![Grass Valley logo - WE LOVE LIVE]

DATASHEET

DENSITÉ 3+ XIP-3901-UDC-IP

Dual-channel 4K UHD Format Converter with HDR and Audio IP Application for XIP-3911 and XIP-3901

XIP-3901-UDC-IP application for the reprogrammable software-defined platforms Densité 3+ XIP-3911 and XIP-3901.

The XIP-3901-UDC-IP application from Grass Valley is a dual-channel 4K UHD broadcast-quality format converter offering support for all common video processing tasks (proc amp adjustment, signal enhancement, color correction and legalization), and advanced options that introduce rich HDR and audio processing toolsets. Network connectivity is enabled with dual 25 GbE I/O. Based on open standards, this IP edge processing application is compliant to the SMPTE ST 2110 suite of standards and JT-NM TR-1001 technical recommendation for easy integration in a broadcast network production environment — confirmed by our successful participation in JT-NM tested events in August 2019 and March 2020.

The XIP-3901-UDC-IP integrates all the video processing functions to perform the up/down/ crossconversion needed to maintain chosen output formatting, irrespective of whether the input is HD 720p, 1080i, 1080p or UHD 2160p. High-quality up/down/ crossconversion is performed at both 50 and 59.94 Hz, based on multiple sophisticated processing technologies. These include detail enhancement, pixel-based de-interlacing and advanced motion adaptive de-interlacing and anti-ringing.

The XIP-3901-UDC-IP supports processing of common film rates 23.98p and 29.97p Hz to and from 59.94 Hz material and offers timecode selection either directly

from the PTP source or the SMPTE ST 2110-40 stream for processing and regeneration.

The XIP-3901-UDC-IP provides an additional 1080p HD output for monitoring purposes from the first processing path when that path is configured to provide a 2160p UHD output, and the secondary processing path is configured to provide an HD output.

The optional HDR processor, XIP-3901-UDC-HDR, allows conversion between SDR and HDR formats and wide color gamut BT.709 and BT.2020, supporting HLG (ITU-R BT.2100), PQ (ITU-R BT.2100), and S-Log3/S-Gamut3 formats. In addition to the Grass Valley LUTs, you can select BBC LUTs v1.4 or you can choose your own custom LUTs

Densité 3+ FR4

4 RU

12 XIP-3911 = 24 4K UHD Channels

Densité 3+ FR1

1 RU

2 XIP-3911 = 4 4K UHD Channels
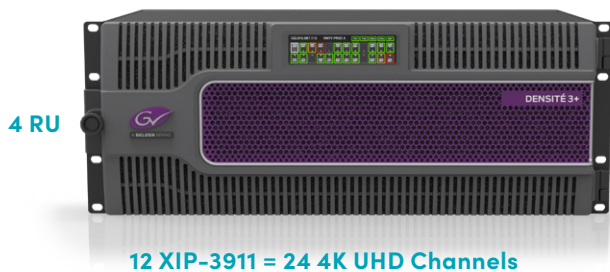
Key Features

- Independent dual-channel UHD up/down/cross IP video processor
- SMPTE ST 2110-20 video with UHD over single stream
- SMPTE ST 2110-21 Wide/Narrow profile receivers and Narrow senders
- SMPTE ST 2110-30 PCM audio
- SMPTE ST 2110-31 AES3 transparent transport
- SMPTE ST 2110-40 metadata associated with SMPTE ST 2110-20 video stream
- SMPTE ST 2022-7 Class A & D seamless protection switching of IP streams
- SMPTE ST 2059-1 & -2 precision time protocol with best master clock algorithm
- NMOS IS-04 discovery and registration with group hints tag support
- NMOS IS-05 device connection management
- In-band or out-of-band control of NMOS

- Support of DHCP, LLDP and DNS-SD for easy IP configuration
- Video proc features include: gain, offset, hue, horizontal and vertical picture enhancement during downconversion, RGB color corrector and gamut legalization
- Secondary monitoring HD output from first processing path
- XIP-3901-UDC-HDR option provides HDR conversion supporting both Wide Color Gamut BT.709/ BT.2020 and High Dynamic Range: HLG, PQ and S-Log3:
  - All processing operates in full 10-bit video signals with ability to pass sub-blacks and super-whites in SMPTE narrow video
  - Choice between Grass Valley conversions algorithms, BBC HLG LUT v1.4 and user defined 3D-LUT support
  - ITU R BT 2111 HLG/PQ color bar test patterns

- Four SMPTE ST 2110-30/31 Level A and C audio stream per processing channels
- XIP-3901-UDC-AUD option provides 224 channels audio processors with level, delay, up/down mixing and 2:1 mixer/shuffling
- Dual SFP28 Flexible Ethernet for 25 GbE SFP+ cage:
  - SFP-25G-SR for short-range multimode optical connectors
  - SFP-25G-LR for long-range single-mode optical connectors
  - Active optical cables and optical transceiver
- Both FEC74 (CL74 Fire Code) and FEC108 (Reed Solomon IEEE) Forward Error Correction are supported
- GV Orbit for configuration, control and monitoring
- Individual XIP-3911 and XIP-3901 applications licensed, purchased as needed
- Rapid switching between XIP-3911 applications

compliant to Adobe cube file v1.0 for fully flexible HDR processing. The HDR processor operates in full 10-bit video signals with the ability to pass sub-blacks and super-whites in SMPTE Narrow video signals and the support of SMPTE Full in PQ and S-Log3 signals.

Four streams of SMPTE ST 2110-30/31 audio conforming to Level A and Level C is supported per video channel, giving a total of 224 channels of audio with automatic delay to keep lip sync. The XIP-3901-

UDC-AUD option gives advanced processing control with audio level, delay, up and down-mixing, and shuffling for additional flexibility.

The XIP-3901-UDC-IP is configured, controlled and monitored by GV Orbit from Grass Valley, taking advantage of many features and functions specifically crafted to make IP easy. It can also be configured and controlled from iControl systems.

Based on the proven Densité modular framework of over 100 cards, the flexible, space-efficient XIP-3911

agile processing platform can accommodate a gradual adoption of different production elements into 1080p and 4K UHD broadcasting workflows, all while protecting your investment in installed equipment. With flexibility to configure up to 12 XIP-3911 dual-channel processing applications per Densité 3+ FR4 frame, the Densité platform scales to a density of 24 4K UHD processors in a 4 RU frame. This means space and cost-efficient scaling today and tomorrow.

XIP-3901-UDC-HDR processing option supported conversions:

GV LUT Conversions	BBC LUTs v1.4	Up to 8 User-defined LUTs
BT.709↔BT.2020	BT.709↔HLG BT.2100 Scene-referred	Adobe cube file v1.0 – 33 cube
BT.709↔HLG BT.2100	BT.709↔HLG BT.2100 Display-referred	BT.709↔BT.2020
BT.709↔PQ ST.2100	HLG BT.2100↔PQ BT.2100	Narrow↔Full range
S-Log3/S-Gamut3→ BT.709	S-Log3 BT.2020→HLG BT.2100	
S-Log3/S-Gamut3→HLG BT.2100		
S-Log3/S-Gamut3→PQ BT.2100		
And new ITU R BT.2111 HLG/PQ Color bar test patterns		

SDI (Inputs/Outputs)
Not used by this application

Reference Input
Not used by this application

Ethernet Port for Media
Physical: Two SFP28 sockets for active optical cable, short- and long-reach fiber
Standard: IEEE 802.3-2008 25 GbE
Performance: Up to 25 Gb of streaming per direction

Ethernet Port for Control
Physical: One electrical RJ45 port
Standard: IEEE 802.3 1000 Mb/s

Video Processing Performance
Signal path: 10 bits

Electrical
Power: 60W maximum

Supported input/output video formats:

XIP-3901-UDC-IP 1.1
23.98, 29.97 and 59.94 Hz

Input Format \ Output Format	720p59	1080p23.98	1080p29.97	1080i59.94	1080p59.94	2160p23.98	2160p29.97	2160p59.94
720p59	●			●	●			●
1080p23.98		●		●	●	●		●
1080p29.97			●	●	●		●	●
1080i59.94	●			●	●			●
1080p59.94	●			●	●			●
2160p23.98		●		●	●	●		●
2160p29.97			●	●	●		●	●
2160p59.94	●			●	●			●

XIP-3901-UDC-IP 1.1
50 Hz

Input Format \ Output Format	720p50	1080i50	1080p50	2160p50
720p50	●	●	●	●
1080i50	●	●	●	●
1080p50	●	●	●	●
2160p50	●	●	●	●
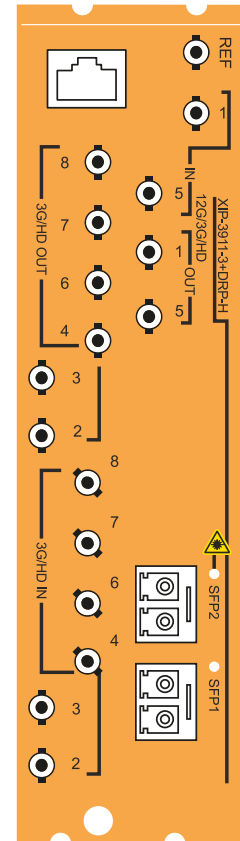
XIP-3911-3+DRP-H

Application Software
XIP-3901-UDC-IP
Dual-channel 4K UHD up/down/cross IP application

Application Option
XIP-3901-UDC-HDR
HDR processing option
XIP-3901-UDC-AUD
Audio processing, down/up mix, shuffling option

Densité 3+ Frame
XIP-3911
Agile SDI/IP processing platform
XIP-3911-3+DRP-H
Double rear panel for Densité 3+ with HD-BNC

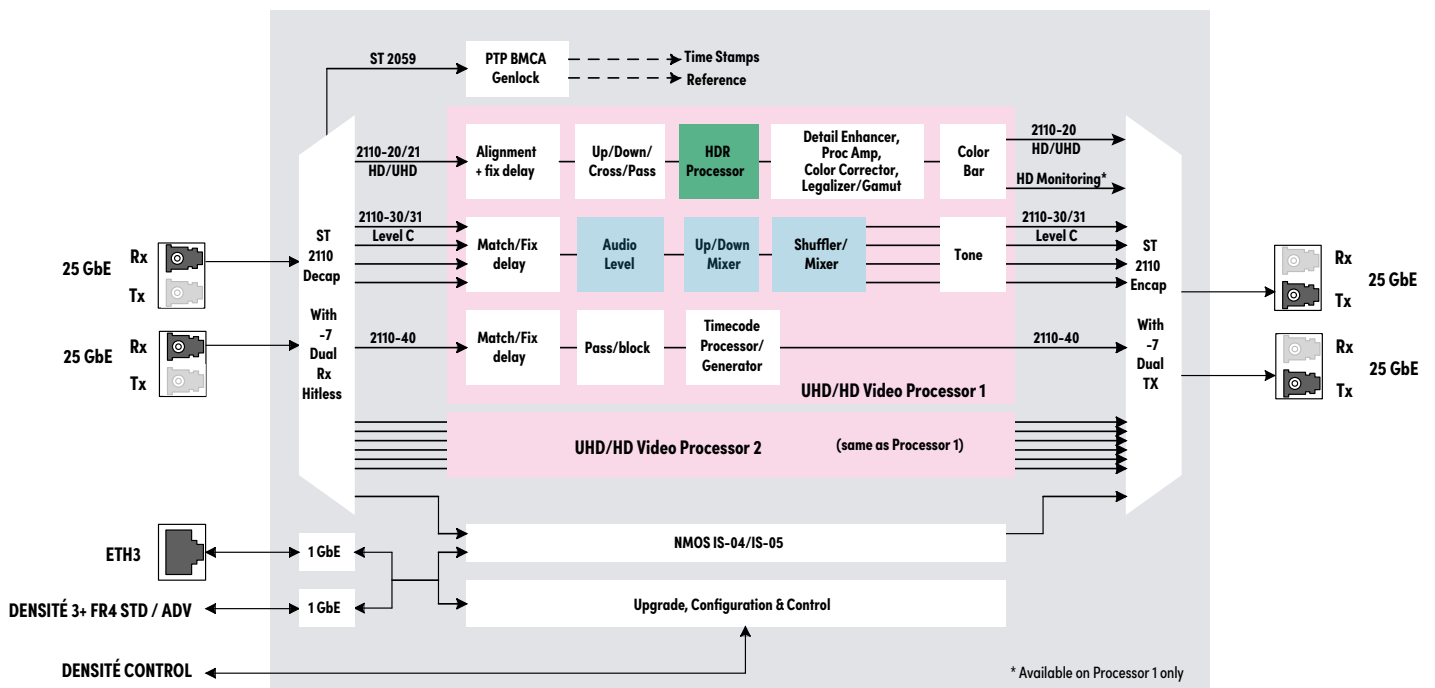### SFP+ Options
One or two SFP+ are needed to run this application
SFP-25G-SR
SFP28 25GBASE optical transceiver MMF
SFP-25G-LR
SFP28 25GBASE optical transceiver SMF

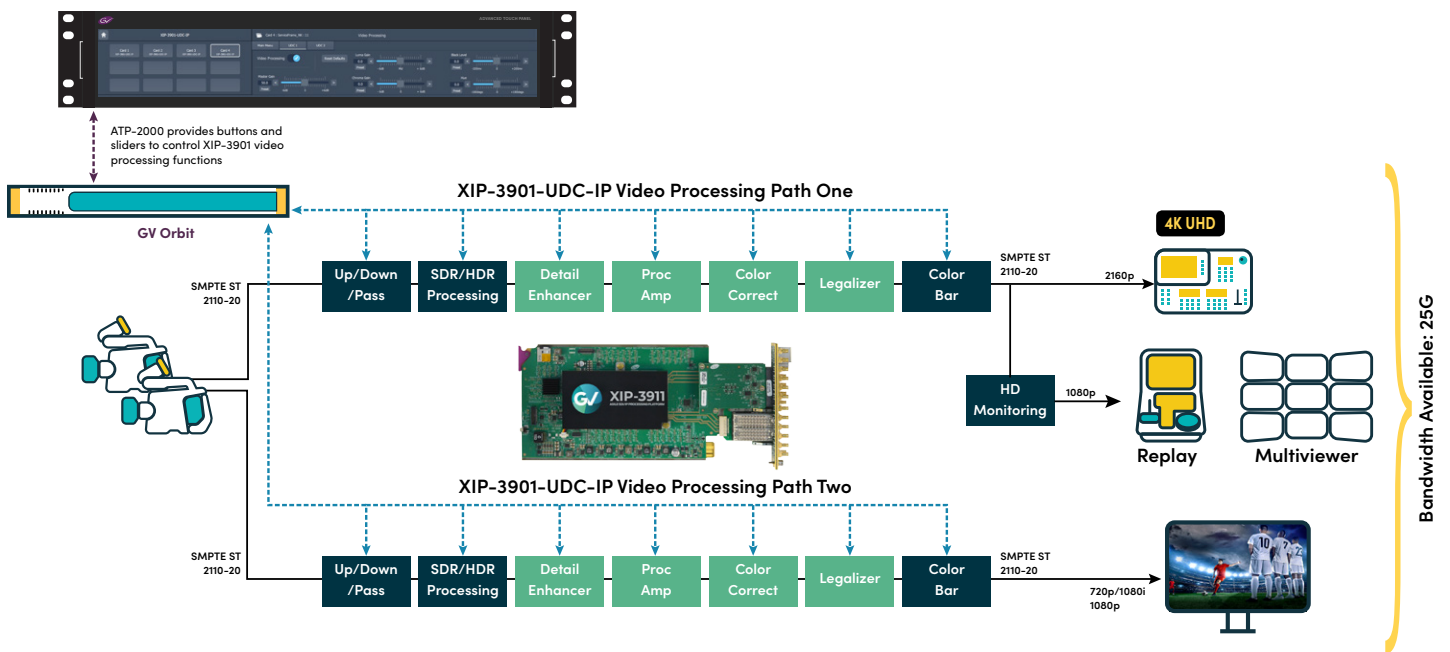# XIP–3901–UDC–IP Application Functional Diagram

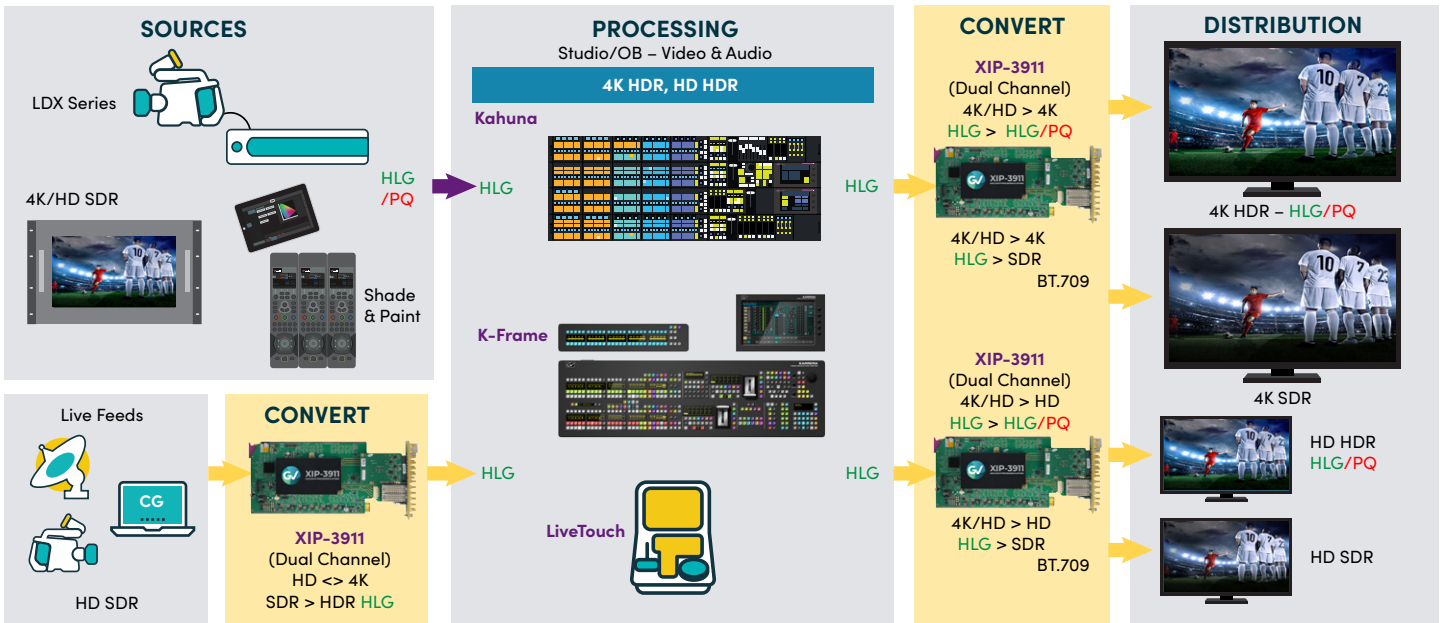**XIP–3901–UDC–IP Dual Channel 4K UHD IP Processing Application**

OPTIONAL LICENSES:

XIP-3901-UDC-HDR   XIP-3901-UDC-AUD

Control, Configuration and Monitoring

Featured Solution: ATP–2000 Touch Panel with GV Orbit Dynamic Orchestration

Typical HDR/SDR Format Conversion Used in Live Production

SOURCES

LDX Series

4K/HD SDR

Shade & Paint

HLG /PQ → HLG

PROCESSING
Studio/OB – Video & Audio

4K HDR, HD HDR

Kahuna

K-Frame

LiveTouch

HLG

CONVERT

Live Feeds

CG

HD SDR

XIP-3911
(Dual Channel)
HD <> 4K
SDR > HDR HLG

HLG

CONVERT

XIP-3911
(Dual Channel)
4K/HD > 4K
HLG > HLG/PQ

4K/HD > 4K
HLG > SDR
BT.709

XIP-3911
(Dual Channel)
4K/HD > HD
HLG > HLG/PQ

4K/HD > HD
HLG > SDR
BT.709

HLG

HLG

DISTRIBUTION

4K HDR – HLG/PQ
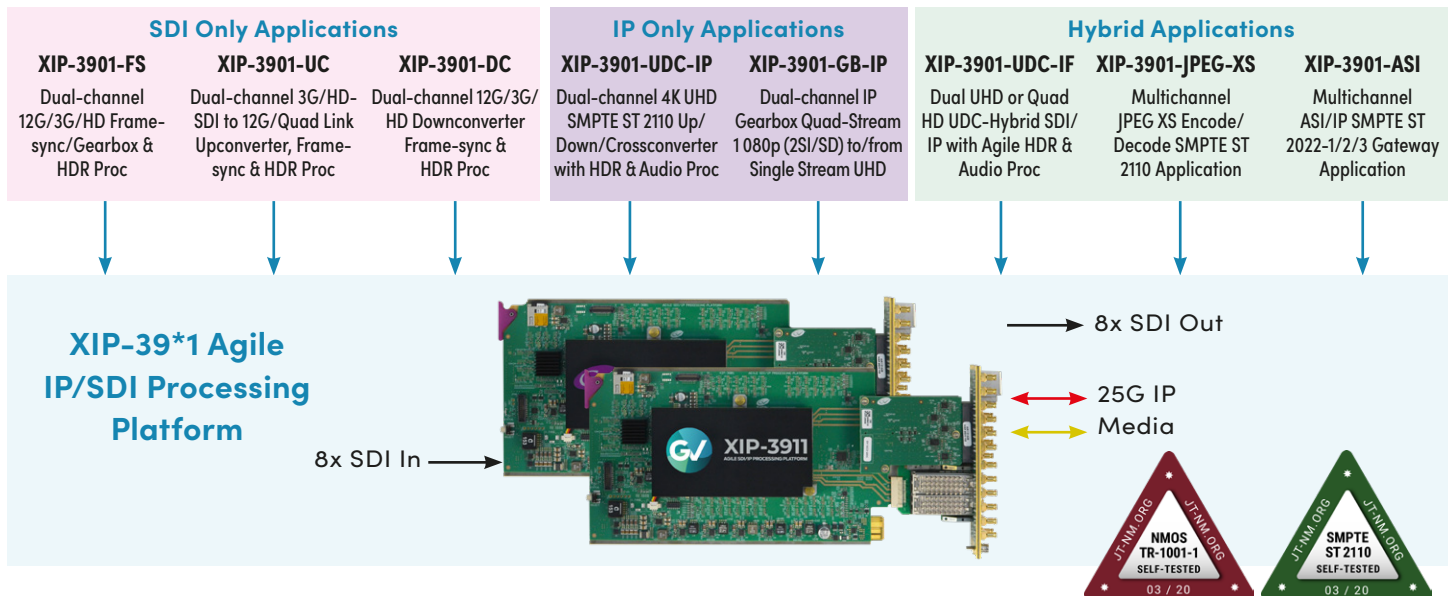
4K SDR

HD HDR
HLG/PQ

HD SDR

XIP Application Portfolio

All the processing applications delivered on the XIP-3911 and XIP-3901 platforms allow live productions, either from trucks, venues, stadiums or broadcast facilities to make the most of new UHD and HDR formats. Packing lots of audio/video processing power in a small form factor results in savings in terms of space, power and weight.

The XIP-3911 Agile Processing Platform also provides long-term value by protecting a customer's CAPEX investment in current HD and UHD SDI and now IP infrastructure. The application-based licensing model adapts the XIP-3911 to new workflows with different software applications resulting in a truly virtualized hardware environment.

XIP Application Agility Evolution

SDI Only Applications			IP Only Applications		Hybrid Applications		
XIP-3901-FS	**XIP-3901-UC**	**XIP-3901-DC**	**XIP-3901-UDC-IP**	**XIP-3901-GB-IP**	**XIP-3901-UDC-IF**	**XIP-3901-JPEG-XS**	**XIP-3901-ASI**
Dual-channel 12G/3G/HD Frame-sync/Gearbox & HDR Proc	Dual-channel 3G/HD-SDI to 12G/Quad Link Upconverter, Frame-sync & HDR Proc	Dual-channel 12G/3G/HD Downconverter Frame-sync & HDR Proc	Dual-channel 4K UHD SMPTE ST 2110 Up/Down/Crossconverter with HDR & Audio Proc	Dual-channel IP Gearbox Quad-Stream 1 080p (2SI/SD) to/from Single Stream UHD	Dual UHD or Quad HD UDC-Hybrid SDI/IP with Agile HDR & Audio Proc	Multichannel JPEG XS Encode/Decode SMPTE ST 2110 Application	Multichannel ASI/IP SMPTE ST 2022-1/2/3 Gateway Application

XIP-39*1 Agile IP/SDI Processing Platform

8x SDI In

8x SDI Out

25G IP Media

NMOS TR-1001-1 SELF-TESTED 03 / 20

SMPTE ST 2110 SELF-TESTED 03 / 20

DS-PUB-3-0949A-EN

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