.edge

HYPER-DENSITY
SDI/IP CONVERSION
AND ROUTING PLATFORM

LAWO

REPLACE
SCALE
DISTRIBUTE

.edge
Software-Licensable Infrastructure

Never before has the broadcast sector seen a paradigm shift of a magnitude that comes even close to what we are witnessing right now. What used to be confined to a single facility today stretches beyond the horizon: private, public and hybrid clouds as well as remote and distributed workflows are redrawing the production landscape.

The only constant in this state of flux is the need for SDI inputs and outputs in higher capacity. Lawo .edge provides this in an amazingly compact footprint, at 25GbE or 100GbE, and with all the routing capabilities users expect from Lawo.

.edge is your broadcast and AV genie, ready to perform its magic when summoned.

.edge is designed with simplicity, flexibility, agility and economic efficiency in mind. Software-defined by nature, it can be used as a feature-laden replacement for traditional SDI routers, and expanded with flexible software licenses to provide the perfect mix of advanced features. With .edge, OPEX meets CAPEX in the leanest of ways.

Whether you are looking to replace the SDI router that you are on the verge of outgrowing, or in search of a highly user-friendly tool to add flexible I/O to your local, distributed, remote or cloud infrastructure: now is the time to take your infrastructure to the edge.

PROUDLY SUPPORTING:

AIMS — Alliance for IP Media Solutions

RAVENNA

EMBER+

REST API

JPEG XS

lives @ HOME

Hyper Density as A Service

.edge's compact 2RU housing accommodates up to 192 HD-BNC connectors for SDI and MADI* interfacing and can be clustered to provide matrices well beyond 1152 x 1152 crosspoints. Your next large SDI router can be IP-native, 24RU small, consume only 24x 100G network ports**—a third of what other offerings require—and still be more powerful, scalable and future-proof.

Support for the SMPTE ST2110 suite of standards with SMPTE ST 2022-7 redundancy is built in, providing not only advanced essence-based handling but also ensuring seamless protection switching of audio, video and ancillary data streams in both local and wide-area network operations.

Basic video and audio processing functions come as standard, whilst power-user features can be added as and when you need them—even for a limited time.

.edge is one of the only gateway solutions to boast high-capacity symmetrical IP ingress and egress, providing the sender and receiver count you expect from an IP pro.

SDI is Here to Stay

The trend towards software-enabled solutions and highly anticipated OPEX business models is clearly driving product innovation in the industry. Yet, unless you embark on a green-field project, your operation most likely already owns SDI hardware that is nowhere near its end of service life. And maybe you see no need to invest in IP-native sources and destinations anytime soon.

As your operation grows, however, the scope of your current SDI router may quickly hit a glass ceiling beyond which it needs to be replaced at substantial cost. .edge allows you to scale your router linearly and almost infinitely*** at your own pace.

With .edge, users can start small, e.g. with one processing blade and one rear I/O plate, then add a second, a third and a fourth, for a total of 192 SDI connectors per 2RU frame as their operation and infrastructure grows.

More .edge devices can be networked at a moment's notice and stationed close to the sources and destinations they serve—anywhere in the world—for remote or distributed production scenarios. Thanks to .edge's IP backbone, the sum of all networked .edge processing cards becomes a giant SDI router with a powerful, intuitive feature set.

For easy drop-in SDI router replacement, all-in .edge bundles are available for 288 x 288, 576 x 576 and 1152 x 1152 matrix capacities, complete with your choice of network switches and a fully-clustered HOME license.

.edge KEY FEATURES

- IP-native virtualized, highly modular SDI routing system, based on high-capacity generic compute processing blades.
- SD, HD and UHD on all inputs and outputs.
- Compact footprint, lightweight, low power requirements.
- Software-defined, flexibly licensable features for budget-effective performance.
- Hardware/software bundles for easy, out-of-the box SDI router replacement.
- HOME-native, with operator- and expert-level parameter control and more for time-critical, intuitive operation. Ember+ and REST API control support.
- High-density IP conversion for SDI equipment (up to 192 SDI connectors per 2RU).
- Designed for (de)centralized, distributed, remote and cloud operation.
- Fully based on open industry standards: ST2110, ST2022-7, RAVENNA, AES67, and more.

Signal conversion and edge processing

Audio embedding and de-embedding,
Audio shuffling,
Audio and video delay,
Frame synchronization,
Video gearboxing

.edge, Location A

Processing and Multiviewer

HOME Apps on
standard servers

LAN, WAN,
Publ. Coud

LAN   LAN

Signal conversion and edge processing

Audio embedding and de-embedding,
Audio shuffling,
Audio and video delay,
Frame synchronization,
Video gearboxing

.edge, Location B

Signal conversion and edge processing

Audio embedding and de-embedding,
JPEG XS compression,
Audio and video delay,
Frame synchronization,
Video gearboxing

.edge, Location C (remote operation)

Remote control and monitoring

WAN

LAN

Facility control and monitoring

(*) Licensable option – future product development.
(**) Calculation based on 1152 x 1152, 1080i format and non-redundant operation.
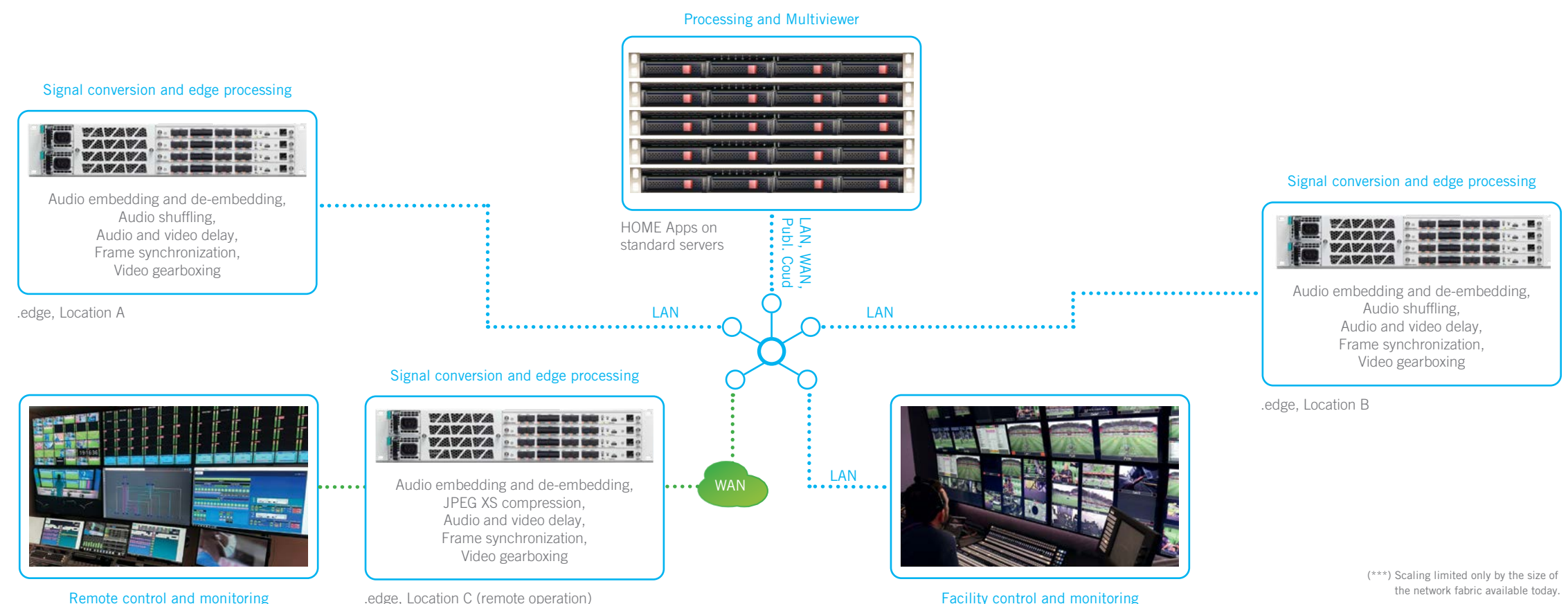
(***) Scaling limited only by the size of the network fabric available today.

One Size Fits All

.edge FRAME

The .edge frame provides redundant power, protective housing and temperature-controlled ventilation for the processing blades and rear I/O plates. Its height of only 2RU holds up to four processing blades and four 48-connector rear I/O plates.

Thanks to its quiet operation, it can even be used in noise-sensitive places, such as control rooms, audio booths, and on-set.

.edge PRODUCT FEATURES:

- Pre-configured, selectable configurations per rear I/O plate: 24 in/24 out, 32 in/16 out, 16 in/32 out.
- Features: SDI signal transparency, clean and quiet switching, audio embedding and de-embedding, audio shuffling, audio and video delay, frame synchronization, video gearboxing, and support of multiple timing planes.
- SDI/IP router capability (drop-in replacement of a legacy router).

.edge PROCESSING BLADE

.edge's high-density processing blade is based on the latest generation of high-performance FPGAs, featuring high-bandwidth memory (HBM) for high-density, high-performance 100Gbps operation.

.edge blades are hot-pluggable and designed to support multiple ways of connecting to the network fabric. Each blade is equipped with four 25Gbps SFP28 and two 100Gbps QSFP28 ports, each with a dedicated LINK STATUS indicator. 25GbE connectivity comes as standard, 100GbE operation can be activated via an optional license as and when necessary.

Device control via LAN or WAN is addressed either in-band or out-of-band via two dedicated SFP-based 1GbE management ports, depending on what is more convenient.

Mid-plane connections inform the .edge unit about the number of processing blades that have been installed (up to four per frame), which in turn controls .edge's automatic power regulation and temperature-controlled fan activity.

Designed with the environment in mind, a blade's CPU module can be removed, serviced and even replaced with a more powerful one in the future. This way, .edge's already stunning throughput and processing capacity can grow, while the core hardware essentially stays the same.

.edge REAR I/O PLATE

.edge's high-density rear I/O plates are equipped with 48 HD-BNC connectors. Up to four rears can be installed in one frame for best-in-class 192 I/O capability per 2RU.

All 48 connectors provide full support for SD, HD, 3G and 12G SDI video signals and MADI audio signals*. 12 connectors are directional inputs, an additional 12 are directional outputs. The remaining 24 connectors are bi-directional and can be used either as inputs or outputs.

By design, all connectors are 12G**-capable. Quad-link 3G-SDI can be activated via an optional 3G UHD Gearboxing function when your operation migrates to UHD. The number of simultaneous 12G streams is only limited by the bandwidth on the network interfaces.

Support for MADI* audio operation (12 in, 24 bidirectional, 12 out) is planned as a future licensable add-on.

Sync Reference on Board

In addition to the signal inputs and outputs on each rear plate, there are two reference inputs, each with a dedicated loop-thru connector, and one reference output. The latter can be driven either from a reference input or via PTP timing (Precision Time Protocol).

In remote setups, an .edge unit in a flypack can receive PTP timing via the network and provide tri-level sync to non-PTP capable devices. This removes the need for an external, on-location synchronous pulse generator (SPG).

.edge's PTP implementation offers multi-mode support (multicast, unicast or hybrid), BMCA (best master-clock algorithm, fully traceable clock) and user-definable parameter control.

(*) Licensable option – future product development.
(**) 12G capacity usage is defined by available network capacity. All connectors are 12G capable for future product development (12 x 12G enabled today).

# Built for Real-World Users

Welcome HOME

.edge has been designed from the ground up to be a HOME-native client. It is automatically discovered and registered within the HOME environment and benefits from all of HOME's next-generation management features: user access control, quarantining of unknown devices, security, parameter tweaking and real-time health monitoring.

.edge's parameters can be adjusted in HOME's web-based user interface, either on an algorithm-based operator level or on an expert level with granular access to deep-dive parameters. Though possible, scripting is not required to leverage .edge's full potential.

HOME furthermore provides comprehensive information about the label, the video format, the audio channels, and, in case of quad-link UHD, the individual 3G legs of incoming SDI signals. Frame sync and delay settings are abstracted for intuitive control.

To expedite physical source or destination identification, each processing blade's front panel is equipped with a CALL HOME button. Pressing it flags the processing blade within the HOME user interface for lightning-fast selection and adjustments.

Conversely, operators can click a dedicated button in HOME to cause the ID indicator on a processing blade to flash, making it easy to troubleshoot cabling issues.
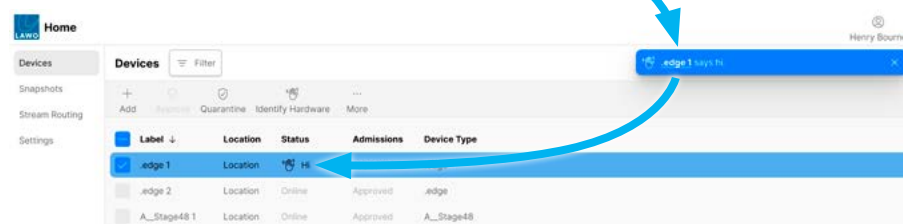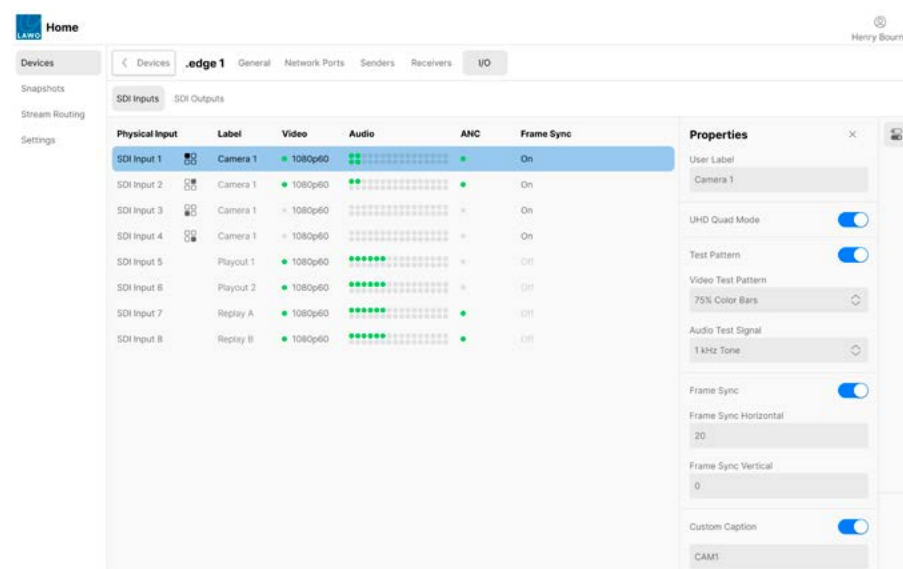
More Control

While HOME is the most intuitive way to control .edge, not all third-party broadcast controllers are equipped with a licensed API.

.edge also fully supports the Ember+ protocol for extensive device, parameter and routing control and native support for Lawo's VSM IP Broadcast Control System.


REST API support is available for device and parameter control using automated and scripted deployment.

'UHD Link Rotate' for Peace of Mind

As an industry-first, .edge offers comprehensive support for UHD scenarios with unparalleled video, audio and metadata capabilities. To assist operators of quad-link 3G-SDI cameras, replay devices, switchers, etc., in hectic situations, .edge's unique UHD Link Rotate function automatically reshuffles the legs of a four-wire 3G-SDI link whose cables were connected in the wrong order.

By reading the 2-sample interleave signal identifiers, .edge auto-corrects the ordering before the IP stream is generated, thus ensuring that UHD signals always arrive in the expected sequential order. UHD Link Rotate is included in the optional 3G UHD Gearboxing license.
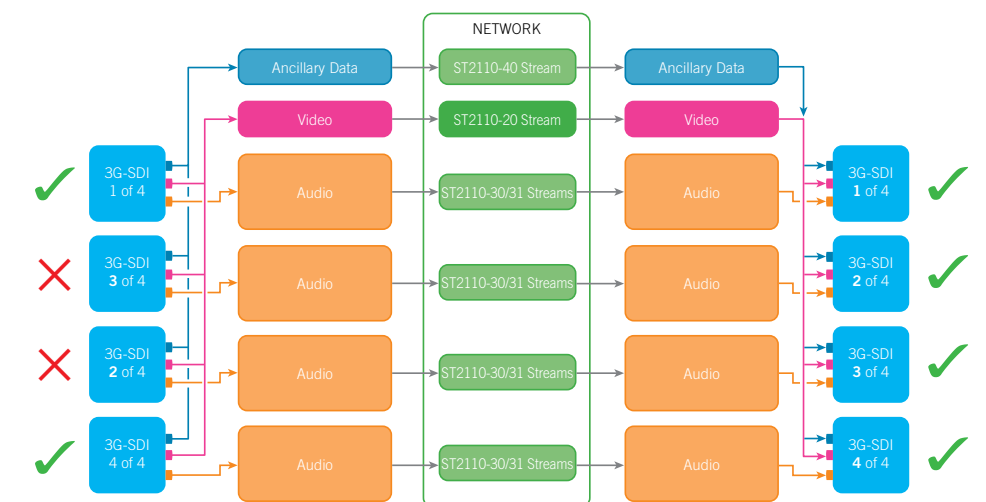
IP Wolf in SDI Clothing

Gold Standard

All standard, high-definition and ultra-high definition video formats are supported, both on the input and the output interfaces, in full compliance with the relevant SMPTE ST2110 standards (-10, -20, -21, -30, -31, -40). Comprehensive redundancy support is provided by SMPTE ST2022-7.

Thanks to its narrow sender/wide receiver design, .edge avoids the pitfalls associated with bursty software transmitters. .edge furthermore fully complies with the JT-NM SMPTE ST2110 self-testing process.

Yet another remarkable feature is .edge's ability to correct signal metadata both on the way in and on the way out by matching formats and color spaces to the job at hand.

Signal Transport

Equally at home with individual essence and group routing, .edge seamlessly transports video, audio and ancillary data. Audio shuffling and test-tone insertion (400Hz~1kHz) are available on both the input and output sides.

.edge's SDI outputs and inputs are equipped with independently adjustable frame synchronizers. On the input side, these synchronizers can be activated for wireless cameras, independent off-air feeds, etc., via a licensable add-on option. Pixel and line offsets can be adjusted with the same granularity as on traditional devices.

Operators are able to work with predefined, persistent pixel and line offsets per format, for easy alternations between 50Hz and 60Hz operation. A global offset parameter for fast ad-hoc skewing rounds out the picture.

3G UHD Gearboxing

Quad-link 3G-SDI support is available through a licensable 3G UHD Gearboxing option. Before hitting the IP data plane, quad-link 3G signals are combined into a transparent single-raster stream—to support SDQS (Square Division Quad Split), 2SI, and 4x super slow motion—rather than four separate IP streams. This significantly lowers the load on multicast addressing in the network and avoids time re-alignment issues at the destination.

The ST2110-40 ancillary data of the four 3G legs are combined on the UHD IP path, and an identifier is inserted to differentiate between the legs that supplied the ancillary packets.

On the output side, operators can choose to transmit UHD video to either one 12G or four 3G-SDI outputs. For maximum UHD signal distribution flexibility, users can repackage 12G input to quad-link 3G output, and vice versa. Single-link 12G-SDI signal input, on the other hand, requires no video gearboxing, as it is handled natively.

3G UHD Gearboxing includes the UHD Link Rotate function as well as VPID insertion on the output interface (2-sample interleave, SMPTE ST352 payload identification).

Audio Handling

Audio signal and essence handling is more flexible than ever. For SD and HD signals sent to an SDI input, .edge accepts the usual 16 audio channels, which can be routed to four IP senders, in any combination.
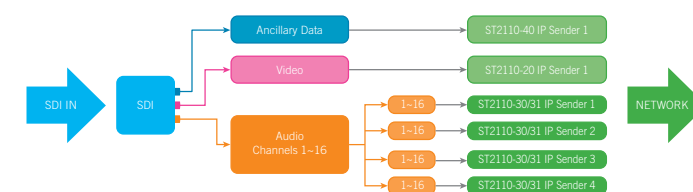
Other audio signals available on the IP network can be routed to the four IP receivers in addition to the ones received by the SDI input. Each receiver accepts up to 64 audio channels.
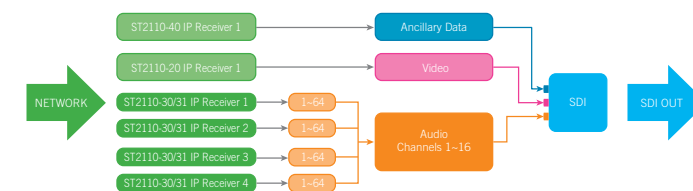
This is a must-have for installations where the audio is supplied by a different source (A__UHD Core, Power Core, third-party device). Any of the 64 channels sent to the four IP receivers can be shuffled into the final 16 audio channels sent to an HD-BNC output, providing maximum flexibility for audio packaging.

3G input scenarios (at 1080p) work similarly, except that each IP sender accepts up to 32 audio channels. The IP receivers can each handle 64 audio channels, 32 of which can be shuffled to an SDI output.
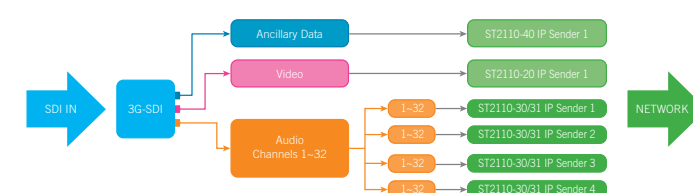
In quad-link 3G-SDI configurations (2160p, UHD), 128 audio channels (4 x 32 ch.) are supported and can be assigned to four IP senders per leg.
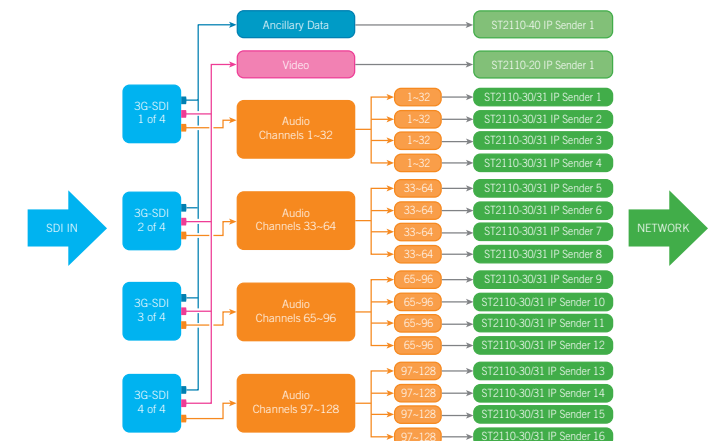
On the output side, 4 x 4 audio receivers each support 64 audio channels and can output 32 of them. Support for a combined 128 audio channels (4 x 32 ch.), as defined for the 12G/Quad-Link standard, is invaluable in production scenarios that involve parallel combinations of immersive, 5.1, stereo, and other audio formats.
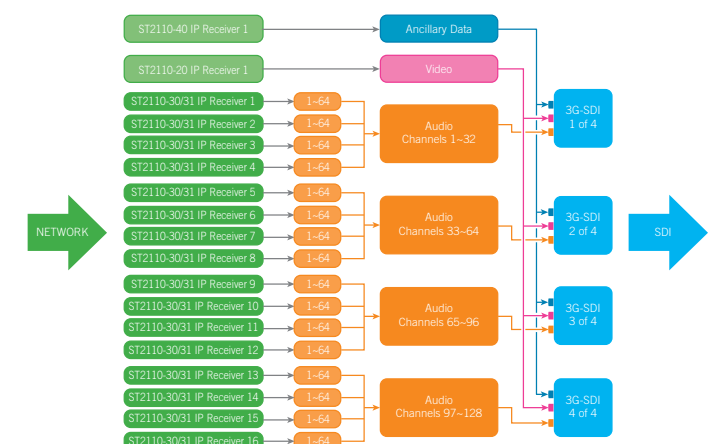
Single-link 12G-SDI input works in the same way as quad-link 3G-SDI input, the only exception being that there is no need to gearbox the video.

License to Thrill

To deliver maximum OPEX flexibility for a hardware-based tool, each .edge unit can be used in a variety of scenarios simply by unlocking the required feature sets, via a flexible licensing system. This makes it easy to deploy .edge in any location—field of play, OB trucks, news gathering, control rooms, MCR, etc.—at a highly competitive price point.

In fact, .edge's software-based specification potential is so diverse that Lawo has decided to propose a starter package that can be expanded with one or two optional licenses.

.jpegxs   .proxy

Additional Feature Licenses

.framesync
- Per input/instance[***]
- Licensing scheme: permanent, monthly[**], yearly[**]

.gearboxing
- For quad-link 3G signal input or output
- Per input/output instance
- Licensing scheme: permanent, monthly[**], yearly[**]

.100G
- Unlocks 100Gbps bandwidth
- Recommended for, e.g., single- and quad-link 3G as well as single link 12G UHD

.jpegxs
- Edge computing application for bandwidth-critical remote workflows with broadcast-grade support for JPEG XS encoding and decoding (compression up to 20:1)
- Ultra low-latency HD, 3G and UHD instances run alongside .edge's existing SDI input functionality
- Decoding downscale function built in
- Reduces infrastructure and IP network congestion at source
- Enables remote workflows thanks to highly efficient, lossless compression via WAN and LAN
- Multi-format capable: HD, 3G and UHD with HDR support (8K-ready)
- Industry-grade interoperability: support for SMPTE ST2110-22 and NMOS (requires HOME and an NMOS Exporter license)
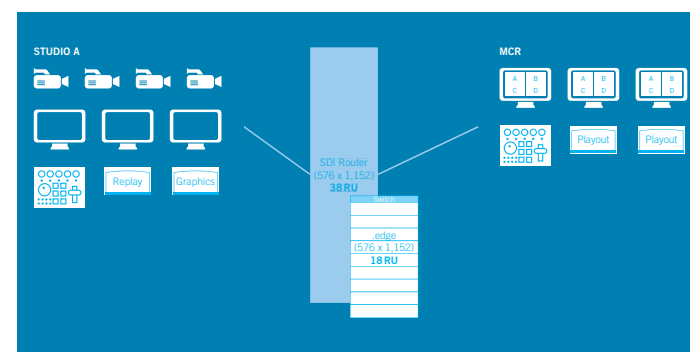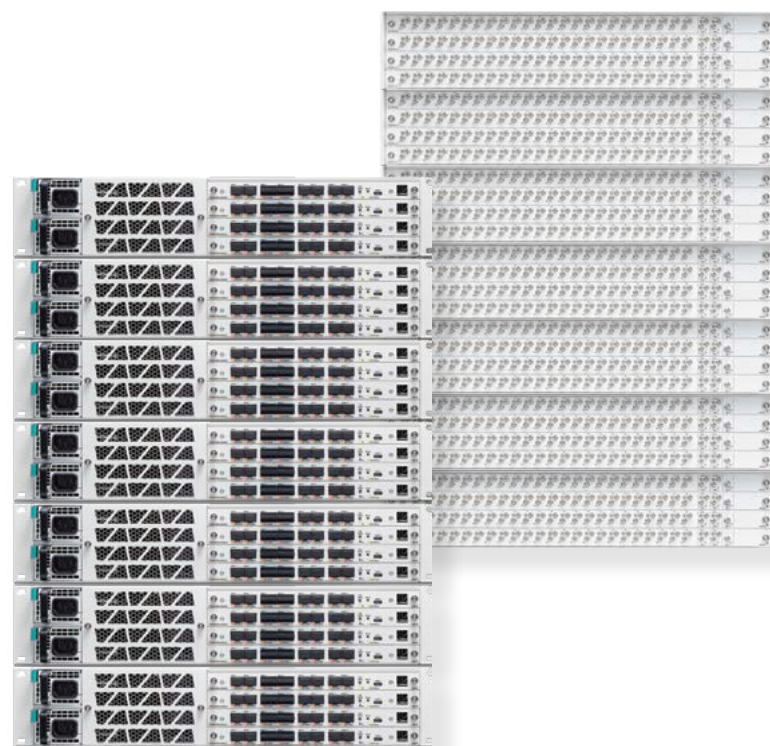
.proxy
- Generates downscaled video proxies for multiviewers and other destinations
- Up to 32 proxy generators in SD/HD/3G, and up to 8 generators in UHD, native SMPTE ST2110-20 signal delivery
- Downscaled resolutions: from 1/4 through 1/64, can be transported alongside the original 1:1 stream via the combined use of the 25Gbps and 100Gbps ports
- Simplifies workflows with source-to-destination delivery (no source indices), common audio and data
- Linear scalability: no cluster limitation
- Secure and robust: each .edge processing blade operates independently

Base License
- .edge unit with one processing blade and one SDI rear I/O plate
- 16x SDI (one of three configurations, see below)
- 25Gbps operation (4x SFP28 ports)

Configuration Preset 1: 8 inputs, 8 outputs*

Configuration Preset 2: 4 inputs, 12 outputs*

Configuration Preset 3: 12 inputs, 4 outputs*

Option 1 (software license)
- Adds an additional 16x SDI (total of 32, one of three configurations, see below)
- No additional hardware or network ports required
- Licensing scheme: permanent, monthly[**], yearly[**]

Configuration Preset 1: 16 inputs, 16 outputs*

Configuration Preset 2: 8 inputs, 24 outputs*

Configuration Preset 3: 24 inputs, 8 outputs*

Option 2 (software license)
- Adds another 16x SDI (total of 48, one of three configurations, see below)
- No additional hardware or network ports required
- Licensing scheme: permanent, monthly[**], yearly[**]

Configuration Preset 1: 24 inputs, 24 outputs*

Configuration Preset 2: 16 inputs, 32 outputs*

Configuration Preset 3: 32 inputs, 16 outputs*

(*) Solid connectors indicate currently enabled 12G-capable inputs and outputs.

(**) Limited-time licenses will be supported by Lawo's software subscription model in the future.
(***) Four Input Frame Synchronizer instances are required for UHD input (12G and Quad-3G).
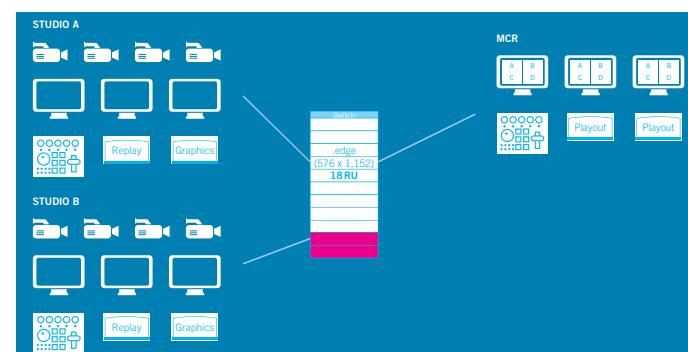
Replace. Scale. Distribute.

Designed as the ideal replacement for legacy SDI routing infrastructure, .edge offers the convenience and reliability of native SDI/IP conversion for long-haul signal transport. It is also the perfect solution for users who need to scale up to UHD and quickly find themselves limited by existing router infrastructure.

Clean and Quiet Switching

.edge's board design is unique: it does not have an audio TDM bus, nor a video matrix in the middle of its architecture. Video is switched on the IP packet level, in one of two ways: "make before break" (MBB) and "break before make" (BBM). Audio signals are switched in MBB mode using a V-fade curve for clean and quiet transitions.

Local Loop Support

Local and remote streams run on the same timing plane. In addition to doing away with timing issues, this approach also allows users to route local inputs to local outputs.
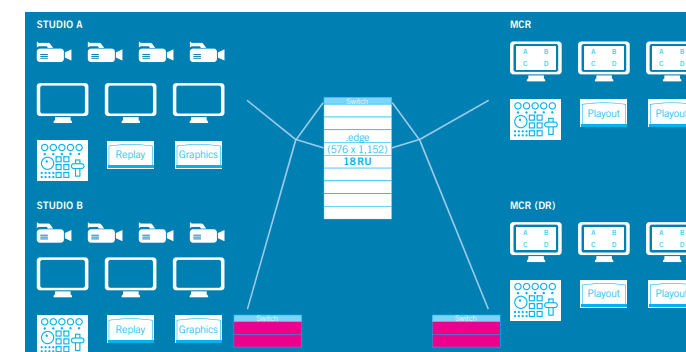
Packet Replication

A packet received once can be used many times without additional stream management or logic operations: packets in the packet buffer are available to any SDI output.

Test Pattern Generation

Test patterns can be static or moving. Use them to check whether the input signals go to the required destinations, whether there is network congestion, etc.
Test patterns and insertable character IDs also come in handy to program the entire switch fabric and routing architecture while no sources are available or connected.

Available Router Bundles

All-in bundles turn .edge into a user-friendly, drop-in replacement for an SDI router. In this capacity, .edge outclasses the competition in all respects: footprint, power requirements and weight. All of these considerations are as important for OB trucks as they are for ventilation requirements. .edge is easily the coolest high-capacity SDI/IP router on the market.

In addition, .edge is symmetrical, with as many high-density IP inputs as there are outputs. No other SDI router with IP gateway functionality comes even close.

Bundle 1: 288 x 288 SD and HD (25Gbps)
- 12 x processing blades with 12 x SDI I/O plates and the required software licenses
- 3 x 2RU frames with redundant power supplies
- 1 x HOME Cluster license including 3 x 1RU servers (device management, plug & play, DNS, DHCP, 802.1X security)

Bundle 2: 576 x 576 SD and HD (25Gbps)
- 24 x processing blades with 24 x SDI I/O plates and the required software licenses
- 6 x 2RU frames with redundant power supplies
- 1 x HOME Cluster license including 3 x 1RU servers (device management, plug & play, DNS, DHCP, 802.1X security)

Bundle 3: 1152 x 1152 SD and HD (25Gbps)
- 48 x processing blades with 48 x SDI I/O plates and the required software licenses
- 12 x 2RU frames with redundant power supplies
- 1 x HOME Cluster license including 3 x 1RU servers (device management, plug & play, DNS, DHCP, 802.1X security)

REPLACE

Keep all your existing SDI gear in operation and replace your SDI router with an .edge router bundle. To your broadcast control system, the .edge/HOME bundle behaves like a traditional SDI router, which means that there are no changes to users' UIs or workflows. Immediately benefit from easy one-step migration to IP by saving rack space, weight and power consumption.

SCALE

After migrating to an .edge/HOME router replacement solution, you can do more: you now have an SDI router that can scale according to your needs. What if your requirements grow? Just connect more .edge I/O to your network switch.

DISTRIBUTE

Since your core routing system is now based on IP, your router doesn't have to stand like a monolith in one place. It can be distributed across the facility. Put I/Os where they are needed and save signifcant cabling costs. It doesn't stop there: you can distribute your .edge routing infrastructure across multiple facilities, across the country or even across continents…

.edge

Software-Licensable Infrastructure

REPLACE. SCALE. DISTRIBUTE.

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.edge
SPECIFICATIONS

.edge Processing Blade

INTERFACES
- 2x SFP (1GbE) cages: copper (RJ45), short- (SR) and long-reach (LR) optical transceiver modules supported
- 4x SFP28 (25GbE) cages: active optical cable (AOC), short- (SR) and long-reach (LR) optical transceiver modules supported
- 2x QSFP28 (100GbE) cages: active optical cable (AOC), short- (SR) and long-reach (LR) optical transceiver modules supported
- 1x USB Type-C port: maintenance console port

STANDARDS
SMPTE 2110 Professional Media Over Managed IP Networks:
- ST2110-10: System Timing and Definitions
- ST2110-20: Uncompressed Active Video
- ST2110-21: Traffic Shaping and Delivery Timing for Video
- ST2110-30: PCM Digital Audio (Levels A, B and C)
- ST2110-31: AES3 Transparent Transport (Levels A, B and C)
- ST2110-40: SMPTE ST291-1 Ancillary Data

SMPTE ST2022-7: Seamless Protection Switching of RTP datagrams (Class A and B)

REFERENCE STANDARDS
IEEE1588 (PTP version 2)

PROCESSING
- SD/HD: 2x SFP28 (25GbE) in non-SPS discrete mode, 4x SFP28 (25GbE) in SPS redundancy mode
- 3G/12G: 1x QSFP28 (100GbE) in non-SPS discrete mode, 2x LE 28 (100GbE) in SPS redundancy mode

MANAGEMENT AND MONITORING
- OUT-OF-BAND CONTROL via 2x SFP (1GbE) interfaces
- IN-BAND CONTROL via 4x SFP28 (25GbE) or 2x QSFP28 (100GbE) interfaces
- API PROTOCOLS: HOME, Ember+ and RESTful
- FUNCTION BUTTONS: 1x Call HOME button and 1x Card RESET button
- INDICATORS: 1x Card Status LED, 1x Location (ID) LED, 8x Network Status LEDs (one per network interface)

.edge Rear I/O Plate

SDI CONNECTORS
- 48 micro HD-BNC connectors: 12 inputs (fixed), 12 outputs (fixed), 24 bi-directional (software programmable)

SDI STANDARDS
- SD: SMPTE ST259M-C (270Mb/s)
- HD: SMPTE ST292 (1.485, 1.485/1.001 Gb/s)
- 3G: SMPTE ST424 (2.970, 2.970/1.001 Gb/s)
- 12G: SMPTE ST2082-1:2015

SUPPORTED FORMATS
- SD: 525i59.94 (NTSC) and 625i50 (PAL)
- HD: 720p25, 720p29.97, 720p30, 720p50, 720p59.94, 720p60, 1080i23.98 (PsF), 1080i24 (PsF), 1080i50, 1080i59.94, 1080i60, 1080p23.98, 1080p24, 1080p25, 1080p29.97 and 1080p30
- 3G: 1080p50, 1080p59.94 and 1080p60
- 12G: 2160p50, 2160p59.94 and 2160p60

RETURN LOSS
- SD: >15dB, HD: >15dB
- 3G: >15dB (5 MHz~1.485 GHz), >10dB (1.485 GHz~2.97 GHz)

CABLE LENGTH
- SD: 400m at 270 Mb/s (using Belden 1694A)
- HD: 165m at 1.485 Gb/s (using Belden 1694A)
- 3G: 120m at 2.970 Gb/s (using Belden 1694A)
- 12G: 60m at 11.88 Gb/s (using Belden 4794A)

REFERENCE CONNECTORS
- 5x micro HD-BNC connectors: 2x inputs with 2x loop-through, 1x output
- REFERENCE STANDARDS: SMPTE ST170, SMPTE ST318, ITU 624-4 blackburst

.edge Frame

FRAME MECHANICS
- DIMENSIONS (H x W x D): 88 mm (2RU) x 482 mm (19") x 411 mm
- WEIGHT: Frame with fan tray fitted: 5.8kg (12.8lb); per PSU: 1.1kg (2.4lb); per processing blade: 1.2kg (2.7lb); per rear I/O plate: 1.1kg (2.4lb)
- INDICATORS: 2x power status per PSU
- POWER: Connectors: 2x IEC redundant, Input Voltage: nominal 100~240V, AC ±10%, 50/60Hz, Hot swappable
- MAX. CONSUMPTION: <1,000 W

ENVIRONMENTAL SPECIFICATIONS
- OPERATING TEMPERATURE: 0°C~+30°C (+32°F~+86°F)
- STORAGE TEMPERATURE: −20°C~+70°C (−4°F~+158°F)
- RELATIVE HUMIDITY: <90% non-condensing
- ELECTROMAGNETIC ENVIRONMENT: E2 (EN55103-1, -2)

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