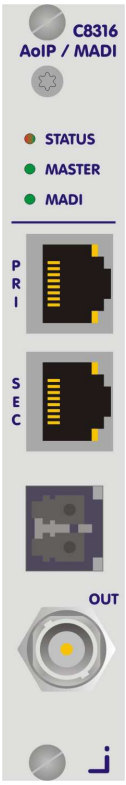
64ch optical MADI & AoIP I/O

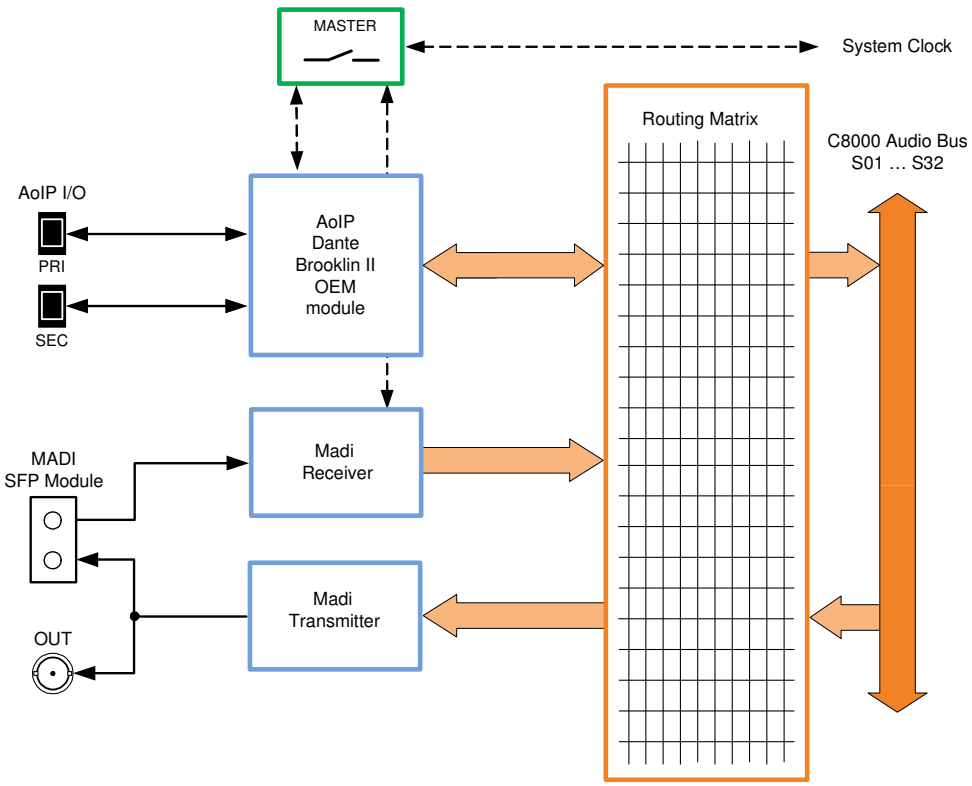
C8316



features

- Interface for AoIP (AES67 or DANTE)
- Two AoIP network ports for redundant or switch operation
- MADI I/O connection
- Optical SFP module / LC connectors (multi mode or single mode fiber)
- BNC parallel output
- Word length 24bit
- Extended mode (64ch)
- MASTER mode: A C8000 frame may be clocked via MADI input or AES67 network
- Bridging between MADI and AoIP network

block diagram



64ch optical MADI & AoIP I/O

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technical specifications – MADI interface

Standards	Relevant specifications comply with AES10-2008 and AES11-2009.	
Audio	24bits, transparent forwarding of PCM and compressed audio	
Audio Sample Rate	44.1, 48kHz	
Optical Input, LC	64/56 channels @ 44.1 and 48 kHz	
	Connector type	LC (IEC 61754-20)
	Center wavelength	1310nm (typ.), 1270 … 1360nm
	Input optical power	-31 … -8 dBm, OM2 multimode (50/125µm) -23 … -8 dBm, singlemode (9/125 µm) (standard values, others on request)
	Cable length (max.)	1.5km, OM2 multimode 2km, singlemode (standard values, others on request)
Optical Output, LC	64/56 channels @ 44.1 and 48kHz	
	Connector type	LC (IEC 61754-20)
	Center wavelength	1310nm (typ.), 1270 … 1360nm
	Output optical power	-23 … -14dBm, OM2 multimode (50/125µm) -15 … -8dBm, singlemode (9/125µm) (standard values, others on request)
BNC Output	Optical and BNC output carries the same signal.	
	Impedance	75Ohm
	Output voltage	0.6Vpp (typ.) @ 75Ohm
General Features	• Field-replaceable optical module (SFP) • Reference grade word clock recovery, master-sync capable • Dedicated routing for non-processed channels, all channels (max. 64) can be routed to/from the device or looped through • AES3 channel status management, non-audio detection • Parallel outputs (BNC/LC) for media conversion	

64ch optical MADI & AoIP I/O

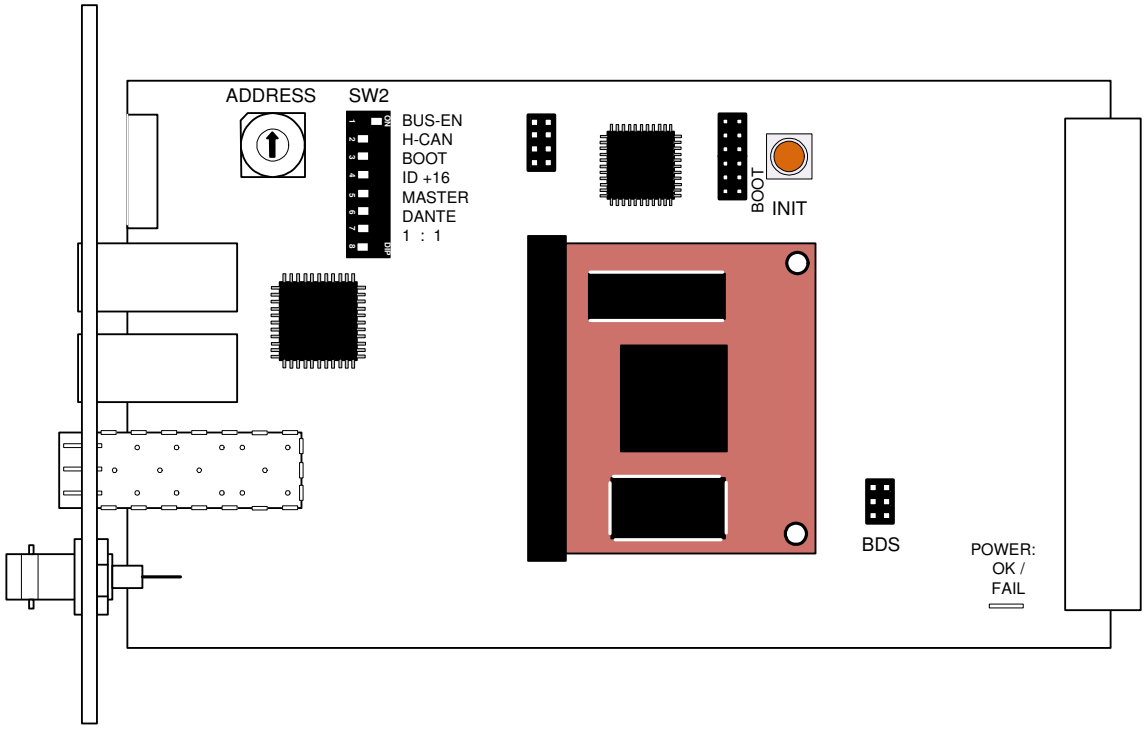
C8316

technical specifications – AoIP (AES67 / Dante) interface

Standards	Audio-over-IP by Dante™ Digital Audio Networking Standard AES67 compliant
Audio	24bits, transparent forwarding of PCM and compressed audio
Audio Sample Rates	44.1, 48kHz
Inputs and Outputs	2 x Gigabit Ethernet RJ45 connectors (100M/1Gbit), primary and secondary port
Inputs	64 channels @ 44.1, 48kHz
Outputs	64 channels @ 44.1, 48kHz
General Features	• AES67 compliant • Network master-sync can be provided by c8k frame • Master-sync capable • Non-audio detection for input channels • Glitch-free Dante™ audio redundancy using dual Ethernet networks

installation

Initial set up



ADDRESS: This **rotary encoder** sets the **CAN ID** of the **C8316**. The switch positions are hexadecimal numbers (0x0 to 0xF). The CAN address also defines the location of the module icon within the GUI overview of rows three to six.

SW2:

#1 BUS-EN

ON = The output configuration will be taken from the **NV** (non volatile) **memory** after power up.

OFF = will set all bus outputs to Tri-State-Mode (inactive).
Now you may use the frame controller to configure the board.
This configuration will automatically be stored into the **NV memory**
To enable the configuration for the next power up you must **pull out** the module and set **BUS-EN=ON** again.

Important note! Since this type of module has an electronic output routing facility, great care must be taken when installing or exchanging a module when such frame has components which are On Air!
If an unknown output bus configuration is stored, it can cause a conflict with other modules in the frame. If you are not sure about the output bus configuration you must turn **BUS-EN=OFF** before inserting such a module into a system that is On Air. If all settings are done remotely and the unit fits into the bus assignment scheme of that frame, you must remove it and place the switch back into position **BUS-EN=ON** to activate this setting for the **next** power up(s).

#2 H-CAN

OFF = CAN bus speed 256kBit/s

ON = CAN bus speed 1Mbit/s

Important Note! For a limited number of modules like the **C8316** it is possible to communicate with a CAN bus speed of 1MBit/s. This provides more bandwidth to move measuring data from the module via the frame controller to the **J*AM** based loudness logger. Be sure that all modules within a frame are operating with the same CAN bus speed.

#3 BOOT

OFF = Internal use and **must** be set to **OFF**.

#4 ID +16

OFF = **CAN** bus address range is standard (counting from 0x0 to 0xF) see rotary encoder settings above.

ON = **CAN** bus address range is extended by **+16** (counting from 0x10 to 0x1F).

#5 MASTER

OFF = Sync is taken from the **c8k** frame

ON = The **C8316** will be **sync master** of the frame (or an C8934 island). Sync source is defined by SW2 #6

#6 DANTE

OFF = **MADI** is sync reference.

ON = **DANTE** is sync reference.

#7 1 : 1

OFF = Remote controlled operation by **C8702** frame controller.

ON = Stand alone operation. **MADI** and **AS67** interfaces are bridged.

#8

OFF = Internal use and **must** be set to **OFF**.

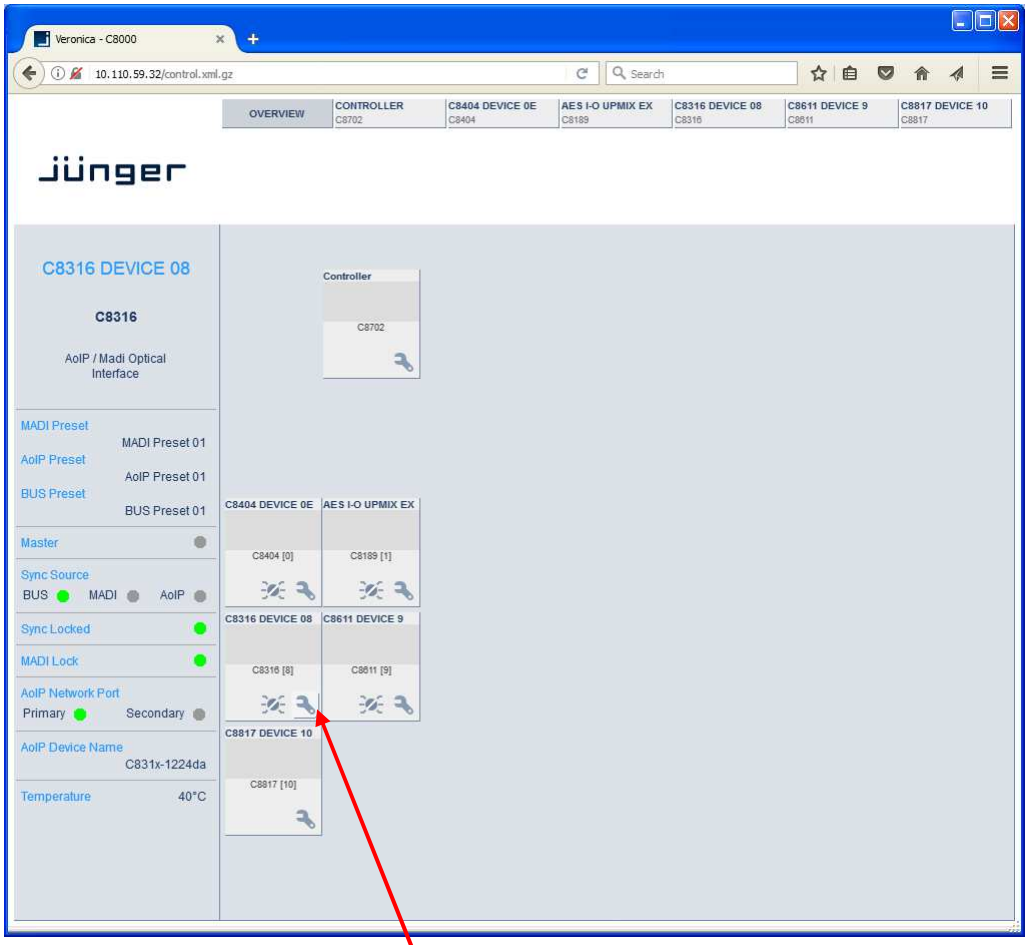
INIT Pressing the **INIT** button during power up will initialize the module parameters to factory default values.

64ch optical MADI & AoIP I/O

C8316

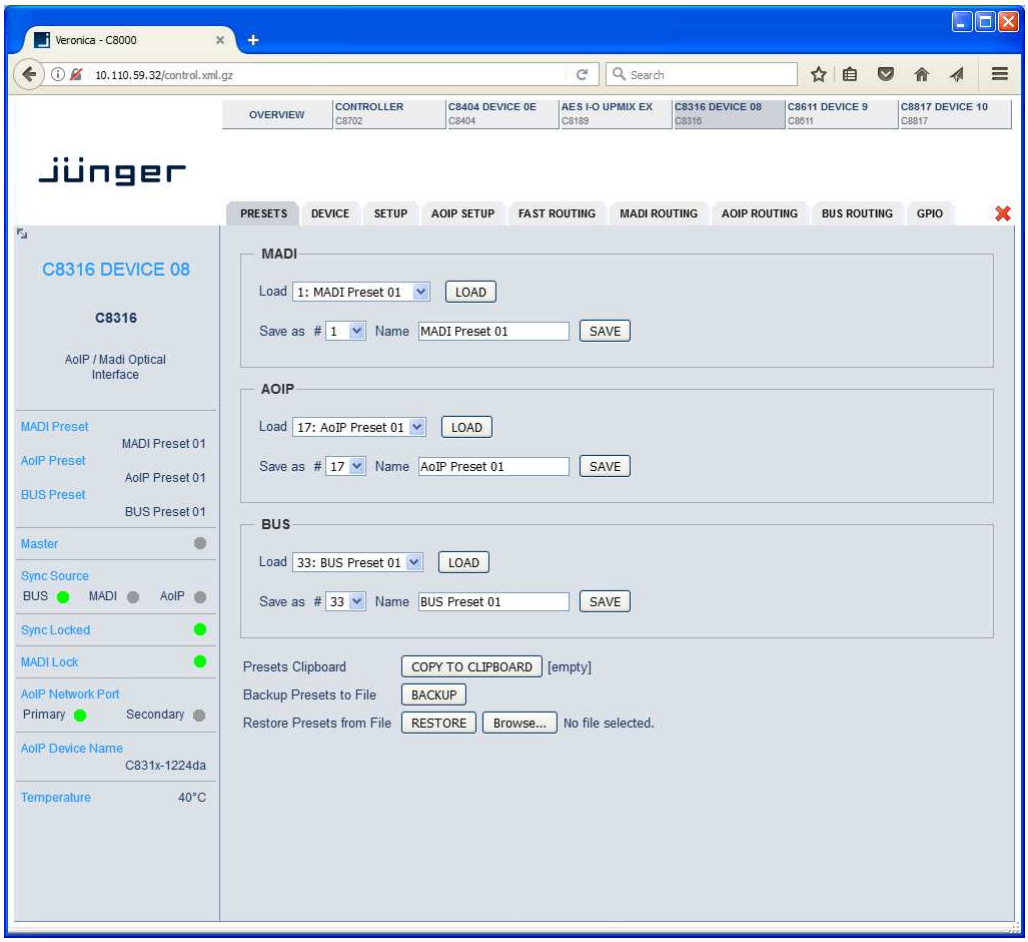
web browser based GUI

OVERVIEW: The module overview of a frame (below the display of an example frame)



By clicking on the spanner tool symbol you will be forwarded to the control pages of the **C8316** and the status pane on the left hand side, which is also shown on mouse over.

PRESETS: Each of the three preset banks holds the parameters of the respective MADI, DANTE and c8k internal BUS routing.

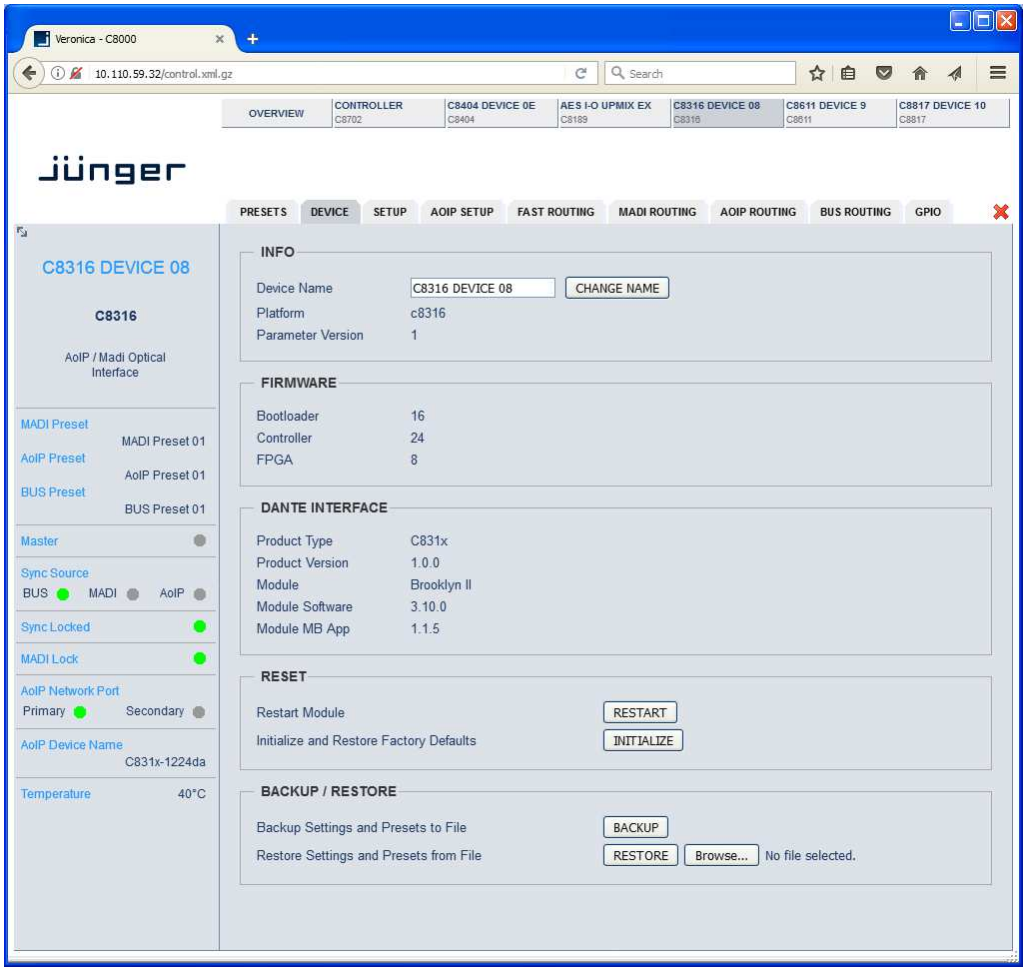


There are presets for each of the three banks for the main function blocks of the **C8316**.

Since the **C8316** offers two interfaces each one has an individual bank of 16 presets to recall parameters at any time.

MADI	refers to the **MADI ROUTING** pane
Load	[1: "name" … 16: "name"] Select a preset by number/name and press **<LOAD>**. The preset number and name loaded automatically appear in the **Save as #** and **Name** field below.
Save as #	[1 … 16] You must elect a preset memory number where you would like to save the actual metadata parameters.
Name	[16 character ASCII text] Assign a name to the preset you are about to save here and press **<SAVE>.** The number and the name automatically appear in the **"Load"** fields as well because they are active now.
AoIP	Refers to the **AOIP Routing** pane
Load	[17: "name" … 32: "name"] Select a preset by number/name and press **<LOAD>.** The preset number and name loaded automatically appear in the **Save as #** and **Name** field below.
Save as #	[17 .. 32] Select a preset memory number where you would like to save the actual audio program parameters.
Name	[16 character ASCII text] Assign a name to the preset you are about to save (up to 16 digits) and press **<SAVE>.**
BUS	Refers to the **BUS** pane A bank of 8 presets to recall device settings.
Load	[33: "name" … 48: "name"] Select a preset by number/name and press **<LOAD>.** The preset number and name loaded automatically appear in the **Save as #** and **Name** field below.
Save as #	[33 … 48] Select a preset memory number where you would like to save the actual audio program parameters.
Name	[16 character ASCII text] Assign a name to the preset you are about to save (up to 16 digits) and press **<SAVE>.**
Preset Clipboard	Copies the presets to a frame internal **clipboard**, the data may be used by other modules inside the **same** frame.
Backup Presets to File	Creates a backup **XML file** which may be stored to the PC.
Restore Presets from File	You can **<browse>** for a backup file from the PC and restore it by pressing the **<RESTORE>** soft button.

DEVICE: Display of device specific hardware information



INFO

Device Name [16 digit ASCII text]
Pressing **<CHANGE NAME>** will do so.

Platform [C8316]
Hardware related descriptor.

Parameter Version [x]
Software related descriptor (descriptor of the feature set).

FIRMWARE

Bootloader [xy]
Actual version of the card boot-loader.

Controller [xy]
Actual version of the module controller firmware.

FPGA [xy]
Actual version of the system FPGA.

DANTE INTERFACE

Product Type	[c8k_x] Customized version for the c8k system
Product Version	[x.y.z] HW of the DANTE OEM module
Module	[Brooklin II] DANTE OEM module
Module Software	[3.10.0] Software version of the module FPGA
Module MB App	[1.1.5] Software version of the FPGA embedded controller

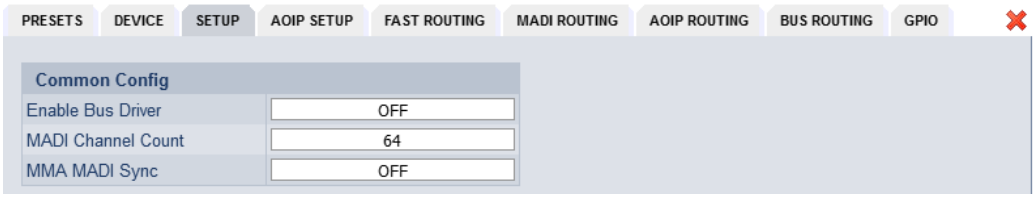
RESET

Restart Module	**<RESTART>** Pressing the soft button will warm start the module.
Initialize and Restore Factory Defaults	**<INITIALIZE>** Pressing the soft button, will clear the parameter memory and will initialize all parameters to their factory default values.

BACKUP / RESTORE

Backup Settings and Presets to File	**<BACKUP>** Pressing the soft button will create an XML file that one may store on a PC.
Restore Settings and Presets from File	**<RESTORE>** I Pressing the soft button will upload a backup file that has been selected via soft button **<BROWSE>** and move the previously stored settings back to the module.

SETUP: Set up of general device parameters



Common Config

Enable Bus Driver	[ON/OFF] You can temporarily disable the bus drivers by selecting OFF here. The state of this soft switch also depends on the setting of **SW1** on the module PCB. If **SW1 #1** is turned off, this switch will be off after a power cycle. You can turn it on temporarily to check out your settings but you must keep in mind that after the next power cycle it will be off again unless you have turned **SW1 #1** on. This procedure is useful if you must insert a module into a frame that is on air and other services must not be interrupted or disturbed.

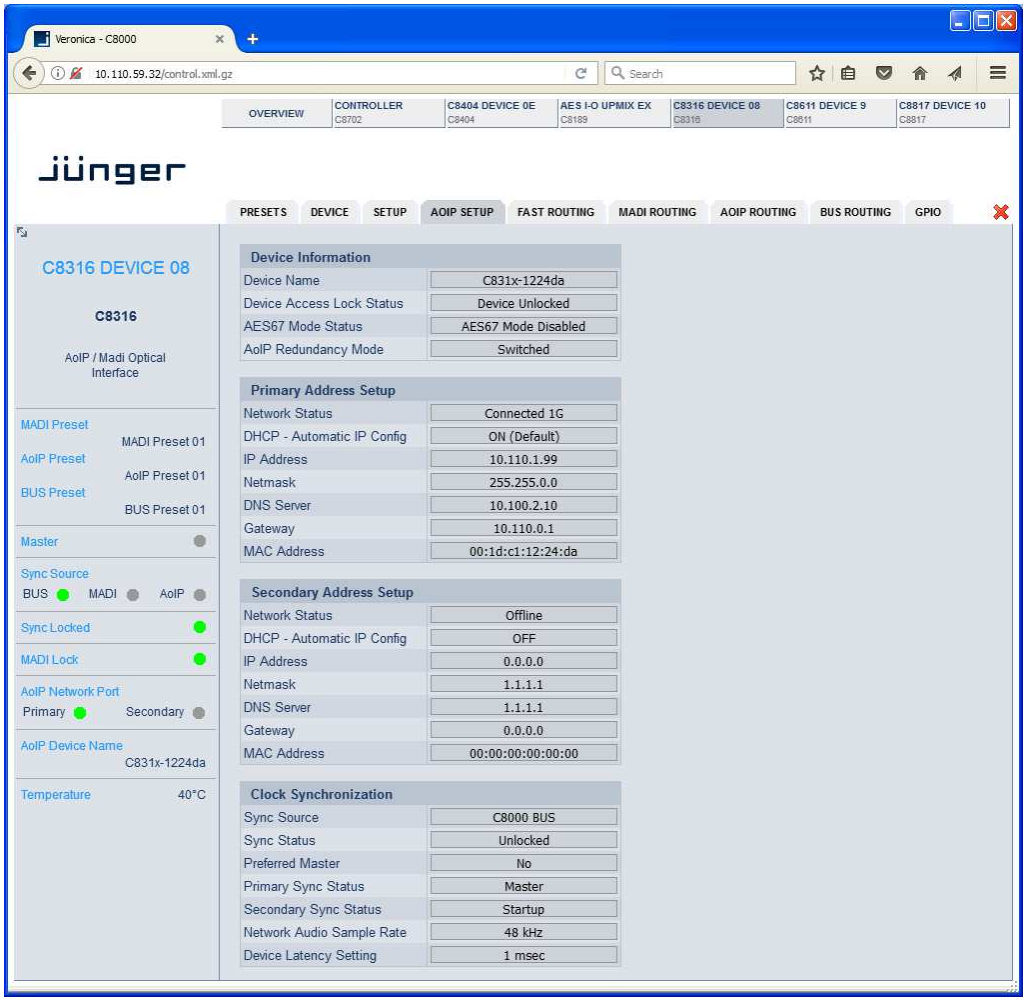
MADI Channel Count [64 / 56]
General set-up of the number of MADI channels in use. It must be equal to the channel count of the device from where the **C8316** receives from or where it transmits to.

MMA Sync [OFF/ON]
Will enable a dedicated sync signal for use by the Junger MMA meta data generator. It will be inserted into MADI Ch 64.

Important Note! If MMA Sync is turned on, MADI transmitter Ch 64 is blocked and can't be used for audio transport.

AOIP SETUP: General settings of the AoIP (Dante OEM) module used for the **C8316**

Important Note! This page content is informational only for the first release of the **C8316**. Parameters may only be changed by use of the DANTE Controller software from Audinate.



Device Information

Device Name	The name that appears in an AoIP network. It may be set by the DANTE controller software.
Device Access Lock Status	[Device Unlocked / Device Locked] Display if the device access from the network controller is locked or not.
AES67 Mode Status	Shows whether the AES67 mode for the DANTE Brooklin II OEM module is enabled or not.
AoIP Redundancy Mode	[Switched / Redundant] The AoIP interface allows redundant network operation. Pls. refer to manufacturer's documentations of your Ethernet equipment on supported switching configuration and redundant operation. Redundant – The interface will duplicate the audio traffic to both Ethernet ports. Both ports must have different IP addresses. Switched – The secondary port behaves like an Ethernet switch port allowing daisy-chaining through the interface. I.e. IP configuration of the second port is only available for redundant mode.

Important Note! When set to switched mode, do **not** connect both ports to the same network (same Ethernet switch) if it does not support STP (Spanning Tree Protocol). This is the case for most of off-the-shelf (office grade) switches. Doing so will cause a race condition where IP packets are circling around from the external switch to the second DANTE (switch) port and back via the first port. This will tear down your network and may create a bunch of new "friends" in your facility.

Primary Address Setup	Setup of the primary network interface
Network Status	[Offline / Connected + bandwidth]
DHCP – Automatic IP Config	[OFF / ON]
IP-Address	[0.0.0.0 / address]
Netmask	[1.1.1.1 / mask]
DNS Server	[1.1.1.1 / address]
Gateway	[0.0.0.0 / address]
MAC Address	[00:00:00:00:00:00 / address]
Secondary Address Setup	Setup of the secondary network interface
Network Status	[Offline / Connected + bandwidth]
DHCP – Automatic IP Config	[OFF / ON]
IP-Address	[0.0.0.0 / address]
Netmask	[1.1.1.1 / mask]
DNS Server	[1.1.1.1 / address]
Gateway	[0.0.0.0 / address]
MAC Address	[00:00:00:00:00:00 / address]

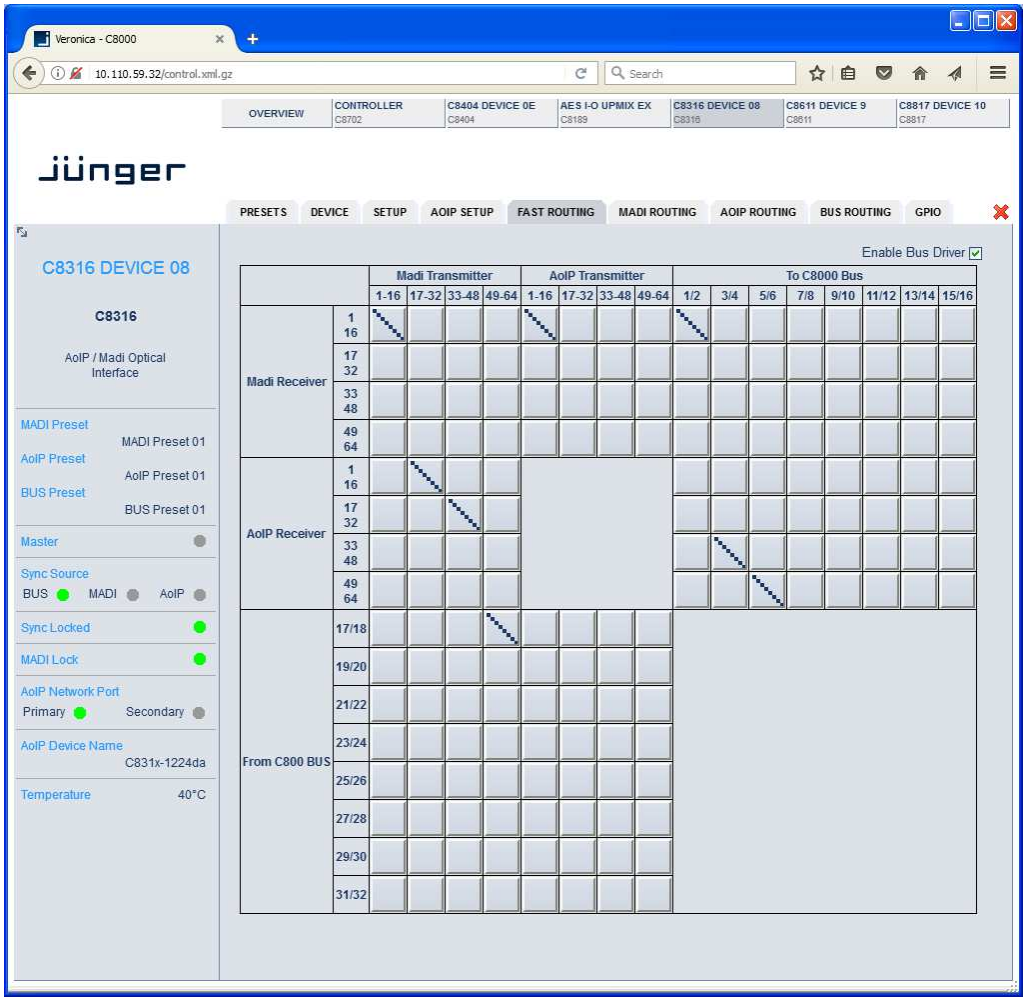
Clock Synchronization

Sync Source	[AoIP Network / C8000 Bus / Madi] Source of the reference clock for the Dante module. See also MASTER switch (page 4).

Important Note! If this parameter is set to "Dante Network", the c8k frame must be synchronized to the same clock as the network clock master (whoever it is). It **must** be set to "Dante Network" if this module is to become the "Preferred Master" of the network.

Sync Status	[Unlocked / Locked / Locked-Async] The sync source for the **Dante** interface is the **AoIP** network. If no network cable is connected the interface is "Unlocked". If it is connected to a network it will be "Locked". If the **C8316** is set to synchronize to other than the **AoIP** interface it will show "Locked-Async".
Preferred Master	[No / Yes] The **Dante** algorithm automatically looks for the best clock master inside the network but one may force a **Dante** module to become the clock master.
Primary Sync Status	[Startup / Initializing / Faulty / Disabled / Listening / Premaster / Master / Passive / Uncalibrated / Slave]
Secondary Sync Status	[Startup / Initializing / Faulty / Disabled / Listening / Premaster / Master / Passive / Uncalibrated / Slave]
Network Audio Sample Rate	[48kHz] The c8k system is set to use 48kHz sample rate only.
Device Latency Setting	[xms] You can allow for a certain transmission latency if you face network problems of any kind.

FAST ROUTING: Easy to use matrix for routing of groups of signals with a single button.



MADI Transmitter Routing destination for the MADI interface. 16 adjacent MADI channels are grouped for fast routing. I.e. you can select a group of 16 source channels from an available input and route them to one of four pre-defined MADI destination groups. The diagonal dotted line shows the connected source and destination group.

AoIP Transmitter Routing destination for the AoIP interface. 16 adjacent AoIP channels are grouped for fast routing. I.e. you can select a group of 16 source channels from an available input and route them to one of four pre-defined AoIP destination groups. The diagonal dotted line shows the connected source and destination group.

To C8000 BUS Routing destination for the c8k frame busses. Two adjacent c8k Bus lines are grouped for fast routing. I.e. you can select a group of 16 source channels from an available input and route them to one of eight pre-defined pairs of bus lines. The diagonal dotted line shows the connected source and destination group.

Important Note! The c8k bus drivers are automatically set to 8ch mux mode for fast routing. I.e. two adjacent busses (both in 8ch mux mode) will carry the 16 source signals.

MADI Receiver

Routing sources of the MADI interface. 16 MADI channels are grouped for fast routing. I.e. you can select a group of 16 source channels from the MADI input and route them to one of the available destination groups.

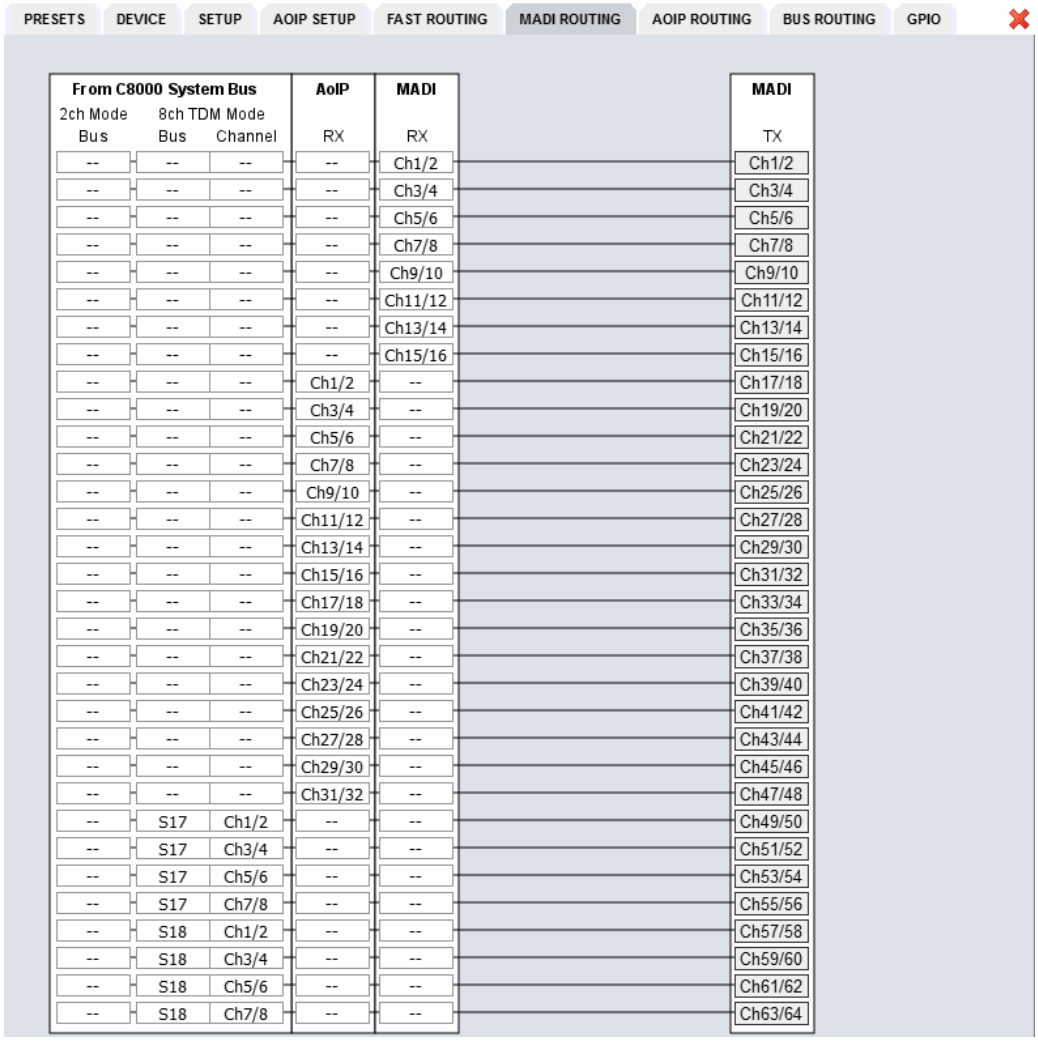
AoIP Receiver

Routing sources of the AoIP interface. 16 AoIP channels are grouped for fast routing. I.e. you can select a group of 16 source channels from the AoIP network and route them to one of the available destination groups.

From C8000 BUS

You can select pairs of c8k bus lines (both operating in 8ch mux mode). 16 channels from the c8k busses are grouped for routing. I.e. you can select a pre-defined group of 16 c8k channels and route them to one of the available destination groups.

MADI ROUTING



This pane shows the possible sources for the MADI transmitter. The above example is the result of the **FAST ROUTING** settings above.

From C8000 System Bus

2Ch Mode	
Bus	[S1 … S32 … --] One of the 32 bus lines of the c8k back plane. Two audio channels are put onto one bus line.
8ch TDM Mode	Eight channel mux mode
Bus	[S1 … S32 … --] One of the 32 bus lines of the c8k back plane. Eight audio channels are put onto one bus line.
Channel	[Ch1/2 ... Ch7/8] A channel pair of the eight multiplexed

AoIP

RX	[Ch1/2 … Ch63/64] One of the 32 channel pairs provided by the DANTE OEM interface.

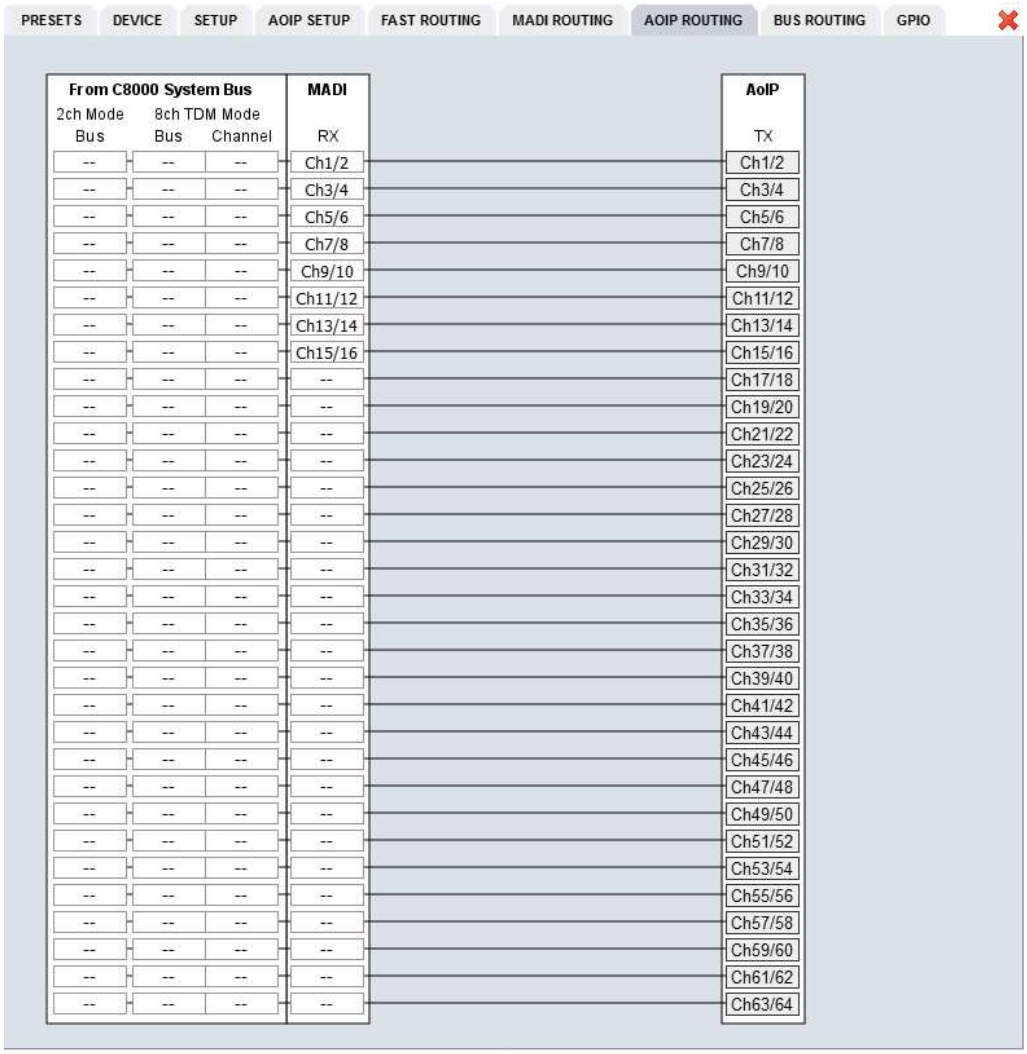
MADI

RX	[Ch1/2 … Ch63/64] One of the 32 channel pairs provided by the MADI interface.

MADI

TX	[Ch1/2 … Ch63/64] One of the 32 channel pairs of the MADI transmitter.

AOIP ROUTING



This pane shows the possible sources for the AoIP interface. The above example is the result of the **FAST ROUTING** settings above.

From C8000 System Bus

2Ch Mode

Bus	[S1 … S32 … --] One of the 32 bus lines of the c8k back plane. Two audio channels are put onto one bus line.
8ch TDM Mode	Eight channel mux mode
Bus	[S1 … S32 … --] One of the 32 bus lines of the c8k back plane. Eight audio channels are put onto one bus line.
Channel	[Ch1/2 ... Ch7/8] A channel pair from the eight multiplexed channels.

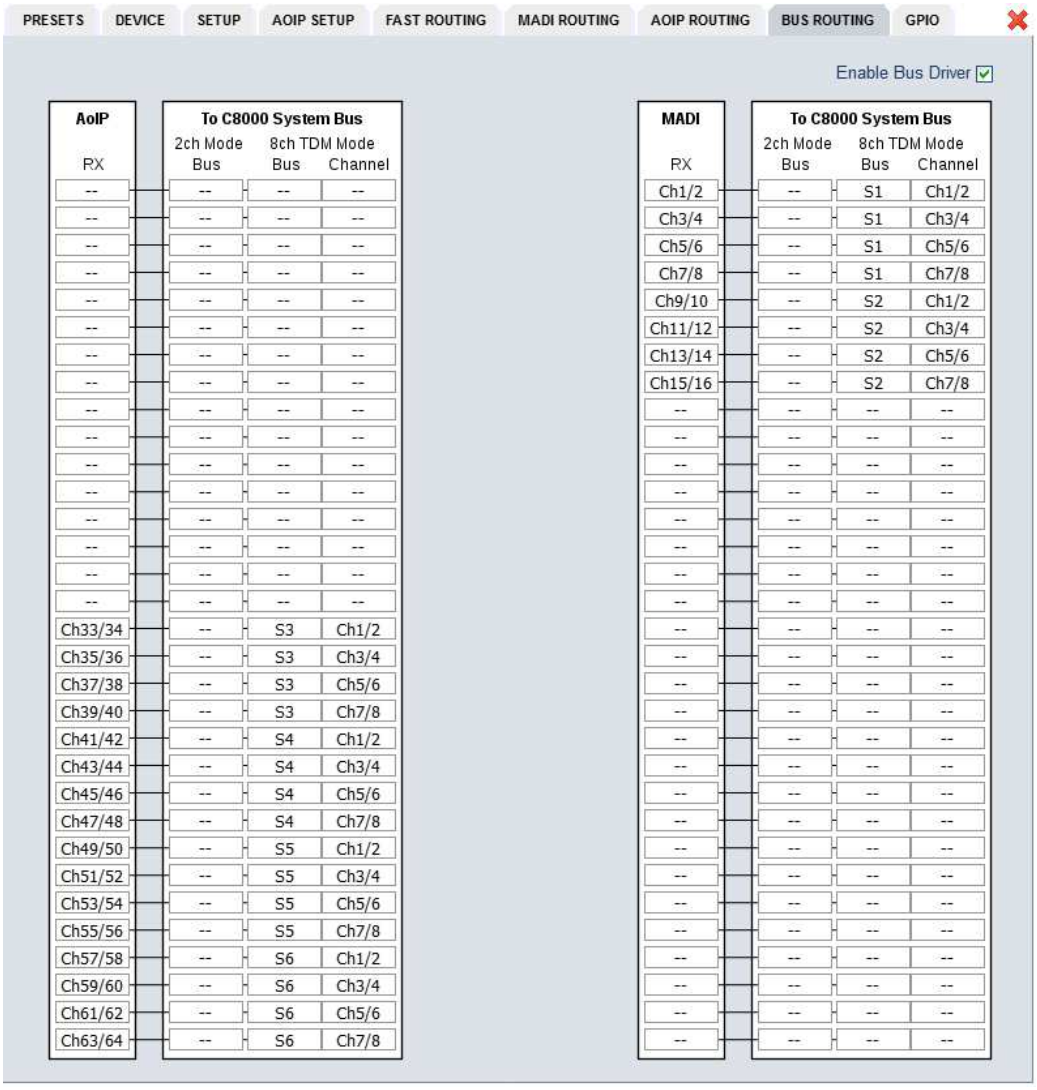
MADI

RX — [Ch1/2 … Ch63/64]
One of the 32 channel pairs provided by the MADI interface

AoIP

Tx — [Ch1/2 … Ch63/64]
One of the 32 channel pairs sent to the AoIP interface

BUS ROUTING



This pane shows the possible sources for the c8k busses from the AoIP as well as from the MADI interfaces. The above example is the result of the **FAST ROUTING** settings above.

Enable BUS Driver [ON / OFF]
You can disable the output drivers by un-checking the **Enable Bus Driver** check box. The state of this check box also depends on the setting of **SW2** on the module PCB.
If **SW2 #1** is turned off, this checkbox will be off after a power cycle. You can turn it on temporarily to check out your settings but you must keep in mind that after the next power cycle it will be off again unless you have turned **SW2 #1** on.
This procedure is useful if you must insert a module into a frame that is on air and other services must not be interrupted or disturbed.

AoIP

RX [CH1/2 … Ch63/64 … --]
One of the 32 channel pairs provided by the AoIP interface.

To C8000 System Bus

2Ch Mode

Bus [S1 … S32 … --]
One of the 32 bus lines of the c8k back plane. Two audio channels are put onto one bus line.

8ch TDM Mode Eight channel mux mode

Bus [S1 … S32 … --]
One of the 32 bus lines of the c8k back plane. Eight audio channels will be muxed onto one bus line.

Channel [Ch1/2 ... Ch7/8]
A pair from the eight multiplexed channels.

MADI

RX [CH1/2 … Ch63/64 … --]

To C8000 System Bus

2Ch Mode

Bus [S1 … S32 … --]
One of the 32 bus lines of the c8k back plane. Two audio channels are put onto one bus line.

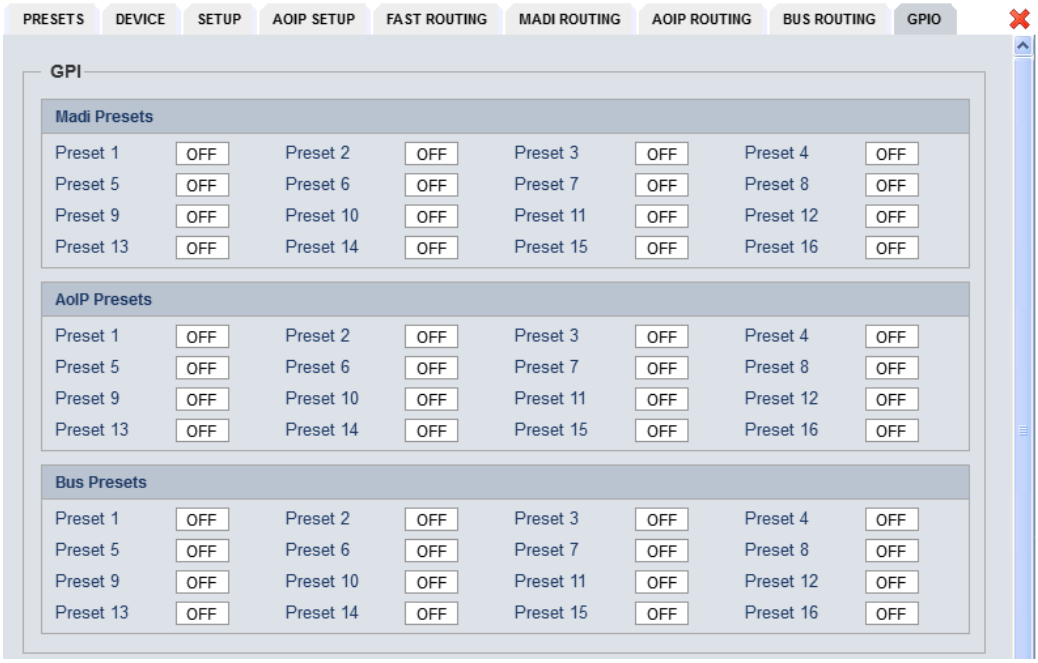
8ch TDM Mode Eight channel mux mode

Bus [S1 … S32 … --]
One of the 32 bus lines of the c8k back plane. Eight audio channels may be muxed onto one bus line.

Channel [Ch1/2 ... Ch7/8]
A pair from the eight multiplexed channels.

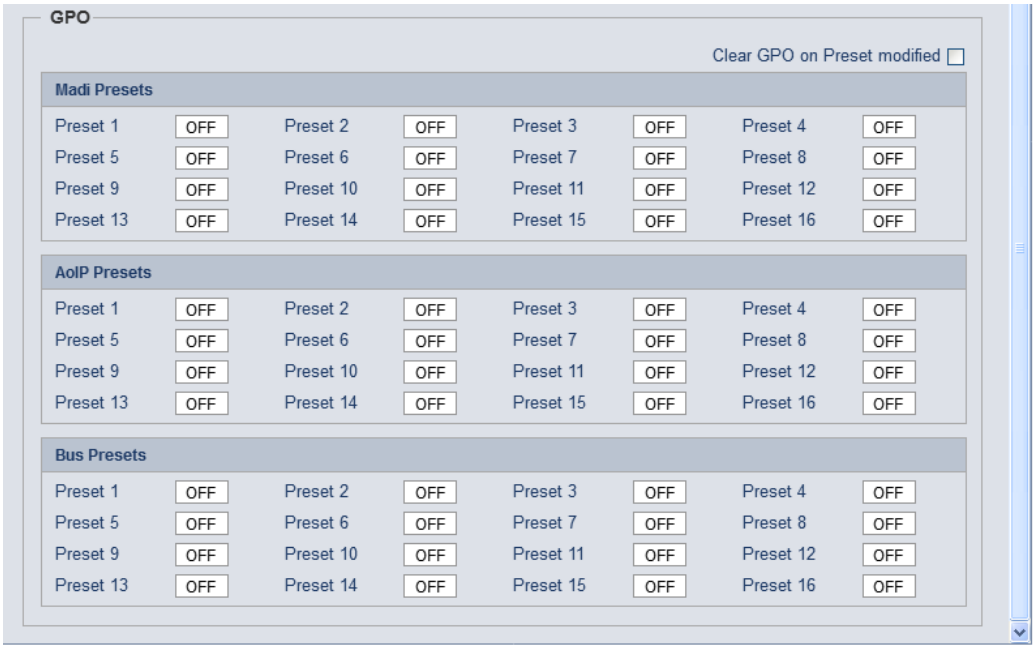
GPIO

The **C8316** has three dedicated sets of GPI/Os to remote control the **MADI-,** the **AoIP-** and the **Bus Presets.**



GPIs are useful if you want to recall settings remotely (e.g. via presets). The C8k frame can handle **127** different virtual (system) **GPI** numbers. You must assign a unique number to the respective function. Such numbers will be generated by the **brc8x** Broadcast Remote Controller or by a **GPI/O** interface module **C8817**. If the **C8316** receives such a number over the internal CAN bus, it will for example load the respective preset or it will turn on a bypass function or clear the processing (DSP) history.

GPOs (Tallies) may signal the status of a module for **GPI** driven devices like legacy equipment monitoring systems. The c8k frame can handle **127** different virtual (system) **GPO** numbers.
If an event occurs, the **C8316** puts the assigned number on the CAN bus so a **C8817 GPI/O** module can engage a relay or the **brc8x** may activate its tallies.



Clear GPO on Preset modified

If a GPO indicates that a certain preset is loaded and if you change parameters which are related to that preset the word "modified" will be displayed in line with the preset name in the status window.
In this case you may clear that GPO to indicate that the parameters are not the same as the content of the previously loaded preset.

Important Note! Virtual **GPI** and **GPO** numbers do not "see" each other on the CAN bus. I.e. you can not use a **GPO** number to trigger an event inside the frame directly. If this is the task you **must** use the **C8817 GPI/O** module that can do the system **GPI/O** link-up that also provides you with the possibility to set up logical combinations of physical and virtual (system) **GPI/Os**.