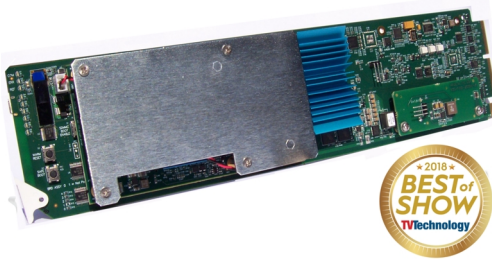# COBALT

9904-UDX-4K-IP • 12G/6G/3G/HD/SD UHD Up/Down/Cross Converter/Frame Sync with Dual 10GigE IP Ports

The Cobalt® **9904-UDX-4K-IP 12G/6G/3G/HD/SD UHD Up/Down/Cross Converter/Frame Sync with Dual 10GigE IP Ports** is Cobalt's next generation of advanced scaler/frame synchronizers for the openGear® platform.

The 9904-UDX-4K-IP upconverts 12G/6G/3G/HD/SD to either UHD1 3840x2160 Square DIvision Multiplex (SDM) or Two-Sample Interleave (2SI) quad 3G-SDI based formats, or can output ST 2082 12G-SDI for single-wire 4K transport. With both 12G-SDI and quad 3G-SDI inputs, the 9904-UDX-4K can downconvert 12G and quad UHD. The 9904-UDX-4K provides an HDMI 2.0 output for economical 4K video monitoring. The 9904-UDX-4K-IP offers numerous options, including SDR-to-HDR conversion and color correction.

The 9904-UDX-4K-IP can provide dual 10GigE ports providing support for the emerging uncompressed video/audio/data over IP standards.

The high-density openGear® design allows for up to five 9904-UDX-4K-IP cards to be installed in one 2RU openGear® frame. Card control/monitoring is available via DashBoard user interface or Cobalt's RESTful-based Reflex protocol.
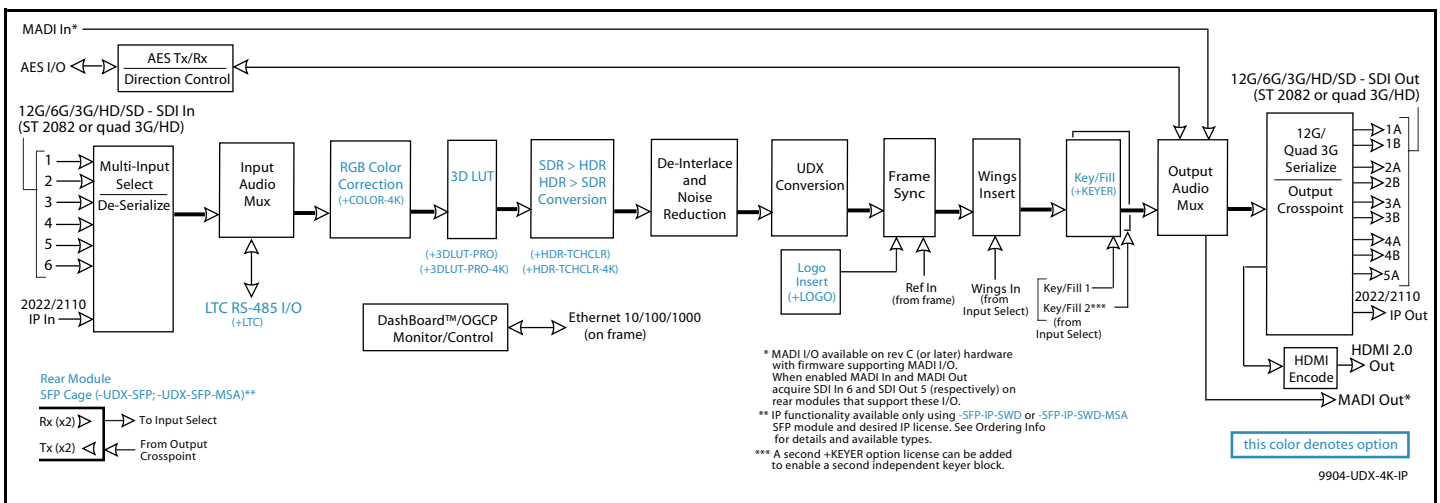
BEST of SHOW 2018 TVTechnology

openGear®

FEATURES

High-density openGear comprehensive UHD UDX solution

Supports all popular formats: 480i, 576i, 720p, 1080i, 1080pSF, 1080p

Full up/down conversion between HD/3G, ST 2082 12G-SDI single-wire, and SDQS/2SI quad 3G-SDI based formats, with ST 2082 12G-SDI single-wire and quad 3G UHD available at both input and output

Supports Square Division Multiplex (SDM) and Two-Sample Interleave (2SI) quad UHD formats

12G-SDI and quad 3G frame sync and user delay

Supports Cobalt's Reflex (JSON) Protocols

Noise Reduction and Detail Enhancement provide image quality optimization

Remote control/monitoring via Dashboard™ software, OGCP-9000 remote control panels, or Cobalt's RESTful-based Reflex protocol

Hot-swappable
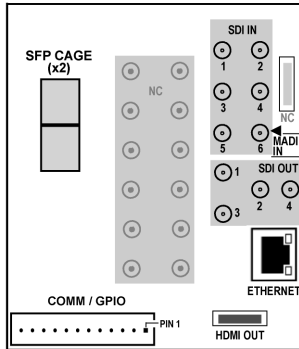
Five year warranty

OPTIONS

SDR/HDR Conversion Options (**+HDR-TCHCLR-4K**, **+HDR-TCHCLR**) – Provides real-time intelligent HDR conversion powered by Technicolor®. Contains SDR-to-HDR, HDR-to-SDR, and HDR-to-HDR conversion with dynamic metadata creation. Technicolor toolkits include SL-HDR encode, SL-HDR decode, and ITM Intelligent Tone Management.

3D LUT Options (**+3DLUT-PRO-4K**, **+3DLUT-PRO**) – 3D LUT (Look-Up Table) options provide 33 cube LUT mapping between 10-bit RGB and HDR color spaces.

3D LUT Option (**+3D-LUT-BBC**) – Licensed product developed by the BBC, provides BBC 3D LUTS as optional SDR-to-HDR and HDR-to-SDR profiles.

Logo Insertion Option (**+LOGO-4K**, **+LOGO**) – Provides file-based insertion for branding local or destination branding/ID requirements.

Audio LTC I/O Option (**+LTC**)

Color Correction Options (**+COLOR-4K**, **+COLOR**) – Provides full RGB color corrector (offset, gain, gamma) with extended YCbCr proc controls with white hard clip, white soft clip, black hard clip, and saturation clip.

Key/Fill Keyer Option (**+KEYER-4K**, **+KEYER**) – Provides keying using SDI inputs for key and fill signals. Alpha Threshold mode allows full-color key/fill using low-cost PC-based graphics host where the same signal provides a shared key/fill input. (A second +KEYER option license can be added to enable a second independent keyer block.)

-UDX-SFP Options – Adds daughter card supporting externally-accessible dual SFP cage. (See Ordering Information for SFP types available, descriptions, and further info.)
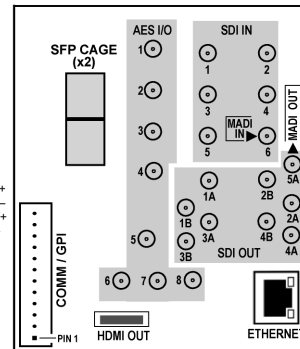

Block diagram for 9904-UDX-4K-IP

* MADI I/O available on rev C (or later) hardware with firmware supporting MADI I/O. When enabled MADI In and MADI Out acquire SDI In 6 and SDI Out 5 (respectively) on rear modules that support these I/O.
** IP functionality available only using -SFP-IP-SWD or -SFP-IP-SWD-MSA SFP module and desired IP license. See Ordering Info for details and available types.
*** A second +KEYER option license can be added to enable a second independent keyer block.

this color denotes option

9904-UDX-4K-IP • 12G/6G/3G/HD/SD UHD Up/Down/Cross Converter/Frame Sync with Dual 10GigE IP Ports

SFP CAGE (x2) NC

GPI/COMM
1 - GPI IN 1
2 - GPI IN 2
3 - GPI IN 3
4 - GPI IN 4
5 - GPI IN 5
6 - GPI IN 6
7 - GND
8 - GND
9 - COMM A RX1/–
10 - COMM A RX2/+
11 - COMM A TX1/–
12 - COMM A TX2/+

SDI IN 1 2 3 4 5 6 MADI IN NC
SDI OUT 1 2 3 4
COMM / GPIO PIN 1
HDMI OUT
ETHERNET

RM20-9904-C-HDBNC

SFP CAGE (x2)

GPI/COMM
12 - COMM A TX2/+
11 - COMM A TX1/–
10 - COMM A RX2/+
9 - COMM A RX1/–
8 - GND
7 - GND
6 - GPI IN 6
5 - GPI IN 5
4 - GPI IN 4
3 - GPI IN 3
2 - GPI IN 2
1 - GPI IN 1

AES I/O 1 2 3 4 5 6 7 8
SDI IN 1 2 3 4 5 6 MADI IN MADI OUT
1A 1B 2A 2B 3A 3B 4A 4B 5A
SDI OUT
COMM / GPI PIN 1
HDMI OUT
ETHERNET

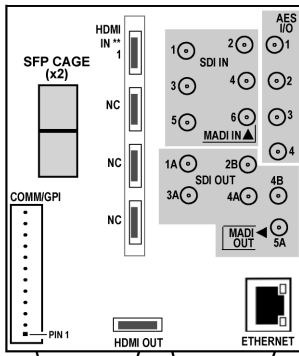*RM20-9904-F-HDBNC*

Note: Mates to card in **odd** slot.

SFP CAGE (x2)

GPI/COMM
1 - COMM A TX2/+
2 - COMM A TX1/–
3 - GPI IN 1
4 - GPI IN 2
5 - GND
6 - GPO COM
7 - GPO OUT 1
8 - GPO OUT 2
Note: Pin 1 is ■ in illustration.

SDI IN 1 3 5 6 MADI IN
AES I/O 1 2 3
SDI OUT 1B 3B 4A 2A
COMM / GPIO
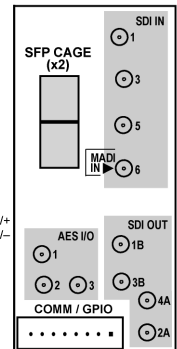
RM20-9904-G-HDBNC

COMM/GPI PINOUTS
1 - GPI IN 1
2 - GPI IN 2
3 - GPI IN 3
4 - GPI IN 4
5 - GPI IN 5
6 - GPI IN 6
7 - GND
8 - GND
9 - *COM A_RX1 / 422(-)
10 - *COM A_RX2 / 422(+)
11 - *COM A_TX1 / 422(-)
12 - *COM A_TX2 / 422(+)

* Port can be GUI-configured as two RS-232 ports (Tx and Rx), or as RS-422 port.
** HDMI IN port only present in conjunction with option **-H2S**. Although multiple ports may be present, only **HDMI IN 1** is active.

HDMI IN ** 1 NC NC NC
SFP CAGE (x2)
COMM/GPI PIN 1
AES I/O
SDI IN 1 2 3 4 5 6 MADI IN
1A 1B 2A 2B 3A 3B 4A 4B 5A MADI OUT
SDI OUT
HDMI OUT
ETHERNET

RM20-9904-K-HDBNC

Note: 9904-UDX-4K-IP model does not support HDMI inputs. HDMI inputs are not supported nor present when using rear modules that show HDMI IN presence in rear module illustrations here.

Note: MADI I/O is available on rev C (or later) hardware with firmware supporting MADI I/O. When enabled MADI In and MADI Out acquire SDI In 6 and SDI Out 5 (respectively) on rear modules that support these I/O. Rear modules that support MADI I/O show the MADI port locations that are SDI IN 6 and SDI OUT 5 alternatives (as shown in illustrations here).

SPECIFICATIONS

12G/6G/3G/HD/SD-SDI Input/Outputs
(6) 75Ω inputs (max)
(8) 75Ω outputs (max)
SDI Formats Supported: SMPTE ST2082-1,10, 424M, 292M, SMPTE 259M-C. All inputs/outputs 12G compliant and SDQS/2SI quad 3G compliant.
Return Loss:
 > 15 dB up to 1.485 GHz
 > 10 dB up to 3 GHz
 > 7 dB up to 6 GHz
 > 5 dB up to 12 GHz
Input Cable Length:
 45m Belden 1694A cable at 11.88 Gbps
 120m Belden 1694A cable at 2.97 Gbps
 240m Belden 1694A cable at 1.485 Gbps
 400m Belden 1694A cable at 270 Mbps
Output Signal Level: 800 mV ± 10%
DC Offset: 0 V ± 50 mV
Rise and Fall Time @ 11.88 Gbps: < 45 ps
Alignment Jitter (12G/3G/HD/SD): < 0.3/0.3/0.2/0.2 UI

Frame Sync Audio/Video Delay
Max offset: 20 frames
Latency (min): 1 frame

User Audio Delay Offset from Video
Bulk delay control: -33 msec to +3000 msec.
Per-channel delay controls: -800 msec to +800 msec

AES Audio Inputs/Outputs
(8) AES-3id 75Ω coaxial ports (max); port direction assignable as inputs or outputs in groups of 4 ports.
Note: Hardware rev –E and later has 8 AES ports; earlier versions have 4 port max.

SPECIFICATIONS (cont.)

MADI Audio Inputs/Outputs
(2) 75Ω coaxial ports (max)
Note: Not all rear modules support full MADI I/O. MADI I/O is a function of Rear Module used and is available only on card with on rev C (or later) hardware with firmware supporting MADI I/O. See Rear Module illustrations for specific information.

HDMI Output
HDMI 2.0 Output; type A standard connector

IP ST 2022-6 Interface
(2) 10GigE multi-mode optical Tx/Rx interface; female LC duplex connectors

GPIO
(6) GPI (max); (2) GPO (max)
Note: GPIO max capacity is a function of Rear Module used. See Rear Module illustrations for specific information.

Frame Reference Input
(2) reference from frame bus. SMPTE 170M/318M "Black Burst", SMPTE 274M/296M "Tri-Level"

Frame Loading (Max. recommended number of 9904 cards supported per Frame Model)
· OG3 Frame: (5) cards
· HPF-9000 Frame: (5) cards
· oGx Frame: (7) cards
Note: In all cases, it is recommended to leave a 1RU gap above the frame and set frame Network Controller Card to run the frame cooling fans at full (max.) speed.

ORDERING INFORMATION

9904-UDX-4K-IP   12G/6G/3G/HD/SD UHD Up/Down/Cross Converter/Frame Sync with Dual 10GigE IP Ports

Rear Modules:

Note: · MADI I/O is available on rev C (or later) hardware with firmware supporting MADI I/O. When enabled MADI In and MADI Out acquire SDI In 6 and SDI Out 5 (respectively) on rear modules that support these I/O. Rear modules that support MADI I/O show the MADI port locations that are SDI IN 6 and SDI OUT 5 alternatives. Rear modules that support MADI are identified below as **MADI Compatible**.

· Rear modules with SFP access do not come standard with any SFP functionality. Appropriate SFP option must be provisioned for rear module SFP functionality.

· SFP port-type availability depends upon SFP Type, rear IO module, and 9904-UDX host card rev as follows:

  · **Option -UDX-SFP (non-MSA); Card Rev E and earlier with -C, -F, -G rear IO module:**
    - Top SFP port supports up to 2 Fiber inputs and up to 2 Fiber outputs.
    - Bottom SFP port supports up to 2 Fiber inputs.

  · **Option -UDX-SFP (non-MSA); Card Rev F and later with -C, -F, -G rear IO module:**
    - Top SFP port supports up to 2 Fiber inputs and up to 2 Fiber outputs.
    - Bottom SFP port supports up to 2 Fiber inputs and up to 2 Fiber outputs.

  · **Option -UDX-SFP (non-MSA); Card Rev E and earlier with -K rear IO:**
    - Top SFP port supports up to 2 Fiber inputs and up to 2 Fiber outputs.
    - Bottom SFP port is unused (NC).

  · **Option -UDX-SFP (non-MSA); Card Rev F and later with -K rear IO:**
    - Top SFP port supports up to 2 Fiber inputs and up to 2 Fiber outputs.
    - Bottom SFP port support up to 2 Fiber outputs.

  · **Option -UDX-SFP-MSA (no card restrictions):**
    - Top SFP port supports 1 Fiber input and 1 Fiber output.
    - Bottom SFP port supports 1 Fiber input and 1 Fiber output.

RM20-9904-C-HDBNC   20-Slot Frame Rear I/O Module (Double-Width) (6) 12G/6G/3G/HD/SD/SD-SDI Inputs, (4) 12G/6G/3G/HD/SD/SD-SDI Processed Outputs, GPI/COMM, HDMI 2.0 Output (type A standard connector), (2) SFP cage receptacles, 100/1000 BaseT Ethernet Port **MADI Compatible.** (All coaxial connectors HD-BNC.)

RM20-9904-F-HDBNC   20-Slot Frame Rear I/O Module (Double-Width) (6) 12G/6G/3G/HD/SD/SD-SDI Inputs, (9) 12G/6G/3G/HD/SD/SD-SDI Processed Outputs, (8) AES I/O, GPI/COMM, HDMI 2.0 Output (type A standard connector), (2) SFP cage receptacles, 100/1000 BaseT Ethernet Port **MADI Compatible.** (All coaxial connectors HD-BNC.)

RM20-9904-G-HDBNC   20-Slot Frame Rear I/O Module (Standard-Width) (4) 12G/6G/3G/HD/SD/SD-SDI Inputs, (4) 12G/6G/3G/HD/SD/SD-SDI Processed Outputs, (3) AES I/O, GPIO/COMM **MADI Compatible.** (All coaxial connectors HD-BNC.) (**Note:** Mates to card in odd frame slot.)

RM20-9904-K-HDBNC   20-Slot Frame Rear I/O Module (Double-Width) (6) 12G/6G/3G/HD/SD/SD-SDI Inputs, (6) 12G/6G/3G/HD/SD/SD-SDI Processed Outputs, (4) AES I/O, COMM/GPI, HDMI 2.0 Output (type A standard connector), (2) SFP cage receptacles (when used in conjunction with SFP option), 100/1000 BaseT Ethernet Port **MADI Compatible** (All coaxial connectors HD-BNC.)

ORDERING INFORMATION (cont.)

Options:

Note: · Options denoted as **"+"** are **software-based** options which are available on new product when ordered or can be customer field-installed as a software upload upgrade.
· Options or ordering line items denoted as **"-"** are **hardware-based** options/items. These options are available as factory-installed only on new product, or product returned to Cobalt for factory installation.

+HDR-TCHCLR-4K 4K SDR/HDR Conversion Option (This option includes SL-HDR encode, SL-HDR decode, and ITM Intelligent Tone Management.)

+HDR-TCHCLR SDR/HDR Conversion Option (This option includes SL-HDR encode, SL-HDR decode, and ITM Intelligent Tone Management.)

+3DLUT-PRO-4K 3D LUT 4K Option (compatible with up-mapping to HDR and processing for down-conversions to HD SDR color space)

+3DLUT-PRO 3D LUT Option (compatible with processing for down-conversions to HD SDR color space)

+3D-LUT-BBC BBC 3DLUT Option (Requires +3D-LUT-PRO or +3D-LUT-PRO-4K option to also be present to support this option)

+COLOR-4K 4K Color Correction Option

+COLOR Color Correction Option

+KEYER-4K 4K Key/Fill Keyer (Alpha) Option (Additional second option license enables a second independent keyer block.)

+KEYER Key/Fill Keyer (Alpha) Option (Additional second option license enables a second independent keyer block.)

+LOGO-4K 4K Logo Insertion Option

+LOGO Logo Insertion Option

+LTC Audio LTC I/O Option

-UDX-SFP-MSA Adds daughter card supporting externally-accessible dual SFP cage.
Note:
· To support SFP option(s) below, card must be fitted with rear module (such as RM20-9904-C-HDBNC, RM20-9904-F-HDBNC, or RM20-9904-G) that supports SFP plug-in modules.
· This daughter card included standard on 9904-UDX-4K-IP model, but needs to be specified at purchase to support MSA-type SFP below.
· **-UDX-SFP-MSA-4S** daughter card is used with **4-slot** ("Double-Width") rear module (such as RM20-9904-C-HDBNC, RM20-9904-F-HDBNC, or RM20-9904-K-HDBNC). UDX-SFP-MSA is **only** available for use in conjunction with **4-slot** rear modules and daughter card -UDX-SFP-MSA-4S). Rear modules RM20-9904-C-HDBNC, RM20-9904-F-HDBNC, RM20-9904-K-HDBNC and option -UDX-SFP-MSA-4S are available separately.

 -SFP-IP-SWD-MSA Software-Defined MSA SFP 2011/2022-6 Encap/De-Encap Host. 10GigE Multi-Mode Optical Interface with Female LC Duplex Connectors. The following I/O purposing software options are available for cards using SFP type -SPF-IP-SWD-MSA (Up to 3 software licenses can be added to the -SFP-IP-SWD-MSA, but only 1 license can be active at a time):
  +ADD-SFP-IP-TO-SDI-2022-6 SFP Software License; Single-Channel De-Encapsulator IP-2022-6-to-SDI
  +ADD-SFP-IP-TO-SDI-2110 SFP Software License; Single-Channel De-Encapsulator IP-2110-to-SDI
  +ADD-SFP-SDI-TO-IP-2022-6 SFP Software License; Single-Channel Encapsulator SDI-to-IP-2022-6
  +ADD-SFP-SDI-TO-IP-2110 SFP Software License; Single-Channel Encapsulator SDI-to-IP-2110

-UDX-SFP Adds daughter card supporting externally-accessible dual SFP cage.
Note:
· To support SFP option(s) below, card must be fitted with rear module (such as RM20-9904-C-HDBNC, RM20-9904-F-HDBNC, or RM20-9904-G) that supports SFP plug-in modules.
· This daughter card included standard on 9904-UDX-4K-IP model, but needs to be specified at purchase to support SFP below.
· **-UDX-SFP-2S** is required where **2-slot** ("Standard-Width") rear module (such as RM20-9904-G-HDBNC) is to be fitted with SFP option.
· **-UDX-SFP-4S** is required where **4-slot** ("Double-Width") rear module (such as RM20-9904-C-HDBNC, RM20-9904-F-HDBNC, or RM20-9904-K-HDBNC) is to be fitted with SFP option. Rear modules RM20-9904-C-HDBNC, RM20-9904-F-HDBNC, RM20-9904-G-HDBNC, RM20-9904-K-HDBNC and option -UDX-SFP-2S or -UDX-SFP-4S are available separately.

-SFP-IP-SWD Software-Defined EmSFP; 2011/2022-6 Encap/De-Encap Host. 10GigE Multi-Mode Optical Interface with Female LC Duplex Connectors. The following I/O purposing software options are available for cards using SFP type -SPF-IP-SWD (Up to 3 software licenses can be added to the -SFP-IP-SWD, but only 1 license can be active at a time):
  +ADD-SFP-2SDI-TO-IP-2022-6 SFP Software License; Dual-Channel Encapsulator 2SDI-to-IP-2022-6
  +ADD-SFP-2SDI-TO-IP-2110 SFP Software License; Dual-Channel Encapsulator 2SDI-to-IP-2110
  +ADD-SFP-IP-TO-2SDI-2022-6 SFP Software License; Dual-Channel De-Encapsulator IP-2022-6-to-2SDI
  +ADD-SFP-IP-TO-2SDI-2110 SFP Software License; Dual-Channel De-Encapsulator IP-2110-to-2SDI
  +ADD-SFP-IP-TO-SDI-2022-6 SFP Software License; Single-Channel De-Encapsulator IP-2022-6-to-SDI
  +ADD-SFP-IP-TO-SDI-2110 SFP Software License; Single-Channel De-Encapsulator IP-2110-to-SDI
  +ADD-SFP-SDI-TO-IP-2022-6 SFP Software License; Single-Channel Encapsulator SDI-to-IP-2022-6
  +ADD-SFP-SDI-TO-IP-2110 SFP Software License; Single-Channel Encapsulator SDI-to-IP-2110