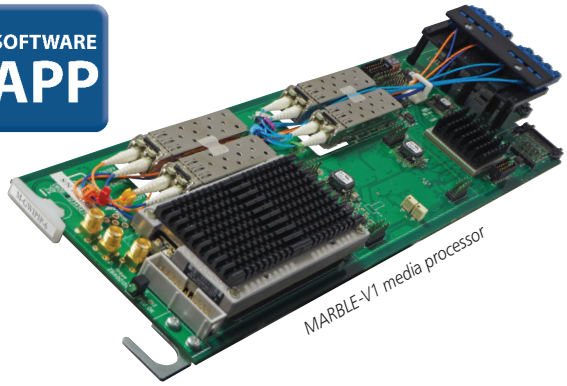
Crystal Vision

M-GWIPIP-6

SOFTWARE APP

IP to IP translator



MARBLE-V1 media processor

With no limitations on VLAN support and the ability to make changes to network settings, the M-GWIPIP-6 de-encapsulates and re-encapsulates video (up to six HD/SD or three 3Gb/s) between up to four bi-directional 10GbE IP network interfaces, with flexible assignment of the flows to the networks.

Supporting the SMPTE ST 2022-6 and 2022-7 protocols, as well as video within ST 2110, the M-GWIPIP-6 is a software app that runs on the MARBLE-V1 media processor – purpose-built GPU/CPU hardware that fits in the Vision frame. IP inputs and outputs are individually selectable between ST 2022 and ST 2110, allowing use with both protocols at the same time if required.

The M-GWIPIP-6 app has the flexibility to be useful in many applications. It can be used for network address translation – ideal for connecting systems with conflicting IP addresses. It can be used to translate unicast addresses to multicast addresses – useful for those who want to distribute IP encapsulated video flows. It can be used for protocol conversion between any of the input formats (ST 2022-6, ST 2022-7, ST 2110-20 and ST 2110-20 protect) and any of the output formats (ST 2022-6, ST 2022-7, ST 2110-20 and ST 2110-20 protect). When used with ST 2110 on the input or output, only the video is transferred from input to output. It can be used as a media firewall providing security isolation – ensuring that only the media payload is transferred between two VLANs.

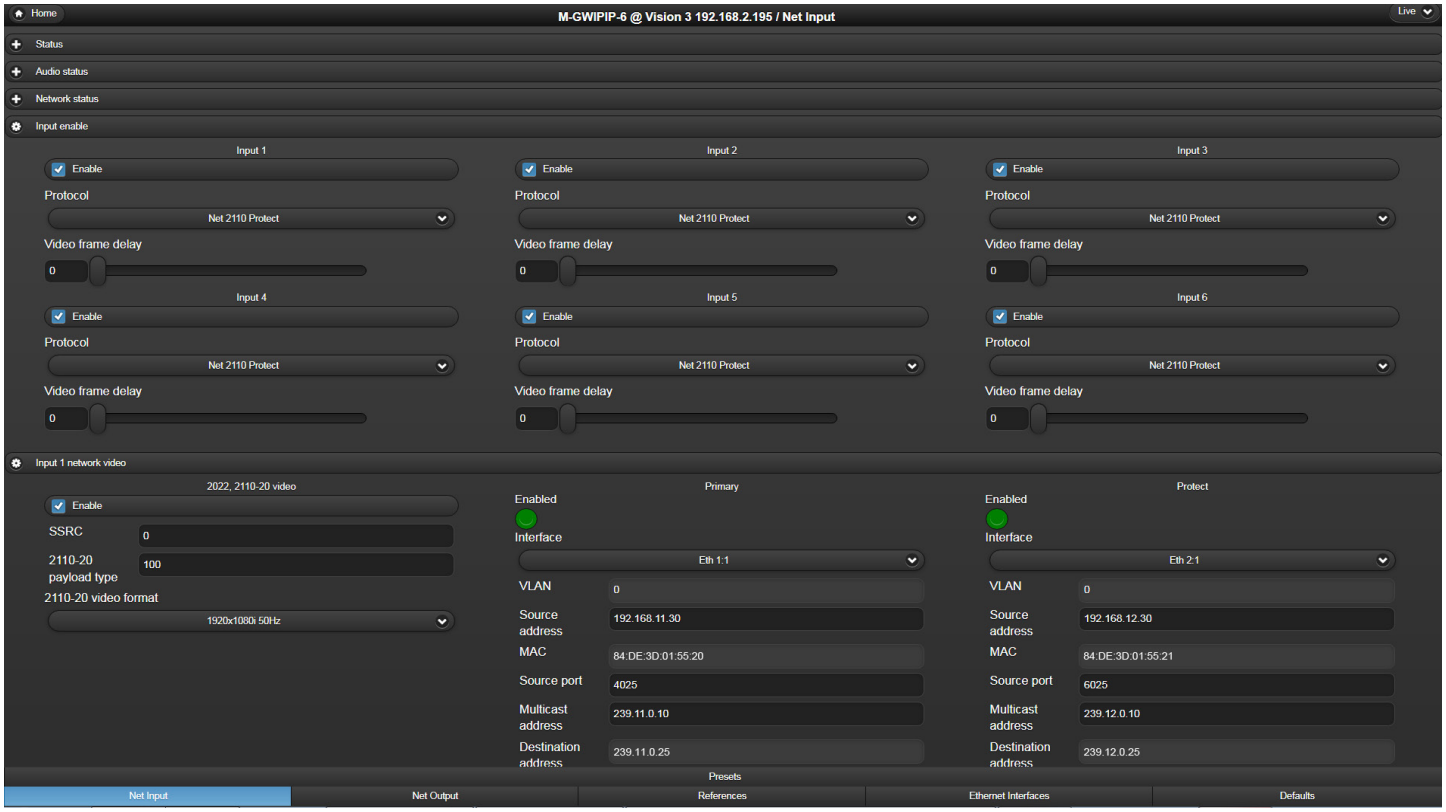
With clean switching between signals and sophisticated synchroniser features (plus up to ten frames of additional video delay), the M-GWIPIP-6 supports PTP in addition to analogue references as a timing source, with user configurable options for timing source priority and redundancy. All references can be used with both ST 2022 and ST 2110 outputs, although PTP should be used with ST 2110 to get a time of day related RTP timestamp.

Other features include signal status and IP monitoring statistics and up to ten frames of video delay. Whatever the packet distribution on the input, traffic shaping on the output will ensure that any downstream devices will accept the signal.

The future-proof M-GWIPIP-6 is robust and includes all the required features at a competitive price. Broadcasters are discovering they have all sorts of new issues to solve using IP – and the M-GWIPIP-6 could be the ideal product to solve them. And when you want to change the functionality of your product completely, you just need to buy a new app to run on your MARBLE-V1 hardware.

- **Software app that runs on the MARBLE-V1 media processor**
- **De-encapsulates and re-encapsulates video (up to six HD/SD or three 3Gb/s) between up to four bi-directional 10GbE IP network interfaces**
- **Supports SMPTE ST 2022-6 and ST 2022-7 protocols and video within ST 2110 (supporting ST 2110-10, -20 and -21 standards)**
- **Ideal for applications such as network address translation, unicast to multicast address translation, for setting firewall restrictions and for protocol translation between any of the input formats and any of the output formats**
- **Supports ST 2022-7 redundant streaming or ST 2110 protect**
- **Tolerant of any input packet distribution, and includes output traffic shaping**
- **Supports 31 video standards**
- **Full range of VLAN support**
- **Instant clean switching between inputs, whatever their timing**
- **Choice of multiple timing sources with fail-over: PTP and two analogue Black and Burst or tri-level syncs references via Vision frame**
- **Know your signal is present and valid, thanks to signal monitoring and fault detection**
- **IP flow monitoring including packet loss, duplicated packets and packet delay variation**
- **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**
- **Save rack space: MARBLE-V1 media processor is a 'double slot' 96mm x 325mm card, with up to ten MARBLE-V1 fitting in 3U**

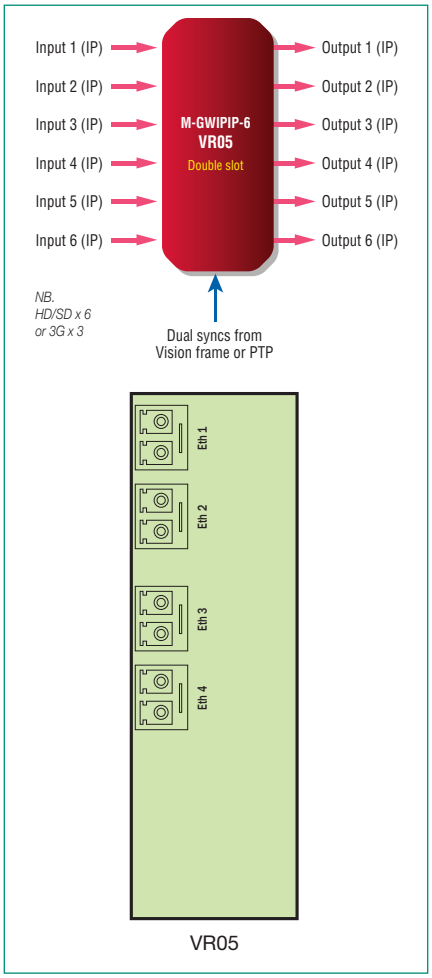
THE CONTROLS

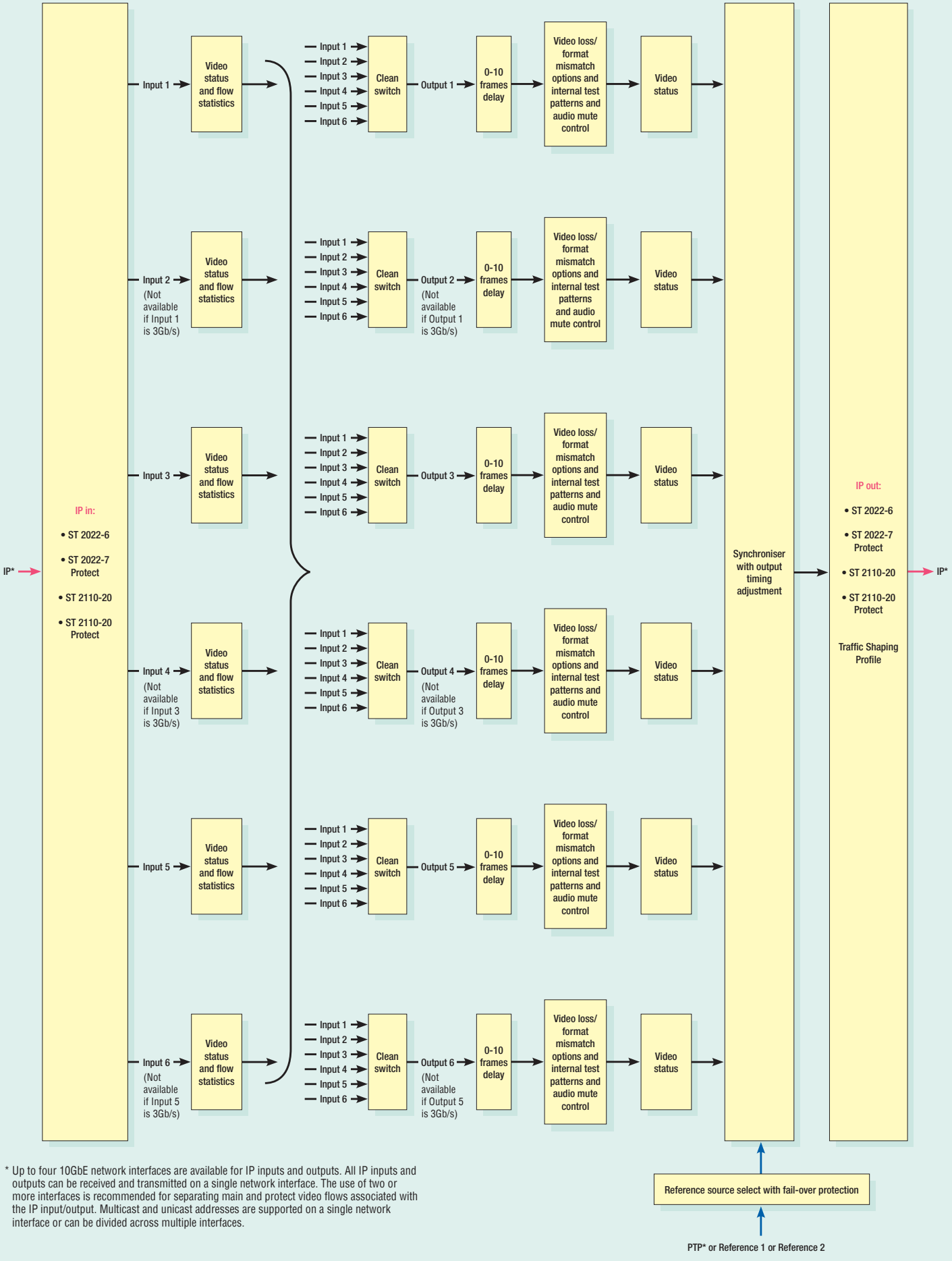


Example of a VisionWeb Control GUI

REAR MODULE CONNECTIONS

NB. A generic label will be supplied with purchase of the VR05 rear module. The label shown below is provided to help you understand the signal connections, such as for wiring purposes.





* Up to four 10GbE network interfaces are available for IP inputs and outputs. 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.

M-GWIPIP-6 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 are IP

Outputs are IP

Input and output connections: 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)

Inputs can be mixture of ST 2022 and ST 2110

Outputs can be mixture of ST 2022 and ST 2110

Video can be passed between ST 2022 and ST 2110, while audio and any other non-video data will be lost

Requires 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

IP INPUTS

Three 3Gb/s video over IP inputs or six HD or SD video over IP inputs

If the input is 3Gb/s then inputs 1, 3 and 5 should be used, and inputs/outputs 2, 4 and 6 should be disabled

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

IP OUTPUTS

Three 3Gb/s video over IP outputs or six 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 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

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

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 video flow protection facilitates the dual stream output

ROUTING

There are six clean switches

Any input can be switched to any output. The default setting is Input 1 to Output 1, Input 2 to Output 2, Input 3 to Output 3, Input 4 to Output 4, Input 5 to Output 5 and Input 6 to Output 6

VIDEO LOSS CONTROLS

The video loss/format mismatch controls allow the user to select what will happen to an output in the event that the input 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 output

TEST PATTERNS

The test pattern controls allow the user to override an input and 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 output

AUDIO MUTE CONTROL

The output audio mute control allows the user to mute the audio embedded within any of the ST 2022 outputs

SYNCHRONISER AND TIMING ADJUSTMENTS

Video sources are synchronised to common reference timing source

Choice of timing options:

- PTP (SMPTE 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

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

There are five 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 card will move down the list until it finds a valid timing reference source:

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

("PTP" means PTP Master>PTP Backup. "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

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

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

An additional ten frames of video delay (adjustable in one frame steps) allows compensation for any big system delays. This delay can be configured individually for each output

ANCILLARY DATA

All ancillary data from ST 2022 (including audio and locked Dolby E) is passed from input to 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 video, 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 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 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

ORDERING INFORMATION

M-GWIPIP-6	Six channel IP to IP translator. Supports 3G/HD/SD and ST 2022-6, ST 2022-7 and ST 2110-20 protocols. Ideal for applications such as network address, unicast to multicast and protocol translation. Software app which runs on the MARBLE-V1 media processor
MARBLE-V1	Media processor hardware which runs Crystal Vision's software apps. Housed in the Vision frames, with up to ten MARBLE-V1 in 3U. Requires between one and four 850nm or 1310nm SFP+ transceiver modules when used with M-GWIPIP-6 app
SFP+10G-850MM	Multi-mode 850nm 10GbE SFP+ transceiver module for MARBLE-V1 media processor – fit between one and four SFP+10G-850MM (or SFP+10G-1310SM) when M-GWIPIP-6 app used
SFP+10G-1310SM	Single-mode 1310nm 10GbE SFP+ transceiver module for MARBLE-V1 media processor – fit between one and four SFP+10G-1310SM (or SFP+10G-850MM) when M-GWIPIP-6 app used
App support	Purchase with M-GWIPIP-6 app to get software upgrades for changes in standards, new features and bug fixes plus telephone and e-mail operational support (with support for the first year included for free)
Vision 3	3U frame with integrated control panel and smart CPU for up to 20 Crystal Vision cards from the Vision range
VR05	Two slot frame rear module. Allows ten M-GWIPIP-6 in 3U. Inputs and outputs are IP via up to four 10GbE network interfaces on dual LC. Gives access to three 3Gb/s or six HD/SD IP inputs and three 3Gb/s or six HD/SD IP outputs
VisionPanel	3U Ethernet remote control panel with touch screen
SBB-4	Smart button box with four programmable LCD switches. It is powered by PoE (Power over Ethernet) and therefore needs to be connected to a PoE enabled switch
VisionWeb Control	VisionWeb web browser control included within frame software
SNMP	SNMP monitoring and control included in frame

Crystal Vision

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