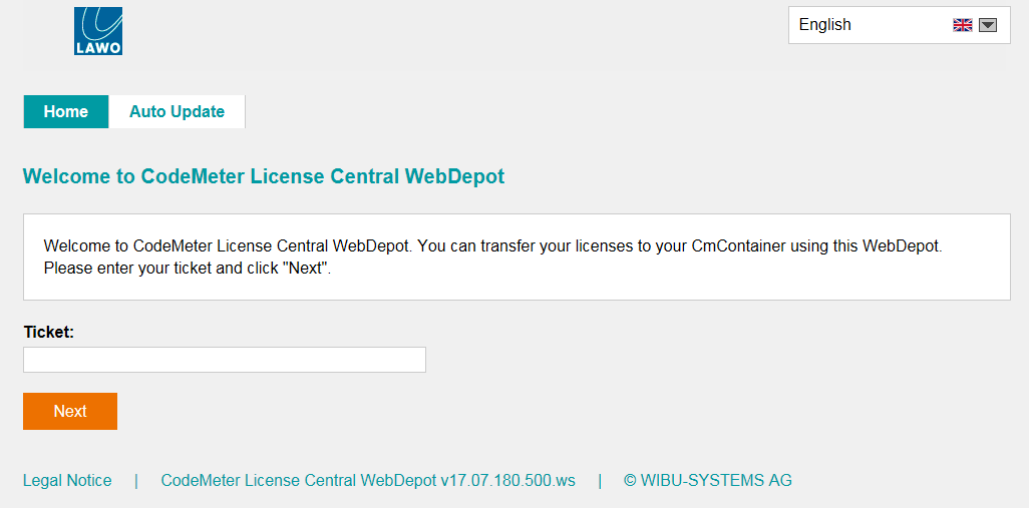
This shows that a Cm container (for local license storage) has been installed.

6.6.4 Activating a License Online

Repeat the following procedure to activate both licenses. The AP IO Node license must be installed onto the USB dongle supplied with the system. For simplicity, install the VisTool RP license into the Cm container on the host computer.

To use this method, your PC must have an internet connection. If installing onto a dongle, then this should be connected to the PC's USB port.

1. Open the Lawo licensing web page by copying the following URL into your web browser: https://licenseportal.lawo.com



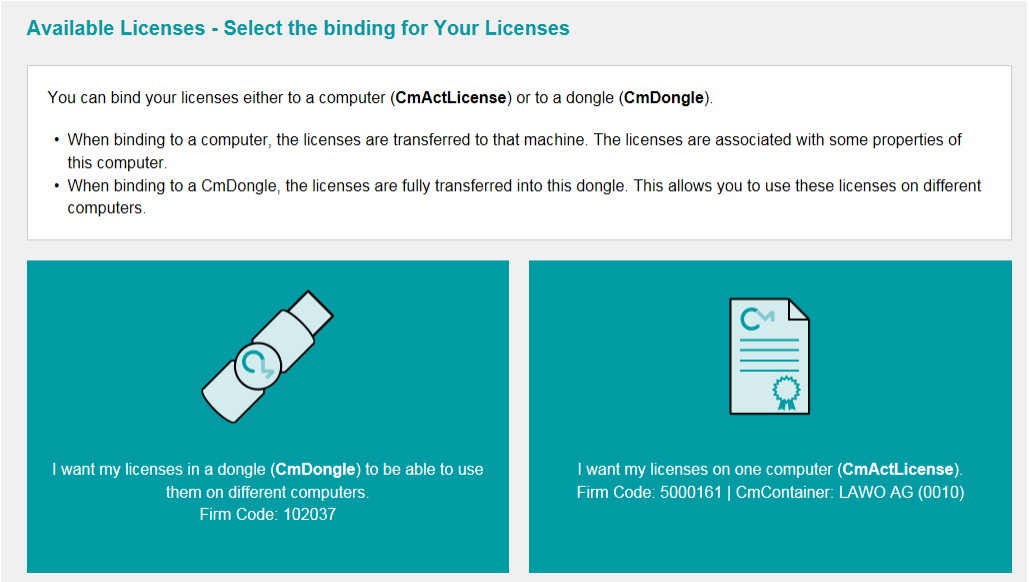
If necessary you can choose a different language using the drop-down menu at the top right of the page.

2. Copy your license ticket number - this is the 25-digit number code - into the **Ticket** field and select **Next**.

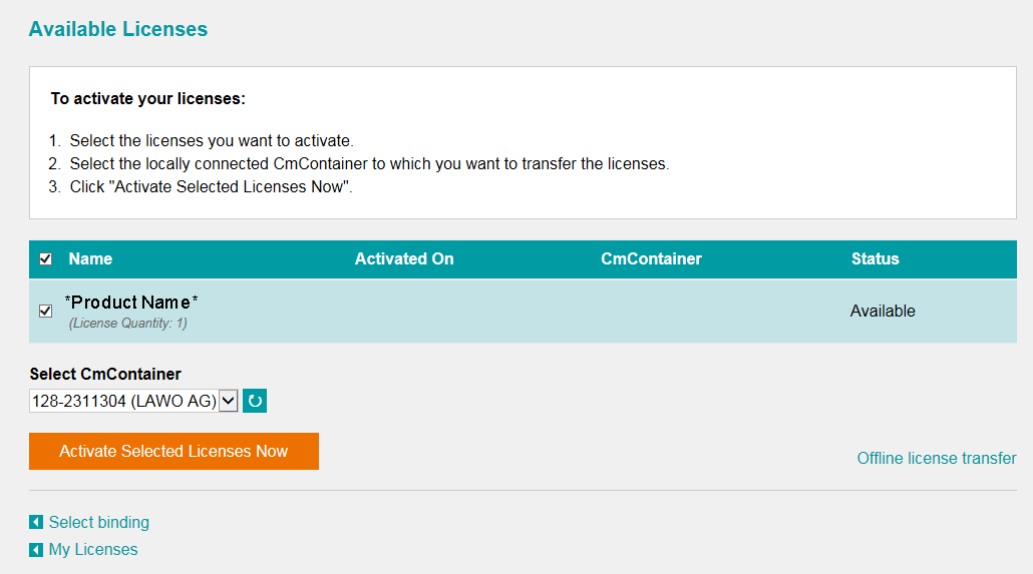
3. The WebDepot searches for and displays your licenses - select **Activate Licenses** to continue.

4. At the next page, select the storage method for your license - note that this cannot be altered later.

Choose either **CmDongle** (to create a USB dongle) or **CmActLicense** (to bind the license to the local computer).

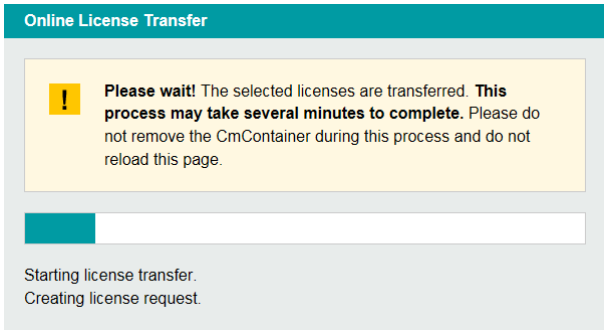


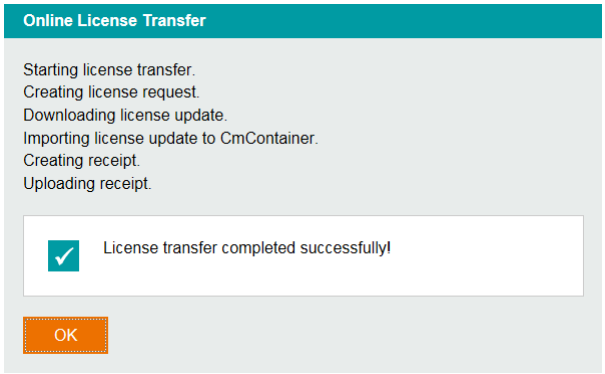
5. At the next page, select the licenses you wish to activate and the **CmContainer** to be used for the license storage.



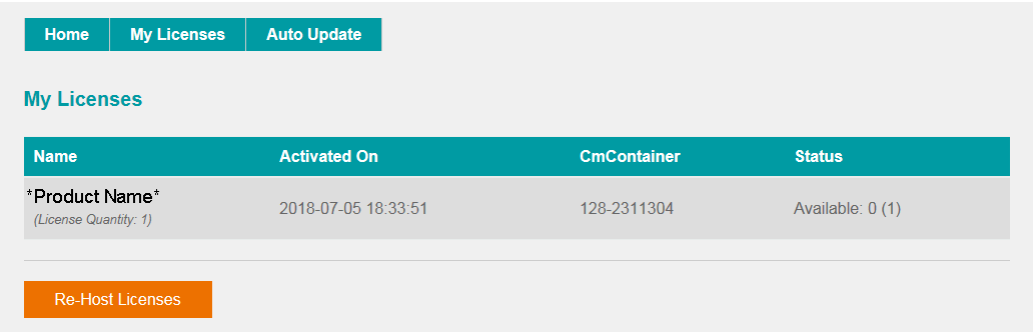
You can store multiple licenses in the same container. If no Cm containers are available, then you will see an option to "**Get CmContainer automatically**".

6. Click on **Activate Selected Licenses Now** and wait for a few seconds - a confirmation pop-up appears once the activation is successful:





7. After selecting **OK**, a summary appears:



8. You can now close the browser and return to your Lawo software application or install the USB dongle.

For information on re-hosting a license, offline activation, backup/restore and using a license server, please see the Advanced Licensing Features appendix.

6.6.5 Installing the Power Core Dongle

Once the "AP IO Node" license has been activated, connect the USB memory stick to the DONGLE port on the Power Core front panel:

If the optional safety cap is fitted, you will need a T10 star tool to remove and replace the cap.

After inserting the license dongle, the device will automatically reboot and load the appropriate settings.

6.7 Updating the Firmware

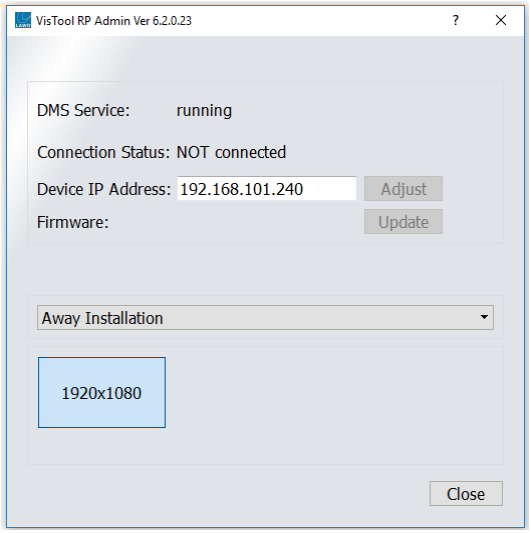
The next step is to check and, if necessary, update the firmware version running on the Power Core^{RP} device. This is handled by **VisTool RP Admin**, the administration program for VisTool RP.

You will need to run VisTool RP Admin whenever you update to a new version of software. The latest firmware is copied onto the host PC when you run the VisTool RP installer. When VisTool RP Admin connects to Power Core, it compares the versions and updates the "Firmware" status messages accordingly. Any new files can then be transferred.

1. VisTool RP Admin starts automatically at the end of the software installation procedure.

Alternatively, select **Program Files** -> **VisTool RP Admin** from the Windows START menu.

The "DMS Service" should be **running** and the "Connection Status" will show either **connected** (if there is a valid network connection) or **NOT connected** (if there is no network connection):



2. To establish a connection, connect your VisTool PC to the Power Core^{RP} CONTROL A port and enter its IP address into the "Device IP Address" field, and select **Adjust**.

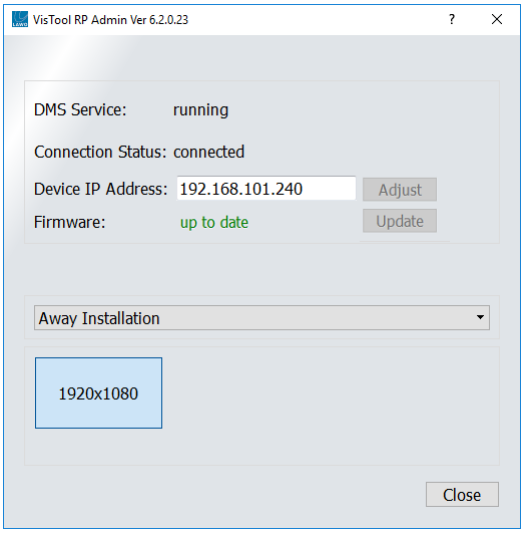
You can check the current network settings from Power Core's front panel display. The default IP address = 192.168.101.240

If the "Connection Status" remains as **NOT connected**, then there is a problem with the network communication. Check that the "Device IP Address" has been entered correctly. Then check the physical connections and the TCP/IP settings of your computer's Network Interface Card.

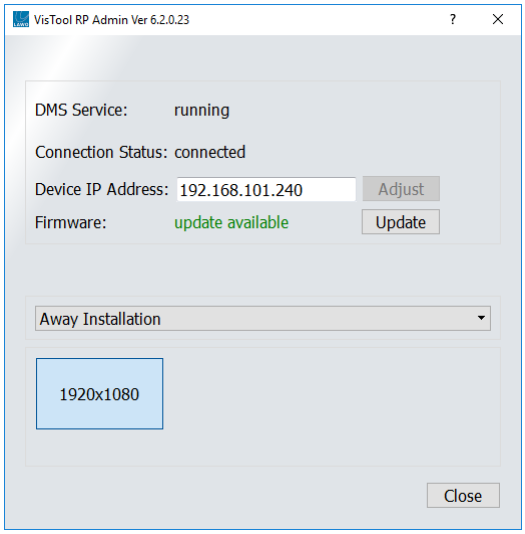
3. Once a valid network connection is detected, the program begins checking the "Firmware" status of the device - this may take a few seconds.

If the firmware is "up to date", you can move on to the next task. Alternatively, continue reading to update the firmware.

No action required



Update Available

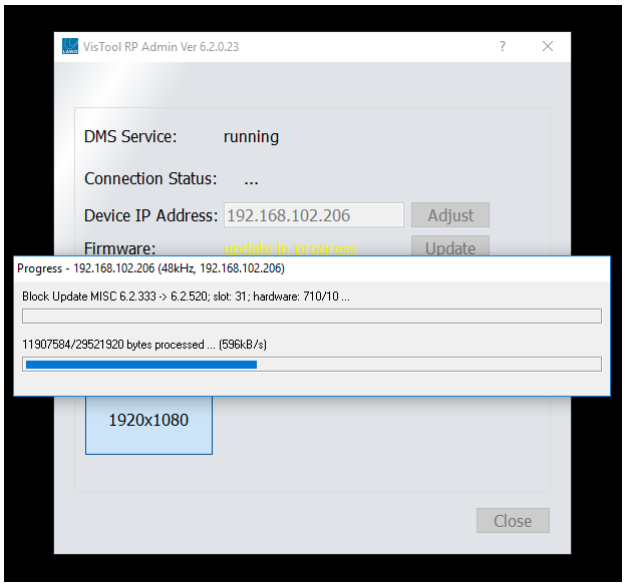


➢ To update the firmware:

1. Click on **Update** to start the update procedure.

The "Firmware" status message shows **update in progress** while the necessary data is transferred. This may take a while.

Update in progress



2. Following the transfer, Power Core restarts and during this time you will lose your network connection ("Connection Status" = **NOT connected**).

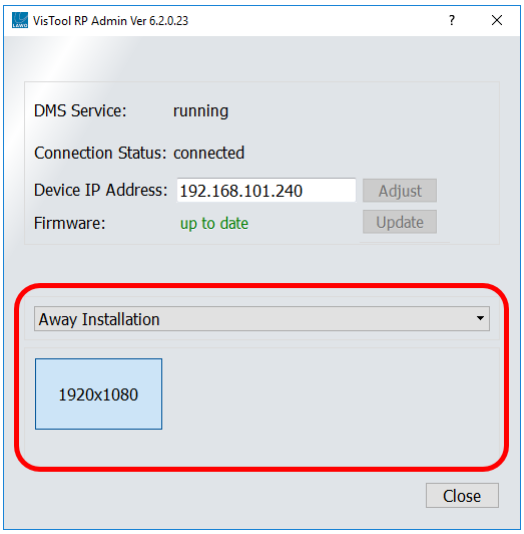
3. After the restart, the program reconnects and checks the "Firmware" status again.

The firmware status should now be "up to date", and you can continue on to the next task.

6.8 Modifying the VisTool Start Script

Before closing VisTool RP Admin, check the two options at the bottom of the screen.

Start Script Options



These can be used to modify the start script which launches VisTool RP. They are important if you are installing more than one VisTool instance, or if your PC supports more than one monitor. If neither of these situations apply, then leave the options at their defaults, select **Close** and move on to the next task.

Installing Multiple VisTool Instances

VisTool RP can be installed on two computers to control the same Power Core^{RP} from different locations. For example, to run the GUI locally (at the broadcast venue) and remotely (alongside the mc^2 console). For this application, it is desirable for the two GUIs to have independent page switching so that the VisTool pages do not switch at the same time! This can be achieved by setting different station IDs using the "Home Installation / Away Installation" option in VisTool RP Admin.

First, follow all of the previous steps to install and configure VisTool RP on each PC. Then set the option to "Away Installation" on one PC, and to "Home Installation" on the other PC. The order is not important as long as the assignments are different. When you close VisTool RP Admin, the start script updates accordingly. When you next open the VisTool RP session, the new station ID will be active.

Selecting the VisTool Monitor

At the bottom of the Admin window, you can select the monitor which will be used for the VisTool RP GUI. If only one monitor is connected, then this is automatically selected (as shown above).

If the PC has more than one monitor connected, then you will see multiple entries. In each case, the resolution is shown in the monitor icon (e.g. 1920x1080). Click on an icon to select the monitor you wish to use - an ID appears briefly on the connected screen. Then close VisTool RP Admin to update the start script accordingly. When you next open the VisTool RP session, the GUI will appear on the selected monitor.

6.9 Configuring Power Core as an IO Node

The next task is to configure Power Core as a remote IO node / stagebox. This is achieved as follows:

- Adjust the system configuration file (config.tcl) using AdminHD:
  - Add Power Core to a RAVENNA port and define the rear panel IO cards (see Defining the Hardware).
  - Adjust the signal labels and Device ID if desired.
  - Edit the **HD Core port IP settings** to define the RAVENNA port IP settings on the console/router side (see Media Network Settings).
  - Edit the **Control A IP settings** to define the CONTROL port IP settings on the Power Core side (see Management Network Settings).
  - Export the "config.tcl" file and upload it to your system.
- Adjust the signal list configuration (gui_config.tcl) using AdminHD's Signal List Editor.
- Edit the Power Core network settings using its Web UI.

Once the AdminHD configuration is in place and the Power Core network settings have been configured to match, the streams between the mc^2/Nova and Power Core will be set up automatically.

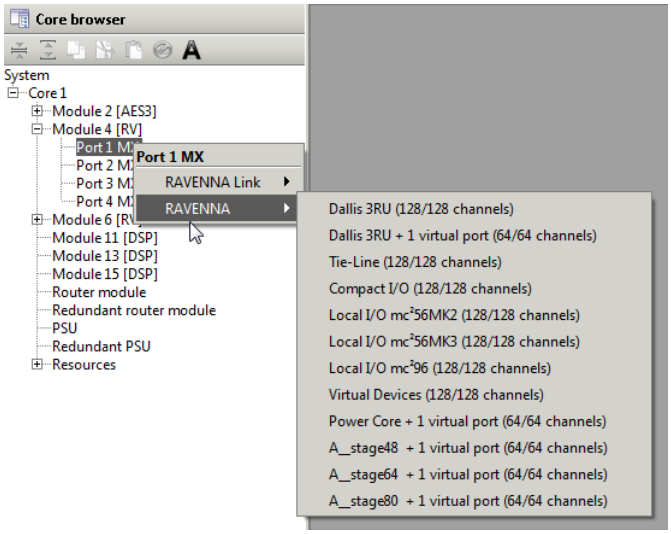
Parameters of the local IO boards (microphone preamp, AES3 SRC on/off) can be controlled in the usual manner (via the **Signal Settings** page). In addition, mic preamp parameters can be controlled from a console channel strip, if the signal is connected to an mc^2 input DSP channel.

If you need more information on how to install or operate AdminHD, please refer to the "Configuration" chapter of your product's Technical Manual. The next few pages describe the relevant options.

6.9.1 AdminHD: Defining the Hardware

1. Right-click on the RAVENNA IO port and select the **Power Core + 1 virtual port** option.

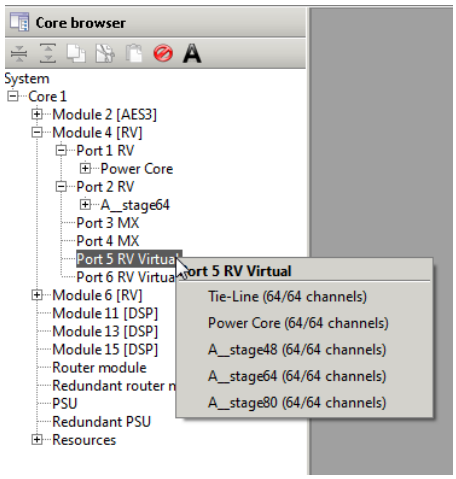
If you wish to use SMPTE ST2022-7 for redundant streaming, then you should choose an odd port number (either 1 or 3).



This adds the Power Core frame plus a new virtual port (e.g. **Port 5 RV Virtual**). Note that this port exists virtually; there is no physical interface for port 5.

The virtual port allows you to configure two 64-channel devices via a single 981/61 RAVENNA Net interface. The two devices can be of the same or different types. For example: 2 x Power Core; 1 x Power Core + 1 x A__stage; 1 x Power Core + 64 RAVENNA Tie-Line channels

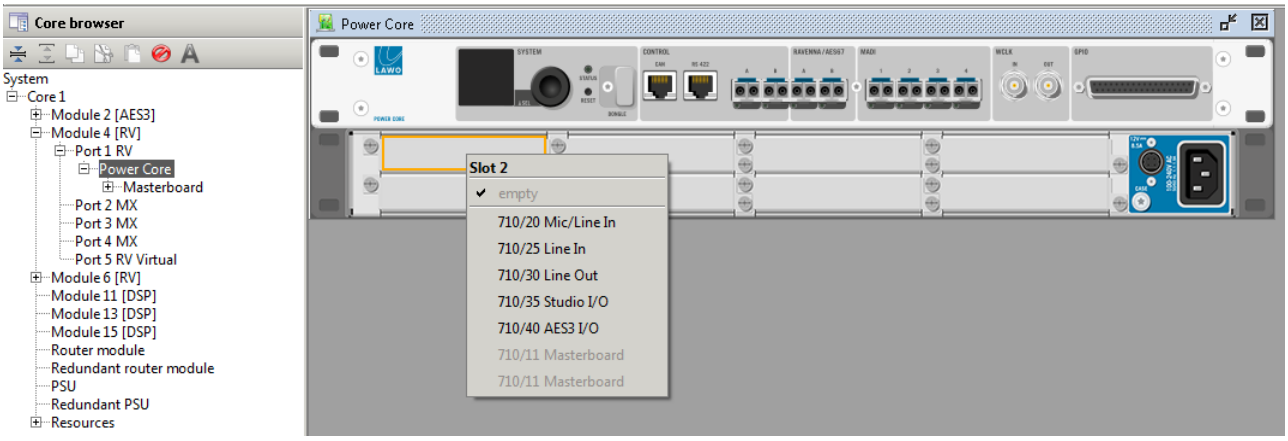
2. Right-click on the virtual port to add the second device.



The **Power Core** frame is added to the **System** tree along with its standard components.

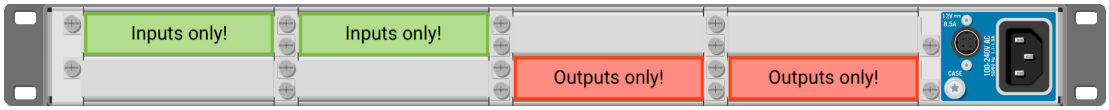
Cards are fitted to a Power Core frame in a similar manner to fitting modules to the Core or cards to a DALLIS.

3. Right-click on a card slot and select a drop-down option - the available options depend on the selected slot:

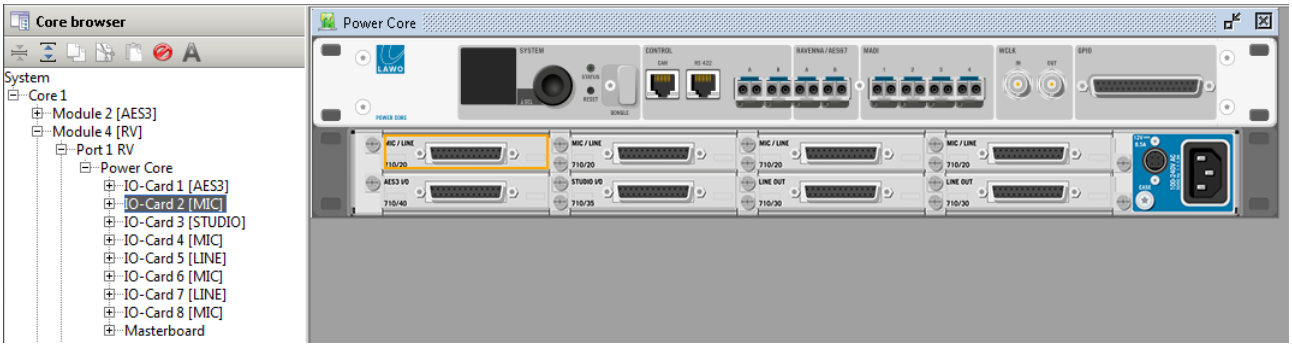


To allow the transfer of audio for console monitoring and matrix tie-lines you *must* fit only input cards to slots 2 and 4, and outputs to slots 5 and 7. Note that other variations are permitted if Power Core is operating as an IO node only.

Expansion Slots (for Power Core^{RP})



Power Core^{RP} - Example



IMPORTANT: Take care to assign the cards to the slot positions so that they match the physical installation.

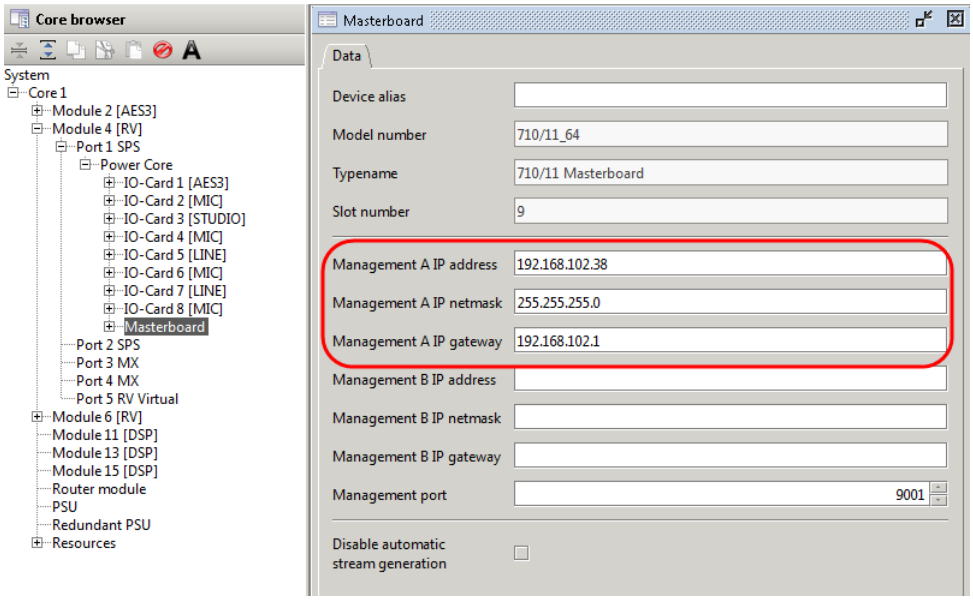
6.9.2 AdminHD: Management Network Settings

➢ Management A IP Settings

For Power Core^{RP}, you must enter the IP settings of the CONTROL A port into the **Management A IP** fields.

1. From the 'Core Browser', double-click on the Power Core **Masterboard** to open its 'Parameter Box'.

Power Core Masterboard Parameters



2. Enter the device's management IP address, netmask and gateway into the **Management A IP** fields.

Leave the **Management B IP** fields empty.

Once the AdminHD configuration is uploaded, and the system is cold started, the management IP settings are read by the mc^2 control system. Providing a proper network connection can be established, the automatic setup of streams will occur.

6.9.3 AdminHD: Media Network Settings

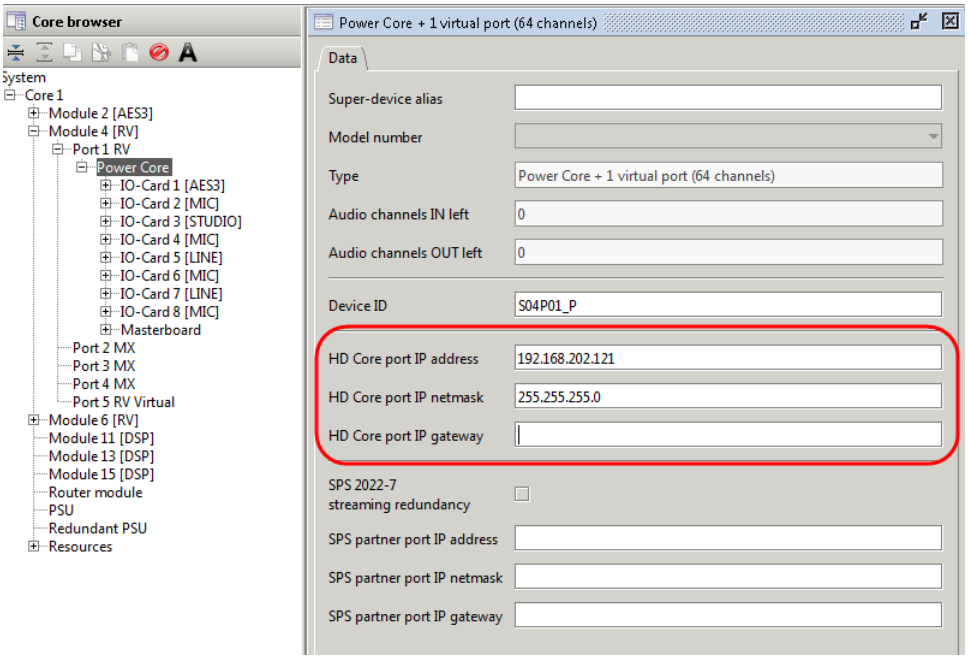
➢ HD Core port IP Settings

These fields define the IP settings of the 981/61 RAVENNA IO port (on the console/router side).

Note that it is not necessary to define the IP settings of the Power Core RAVENNA/AES67 ports as the control system uses the Device ID to configure the streaming connections.

1. From the 'Core Browser', double-click on the Power Core which will connect to the HD Core RAVENNA port - its 'Parameter Box' opens.

Power Core Parameters



2. Edit the **HD Core port IP** fields - you must enter a unique IP address and suitable netmask and gateway.

➢ Configuring Redundant Streaming (SPS)

Redundant streaming (via SMPTE ST2022-7) is configured in a similar manner, but this time you must define the two network paths: primary and secondary.

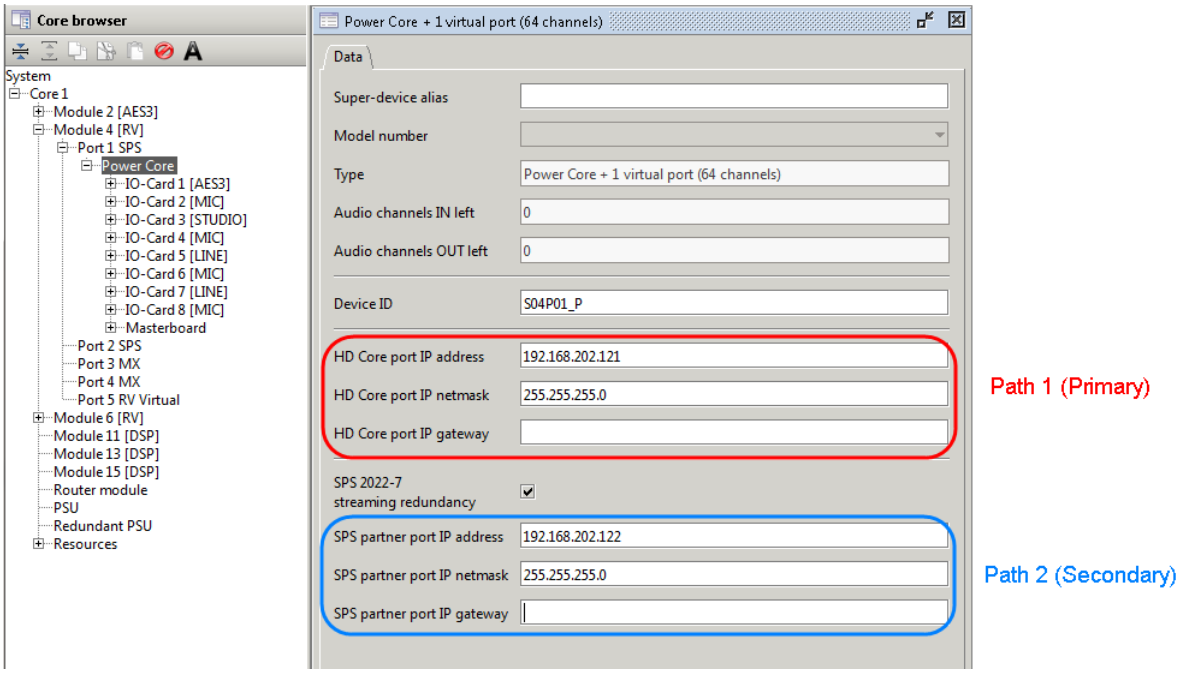
As for a non-redundant connection, you only need to define the settings on the console/router side, as the mcx control system uses the Device ID to configure the streaming connections.

1. Start by editing the **HD Core port IP** settings (and, optionally, the **Device ID**) to configure the primary network path.
2. Then enable the **SPS 2022-7 streaming redundancy** checkbox - you will see that the [RV] suffix in the 'Core Browser' updates to [SPS] for the odd/even port pair.

Note that the **SPS** option is only available when configuring an on odd numbered port as the ports used must be odd/even.

3. Now edit the **SPS partner port IP** fields to configure the secondary network path.

Power Core Parameters (SPS enabled)



6.9.4 Configuring the Network Settings on Power Core

The network settings stored locally on the device can be edited by opening the Power Core Web UI.

For the initial setup, you should connect your computer *directly* to the device's CONTROL A port. At this stage do NOT connect the device to the Management Network switch, as first you must assign the port a unique IP address.

1. Power on the device.
2. Connect your computer's LAN port directly to the CONTROL A port of Power Core.

Take care to connect to the CONTROL A port and not one of the RAVENNA/AES67 streaming ports!

3. Configure the network settings for your computer's LAN port. The exact steps vary depending on your OS version.

The IP address must be unique, and set within the same range as that of the port you are connecting to. The subnet masks should be identical.

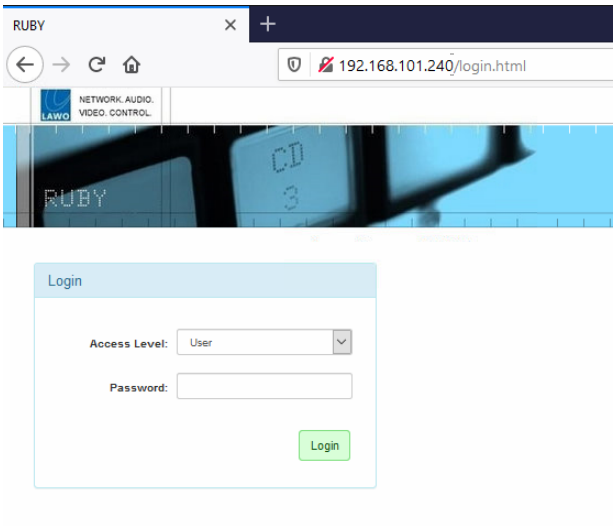
You can check the current network settings from Power Core's front panel display. The defaults are:

Default Network Settings	CONTROL A Interface
Connection type	Static
IP address	192.168.101.240
Netmask	255.255.255.0
Gateway	0.0.0.0

4. Open a browser application and enter the IP address of the CONTROL A port into the URL field (e.g. 192.168.101.240).

To ensure all graphics are correctly displayed, we recommend the following minimum browser requirements: Internet Explorer 10 or Edge 12; current Versions of Firefox, Safari or Chrome.

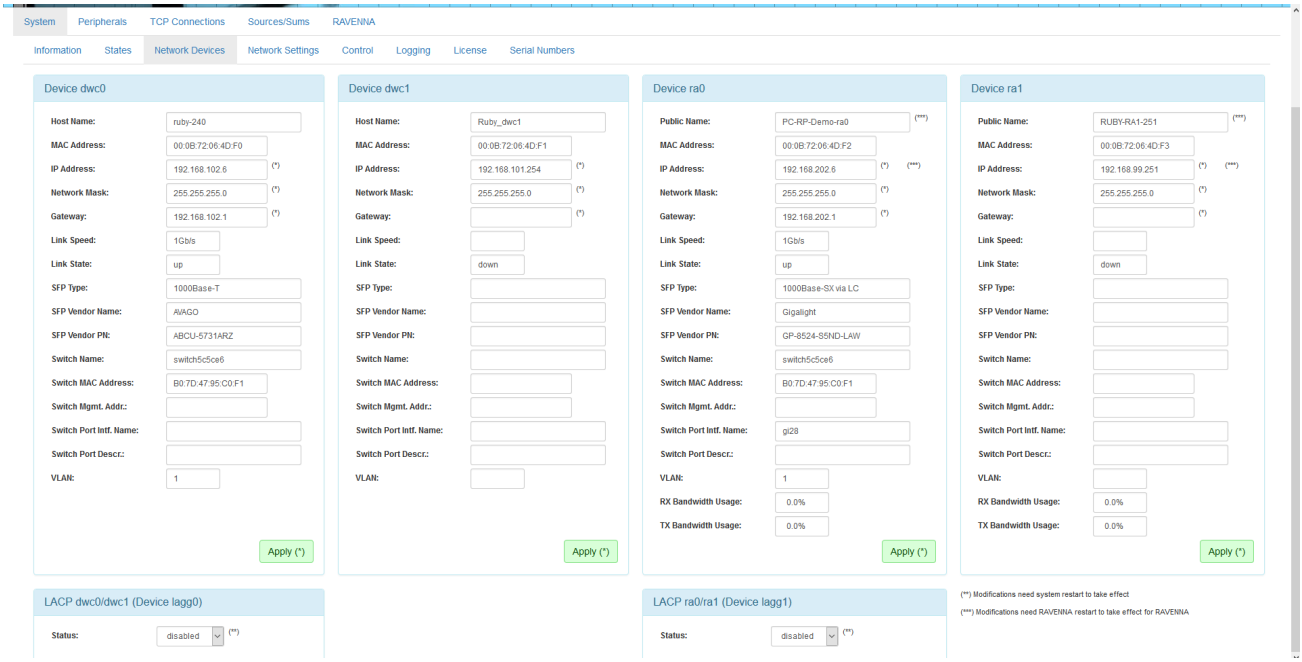
Following a successful connection, the "Login" screen appears:



5. Change the **Access Level** to **Supervisor** and enter the **Password** (default password = *orion*). Then click on the green **Login** button.

Following a successful login, the current information is loaded from the device and the "System -> Information" tab appears.

6. Select "System -> Network Devices":



The four devices correspond to the front panel network ports as follows:

- **Device dwc0** = the CONTROL A port.
- **Device dwc1** = CONTROL B port (unused).
- **Device ra0** = the RAVENNA/AES67 A port. These are the Primary Streaming IP settings.
- **Device ra1** = the RAVENNA/AES67 B port. These are the Secondary Streaming IP settings (used if SPS is activated).

In Supervisor mode, some fields can be edited (as indicated by the hand icons).

7. Edit the **Device dwc0** settings so that they match the Control A IP settings defined in AdminHD. These settings *must* match, otherwise the automatic streaming configuration cannot be implemented.

To change the IP Address, Network Mask and Gateway, click in each field and type in the new value. Then click **Apply** to save the changes.

> It is only necessary to edit the **Device dwc0** settings, and not the settings for the other ports. This is because the **Device ra0** and **Device ra1** settings are configured automatically by the mc^2 control system (according to the AdminHD configuration).

8. If you change the **Device dwc0** settings, you will lose your browser connection. Enter the device's new IP address to re-establish and check the connection.

6.10 Configuring Power Core as a DSP Node

To control Power Core^{RP} DSP from the mc^2 console, the device must be specified in the system's .tcl files.

A default file named "custom_powercore_rp.tcl" is available from the **Downloads** area at www.lawo.com (after **Login**). Go to "Support -> Downloads -> Audio Production Consoles -> Software -> Current Release -> Power_Core_RP" and download the file. Using Filezilla, or another suitable FTP client, copy the file into the "/data/config" folder on the mc^2 control system. You can find full details of how to do this in your Technical Manual.

Then edit both the "custom.tcl" and "custom_powercore_rp.tcl" files using a suitable ".tcl" file editor. Save the changes and cold start the mc^2 control system. The new settings will be read by the mc^2 control system after the cold start.

The following edits must be made to the ".tcl" files.

1. Add the line "source config/custom_powercore_rp.tcl" to the "custom.tcl".

This instructs the mc^2 system to read the "custom_powercore_rp.tcl".

2. Edit the "custom_powercore_rp.tcl" to define up to four Power Core^{RP} devices.

The extract below is taken from the default file.

```
# user key areas (SCREEN_CONTROL_USERBUTTONS, MONITORING_USERBUTTONS, USERPANEL_USERBUTTONS)
# user key panel index  in case of monitoring or userpanel the index of the panel can be specified
here
# module & slot & button & panel idx  are all 0-based counting

set powercore_rp_1_available                1
set powercore_rp_1_module                   3
set powercore_rp_1_slot                     2
set powercore_rp_1_mount_user_key_area      "SCREEN_CONTROL_USERBUTTONS"
set powercore_rp_1_mount_user_key_panel_idx 0
set powercore_rp_1_mount_user_key_button    2
set powercore_rp_1_mount_user_key_label     "RP1 Mnt"
set powercore_rp_1_mount_user_key_color     [mcx_enum LAMP_BLUE]
set powercore_rp_1_lock_user_key_area       "MONITORING_USERBUTTONS"
set powercore_rp_1_lock_user_key_panel_idx  0
set powercore_rp_1_lock_user_key_button     4
set powercore_rp_1_lock_user_key_label      "RP1 Lock"
set powercore_rp_1_lock_user_key_color      [mcx_enum LAMP_RED]
```

Up to four Power Core^{RP} devices can be made available by changing the first line "set powercore_rp_x_available" to either 1 = available, or 0 = not available.

For each available device, you must define the location of its RAVENNA connection (module and slot number), and the user buttons which will mount and lock the Remote Mixing engine.

Please note that 0-based counting is used to define the module, slot and user button panel index numbers. So, for example, if your Power Core is connected to the 3rd RAVENNA port of the IO module fitted to slot number 6, then the module number should be set to 2 and the slot number to 5.

The RPx mount and lock functions are described later.

6.11 Next Steps

Once all of the setup tasks have been completed, you will be able to remotely control Power Core^{RP} from VisTool RP and/or your mc^2 console.

7. Remote Control from VisTool RP

This chapter describes how to remotely control Power Core^{RP} from VisTool RP.

7.1 Opening (& Closing) VisTool RP

1. To open VisTool RP, turn on your host PC and double-click on the "**VisTool RP**" desktop icon.

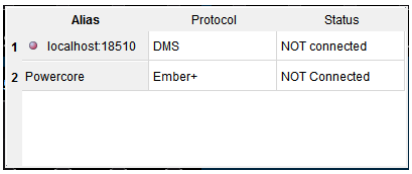
The session loads and connects to the hardware. The Start Page is always the first page to appear. Providing there are no error messages, the GUI is ready for operation.

➢ **Trouble-shooting**

If a valid software license is not found when you start VisTool RP, then an error message appears. Follow the activation procedure to activate your license. If the VisTool RP license is installed onto a USB dongle, then check that the dongle is connected to the PC!

If a valid Power Core^{RP} license is not found, then the system will not operate correctly. In this instance, check that the license has been activated and that the USB dongle is correctly installed.

If VisTool RP opens but there is a problem with the network connection to Power Core^{RP}, then the following window appears:



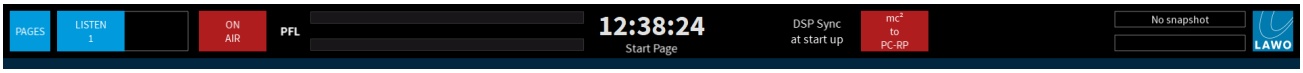
In this instance, check the network cabling and IP settings of the host PC, and then the network settings of the Power Core CONTROL A port.

If the RPx Lock function has been enabled by the mc^2 console, then the VisTool GUI will open but will be locked (to prevent any operation). This feature can be used to lock the operation of the Power Core^{RP} device so that it can only be controlled by the mc^2 console and not VisTool RP. In this instance, you will need to disable the **RPx Lock** user button on the console in order to regain control from VisTool RP.

2. To close the GUI, press ALT + F4 on your PC keyboard.

This closes the **VisTool RP** session only. From hereon, Power Core^{RP} will operate with the current settings, and parameters can be remotely controlled from the mc^2 console.

7.2 Title Bar (Headline)



At the top of every page are the following elements:

- **PAGES** - touch to change the page via the drop-down menu.
- **LISTEN 1** - touch to access the "LISTEN" buttons (to AFL the 16 stereo auxes).
- **ON AIR** - lights in red whenever a input channel fader is open.
- **PFL** meter - a stereo PPM for the local PFL bus.
- **Clock & Page Title** - for information purposes.
- **DSP Sync at Start up** - this option can be set to one of two states: either **mc² to PC-RP** or **PC-RP to mc²**. It determines whether the mc² console settings will reset parameters in Power Core^{RP}, or vice versa, whenever the control network connection is made. If you have been using VisTool to create mixes locally before connecting the console, choose **PC-RP to mc²**. Alternatively, to use the current console settings to reset Power Core^{RP}, choose **mc² to PC-RP**. Note that mc² snapshots and productions will always reset RPx channels (that are not in ISO), independent of this option.
- **VisTool Snapshot** - shows the name of the current VisTool snapshot (if one has been loaded).

7.3 Start Page

The GUI always opens with the Start Page:

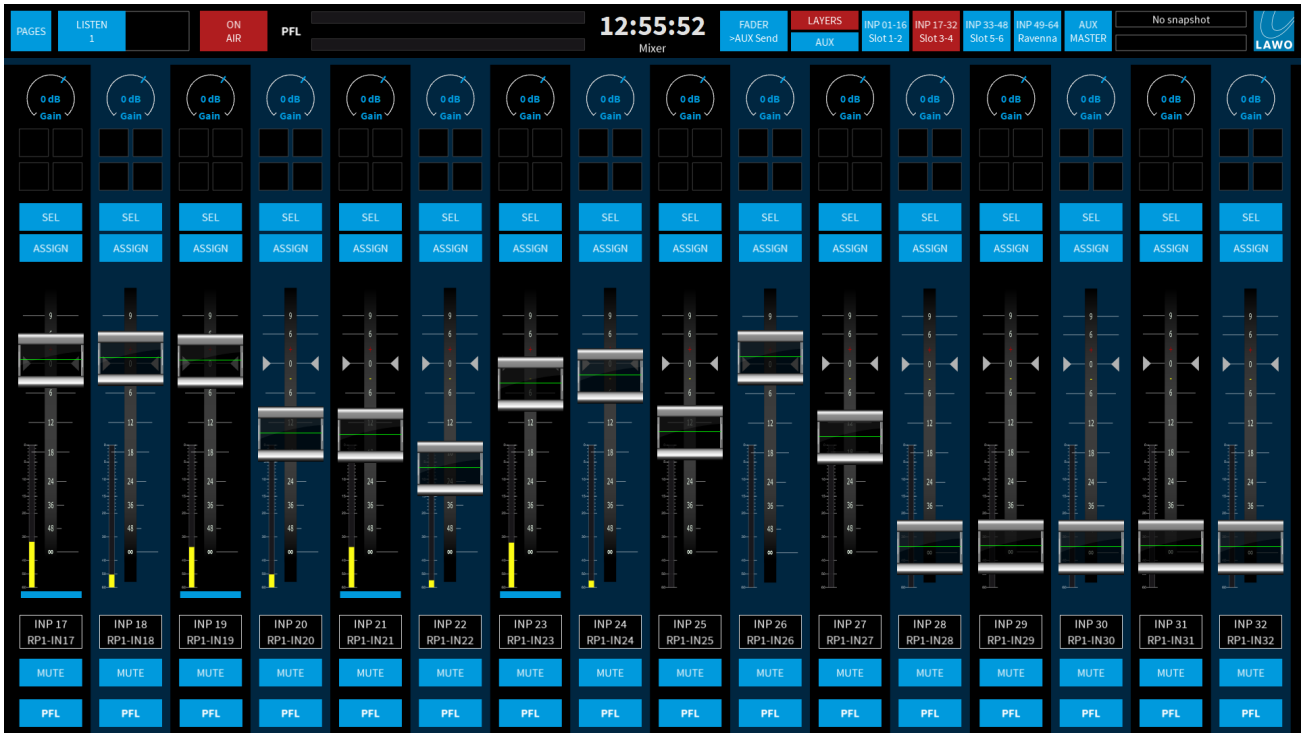
The central area provides metering for the main audio signals. Use the buttons below the meters to change the view:

- **Slot 1-8** - input (or output) metering for each local IO card.
- **RAVENNA RX 1** - metering for the RAVENNA RX streams.
- **AUX 01-16** - output metering for the 16 stereo aux masters.

The buttons at the bottom of the page perform the following functions (described later):

- **USER LABELS** - opens the User Label Editor (admin users only).
- Snapshots: **LOAD**, **SAVE** & **DELETE** - these buttons will load, save or delete a VisTool Snapshot.

7.4 Mixer



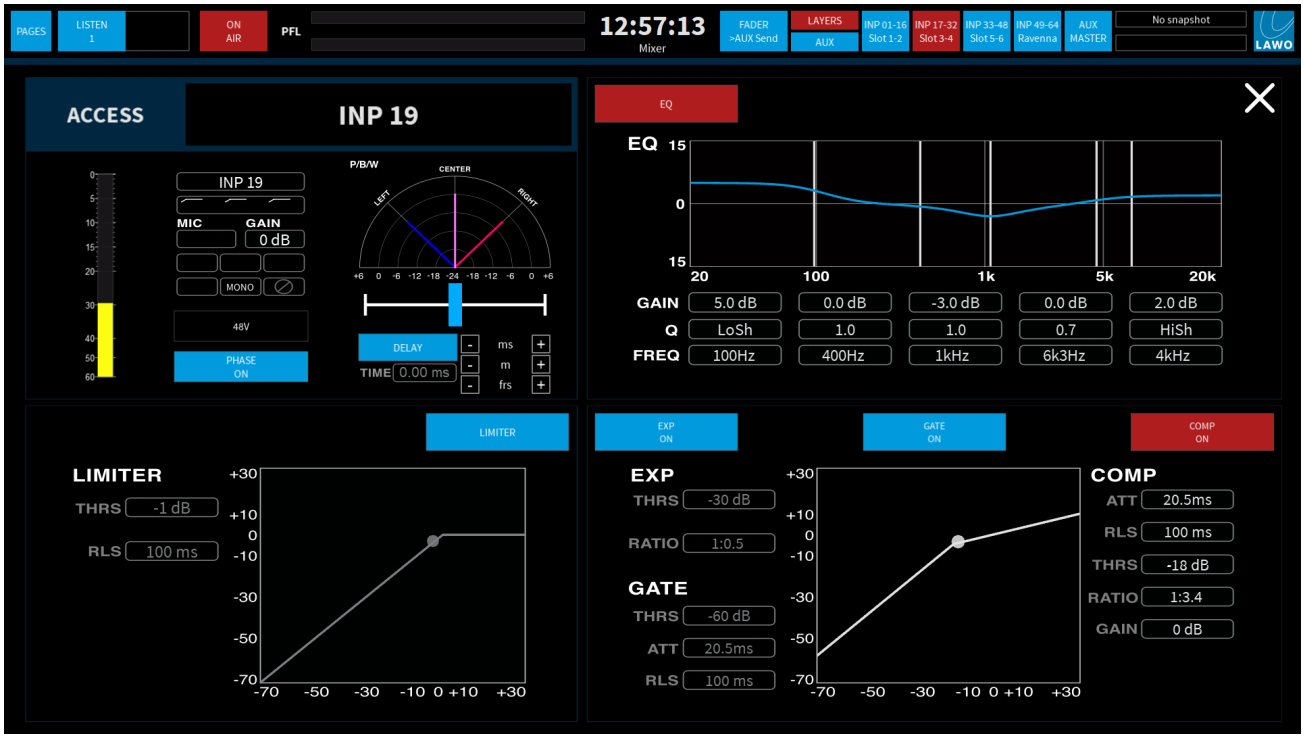
The **Mixer** page provides on-screen control of the Power Core^{RP} DSP channels, 16 channels at a time. Use the **LAYER** buttons to page through the available channels: INP 01-16, INP 17-32, etc. The **FADER to Aux Send** button maps the aux send levels onto the on-screen faders (instead of channel level).

On each fader strip, you can adjust:

- **Gain** - source gain.
- **Aux send on/off** - for 4 auxes. Use the **AUX** button (below LAYERS) to page through all 16 aux sends, 4 at a time.
- **SEL** - channel select. Touch to select a channel and open its DSP Parameter Control page.
- **ASSIGN** - input assign. Touch to assign a processing channel to an on-screen fader. You can choose any of the 64 input channels or 16 auxes.
- **Fader** - on-screen fader.
- **Input Meter & Signal Present Indicator**
- **Channel Label** - shows the system name (e.g. INP 17) and the user label (e.g. RP-1 IN17). The user labels can be edited in admin mode.
- **MUTE** - channel mute.
- **PFL** - channel PFL (pre-fade listen).

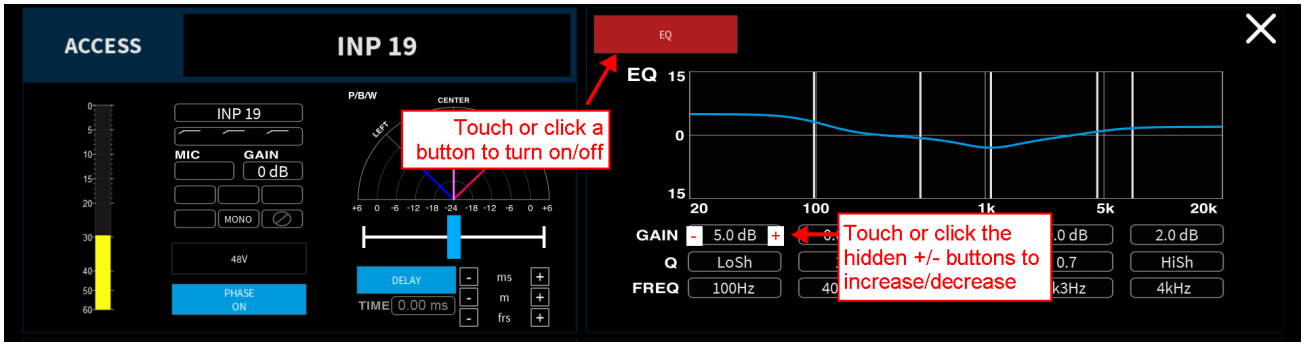
7.4.1 DSP Parameter Control

Whenever you select a channel (using the **SEL** button on the Mixer page), the DSP Parameter Control page appears:



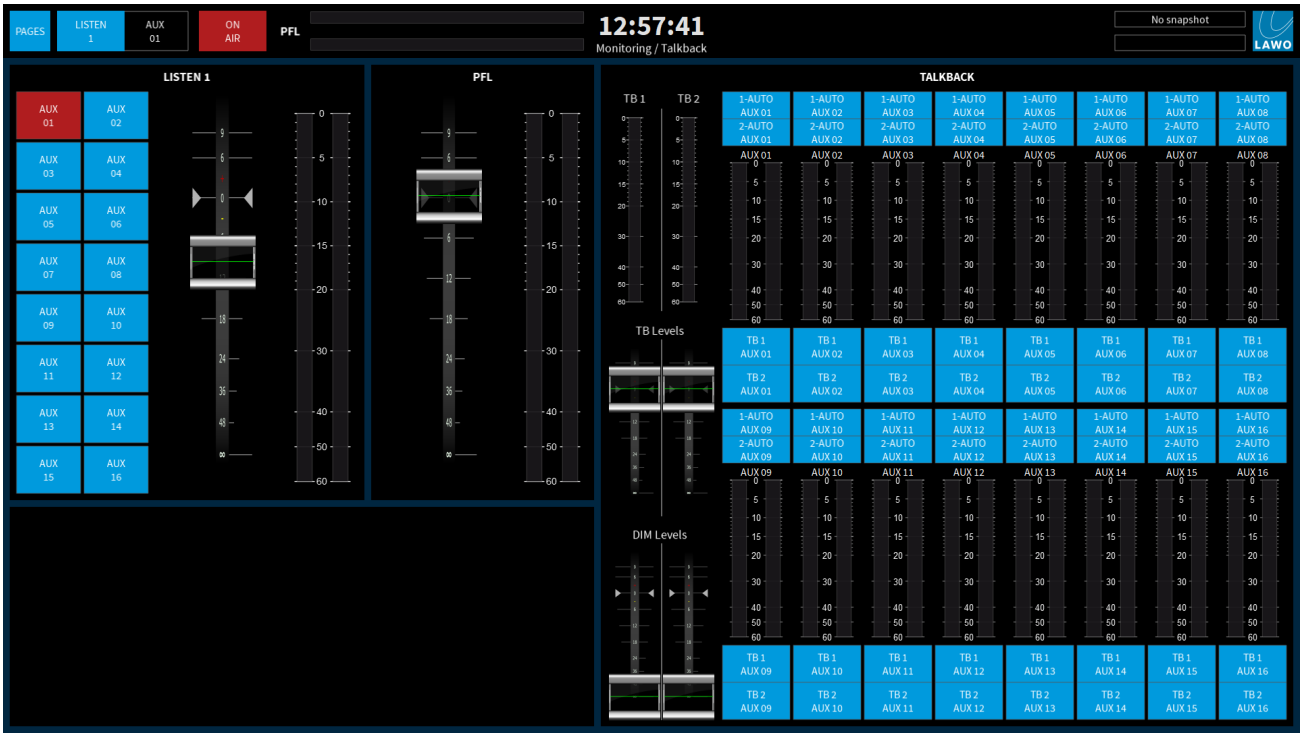
This shows all the DSP parameters supported by the Power Core^{RP} processing channel. To adjust parameters from the GUI:

- For switched parameters, such as **EQ** on/off, touch the button to turn the option on or off: red = on; blue = off.
- For variable parameters, such as EQ GAIN, you can use the hidden **+** and **-** buttons behind the value fields. For example, repeatedly touch the right (or left) side of the GAIN dB field to increase (or decrease) the value.



The Limiter and Dynamics graphs include a green ball which represents the output level. For the Dynamics, this is for the complete Dynamics section: Compressor, Expander and Gate. The ball changes dynamically as the signal level varies, and so is extremely helpful when adjusting parameters.

7.5 Monitoring



The **Monitoring** page provides access to local monitoring and talkback controls. You can use these to check any of the stereo aux mixes and/or talk to the aux outputs while setting up the local mixes. The system supports a stereo LISTEN bus (to monitor any aux), a stereo PFL bus (to monitor any input channel) and two mono talkback sources (to talk to any aux output).

Connections

To provide physical IO for the monitoring outputs and talkback sources, it is recommended to install a STUDIO IO plug-in card. This provides:

- 2 x mono Mic/Line in - to connect the talkback sources (TB 1 & TB 2).
- 2 x stereo Phones out - to connect two pairs of headphones (for LISTEN 1 and PFL).

Monitoring Operation

Under LISTEN 1, press one of the **AUX xx** buttons to monitor a stereo aux output. Use the on-screen fader to adjust the level of the LISTEN 1 bus.

The PFL meter displays the level of the stereo PFL bus. Input channels can be switched onto the PFL bus from the Mixer page. Use the on-screen fader to adjust the level of the PFL bus.

The LISTEN 1 and PFL buses can be assigned to local outputs from the RX Matrix.

Talkback Operation

Under TALKBACK, you will find two mono meters for the TB 1 and TB 2 sources. The talkback sources can be assigned from a local Power Core^{RP} input in the TX Matrix, or from audio arriving from the mc^2 console (via RAVENNA) in the RX Matrix.

Use the on-screen faders to adjust the level of each talkback source. The DIM level faders set the amount by which the aux outputs will be dimmed when talkback is active.

The **TB AUTO** buttons can be used to enable level-triggered talkback. This will cause the level of the aux mix to duck automatically whenever the talkback signal is present.

Alternatively, use the **TB to AUX** buttons at the bottom of the page to talk to an aux - the operation is momentary so you will need to hold the button while you talk.

7.6 RX Matrix

The **RAVENNA RX Matrix** can be used to assign audio arriving from the mc^2 (via the RAVENNA streaming port) to local Power Core^{RP} outputs. The matrix is divided into two halves: "Sources" at the top and "Destinations" at the bottom.

The available "Sources" are paged by the **RX 1** and **PFL AUX** buttons:

- **RX 1** = the 64 incoming RX streams.
- **PFL AUX** = the monitoring buses (LISTEN 1 and PFL).

The available "Destinations" are paged by the **IO Slot** and **Extra** buttons:

- **IO Slot** = the outputs of the 8 local IO cards.
- **Extra** = the programme output and talkback sources (TB 1 and TB 2).

To change an assignment:

1. Press a "Destination" button (e.g. **Slot 1 - 1**) - the button starts to flash.
2. Select an available "Source" (e.g. **RX 1- 01**) - the routing assignment is made and the button changes to static (red).

To remove an output assignment, repeat as above, but select the **PFL AUX** "Source" page button and choose **DISCONNECT** - the current audio source is removed and the button changes to static (blue).

Use the **LISTEN 1** and **PFL** "Sources" (in the **PFL AUX** page) to assign the monitoring outputs to a local output (e.g. the stereo line out or headphone out on a STUDIO IO card).

Use the **TB 1** and **TB 2** "Destinations" (in the **Extra** page) to assign audio arriving from the mc^2 console (via RAVENNA) to a talkback source.

7.7 TX Matrix

The **RAVENNA TX Matrix** can be used to assign audio from local Power Core^{RP} inputs to the mc^2 (via the RAVENNA streaming port). The matrix is divided into two halves: "Sources" at the top and "Destinations" at the bottom.

The available "Sources" are the inputs to the 8 local IO cards.

The available "Destinations" are paged by the **TX 1** and **EXTRA** buttons:

- **TX 1** = the 64 outgoing TX streams.
- **Extra** = the programme output and talkback sources (TB 1 and TB 2).

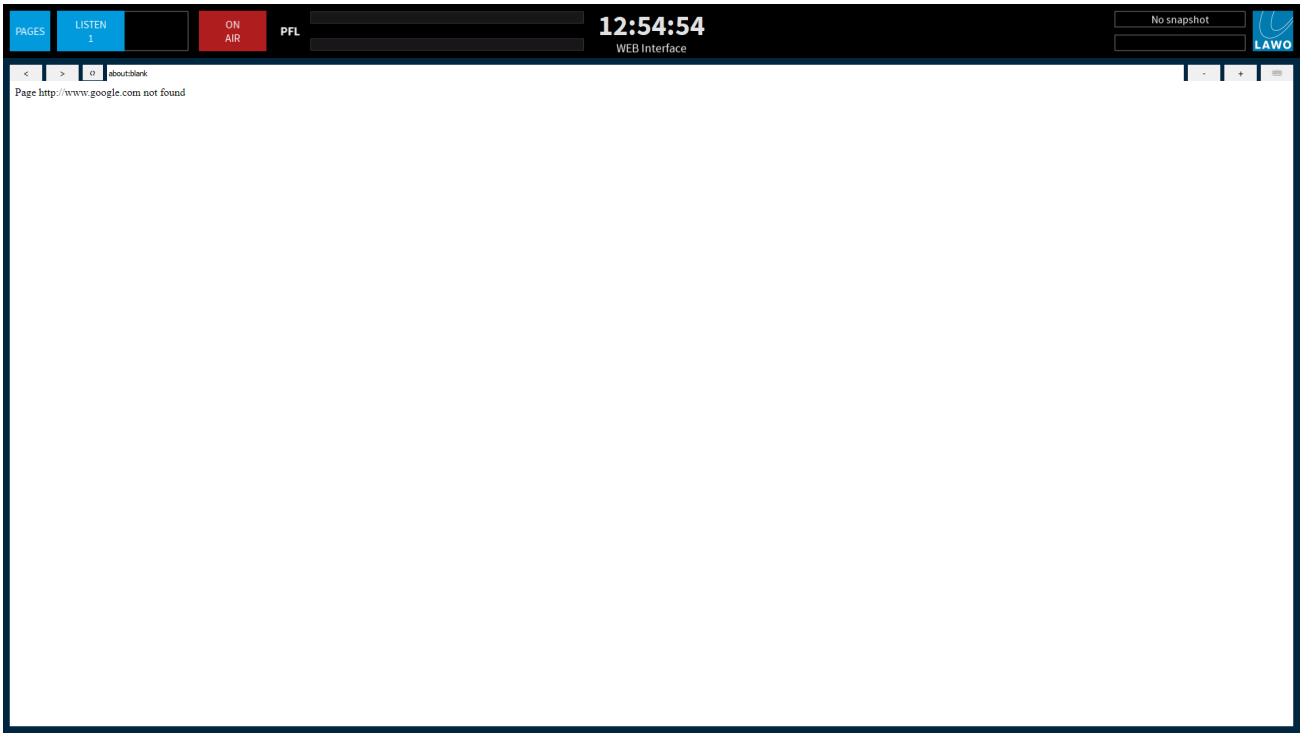
To change an assignment:

1. Press a "Destination" button - the button starts to flash.
2. Select an available "Source" - the routing assignment is made and the button changes to static (red).

To remove an output assignment, repeat as above, but select **DISCONNECT** - the current audio source is removed and the button changes to static (blue).

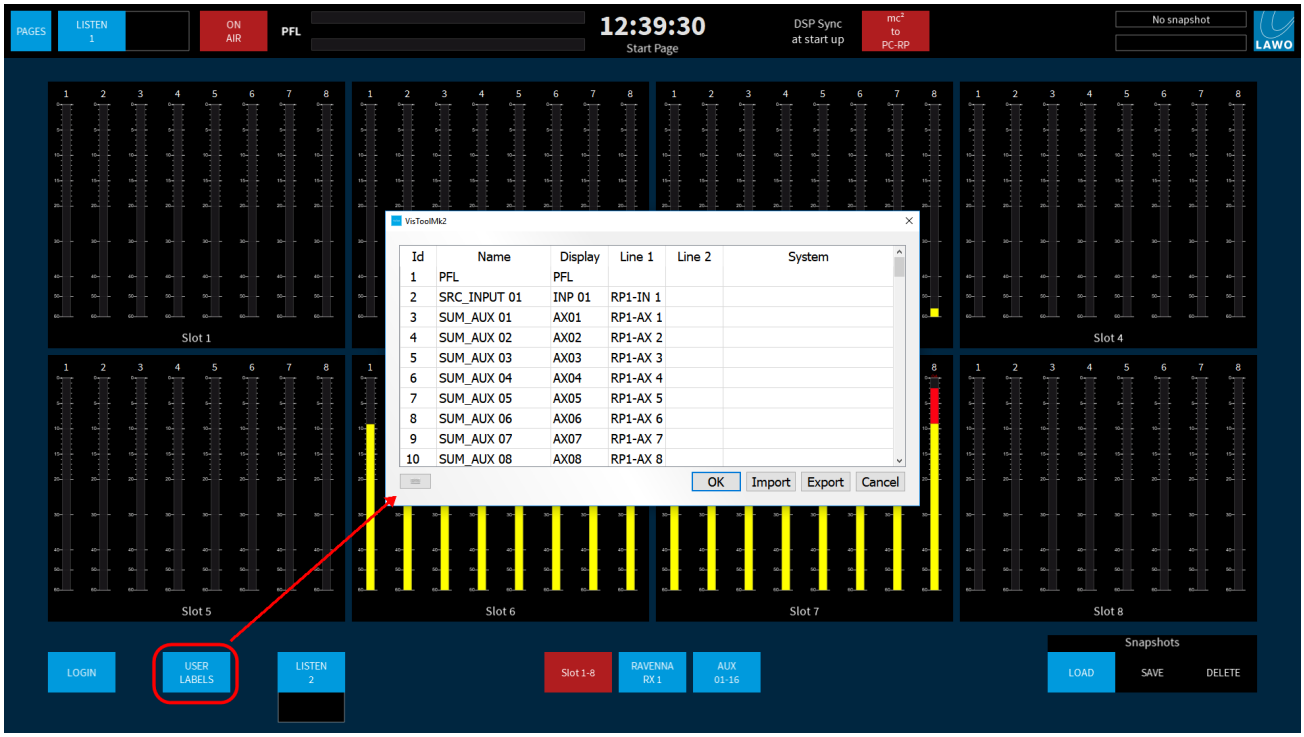
Use the **TB 1** and **TB 2** "Destinations" to assign audio from a mic/line input to a talkback source.

7.8 Web Interface



The **Web Interface** page provides an internet browser that can be used to monitor control interfaces of say your wireless system intercom, or the Power Core itself: temperature, etc.

7.9 Editing User Labels



The User Labels for Power Core^{RP} input and aux channels can be edited from the VisTool GUI. This allows you to prepare the labels before connecting the mc^2 console.

Once the network connection is made, the contents of "Line 1" sync to the RPx user labels (displayed on the mc^2 fader strips and in the **Main** display). The direction of sync is determined by the **DSP Sync at Start up** option (described earlier). Once sync is established, the "Line 1" labels can be edited from the mc^2 (in the same way as for other control channels such as VCAs).

The **Export** button will save all labels into an **.xml** file. This allows to copy the file to another VisTool PC and then select **Import** to import the labels. When using import, the labels are applied to sources with an identical source **Name** field.

7.10 VisTool Snapshots

An unlimited number of VisTool snapshots can be stored on the host PC.

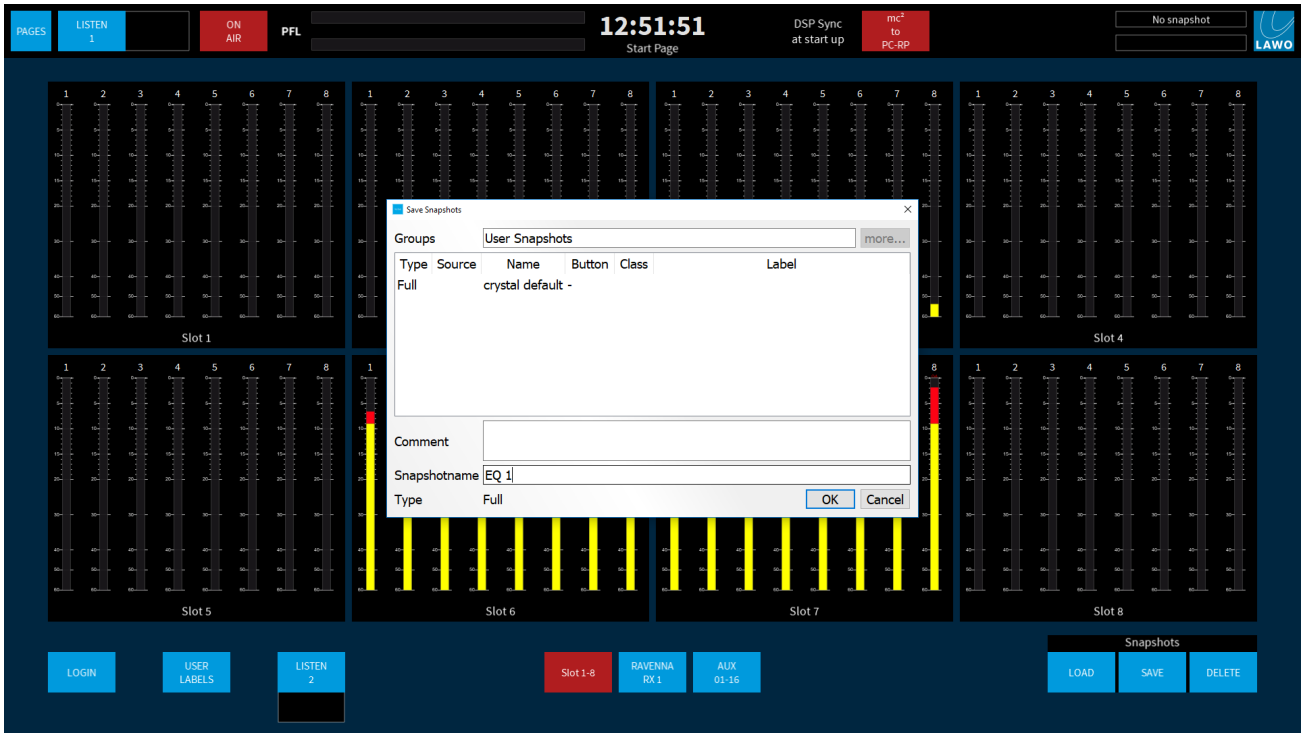
VisTool snapshots come in two types: Full snapshots (to save settings globally) or Source snapshots (to save only the settings for the channel in access).

> It is not recommended that snapshots are loaded during a live broadcast, as to do so may result in sources being taken off air!

7.10.1 Saving a VisTool Snapshot

When you save a VisTool snapshot, you can choose to save either a **Full** snapshot (to save settings globally) or **Source** snapshot (to save only the settings for the channel in access). The **SAVE** button (under "Snapshots") supports both operations as follows.

1. To save a full snapshot, check that there is no source in access and select **SAVE** - the "Save Snapshots" window appears:



2. Enter a snapshot name (e.g.**EQ 1**) and select **OK** - the window closes and the settings are saved.
3. To save a Source snapshot, first press an **ACCESS** key to select the source you wish to save.

The DSP Parameter Control page appears. Notice that the **SAVE** button has updated to **SAVE SOURCE**.

4. Select **SAVE SOURCE** and enter a name and confirm using **OK**.

Note that the snapshot **Group** and **Type** cannot be changed. You can enter text to describe the snapshot into the **Comment** field if you wish.

7.10.2 Loading a VisTool Snapshot

➢ To load either a **Full** or **Source** snapshot:

1. Select **LOAD** - the "Load Snapshot" window appears.

This window lists all of the snapshots stored in the current user group. In a Power Core^{RP} system, one group is available: **User Snapshots**.

In the **Type** column you can see that two types of snapshot are available:

- **Full** snapshots store and recall settings globally across the console.
- **Source** snapshots store settings for a specific source.

Note that **Source** snapshots can be loaded either to the source in access OR to their original source (if nothing is in access). The original source is identified in the **Source** column.

2. Select a snapshot from the list and select **OK** - the window closes and the settings are loaded to the system.

7.10.3 Deleting a VisTool Snapshot

1. Select **DELETE SNAP** - the "Delete Snapshot" window appears.

This window lists all of the snapshots stored in the current user group. In a Power Core^{RP} system, one group is available: **User Snapshots**.

2. Select a snapshot from the list and select **OK** - the window closes and the snapshot is deleted.

7.10.4 Backing up VisTool Snapshots

VisTool snapshots are stored on the VisTool PC in a file named "Visconfigurations.mdb". After a standard installation of the VisTool RP software, the file can be found at:

C:\ProgramData\DSA\VisTool RP\database\Visconfigurations.mdb

If you wish to backup your VisTool snapshots, then make a copy of the file and store it in a secure location.

8. Remote Control from the Console

This chapter describes how to remotely control Power Core^{RP} from the mc^2 console.

8.1 Mounting the Remote Mixing Engine

Start by mounting the Power Core^{RP} device you wish to use by enabling the **RPx Mnt** user button defined earlier.

Up to four Power Core^{RP} devices can be controlled from one mc^2 console. Once a device is mounted, the relevant signals appear in the **Signal List** display and the RPx channels (**RPx INP** and **RPx AUX**) can be assigned to the console's fader strips.

8.2 Locking the Remote Mixing Engine

The operation of the Power Core^{RP} device can be locked so that it can only be controlled by the mc^2 console and not VisTool RP.

Use the **RPx Lock** user button defined earlier to enable (and disable) this option.

8.3 Signal Routing

All local audio and GPIO signals (in Power Core) appear in the mc^2 **Signal List** display once your system is properly configured. This allows you to route a Power Core input to any mc^2 destination (e.g. an input channel). Or, any mc^2 source (e.g. a group bus) to a Power Core output.

You will find all of the available signals in the source and destination directories named **Power Core RP**. These include sub directories for each IO card plus two additional entries:

- **Remote Production Sources** = the stereo PFL and Listen buses from Power Core^{RP}.
- **Remote Production Targets** = the 16 mono tie-lines to Power Core^{RP}.

The PFL and Listen buses are used automatically by the console monitoring when you PFL a RPx input channel or AFL a RPx aux channel.

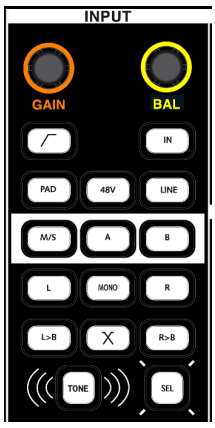
The 16 mono tie-lines can be used to return signals to Power Core^{RP}. On the Power Core side, the tie-lines are assigned to RP input channels 49 to 64. This allows you to feed audio from the mc^2 into a local mix.

In all cases, audio is transferred between Power Core and the mc^2 via the Media Network (RAVENNA).

8.4 Controlling IO Parameters

All accessible IO parameters in Power Core (mic preamp, AES3 SRC on/off) can be controlled from the mc^2 **Signal Settings** display in the usual manner.

If a mic/line input is routed to an mc^2 input channel and channel is assigned to a fader strip, then you can use the console's INPUT section to control:



- **GAIN** - mic input gain.
- **48V** - 48V phantom power.
- **PAD** - a -20dB PAD.
- **HPF** - cycles through the roll-off frequency options: **Off**, **40Hz**, **80Hz** and **140Hz**.

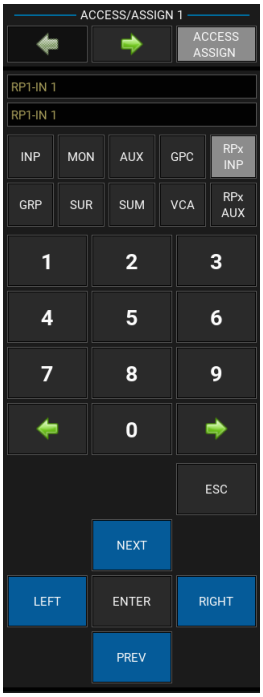
8.5 Controlling DSP Parameters

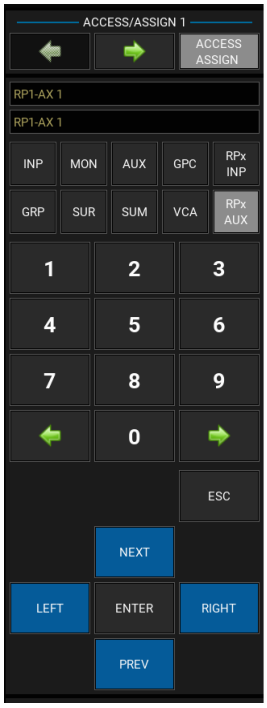
RPx (Remote Production channels) are control channels which can be assigned to any fader strip. They can be used to remotely control the DSP within a Power Core^{RP} without any transfer of audio or usage of mc^2 DSP resources.

8.5.1 Fader Strip Assignment

Once the correct configuration is in place, RPx channels can be assigned to any channel or main fader strip in the usual manner.

1. Select the channel you wish to assign from the ACCESS/ASSIGN panel:





Select **RPx INP** to assign a remote production input channel, or **RPx AUX** to assign a remote production aux master.

Each Power Core^{RP} provides 64 mono input channels and 16 stereo auxes. Therefore, if more than one device is configured, the channels are numbered as follows:

- RPx INP 1-64 + RPx AUX 1-16 = Power Core^{RP} 1
- RPx INP 65-128 + RPx AUX 17-32 = Power Core^{RP} 2
- RPx INP 129-192 + RPx AUX 33-48 = Power Core^{RP} 3
- RPx INP 193-256 + RPx AUX 49-64 = Power Core^{RP} 4

2. Use the **ASSIGN** or FIRST LAST buttons (under STRIP ASSIGNMENT in the centre section) to assign the RPx channel(s) in the usual manner.

8.5.2 Source Assignment

Sources are connected to the 64 input processing channels in a fixed manner. Input channels 1-48 from the rear panel IO cards (as shown below). Input channels 49 to 64 from the mc^2 (via the 16 mono tie-lines available in the Signal List display).

Rear Panel Expansion Slots

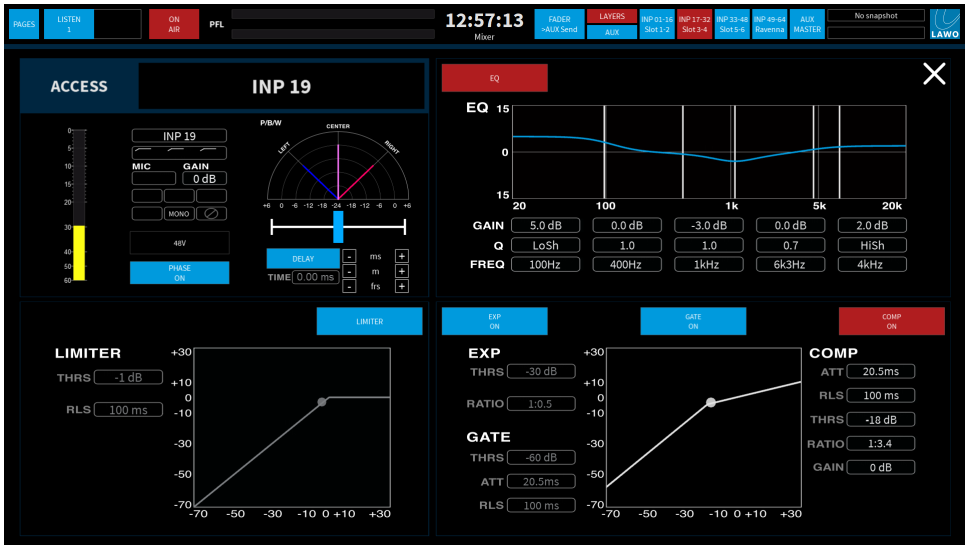
8.5.3 Adjusting Parameters

Once assigned, you can use the mc^2 fader strips or Central Control Section to adjust fader levels and signal processing parameters: EQ, Dynamics, Delay, etc.

RPx channels feature the same control objects as a normal DSP channel – EQ, Delay, Compressor, Limiter, etc. However, the ranges and resolutions used in Power Core^{RP} DSP differ to those used in mc^2. In these instances, a best effort is applied. For example, the EQ GAIN range in mc^2 is +/- 24dB, while in Power Core it is +/- 15dB. This means that if you turn an EQ GAIN control on the console surface beyond +15dB, there will be no further increase in the Power Core EQ GAIN value. Similarly, if a DSP parameter is not supported (e.g. Look Ahead Delay), then the mc^2 console control will have no function.

The best way to see the available DSP within Power Core^{RP} is to open a VisTool GUI instance, select the MIXER page and then press **SEL** to put a channel into access (e.g. INP 19):

VisTool MIXER page (with channel in access)



The DSP sections are similar to those in mc^2 with the following exceptions and additions:

- Power Core^{RP} input channels feature 5 bands of EQ (instead of 4). Thus, band 4 can only be adjusted from the VisTool GUI.
- Power Core^{RP} input channels feature left/right stereo panning only. There is no surround capability.
- There is no AFL for RPx input channels. Stereo PFL is supported.
- There is no PFL for RPx aux channels. Stereo Listen is supported.

For convenient operation, RPx channels support features such as LINK, COUPLE, VCA grouping and AFV.

You can make bus assignments from RPx inputs to RPx auxes in the any of the usual ways: e.g. touch an Aux bus on the Channel display, or use the **Bus Assign** displays on the Central GUI.

8.5.4 Metering

To enable the correct control, all RPx channels are mono (even though aux masters in Power Core^{RP} are stereo). Thus, on RPx AUX channels, the "mono" meter shows the RMS value for the Power Core^{RP} stereo aux DSP channel: L+R.

8.5.5 Audio Monitoring

To monitor the local mixes on the mc^2 console:

1. Press **PFL** on an RPx INP channel to listen to a Power Core^{RP} input channel pre-fader.
2. Press the **LISTEN** fader strip user button on an RPx AUX channel to listen to the Power Core^{RP} aux master after fader.

Note that AFL of input channels and PFL of aux masters is not supported (by the Power Core^{RP} DSP).

8.5.6 Instant Fader Start

Optionally, a special fader start mode can be enabled for specific RPx INP channels. To use this option, the custom .tcl files must be edited by a Lawo engineer.

If enabled, the input channel in Power Core^{RP} will open immediately to 0dB once the RPX INP fader on the console exceeds -70dB. The application is for remote IFB mixing where the channel level needs to open instantly without delay (in case the talent starts speaking while the fader is rising).

8.5.7 Storing Settings

The settings for RPx channels are stored in snapshots and productions in exactly the same way as normal DSP channels. Therefore, use SNAP ISO to isolate an individual RPx from snapshot recall, or protect all RPx channels using the Global Snapshot ISO **DSP** option.

Note that mc^2 snapshots and productions will always reset RPx channels (that are not in ISO), independent of the VisTool "**DSP Sync at Start up**" option (described later).

9. Service Procedures

This chapter describes service procedures for the hardware components.

9.1 Replacing an IO Card

All rear panel IO cards are hot-pluggable which means that they can be exchanged during uptime. This allows fast replacement of a card in the case of a hardware failure. Providing the card is of the same type and fitted to the same rear panel slot as the faulty card, the new card will immediately take over the same functions. See Fitting the IO Cards for instructions.

9.2 Replacing Other Components

Other components can be serviced by removing the top cover of the Power Core frame. You must disconnect the unit from its power source to perform these operations.

Do *NOT* remove the cover while the device is powered.

For more information on these procedures, please contact your local Lawo representative or email support@lawo.com.

10. The Web UI

This chapter describes the Web UI.

10.1 Introduction

The Web UI provides status information about the system. It is accessed by entering the IP Address of the <%SYSTEMUNIT%> you wish to examine into a Web browser. The computer you use must be part of the same network and subnet as <%DSP CORE%>.

10.2 Opening a Session & Logging In

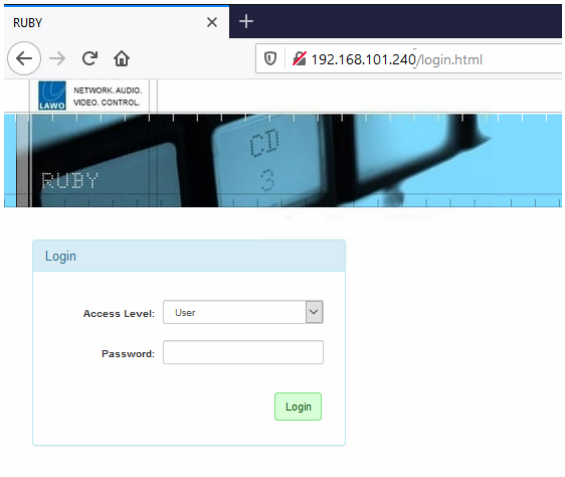
To open a Web UI session:

1. Open a browser application and enter the current system IP address into the URL field.

To ensure all graphics are correctly displayed, we recommend the following minimum browser requirements: Internet Explorer 10 or Edge 12; current Versions of Firefox, Safari or Chrome.

> You can view the <%SYSTEMUNIT%> IP address on the front panel display. The default IP = **192.168.101.240**.

Following a successful connection, the "Login" screen appears:



2. Select an **Access Level** and enter the **Password** (as described below).
3. Click on the green **Login** button.

Following a successful login, the current information is loaded from the device. Once loading is complete, the System Information tab appears.

<%SYSTEMUNIT%> has many system parameters, and it will take a few seconds for the information to load completely. Some of the information is displayed as a "snapshot" of the current data, which is only as current as the latest refresh. So, remember to use your browser's Refresh function to keep up to date.

10.2.1 User Modes (Access Levels)

The Power Core Web UI has three Access Levels:

- **User** (no password required).

  Information is displayed as "read-only" with no editable fields.

- **Supervisor** (default password = *orion*).

  Allows pertinent fields to be edited, such as the IP settings in the Network Devices tab.

- **Administrator** (default password = *hydra*).

  As for Supervisor, but with access to Supervisor and Administrator passwords in the Control tab.

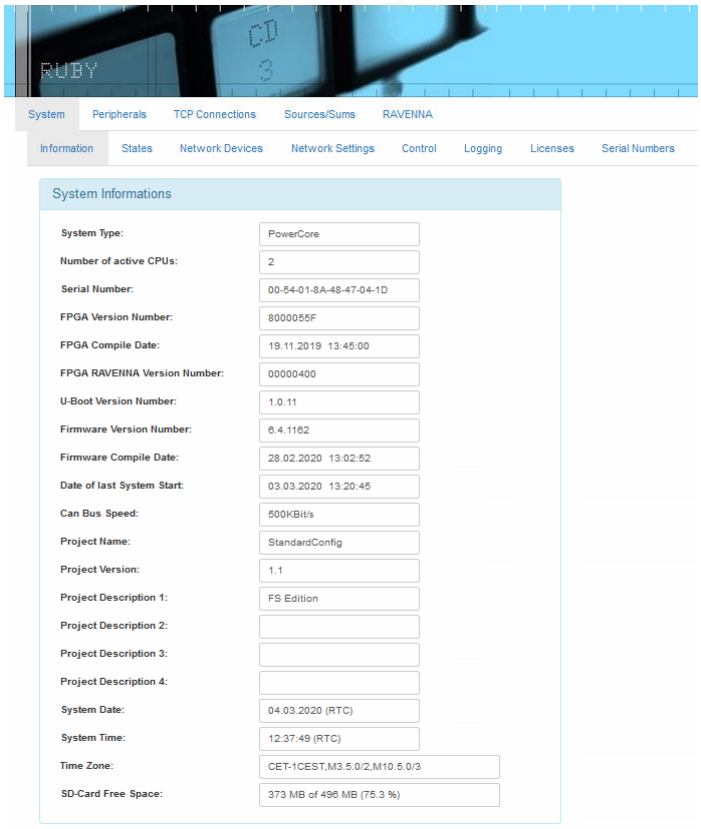
For security reasons, it is recommended to change the Administrator and Supervisor passwords from the defaults once the device is set up.

The remainder of this chapter assumes you are logged in as a Supervisor unless otherwise stated.

10.3 The System Menu

There are eight informational tabs in the System menu. Most of these tabs are status displays for the ruby / Power Core and its peripherals. Values which can be modified are noted for each tab.

10.3.1 Information Tab

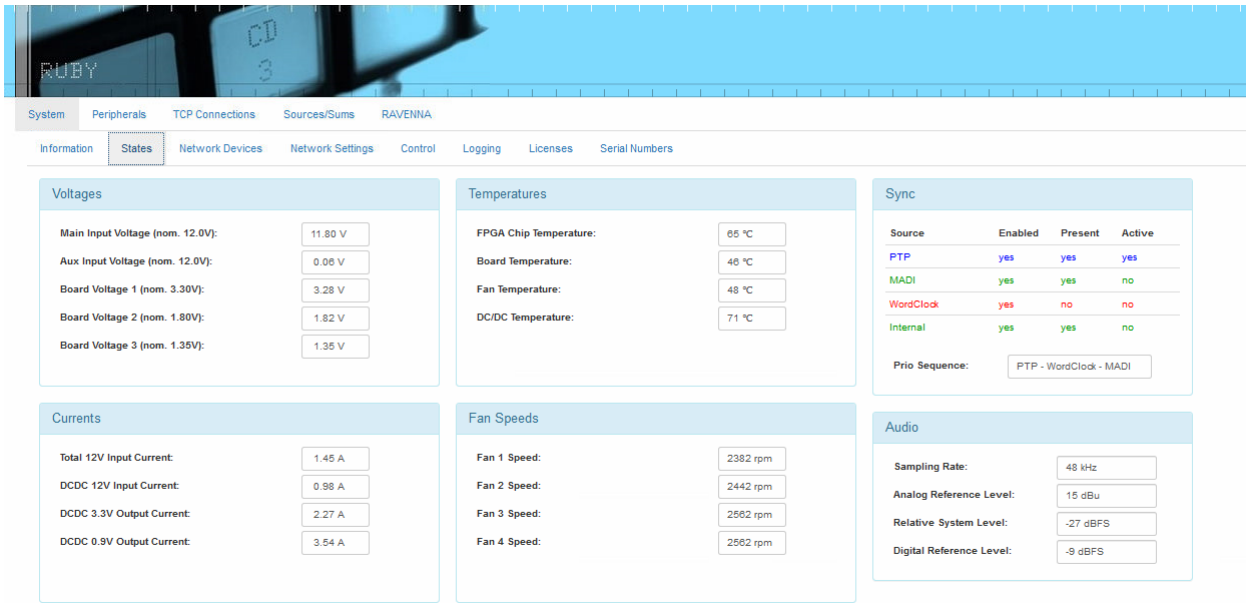


The **Information** tab is the first tab to be shown following a successful login. It displays basic data such as the unit's serial number, software / firmware version numbers, and system time and date.

The time and date are provided by your network's NTP server; if no NTP server is present, time and date are taken from the unit's internal clock.

The identifying name and project description are also displayed. If the unit has not yet been configured, this will be a default description. After configuration, these fields display the name and project description entered using the ON-AIR Designer software.

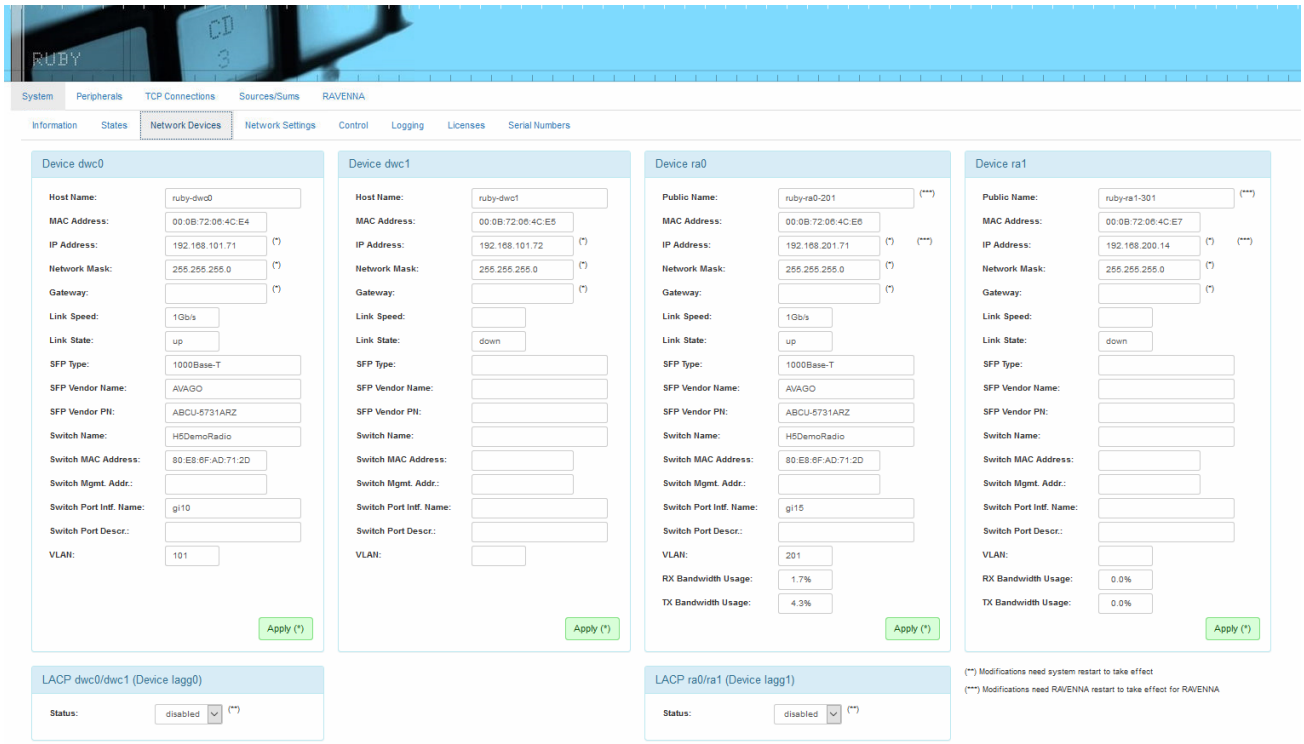
10.3.2 States Tab



The **States** tab gives information about the physical state of the Power Core hardware. This is for diagnostic use only; no values on this page are adjustable. Information displayed here may be used by Lawo technical support to assist you if needed.

The PTP, MADI and WordClock settings displayed here are defined using the ON-AIR Designer software.

10.3.3 Network Devices Tab



The front panel of Power Core contains four network interfaces, two for control and two for Audio over IP (RAVENNA/AES67). The four "devices" shown on this screen correspond to the ports as follows:

- **Device dwc0** = the CONTROL A port, used for system administration and control.
- **Device dwc1** = the CONTROL B port, usually left unconnected unless you are using LACP (for redundant control).
- **Device ra0** = the RAVENNA/AES67 A port, the first of two AoIP ports.
- **Device ra1** = the RAVENNA/AES67 B port, the second of two AoIP ports.

Each Device section displays the port's Host Name (defined using the ON-AIR Designer software), its MAC address and network IP address and netmask, and gateway (if used). The Link State box shows port connection / activity status.

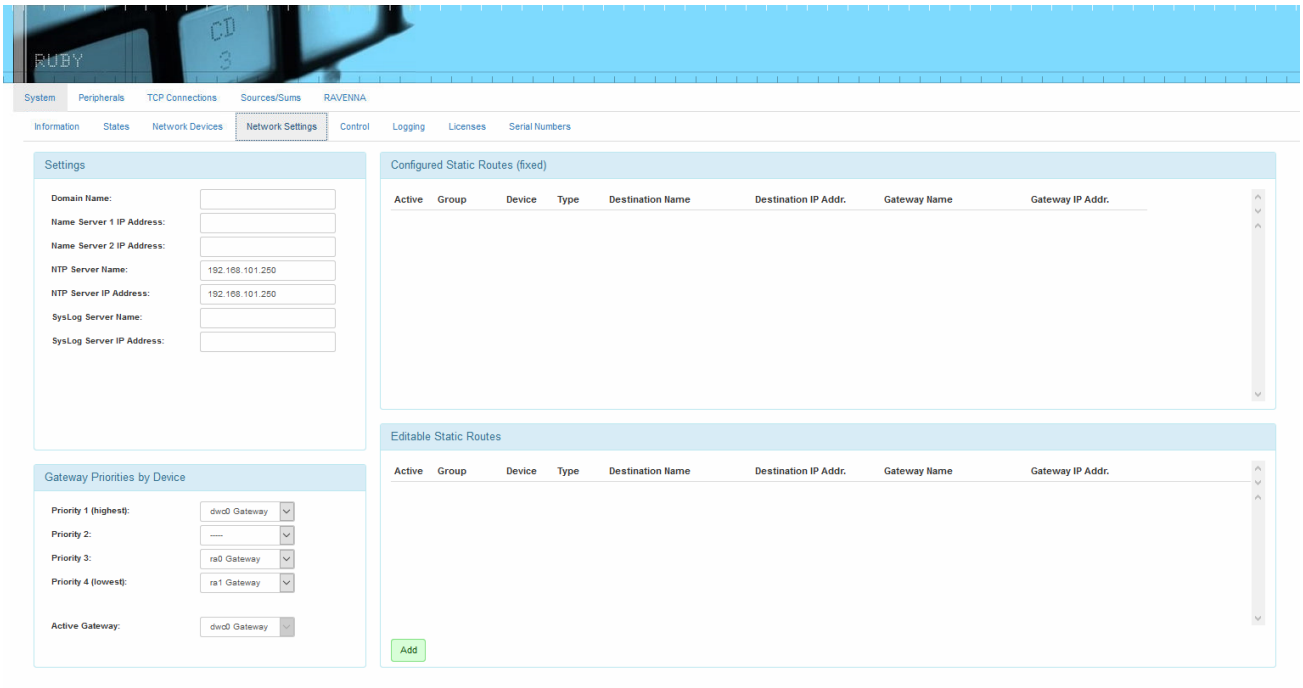
In User mode, all fields are non-editable. Entering Supervisor mode permits changing the IP Address and Network Mask value for each of the three ports, and the Public Name (a friendly name displayed during network searches) of each RAVENNA port.

If any settings are changed, you must click **Apply** to save the changes. IP Address changes are made immediately. If you change the IP Address of **dwc0** then you will lose your browser connection, so enter the device's new IP address into your browser to continue the system administration.

Using LACP

LACP *MUST* be configured in the network switch as well as in Power Core. Otherwise you will not be able to reach Power Core via its CONTROL ports.

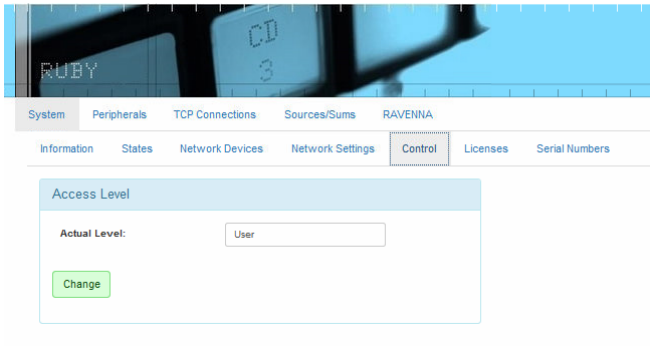
10.3.4 Network Settings Tab



As the name implies, this screen permits access to network settings.

- **Settings.** Using the fields in this box, you can enter the Domain Name of your network, DNS server IP addresses, NTP server and Syslog server addresses.
  - Your NTP Server may be entered either by entering its name in the Server Name box, or its IP Address in the Address box. If you type “ntp.internal” in the Server Name box, the IP Address will be automatically filled.
  - Your Syslog Server may be entered in the same manner. If you type “syslog.internal” in the Server Name box, the IP Address will be automatically filled.
- **Gateway Priorities By Device.** These options allow you to determine which of Power Core’s front-panel Ethernet ports will be used as the control port should the primary link be interrupted. Priority 1 is generally assigned to the “dwc0” port; use the remaining Priority fields to prioritize fallback ports.
- **Configured Static Routes (fixed).** This area shows any static routes which have been configured for your network.
- **Editable Static Routes.** Here you can add an editable static route by clicking **Add** and completing the dialog box.

10.3.5 Control Tab



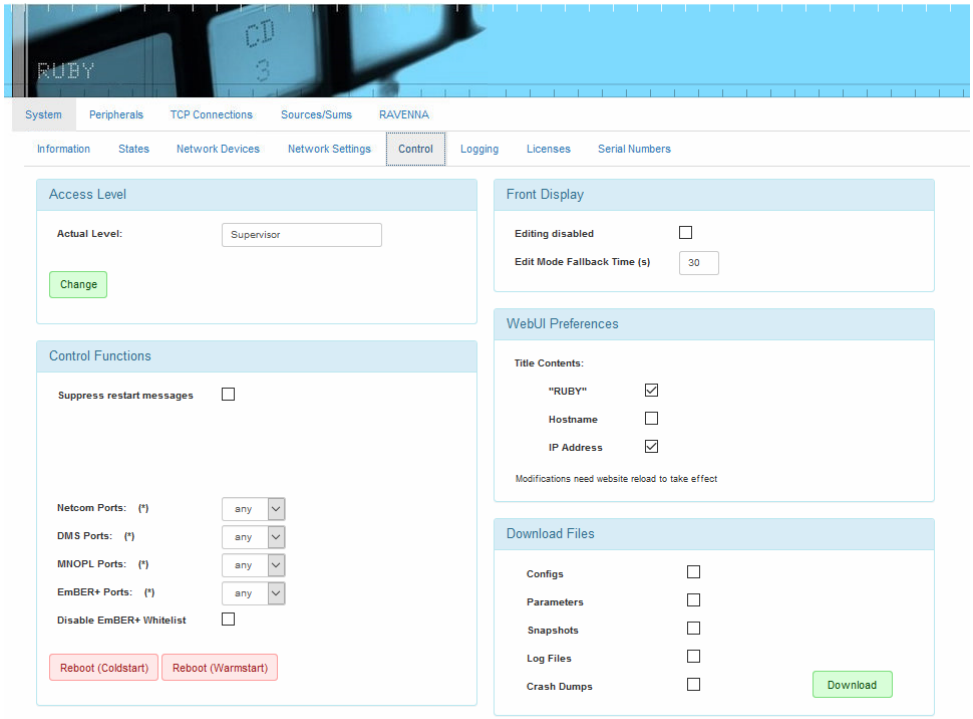
This tab provides access to the control options for the current **Access Level** (user mode).

To change the level, click on the green **Change** button to return to the Login screen, select a different **Access Level** and enter the **Password**:

- **User** (no password required).
- **Supervisor** (default password = *orion*).
- **Administrator** (default password = *hydra*).

On re-opening the **Control** tab, the new user mode is displayed in the **Actual Level** field.

Supervisor Mode



In **Supervisor** mode, the following sections become visible.

➢ Control Functions

By default, an on-screen message appears whenever the system restarts. You can turn the messages off by checking the "Suppress restart messages" box.

The next four options define which network port(s) can be used for Netcom, DMS, MNOPL and EmBER+ communication. In each case, you can choose either **any** (to allow access via any network port) or **dwc0** (to restrict access to CONTROL A only). Note that if you choose **dwc0**, then the restriction also applies to the local host and so access is not permitted via 127.0.0.1. The default setting for all protocols is **any**.

The Ember+ Provider Clients Whitelist (configured in ON-AIR Designer) can be used to make sure only devices with a defined IP can talk to Power Core via EmBER+. For convenience, you can check the "Disable EmBER+ Whitelist" option to temporarily deactivate the whitelist. This will allow access from consumers with any IP address.

The two red buttons at the bottom of the area can be used to restart the system as follows:

- **Reboot (Coldstart).** Reboots the unit and loads the base configuration parameters (as defined by the ON-AIR Designer software). This will clear any temporary changes made from the Web UI.
- **Reboot (Warmstart).** Reboots the unit keeping temporary changes intact.

➢ Front Display

The “Editing disabled” box is checked by default. If unchecked, the unit’s IP Address and other settings can be changed using the display and selection knob on the Power Core’s front panel. Lawo recommends keeping front panel editing disabled.

When using the front panel controls, inactivity causes the display to return to its normal status. You may set a timeout period for this action by entering a value, in seconds, in the “Edit Mode Fallback Time” field.

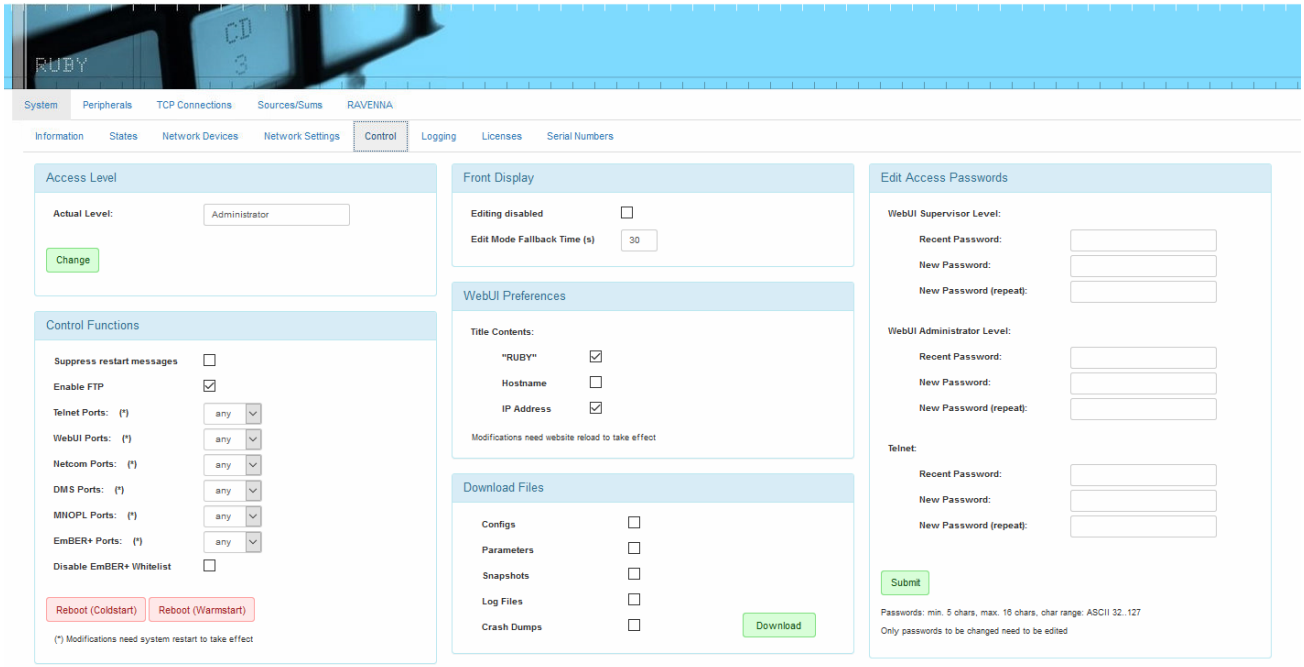
➢ Web UI Preferences

Use these options to adjust what is shown in the browser's "title" for the session.

➢ Download Files

You can use these options to download files from Power Core onto your computer. To proceed, first select the tick boxes and then click on the green **Download** button.

Admininstrator Mode



In **Administrator** mode, you can access all of the Supervisor options plus the following.

➢ Control Functions

By default, the “Enable FTP” box is checked to allow file transfers to Power Core via FTP. Uncheck this option to prevent FTP access.

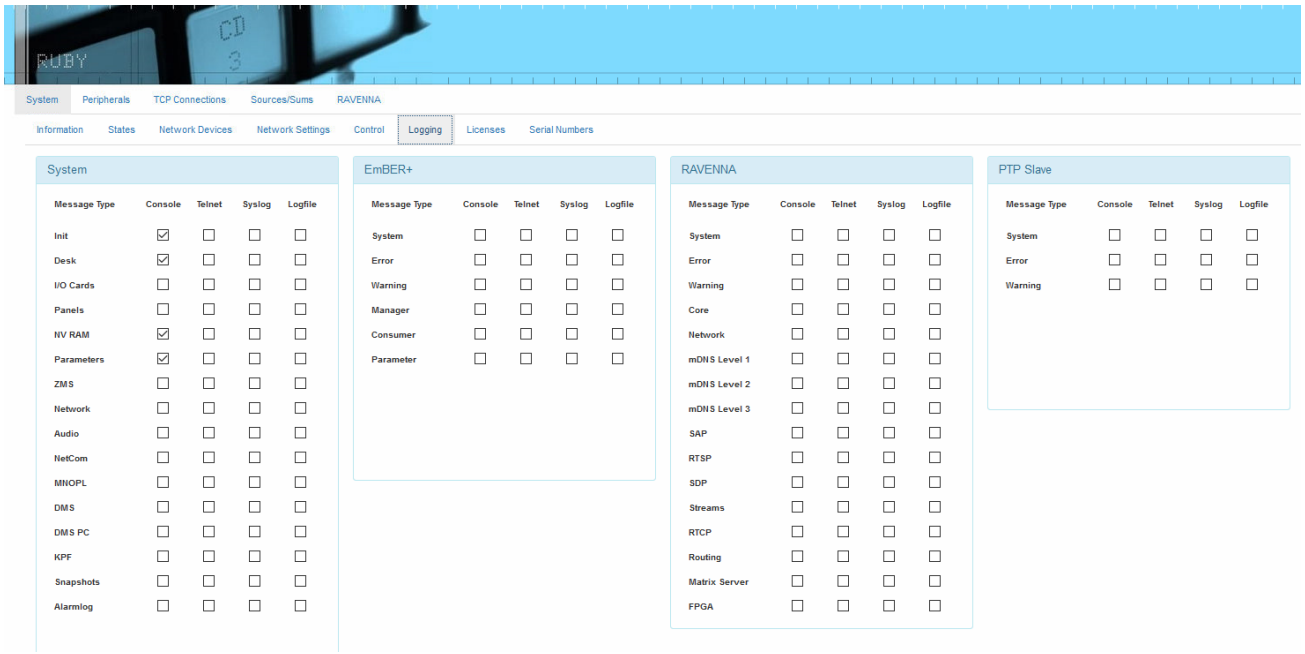
The "Telnet Ports" and "WebUI Ports" are added to the list of network communication protocols. This allows you to restrict Telnet and Web UI access to only the CONTROL A port (**dwc0**) if necessary.

➢ Edit Access Passwords

This area can be used to edit the passwords for the Supervisor and Administrator modes in the Web UI, and/or the device's Telnet login.

In each case, enter the current password into the "Recent Password" field, followed by the new password into the two "New Password" fields. The new password must meet the following requirements: minimum of 5 characters, maximum of 16 characters, character range: ASCII 32..127. Click on **Submit** to apply the changes - an on-screen message appears to confirm (or deny) the operation.

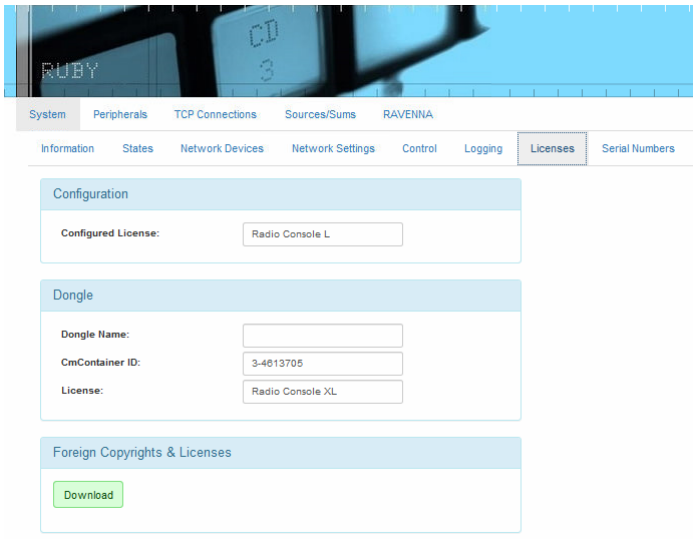
10.3.6 Logging Tab



The options here are used for diagnostics. Please do not change these settings from default unless instructed to do so by Lawo support.

> A special serial cable, article number **485-0700-000**, is required to obtain logs from the system. Should this cable be needed, please contact Lawo Support to obtain one. The customer must provide a serial to USB converter if necessary.

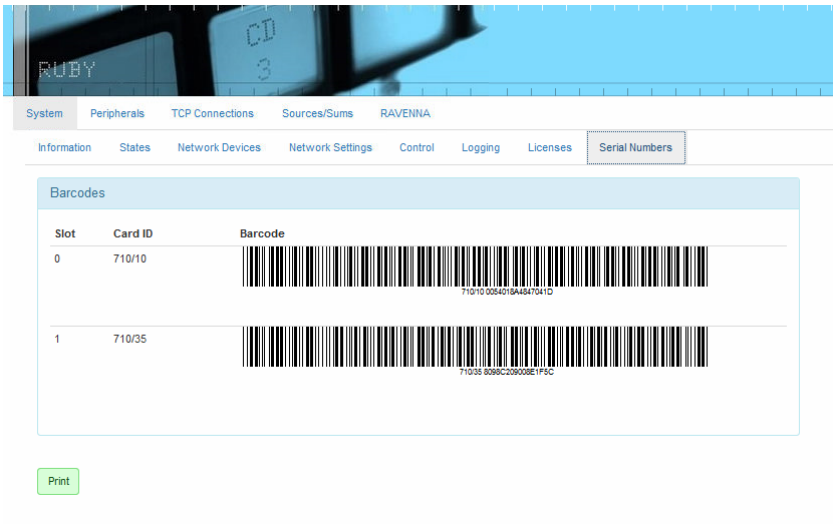
10.3.7 License Tab



This tab displays the license configuration of your Power Core, once the license has been installed via the USB dongle. Please see Licensing for instructions on how to activate and install your Power Core license.

You can use the **Download** button to download copyright and license information to your computer.

10.3.8 Serial Numbers Tab

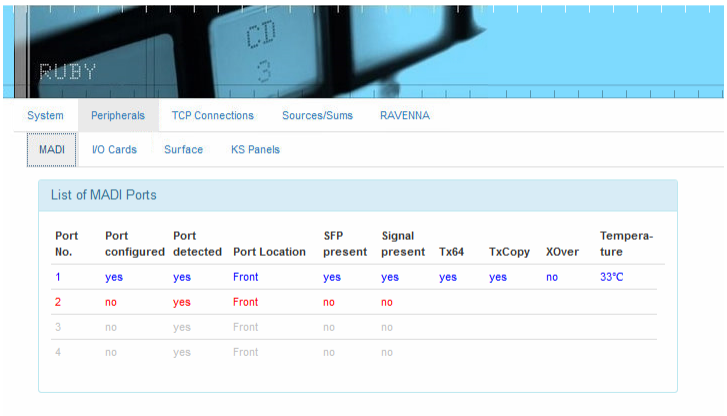


This tab shows the barcodes and serial numbers of the Power Core and any optional I/O cards installed in the Power Core. This may be printed and archived as a part of your system documentation.

10.4 The Peripherals Menu

There are four informational tabs in the Peripherals menu, which display the status of installed hardware extensions and connected ports.

10.4.1 MADI Tab



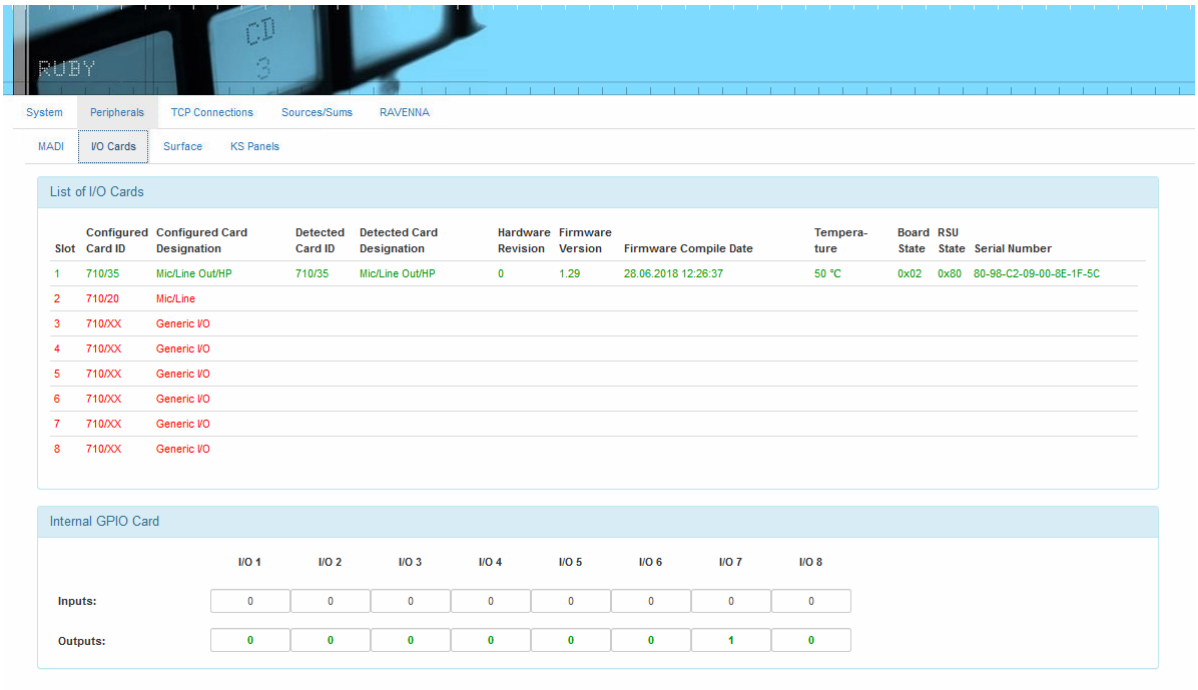
The **MADI** tab gives information on the present state of MADI connections to the Power Core. The ports are color-coded as follows:

Port Color	Meaning
Grey	not configured
Red	signal not present
Green	signal present
Blue	signal present & active
Light Blue	signal present & not active

For each port, you will see the following information:

- **Port Configured:** Shows whether the port has been configured properly using the ON-AIR Designer.
- **Port Detected:** Shows whether the port has been detected correctly by the hardware.
- **Port Location:** Indicates the physical location of the port on the Power Core unit.
- **SFP Present:** Shows whether an SFP connection has been installed on the specified port.
- **Signal Present:** Confirms port signal activity.
- **Tx64:** “Yes” if Tx64 mode is active; blank if Tx56 mode is in use.
- **TxCopy & XOver:** Indicates whether this port is mirrored with another port for signal redundancy. This setting is selected using the ON-AIR Designer software.
- **Temperature:** If an SFP is installed, displays current temperature.

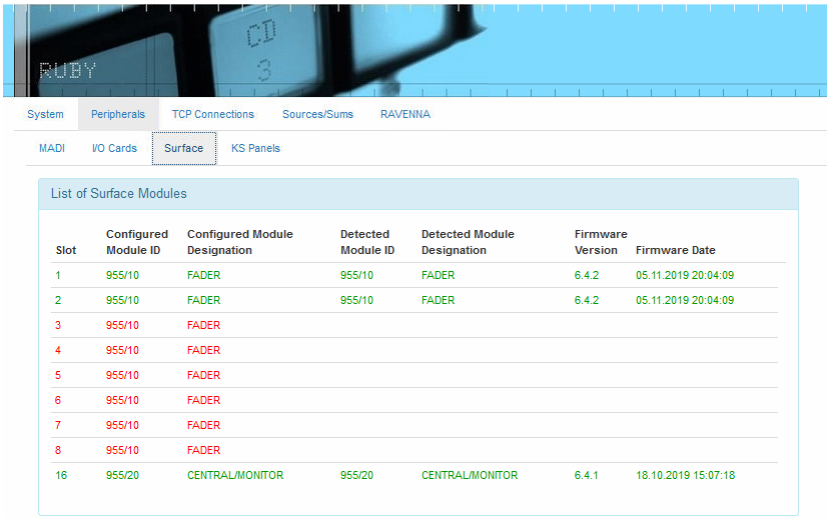
10.4.2 IO Cards Tab



The top portion of this tab displays optionally-installed I/O cards and their serial numbers, and other information which may be used by Lawo Support for diagnostic purposes.

The bottom portion of this tab shows high/low state for each of the built-in GPIO closures.

10.4.3 Surface Tab



This display enumerates the modules installed in the connected surface (if applicable) and their firmware versions. Green indicates an installed, configured and active module; Red indicates a module position which has been defined using the ON-AIR Designer, but which is not physically present in or connected to the console frame.

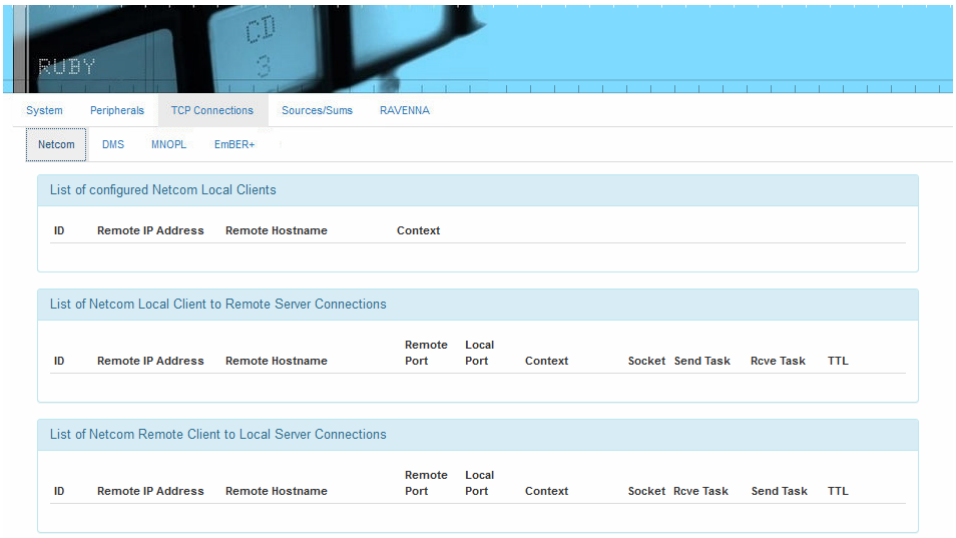
10.4.4 KS Panels Tab

This tab lists any external key panels attached to Power Core.

10.5 The TCP Connections Menu

There are four informational tabs in the TCP Connections menu which display network connections to Power Core, and the state of those connections.

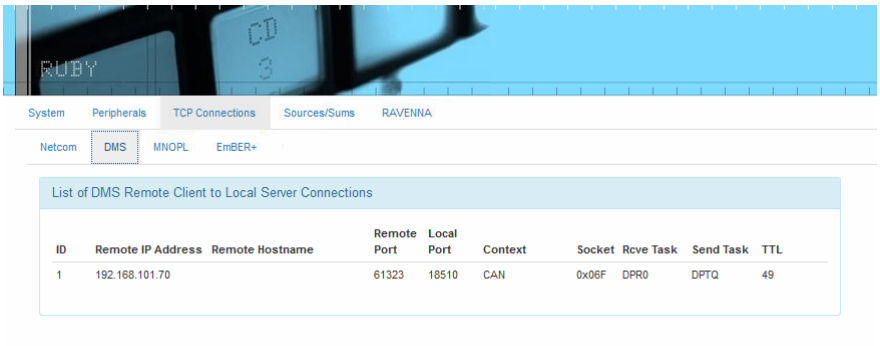
10.5.1 Netcom Tab



This tab is used to see the status of GPIO connections, crosspoint settings and other system streams using Netcom protocol to communicate with Power Core. It contains information which aids in determining whether configured Netcom connections are in fact present.

- **List Of Netcom Local Clients:** Netcom connections which have been configured using ON-AIR Designer.
- **List Of Netcom Local Client To Remote Server Connections:** Netcom connections which are present and active.
- **List Of Netcom Remote Client To Local Server Connections:** External systems connected to the local Power Core.

10.5.2 DMS Tab

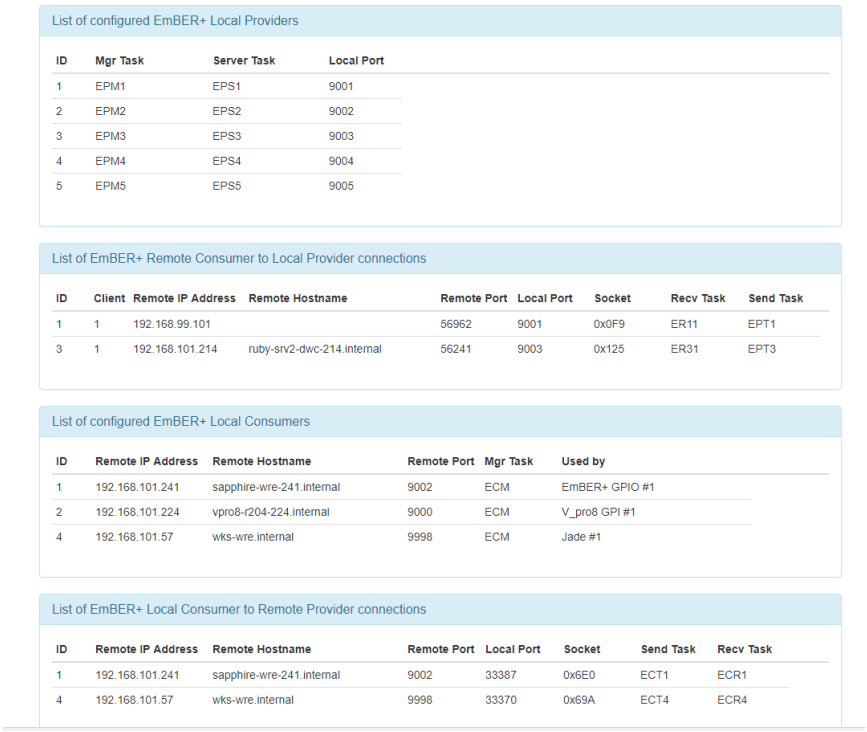


This tab displays systems connected via DMS (e.g. VisTool).

10.5.3 MNOPL Tab

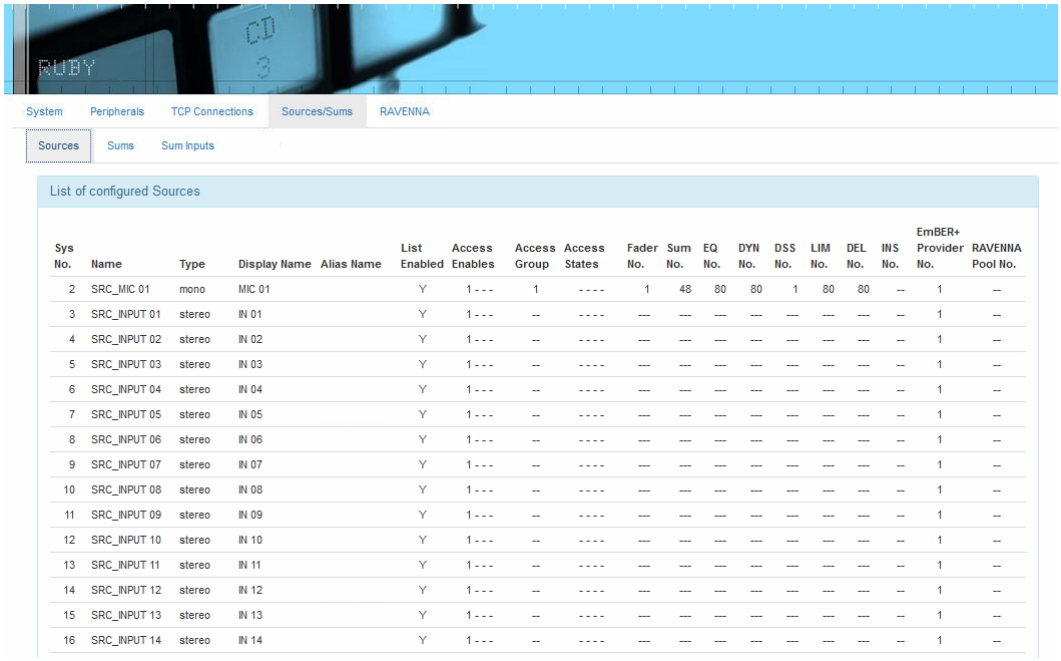
Lists connections from Lawo Nova-series routers, if present.

10.5.4 Ember+ Tab



This tab displays Ember+ control connections from other devices on the network.

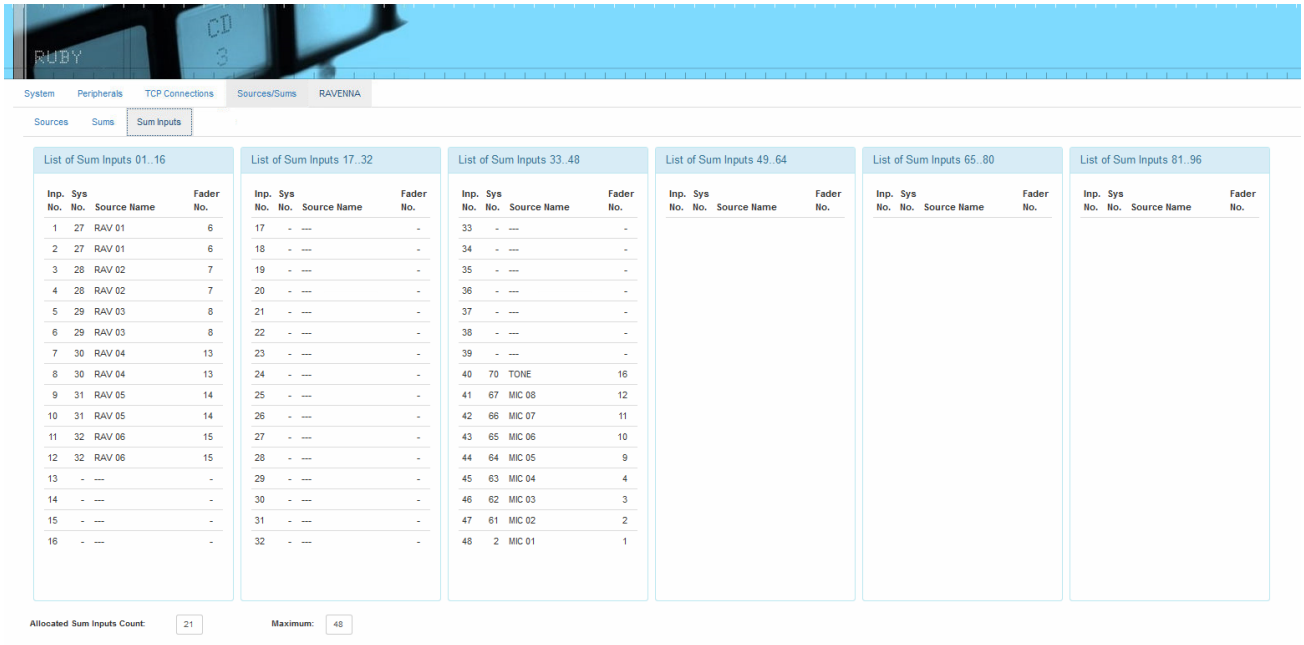
10.6 The Sources / Sums Menu



Sys No.	Name	Type	Display Name	Alias Name	List Enabled	Access Enables	Access Group	Access States	Fader No.	Sum No.	EQ No.	DYN No.	DSS No.	LIM No.	DEL No.	INS No.	EmBER+ Provider No.	RAVENNA Pool No.
2	SRC_MIC 01	mono	MIC 01		Y	1 ---	1	----	1	48	80	80	1	80	80	--	1	--
3	SRC_INPUT 01	stereo	IN 01		Y	1 ---	--	----	---	---	---	---	---	---	---	--	1	--
4	SRC_INPUT 02	stereo	IN 02		Y	1 ---	--	----	---	---	---	---	---	---	---	--	1	--
5	SRC_INPUT 03	stereo	IN 03		Y	1 ---	--	----	---	---	---	---	---	---	---	--	1	--
6	SRC_INPUT 04	stereo	IN 04		Y	1 ---	--	----	---	---	---	---	---	---	---	--	1	--
7	SRC_INPUT 05	stereo	IN 05		Y	1 ---	--	----	---	---	---	---	---	---	---	--	1	--
8	SRC_INPUT 06	stereo	IN 06		Y	1 ---	--	----	---	---	---	---	---	---	---	--	1	--
9	SRC_INPUT 07	stereo	IN 07		Y	1 ---	--	----	---	---	---	---	---	---	---	--	1	--
10	SRC_INPUT 08	stereo	IN 08		Y	1 ---	--	----	---	---	---	---	---	---	---	--	1	--
11	SRC_INPUT 09	stereo	IN 09		Y	1 ---	--	----	---	---	---	---	---	---	---	--	1	--
12	SRC_INPUT 10	stereo	IN 10		Y	1 ---	--	----	---	---	---	---	---	---	---	--	1	--
13	SRC_INPUT 11	stereo	IN 11		Y	1 ---	--	----	---	---	---	---	---	---	---	--	1	--
14	SRC_INPUT 12	stereo	IN 12		Y	1 ---	--	----	---	---	---	---	---	---	---	--	1	--
15	SRC_INPUT 13	stereo	IN 13		Y	1 ---	--	----	---	---	---	---	---	---	---	--	1	--
16	SRC_INPUT 14	stereo	IN 14		Y	1 ---	--	----	---	---	---	---	---	---	---	--	1	--

The **Sources/Sums** tabs provide a comprehensive listing of Power Core's input sources and summing buses:

- **Sources** shows configured sources, whether they are actively assigned to a fader on the surface, which fader they are assigned to, and whether DSP has been applied.
- **Sums** lists all of the configured summing buses, each bus' name, channel configuration, whether it is assigned to a fader on the surface, and whether DSP has been applied.



Inp. No.	Sys No.	Source Name	Fader No.
1	27	RAV 01	6
2	27	RAV 01	6
3	28	RAV 02	7
4	28	RAV 02	7
5	29	RAV 03	8
6	29	RAV 03	8
7	30	RAV 04	13
8	30	RAV 04	13
9	31	RAV 05	14
10	31	RAV 05	14
11	32	RAV 06	15
12	32	RAV 06	15
13	-	---	-
14	-	---	-
15	-	---	-
16	-	---	-

Inp. No.	Sys No.	Source Name	Fader No.
17	-	---	-
18	-	---	-
19	-	---	-
20	-	---	-
21	-	---	-
22	-	---	-
23	-	---	-
24	-	---	-
25	-	---	-
26	-	---	-
27	-	---	-
28	-	---	-
29	-	---	-
30	-	---	-
31	-	---	-
32	-	---	-

Inp. No.	Sys No.	Source Name	Fader No.
33	-	---	-
34	-	---	-
35	-	---	-
36	-	---	-
37	-	---	-
38	-	---	-
39	-	---	-
40	70	TONE	16
41	67	MIC 08	12
42	66	MIC 07	11
43	65	MIC 06	10
44	64	MIC 05	9
45	63	MIC 04	4
46	62	MIC 03	3
47	61	MIC 02	2
48	2	MIC 01	1

Inp. No.	Sys No.	Source Name	Fader No.

Inp. No.	Sys No.	Source Name	Fader No.

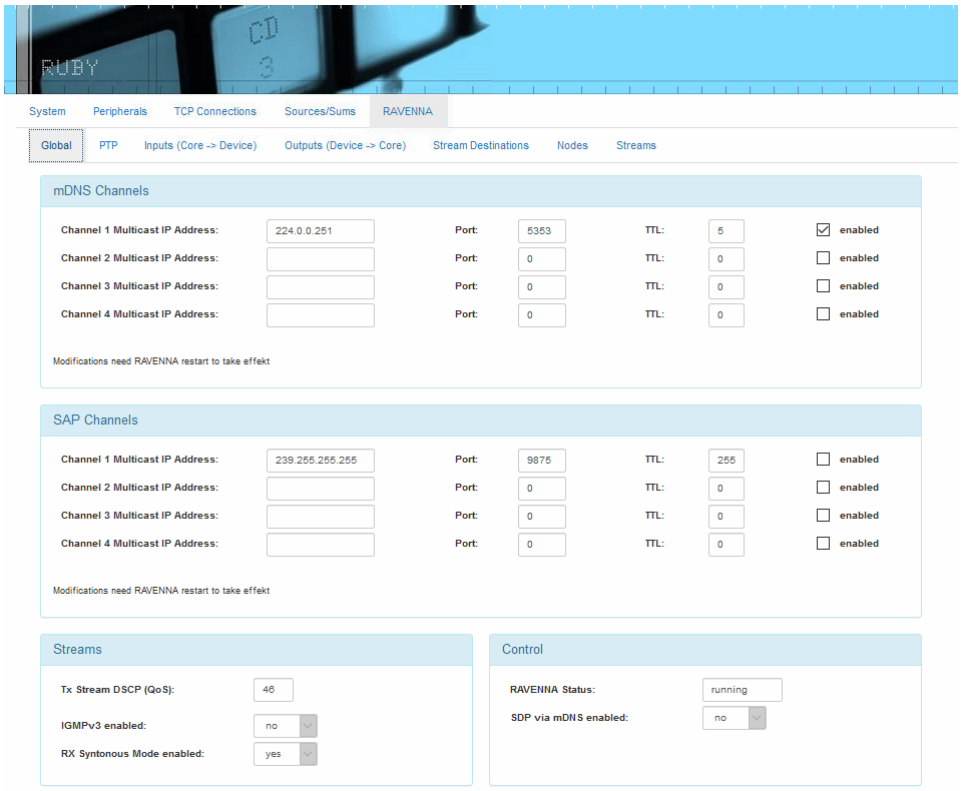
Inp. No.	Sys No.	Source Name	Fader No.

The **Sum Inputs** tab lists the available summing points and shows how they are utilised. The **Maximum** number of parallel mix inputs is determined by your Power Core license.

10.7 The RAVENNA Menu

The RAVENNA menu contains seven tabs. Most of these are informational in nature, although it is possible to change a few options in some of the tabs. The information can be used for troubleshooting and to determine the presence and activity of configured streams.

10.7.1 Global Tab



The **Global** tab displays Power Core's global RAVENNA settings as defined by the ON-AIR Designer.

> For convenience, you may enter new temporary settings. However, for permanent changes it is recommended to edit the base configuration using the ON-AIR Designer (to avoid losing changes after a cold start).
>
> Any temporary changes require a RAVENNA restart to take effect.

➢ **mDNS / SAP Channels**

The first two areas define the mDNS and SAP channels used for stream announcement:

- **mDNS Channels** use the multicast Domain Name System defined in IETF RFC 6762.
- **SAP Channels** use the Session Announcement Protocol defined in IETC RFC 2974.

For each channel, you will see the "Multicast IP Address", "Port" number and "TTL" value (in seconds). The "enabled" checkbox shows if the channel is enabled or disabled.

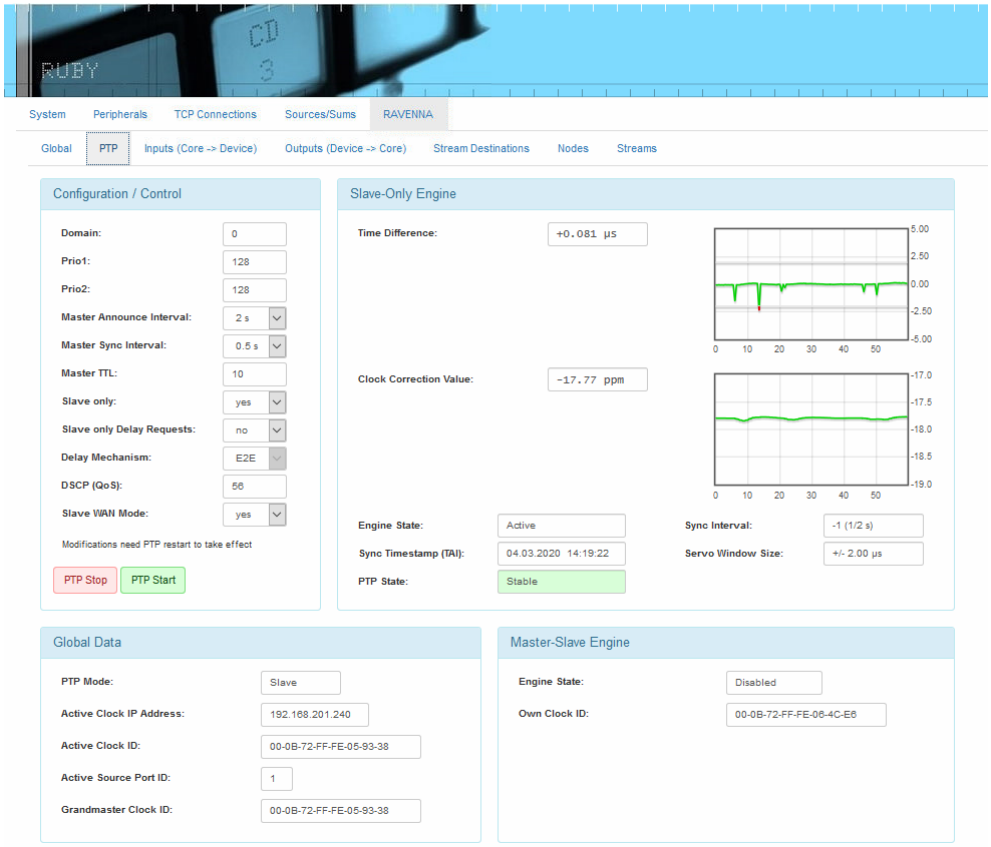
➢ **Streams**

This area shows the global options for streams. The only editable field is the "Tx Stream DSCP (QoS)" value. The default value is 46.

➢ **Control**

Here you will see the status of the RAVENNA service and the global options for control. There are no editable fields.

10.7.2 PTP Tab



This tab shows statistics and options pertaining to your system's PTP clocking.

➢ **Configuration / Control**

This area defines the PTP mode and associated parameters as defined by the ON-AIR Designer. Power Core supports two possible PTP modes: slave only and master-slave. If **Slave only** is enabled, then Power Core is forced to operate as a PTP slave at all times. If **Slave only** is disabled, then Power Core will operate in PTP master-slave mode, whereby the PTP priorities set within the device itself and all other streaming nodes determine the current PTP master.

> For convenience, you may enter new temporary PTP settings. However, for permanent changes it is recommended to edit the base configuration using the ON-AIR Designer.
>
> Any temporary changes require a PTP restart to take effect.

➢ **Slave-Only Engine**

The two graphs in this area monitor PTP jitter across the system. This is useful for system analysis and debugging in conjunction with a Lawo Support technician. As a rule of thumb, the "Clock Connection Value" display should be stable with little variance over time as an indication of good system health. High activity in the "Time Difference" display is normal and to be expected.

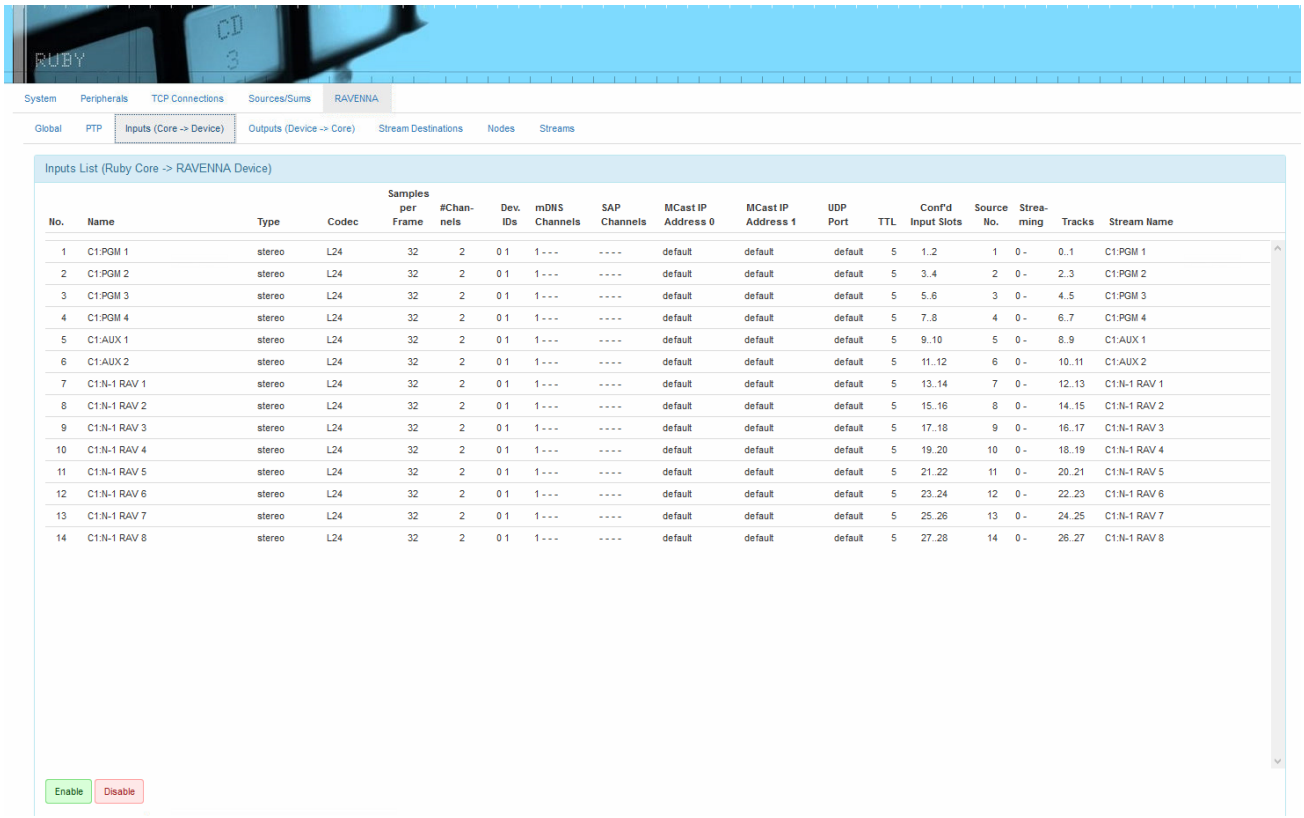
➢ **Global Data**

This area shows the system's PTP mode, the active clock ID and address, and the grandmaster clock ID. These IDs may differ if your system uses a boundary clock.

➢ **Master-Slave Engine**

This area shows whether the master-slave engine is active, and displays the clock ID if this mode is enabled.

10.7.3 Inputs Tab



No.	Name	Type	Codec	Samples per Frame	#Channels	Dev. IDs	mDNS Channels	SAP Channels	MCast IP Address 0	MCast IP Address 1	UDP Port	TTL	Conf'd Input Slots	Source No.	Streaming	Tracks	Stream Name
1	C1:PGM 1	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	1..2	1	0 -	0..1	C1:PGM 1
2	C1:PGM 2	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	3..4	2	0 -	2..3	C1:PGM 2
3	C1:PGM 3	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	5..6	3	0 -	4..5	C1:PGM 3
4	C1:PGM 4	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	7..8	4	0 -	6..7	C1:PGM 4
5	C1:AUX 1	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	9..10	5	0 -	8..9	C1:AUX 1
6	C1:AUX 2	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	11..12	6	0 -	10..11	C1:AUX 2
7	C1:N-1 RAV 1	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	13..14	7	0 -	12..13	C1:N-1 RAV 1
8	C1:N-1 RAV 2	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	15..16	8	0 -	14..15	C1:N-1 RAV 2
9	C1:N-1 RAV 3	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	17..18	9	0 -	16..17	C1:N-1 RAV 3
10	C1:N-1 RAV 4	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	19..20	10	0 -	18..19	C1:N-1 RAV 4
11	C1:N-1 RAV 5	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	21..22	11	0 -	20..21	C1:N-1 RAV 5
12	C1:N-1 RAV 6	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	23..24	12	0 -	22..23	C1:N-1 RAV 6
13	C1:N-1 RAV 7	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	25..26	13	0 -	24..25	C1:N-1 RAV 7
14	C1:N-1 RAV 8	stereo	L24	32	2	0 1	1 - - -	- - - -	default	default	default	5	27..28	14	0 -	26..27	C1:N-1 RAV 8

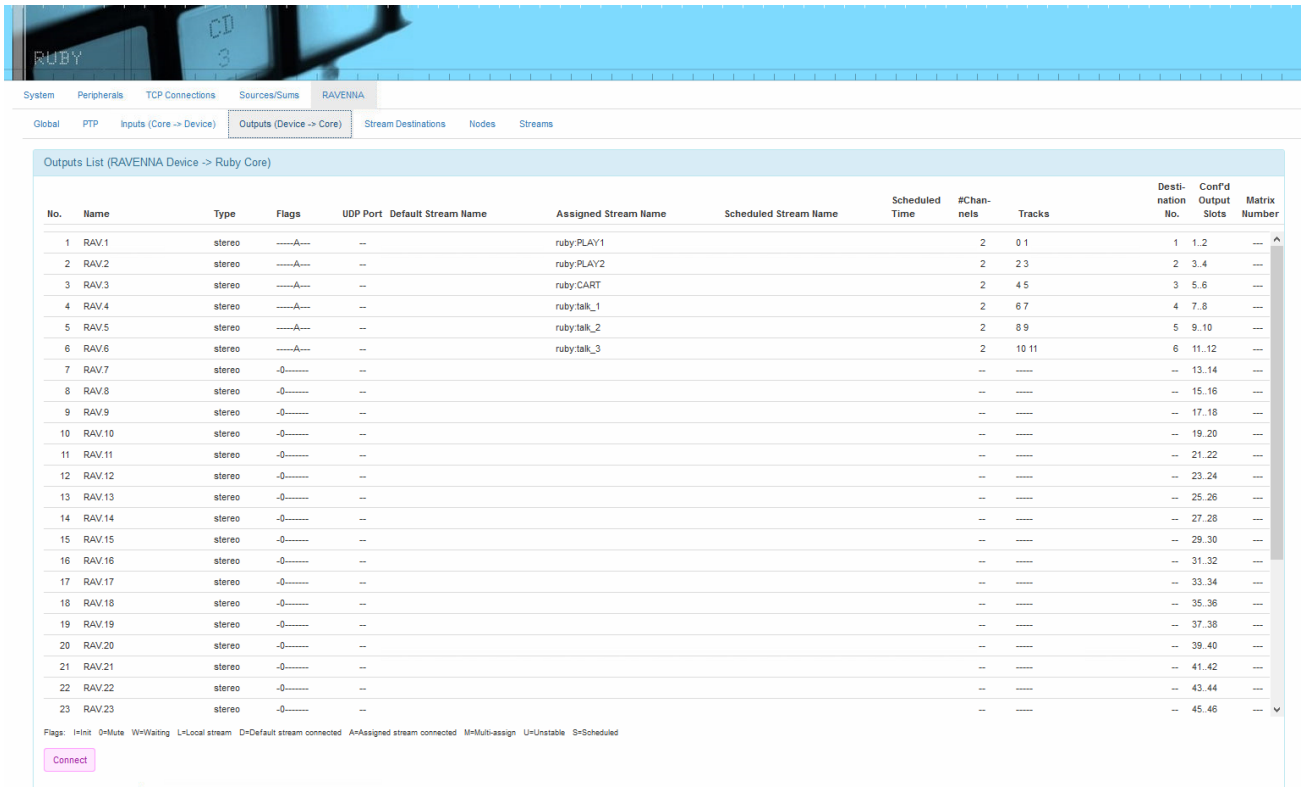
This tab lets you view all of the local RAVENNA streams supplied by Power Core to external devices. The parameters are configured by the ON-AIR Designer.

Stream information includes the number of audio channels, codec type used, audio sample rate, RAVENNA announcement protocol used, multicast stream address, UDP port number, stream TTL value (in seconds), the input slots of the RAVENNA device, and the Track numbers of RAVENNA streams being output by Power Core.

The “Streaming” column shows whether streams are in fact actually being transmitted from Power Core’s RAVENNA interfaces; “0” value corresponds to front-panel port **ra0**, and “1” corresponds to port **ra1**. If both numerals are present, this indicates that the RAVENNA channel is streaming from both front panel ports.

At the bottom of the page, the **Enable** and **Disable** buttons can be used to manually start and stop RAVENNA streams. They should be used for troubleshooting only, and not for controlling stream outputs while on-air. In each case, the button opens a pop-up window where you can select the stream you wish to enable or disable. If all streams are in the opposite state, then the Input Name selector list will be empty.

10.7.4 Outputs Tab



This tab lets you view all of the streams from your RAVENNA network which are being consumed by your Power Core. The parameters are configured by the ON-AIR Designer. Of particular note are:

- **Name** & **Type** show the name and format of the RAVENNA input (i.e. the receiver for the stream).
- **Flags** show information about stream stability and availability. There is a key at the bottom of the page which explains the meaning of each flag.
- **Default Stream Name** shows the name of the stream you wish to subscribe to.
- **Assigned Stream Name** shows the name of the assigned stream following a successful subscription.

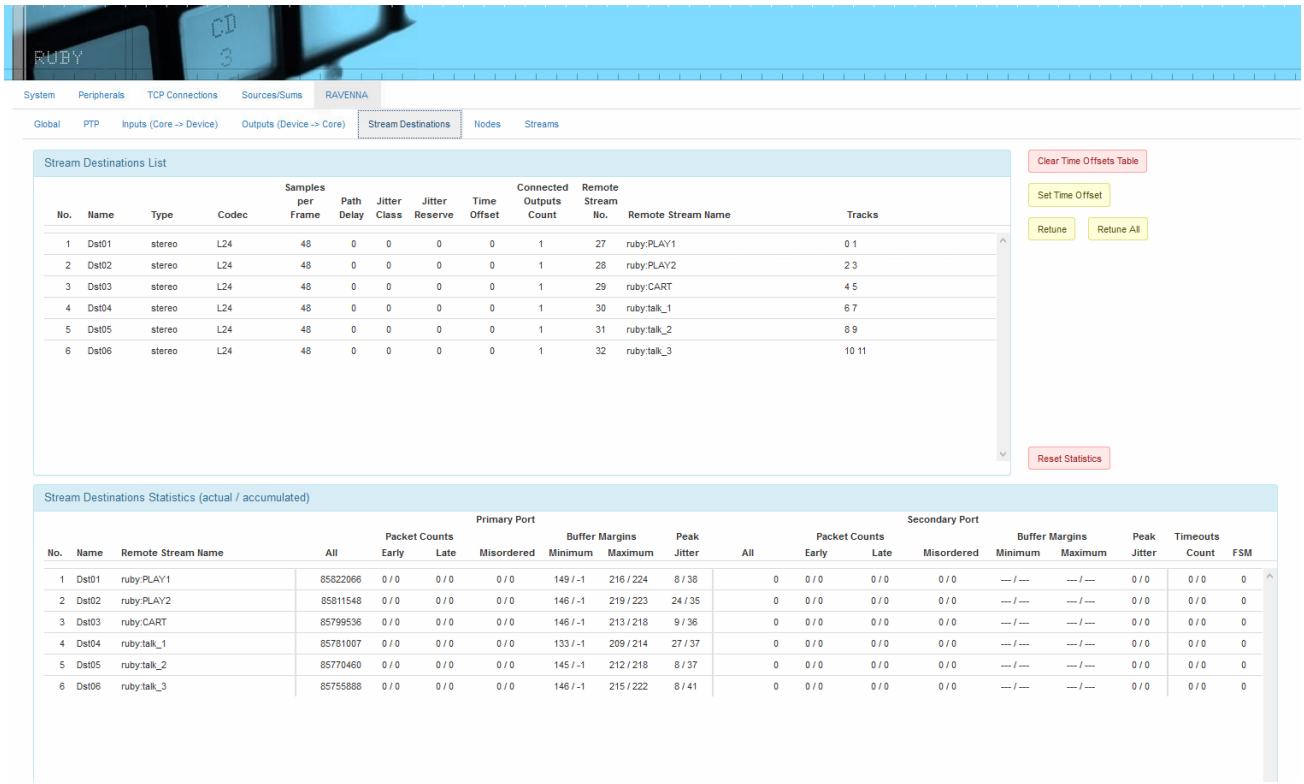
The Default Stream Name is optional and can be used to permanently link the receiver to a stream. If a matching stream name is found, the receiver will automatically subscribe to it. In this instance, you will see the same name in both columns. If a Default Stream name is not entered, then a stream subscription must be established using a different method. For example, by selecting a pool source on the console surface; using internal logic or external control via Ember+; or by manually connecting a stream via the **Connect** button.

Other information includes the UDP Port number, the number of Channels and Track numbers in use.

Clicking on a name in the "Name" column opens a pop-up window containing further information about the receiver and its connected stream.

At the bottom of the page, the **Connect** button can be used to connect an incoming stream from the network to one of the configured RAVENNA inputs. It should be used for troubleshooting only, and not as an operational tool while on-air. The button opens a pop-up window where you can select the RAVENNA input you wish to assign, followed by the stream you wish to subscribe to. The list of available streams is determined by the mDNS or SAP channel announcement.

10.7.5 Stream Destinations Tab



This tab shows the statistics for all of the stream destinations which are in use (i.e. all subscribed streams). It can be used to view information about stream latency and stability, and to “retune” streams which are not performing properly.

➢ Stream Destinations List

This section shows information pertaining to individual RAVENNA streams. Data includes the number of audio channels, codec used, sample rate, number of subscribers listening to the stream, the Remote Stream name and number, and the numerical designations for the audio channels supplied. Streams with blank Remote Stream Name values are inactive or unavailable.

Of particular note are the **Jitter Class** and **Time Offset** which are applied during the tuning process.

The Time Offsets for all streams can be cleared by clicking on the **Clear Time Offsets Table** button. The **Set Time Offset**, **Retune** and **Retune All** buttons can be used to retune streams (described later).

➢ Stream Destinations Statistics

This section provides statistics that report on the health of the received Primary and Secondary streams. Data includes the Packet Count, Early, Late and Misordered Packets, Buffer Margins and Jitter.

Of particular importance are the **Primary Early Packets Count** and **Primary Late Packets Count**. If large numbers are seen in these columns, along with degraded audio performance, the stream should be retuned to fix the problem.

The stream statistics can be cleared by clicking on the **Reset Statistics** button.

Stream Tuning

Each time a stream connects it goes through an automatic "tuning" process.

Depending on the **Jitter** value (in the Statistics), each stream is placed in a particular **Jitter Class** and assigned a **Time Offset** value (shown in the Stream Destinations List). The Jitter Class parameters and corresponding Time Offset values are determined by the ON-AIR Designer.

Power Core supports five jitter classes, where Class 1 is for low-jitter devices (such as a ruby / Power Core), and Class 5 is for high-jitter devices (such as a PC with a RAVENNA virtual sound card on a distant network node). Thus, the higher the Jitter Class, the higher the Time Offset. Note that high Time Offset values mean high latency, which may affect stream performance.

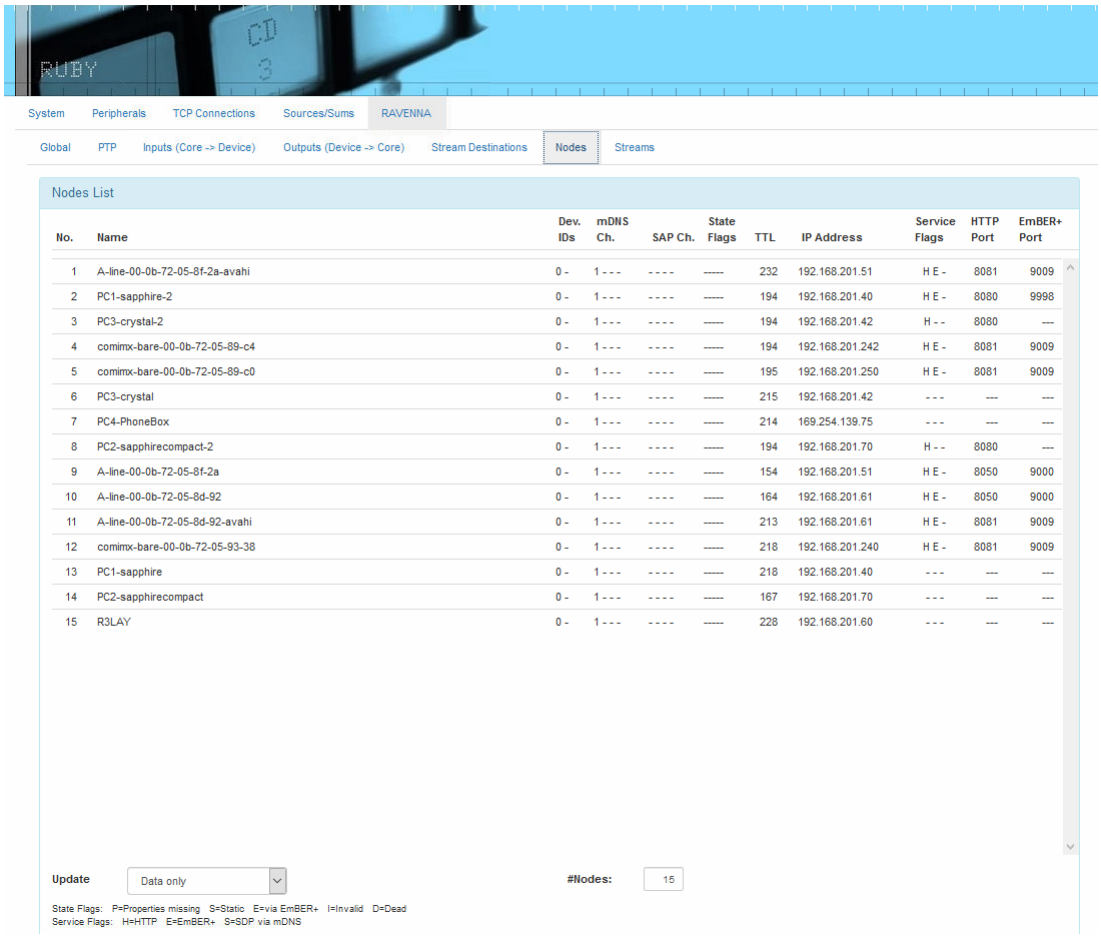
Re-Tuning Streams

If changes are made to the network infrastructure after the initial tuning process, then the **Jitter Class** and **Time Offset** values may no longer be correct. In this instance, audio from the RAVENNA streams may be degraded or inaudible, and you should manually retune the streams as follows:

- **Retune** - select this button to individually retune a stream.
- **Retune All** - select this button to retune all streams.
- **Set Time Offset** - this button allows manual entry of a Time Offset for a single selected stream. This is an advanced function which should only be used when instructed by Lawo Support personnel.

The retuning process goes through three phases which are displayed on-screen. If audio on a selected stream was not previously present, it should be restored immediately. Once 8 has been reached, retuning is complete and the stream's new **Time Offset** value is shown in the Stream Destinations List.

10.7.6 Nodes Tab



No.	Name	Dev. IDs	mDNS Ch.	SAP Ch.	State Flags	TTL	IP Address	Service Flags	HTTP Port	EmBER+ Port
1	A-line-00-0b-72-05-8f-2a-avahi	0 -	1 - - -	- - - -	-----	232	192.168.201.51	H E -	8081	9009
2	PC1-sapphire-2	0 -	1 - - -	- - - -	-----	194	192.168.201.40	H E -	8080	9998
3	PC3-crystal-2	0 -	1 - - -	- - - -	-----	194	192.168.201.42	H - -	8080	---
4	comimx-bare-00-0b-72-05-89-c4	0 -	1 - - -	- - - -	-----	194	192.168.201.242	H E -	8081	9009
5	comimx-bare-00-0b-72-05-89-c0	0 -	1 - - -	- - - -	-----	195	192.168.201.250	H E -	8081	9009
6	PC3-crystal	0 -	1 - - -	- - - -	-----	215	192.168.201.42	- - -	---	---
7	PC4-PhoneBox	0 -	1 - - -	- - - -	-----	214	169.254.139.75	- - -	---	---
8	PC2-sapphirecompact-2	0 -	1 - - -	- - - -	-----	194	192.168.201.70	H - -	8080	---
9	A-line-00-0b-72-05-8f-2a	0 -	1 - - -	- - - -	-----	154	192.168.201.51	H E -	8050	9000
10	A-line-00-0b-72-05-8d-92	0 -	1 - - -	- - - -	-----	164	192.168.201.61	H E -	8050	9000
11	A-line-00-0b-72-05-8d-92-avahi	0 -	1 - - -	- - - -	-----	213	192.168.201.61	H E -	8081	9009
12	comimx-bare-00-0b-72-05-93-38	0 -	1 - - -	- - - -	-----	218	192.168.201.240	H E -	8081	9009
13	PC1-sapphire	0 -	1 - - -	- - - -	-----	218	192.168.201.40	- - -	---	---
14	PC2-sapphirecompact	0 -	1 - - -	- - - -	-----	167	192.168.201.70	- - -	---	---
15	R3LAY	0 -	1 - - -	- - - -	-----	228	192.168.201.60	- - -	---	---

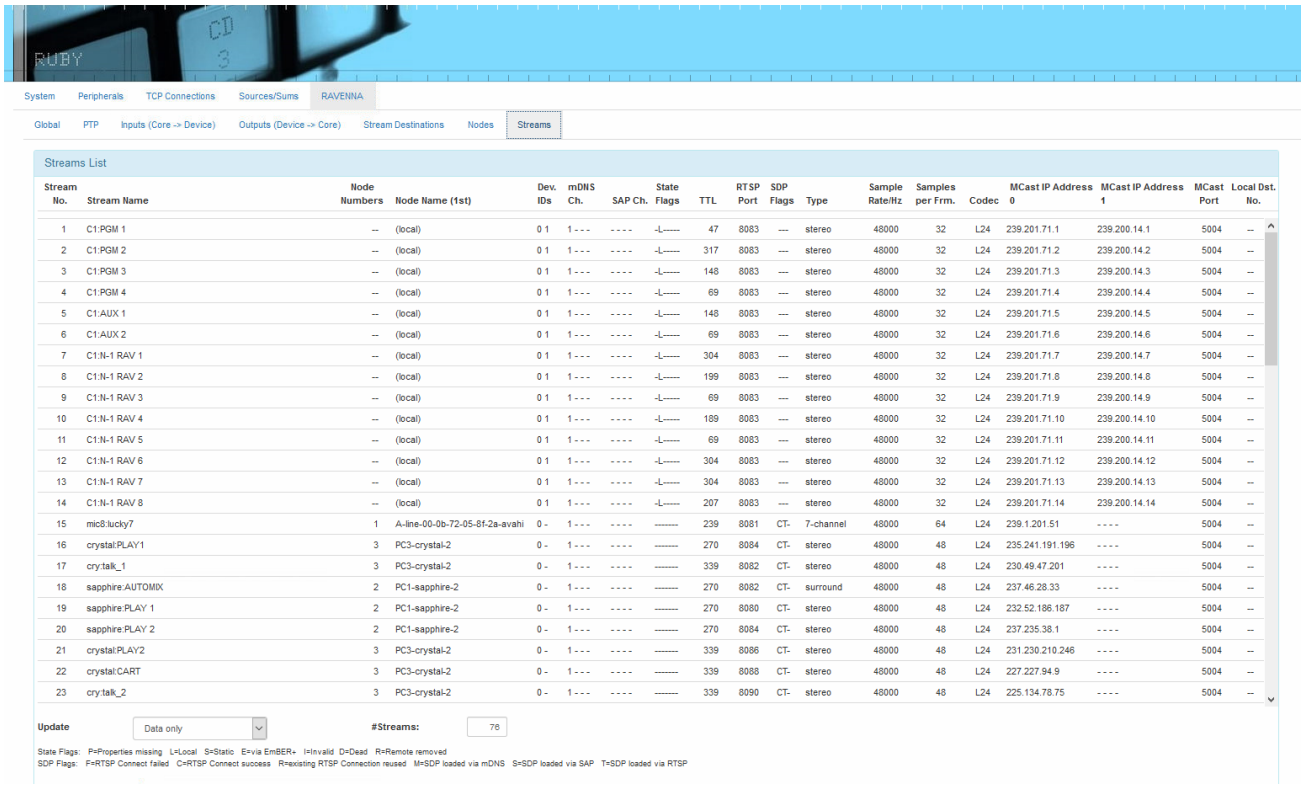
This tab lists all available network Nodes, showing their Device ID, announcement method (mDNS or SAP), TTL (in seconds), and IP address. You may create static streams using Ember+, and these streams are shown in the list as well.

Clicking on a name in the “Name” column opens the device's Web page. You can use this to access further information.

Pay particular attention to the "State Flags" which show the condition of the network node. There is a key at the bottom of the page which explains the meaning of each flag.

Above the flag descriptions is the **Update** selector. This can be set to one of two possibilities: **Data only** (the default) or **Data + TTL**. This defines what happens when the transmitter's MDNS / SAP announcement for a stream is made. If **Data + TTL** is selected, then the TTLs will be reset to the "Nodes List TTLs" value defined in ON-AIR Designer. Once the TTL count-down has expired, the node will remove the associated stream. This is generally needed only for diagnostic purposes.

10.7.7 Streams Tab



Stream No.	Stream Name	Node Numbers	Node Name (1st)	Dev. IDs	mDNS Ch.	SAP Ch.	State Flags	TTL	RTSP Port	SDP Flags	Type	Sample Rate/Hz	Samples per Frm.	Codec	MCast IP Address 0	MCast IP Address 1	MCast Port	Local Dst. No.
1	C1:PGM 1	--	(local)	0 1	1 - - -	- - - -	-L------	47	8083	---	stereo	48000	32	L24	239.201.71.1	239.200.14.1	5004	--
2	C1:PGM 2	--	(local)	0 1	1 - - -	- - - -	-L------	317	8083	---	stereo	48000	32	L24	239.201.71.2	239.200.14.2	5004	--
3	C1:PGM 3	--	(local)	0 1	1 - - -	- - - -	-L------	148	8083	---	stereo	48000	32	L24	239.201.71.3	239.200.14.3	5004	--
4	C1:PGM 4	--	(local)	0 1	1 - - -	- - - -	-L------	69	8083	---	stereo	48000	32	L24	239.201.71.4	239.200.14.4	5004	--
5	C1:AUX 1	--	(local)	0 1	1 - - -	- - - -	-L------	148	8083	---	stereo	48000	32	L24	239.201.71.5	239.200.14.5	5004	--
6	C1:AUX 2	--	(local)	0 1	1 - - -	- - - -	-L------	69	8083	---	stereo	48000	32	L24	239.201.71.6	239.200.14.6	5004	--
7	C1:N-1 RAV 1	--	(local)	0 1	1 - - -	- - - -	-L------	304	8083	---	stereo	48000	32	L24	239.201.71.7	239.200.14.7	5004	--
8	C1:N-1 RAV 2	--	(local)	0 1	1 - - -	- - - -	-L------	199	8083	---	stereo	48000	32	L24	239.201.71.8	239.200.14.8	5004	--
9	C1:N-1 RAV 3	--	(local)	0 1	1 - - -	- - - -	-L------	69	8083	---	stereo	48000	32	L24	239.201.71.9	239.200.14.9	5004	--
10	C1:N-1 RAV 4	--	(local)	0 1	1 - - -	- - - -	-L------	189	8083	---	stereo	48000	32	L24	239.201.71.10	239.200.14.10	5004	--
11	C1:N-1 RAV 5	--	(local)	0 1	1 - - -	- - - -	-L------	69	8083	---	stereo	48000	32	L24	239.201.71.11	239.200.14.11	5004	--
12	C1:N-1 RAV 6	--	(local)	0 1	1 - - -	- - - -	-L------	304	8083	---	stereo	48000	32	L24	239.201.71.12	239.200.14.12	5004	--
13	C1:N-1 RAV 7	--	(local)	0 1	1 - - -	- - - -	-L------	304	8083	---	stereo	48000	32	L24	239.201.71.13	239.200.14.13	5004	--
14	C1:N-1 RAV 8	--	(local)	0 1	1 - - -	- - - -	-L------	207	8083	---	stereo	48000	32	L24	239.201.71.14	239.200.14.14	5004	--
15	mic8:lucky7	1	A-line-00-0b-72-05-8f-2a-avahi	0 -	1 - - -	- - - -	--------	239	8081	CT-	7-channel	48000	64	L24	239.1.201.51	- - - -	5004	--
16	crystal:PLAY1	3	PC3-crystal-2	0 -	1 - - -	- - - -	--------	270	8084	CT-	stereo	48000	48	L24	235.241.191.196	- - - -	5004	--
17	cry:talk_1	3	PC3-crystal-2	0 -	1 - - -	- - - -	--------	339	8082	CT-	stereo	48000	48	L24	230.49.47.201	- - - -	5004	--
18	sapphire:AUTOMIX	2	PC1-sapphire-2	0 -	1 - - -	- - - -	--------	270	8082	CT-	surround	48000	48	L24	237.46.28.33	- - - -	5004	--
19	sapphire:PLAY 1	2	PC1-sapphire-2	0 -	1 - - -	- - - -	--------	270	8080	CT-	stereo	48000	48	L24	232.52.186.187	- - - -	5004	--
20	sapphire:PLAY 2	2	PC1-sapphire-2	0 -	1 - - -	- - - -	--------	270	8084	CT-	stereo	48000	48	L24	237.235.38.1	- - - -	5004	--
21	crystal:PLAY2	3	PC3-crystal-2	0 -	1 - - -	- - - -	--------	339	8086	CT-	stereo	48000	48	L24	231.230.210.246	- - - -	5004	--
22	crystal:CART	3	PC3-crystal-2	0 -	1 - - -	- - - -	--------	339	8088	CT-	stereo	48000	48	L24	227.227.94.9	- - - -	5004	--
23	cry:talk_2	3	PC3-crystal-2	0 -	1 - - -	- - - -	--------	339	8090	CT-	stereo	48000	48	L24	225.134.78.75	- - - -	5004	--

This tab lists all available network streams which have been announced to Power Core.

Clicking on a name in the “Stream Name” column opens a pop-up where you can view and copy the stream's SDP.

Pay particular attention to the stream "State Flags" which show the condition of the stream. There is a key at the bottom of the page which explains the meaning of each flag.

Above the flag descriptions is the **Update** selector. This can be set to one of two possibilities: **Data only** (the default) or **Data + TTL**. This works in a similar manner to the **Update** function in the Nodes Tab, but the TTLs are reset to the "Streams List TTLs" value (defined in ON-AIR Designer).

11. Appendices

This chapter includes further information which you may find useful.

11.1 Part Numbers

System Component		Part Number
Power Core	Main Frame	710/11
IO Cards	MIC / LINE IN	710/20
	ANALOG LINE IN	710/25
	ANALOG LINE OUT	710/30
	STUDIO IO	710/35
	AES3 IO	710/40
	AES3 IO (with bit transparency)	710/41
Accessories	SFP Modules - please see accessories.	981/60-xx
	12V DC power supply	955/50-80

11.1.1 Data Sheets

Further technical information can be found in the product data sheets. The system part numbers will help you locate the data sheets for the main system components.

All documentation is available from the **Downloads** area at www.lawo.com (after **Login**).

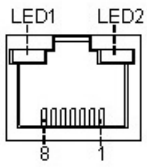
11.2 Dimension Drawing

Please double-click here to open the Power Core dimension drawing (pdf).

11.3 Connector Pin-Outs

11.3.1 CAN

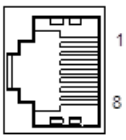
8-pin RJ45 connector, female.



PIN No:	FUNCTION
1	BUS high
2	BUS low
3	GND
4	n.c.
5	n.c.
6	n.c.
7	n.c.
8	n.c.
LED1	CAN Rx
LED2	CAN Tx

11.3.2 RS-422

8-pin RJ45 connector, female.

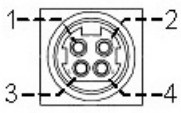


SERIAL RS422

PIN No.	RAS/NTP.(1)	DEBUG
1	n.a.	Tx +
2	n.a.	Tx -
3	n.a.	Rx +
4	Tx +	n.a.
5	Tx -	n.a.
6	n.a.	Rx -
7	Rx +	n.a.
8	Rx -	n.a.

11.3.3 DC Power Input

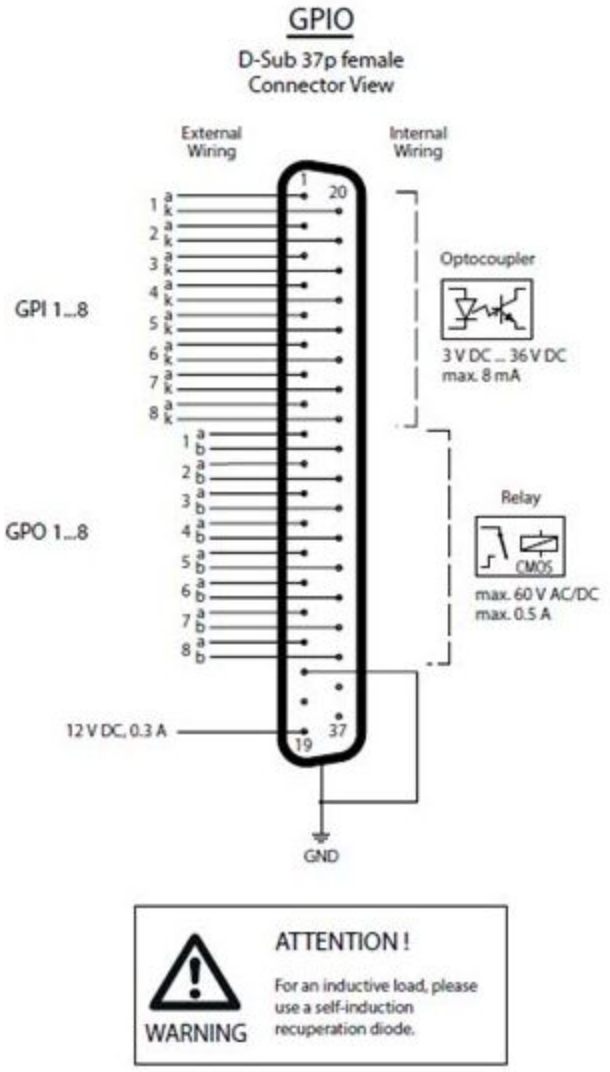
4-pin Kycon connector, female.



PIN No:	FUNCTION
1	+ 12 VDC
3	+ 12 VDC
2	GND
4	GND

11.3.4 GPIO

37-pin D-type connector, female.

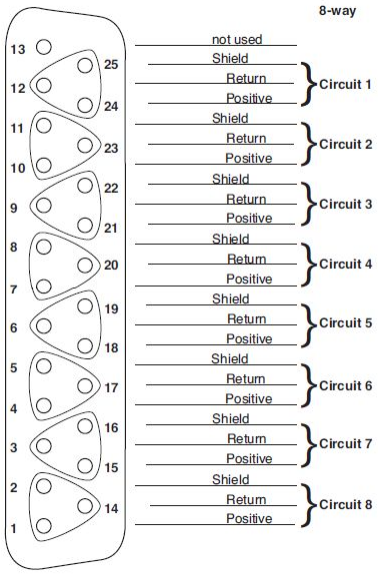


11.3.5 IO Cards

All IO cards use DB-25 connectors. All DB-25 connectors are wired according to the AES59 standard, except for the Phones outputs on the 710/35 STUDIO IO card.

MIC/LINE IN (710/20), LINE IN (710/25), LINE OUT (710/30)

25-pin D-type connector (DB25), female.

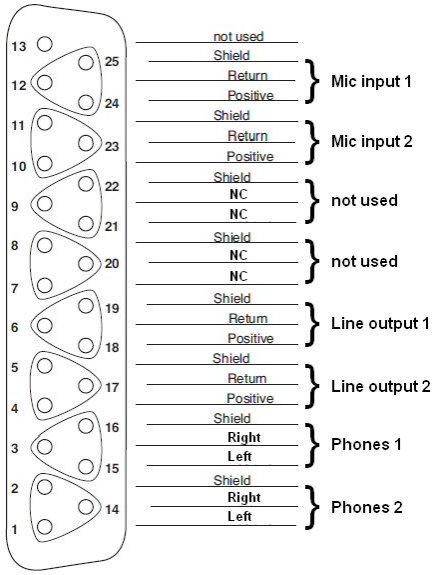


Pinning and gender according to AES59.

All shields are internally connected to system ground.

STUDIO IO (710/35)

25-pin D-type connector (DB25), female.



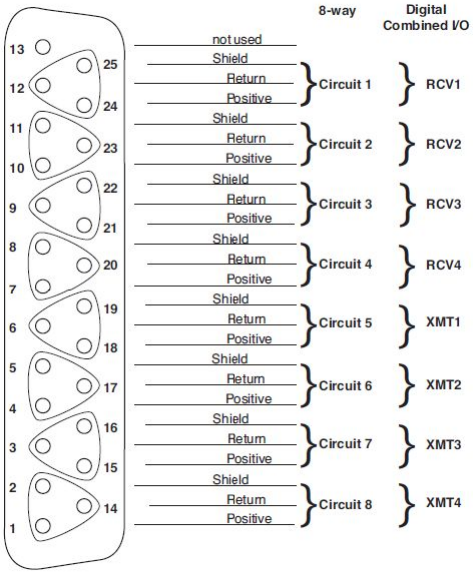
Pinning and gender according to AES59, except for Phones.

All shields are internally connected to system ground.

AES3 IO (710/40 and 710/41)

25-pin D-type connector (DB25), female.

AES3 inputs 1..4 (RCV1..4), AES3 outputs 1..4 (XMT1..4)

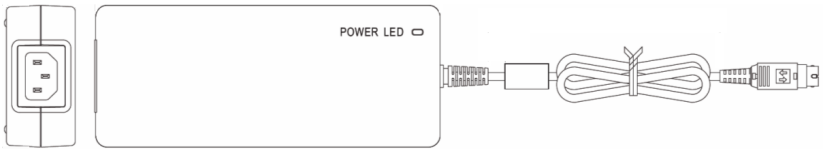


Pinning and gender according to AES59.

All shields are internally connected to system ground.

11.4 The 12V DC Power Supply

12V DC Power Supply (955/50-80)



IEC 320-C14 plug

DC Plug Pinning

PIN No:	FUNCTION
1	+ 12 VDC
3	+ 12 VDC
2	GND
4	GND

Dimensions and Weight

Parameter	Conditions		Unit
Mechanical data			
Width		72	mm
Height		35	mm
Length		175	mm
Weight		670	g
Cable length	without plug	1200	mm

Electrical Specification

Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Voltage		85		264	VAC
Frequency		47		63	Hz
Input Current		1,85A/115VAC 1A/230VAC			AAC
Inrush Current		120A/230VAC			AAC
Efficiency		89			%
Output Voltage		12±5%			VDC
Output Current				11.5	ADC
Leakage Current				0,75	mA

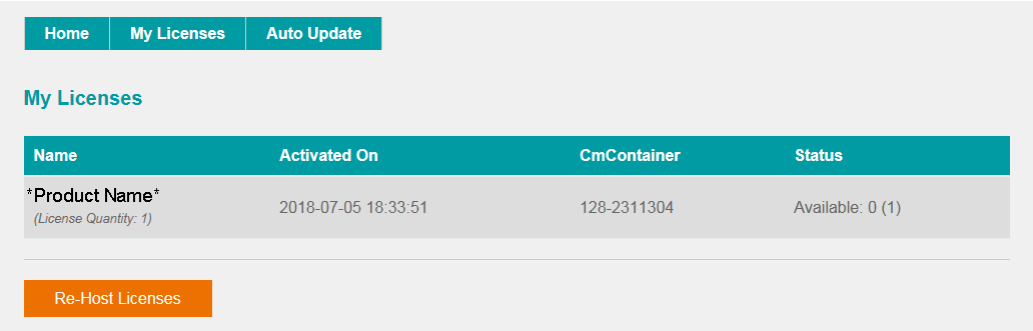
11.5 Advanced Licensing Features

This section describes the more advanced features of the CodeMeter Runtime licensing system.

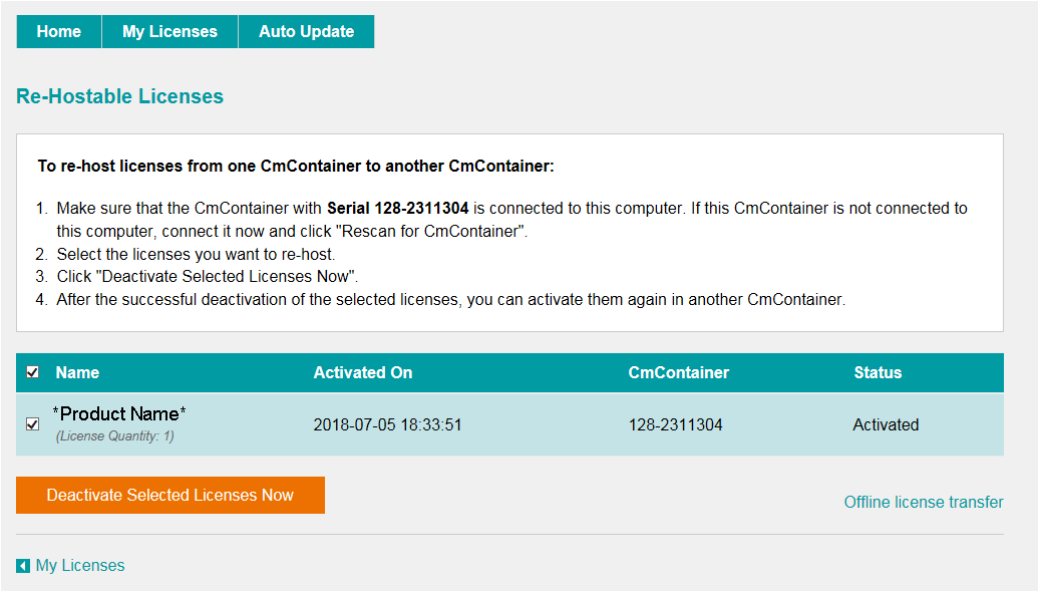
11.5.1 Re-Hosting a License

To move a license from one Cm container to another, you will need to re-host the license as follows. This requires you to first de-activate the license from its existing Cm container, and then choose the new storage container.

1. Follow the first two steps from the online activation method:
   - Open the 'Lawo License' web browser page at https://licenseportal.lawo.com.
   - Copy your license ticket number - this is the 25 number code - into the **Ticket** field and select **Next**.
2. At the "My Licenses" summary window, select **Re-Host Licenses**:



3. Make sure that the Cm container is connected to the computer, select the licenses you wish to re-host and select **Deactivate Selected Licenses Now**.



Wait for a few seconds - a confirmation pop-up appears once the de-activation is successful.

You can follow steps 3 to 7 from the online activation method, or perform an offline license transfer, to activate the license using a new storage container.

11.5.2 Activating a License Offline

If your PC has no internet access, then you can activate a software license offline. This method involves three stages:

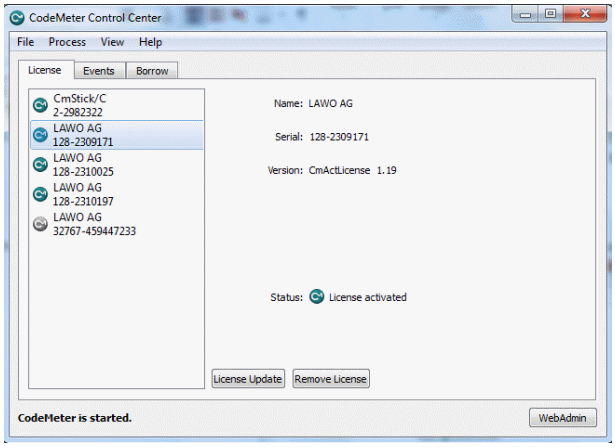
- **Create a license request file -** for the Cm storage container. Then copy the file onto a computer with internet access.
- **Activate the license** - using the 'Lawo License' web portal, copy the license update file back to the original computer.
- **Import the license update file** - to the Cm storage container.

Creating the License Request File

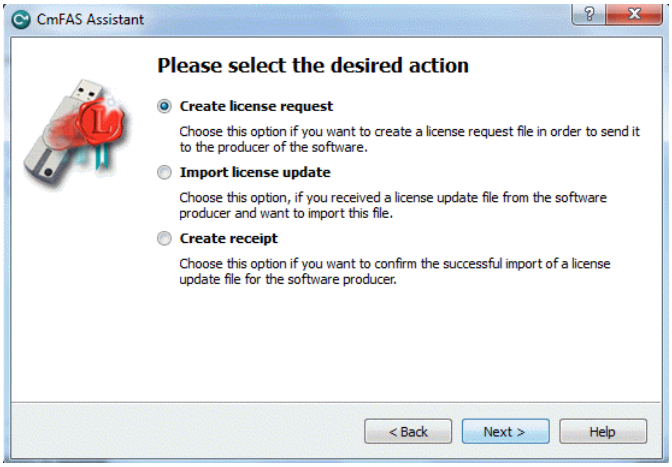
On the computer you wish to license:

1. Open the 'CodeMeter Control Center' (by clicking on the Cm taskbar icon), and select the container you wish to use for the license storage.

2. If the container is empty, select **Activate License**. Or, if the container already holds an active license, select **License Update**. This starts the 'CodeMeter Field Activation Service (CmFAS) assistant':

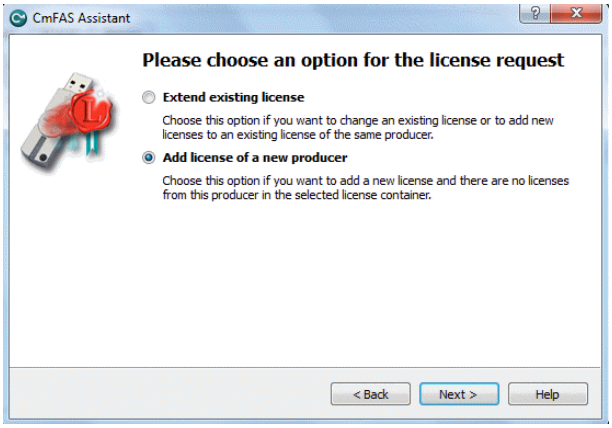


3. Select **Next**: and then **Create license request**:



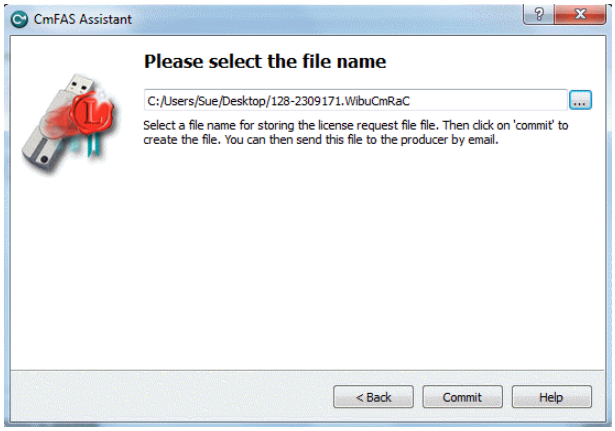
At this stage, there are two additional steps (to add the correct firmcode) if you have selected a **CmStick** container. Enter the following Lawo FirmCode to create the license request file:

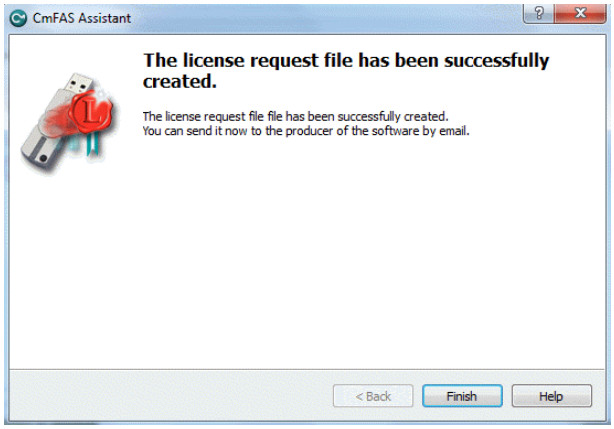
Select Add license of a new producer



Enter the Lawo FirmCode = 102037

4. Select **Next**, and using Windows Explorer, enter a file path for the license request file. Choose somewhere easy to find, such as the Desktop. Then select **Commit** to create the request file:

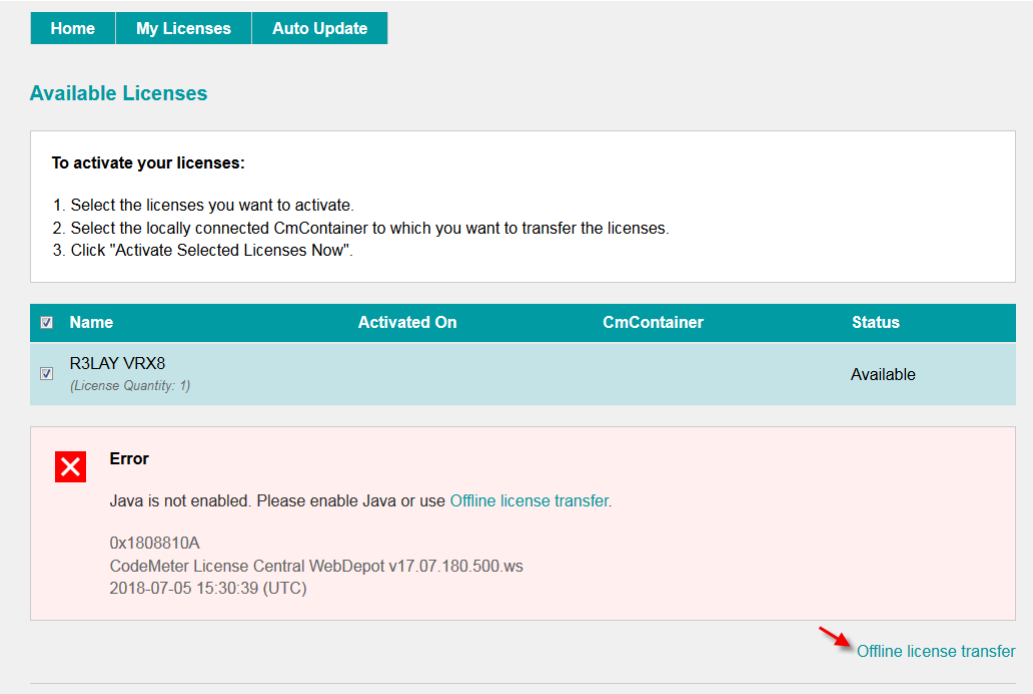




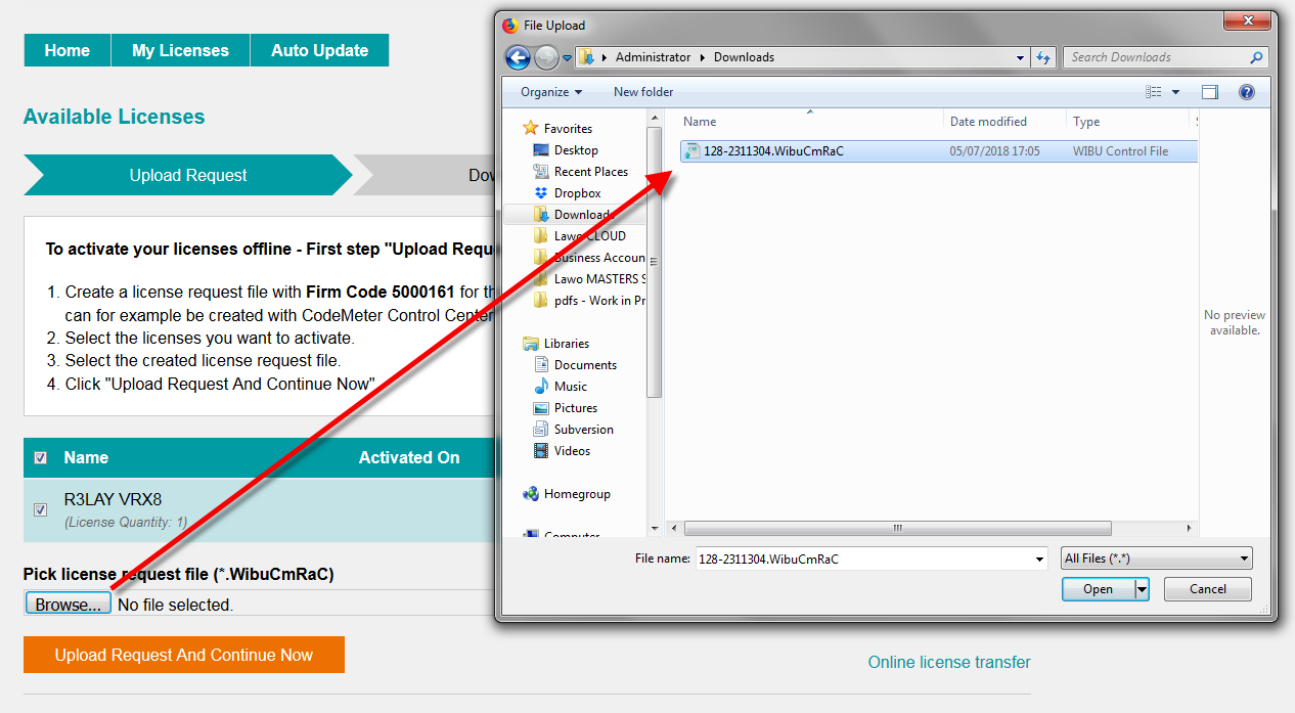
5. Select **Finish** and copy the request file onto a computer with internet access. You will need both the license request file and the 25-digit ticket number (received with your license purchase).

Activating the License

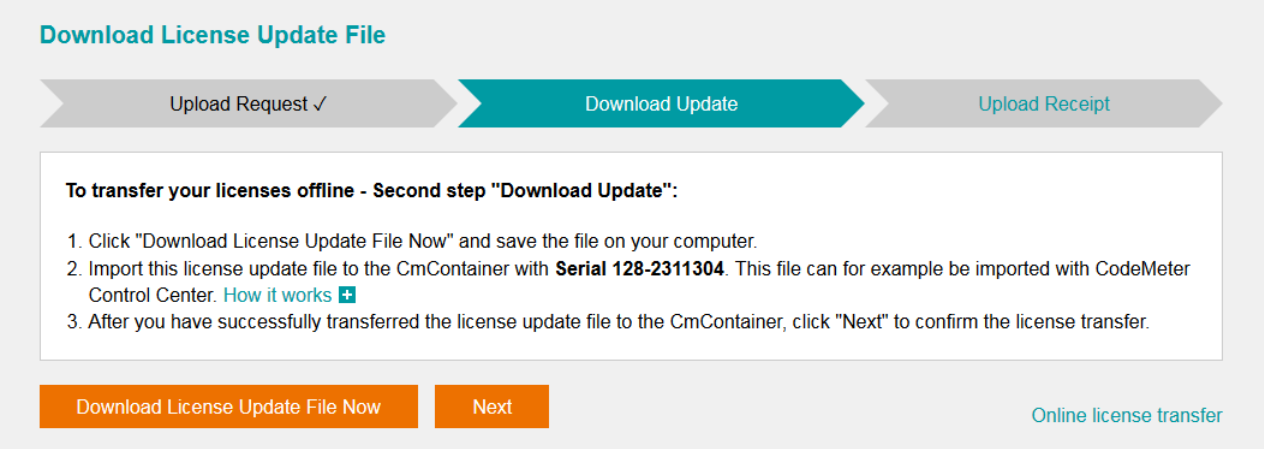
1. On a computer with internet access, follow the first four steps from the online activation method:
   - Open the 'Lawo License' web browser page at https://licenseportal.lawo.com.
   - Copy your license ticket number - this is the 25 number code - into the **Ticket** field and select **Next**.
   - When your license is displayed, select **Activate Licenses** to continue.
   - Select the storage method for your license - either USB dongle or single computer.
2. At the **Available Licenses** page, select **Offline license transfer** to continue:



3. On the next page, select the license(s) you wish to activate, select **Browse...** and, using Windows Explorer, choose the request file (created earlier):



4. Then select **Upload Request And Continue Now** - the license request is processed and, if successful, you will have the option to Download the update:

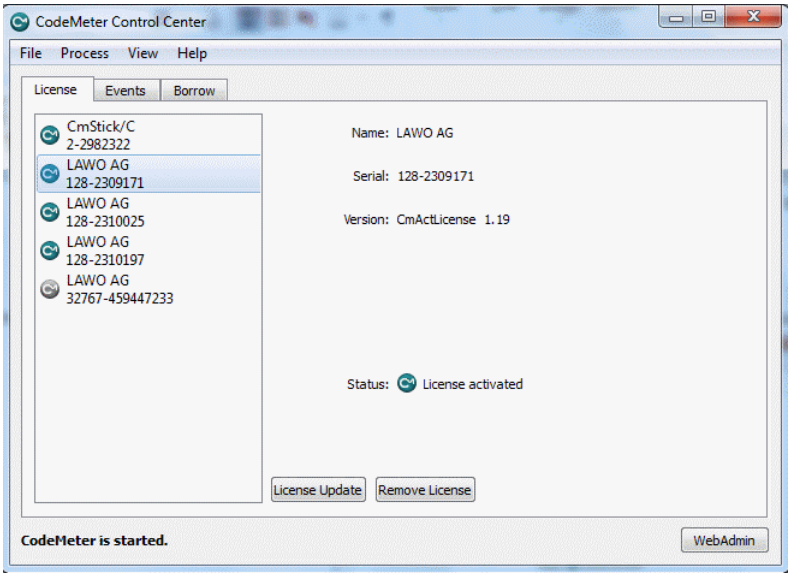


5. Select **Download License Update File Now** and, when prompted, choose the **Save** file option - the file is downloaded.

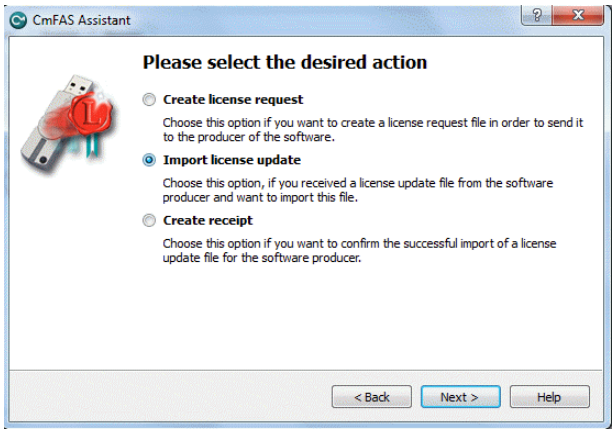
6. Copy the License Update file back to the original PC.

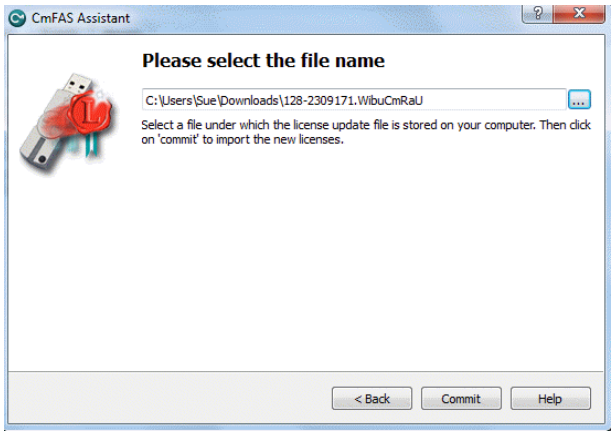
Importing the License Update

1. On the original computer re-open the 'CodeMeter Control Center' and select the Cm container for the license update. Note that this must be the same container as the one selected earlier (during the License Request).



2. Select **License Update** and follow the instructions given by the 'CmFAS Assistant' - when prompted, select Import License update and choose the update file (downloaded from the License portal):





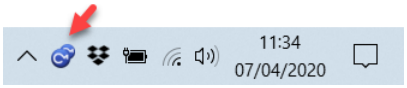
3. Select **Commit** to action the update - the license is activated and you can close the 'CodeMeter Control Center'.

4. You can now return to your Lawo application or install your USB license dongle - all licensed features should be available.

11.5.3 The CodeMeter Control Center

The 'CodeMeter Control Center' is used to manage the license containers and perform a backup or restore.

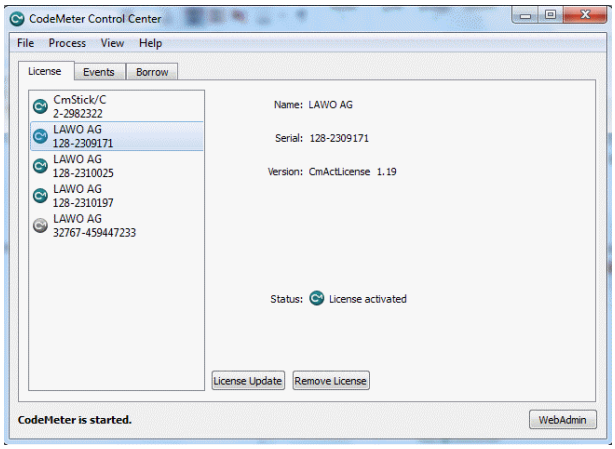
1. Click on the Windows taskbar Cm icon to open the 'CodeMeter Control Center' - the icon may be hidden from view or vary in color (depending on your taskbar configuration).



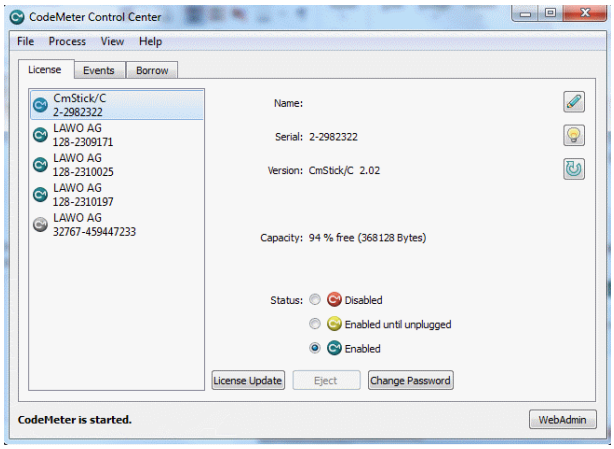
The 'CodeMeter Control Center' shows all the Cm containers which can be used for license storage.

A new local computer container is created each time you run the **CodeMeter Runtime** install wizard. Therefore, if you have installed multiple Lawo products or software versions, you will see several **LAWO AG** containers. If a USB dongle is connected, you will see a container labelled **CmStick**.

Local Computer Container (LAWO AG)



USB Dongle Container (CmStick)

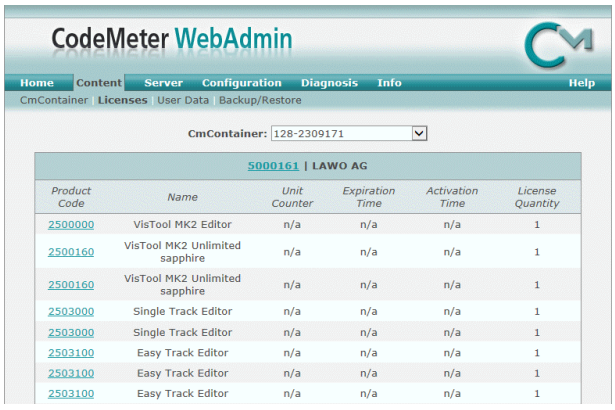


The **Serial** numbers identify each container. The icon colours indicate: green = license activated; grey = container is empty; red = license deactivated.

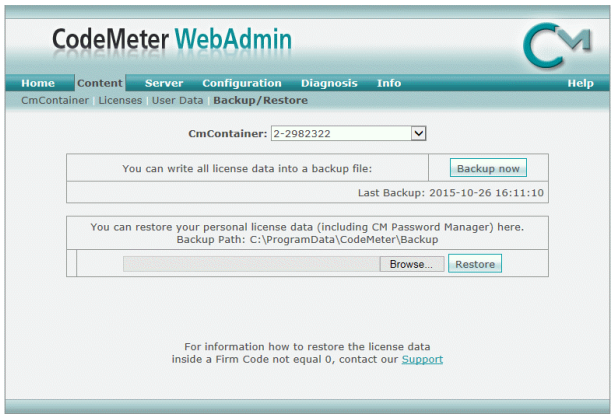
> A single Cm container can contain multiple licenses - simply select the same container during the activation process.

2. Select **WebAdmin** (bottom right) to open the WebAdmin portal in your default browser. The portal has many functions including license interrogation, and backup/restore functions for licenses stored on a **CmStick** (USB Dongle):

WebAdmin Content Cm Container



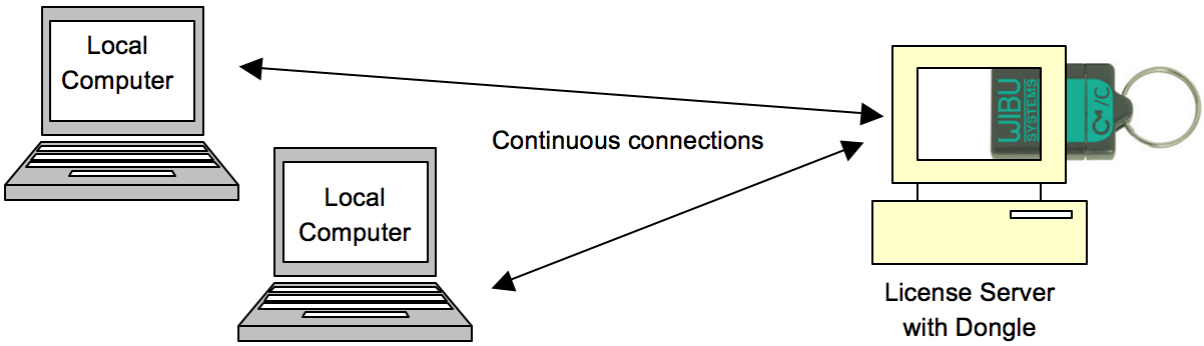
WebAdmin Backup/Restore



For further information, please refer to the **CodeMeter Runtime** documentation at wibu.com.

11.5.4 License Configuration via a Central Server

This license storage method can be used to administrate licenses centrally within a local network. For example, when starting a Lawo application such as **VisTool**, the local computer asks the server to borrow the relevant license. The license is then used by the **VisTool** client until the application is closed. On closing, the license is handed back to the server where it may then be used by a different **VisTool** client.



Preparing the License Server

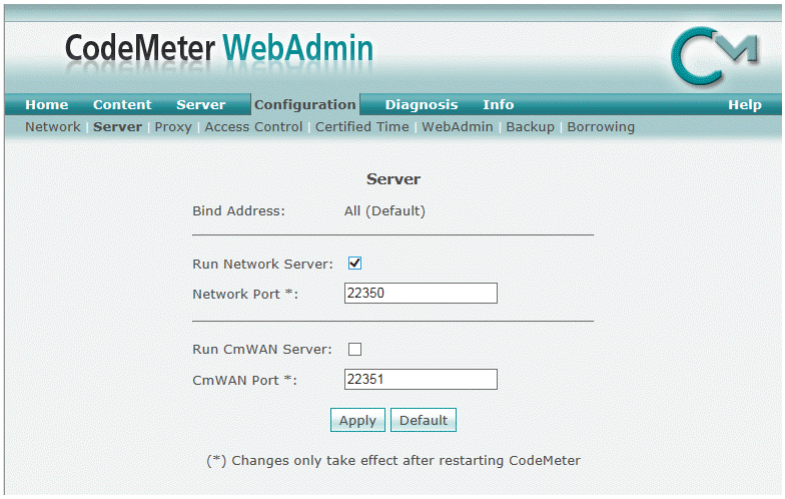
1. First, install the **Codemeter Runtime** software (Version 5.10 or above) on the central server. (Or, on a virtual machine on the server).

The latest release of CodeMeter Runtime can be downloaded from WIBU systems at wibu.com.

2. Activate all licenses in the usual manner.

If a virtual machine is being used, set up a connection between the virtual machine and USB dongle.

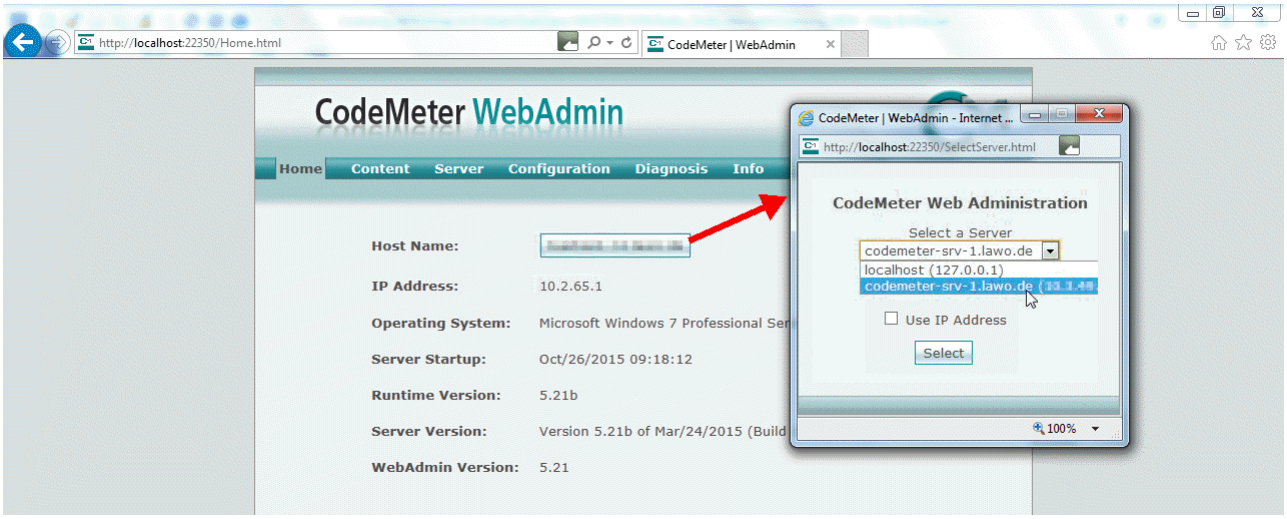
3. Open the CodeMeter Control Center and select **WebAdmin**.
4. Under **Configuration** -> **Server**, select the **Run Network Server** checkbox:



5. Click **Apply** and restart the **CodeMeter Runtime** software.

Preparing the Clients

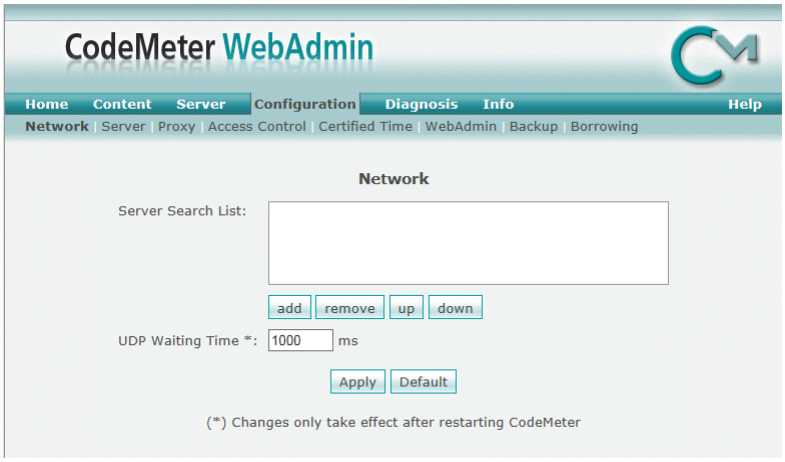
1. Install the **Codemeter Runtime** software (Version 5.10 or above) on each of the client computers.
2. Connect the clients (and server) to the network - on startup, the **CodeMeter Runtime** software sends a broadcast message across the network to find all license servers.
3. On each client computer, open the Codemeter Control Center and select **WebAdmin**.
4. From the **Home** page, select the name of the computer - a dialogue box should appear listing all the available license servers:



5. Choose the correct server from the drop-down list and click on **Select**.

If the license server is not found, then your firewall or network policy may not allow messages to be broadcast. In this case, you will need to add the server's IP settings to the search list, manually, as follows:

Under **Configuration** -> **Network**, add the correct IP settings into the **Server Search** list:



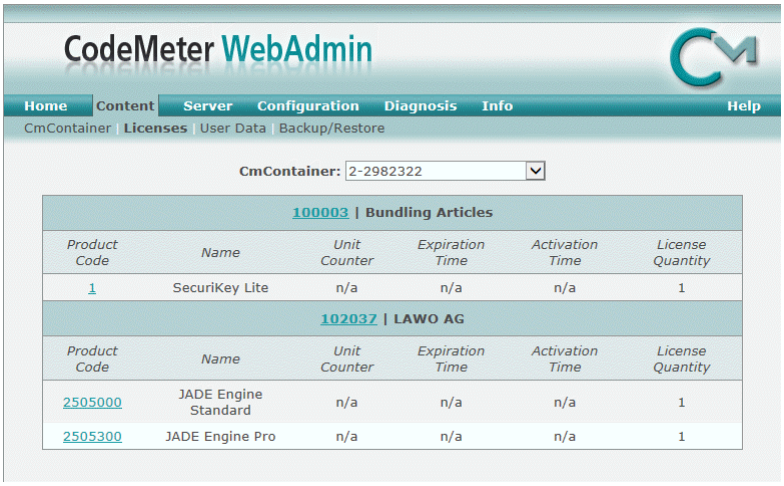
Click **Apply** and restart the **CodeMeter Runtime** software.

Note that once the **Server Search list** has an entry, all other license servers (announced automatically to the network) will be ignored.

Choosing a License

Once a connection to the license server is established, you can borrow one of the server licenses as follows:

1. On the client computer, open the Codemeter Control Center and select **WebAdmin**.
2. Under **Content** -> **Licenses**, choose the **CmContainer** (holding the server licenses) and select the desired license file:



If the licenses is in use, then a warning message appears.

You can check which licenses are available (free) by selecting **Server** and **Cluster**: