USER MANUAL

Vision SYSTEM

M-WEBKEY

IP/SDI web page keyer

Crystal Vision

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Contents

Revision 1	Updated block diagram on page five. Updated VIDEO LOSS CONTROLS wording on page 32. Updated SYNCHRONISER AND TIMING ADJUSTMENTS wording on page 33.	02/06/20
Revision 2	User interface screen shots updated to align with V2.3 MARBLE-V1 and V1.19 Vision 3 software releases. Added VR07 relay bypass. Added new audio monitoring and audio mute features. Added new preset features. Updated use of flow terminology.	04/07/22

1 Introduction

M-WEBKEY is a 3G/HD/SD-SDI web page keying software app that runs on the MARBLE-V1 media processor – purpose-built GPU/CPU hardware that fits in the Vision frame. With its ability to key a web page on to an uncompressed video input, this unique product provides a cost-effective alternative to a full graphics system for both SDI and IP infrastructures.

The M-WEBKEY includes an internal web page renderer, with the user able to enter the required URL using the VisionWeb control software or a remote protocol. The M-WEBKEY allows input 1 or a matte to be set as the background source, with the foreground source and key signal coming from the URL that is entered. The transparency and location of the graphic is achieved by the key signal which is part of the web page. The M-WEBKEY will typically be used with web pages on internal servers. It is also possible to store an HTML file in the Vision 3 frame if required.

Like all MARBLE-V1 video processing software apps, the M-WEBKEY can be used with IP (ST 2022 or ST 2110 video), with SDI or with both IP and SDI at the same time (thereby providing gateway functionality).

M-WEBKEY:

- Key a web page on to an SDI or IP input using the app's internal web browser
- Internal renderer extracts foreground (fill) and key/mask information from the web page and matches web page resolution to background input
- One background video input and two video outputs
- Video output source routing: route each output independently to Keyer Main, Keyer Aux or video input
- Ten frame adjustable video input delay in one frame increments
- Internal force foreground and background adjustable crops with edge softness adjustment
- Two DNS server addresses

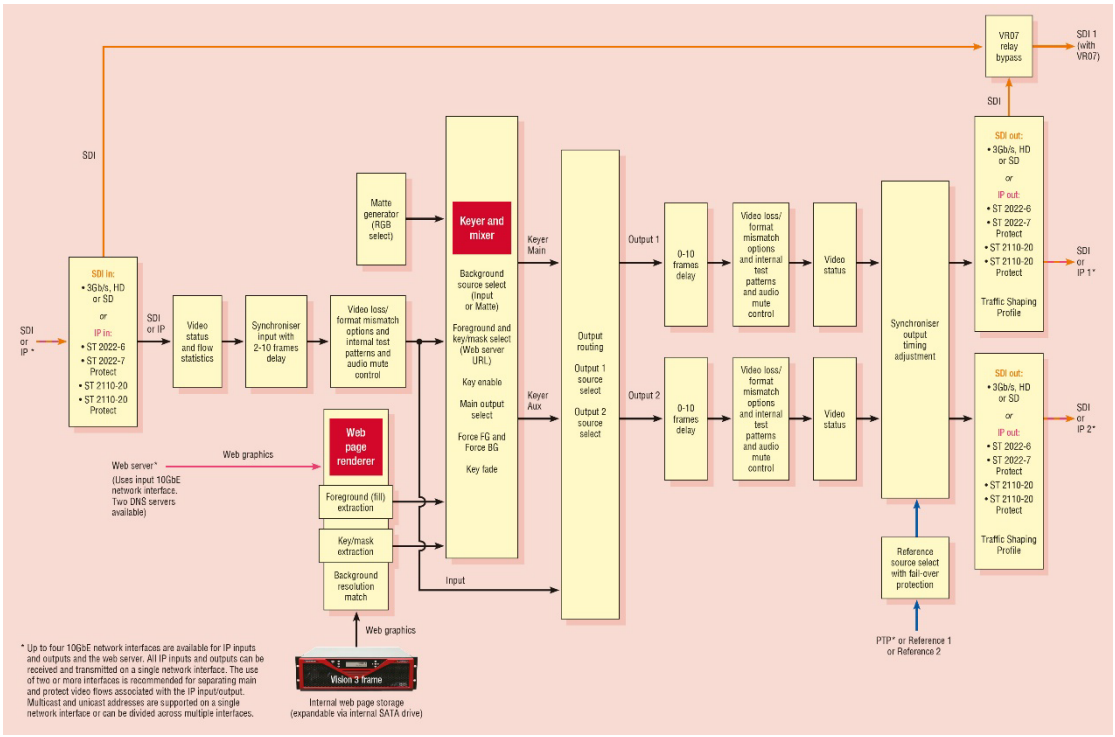
Common MARBLE-V1 feature set:

- Supports SMPTE ST 2022-6 and ST 2022-7 protocols and video within ST 2110 (supporting ST 2110-10, -20 and -21 standards)
- 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 monitoring
- IP inputs tolerant of any input packet distribution
- Instant clean switching between input flows, 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 frames 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-WEBKEY



3 Hardware Installation

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

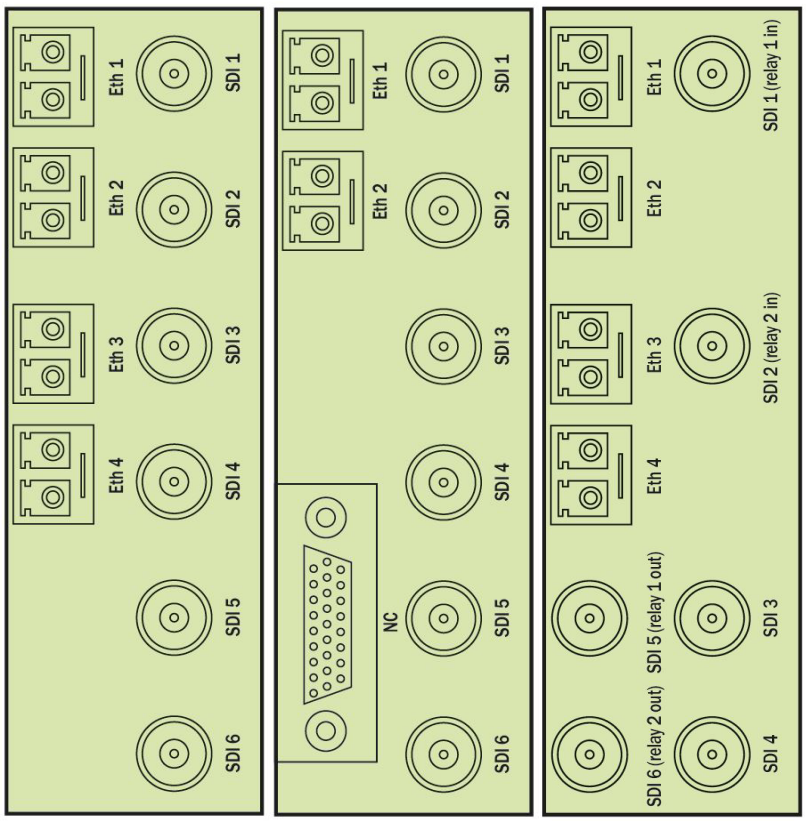
The app based MARBLE-V1 cards are intended for use only in the Crystal Vision ‘Vision’ frame range and not in older style frames such as ‘Indigo’.

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-WEBKEY 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

SDI 2: No connection

SDI 3: No connection

SDI 4: No connection

SDI 5: SDI Out 1

SDI 6: SDI Out 2

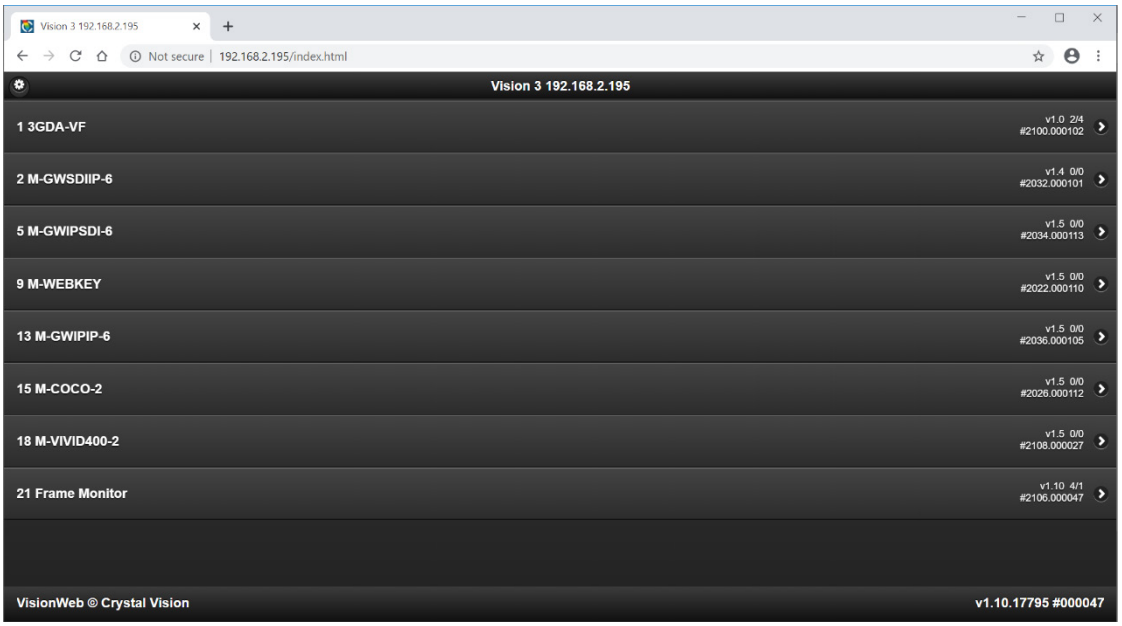
Eth 1 to 4: 10GbE video over IP I/O and web server input

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 I/O Configuration

VisionWeb web browser control software 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 and ST 2110 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 provides 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, or input flows to be separated from output flows.

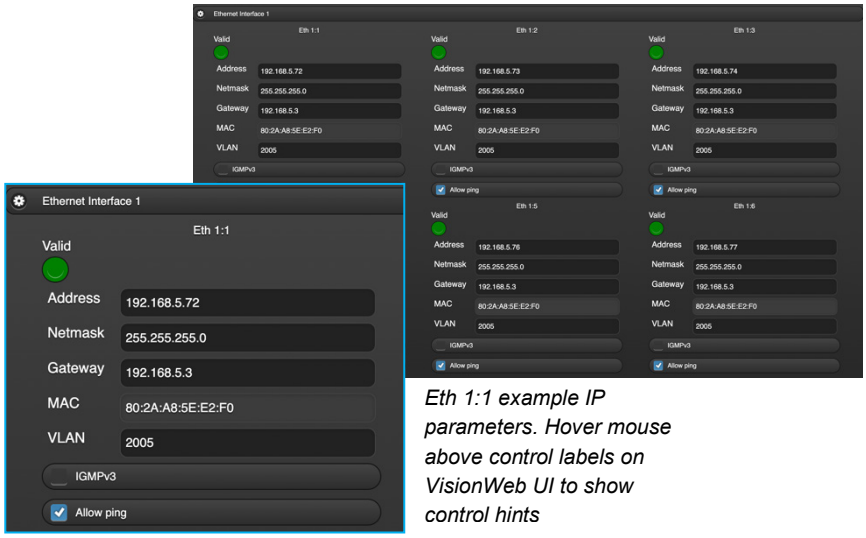
Within each Ethernet interface there are six virtual interfaces. These are useful for software apps which process six individual IP flows, such as the IP gateways, as each flow can be assigned to its own unique IP address. For the M-WEBKEY app fewer connections will require configuration. If using SDI I/O then only one virtual interface will need connecting, typically Eth 1:1, which should be configured to allow connection to the LAN for web server connectivity.

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

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

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

If using IP I/O the same Ethernet interfaces configured for the IP flows can be used for the web server connection. Alternatively the web server connection or IP Flow Outputs can be separated onto Eth 3 & 4.

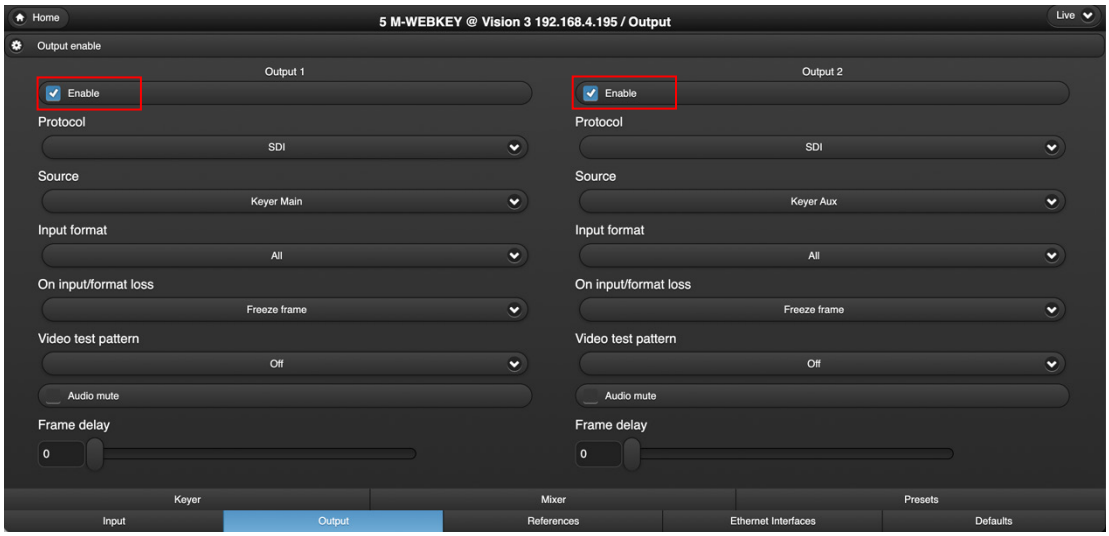


Eth 1:1 example IP parameters. Hover mouse above control labels on VisionWeb UI to show control hints

4.2 Enabling Inputs & Outputs

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

M-WEBKEY Input Enable

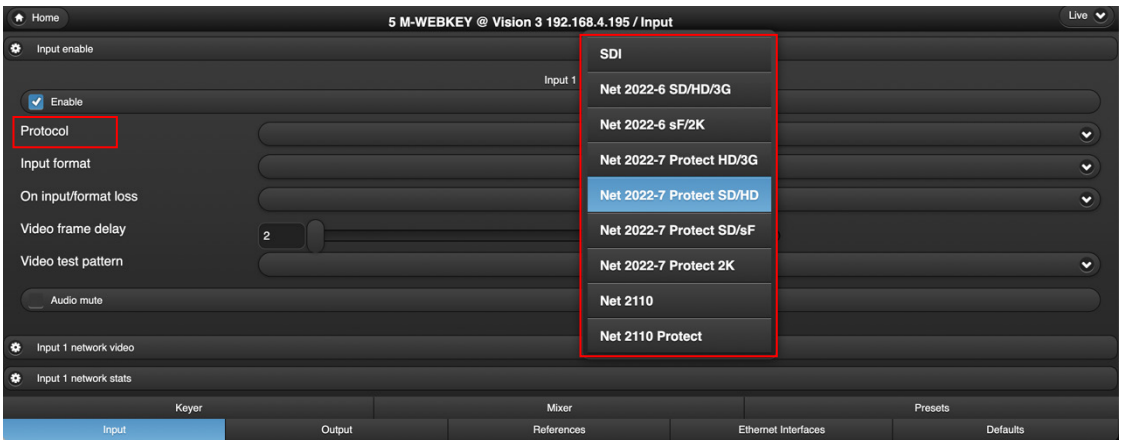


M-WEBKEY Output Enable

4.3 Select I/O Protocol

M-WEBKEY supports SDI and uncompressed video over IP protocols ST 2022 and ST 2110-20. 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 2110 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 and Output control tabs. The protocol type will need selecting for the input and each output.



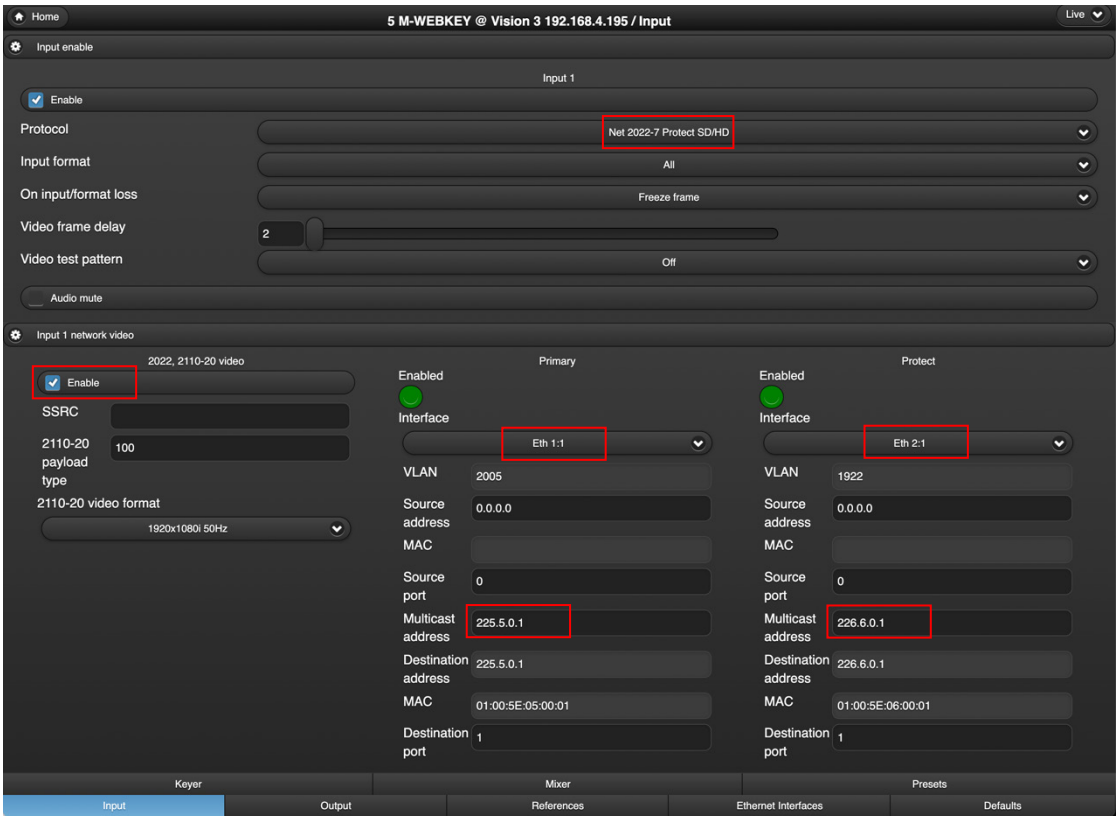
M-WEBKEY Input Protocol Selection

IP output flow transmission supports both Block Packing Mode (BPM) and General Packing Mode (GPM) for ST 2110-20 encapsulation. BPM, which packs multiple (up to 7) 180 byte blocks into an RTP payload, is a restricted subset of GPM, and GPM is the more general case.

4.4 Receiving an IP Flow

M-WEBKEY receives ST 2022 or ST 2110-20 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-WEBKEY 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-WEBKEY Input 1 IP Flow In

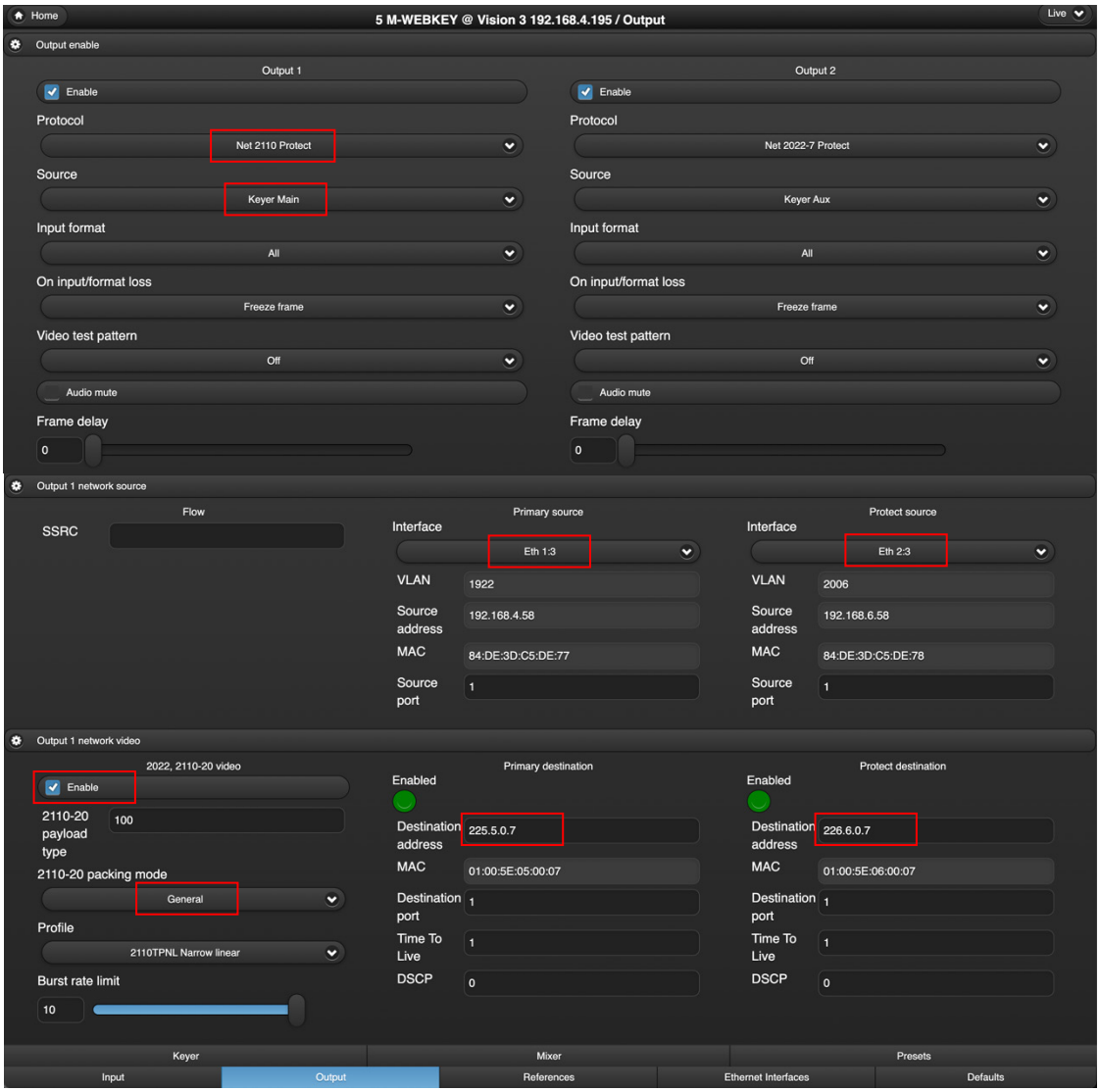
The controls highlighted in the above configuration show Input 1 of the M-WEBKEY set to receive the 'main' flow packets on Ethernet Interface 1:1 and 'protect' packets of the ST 2022-7 protocol on 2:1. In this example multicast IP addresses are in use.

To successfully receive a flow, all IP parameters must agree with those of the transmitter. If receiving ST 2110, the 2110 payload type and 2110 format will need to match the transmitter.

4.5 Transmitting an IP Flow

M-WEBKEY transmits ST 2022 or ST 2110-20 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-WEBKEY configured to transmit Output 1 using ST 2110-20 GPM Protect protocol. When selecting a protect protocol it is necessary to configure both the ‘Network Out’ and ‘Protect Network Out’.



M-WEBKEY Output 1 IP Flow Out

The controls highlighted in the above configuration show Output 1 of the M-WEBKEY routing the Main output of the Keyer processing block to Ethernet Interface 1:3 and 2:3 using ST 2110-20 GPM Protect 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.

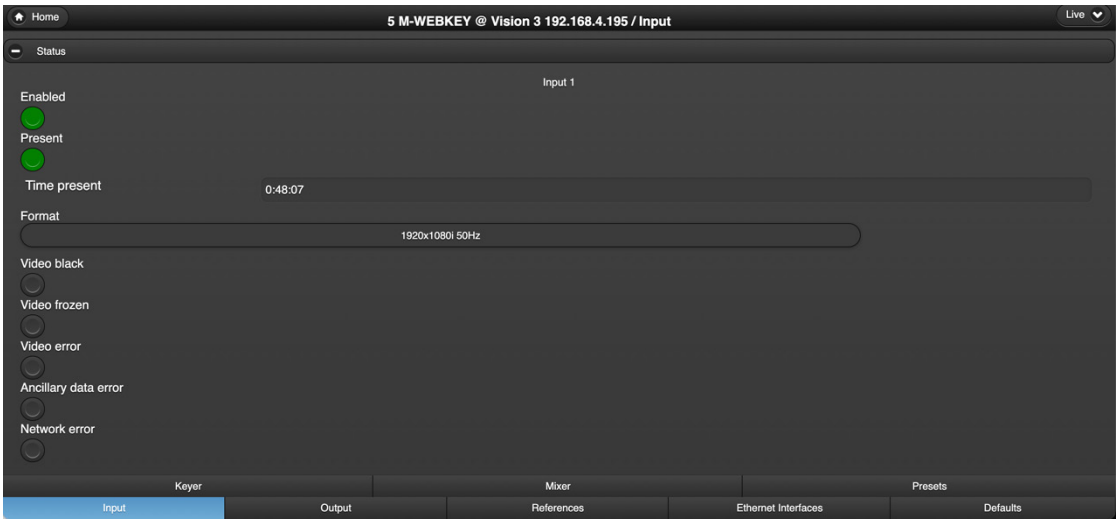
VLANs, ports and Time To Live (TTL) should be configured as per the network switch requirements.

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

When transmitting ST 2110 the required payload type value should be set. The value for payload type is arbitrary and decided by the user. For example, value 100 could be used to indicate 1920x1080i 50Hz content and value 101 used to indicate 625i 50Hz content.

5 Status

5.1 Input Video status



Input video status

Video Status

Enabled LED: Green when input is enabled, otherwise off

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 50Hz

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

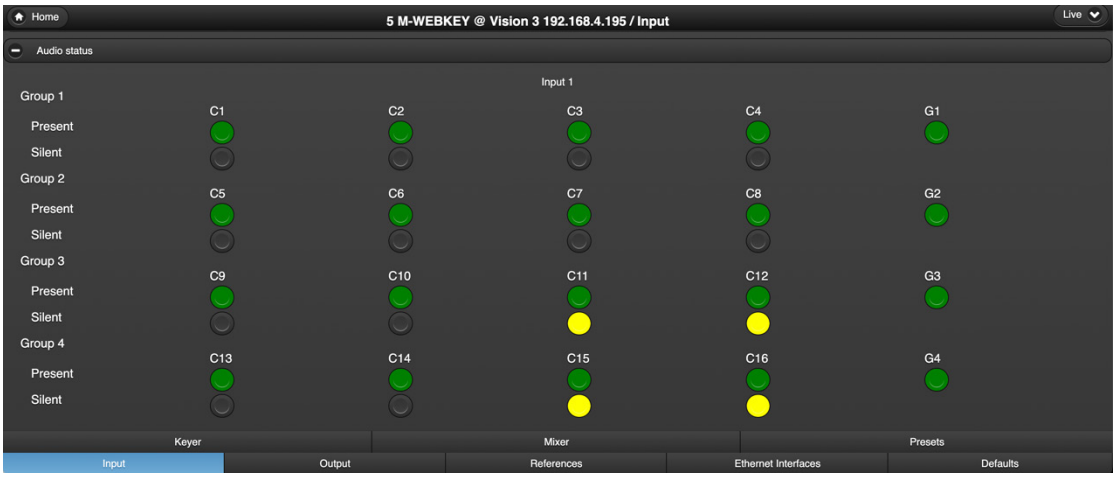
Video frozen LED: Yellow if input is frozen, otherwise off

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

Ancillary data error LED: Red if ANC data errors detected at input, otherwise off

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

5.2 Input Audio status



Input audio status

Audio Status

Audio Group 1 to 4 present LED: Green when audio groups present, otherwise off

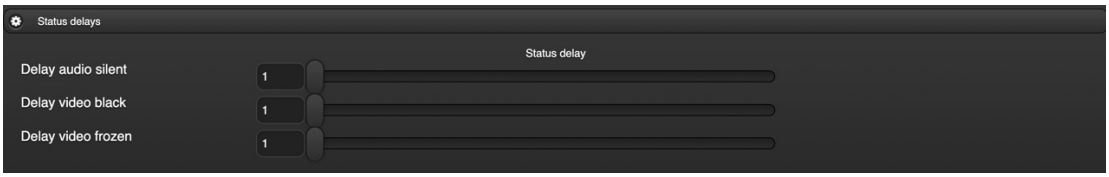
Audio Channel 1 to 16 present LED: Green when audio channels present, otherwise off

Audio Group 1 to 16 silent LED: Yellow when audio channels silent (-93dBFS trigger point), otherwise off

The equivalent output status is also provided for video enabled, video present, video format, video black, video frozen, audio groups present, audio channels present and audio channels silent.

5.3 Status Delay

Audio silent, video black and video frozen status can be prevented from triggering until a user selectable delayed period between 1 to 120 seconds has expired. These controls are located within the ‘Defaults’ tab.



Status delay

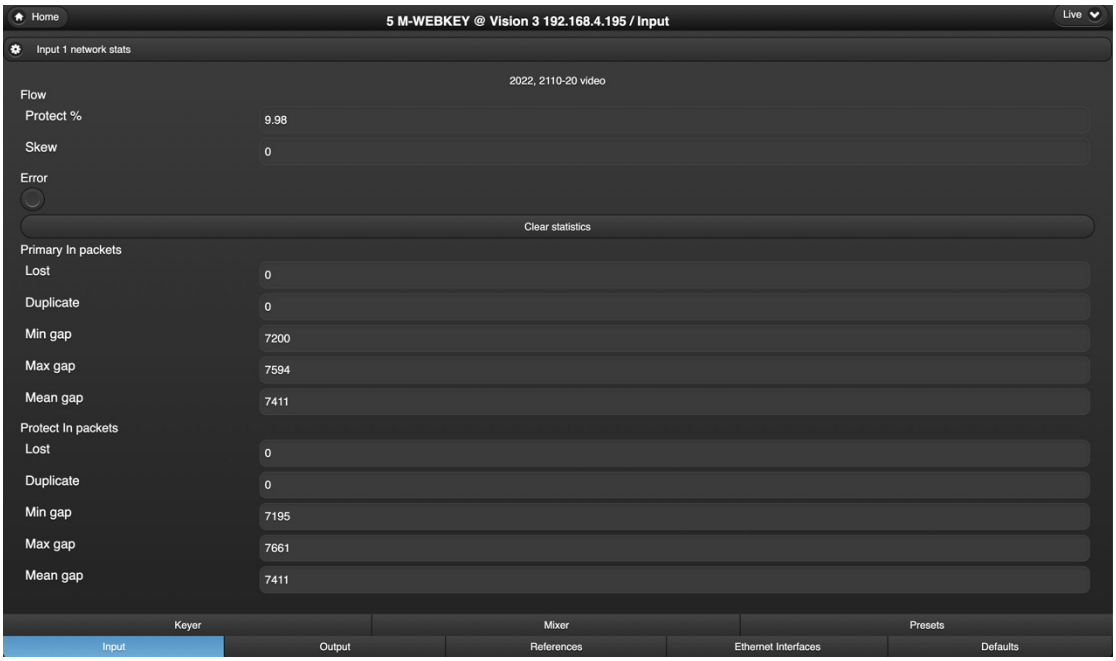
5.4 Network Status & Statistics

Input network status

Enabled LED: Green when input is enabled, otherwise off

Present LED: Green when input is present, otherwise off

Error LED: Red if lost or duplicate packets detected at input, otherwise off



Input 1 flow network statistics

Flow Statistics

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

Skew: Difference in packet arrival. –ve 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)

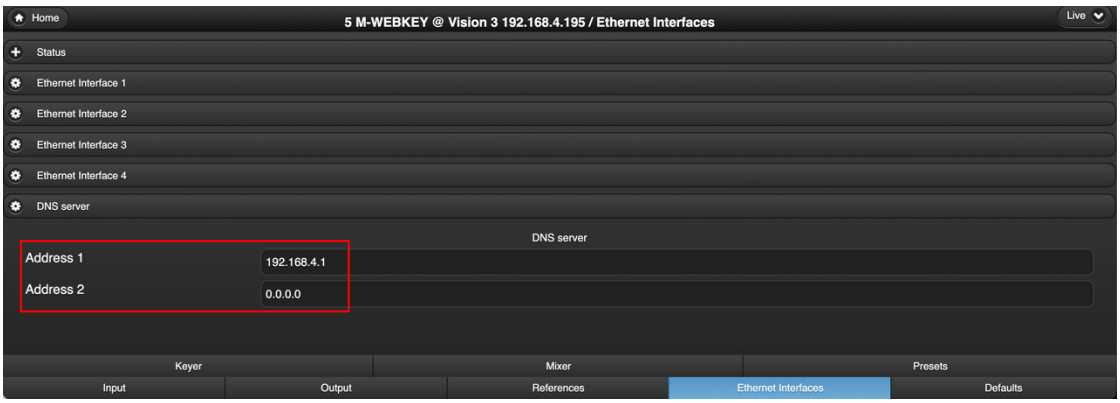
Mean gap: Mean gap between packets of a frame (nSec)

6 Keyer and Mixer

6.1 Configuring the Web Page Keyer

DNS Server

M-WEBKEY can key content from web servers connected to the same local network without needing to enter a DNS server address. To key external web server content, a DNS server address should be entered on the Ethernet Interfaces control tab. Up to two addresses can be entered.

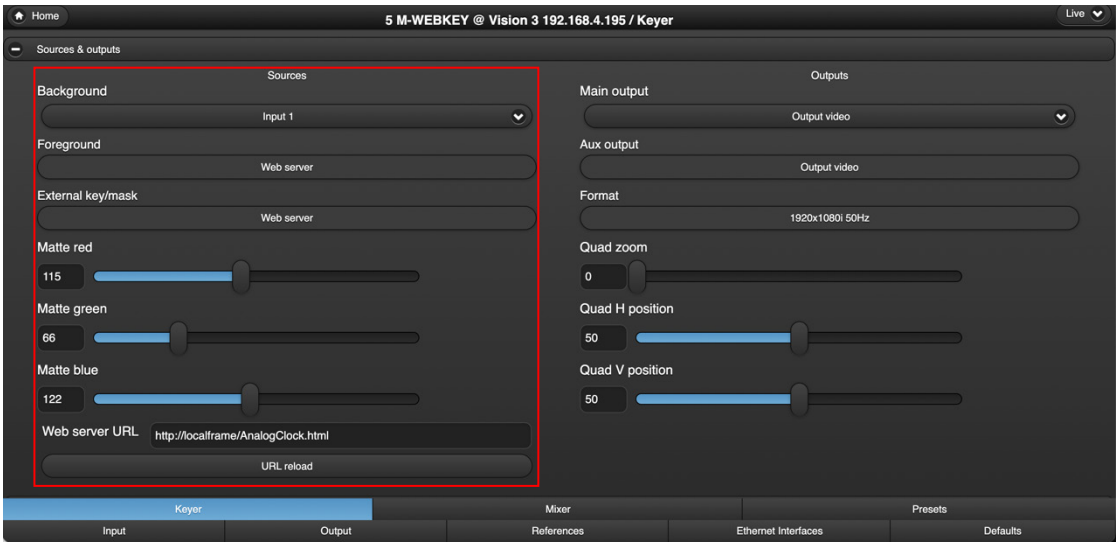


Ethernet Interfaces DNS server addresses

Keyer Sources

The foreground (fill) source along with its associated key information is derived from the web server URL address. The background source would typically be the SDI/IP input video, but could be set as an internal matte using the RGB matte sliders to determine the matte colour.

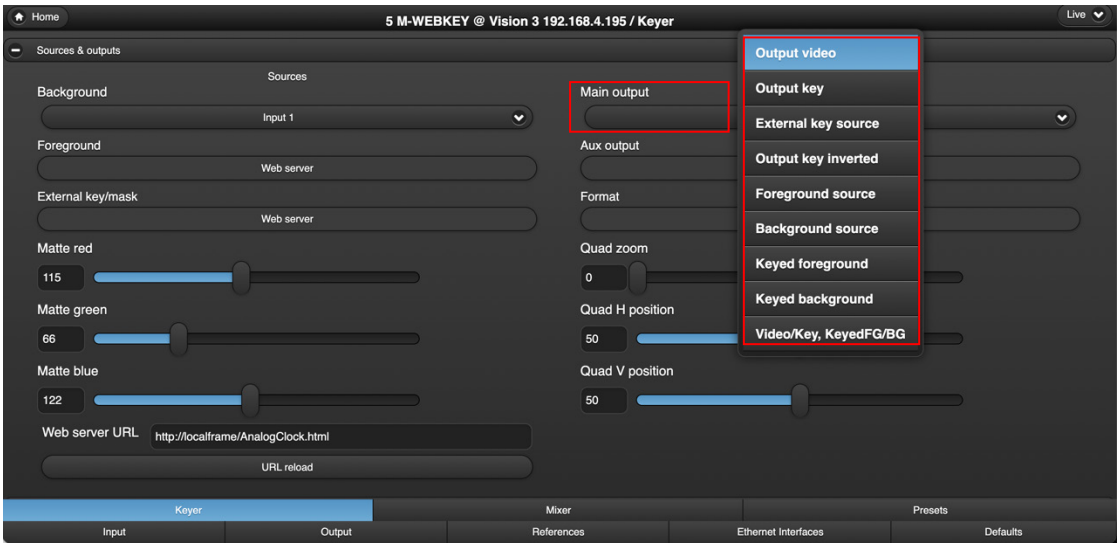
The Vision 3 frame also serves an internal analogue clock webpage. This can be access by typing http://localframe/AnalogClock.html into the web server URL.



Keyer source selection

Keyer Outputs

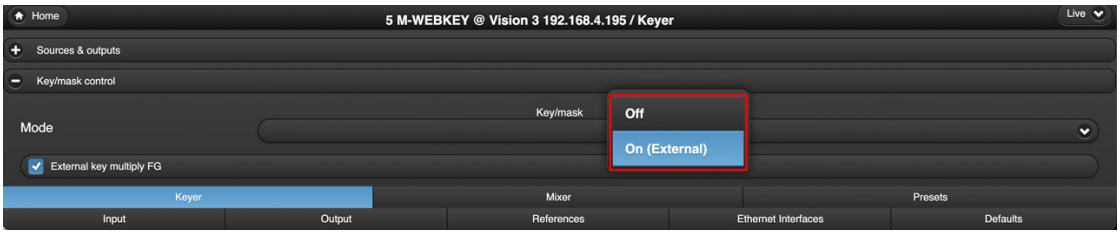
The keyer processing provides both a ‘Main’ and ‘Aux’ output. The Aux output is fixed to display the final processed output from the keyer. The Main output however, can be routed to display keyer source signals or keyed signals at various stages of the key processing.



Keyer Main Output signal processing selection

Key Control

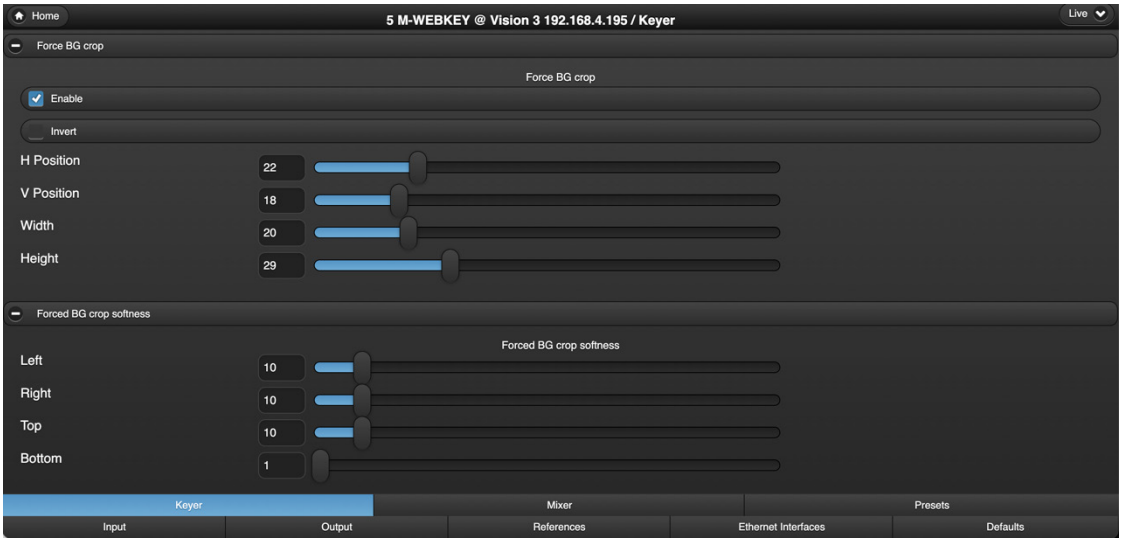
Use the Key Control to enable external keying of the key sources.



Key on/off control

Force areas of background or foreground

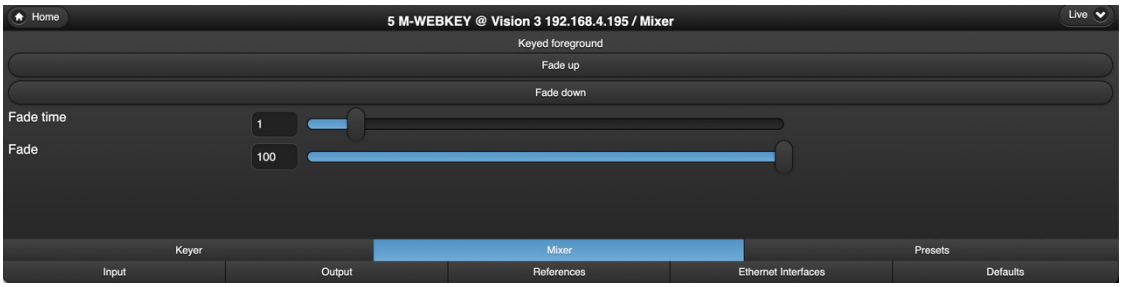
Using the Force BG and Force FG controls it is possible to force areas of the foreground or background input sources. Use the crop controls to determine the size and position of the forced area. Use the softness controls to apply a soft edge to the forced area.



Force Background and Foreground

6.2 Mixer

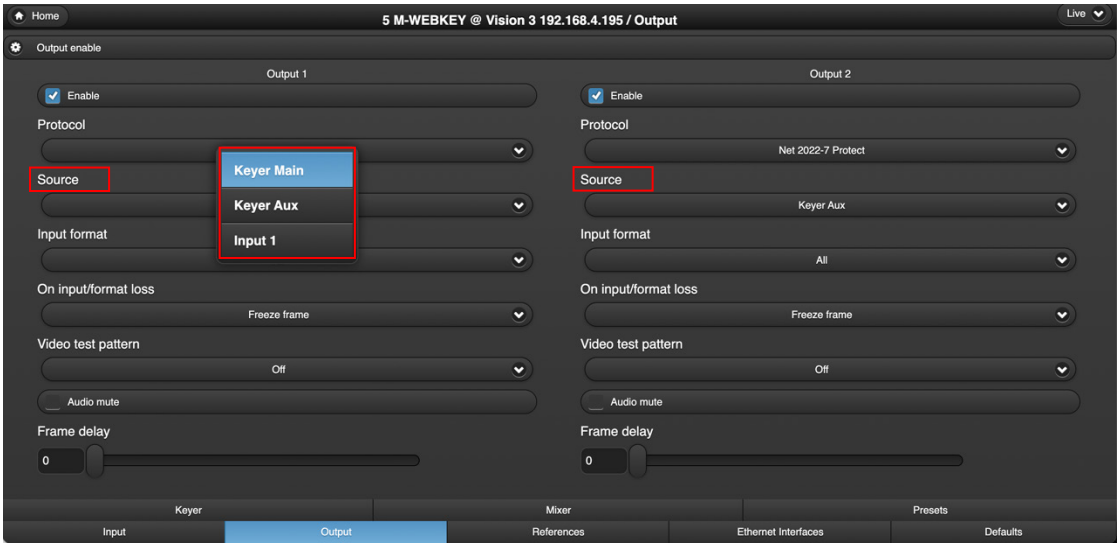
The keyed foreground can be faded up and down using the fade buttons on the Mixer control tab. Fade time from 0 to 10 seconds can be set.



Mixer Fade Key

6.3 Keyer Output Routing

Both outputs can be independently routed to either the Main or Aux source from the keyer processing block, or to route the SDI/IP input directly to the output after the input frame delay processing.



Output routing

7 References and Output Timing

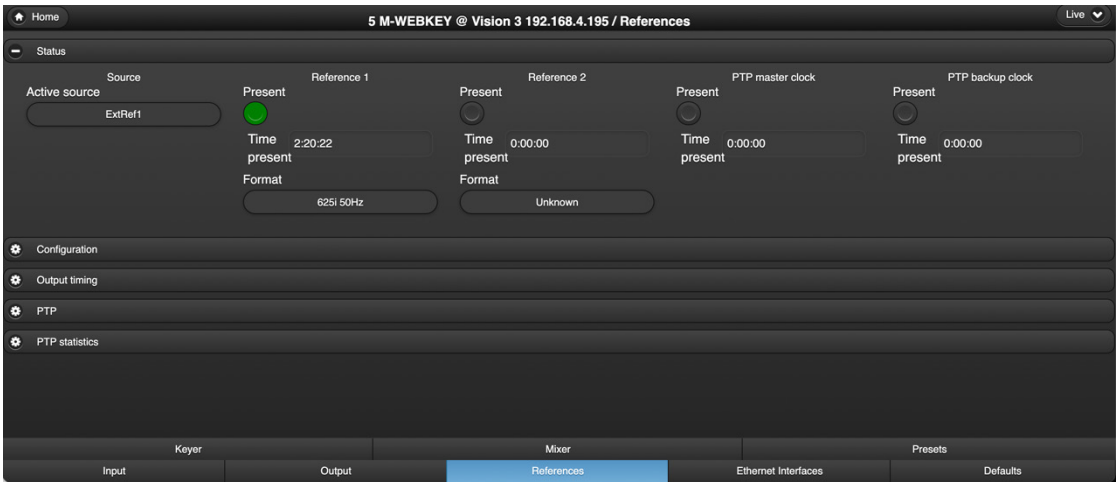
7.1 References

M-WEBKEY outputs 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 in order to maintain a valid output.

Status



Reference Status

Active source: Reference source outputs are locked to

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. 625i 50Hz

Reference configuration

Reference Configuration

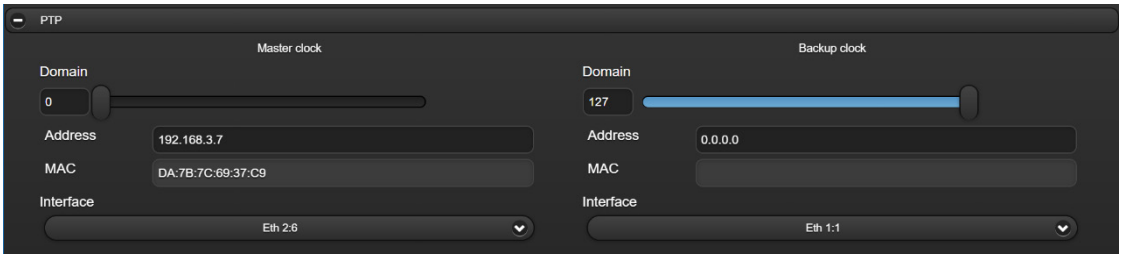
Reference source: Select priority order of reference source. Will automatically fail-over to next source in list if priority source missing

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

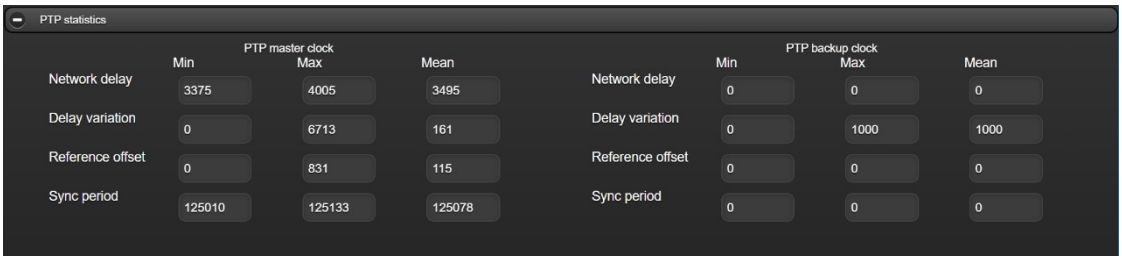
Domain: Domain number of the PTP clock

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

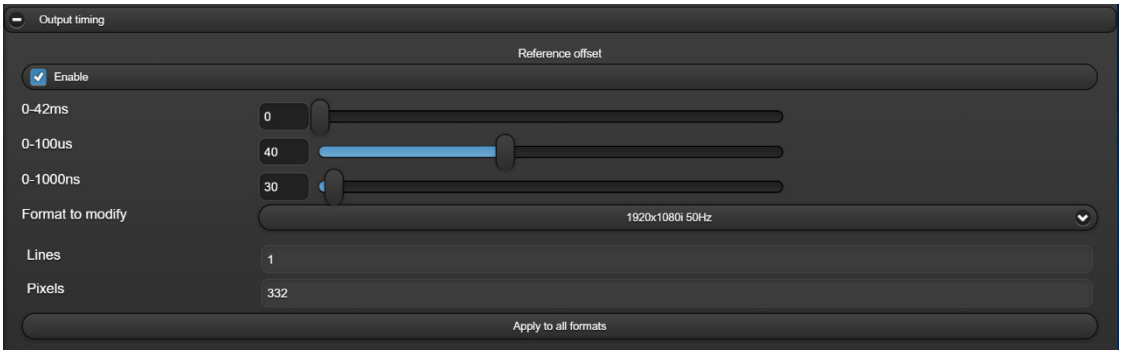
Delay variation: Indicates system noise and how accurately MARBLE-V1 can lock. For example, to lock within 500ns, the delay variation should be less than 500ns

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

7.2 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

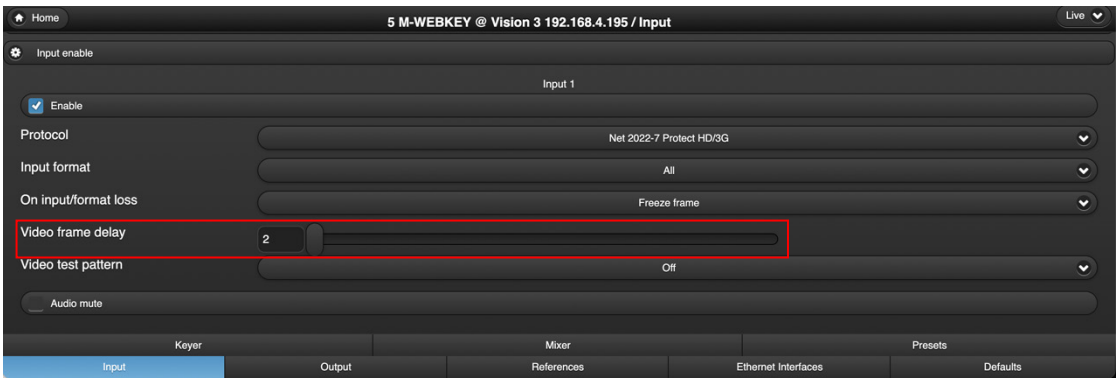
Format to modify: Independently adjust output timing for each video format

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

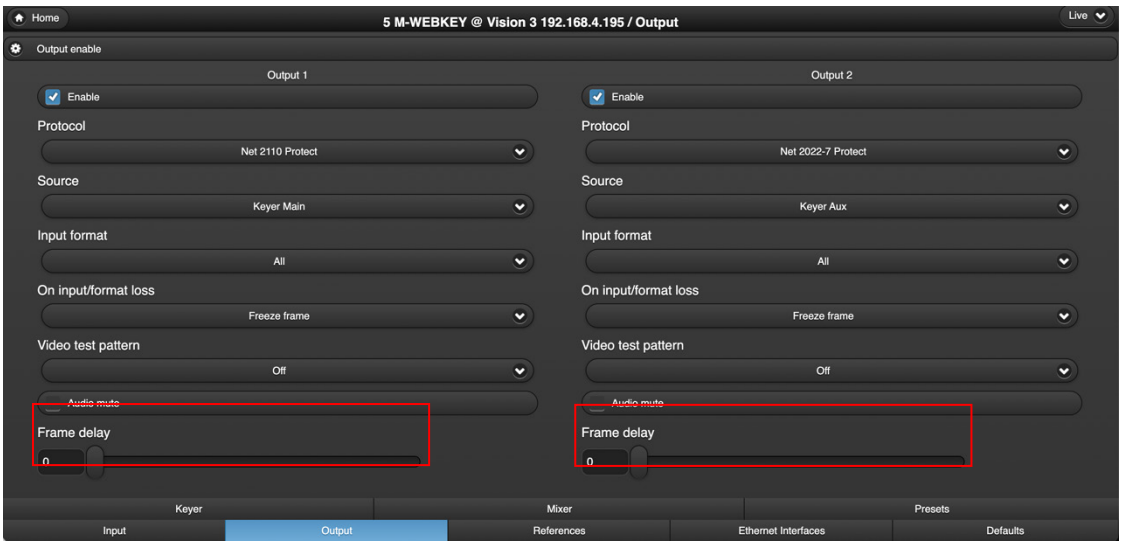
Lines/Pixel: Read only status of the output timing in equivalent lines and pixels

7.3 Frame delay

Up to ten frames of delay adjustable in one frame steps can be applied to the input and each output. The minimum processing delay is 2 frames as indicated by the minimum setting of the input video frame delay controls.



Input Frame Delay



Output Frame Delay

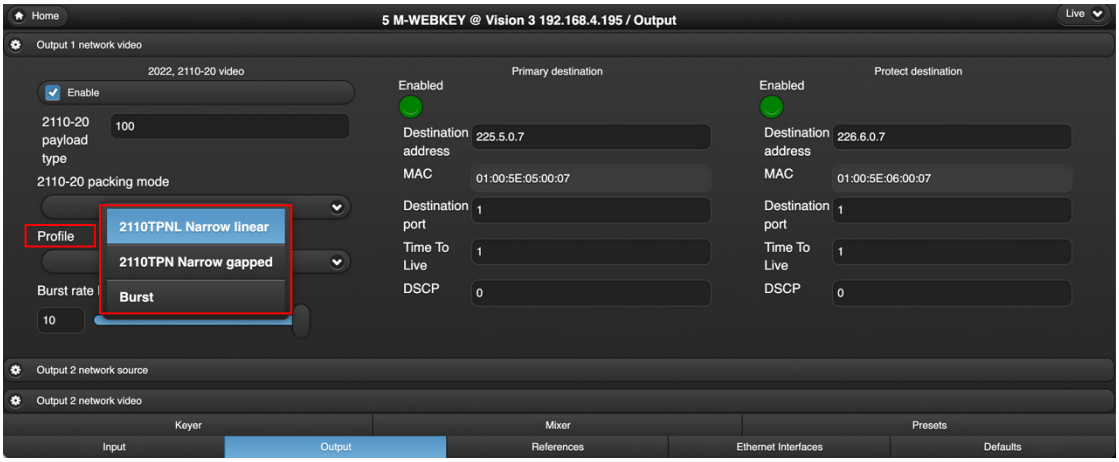
8 Traffic Shaping Profile

8.1 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.

SMPTE ST 2110-20 supports both narrow linear (TPNL) and narrow gapped (TPN) transmission. As per SMPTE ST 2022 transmission, TPNL transmits the packets evenly spaced throughout the duration of each entire video frame, but starting one line after the first Start-of-Frame (SOF) VANC period. TPN, however, does not transmit packets during the VBI or VANC period of the traditional corresponding SDI video frame.

For both SMPTE ST 2022 and ST 2110-20 protocols it is possible to 'burst' the packets out as fast as possible, using the 'Burst rate limit' control to determine the maximum bandwidth the burst traffic will limit to.



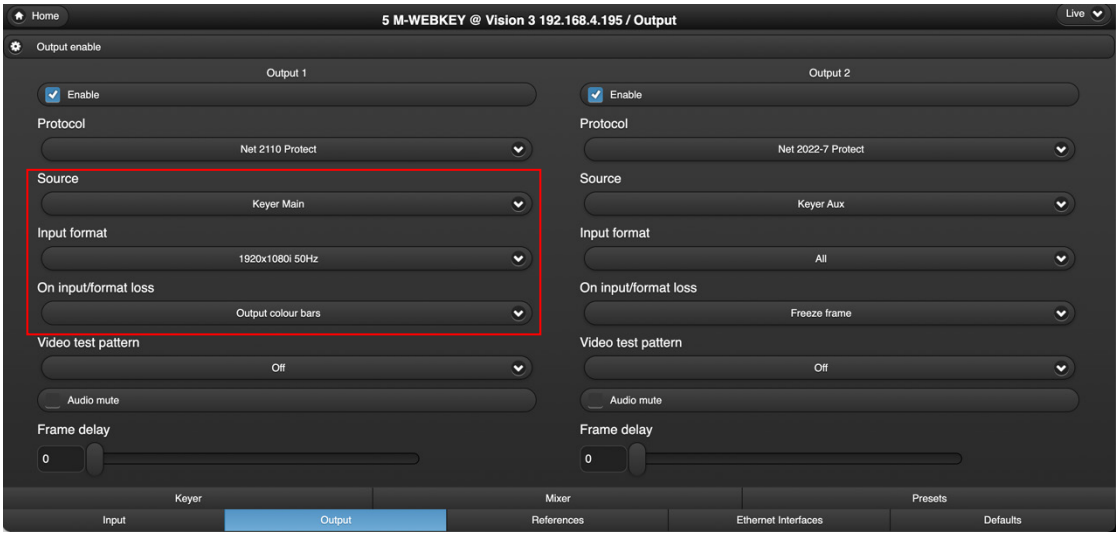
Traffic Shaping Profile

9 Input Format, Input Loss and Test Pattern Options

9.1 Input Format and On Loss of Input

All apps provide an Input Format control. 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 loss of input’ function is triggered.

In the example below, if the source input format from the keyer processing is not 1920x1080i 50Hz, the output will be replaced with colour bars.

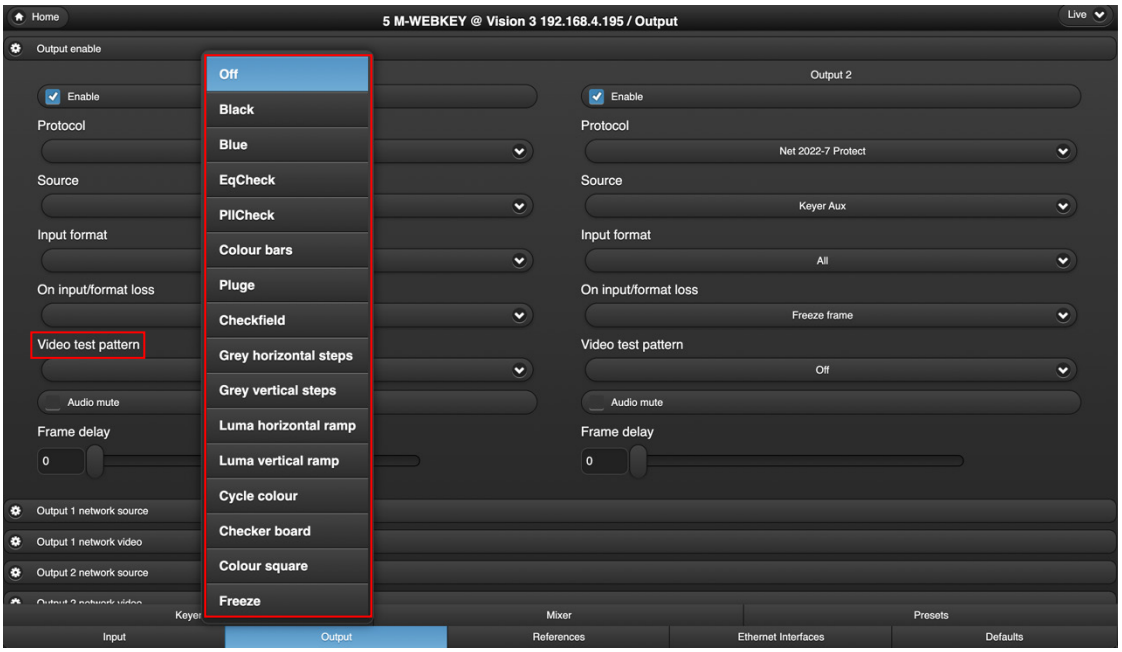


Input Format and On Loss Options

Apps which combine multiple input flows to produce an output, such as keying apps, feature ‘On loss of input’ functions at both the Flow In and Flow Out stage. This is to provide on loss of input functionality for video sources to and from the processing block.

9.2 Internal Test Patterns

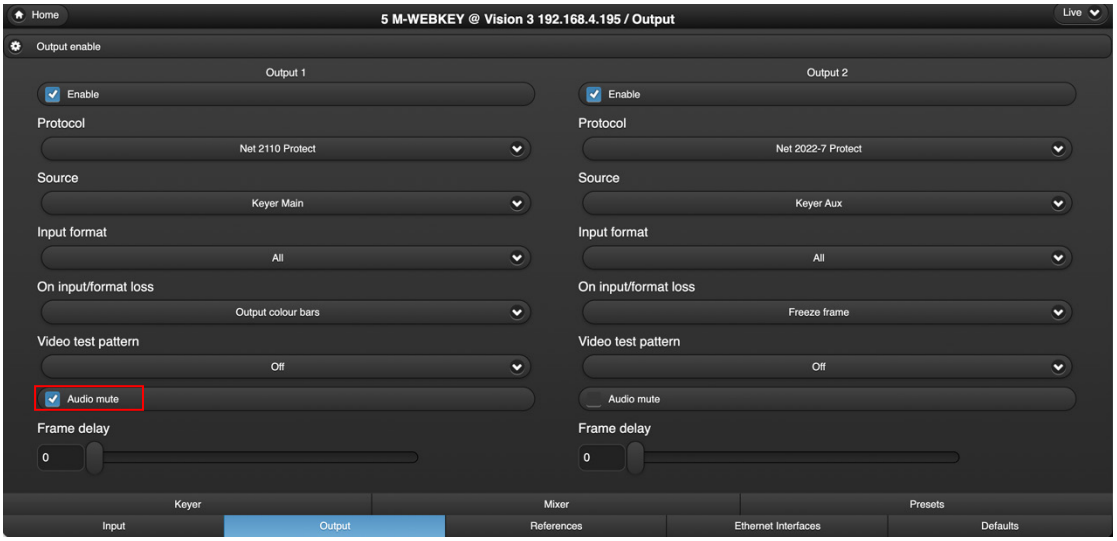
The following internal test patterns are provided which, when enabled, replace the outgoing video content with the selected test pattern.



Internal Test Pattern options

9.3 Audio mute

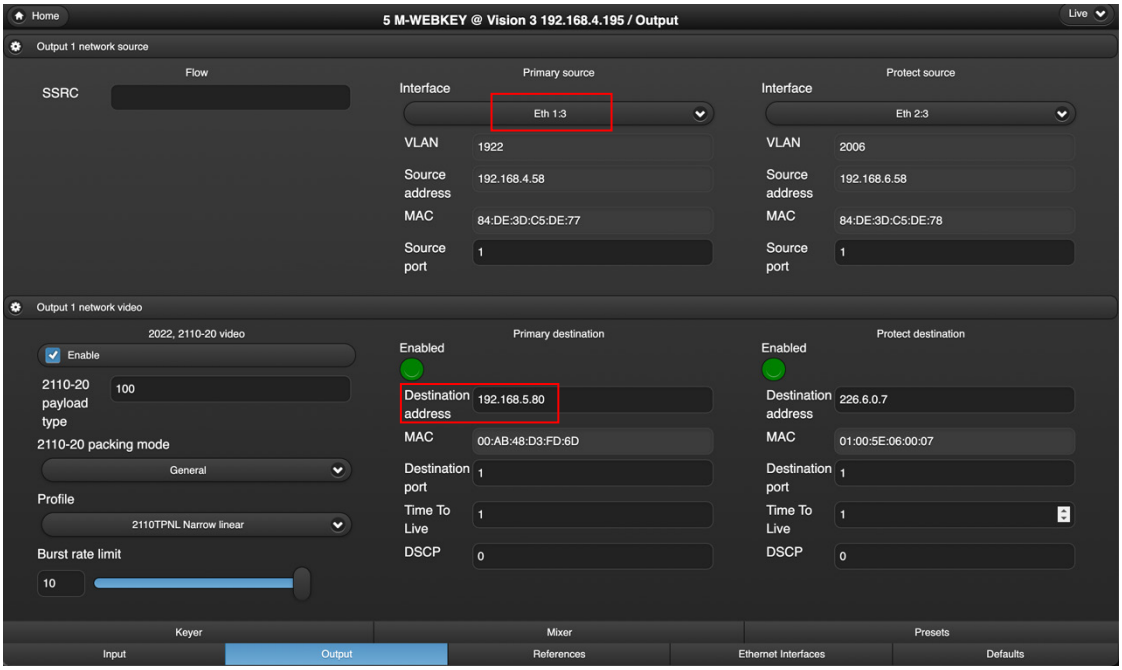
Embedded audio present in SDI or ST 2022 inputs will be passed through to the outputs. Use the Audio mute controls to mute embedded audio present on the output.



Audio mute

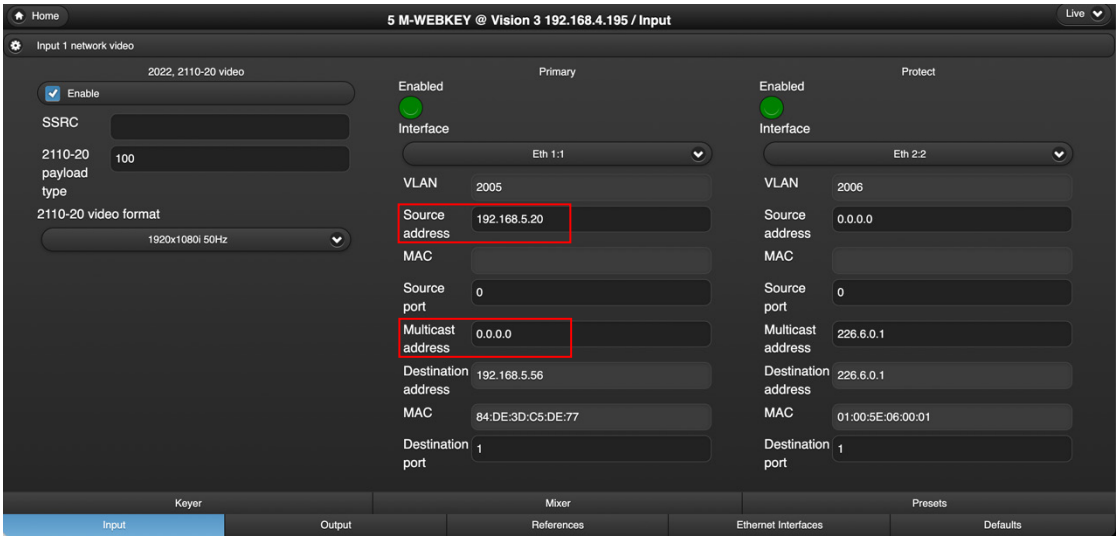
10 Unicast Flow Configuration

To transmit a unicast flow, the output network video ‘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 1:3 on the M-WEBKEY is now set to transmit the flow to a downstream device with IP address 192.168.5.80.



Unicast IP Address transmit

When receiving a unicast flow, the input network video ‘Multicast address’ should be set to 0.0.0.0. The input flow ‘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 192.168.5.20.



Unicast IP Address receive

11 Basic Trouble Shooting

11.1 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 I/O protocol has been selected
- Check IP 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

11.2 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 flow 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.

11.3 IP flows keep stopping after a few minutes

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

12 Specification

M-WEBKEY 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

INPUT AND OUTPUTS

Input can be IP or SDI
Outputs can be IP and/or SDI
Input and outputs can be mixture of ST 2022 and ST 2110. Video can be passed between ST 2022 and ST 2110, although audio and any other non-video data will be lost
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+ when using a web page located in the Vision frame. When using a web server for the web page, SDI only applications will require one SFP+
Uses VR04, VR06 or VR07 frame rear modules. VR04 or VR07 must be used when more than two SFP+ are fitted

SDI VIDEO INPUT

(NB. Input can be IP instead)
Up to one 3Gb/s or HD or SD SDI input
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 INPUT

(NB. Input can be SDI instead)
Up to one 3Gb/s or HD or SD video input
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)
Packet distribution is not important as variable input buffer will compensate for any timing irregularities. Any traffic shaping option from ST 2110-21 can be used, or packets can come from a device which does not meet the shaping requirement of ST 2110-21
A protect input for SMPTE ST 2022-7 seamless protection switching or the equivalent protect input in ST 2110-20 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 of 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 of the outputs can be SDI instead)
Up to two 3Gb/s or HD or SD video outputs
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)
Any of the 10GbE IP network interfaces can be used to provide a protected output for SMPTE ST 2022-7 or ST 2110 seamless protection switching, 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

RELAY BYPASS PROTECTION (SDI ONLY)

The VR07 frame rear module provides dual relay bypass protection when M-PIP is used with both SDI inputs and SDI outputs
The relay bypass protection protects the video output on frame power failure or if the MARBLE-V1 card loses power or is removed
An electromechanical relay switch on the VR07 needs power to hold the switch in one state and will revert to the other state (card bypass) on loss of power. It prevents signal loss by mechanically connecting the SDI input to an SDI output: SDI In is connected to SDI Out 1
NB. Use of the VR07 requires issue 5 or later of MARBLE-V1

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 supported on network interfaces: SMPTE ST 2022-6, SMPTE ST 2022-7, SMPTE ST 2110-20 (uncompressed video), SMPTE ST 2110-10 (system architecture and synchronisation), SMPTE ST 2110-21 (traffic shaping), IGMPv3, ARP, ICMP ping, IPv4, IEEE802.1q, VLAN, IEEE802.3-2012 (10G Ethernet), LLDP
NTP via Vision 3 frame provides time of day for clock displays on web pages
Packing options of the ST 2110-20 video flow are selectable per IP output between BPM and GPM (Block Packing Mode or General Packing Mode)
Packet shaping and distribution of the video flow (compulsory in ST 2110 and 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 and ST 2110 flow protection facilitates the dual stream output

ROUTING

The keyer processing block provides a main and aux output. The aux output shows the final result of the keyer processing (output video), whereas the main output can show different stages of processing (see KEYER section)
The output routing allows selection between Keyer Main and Keyer Aux for each of the two outputs. For example, Output 1 could be set to Keyer Aux and therefore display the final output video of the keyer processing, whereas setting Output 2 to Keyer Main allows this output to be used to preview different stages of the keyer processing. Additionally the output routing can be set to Input 1 to monitor the input being used as the background source to the keyer

WEB BROWSER RENDERER

Web page provides the fill and key
Web pages can be accessed remotely – with two DNS servers available – or can be stored internally on Vision 3 frame, with storage expandable via internal SATA SSD drive
Web page resolution is matched to background video resolution
Web page fill and key transparency information is extracted
Web page can include areas of the key to be masked

KEYER

External Key mode uses web page transparency to key the web page over a background source
Background source can be set to Input 1 or Matte Foreground and external key/mask source is fixed to the web server
Foreground and external key/mask source is fixed to the web server
Keyer Main Output can be set to show processed Output video, Output key, Output key inverted, Foreground source, Background source, External key source, Keyed foreground or Keyed background
Keyer Aux Output shows processed Output video only
External keying can be enabled or turned off

INTERNAL FORCE FOREGROUND AND FORCE BACKGROUND CROPS

Two internal crops can be turned on or off to force areas of foreground and background. They can be inverted and adjusted in position and size
Edge softness controls prevent hard edge on crop, with each edge individually selectable

INTERNAL MATTE GENERATOR

The keyer background source can be replaced with a colour produced by an internal matte generator

MIXER

Key can be faded up or down as a timed transition, with fade time set from 0-10 seconds
Fade level can be manually adjusted between 0% and 100%

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 the 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)

"Hold" means it will hold the timing of the last good reference

When using video reference, a video input of the same frame rate as the reference will be locked to the external reference. An input with a differing frame rate will be locked and maintain timing with no drift, but the sync point will be undefined

When using PTP reference, a video input of any supported standard will be correctly locked to the PTP reference
PTP timing reference should be used when there is a ST 2110-20 output to ensure the RTP timestamp is related to the time of day. However without a PTP reference, a valid ST 2110-20 signal will still be generated using a free running RTP timestamp
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
Minimum input delay is two frames which equates to the minimum processing delay. Eight additional frames of input video delay (adjustable in one frame steps) allows delay compensation between the background source and delayed sources from the web server
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 output video delay (adjustable in one frame steps) allows compensation for any big system delays. This delay can be configured individually for each SDI or IP output

ANCILLARY DATA
All ancillary data (including audio and locked Dolby E) is passed from SDI or ST 2022 input to SDI or ST 2022 output. When ST 2110 input or output is selected, all ancillary data is discarded

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

Software:

VisionWeb Control is available via the web server on the frame and allows 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 configured for each order). The SBB-4 uses information from VisionWeb for settings. Uses Power over Ethernet so must be used with PoE enabled switch