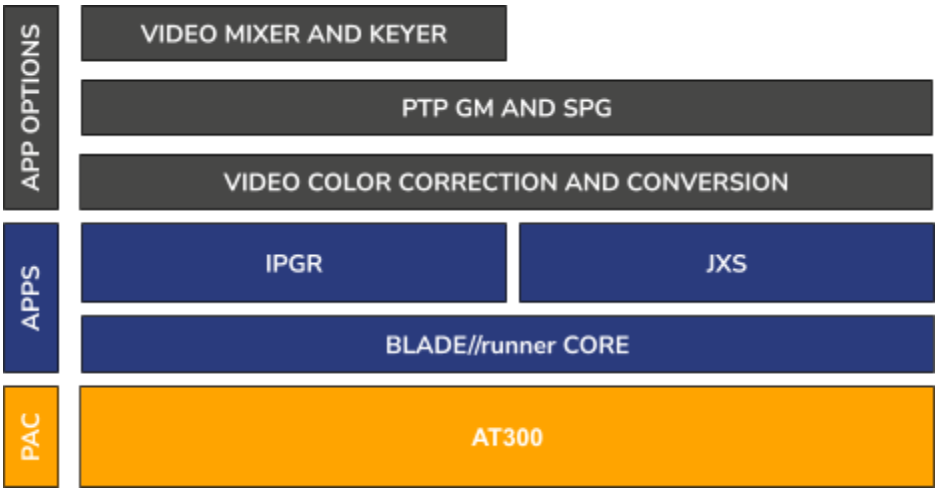
BLADE//runner is arkona's product line of software applications and programmable acceleration cards which provide core infrastructure solutions for Tier-1 live broadcast productions.

Designed around a highly flexible and modular core which forms the foundation upon which additional functionality is built, it allows for the creation, control and deletion of all processing functions on-the-fly through an open API as well as through NMOS IS-04/-05.



IP GATEWAY AND ROUTER APP (IPGR)

IPGR is a software application for the AT300 PAC that provides a comprehensive audio/video/metadata framework for encapsulating/de-encapsulation, routing and delay/sync of IP and SDI. In addition to the AT300's native dual 100GE IP network interfaces, SDI and MADI I/O are available when using one of the micro-BNC rear-modules thereby providing direct access to legacy baseband infrastructures. IPGR also features test-signal and LTC insertion functionality.

JPEG-XS ENCODE / DECODE APP (JXS)

JXS is a software application for the AT300 PAC that provides 8 instances of ST2110-22 JPEG-XS codecs. All 8 codecs are either configured as encode OR decode but can be changed on demand. Each codec instance supports one UHD/FHD/HD signal for a max of 8 x UHD.
In addition the JXS app provides uncompressed gateway capabilities with 2110-20, 30/31 and 40 encapsulation/de-encapsulation as well as routing/shuffling and delay/sync capabilities.

BLADE//runner CORE

BLADE//runner is built upon a CORE framework consisting of I/O, Routing, Processing, Delay and Sync features that are common across all APPS.

CORE I/O

The BLADE//runner framework provides input/output functionality with instantiable ST2110 and ST2022 transmitters and receivers as well as interfacing to legacy infrastructure through modular rear-plates. All IP senders and receivers support ST2022-7 seamless protection switching with at least class C (150ms) path differential.

NMOS:

BLADE//runner CORE I/O supports NMOS IS-04 and IS-05 for discovery and connection management.

IP:

ST2110-20 (HD and UHD), ST2022-6 (SD and HD with embedded audio and ANC)
Encap/Decap latency: Less than 1 line

ST2110-22 (HD and UHD).
Available with the JXS app.
Compression configurable between 5:1 and 40:1.
Encoding/Decoding latency: Estimated less than 2 ms[1].

ST2110-30/31 Level CX (64 channel max per stream), ST2022-6 (with embedded video and ANC), AES67, RAVENNA (80 channel max per stream)
Payload: L16, L24, AM824
Encap/Decap latency: Synchronous operation < 2msec; bypass option

ST2110-40, ST2022-6 (with embedded video and audio)

[1] Estimate. Pending exact measurement.

TX/RX Instances per APP	IPGR	JXS (Encode Mode)	JSX (Decode Mode)
2110-20/2022-6 - Uncompressed (UHD uses 2 instances)	36/32	30/32	30/32
2110-22 - JPEG-XS Encoders	0	8	0
2110-22 - JPEG-XS Decoders	0	0	8
2042 - VC2 (UHD uses 4 instances)	20/32	0/32	0/16
2110-30/31 - Audio	511/256	511/256	511/256
2110-40 - Metadata (UHD uses 2 instances)	32/32	30/32	30/32

Note:
An active 2110-22 encoder instance replaces one uncompressed 2110-20 TX instance.
An active 2110-22 decoder instance replaces one uncompressed 2110-20 RX instance, two if decoding JPEG-XS UHD streams.

SDI:

16 x UHD inputs, 16 x UHD outputs. Limit dependent on rear-plate configuration.
16/32 audio channels de-embedded from each input.
16/32 audio channels selectively embedded to each output from the audio matrix.
ATC (LTC, VITC1, VITC2), Binary group data, AFD, Audio Meta Data, Closed-Caption, VBI data services /DTV descr., DVB/SCTE VBI dta, ANSI/SCTE104, OP47, OBS source-id

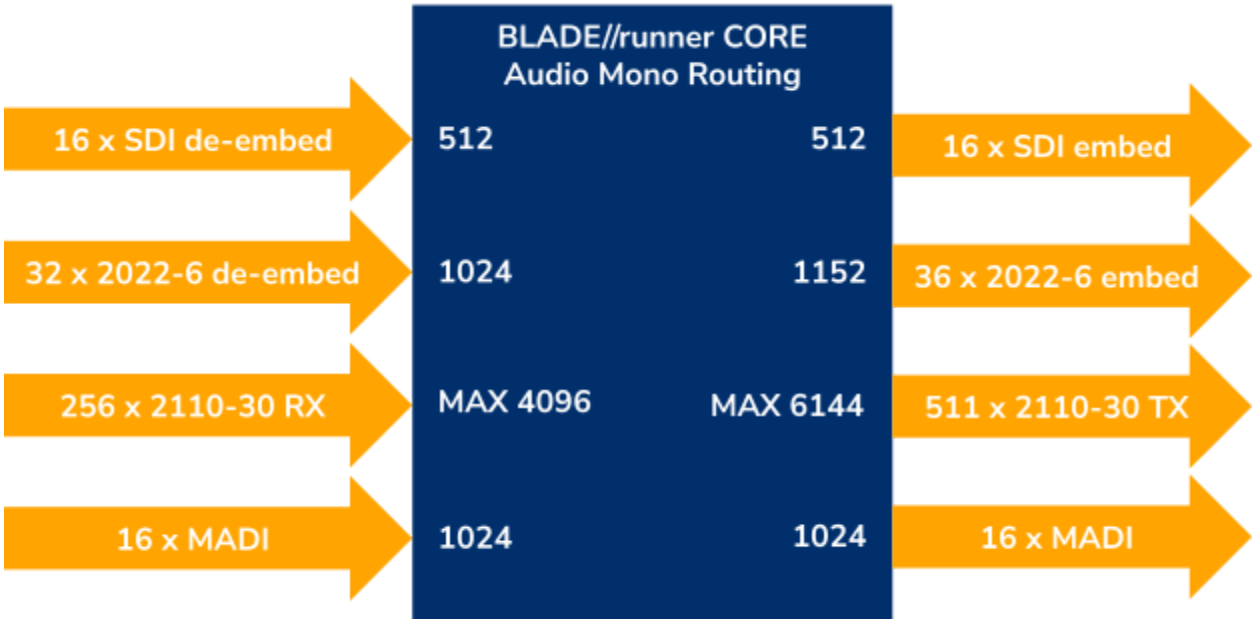
MADI:

16 x inputs, 16 x outputs. Limit dependent on rear-plate configuration.

CORE ROUTING & PROCESSING

Routing & Processing is an inherent layer of all BLADE//runner apps that provide any-to-any routing of Video, Audio and Metadata between processing functions and I/O.

BLADE//runner CORE audio router offers mono level shuffling with individual audio gain control on every output.



All routing is “clean and quiet” with make-before-break (MBB) or break-before-make (BBM) configurable per video receiver. Audio routing and shuffling within the audio router is always done with crossfade while V-fade is used when an audio IP receiver changes source.

SAMPLE RATE CONVERTERS:

Routable instances of audio sample-rate converters. Each instance processes up to 16 channels of audio.

Processing	IPGR	JXS Encode	JSX Decode
Sample-rate converters (16 channel)	72	72	48

DELAY & SYNC

Delay and Sync is part of all BLADE//runner apps and provide Audio, Video and Metadata delay through routable instances using a shared memory pool. SDI frame sync and UHD single-link to quad-link conversion is available on all input interfaces when outfitted with an appropriate rear-plate.

- Configurable audio and video delay instances using a shared memory pool with multiple outputs (readers) per delay instance allowing for playout at different times from the buffer. (*Example: A single delay instance with a 2 second total delay buffer utilizes 4 readers to play out the same content at a delay of 2s, 1.8s, 0.75s and 0.2s.)*
- Auto-alignment feature using ST2110 RTP information for audio/video/metadata alignment.
- Frame Sync for 16x SDI inputs when an optional rear-plate is attached.
- UHD Single-link/Quad-link splitter (2SI/SQD) and merger (2SI) with automatic re-ordering based on identifiers.

VIDEO

16 instances of video delay using an 8GB shared memory pool . Total delay is dependent on format/bitrate. Each video delay instance provides up to 10 outputs (readers) allowing for playout at different times.

Example max delay @3G 1080p50 = 32 sec / 1080p60 = 27 sec. UHD would use 4 x the memory of 3G, while HD and SD use less.

AUDIO

256 instances of 16-channel audio delay each using up to 256MB from a 1GB shared memory pool. Each audio delay instance provides up to 16 outputs (readers) allowing for playout at different times.
Dolby-E alignment functionality is available for every audio delay instance.

Example max delay@48kHz for one instance = 49 sec.

Delay and Sync features	IPGR	JXS
Video delay instances	16	16
Video delay memory pool	8GB	8GB
Video delay readers per instance	10	10
Audio delay instances	256	256
Audio delay memory pool	1GB	1GB
Audio delay readers per instance	16	16
Automatic A/V/M alignment based on RTP timestamps	YES	YES
DolbyE alignment	YES	YES
SDI frame syncs	16	16

TEST-SIGNAL & LTC GENERATOR

All BLADE//runner apps include 2 instances of test signal generators routable to any I/O as well as LTC time code generation.

Video: 100% color bar, counters, RP198.
Audio: Silence/1kHz/440Hz/400Hz (-6dB, -18dB,-20dB)
Time code generator/inserter: Free run, SDI, PTP, LTC (dig. Audio) output

SOFTWARE OPTIONS

The following section describes the BLADE//runner. Not all options are available for all APPS. See the infographic at the top of this datasheet.

VIDEO COLOR CORRECTION & CONVERSION (VCC)

VCC is an option that provides additional routable instances of RGB/YUV color correction and SDR-HDR color space conversion.

COLOR CORRECTION

RGB color and ProcAmp (YUV) controls. UHD uses 2 instances.
Processing latency: < 100 pixels.

COLORSPACE CONVERSION SDR<->HDR

Broadcast quality colorspace conversion: SDR (BT609/709) to/from HDR (BT2020/2100) using tetrahedral interpolation with user loadable 3D LUTs.

Option and instances	IPGR	JXS Encode	JXS Decode
Proc Amp	12	0	0
Colorspace conversion and Proc Amp	12	8	8

VIDEO MIXER & KEYER (VMK)

VMK is an option that adds routable instances of mixing, keying and frame grabber/clip player functionality.

MIXER & KEYER

A/B mix or Luminance Key/Fill with configurable transitions. UHD uses 2 instances.

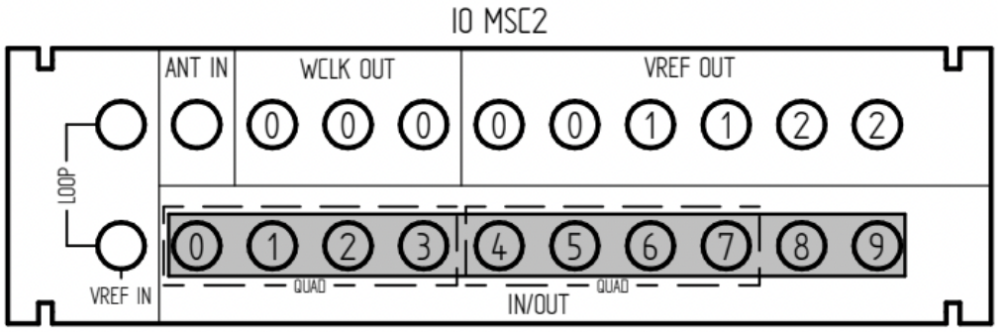
VIDEO STILL STORE PLAYER/GRABBER AND CLIP PLAYER

Player/Grabber Instances configurable as still store player OR video clip player OR Frame grabber and 16 instances of frame grabber using a shared memory pool of 8GB.

Option and instances	IPGR	JXS Encode	JXS Decode
Video Mixer and Keyer	24	0	0
Video clip/still store player	24	24	24
Video frame grabber	16	16	16

PTP GRANDMASTER CLOCK & SYNC PULSE GENERATOR (GMC)

GMC is an option that provides IEEE1588 PTPv2 GrandMaster functionality with support for the SMPTE 2059-2 and AES67 profiles allowing it to be the PTP GM for ST2110 networks.



Synchronization can either be derived from internal clock, GPS input, or external video reference (BB or Tri-Level). GMC supports up to 256 simultaneous PTP agents.

With the optional IO_MSC2 rear-plate it also adds support for GPS/GLONASS antenna input as well as legacy reference outputs for Word Clock (3 outputs) and Black and Burst and Tri-Level video reference outputs (6 outputs in total which can have up to three different timing domains). In addition the IO_MSC2 provides 10 BNC connectors for 4K/3G/HD/SD which are configurable as IN or OUT..

SUPPORTED VIDEO STANDARDS

UHD FORMATS

2160p 50;59.94;60Hz SMPTE ST-2082

HD FORMATS

1080p 60Hz SMPTE-424M, 425M Level A
1080p 59.94Hz SMPTE-424M,425M Level A
1080p 50Hz SMPTE-424M, 425M Level A
1080i 60Hz SMPTE-274M(4),-292M(D)
1080i 59.94Hz SMPTE-274M(5),-292M(E)
1080i 50Hz SMPTE-274M(6),-292M(F)
1080p 30Hz SMPTE-274M(7)-292M(G)
1080p 29.97Hz SMPTE-274M(8)-292M(H)
1080p 25Hz SMPTE-274M(9)-292M(I)
1080p 24Hz SMPTE-274M(10)-292M(J)
1080p 23.98Hz SMPTE-274M(11)-292M(K)
720p 60Hz SMPTE-296M(1),-292M(L)
720p 59.94Hz SMPTE-296M(2),-292M(M)
720p 50Hz SMPTE-296M(2),-292M(M)
720p 30Hz;29.97Hz;25Hz SMPTE-296M(2),
-292M(M)

SD FORMATS

576i 16:9 and 4:3 SMPTE-259M(C)
480i 16:9 and 4:3 SMPTE-259M(C)

DCI FORMATS

2048x1080 DCI p24 and sF25

COLORSPACE

REC 601, REC 709, REC 2020 / 2100