

4x3G Dynamic Frame Synchronizer



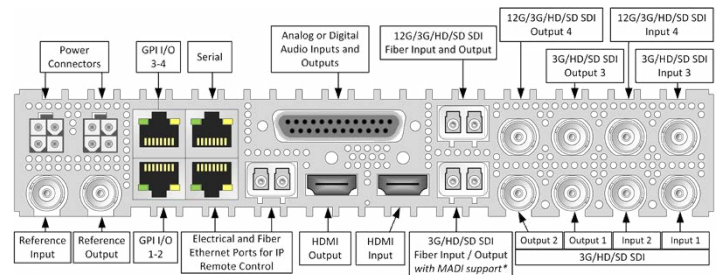
Description

The greenMachine 4FS is an advanced frame synchronizer for formats up to 3Gbit/s SDI. It is designed and developed for applications that require dependable broadcast-quality frame synchronization even if the reference signal drops thanks to its internal "flywheel sync engine".

The 4FS allows bi-level/tri-level reference signal for synchronization of video signals. Along with high-end frame synchronizer, it includes scaler with versatile region of interest (ROI) selection, basic audio & video test generator, video adjustments, color correction, audio routing and management, and metadata management.

This constellation includes full audio processing capabilities, with independent embedder & de-embedder, audio processing, and Dolby E[®] decoding. Four built in audio in/outputs can individually be configured to be analog (balanced) or digital (AES) interfaces. MADI in- and output can be added with an optional MADI SFP. Multiple internal crossbars allow for extensive audio shuffling of all audio streams. Individual delay can be applied manually if necessary.

Like any other greenMachine constellation 4FS also fully supports LynxCentral for remote configuration, monitoring and automation. For local control, the button control interface with LCD Display offers image previews and audio level meters of the processed video paths. With full SNMPv2 support implemented with our Nova controller remote control and monitoring via third party master control software is also possible.



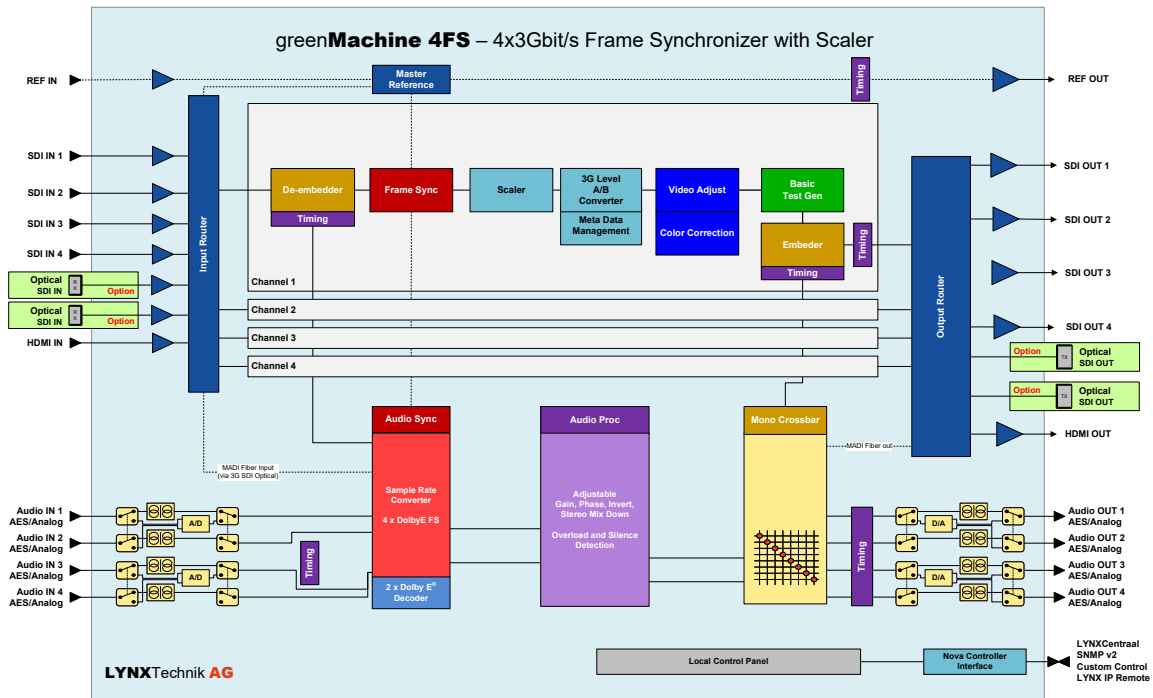
Functions

Processing Channels:	Four independent 3G channels (4x3G)
Frame Synchronizer:	One of the best synchronizers in the industry utilizing the external reference with a robust "flywheel" function for the synchronization of SDI sources. All embedded audio is extracted and delayed automatically to match the video processing delay, then embedded via a matrix into the SDI output.
3G level A/B:	It provides automatic detection of 3G level A/B and allows 3G level A <> 3G level B dual-link conversion. (3G level A acc. to SMPTE ST425-1/4:2:2, 10Bit)
Basic Audio & Video Test Generator	The test generator is a basic audio & video test signal generator with a wide range of still video test patterns. It can be configured to work in conjunction with the Frame Synchronizer to output a test pattern on TRS errors.
Embedder/De-embedder:	A multi-format audio embedder and de-embedder provide access to all the channels in the input SDI and allow shuffling and embedding them to the output(s).
Metadata Management:	This functionality manages the embedded metadata in the video signals. Time code, Closed captions, and Teletext can be monitored and/or converted.
Video Adjustment:	It includes saturation, gain black and hue adjustments, blanking interval deletion and aperture correction. It also provides a horizontal flip and YCrCb headroom clipping functionality.

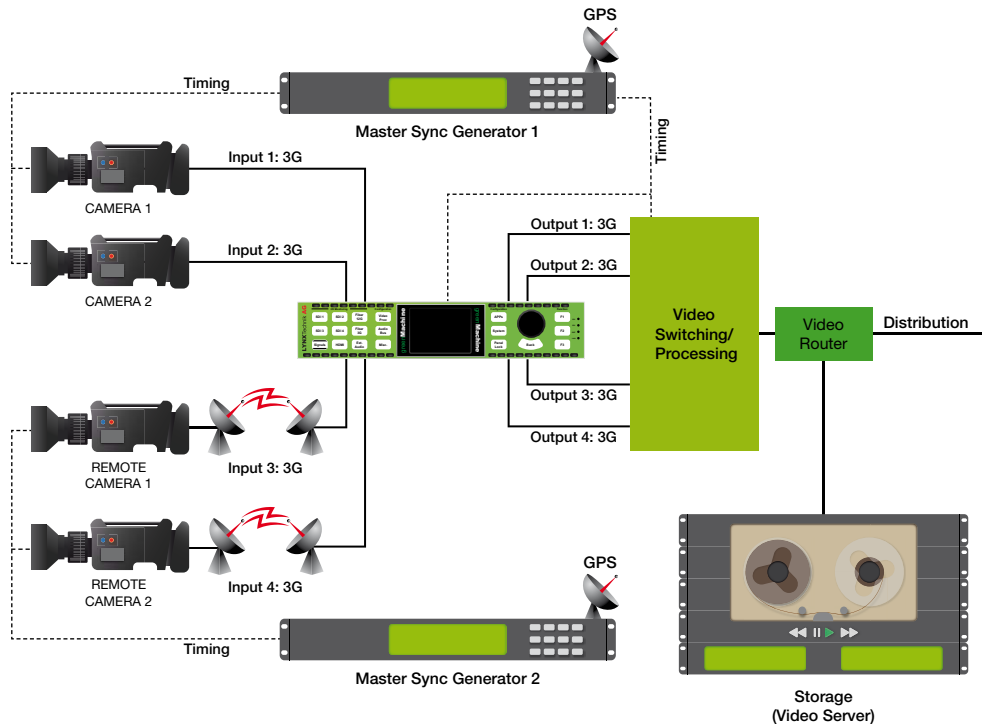
Color correction:	It allows adjustments in gain, offset, lift, and gamma for Red, Green, and Blue (RGB). It also provides gain and offset adjustments for Cyan, Magenta, Yellow, and White (CMYW).
Audio Processing:	It provides gain adjustment, mute, inversion, and stereo to mono-mix on each mono audio channel including silence and overload monitoring. It has a 1kHz test signal as well.
Dolby E[®] decoder:	Two Dolby E [®] decoders can be used to decode all 8 channels contain in a Dolby E [®] stream. The Dolby [®] metadata can be mapped to VANC acc. to SMPTE 2020-3 and SMPTE 2020-2.
MADI in/out:	This constellation fully supports MADI, if the greenMachine is equipped with an optionally available MADI SFP. All incoming and outgoing MADI signals have internal audio processing and are connected to the internal audio matrix and can be rearranged.
Timing	Each video and audio (AES and MADI) channel can be individually delayed. The available video delay per channel is 30 frames and the audio delay is 1.3 second per AES audio channel.
LynxCentral	LynxCentral is a control software that provides remote control and status monitoring and event (error) reporting for all the greenMachines installed on a network.
Nova Controller	Adds full SNMP v2 along with LYNX IP remote control



Functional Diagram: 3G Quad Channel



Example: Frame synchronization of 2 local and 2 remote cameras.



GMPT-Quad3G-FS_Rev3.6 Specifications subject to change



Hardware Specifications

BNC Connection

SDI Inputs	4x 3G SDI video on 75 Ohm BNC connector (SMPTE 259M, 292M, 424M) with automatic video format and standard detection
Return Loss:	>15dB from 5MHz to 1.5GHz, >10dB from 1.5GHz to 3GHz
Automatic cable EQ (Belden 1694A):	340m @ 270Mbit/s, 150m @ 1.5Gbit/s, 110m @ 3Gbit/s
12G SDI Input*	1x 12G SDI video on 75 Ohm BNC connector (SMPTE 259M, 292M, 424M, 2082) with automatic video format and standard detection
Return Loss:	>7dB to 6GHz; >4dB to 12GHz
SDI Output	4x SDI video on 75 Ohm BNC connector (SMPTE 259M, 292M, 424M)
Timing jitter:	< 0.2 UI @ 270Mbit/s, < 1.0 UI @ 1.5Gbit/s, < 2.0 UI @ 3Gbit/s
Alignment jitter:	< 0.2 UI @ 270Mbit/s, < 0.2 UI @ 1.5Gbit/s, < 0.3 UI @ 3Gbit/s
Return Loss:	>15dB from 5MHz to 1.5GHz, >10dB from 1.5GHz to 3GHz
12G SDI Output*	1x 12G SDI video on 75 Ohm BNC connector (SMPTE 259M, 292M, 424M, 2082)
Return Loss:	>7dB to 6GHz; >4dB to 12GHz
Reference Input	<ul style="list-style-type: none"> 1x analog video reference on 75 Ohm BNC connector Analog bi-level (SDTV) or tri-level (HDTV) auto detect
Reference Output	<ul style="list-style-type: none"> 1x analog video reference on 75 Ohm BNC connector Analog bi-level (SDTV) or tri-level (HDTV), cross lock capability

Audio Connection

Audio I/O	4x input and 4x output on Sub-D 25 female connector
Analog I/O	input impedance >10k Ohm Output Impedance 150 Ohm
	Analog I/O full scale level: selectable 12, 15, 18, 20, 22, 24 dBu

Technical Information

Power	12V DC @ 45W nominal (supports 7 - 24VDC input range) 2x power connections for redundant power supply
Mechanical	W: 218mm (1/2 19"), H: 44mm (1.75"), D: 225mm (8.86") - including connectors. Weight: 1.4kg (3.09lb)
Ambient	Temperature: 5°C to 40°C (41°F to 104°F) maintaining specification Humidity: 90% maximum, non-condensing

Supported SDI Formats

SDTV	525 / 59.94Hz 625 / 50Hz		
HDTV	1080i / 50Hz 1080i / 59.94Hz 1080i / 60Hz 1080p / 23.98Hz 1080p / 24Hz 1080p / 25Hz 1080p / 29.97Hz	1080p / 30Hz 1080psf / 23.98Hz 1080psf / 24Hz 1080psf / 25Hz 720p / 23.98 Hz 720p / 24Hz 720p / 25Hz	720p / 29.97Hz 720p / 30Hz 720p / 50Hz 720p / 59.94Hz 720p / 60Hz
3Gbit/s Level A	1080p / 50Hz 1080p / 59.94Hz 1080p / 60Hz		
12Gbit/s* Single Link	3840 x 2160p / 50Hz 3840 x 2160p / 59.94Hz 3840 x 2160p / 60Hz		
12Gbit/s* Quad Link 2SI Level A (4 x 3G)	3840 x 2160p / 50Hz 3840 x 2160p / 59.94Hz 3840 x 2160p / 60Hz		

***NOTE:** 12G SDI operations not supported on 3G constellations and constellation modes (i.e. 3G quad channel configuration)

Optical Connection (optional SFP required)

Optical SDI I/O	<ul style="list-style-type: none"> 1x 3G SDI SFP Transceiver (SMPTE 297M - 2006) 1x 12G SDI SFP Transceiver (SMPTE 292M, 424M, 2081 2082) - no SD SDI (270MBit)**
Optical Ethernet	IEEE 802.3z 1000Base-X Gbit/s Ethernet over Fiber at 1Gbit/s (125 MB/s)

****NOTE:** 12G SFPs can be used with 3G constellation and constellation modes, but only support 3G signals

AV Connection

HDMI	<ul style="list-style-type: none"> 1x Input 10 bit HDMI 1.4b 1x Output 10 bit HDMI 1.4b
Digital	AES3 balanced transformer isolated; Digital output level: 4V peak to peak nom
MADI	64 channel MADI supported on selected constellations (optional MADI SFP required for this)

Network Connection

Ethernet (LAN)	1x 10/100/1000 BaseT RJ45 Connector
GPI I/O	<ul style="list-style-type: none"> 4x general purpose inputs (RJ45 Connector) 4x general purpose outputs (RJ45 Connector)
Serial Data	EIA/ETA RS232C / RS422 / RS 485 (selectable through Lynx-Centraal) - RJ45 connector ESD protection for up to 16kV



Options: Rack Frames, Carry Case, and SFP Options

RFR 6000 - 1RU 19" Rack Mount Chassis

Rack mounting hardware which can accommodate one or two greenMachines in 1RU of rack space which also securely mounts the power supplies.
Note: Two power supplies can be mounted onto one RFR 6000. Please see more information in the RFR 6000 quick reference guide.



One greenMachine in Rack Mount

RXT 6001 19" Rack Extension for RFR 6000

The RXT 6001 is a compact and flexible rack extension for RFR 6000. It can be setup to hold up to four RPS A100 power supplies with optimized airflow surfaces.



RXT 6001 installed in RFR 6000

ABS Case for greenMachine

The transport case is perfect to keep your greenMachine[®], cables and documents organized and in one place, while also protecting it from environmental influences. With its study design, our ABS Case is the ideal partner to transport your greenMachine[®] whenever it is not wired in a rack, standalone or any other system you can think of.



SFP Fiber Options

3G SDI Video Fiber Transmitter		Power	
OH-TX-1 LC/SC/ST	3G SDI Fiber TX SFP - LC/SC/ST - 1310nm	-8 ... -3dBm	
3G SDI Video Fiber Receiver		Sensitivity	
OH-RX-1 LC/SC/ST	3G SDI Fiber RX SFP - LC/SC/ST - 1270-1610nm	-18dBm (SD/1.5G/3G)	
OH-RX-8-LC	3G SDI Fiber RX SFP (High Sense) - LC - 1270-1610nm	-26dBm (SD/1.5G/3G)	
3G SDI Video Fiber Transceiver		Power	Sensitivity
OH-TR-1-LC	SDI Fiber Transceiver, Singlemode - LC - 1310nm	-8 ... +3 dBm	-16dBm (SD/1.5G/3G)
CWDM SDI Video Transceiver (TR)		Power	Sensitivity
OH-TR-4-XXXX-LC	3G SDI Fiber Transceiver, Singlemode CWDM capable - 40km* - LC 18 wavelengths acc. to ITU T G692.2: 1270 - 1610nm.	-4 ... +2 dBm	-20dBm (SD/1.5G/3G)
OH-TR-8-XXXX-LC	3G SDI Fiber Transceiver, Singlemode CWDM capable - 80km* - LC 18 wavelengths acc. to ITU T G692.2: 1270 - 1610nm.	+1 ... +5 dBm	-26 ... -28dBm (SD/1.5G/3G)

* **Distance is an approximation.** Actual distances achieved can be longer or shorter depending on the type of fiber cable and accumulated optical losses in the fiber link. Determine link losses and perform optical budget calculations to ensure correct operation.
More SFP options are available.

Ordering Information

greenMachine Package			
Includes	GM 6840:	greenMachine titan Processor Hardware	
	RPS A100:	Primary Power Supplies with Region Specific Power Cord	
	GMC-quad3G-FS	3G Up/Down/Cross Converter Constellation License	
GMPT 4FS (N/EU/US/UK)	4 x 3G SDI Frame Synchronizer(Hardware & License)		EAN: 4250479327924
	Power plug Variants (please specify when ordering)		
	GMPT 4FS N	Power supply without Plug	
	GMPT 4FS EU	Power Supply with EU Plug	
	GMPT 4FS US	Power Supply with US Plug	
GMPT 4FS UK	Power Supply with UK Plug		
License Only (no hardware included)			
GMC-quad3G-FS	greenMachine titan Quad3G FS constellation: 4x3G Frame Synchronizer	4250479326057	
Accessories and Power Supply			
RFR 6000	1 RU 19" Rack Mount Chassis	4250479324466	
RXT 6001	19" Rack Frame Extension for RFR 6000	4250479326507	
RPS A100 (N/EU/US/UK)	AC to DC Desktop Power Supply Module 12V/8A (with None / EU / US / UK plug)	4250479327955	

More broadcast applications:

- GMC-3GUPXD: 4 Channel 3G Up/Down/Cross Converter
 - GMC-4KUPXD: 4K Up/Down/Cross Converter
 - GMC-HDREvie+: Segmented, Dynamic HDR>SDR converter
 - GMC-4FS: 4x3Gbit/s Frame Synchronizer
 - GMC-BiDi-Transport: Bi-directional Transport
- The greenMachine hardware can be configured for a different broadcast application by re-deploying a different application called "constellation". These perpetual licenses are and application deployment on the greenMachine.

For greenMachine the following regulatory and safety standards apply:
CE: EN 55103-1/1996, EN 55103-2/1996, EN 60950-1/2006
Following the provisions of 2004/108/EC and 2006/95/EC directives.
FCC: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15, Subpart B of the FCC Rules.

The RPS A100 power supply (EA11011D-1200) complies with the following safety standards:
UL/cUL 62368-1, TUV EN 62368-1, CB IEC 62368-1, FCC, CE, BSMI, PSE, RCM, IRAM



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