USER MANUAL

Vision
SYSTEM

M-CLEANIT

IP/SDI profanity delay

Crystal Vision

Contents

Revision 1	Added information about new video format Mode menu, with three inputs available in HD or SD operation and two inputs in 3Gb/s operation.	22/07/21
Revision 2	Added VR07 relay bypass. Updated monitor output options. Added new audio monitoring and audio mute features. Added new preset features. Updated use of flow terminology.	07/06/22
Revision 3	Updated monitor output options.	22/06/22

1 Introduction

M-CLEANIT is a 3G/HD/SD profanity delay system software app that runs on the MARBLE-V1 media processor – purpose built GPU/CPU hardware that fits in the Vision frame system. M-CLEANIT is a three input (two inputs in 3G operation), dual output application that allows for programme delay as well as multiple user defined workflows to "clean" the delayed programme source before broadcast. M-CLEANIT also provides for a user monitor output so that the user can see all sources and monitor audio sources of the M-CLEANIT during operation.

Like all MARBLE-V1 video processing software apps, the M-CLEANIT can be used with IP (ST 2022) or SDI or with both IP and SDI at the same time (thereby providing gateway functionality).

M-CLEANIT:

- 3 input (2 in 3G operation), dual output, supporting 31 video formats and frame rates

- Routing allows for any input to be designated as programme (source A)

- User defined programme delay of up to 600 frames

- Individual reaction time settings for delay to event and restore from event

- Audio mute function with user defined channel selection

- Audio "clean" features allow for mute and switch to another source

- Video "clean" features include video blur, clean switch to another source, switch to HTML animation or still

- Fully integrated Multiview monitor output allows the user to aurally monitor live audio, delayed audio, source B audio and source C audio, while visually monitoring live programme, delayed programme, source B, source C (video source, animation or still)

- Gateway functionality for each input or output to be IP or SDI sources

- All workflows are user defined allowing for different "cleaning" options per user content

- Live control via 4 button smart button remote panel

- Simple Ethernet protocol control available for integration into control systems

Common MARBLE-V1 feature set:

- Supports SMPTE ST 2022-6 and ST 2022-7 protocols

- 10GbE SFP+ connectivity supporting 1310nm single-mode long range and 850nm multi-mode short range fibre

- Input and output present, black and frozen monitoring

- Input video and network error detection

- Input audio group and channel monitoring

- IP inputs tolerant of any input packet distribution

- Instant clean switching between inputs, whatever their timing

- IP flow monitoring including packet loss, duplicated packets and packet delay variation

- Internal test patterns

- Sub frame output timing adjustment locked to chosen reference source

- Ten frame adjustable video output delay per output, in one frame increments

- Choice of multiple timing sources with fail-over: PTP and two analogue Black and Burst or tri-level syncs references via Vision frame

- Support for unicast and multicast transmission

- Full range of VLAN support

- Supports IGMP V1, V2 and V3

- Supports 31 video standards

- Flexible remote control and monitoring using frame integrated control panel, VisionPanel remote control panel, ASCII and JSON protocols, SNMP and the web browser-based VisionWeb Control

- Dual slot card allowing 10 cards in Vision 3 frame

2 Block Diagram

M-CLEANIT
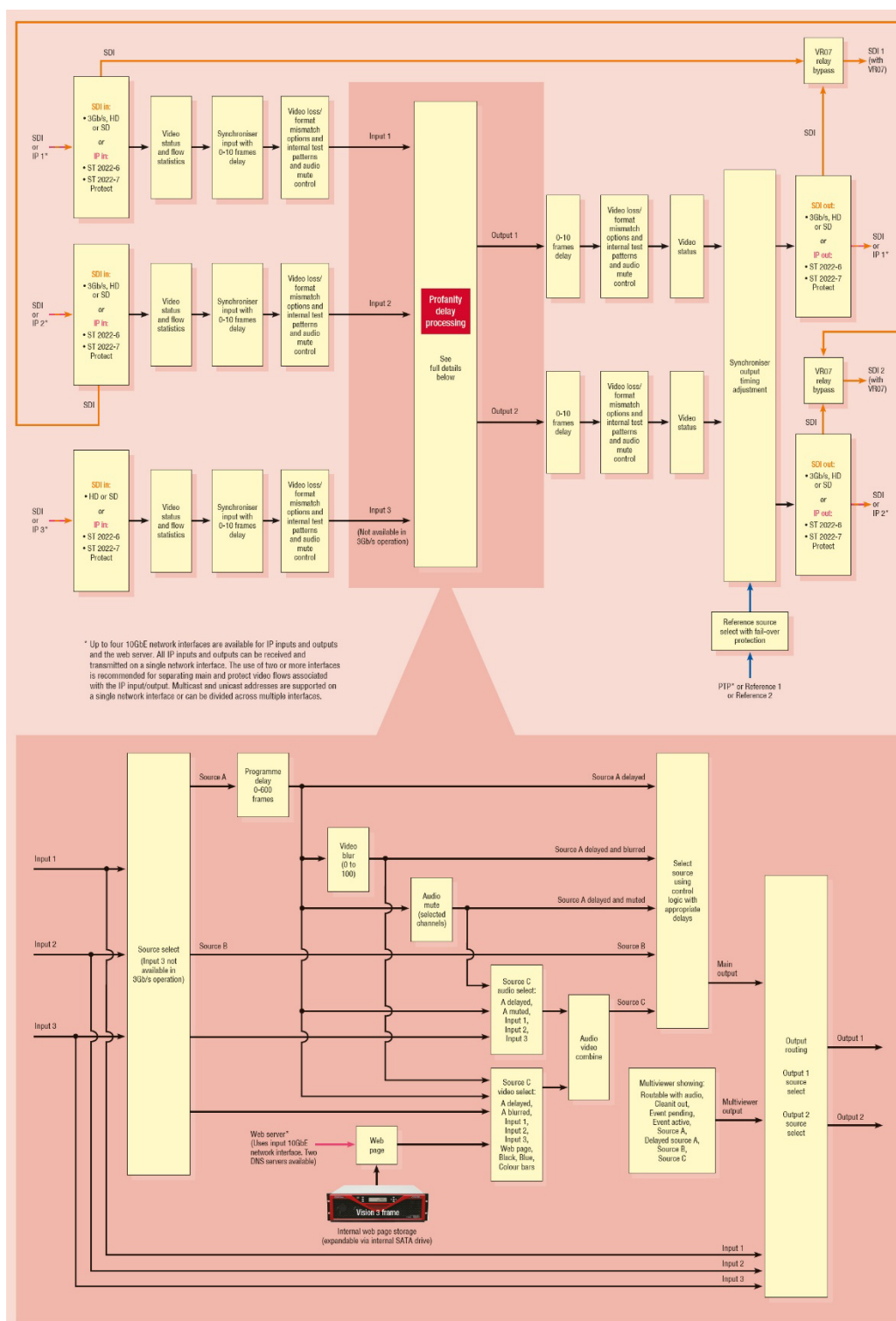
3 Hardware Installation

The potentiometers on the card are factory set and should not be adjusted. There are no user-selectable links.

The app based MARBLE-V1 cards are intended for use only in the Crystal Vision 'Vision' frame range and not in older style frames such as 'Indigo'.

Insert the card by pushing the white handle on the card edge, being careful to ensure the card is inside the guide rails. Remove it by pulling the metal hook. Do not force the card if resistance is met as the card may not be correctly aligned with the rear connectors.

Ensure that the Vision frame has the correct rear module fitted. Only the VR04, VR06 and VR07 rear modules offer the correct input/output functionality for the M-CLEANIT app.

The cards and rear modules can be inserted and removed without powering down the frame.

3.1 Rear module signal IO

VR04   VR06   VR07
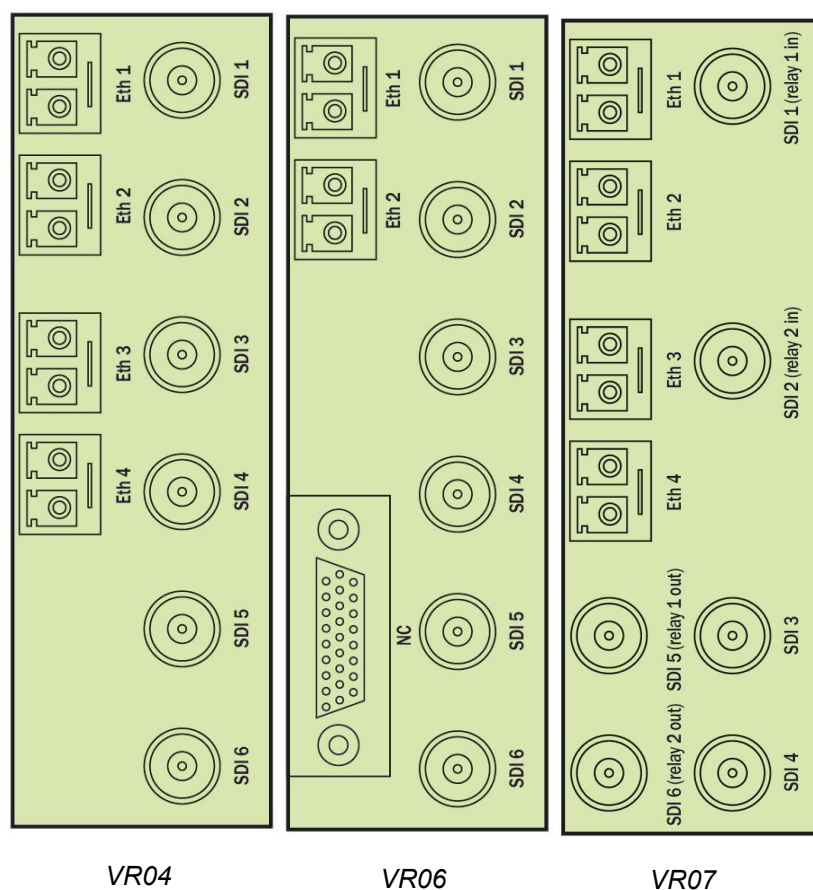
SDI 1: SDI In 1

SDI 2: SDI In 2

SDI 3: SDI In 3

SDI 4: No Connection

SDI 5: SDI Out 1

SDI 6: SDI Out 2

Eth 1 to 4: 10GbE video over IP I/O

D-Type on VR06: No connection

VR07 SDI relay bypass protection, in the event of power or card malfunction: SDI 1 to 5, SDI 2 to 6

4 Input/Output Configuration

VisionWeb web browser control is recommended for the configuration of the MARBLE-V1 software apps. This is achieved by entering the IP address of the frame into a web browser (10.0.0.201 on Ethernet port 1 of the frame by default). See the Vision 3 frame manual for more information on VisionWeb and frame configuration and operation.
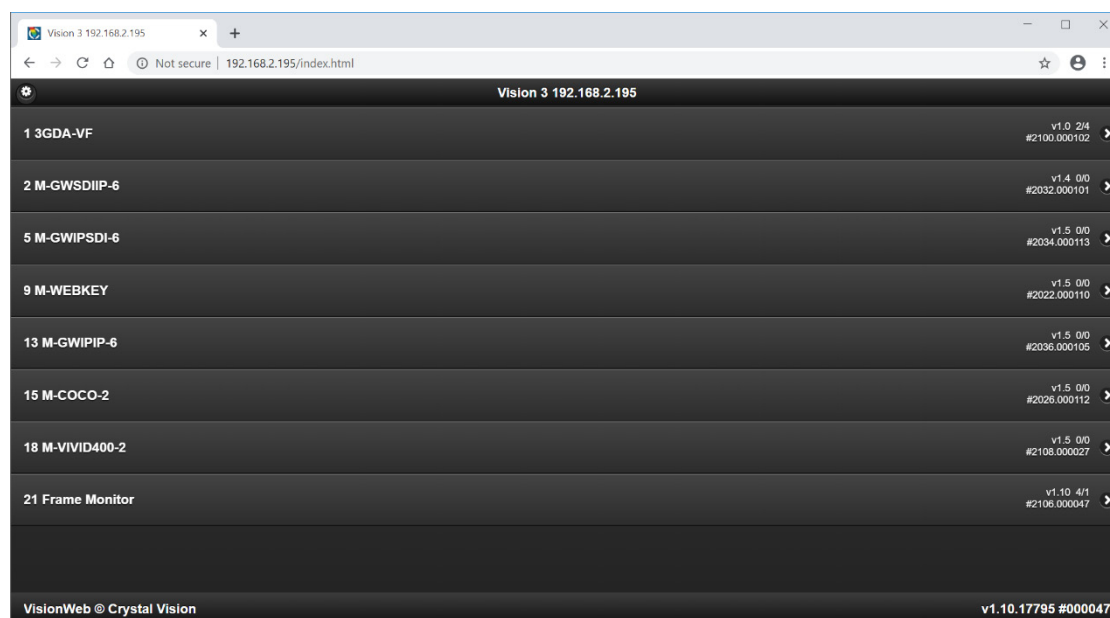
Example 'VisionWeb' homepage

4.1 Configuring the Ethernet Interfaces

MARBLE-V1 ST 2022 video over IP flows are received and transmitted using the VR04/VR06/VR07 10GbE network interface connections. VR06 provides two network interfaces while the VR04 and VR07 provide four. A typical usage case is to use Eth 1 interface for the 'primary' IP traffic and Eth 2 for the 'protect'. The additional Eth 3 and 4 interfaces on the VR04 and VR07 allow a separate connection for the web server (if used), or input flows to be separated from output flows.

Within each Ethernet interface there are six virtual interfaces. These are useful for software apps which process six individual IP flows, such as the IP gateways, as each flow can be assigned to its own unique IP address. For the M-CLEANIT app fewer connections will require configuration. M-CLEANIT is a three input (two in 3G Mode), dual output application. If using SDI I/O with an analogue reference and no web server, no virtual interfaces will need configuring.

If using IP I/O main and protect protocols, typically five virtual interfaces across two physical interfaces will require configuration. For example:

IP Inputs

Eth 1:1 Primary IP Input 1   Eth 2:1 Protect IP Input 1

Eth 1:2 Primary IP Input 2   Eth 2:2 Protect IP Input 2

Eth 1:3 Primary IP Input 3   Eth 2:3 Protect IP Input 3

IP Outputs

Eth 1:4 Primary IP Output 1   Eth 2:4 Protect IP Output 1

Eth 1:5 Primary IP Output 2   Eth 2:5 Protect IP Output 2

Alternatively if using the VR04 or VR07, the IP outputs can be separated onto Eth 3 and 4.

Eth 1:1 example IP parameters. Hover mouse above control labels on VisionWeb UI to show control hints
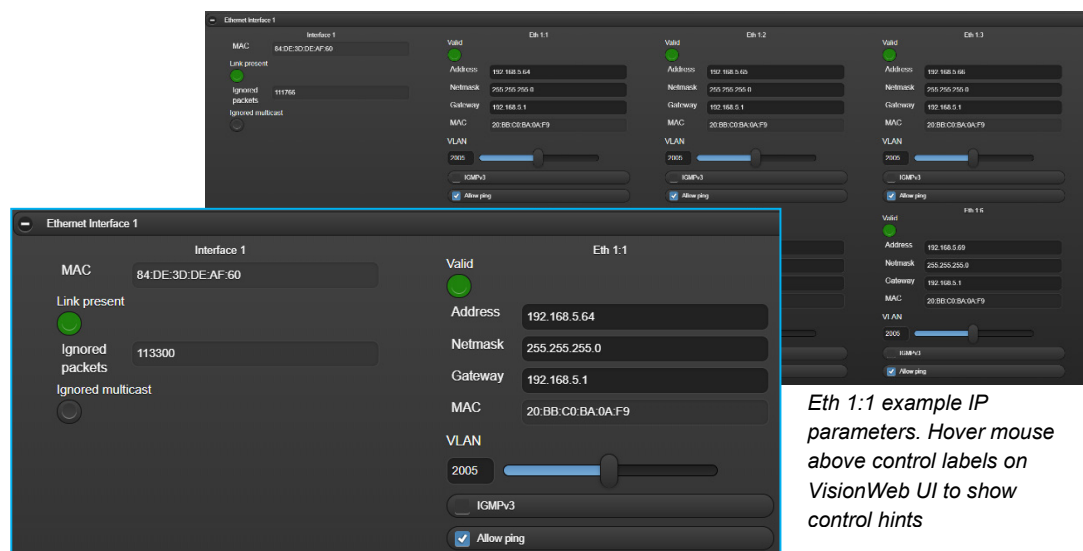
Once Ethernet Interfaces are properly configured and connected to the network, you will now proceed to configuration of the Input and Output menus.

4.2 Enabling Inputs and Outputs

By default M-CLEANIT inputs and outputs are disabled. Use the Enable control within the Input enable and Output enable menus to enable inputs and outputs.
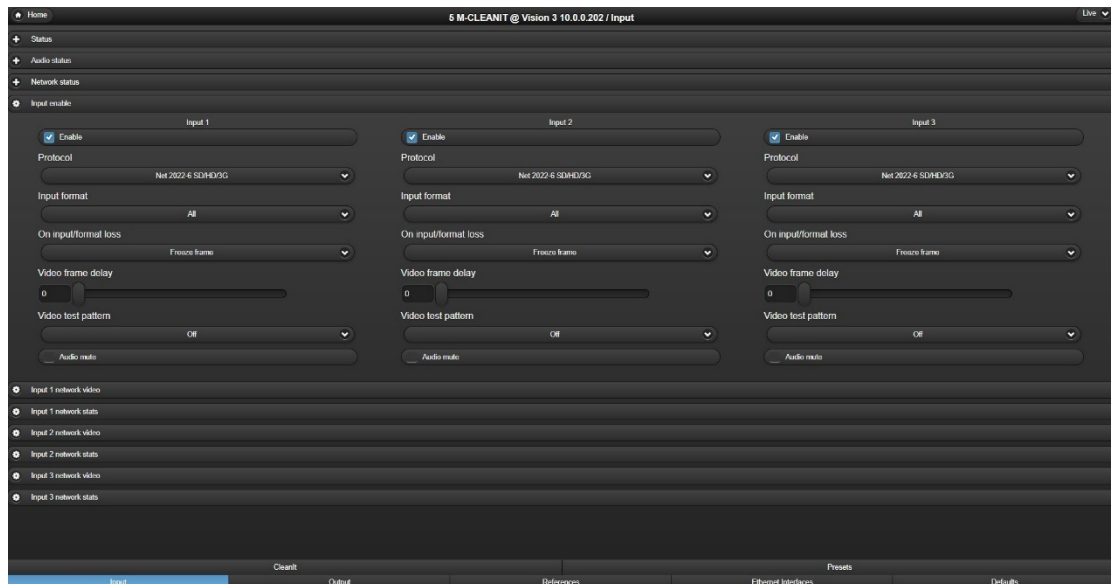
M-CLEANIT Input Enable

4.3 Select Protocol

M-CLEANIT supports SDI and uncompressed video over IP protocol ST 2022. It is possible to mix protocols between input and outputs. For example, an ST 2022 input can be output as SDI on Output 1 and ST 2022 on Output 2.

Once the input and outputs have been enabled, the required Protocol can be selected using the drop-down menus within the input enable and output enable menus. The protocol type will need selecting for each input and output.
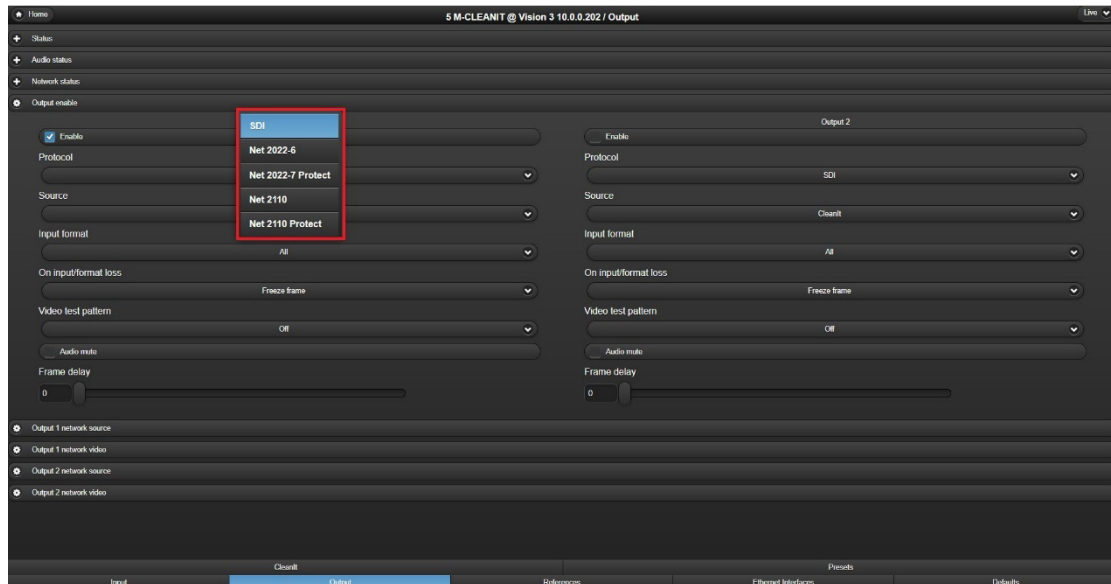
M-CLEANIT Output protocol selection

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4.4 Receiving an IP Flow

M-CLEANIT receives ST 2022 video over IP flows using the 10GbE network interfaces on the VR04, VR06 or VR07 Vision frame rear connector. Typically, Eth 1 is used for receiving and transmitting the 'primary' IP flows, with Eth 2 being used for the 'protect' in -7 protect applications.

The following example shows an M-CLEANIT configured to receive Input 1 using SMPTE ST 2022-7 protocol. When selecting ST 2022-7 it is necessary to configure both the 'Network In' and 'Protect Network In'.
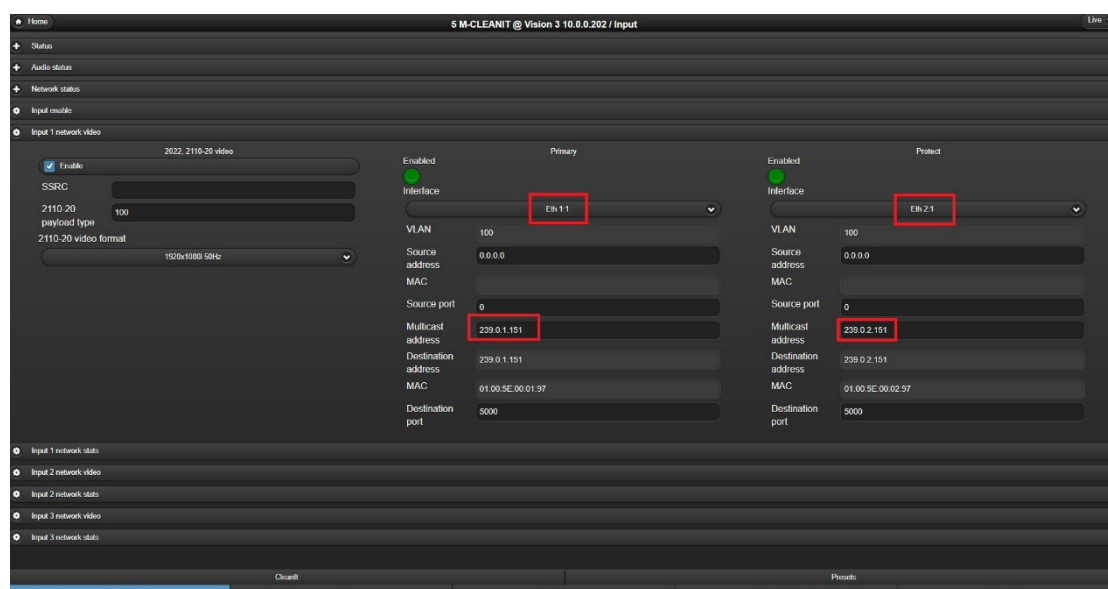
M-CLEANIT Input 1 network video

The controls highlighted in the above configuration show Input of the M-CLEANIT set to receive the 'main' flow packets on Ethernet Interface 1:1 and 'protect' packets of the ST 2022-7 protocol on 2:1. In this example multicast IP addresses are in use.

To successfully receive a flow, all IP parameters must agree with those of the transmitter.

4.5 Transmitting an IP Flow

M-CLEANIT transmits ST 2022 video over IP flows using the 10GbE network interfaces on the VR04, VR06 or VR07 Vision frame rear connector. Typically, Eth 1 is used for receiving and transmitting the 'primary' IP flows, with Eth 2 being used for the 'protect' in -7 protect applications.

The following example shows an M-CLEANIT configured to transmit Output 1 using ST2022-7 Protect. When selecting a protect protocol it is necessary to configure both the 'Network Out' and 'Protect Network Out'.
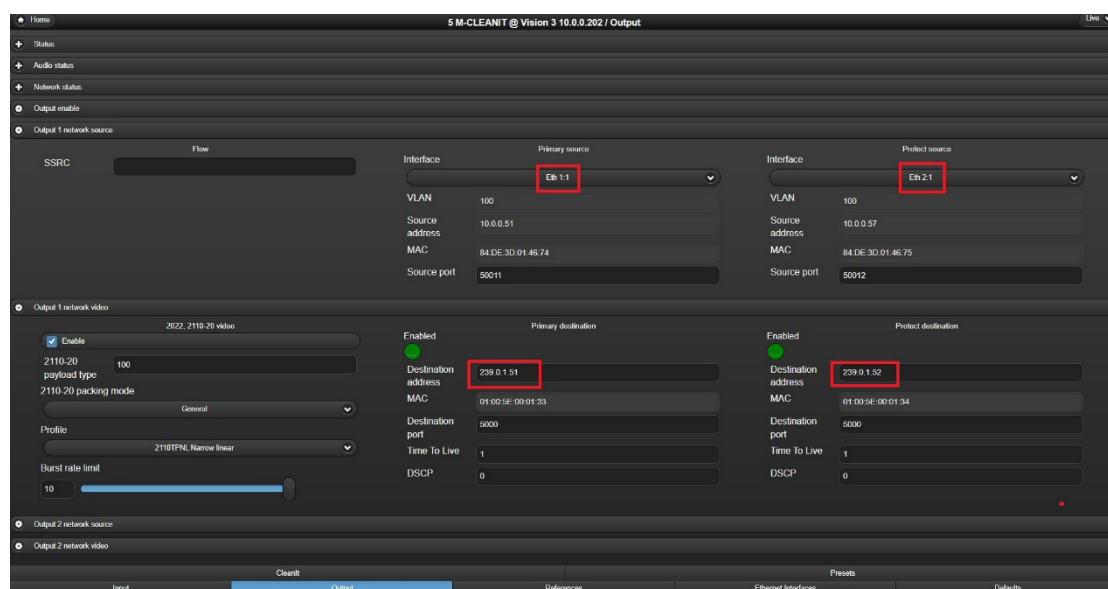
M-CLEANIT Output 1 network source and network video

The controls highlighted in the above configuration show Output 1 of the M-CLEANIT routing the CLEANIT programme output to Ethernet Interface 1:1 and 2:1 using ST 2022-7 protocol. In this example multicast destination addresses are being used for the main and protected flows which, if required, could be replaced by single point unicast addresses.

VLANs, ports and Time To Live (TTL) should be configured as per the network switch requirements.

If required a valid SSRC (Synchronisation source identifier) can be entered, otherwise left blank or set to 0 will accept all.

4.6 Video Mode for 3G Operation

Video Mode can be set in the Defaults->Mode menu. By default, the video format mode is set to HD/SD Inputs. In this mode, Input 1-3 is available for HD or SD. For 3G operation, the mode setting is set to the second selection. This selection allows for Input 1 and 2 to be 3G, with Input 3 disabled.
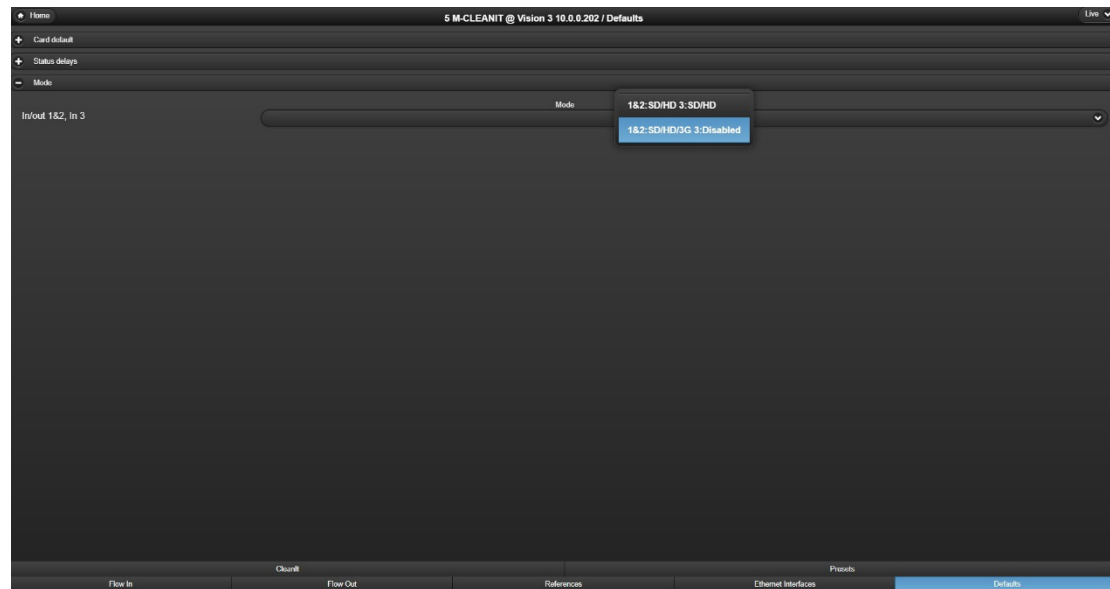
M-CLEANIT Mode Menu

5 Status

5.1 Input Video and Audio status
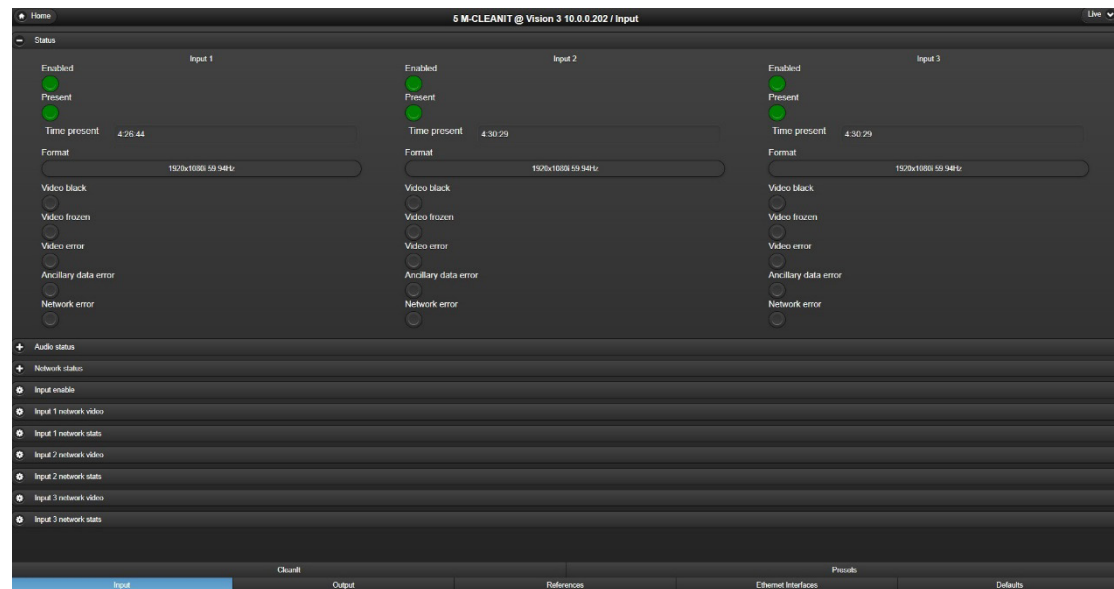
Input status

Video Status

Present LED: Green when input is present, otherwise off

Time present: Length of time input has been present

Format: Read only text showing video format e.g. 1920x1080i 59.94Hz

Video black LED: Yellow if input is full frame black, otherwise off

Video frozen LED: Yellow if input is frozen, otherwise off

Video error LED: Red if CRC errors detected at input, otherwise off

Network error LED: Red if lost or duplicate packets are detected on primary or protect network input

Audio status

Audio Status

Audio group and channel LED: Green when audio groups or individual channels are present, otherwise off

Audio silent LED: Yellow if audio is present but silent for a given channel, otherwise off

The equivalent Output status is available in the output menu.

Status Delay

Black, frozen and audio silence can be prevented from triggering until a user selectable delayed period between 1 to 120 seconds has expired. These controls are located on the 'Defaults' tab.
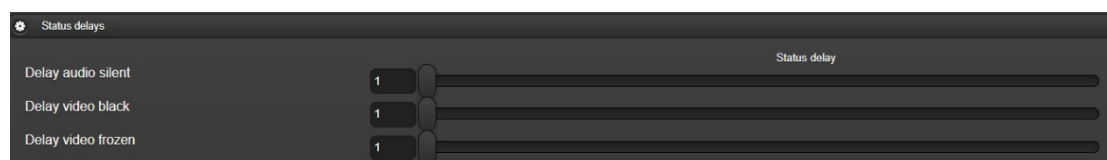
Status delay

5.2 Network Statistics
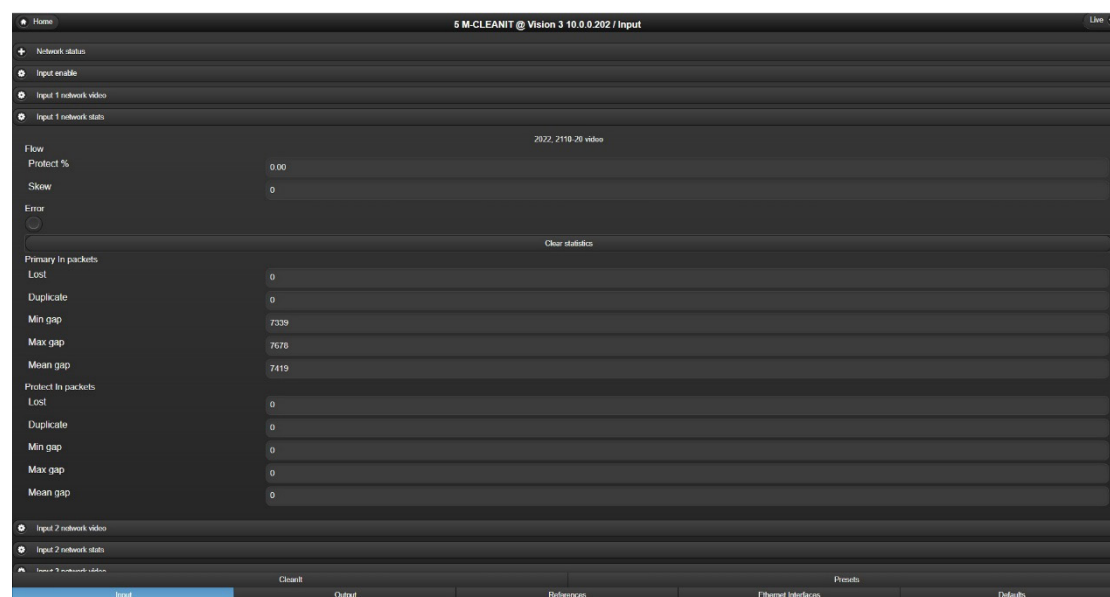
Input network statistics

Flow Statistics

Protect %: Percentage of packets used from the 'protected' network input

Skew: Difference in packet arrival. – indicates protect packets are arriving first

Network In/Protect Network In pkts

Lost: Number of lost packets

Duplicate: Number of duplicate packets

Min gap: Minimum gap between packets (nSec)

Max gap: Maximum gap between packets (nSec)

Mean gap: Mean gap between packets of a frame (nSec)

6 CLEANIT Processing

M-CLEANIT features multiple user defined options to define the workflow required for "cleaning" your content. All these features are user selectable utilising the VisionWeb UI found in the CLEANIT menu tab.

6.1 Sources

The Sources section of the UI allows you to define your signals to the various sources used for the CLEANIT system.
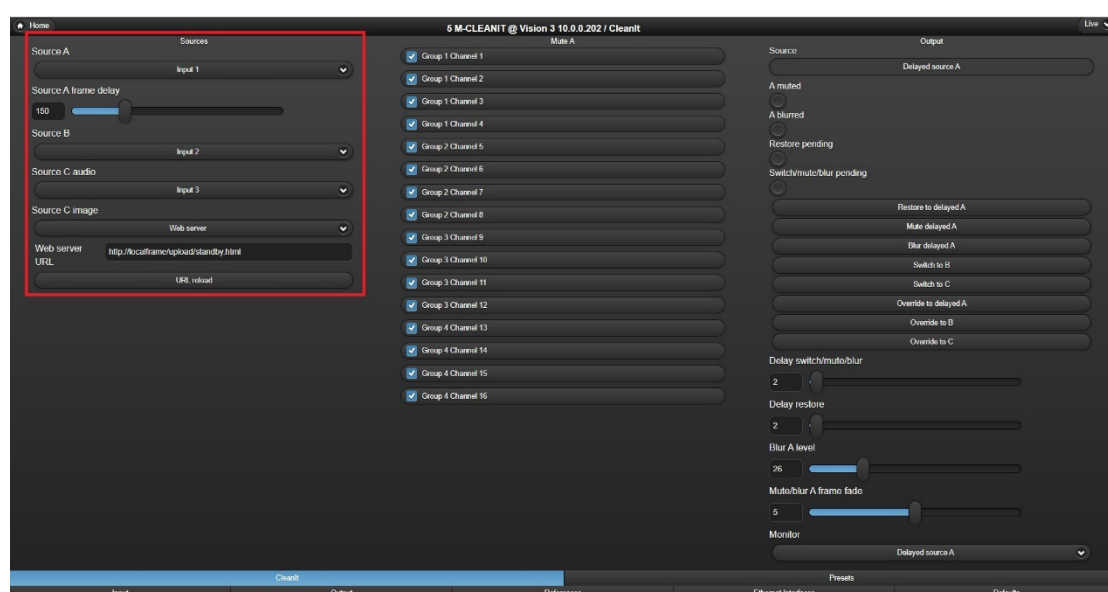
CLEANIT source selection

Source A: This source is your Programme feed. Select from Input 1, Input 2 or Input 3 whichever is your programme source.

Source A Frame delay: User defined programme delay. This setting is in frames and its range is 0-600. This is set to the desired delayed programme delay. As this setting is in frames, special care needs to be taken while setting this with the frame rate of the signal. For instance, 1080i/59.94 is 30 frames per second. A setting of 150 frames, for instance, would be an overall programme delay of five seconds. That same setting while using a 1080i/50 signal at 25 frames per second would equal 6 seconds of overall delay.

Source B: Select Input 1, Input 2 or Input 3 as an alternate "safe" feed to switch to during a cover event.

Source C audio: Select the audio that will output during a Source C "cleaning" event. The selections are Input 1, Input 2, Input 3, Delayed A and Mute delayed A. Note: Selecting Delayed A here allows only the video portion of Source C to change during a Switch to C. The audio on the CLEANIT output will continue to be the uninterrupted Delayed Source A.

Source C image: Select the video to be output during a Source C "cleaning" event. The selections are Input 1, Input 2, Input 3, Blur A, Delayed A, Black, Blue, Colour bars or Web server. Note: Selecting Delayed A here allows for only the selected Source C audio to be affected during a Switch to C event.

Web server URL: Identify the location of the HTML file to be used during a Source C "cleaning" event when Web server has been selected as the Source C image.

Note: There is a small amount of memory available on the frame CPU that can be used to store an HTML page to use for this graphic. An HTML page can be saved on the frame via FTP.

To FTP HTML files to the CPU for use:
Username: cvision
Password: CrystalVisionAdmin2018.

Navigate to /var/settings/upload
Copy files to this folder
Care should be taken to not alter any other files or the file structure.

The file loaded will then be accessed in the following path, http://localframe/upload/xxxx.html where the xxxx is replaced by your uploaded filename.

Once transfer is complete, frame CPU comms will need to be reset. This is done by opening the front panel of the frame and simultaneously holding down the two reset buttons for a few seconds and releasing.
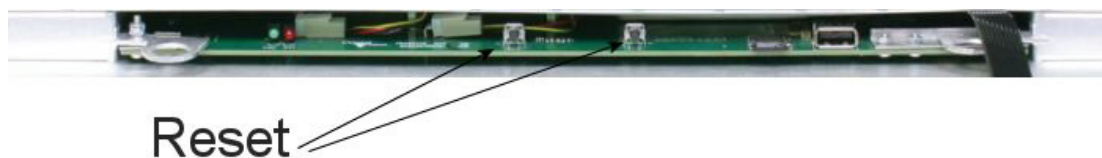
The M-CLEANIT web server can use content from web servers connected to the same local network via the 10GbE data connection. To use external web server content, a DNS server address should be entered on the Ethernet Interfaces control tab. Up to two addresses can be entered.

Note: Input 3 not available in 3G mode.

6.2 Mute A

Select audio channels of Source A that will mute during a "Mute delayed A" event.
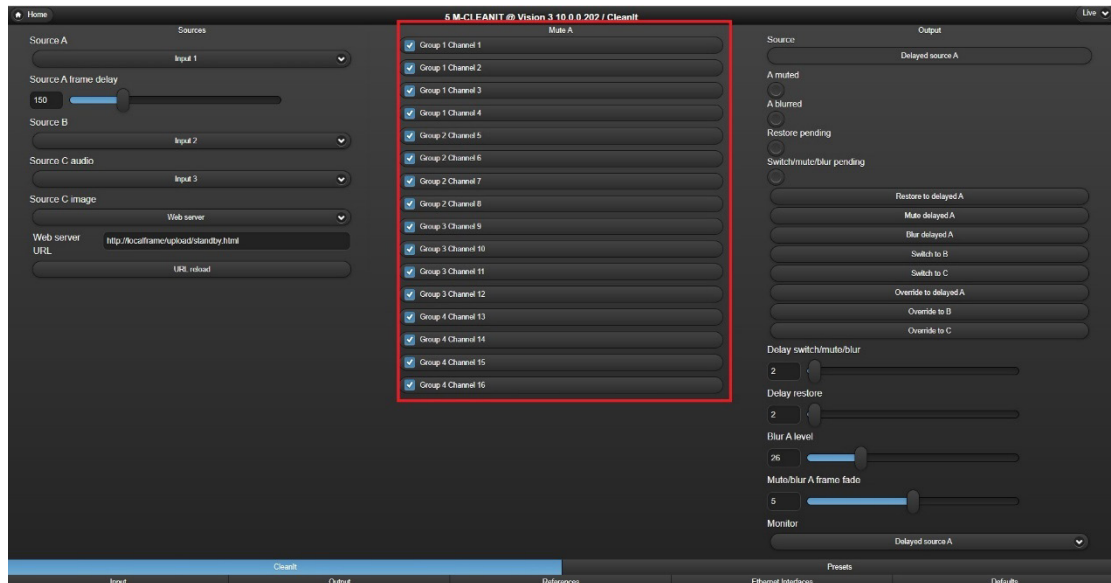
M-CLEANIT Mute A channel selection

6.3 Switch away/restore/blur level/fade time

Selections are made here to set reaction time to a cover "event" as well as delay before a restore. Blur level and mute/blur fade in time is also set in this area.

M-CLEANIT Switch away/restore/blue level/fade time

Delay switch/mute/blur: This time is set in seconds. This is the time before an initiated event occurs on the delayed output. This time is used as a reaction time for the user to react to improper content. A use example, operating in 59.94, 30 frames per second. The Source A delay is set to 150 frames or five seconds. Setting the switch/mute/blur to three seconds gives the operator a two second reaction time, meaning that they will have two seconds to initiate the "cleaning" action to get it cleaned on the output.

Special consideration should be given to making this setting. A shorter setting in relation to the Source A frame delay creates extra safety to ensure that all objectionable content is cleaned while sacrificing some additional programme content before the event. When set to zero, the reaction time is equal to the Source A frame delay, when set the same as the Source A frame delay, you have zero time to react. There is no reason to ever set it to be more than Source A frame delay.
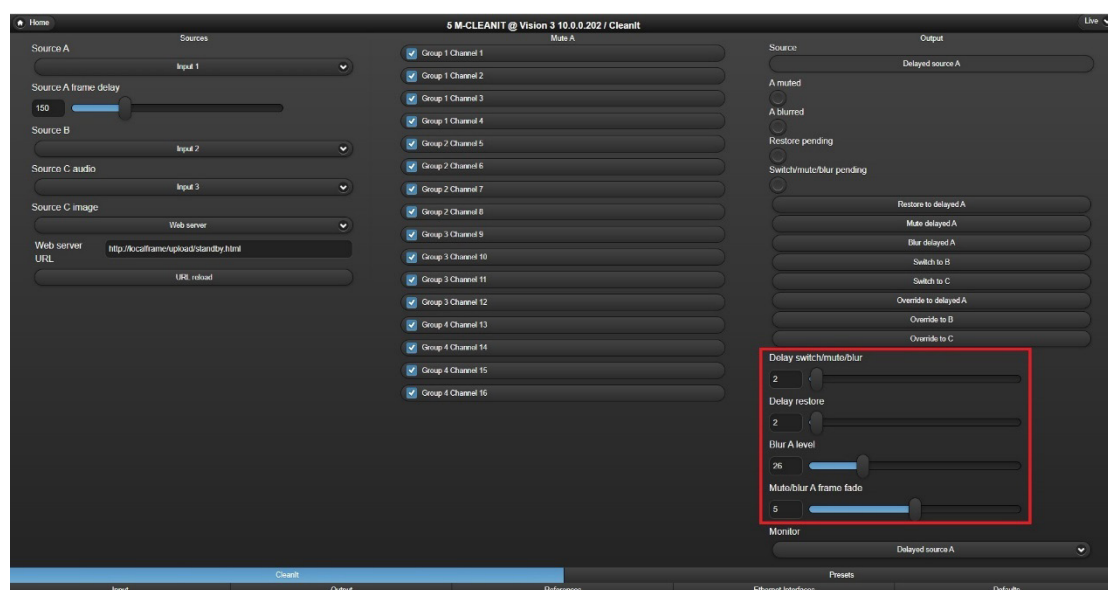
Delay restore: This time is set in seconds. This is the time before an initiated restore occurs on the delayed output. This time is used to ensure that the cover length is long enough to cover the entire event. In the example used above, setting the restore delay to five seconds would ensure that a restore initiated after the occurrence has ended live, will properly "clean" the content on the delayed output.

When the value is set to be the same as the Source A frame delay the programme output will be restored at the same point in the programme that the operator initiates the restore while monitoring the Live source A. A value larger than that would add extra protection, and a value less than that would release content earlier than the operator's action. It would normally not be set to be less than the Source A frame delay. This operation will be explained further in section 11, SBB-4 Remote Panel Operation.

Blur A Level: User defines the amount of video blur applied during a Blur A event. Scale is 0-100.

Mute/blur A frame fade: This setting is in frames. This provides for a smooth fade into and out of a mute or blur effect. This setting can be set from 0-10 frames.

6.4 Output

Status and actions are in the output area of the menu. For live production the system is operated from the SBB-4 remote panel. The actions in this menu are generally used for testing and for system configuration.
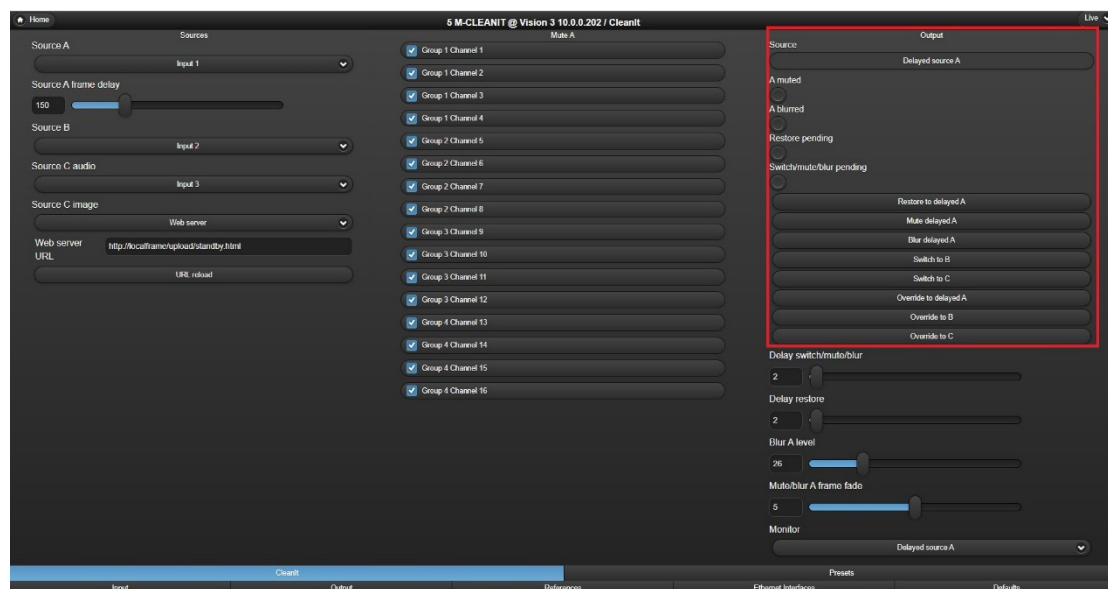
M-CLEANIT Output statuses and actions

Source: Shows status of which source is currently being output by the CLEANIT system.

A Muted: LED will show red when Delayed Source A audio is muted. Will show nothing when audio is not muted.

A Blurred: LED will show red when Delayed Source A video is blurred. Will show nothing when video is not blurred.

Restore pending: LED will show yellow when Restore to delayed A has been initiated and timer is still counting down to execute the action on the delayed output. Will show nothing when no restore is pending.

Switch blur/mute/blur pending: LED will show yellow when switch, mute or blur action has been initiated and timer is still counting down to execute the action on the delayed output. Will show nothing when no action is pending.

Restore to delayed A: Action to initiate the Restore to delayed A. On action, timer begins set in the "Delay restore" setting and "Restore pending" LED will show yellow. When timer expires, CLEANIT output will restore to Delayed A source, "Restore pending" LED will go dark.

Mute delayed A: Action to initiate an audio mute of Source A. On action, timer begins set in the "Delay switch/blur/mute" setting and "Switch/blur/mute pending" LED will light yellow. When timer expires, CLEANIT output will mute audio channels designated in the "Mute A" audio channel selection of this menu and "Switch/blur/mute pending" LED will go dark.

Blur delayed A: Action to initiate a video blur of Source A. On action, timer begins set in the "Delay switch/blur/mute" setting and "Switch/blur/mute pending" LED will light yellow. When timer expires, CLEANIT output will blur video and "Switch/blur/mute pending" LED will go dark. Blur level is set in the "Blur A level" setting in this menu.

Switch to B: Action to initiate a switch to source B. On action, timer begins set in the "Delay switch/blur/mute" setting and "Switch/blur/mute pending" LED will light yellow. When timer expires, CLEANIT output will switch to Source B and "Switch/blur/mute pending" LED will go dark.

Switch to C: Action to initiate a switch to Source C. On action, timer begins set in the "Delay switch/blur/mute" setting and "Switch/blur/mute pending" LED will light yellow. When timer expires, CLEANIT output will switch to Source C and "Switch/blur/mute pending" LED will go dark.

Override to delayed A: Action to initiate a restore to Delayed A. On action, the CLEANIT output will instantly restore to Delayed A.

Override to B: Action to initiate a switch to Source B. On action, the CLEANIT output will instantly switch to Source B.

Override to C: Action to initiate a switch to Source C. On action, the CLEANIT output will instantly switch to Source C.

Live production workflows will be discussed further in section 11/SBB-4 Remote Panel Operations of this manual.

6.5 Monitor Routing

Audio and video can be routed to a window on the monitor output. This control allows you to route a source for visual and aural monitoring by the operator. This is discussed in further detail in section 6.7 of this manual.
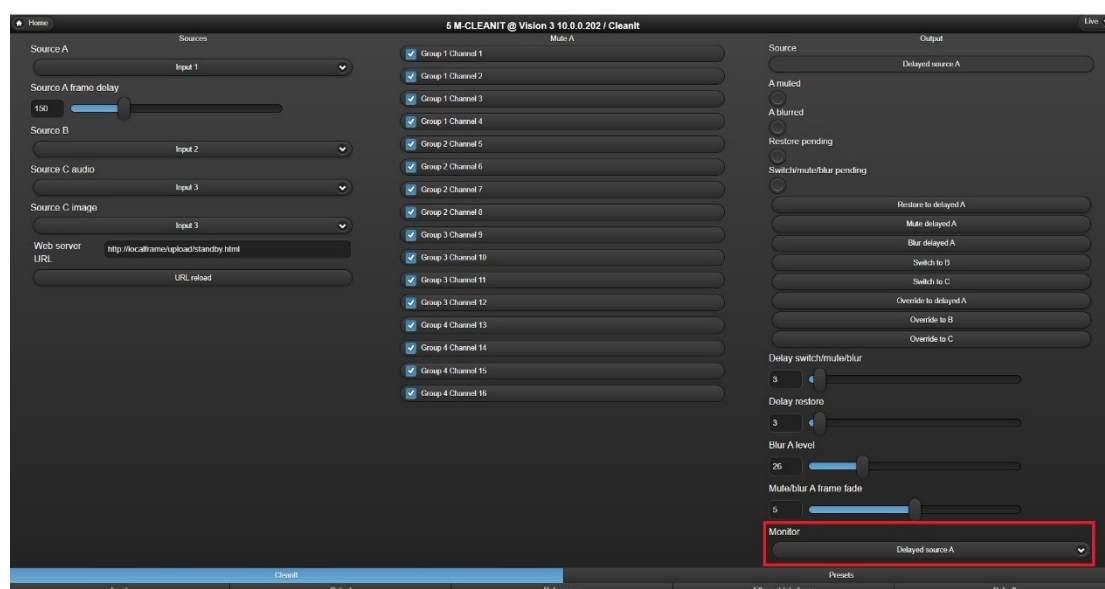
Monitor routing selection

6.6 Output Routing

M-CLEANIT features two outputs. There are multiple sources available to the users that can be routed out of Output 1 and Output 2. Using the Source selection pulldown, you can choose between Cleanit, Monitor, Input 1, Input 2 and Input 3.
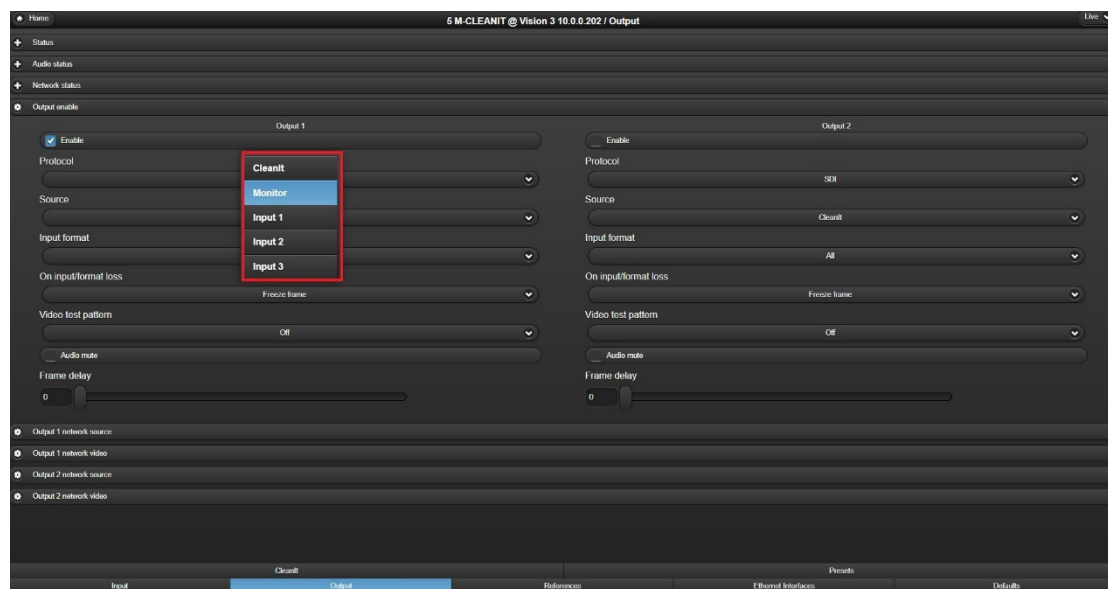
Output source selection in output enable menu

Cleanit: Cleaned programme output.

Monitor: Operator Multiview output. Output video shows a source routable window, Cleanit Out, Source A, Delayed Source A, Source B and Source C. Audio flow embedded in signal is a routable source. Video output also shows yellow tally of action pending and red tally when action is active. This is explained further in section 6.7.

Input 1: Unprocessed Input 1.

Input 2: Unprocessed Input 2.

Input 3: Unprocessed Input 3. (Not available in 3G Mode.)

6.7 Monitor Output

The monitor output is designed for the operator to be able to see and hear everything required to run and "clean" the live production. The following figure shows all the sources available.

Monitor output window sources

Routable with audio: This window is routable from the Cleanit operation menu. The associated audio allows the operator to choose what they see and hear. Under normal operations, the monitor selection will be Source A. This allows the operator to see and hear live programme audio and video. The routable choices are Source A, Cleanit Out, Source B and Source C.

Cleanit out: Delayed programme output.

Event pending tally: Normally dark, will show yellow when a cleaning event is pending. This is an extension of the Restore/switch/mute/blur tally on the main Cleanit tab.

Event active tally: Normally dark, will show red when a cleaning event is active.

Source A: Live Source A video.

Delayed Source A: Delayed Source A video.

Source B: Live Source B video.

Source C: Live Source C video.

6.9 Traffic Shaping Profiles

SMPTE ST 2022 transmits using a narrow linear profile, with all packets evenly spaced throughout the duration of each entire traditional corresponding SDI video frame.

7 SBB-4 Remote Panel Setup and Operation

The SBB-4 control panel is the preferred way to run the M-CLEANIT system during live broadcasts. The panel will ship with the four actions Mute, Blur, Switch to B and Switch to C as its default. Other actions or control modifications can be made. Please contact support@crystalvision.tv for further instructions on how to modify panel controls.

7.1 SBB-4 Connection

The SBB-4 requires a connection to a PoE enabled switch. The panel will ship with the following default network settings:

IP address: 10.0.0.211
**Netmask:** 255.255.255.0
Gateway: 10.0.0.1

The panel must have a network connection with the Vision 3 or Marble DT frame for operation. If the IP address of the panel needs to be changed, please contact support@crystalvision.tv for further instruction.

The panel will also expect that the Vision 3 frame is available at its default IP address of 10.0.0.201. If the frame IP address is changed, please contact support@crystalvision.tv for further instruction.

7.2 Operation

The four keys on the SBB-4 are configured for momentary operation. Pressing a key will initiate the action and releasing the key will start the restore. Here is a detailed description of the operation.
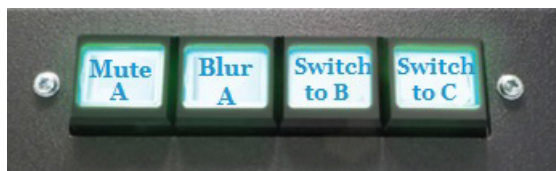
Key 1 – Mute A: Pressing this key will start the Switch/mute/blur delay timer. At the conclusion of the timer the selected audio channels in Source A will mute. Releasing the key will initiate the Restore to A delay timer. At the conclusion of the timer the selected audio channels will restore to normal operation.

Operation example: The overall programme delay (Source A delay) for your format is set for five seconds. The switch/mute/blur delay is set to three seconds and the Restore to A delay is set to five seconds. When a profanity occurs on the live monitored audio, the operator will have two seconds to react and press the Mute Key 1. The three seconds delay to mute on the output will begin. The operator would hold the key until the profanity has cleared on the live monitored audio. On the release, the delay to restore timer will begin. The output will mute three seconds after the key was initially pressed and will unmute/back to normal five seconds after the key is released.

Key 2 – Blur A: Pressing this key will start the Switch/mute/blur delay timer. At the conclusion of the timer the CLEANIT video output will blur. Releasing the key will initiate the Restore to A delay timer. At the conclusion of the timer the video output will return to normal.

Key 3 – Switch to B: Pressing this key will start the Switch/mute/blur delay timer. At the conclusion of the timer the CLEANIT output will switch to Source B. Releasing the key will initiate the Restore to A delay timer. At the conclusion of the timer the output will switch back to Delayed A.

Key 4 – Switch to C: Pressing this key will start the Switch/mute/blur delay timer. At the conclusion of the timer the CLEANIT output will switch to Source C. Releasing the key will initiate the Restore to A delay timer. At the conclusion of the timer the output will switch back to Delayed A.

8 Workflow Examples

There are many workflows that can be defined. A few examples of settings for various cleaning methods:

8.1 Workflow example 1

Mute audio only - Blur video only - Mute audio/blur video

This gives the user the ability to clean audio only, video only or both simultaneously. With this workflow, after properly setting Source A delay, Switch/mute/blur delay and Restore to A delay to your preferred settings, the user will ensure the following configuration:

Source C audio: Mute A is selected.

Source C image: Blur A is selected.

Mute A: Tick the boxes of the channels to be muted during a mute operation.

The following actions will then be used to clean content:

Mute delayed A: Selecting this action will mute audio only.

Blur delayed A: Selecting this action will blur video only.

Switch to C: Selecting this action will blur video and mute audio.

8.2 Workflow example 2

Mute audio only - Switch to safe video source

This operation gives the user the ability to Mute audio only or switch audio/video to a clean source. With this workflow, after properly setting Source A delay, Switch/mute/blur delay and Restore to A delay to your preferred settings, the user will ensure the following configuration:

Source B: Select the input of the safe source. The options here are Input 1, Input 2 or Input 3.

Mute A: Tick the boxes of the channels to be muted during a mute operation.

The following actions will then be used to clean content:

Mute delayed A: Selecting this action will mute audio only.

Switch to B: Selecting this action will switch to source B.

8.3 Workflow example 3

Switch to video graphic/safe audio source

This allows a user to switch to a video graphic and audio clean source. This uses an HTML page for the graphic animation and an input as an audio source. With this workflow, after properly setting Source A delay, Switch/mute/blur delay and Restore to A delay to your preferred settings, the user will ensure the following configuration:

Source C audio: Select the Input of the safe source. The options here are Input 1, Input 2 or Input 3. This could be a looping audio file such as a music bed

Source C image: Select Web Server.

Web server URL: Location of HTML web page to display.

The following actions will then be used to clean content:

Switch to C: Selecting this action will switch video to the HTML page and audio to the safe source that has been selected.

Many other combinations of workflows can be selected utilising M-CLEANIT's flexibility.

9 References and Output Timing

9.1 References

The M-CLEANIT output can be locked to a PTP clock, an analogue tri-level or Black & Burst sync or the SDI input if present and selected as the input protocol. If the chosen reference sources are absent at power up, the outputs will freerun to an internally generated clock.

Both outputs are locked to the same reference clock. It is not possible to lock different outputs to different clocks.

Inputs are not required to be the same frame rate as the chosen reference. It is possible, for example, to input 59.94Hz video locked to a 50Hz reference. However, frames will be dropped and repeated as necessary when cross-locking frame rates to maintain a valid output.

Status
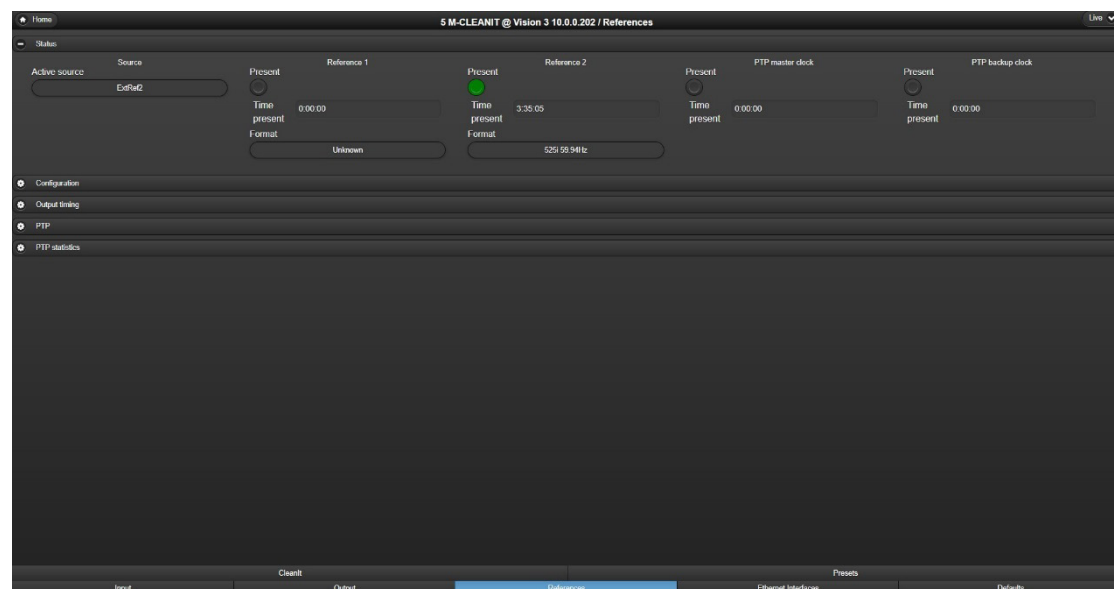
Reference Status

Reference & PTP clock Present LEDs: Green when present, otherwise off

Time present: Length of time input has been present

Reference 1 & 2 Format: Read only text showing reference format e.g. 525i 59.94Hz

Reference configuration

Reference Configuration
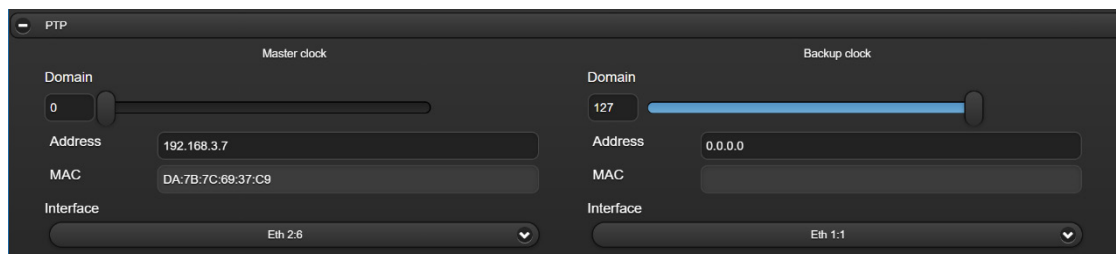
Reference source: Select priority order of reference source. Will automatically fail-over to next source in list if priority source missing

Auto relock enable: Automatically relocks to priority reference source upon its return

Active source: Read only text showing which reference source is in use

Force relock: Returns to priority reference source if auto relock is not enabled

PTP Configuration

PTP Configuration

Domain: Domain number of the PTP clock

Address: IP address of the master and backup PTP clocks

MAC: Read only text showing the MAC address of the PTP clocks

Interface: Ethernet interface chosen to receive the PTP clock. The interface chosen must be configured for the same IP range and as the PTP clock

PTP Statistics

PTP statistics

Network delay: Calculated delay between MARBLE-V1 card and the master PTP clock. Expected to be small if network switch is PTP-aware, otherwise will reflect number of switches between MARBLE-V1 card and the master PTP source

Delay variation: Indicates system noise and how accurately MARBLE-V1 can lock. For example, to lock within 500ns, the delay variation should be less than 500ns

Reference offset: Offset between MARBLE-V1 card and master PTP clock. Expected to be less than 500ns

Sync Period: How often the PTP sync packets are seen. Indicates whether the master PTP clock is configured correctly, e.g. 8 packets a second, and whether there are any packets missing which could indicate a network issue

9.2 Output timing

The output timing controls adjust the offset delay of all outputs relative to the chosen reference source. All outputs are locked to the same reference source, it is not possible to offset each output individually. However, the offset can be set per video format, allowing for example, different output timing for HD and SD signals. If the input to chosen reference timing is close enough to fall below the card's minimum processing delay, a one frame delay will be applied. The output timing controls are sub-frame time based (ms and us). Status is provided for the equivalent lines and pixels delay.

Output timing

Output Timing

Enable: Select to enable the output timing controls. Minimum possible delay applied when deselected

Time adjustment sliders: Sub-frame adjustment of output timing relative to reference source

Format to modify: Independently adjust output timing for each video format

Apply to all formats: Select to apply the output timing adjustment to all video formats

Lines/Pixel: Read only status of the output timing in equivalent lines and pixels

9.3 Frame delay

Up to ten frames of delay adjustable in one frame steps can be applied to the inputs and outputs.
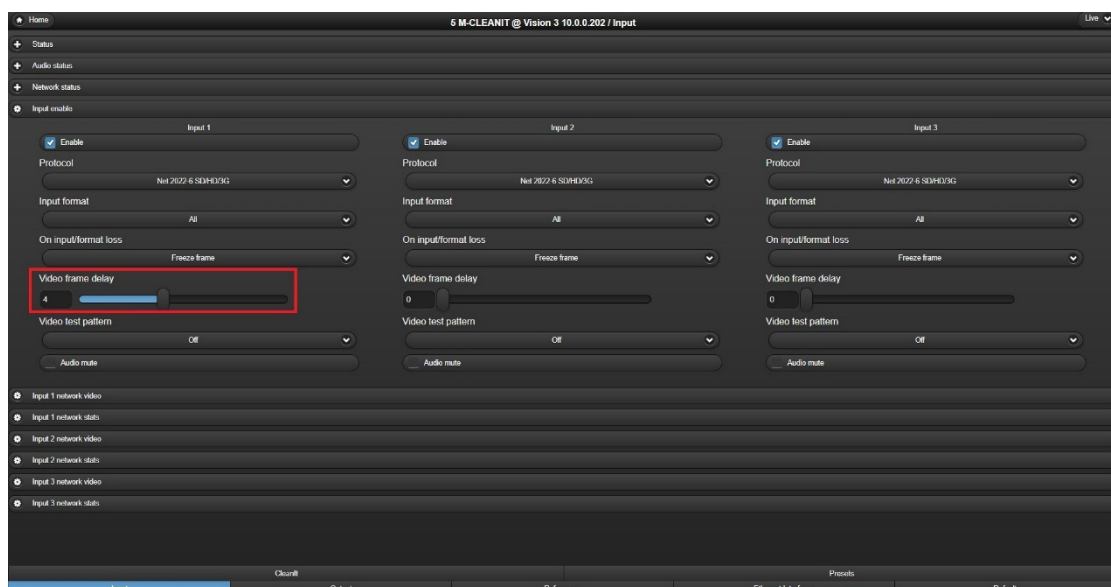
Input 1 Frame Delay

10 Input Format, Input Loss and Test Pattern Options

10.1 Input Format and On Loss of Input

All apps provide an Input Format control on Input enable and Output enable. If set to 'All', any input format present is deemed valid. If set to a single format, any input format present which does not match the selected format is deemed invalid, upon which the 'On input/format loss' function is triggered.

In the example below, if the source input format is not 1920x1080i 59.94Hz, the output will freeze then output black.
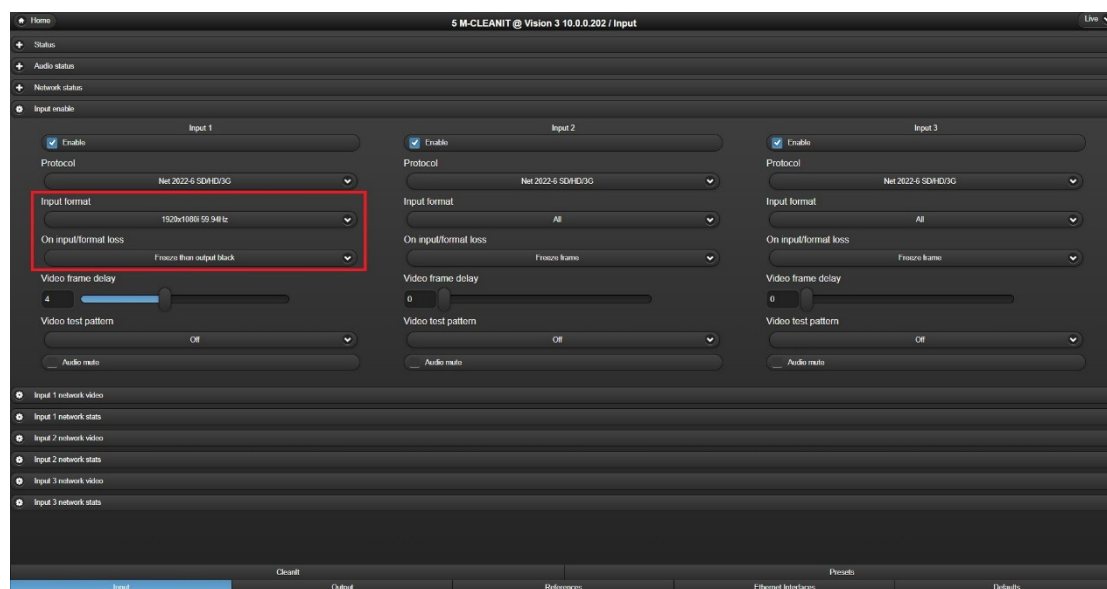
Input Format and On Loss Options

10.2 Internal Test Patterns

Inputs and outputs can generate internal test patterns. If selected on an input, this test pattern will be inserted on the input side of the CLEANIT processing. If selected on output, the test pattern will be inserted after CLEANIT processing. The following internal test patterns are available.
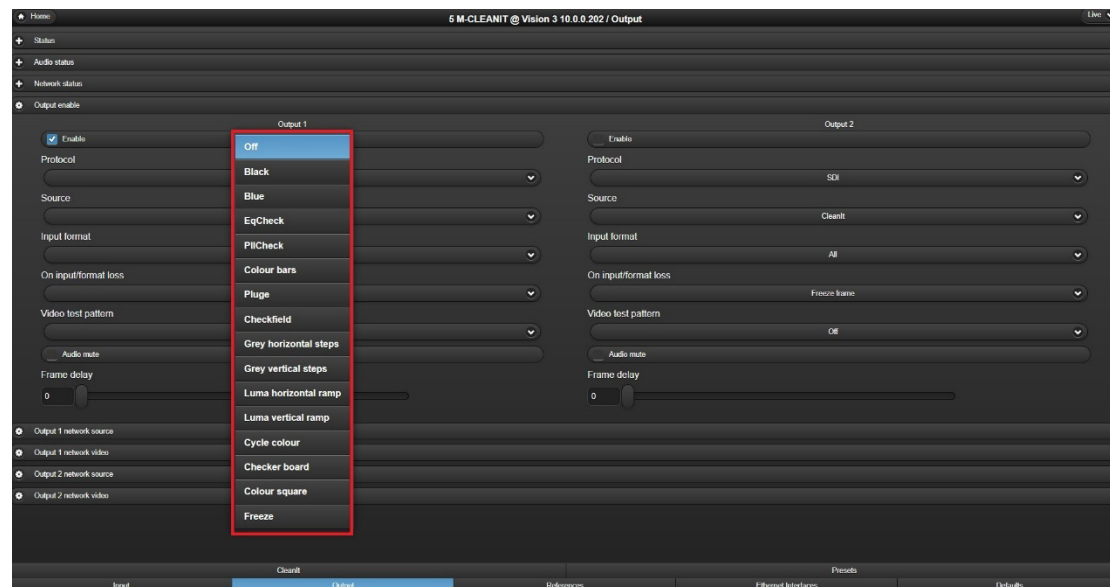
Internal Test Pattern options

11 Unicast Flow Configuration

To transmit a unicast flow, the output 'Destination address' should be the IP address of the downstream Ethernet Interface you want to transmit to. The example below shows that rather than transmitting using a multicast address, interface 1:5 on the M-CLEANIT is now set to transmit the flow to a downstream device with IP address 10.0.0.100
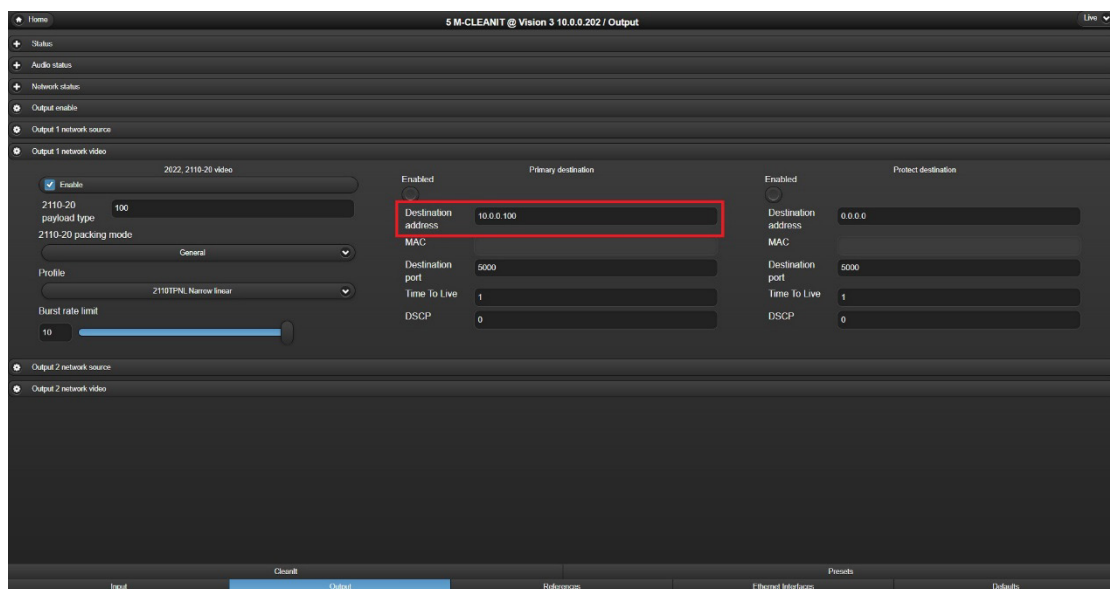
Unicast IP Address transmit

When receiving a unicast flow, the input 'Multicast address' should be set to 0.0.0.0. The input 'Source address' can be one of two options. If set to 0.0.0.0 it will accept any source transmitting to its virtual interface IP address. This is acceptable if it is known only one device at a time will be transmitting to it. Alternatively the 'Source address' can be limited to only receive from one IP address, as shown in the example below, where the source address is limited to only receiving traffic from a device with IP Address 10.0.0.99.

Unicast IP Address receive

12 Basic Trouble Shooting

12.1 No input or output signals present

- Confirm using GUI status LEDs whether the problem is input or output related

- Check SDI and fibre cabling

- Check inputs are enabled (off by default)

- Check outputs are enabled (off by default)

- Check correct flow protocol has been selected

- Check flow parameters (protocol type, IP address, VLANs, ports etc.) are configured correctly

- Check Ethernet Interface IP parameters are configured correctly

- Check Ethernet Interface link present LED is illuminated on GUI

- Check network switch ports are configured for trunk mode and not access mode (access mode sends untagged packets which MARBLE-V1 will ignore)

- Check that Mode is correctly set in the Defaults->Mode menu. Selection 1 is for HD/SD operation, selection 2 is for 3G operation. See section 4.6 for more information.

12.2 Errors in the IP flow's video content

- Check the 'Ignored packets' count on the Ethernet Interfaces tab of GUI is incrementing in no more than values of 10s. Incrementing in values of 100s indicates a network flooding problem.

- Check the 'Ignored multicast' LED on the Ethernet Interfaces tab of GUI is not illuminated. If illuminated, this indicates multicast packets are being flooded to the card's Ethernet Interface port, a likely cause of which is incorrectly configured IGMP on the network switch.

- Check input network status for lost or duplicate packets. Check maximum gap is less than 12000ns (0.012us). Larger gaps could indicate bursts in the IP packets.

12.3 IP flows keep stopping after a few minutes

- Check IGMP is enabled and correctly configured on the network switch.

13 Specification

M-CLEANIT APP RUNNING ON MARBLE-V1 MEDIA PROCESSOR

MECHANICAL
'Double slot' Vision card 96mm x 303mm (96mm x 325mm including finger pull)
Weight: 355g
Power consumption: 25 Watts, plus 1 Watt for each SFP+ fitted to MARBLE-V1

INPUTS AND OUTPUTS
Inputs can be IP and/or SDI
Outputs can be IP and/or SDI
Five BNCs for SDI and up to four fibre SFP+ 10GbE IP network interfaces. Choice of fibre modules: either 850nm multi-mode (for up to 300m) or 1310nm single-mode (for up to 10km)
IP inputs and outputs can be ST 2022 (NB. ST 2110 coming soon)
IP only, SDI to IP and IP to SDI applications require at least one SFP+ transceiver option, up to a maximum of four. All IP inputs and outputs can be received and transmitted on a single network interface. The use of two or more interfaces is recommended for separating main and protect video flows associated with the IP input/output. Multicast and unicast addresses are supported on a single network interface or can be divided across multiple interfaces. One network interface could be used exclusively for the web server, if required
SDI only applications do not require any SFP+, unless using a web server for a web page cover source in which case one SFP+ will be required
Uses VR04, VR06 or VR07 frame rear modules. VR04 or VR07 must be used when more than two SFP+ are fitted
The video format mode can be set using Defaults->Mode. By default, the mode is set to "1&2:SD/HD 3:SD/HD", where Input 1, Input 2 and Input 3 are available for HD or SD. For 3Gb/s operation the mode should be changed to "1&2:SD/HD/3G 3:Disabled", which allows for Input 1 and Input 2 to be 3Gb/s with Input 3 disabled

SDI VIDEO INPUTS
(NB. Some or all the inputs can be IP instead)
Up to two 3Gb/s SDI inputs or three HD or SD SDI inputs. If the input is 3Gb/s then Input 3 is disabled
270Mb/s or 1.5Gb/s or 3Gb/s serial compliant to SMPTE 259, SMPTE 292-1 and SMPTE 424/425-A
3Gb/s cable equalisation up to 100m using Belden 1694A. HD cable equalisation up to 140m with Belden 1694A or equivalent (approx. 100m with Belden 8281). SD cable equalisation >250m Belden 8281 or equivalent

IP INPUTS
(NB. Some or all the inputs can be SDI instead)
Up to two 3Gb/s video over IP inputs or three HD or SD video over IP inputs. If the input is 3Gb/s then Input 3 is disabled
Packet distribution is not important as variable input buffer will compensate for any timing irregularities

A protect input for SMPTE ST 2022-7 seamless protection switching can come from any of the 10GbE IP network interfaces. This protects the video flow from lost packets by creating two streams of the same data using different routing to the destination. IP packet analyser handles the analysis and reconstruction of the protected video flow. Any IP input can come from any of the 10GbE IP network interfaces and can either be multicast or unicast

SDI VIDEO OUTPUTS
(NB. Some or all the outputs can be IP instead)
Up to two 3Gb/s or HD or SD SDI outputs
270Mb/s or 1.5Gb/s or 3Gb/s serial compliant to SMPTE 259, SMPTE 292-1 and SMPTE 424/425-A

IP OUTPUTS
(NB. Some or all the outputs can be SDI instead)
Up to two 3Gb/s or HD or SD video over IP outputs
Any of the 10GbE IP network interfaces can be used to provide a protected output for SMPTE ST 2022-7, which protects the stream from lost packets by creating two streams of the same data using different routing to the destination
Alternatively, it is possible to have a unicast on some network interfaces and a multicast on others

VIDEO FORMATS SUPPORTED
The video formats supported are 625i, 525i, 720p50, 720p59.94, 720p60, 1080i50, 1080i59.94, 1080i60, 1080p23.98, 1080p24, 1080p25, 1080p29.97, 1080p30, 1080p50, 1080p59.94, 1080p60, 1080PsF23.98, 1080PsF24, 1080PsF25, 1080PsF29.97, 1080PsF30, 2048x1080p23.98*, 2048x1080p24*, 2048x1080p25*, 2048x1080p29.97*, 2048x1080p30*, 2048x1080PsF23.98*, 2048x1080PsF24*, 2048x1080PsF25*, 2048x1080PsF29.97*, 2048x1080PsF30* (*= YUV 4:2:2 10 bit)

IP PROTOCOLS
Protocols currently supported on network interfaces: SMPTE ST 2022-6, SMPTE ST 2022-7, IGMPv3, ARP, ICMP ping, IPv4, IEEE802.1q, VLAN, IEEE802.3-2012 (10G Ethernet)
Packet shaping and distribution of the video flow (optional in ST 2022) is selectable per IP output between TPNL and TPN (narrow linear or narrow gapped packet distribution). There is also a mode for burst packet distribution with a control for the burst rate limit. This is for connecting between Crystal Vision and other compatible devices that allow for a reduced transmission delay
SMPTE ST 2022-7 video flow protection facilitates the dual stream output

VIDEO AND AUDIO COVER
To prevent profanities from being broadcast, it is possible to clean switch to two different video sources, jump ahead in time of the offensive content, blur the video, make the video black or blue, show colour bars, show a web page, mute individual audio channels or switch to another audio source

SOURCES
Note: Input 3 not available in 3Gb/s operation
Source A: Input 1, Input 2 or Input 3 can be selected as the Source A programme feed

Source B: Input 1, Input 2 or Input 3 can be selected as an alternate 'safe' feed to switch to during a cover event

Source C video: Input 1, Input 2 or Input 3, Blurred A, Delayed A, Black, Blue, Colour bars or Web server can be clean switched to during a cover event. Web pages can be accessed remotely – with two DNS servers available – or can be stored internally on Vision 3 frame via FTP, with storage expandable via internal SATA SSD drive. Note: For only the Source C audio to be affected during a Switch to C event, select Delayed A here

Source C audio: The audio from Input 1, Input 2 or Input 3, Delayed A or Muted A can be switched to during a cover event

PROGRAMME DELAY

Source A programme delay adjustable in steps of frames

Minimum delay: 0 frames

Maximum delay: 600 frames, which is:

- 25 seconds (1080p23.98, 1080p24, 1080PsF23.98, 1080PsF24, 2048x1080p23.98, 2048x1080p24, 2048x1080PsF23.98, 2048x1080PsF24)
- 24 seconds (625i, 1080i50, 1080p25, 1080PsF25, 2048x1080p25, 2048x1080PsF25)
- 20 seconds (525i, 1080i59.94, 1080i60, 1080p29.97, 1080p30, 1080PsF30, 2048x1080p30, 2048x1080PsF30, 2048x1080p29.97, 2048x1080PsF29.97)
- 12 seconds (720p50, 1080p50)
- 10 seconds (720p59.94, 720p60, 1080p59.94, 1080p60, 1080PsF29.97)

Programme delay adjustments can be made live. The M-CLEANIT applies the adjustments slowly over time, with small delay adjustments therefore going virtually unnoticed. Increasing the delay slows down the video until the delay is correct, while reducing the delay speeds up the video until the delay is correct

EVENT AND RESTORE DELAYS

Delay switch/mute/blur: Set in seconds, this is the time before an initiated event occurs on the delayed output. This time is used as a reaction time for the user to react to improper content

Delay restore: Set in seconds, this is the time before an initiated restore occurs on the delayed output. This time is used to ensure that the cover length is long enough to cover the entire event

The 'delay to event' and 'delay to restore' timings can either be the same length or different, to suit all workflows. Setting a longer 'delay to restore', for example, adds some safety delay to ensure all objectionable content is covered

EVENT ACTIONS

Restore to delayed A: Action to initiate the restore to Delayed Source A. Timer begins and counts down the time in the 'Restore delay' setting; when timer expires the Cleanit output will restore to Delayed Source A. If using the SBB-4, releasing a button will initiate the restore timer countdown

Mute delayed A: Action to initiate an audio mute of Source A. Timer begins and counts down the time in the 'Switch/blur/mute delay' setting; when timer expires the Cleanit output will mute the designated audio channels. The 'Mute/blur A fade time' setting allows a mute fade time of 0 to 10 seconds. If using the SBB-4, pressing the Mute button will initiate the timer countdown

Blur delayed A: Action to initiate a video blur of Source A. Timer begins and counts down the time in the 'Switch/blur/mute delay' setting; when timer expires the Cleanit output will blur the

video. User defines the amount of video blur applied (0-100) using the 'Blur A level setting, while the 'Mute/blur A fade time' setting allows a blur fade time of 0 to 10 seconds. If using the SBB-4, pressing the Blur button will initiate the timer countdown

Switch to B: Action to initiate a switch to Source B. Timer begins and counts down the time in the 'Switch/blur/mute delay' setting; when timer expires the Cleanit output will switch to Source B. If using the SBB-4, pressing the Switch to B button will initiate the timer countdown

Switch to C: Action to initiate a switch to Source C. Timer begins and counts down the time in the 'Switch/blur/mute delay' setting; when timer expires the Cleanit output will switch to Source C. If using the SBB-4 smart button box, pressing the Switch to C button will initiate the timer countdown

Override to delayed A: Action to initiate an instant restore to Delayed Source A

Override to B: Action to initiate an instant switch to Source B

Override to C: Action to initiate an instant switch to Source C

ROUTING
The output routing allows selection between the Cleanit output, Monitor output, Input 1, Input 2 or Input 3. (Input 3 not available in 3G mode)

MONITOR OUTPUT
One of the two outputs can be set to show the Monitor output, which allows the content to be monitored and is available as either SDI or IP
This fixed multiviewer simultaneously shows a source routable window, Cleanit out, Source A, Delayed Source A, Source B and Source C. Audio flow embedded in signal is a routable source. Video output also shows yellow tally of action pending and red tally when action is active

VIDEO LOSS CONTROLS
The video loss/format mismatch controls – available at both the input and output stages – allow the user to select what will happen to an input or output in the event that the video is lost or the video format does not match the specified format. The user can specify to freeze the last good frame or show a black or blue screen or 100% colour bars (with or without an initial delay of three seconds). No output can also be selected. This is independently adjustable on each input/output

TEST PATTERNS
The test pattern controls allow the user to override each individual input or force the output to output a test pattern including Colour Bars, Blue, Black, EqCheck, PllCheck, Pluge, Checkfield, Grey Horizontal Steps, Grey Vertical Steps, Luma Horizontal Ramp, Luma Vertical Ramp, Cycle Colour, Checker Board or Colour Square, or to freeze the picture. This is independently adjustable on each input/output

AUDIO MUTE CONTROL
The input and output audio mute controls allow the user to mute the audio embedded within any of the SDI or ST 2022 inputs or outputs

SYNCHRONISER AND TIMING ADJUSTMENTS
Video sources are synchronised to common reference timing source
Choice of timing options:
• PTP (SMPTE ST 2059-2) master and backup, via 10GbE IP network interface

- Two tri-level syncs or analogue Black and Burst references (Reference 1 and Reference 2), connected via the Vision 3 frame
- SDI video input, where available (defaults to SDI 1)

Chosen reference is the global reference source for all inputs and outputs

There are up to ten options for the reference selection, selectable via VisionWeb. The hierarchy runs from left to right – should the timing source at the top of the list become missing or invalid, the app will move down the list until it finds a valid timing reference source. When used with IP inputs, the SDI reference option is not applicable and therefore the reference will move to the next valid timing source:

- PTP>Ref1>Ref2>Hold
- PTP>Ref1>Hold
- PTP>Ref2>Ref1>Hold
- PTP>Ref2>Hold
- PTP>Hold
- PTP>Ref1>Ref2>SDI>Hold
- PTP>Ref1>SDI>Hold
- PTP>Ref2>Ref1>SDI>Hold
- PTP>Ref2>SDI>Hold
- PTP>SDI>Hold

("PTP" means PTP Master>PTP Backup. "SDI" means SDI1>SDI2>SDI3>SDI4>SDI5>SDI6, depending on number of SDI available. "Hold" means it will hold the timing of the last good reference)

When using video reference, video inputs can be different formats but only inputs with the same frame rate as reference video will be locked to that reference. Input signals of same frame rate as reference will be locked together and locked to external reference. Inputs with a differing frame rate will be locked and maintain timing with no drift, but their sync point will be undefined (all same frame rate signals will, however, be locked to each other)

When using PTP reference, input sources of different format and/or frame rate will all be correctly locked to the PTP reference

When Auto relock enable is selected, the card will automatically relock when a lost reference is restored. Selecting Force lock (with Auto relock disabled) will force the synchroniser to relock after a reference is restored, and can be activated at a non-critical time to avoid video disturbance

Output timing can be fully adjusted with respect to the reference using three time-based controls: 0 - 42ms adjustable in 0.1ms steps, 0 - 100us adjustable in 1us steps and 0 - 1us adjustable in 5ns steps. Sub frame timing alignment to chosen reference is global to all outputs

Ten frames of input video delay and ten frames of output video delay (adjustable in one frame steps) are available in addition to the M-CLEANIT's main programme delay

ANCILLARY DATA

All ancillary data (excluding audio) is passed from SDI or ST 2022 input to SDI or ST 2022 output. Audio and locked Dolby E is passed through unless muted or replaced by the operator

LED INDICATION OF:

Power okay

PRESETS

The current app settings can be saved in one of 16 locations to be recalled as required

App settings and Input/Output configuration settings can be stored and recalled independently

SIGNAL MONITORING

Comprehensive SDI, IP and PTP monitoring information is available and can be used to generate SNMP traps

Checks can be performed on the following video and audio parameters:

- Video present and time present
- Video format
- Video black
- Video frozen
- Video error
- Audio group 1 present
- Audio group 2 present
- Audio group 3 present
- Audio group 4 present
- Audio present on group 1 channel 1
- Audio present on group 1 channel 2
- Audio present on group 1 channel 3
- Audio present on group 1 channel 4
- Audio present on group 2 channel 5
- Audio present on group 2 channel 6
- Audio present on group 2 channel 7
- Audio present on group 2 channel 8
- Audio present on group 3 channel 9
- Audio present on group 3 channel 10
- Audio present on group 3 channel 11
- Audio present on group 3 channel 12
- Audio present on group 4 channel 13
- Audio present on group 4 channel 14
- Audio present on group 4 channel 15
- Audio present on group 4 channel 16
- Silence group 1 channel 1
- Silence group 1 channel 2
- Silence group 1 channel 3
- Silence group 1 channel 4
- Silence group 2 channel 5
- Silence group 2 channel 6
- Silence group 2 channel 7
- Silence group 2 channel 8
- Silence group 3 channel 9
- Silence group 3 channel 10
- Silence group 3 channel 11
- Silence group 3 channel 12
- Silence group 4 channel 13
- Silence group 4 channel 14
- Silence group 4 channel 15

- Silence group 4 channel 16

Black or frozen video will be indicated by an amber LED. This alert can be delayed by 1-120 seconds to prevent false warnings during brief video pauses

The audio silence alert is triggered at an audio level of -93dbFS and can be delayed by 1-120 seconds to prevent false warnings during quiet audio periods

The following IP parameters are monitored for input flows:

- Network error
- Packet loss
- Duplicated packets
- Packet delay variation. Shown as the skew (difference in time of packet arrival) between the main and protected input, and also as the min and max nano second gap between the packets on each input

The Ethernet interfaces are monitored for:

- Count of packets ignored by the app (general network traffic non-media packets, which do not require processing by the app). Jumps in 100 step increments indicate network traffic flood
- Ignored multicast packets. LED indicates multicast traffic not requested by the app is present on the Ethernet Interface, indicating incorrectly configured IGMP at the network switch

References are monitored for:

- Reference 1 and 2 present and time present
- Reference 1 and 2 format
- PTP master and backup clock present and time present
- PTP statistics – network delay, delay variation, reference offset and sync period

REMOTE CONTROL

The SBB-4 is the recommended way of controlling the M-CLEANIT, but all the standard Crystal Vision control methods are available to suit all preferences

Software:

VisionWeb Control is available via the web server on the frame and allows control and monitoring using a standard web browser on a computer, tablet or phone

SNMP monitoring and control available as standard

Control using ASCII and JSON protocols

Hardware:

Control from integrated control panel on Vision 3 frame

Control from VisionPanel 3U remote panel

SBB-4 smart button box connects to the frame via Ethernet and provides four programmable LCD switches, which are momentary and use a button press to initiate the ON action and a button release to trigger the OFF action. By default these buttons are set to Mute A, Blur A, Switch to B and Switch to C, but the customer can request any of the available actions to be assigned to a button. The SBB-4 uses information from VisionWeb for settings. Uses Power over Ethernet so must be used with PoE enabled switch