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 flows 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 flow.

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.
Examples of some of the VisionWeb Control GUls
THE INPUTS AND OUTPUTS

Input
- Flow 1
- Flow 2
- Flow 3
- Flow 4
- Flow 5
- Flow 6

0-10 frames delay

IP in:
- ST 2022-6
- ST 2022-7
- Protect
- ST 2110-20
- ST 2110-20

Output
- Flow 1
- Flow 2
- Flow 3
- Flow 4
- Flow 5
- Flow 6

Clean switch

Video status and flow statistics

Video loss/format mismatch options and internal test patterns

Synchroniser with output timing adjustment

Traffic shaping profile

PTP* or Reference 1 or Reference 2

Reference source select with fail-over protection

* Up to four 10GbE network interfaces are available for IP. Use one network interface to put all signals together. Use two network interfaces to have main and protect or multicast and unicast on separate network interfaces. Use three or four network interfaces to further separate IP flows.

* Up to four 10GbE network interfaces are available for IP. Use one network interface to put all signals together. Use two network interfaces to have main and protect or multicast and unicast on separate network interfaces. Use three or four network interfaces to further separate IP flows.
VIDEO FORMATS SUPPORTED

1080PsF 24, 1080PsF 25, 1080PsF 29.97, 1080p 59.94, 1080p 60, 1080PsF 23.98, 1080p 25, 1080p 29.97, 1080p 30, 1080p 50, 1080i 59.94, 1080i 60, 1080p 23.98, 1080p 24, 1080p 29.97, 1080p 30, 1080p 50, 1080PsF 24*, 1080PsF 29.97*, 1080PsF 30*, 2048x1080PsF 24*, 2048x1080PsF 25*, 2048x1080PsF 29.97*, 2048x1080PsF 30*, 2048x1080PsF 23.98*, 2048x1080PsF 24*, 2048x1080PsF 25*, 2048x1080PsF 29.97*, 2048x1080PsF 30*

"*= YUV 4:2:2 10 bit"

FLOW INPUTS
Three 3Gb/s video over IP inputs or six HD or SD video over IP inputs
If the input is 3Gb/s then flows 1, 3 and 5 should be used and flows 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
Any network can be routed to any input flow
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 stream from lost packets by creating two streams of the same data using different routing to the destination. Flow analyser handles the analysis and reconstruction of the protected stream. Any IP input can come from any of the 10GbE IP network interfaces and can either be multicast or unicast

FLOW 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, 1080PsF 23.98, 1080PsF 24, 1080PsF 25, 1080PsF 29.97, 1080PsF 30, 2048x1080PsF 23.98, 2048x1080PsF 24, 2048x1080PsF 25, 2048x1080PsF 29.97, 2048x1080PsF 30, 2048x1080PsF 23.98, 2048x1080PsF 24, 2048x1080PsF 25, 2048x1080PsF 29.97, 2048x1080PsF 30

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)
Packet shaping (compulsory in ST 2110 and optional in ST 2022) follows the "narrow" definition of evenly spaced packets. Additionally in ST 2110 there is a choice per flow between TPNL and TPN to give narrow linear or narrow gapped 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
Any output flow can be routed to any of the four network connections
SMPTE ST 2022-7 and ST 2110 flow protection facilitates the dual stream output

ROUTING
There are six clean switches
Any input flow can be switched to any output flow. 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 flow 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 flow

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

SYNCHRONISER AND TIMING ADJUSTMENTS
Video sources are synchronised to common reference timing source for clean switching of input flows to output flows
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 input flows and output flows.
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 > 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 flow

ANCILLARY DATA
All ancillary data is passed from input to output only when both the input and the output of a flow is ST 2022. When ST 2110-20 is used in the input or output of a flow, the ancillary data is discarded

LED INDICATION OF:
Power okay
**SPECIFICATION CONTINUED...**

### PRESETS

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

### 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
- Video error
- Audio group 1 present

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 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

**ORDERING INFORMATION**

- **M-GWIP6**: IP to IP translator which supports SMPTE ST 2022 and ST 2110 video. Ideal for applications such as network address, unicast to multicast and protocol translation (between any of the input formats and any of the output formats). Features up to four network interfaces each carrying up to six HD/SD or three 3Gb/s streams. 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-GWIP6 app.
- **SFP+10G-850MM**: Multi-mode 850nm 10GbE SFP+ transceiver module for MARBLE-V1 media processor – between one and four required when used with M-GWIP6 app.
- **SFP+10G-1310SM**: Single-mode 1310nm 10GbE SFP+ transceiver module for MARBLE-V1 media processor – between one and four required when used with M-GWIP6 app.
- **App support**: Purchase with M-GWIP6 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-GWIP6 in 3U. Gives access to up to four bi-directional 10GbE IP network interfaces which can be configured as inputs or outputs as required.
- **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.

**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.