

## Decentralized TRANSMISSION, ROUTING, DISTRIBUTION and PROCESSING solution



### Product Highlights

The STAGE RACER 2 is a complete optical fiber transmission solution for every broadcast event, ranging from simple OB interconnect to complex mesh topology spread over a whole TV compound. It also supports long distance transmission for contribution and/or remote production allowing content exchange between distant locations while using standard Telco interfaces enabling worldwide SR2 network expansion with minimal transmission delay.

Stage Racer 2 is designed to accept all kinds of signal on a same device without external adapter. Internally those signals can be associated together / routed / distributed to all other machines of the network.

Stage Racer 2 also offers processing capabilities with Multiviewer, Audio Embedding/De-embedding, Audio shuffling, Audio SRC, Frame buffering, Delays and Tico compression.

The network can be controlled by a built-in intuitive web interface or with 3<sup>rd</sup> party like Cerebrum, KSC Core, VSM...

### Video & Audio Processing

To ease system setup and provide a seamless integration the Stage Racer 2 offers the following processing capabilities:

**Multiviewers:** Each SR2 frame offers a powerful Multiviewer allowing to monitor up to 16 SDI inputs or outputs of the network. Each thumbnail feature Audio level monitoring, Tally, SDI format display. Each Multiviewer output is routable or distributable over the whole SR2 network, also each Multiviewer output picture can be viewed from the web Gui. This feature comes without license neither performance reduction.

**Frame synchronizers & Delays:** Each SR2 frame offers up to 16 frame synchronizers located on the 3G ports.

**Embedding/De-embedding:** Audio can be inserted or extracted from any SDI port of the system.

**Audio Processing / Shuffling:** Any audio source can be routed to any kind of audio output. To allow that, each digital audio input (SDI De-embedded / MADI / Dante-AES67) enters the transmission engine thru an SRC to be at the same rate as the analog channels. Inversely each output (SDI Embed / Dante-AES67) will exit the transmission engine thru an SRC.

**Colorbar insertion:** To ease setup when no signal is fed into an SDI input, an internal Colorbar with an embedded text label is internally generated and routed instead of the SDI. A tone generator is also available into the audio matrix.

**Redundancy:** Desired SDI signals travel a duplicated path across the network for seamless switch if a path fails.

### Cooling / Power / Options

The unit achieves a very efficient and silent cooling thanks to a thorough design on internal heatsinks and venting grilles. Temperature raise on the mother board is kept under 25°C at the fans lower speed making this product a good choice for outside applications. Additionally a low power consumption make SR2 a unit of choice for CSR demanding applications.

Each unit has a built-in redundant power supply. An optional 12V power input can act as a third power source.

An 8 channels module with mic preamp plus phantom power and a 6 hi-speed serial channels module are also available.

## Signal Transmission

Transmission is based on TDM multiplexing for the all signals managed by the system, each TDM multiplex is transmitted to another machine by “Trunk” ports. Each machine can have up to 4 trunk ports (minimum is 1 for a network endpoint).

Most part of the bandwidth is dynamically allocated for high data rate signals (SDI / Ethernet / Raw signals). A small remaining bandwidth is fixed and guaranteed, dedicated to low data rate signals (Genlock / Audio / Serial / GPIO / System management) with a predefined maximum channel capacity per signal type.

As a base rule, each trunk total I/O capacity is:

- 25 HD signals (or similar rate signals like GB Ethernet), or 12x3G or 3x12G or any combination,
- 1 Genlock / Tri-level / Composite,
- 400 Bidirectional Processed Audio channels,
- 50 Bidirectional Serial channels,
- GPIO for 256 frames.

For SDI, routing engine will send the signals at the desired points only, after this point the signal is not carried on the network and its bandwidth is available.

For audio all required signals will be allocated one of the 400 channels and routed elsewhere in the network. The same principle is applied to GPIO and Serial channels and allow signal distribution or point to point transmission. Regarding audio processing, 400 channels are available for all audio signals that need to be embedded or de-embedded to be routed anywhere in the network. Audio processing does not affect the audio transport capabilities that remains virtually unlimited by the use of MADI, AES, Embedded SDI or Networked audio raw transport.

For contribution and remote production applications, the SR2 network can be expanded worldwide through Telco services. SR2 proprietary signal is internally formatted to enter a standard Telco operator interface and to be delivered synchronously with minimal delay thousands kilometers away. SDI signals are transmitted bit accurately or with TICO compression for 12G channels.

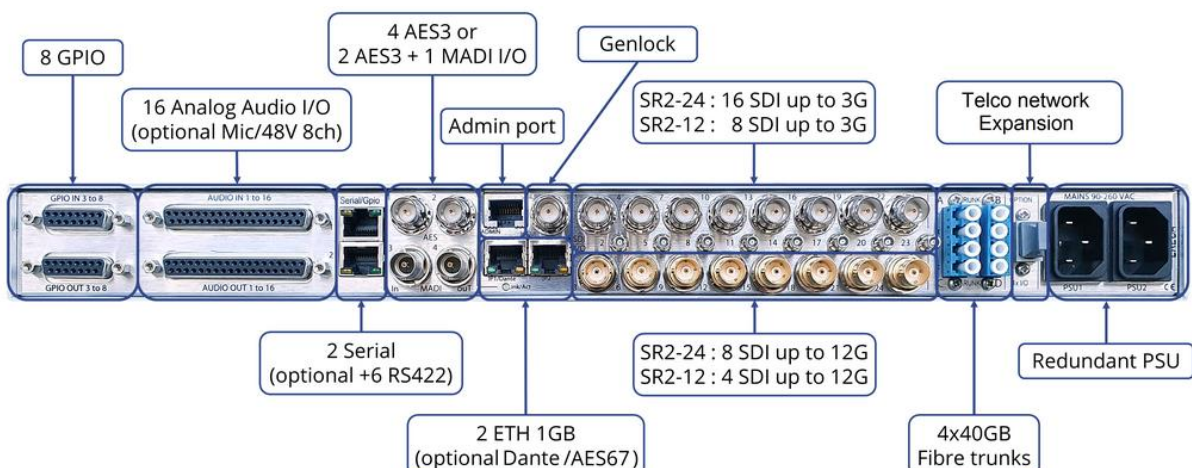
## Electrical Interfaces / Connectors

The Stage Racer 2 is available in two standard configurations: 24 or 12 SDI channels, direction configurable, plus a common set of signals. Each equipment assumes transmission of a comprehensive set of signals as follows:

Stage Racer 2 – 24 SDI version	Stage Racer 2 – 12 SDI version
16 SD to 3G direction switchable channels	8 SD to 3G direction switchable channels
8 SD to 12G direction switchable channels	4 SD to 12G direction switchable channels
1 Distributed Genlock (Composite video / Black burst / Tri-level)	
16 Analog Audio I/O (optional 8ch Mic gain / Phantom 48V module)	
2 Ethernet 10/100/1000Mbps (optional 64ch Dante/AES-67 module on port 1)	
2 Data RS 232/422/485 (optional 6 additional 500Kbps RS422 serial channels <sup>(*)</sup> )	
8 Contact closures	
4 AES3 bidirectional (Intercom panel compatible / Optional 6 additional <sup>(*)</sup> )	
1 MADI I/O (AES10) signal (Shared with 2 of the 4 AES connectors)	

<sup>\*</sup> AES option and Serial RS422 option expansion board are exclusive and cannot be fitted at the same time.

Each SDI port can be independently configured as an input or an output for asymmetrical usage at central points.



## Web management interface / Routing / Offline configurator

All the configuration is done through a standard HTML web interface. Through this interface the user can:

- Explore the network topology (automatic topology discovery),
- Route and distribute all signals (audio, video, multiviewer outputs, IP, Serial, GPIO, ...),
- Control the processing (Embedding/De-embedding, Multiviewers, Frame-syncs, Pattern insertion),
- Monitor status (link saturation, optical losses, redundancy, signal status, signal path used, logs),
- Set priorities for important signals and declare dual path setting for seamless redundancy.
- Preview (SDI's and its audio activity, Multiviewer out) directly from the web Gui.

An offline configuration tool (web based) is available to prepare topologies and routing setups. Setting files can then be downloaded from the tool. Also an existing setup can be uploaded into the tool for offline modifications.

The Stage Racer fiber network topology is automatically detected and signals are dynamically re-routed in case of link breakage, high priority signals are re-routed first.

The architecture is completely decentralized, if any node is added or removed the rest of the network will automatically detect the new topology and keep working as intended. It is also possible to temporarily connect multiple networks to mutualize resources for big events without having to reconfigure the entire system.

Network Graph, Device/Port configuration interface, Live Status, Audio Activity and Logs

The screenshot displays the 'Network graph' view of the Stage Racer web management interface. On the left, a sidebar lists various configuration categories such as GPIO in/out, Analog audio input/output, IP, AES, MADI, DANTE, Genlock, and SDI. The main area shows a network topology with nodes labeled SR2-1 through SR2-10, each with four ports (A, B, C, D). Below the graph, a 'Port selector for SR2-1' is visible. At the bottom, a 'Status for SR2-1' panel provides a detailed overview of the device's operational state across several categories: STATUS (with indicators for Genlock, RS/IP, AUDIO, GPIO, TEMP, Internal PSU, FAN, and Optical power), VIDEO (with metrics for In/Out), RS/IP (with metrics for In/Out), AUDIO (with metrics for In/Out), GPIO (with metrics for In/Out), TEMP (with metrics for Mathematical, Trunk A, Trunk B, Trunk C, Trunk D), Internal PSU (with metrics for core1, core2, Fan 1, Fan 2, Fan 3, Fan 4), FAN (with metrics for Fan 1, Fan 2, Fan 3, Fan 4), and Optical power (with metrics for Trunk A, Trunk B, Trunk C, Trunk D).

Grid view with cross-points matrix, filters, routing indications and signal status

The screenshot displays the 'Grid' view of the Stage Racer web management interface. The left sidebar contains 'Grid type' (set to Video) and 'Source filter' (set to Only show connected inputs). Below this, there are 'Destination filter' and 'Only show connected outputs' options, along with a 'Label filter' and a 'Hold shift to draw diagonals' checkbox. The main area is a large grid representing the routing matrix. The columns are labeled 'Outputs' and the rows are labeled 'Inputs'. The grid cells are color-coded: green for 'Connected and secure', yellow for 'Connected and double routed', red for 'Connected without security', and purple for 'Connected without double routing'. A legend at the bottom of the grid explains these color codes. The grid shows a complex routing pattern between various SDI and MVIEW inputs and outputs across multiple SR2 devices.



## Technical specifications

Optical	
Trunk	4 optical fiber trunks per unit providing a total of 160GBps of data traffic In and Out 10Km of single mode fiber / Link power budget 10dB / LC/PC connector (Optionally 40Km range)
Telco interface	4 Streams / 10Km single mode fiber / MPO connector for the 4 channels
SDI Video	
Number, connector:	12 or 24 Channels (Each channel is direction configurable), 75Ω BNC
Standard (Upper row):	SD, ASI, HD, 3G / BNC Connector
Standard (Mid row):	SD, ASI, HD, 3G / HD-BNC Mini Connector
Standard (Lower row):	SD, HD, 3G, 6G, 12G / BNC Connector
Return loss:	Better than -15 dB for 0 to 1,5 GHz / -10 dB for 1,5 to 3 GHz / -6 dB for 6 to 12 GHz
Composite Video / GL	
Number:	1 port, direction configurable / 75Ω BNC connector
Standard:	PAL, NTSC Composite / Black Burst / Tri-level (Auto sense) Genlock clock may not support all formats
Bandwidth:	> 5,8 MHz at +/- 0,2 dB
Differential Gain/Phase:	< 1%, < 1°
Group delay:	< 10 ns
SNR:	> 67 dB (CCIR567)
Analog Audio	
Number, connector:	16 inputs, 16 outputs channels, D-SUB 37 female socket
Impedance:	Input: 10 KΩ differential (non-floating), Output: 20Ω differential (non-floating)
Amplitude:	+4 dBm nominal (saturation at +18 dBm)
Bandwidth:	50 Hz to 15 kHz at +/- 0,5dB (20 Hz to 20 kHz at -3 dB)
Distortion:	0,05% at 1kHz +18 dBm
Signal to noise ratio:	90dB, "A" weighted
Mic preamp option:	Gain from 10 to 60dB (3dB steps) / Phantom power / Preamp Bypass (8 preamp fitted on channels 9 to 16)
Digital audio	
AES ports:	4 bidirectional ports (Intercom panel compatible) / 75 Ω BNC connector / Shared with Madi port BNC
AES option:	6 bidirectional ports (Intercom panel compatible) / 75 Ω / D-SUB 25 female socket on front side, (*)
MADI port:	1 input, 1 output / 48 kHz support (SRC) / 75 Ω BNC connector
DANTE-AES67 option:	Dante and AES67 support / 64 channels / 48 kHz support (SRC) / Routed to the gigabit port IP1
Serial	
Number, connector:	2 bidirectional channels, 1 RJ45 socket per channel
Protocols:	RS485, RS422, RS232
Data rate:	0 to 500 KB/s (Sony compatible)
RS422 option:	6 bidirectional RS422 / 0 to 500 KB/s (Sony compatible) / D-SUB 25 female socket on front side, (*)
Ethernet	
Number, connector:	2 independent channels, RJ45 Socket
Protocols:	10, 100 or 1000 Mb/s, Full or Half-duplex (Auto), MDI or MDI-X (Auto)
PTP support:	Dynamic adjustment of PTP packets reflecting travel time between IP ports of the Stage racer2 network
GPIO	
Number, connector:	8 bidirectional GPIO contacts / 6 on D-SUB 15 female plus 1 GPIO along each RJ45 Serial connector
Output:	Relay (dry contact) 'Common' – 'Normally Open' terminals for each relay
Input:	Floating on the D-SUB, Input pin grounding on RJ45
Powering / CSR	
Consumption:	95 Watts per unit maximum (All trunks and all signals used)
Mains source:	Dual redundant built in PSU / Voltage range 90 to 260 VAC / 47 to 63 Hz
Low voltage option:	10 to 16 VDC / D-SUB 25 with power inserts (fitted on front side) / protected by internal fast acting fuse
CSR:	Locally built, Low power consumption v/s performance, Recyclable case material (metal), Low plastic.
Mechanical	
Size:	1 RU 19" rack, depth 335mm excluding connectors
Weight:	4.5 Kilograms
Cooling:	Internal fan tray with transversal cooling flow / side panels in/out / Passive heatsinks on actives
Operating temp range:	From -20 to + 60°C (Avoiding direct sun exposition)
Signaling / Admin	
Local display:	OLED display for main parameters (IP add / Optical power) / 1 LED per signal / Technical alarms LED
Setup:	Web interface / 3 <sup>rd</sup> party automation protocols (VSM, Cerebrum, KSC Core, Hi, ....)
Keypanels:	Direct interface with Black-Magic keypanels, Stream deck + Companion software, ....
Connection:	1 dedicated 10/100Mbs ethernet port

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