User Guide

Selenio™ Network Processor

IP Media Processing Platform

April 2024

Release 3.0 GA

Publication Information

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For domestic and international support contact information see:

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- Warranty & Contract Information (https://www.imaginecommunications.com/services/customer-care)
- Imagine Communications Training (https://imaginecommunications.com/services/training/)

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Preface

Manual Information

Purpose

This manual provides information about the Selenio™ Network Processor.

Audience

This manual is written for engineers, technicians, and operators responsible for installation, setup, maintenance, and operation of the Selenio™ Network Processor.

Revision History

Edition	Date	Revision History
1.0	December 2017	Initial Release
1.1	September 2018	New features/content: • Configuring a Section for HD or UHD (on page 116) • Configuring Proxy Output (on page 261) • Configuring a Dual Conversion Personality (on page 135) • Configuring a Remap Personality (on page 133) • Low Latency; see Configuring a Processor (on page 113) Updates to List of Alarms (on page 109) and Configuring Processors (on page 112) Corrections to Using Magellan Control System with SNP (on page 332)
1.1.1	October 2018	HDR changes included in Video Tab: Color Adjustment (on page 415). Updates to specifications.
1.1.2	December 2018	New features/content: • Initial support for ST 2022-6 Tx • PTP locking with black burst assist • 12G HD-BNC I/O support

Edition	Date	Revision History
1.2	May 2019	New features: • ST 2022-6 support • HDR support • Addition of SNP-GW-3GX32-HS-QF frame with hot-swappable power supplies • 1080p23.98 and 1080psf23.98 • NMOS IS-04/IS-05 initial implementation
1.3	September 2019	New features: • Configure Local Host - Password Control (on page 103) • Local SNP Manager; see Using the SNP Manager Interface (on page 62) • NMOS full support; see NMOS (on page 369) • Additional supported QSFPs; see Orderable Part Numbers (on page 35) • Support for 2110-40 in Conversion mode; see Ancillary Data IP Filter (Conversion Mode) (on page 463) • Dolby E alignment; see Audio Tab: General Configuration (on page 449)
1.4	December 2019	New features: • Multiviewer Personality • MADI support; MADI Support (on page 293) • Clean switching for untimed/phased signals; see Input Tab: IP Video Configuration (on page 389) • 12G optical and coaxial VSFP support; see Video/Audio Expansion Interface Supported SFPs (on page 39) • Video Tab: On Screen Display (on page 419) • License Management (on page 381): licenses are listed in Licensing and Ordering (on page 34) • Sharpness controls; see Video Tab: Scaler Configuration (on page 419) • Improved ranges for Black and white Gain and clip levels; see Video Tab: Color Adjustment (on page 415)
1.4.1	December 2019	New content: • Configuring a Multiviewer Personality (on page 237)
1.4.3	February 2020	• Updates to features: • QSFP descriptions • FEC • License support

Edition	Date	Revision History

1.5	April 2020	• Added the following parameters to the Multiviwer Personality Configuration:
		  • Enable 9th Receiver
		  • Display Colorimetry and TCS
		  • Decimation Filter Sharpness
		  • Force MAB Mode
		See Configure a Multiviewer Personality (on page 240)
		• Documented the remote user credentials. See Add Element (on page 85)
		• Added a note about number of PiPs exceeding the number of ports. See Configuring a Multiviewer Personality (on page 237).
		• Support for asynchronous clean switching. See Input Tab: IP Video Configuration (on page 389)
		• Color Processing Features
		  • When configuring an element, new HDR Gain parameters are available for mapping when converting between SDR and HDR. See HDR Matching White Gain (on page 363)
		  • When configuring programs, in the Video tab, the Color Correction section is now called Color Adjustment, with 3 sub sections. See Video Tab: Color Adjustment (on page 415).
		  • A new Return to Neutral button lets you reset Color Correction settings to default. See Video Tab: Color Adjustment (on page 415).
		  • Mapping Mode now lets you select Scene Referred in addition to Display Referred. See Video Tab: Color Adjustment (on page 415).
		• TSL5 configuration recommendation for SNP-MV. For instructions, see TSL5 Configuration (on page 238)
		• Restructured the Servicing section. See Servicing (on page 535)
		• Added Fan Replacement Instructions. See:
		  • Replacing the IP Fan on SNP-GW-3GX32-HS-QF (on page 544)
		  • Replacing the BB Fans on SNP-GW-3GX32-HS-QF (on page 557)
		• New SNP Management Tab when configuring an Element. Contains items previously on the IP Wan tab. See SNP Management (on page 368)

Edition	Date	Revision History

1.6	August 2020	• Quad Conversion Personality. See Configuring a Quad Conversion Personality (on page 141)
		• Support for SDI inputs and outputs, without the need for IP domain connectivity. See SDI Inputs to SDI Outputs within a Program (on page 253)
		• Support for SNP running as a master or a slave. See Configuring a PTP Network (on page 485) and see new Master parameters Configuring Reference for SNP - PTP (on page 351)
		• Support for connecting two SNPs using master slave technology without the need for a switch. See Synchronous SDI Point to Point
		• Updates to Recovering from a Firmware Upgrade Failure (on page 96)
		• Updates to Input Tab: IP Audio Routing (on page 394) in the Configuring Programs section
		• Edits to the working with SDNO section including new logical templates that replace device names in SDNO 3.0. See Using Magellan Control System with SNP (on page 332)
		• Support for SD
		  • See Support for SD over 2110 (on page 309)
		  • Updated list of features to reflect support. See Main Features (on page 27)
		  • Added the following status parameters that apply in case of SD-SDI Input: EDH Present, AP EDH Errors, FF EDH Errors, Clear EDH Errors. See Input Tab (SDI): Video Status (on page 400).
		• Front Fan Replacement Instructions. See Replacing the FP Fan on SNP-GW-3GX32-HS-QF (on page 574)
		• Updates to the list of features. See Main Features (on page 27)
		• Updates to License Keys:
		  • Added SNP-SK-QUAD-3GCONV. See Licensing and Ordering (on page 34)
		  • Updates to the License Management dialog to apply licenses by processor. See License Management (on page 44)
		• Ability to name an SNP Unit. See Naming your SNP (on page 65)
		• Edits to Configuring HDR conversion (on page 263)
		• Note about Programs Ancillary Data Configuration that applies to Dual and Quad Conversions. See Programs Ancillary Data Configuration (on page 139)
		• Edits to Input Colorimetry and TCS for SDI and IP Input
		  • IP Input: Input Tab: IP Video Configuration (on page 389)
		  • SDI Input: Input Tab (SDI): Video Configuration (on page 400)
		• MADI Licensing applies to Sync and Remap personalities. See Configuring MADI

Edition	Date	Revision History
1.7	February 2021	• Edits to Configuring Reference for SNP - PTP (on page 351) • Support for Masterclock Devices. See Masterclock Devices (on page 373) • Portrait Mode. See Configuring a Multiviewer Portrait Mode Personality (on page 250) • Color Processing, 3D LUTs. See Color Processing - Built In and Custom LUTs (on page 264) • Note about restoring factory defaults. See Configure Local Host - System Control (on page 99) • Edits and notes added to various sections (Features, Licensing, Quad Conversion, MADI Configuration, etc.) to note that MADI only applies to Sync and Remap personalities. • Additional Arista QSFP part numbers. See DATA QSFPs (on page 39) • LRC Routing Support to force routes when layouts are recalled. See LRC Routing (on page 273) • Edits to Configuring a Section for HD or UHD (on page 116) • List of supported process combinations on the Conversion Personality. See Supported Combinations (on page 136) • Edits to electrical specifications. See 12G/6G/3G/HD/SD-SDI Input Specifications (on page 510) and 12G/6G/3G/HD/SD-SDI Output Specifications (on page 512) • Updates to the list of UDP/TCP used by SNP. See UDP/TCP Ports (on page 102) • Note about license assignments via the REST API. See Acquiring Licenses (on page 381) • Updates to Licensing and Ordering information to reflect the SNP's shift to a new model of ordering, separating the base unit from the feature keys. See Licensing and Ordering (on page 34) • Information about SDI Input/Output Assignments. See SDI Input/Output Assignments (on page 253) • Added details about the LMMonitor default user. See Users (on page 68) • Updated the Proxy Output section to add information about proxy output in the Multiviewer personality. See Configuring Proxy Output (on page 261)
2.0	October 2021	• Automatic Change Over (ACO) on the Sync Personality (on page 124) • New Stat Personality. See Configuring a Simple Transparent Asynchronous Transport (STAT) Personality (on page 179) • **(Preview Feature)** New JPEG-XS Personality. See Configuring a JPEG-XS Personality (on page 146) • **(Preview Feature)** New Master Control Lite Personality. See Master

Edition	Date	Revision History
		Control Lite (MCL) Personality (on page 186) • Support for multi-unit cascading. See Multi-Unit Cascading (on page 473) • New licensable features and updates to Licensing Information. See Orderable Part Numbers (on page 35) • System Logging. See Configure Local Host - System Logging Control (on page 100) • Custom hostnames for the SNP. See DNS (on page 357) • Unit Tag/Name for the SNP. See Naming your SNP (on page 65) • DHCP Support. See Using DHCP with your SNP (on page 466) • New option to have the SNP discoverable by Magellan RCP Control Panels. See Security (on page 368) (Configure Element > System Tab) • Updates to the list of Data QSFPs. See DATA QSFPs (on page 39) • Updates to Licensing Information. See Ordering Information (on page 35) • Renamed Control Source ID to Device ID. See Masterclock Devices (on page 373) • Updates to the Packing Mode parameter (Output Tab, IP Video Configuration) to add an additional option. See Output Tab: IP Video Configuration (on page 454) • Updates to the Grandmaster UUID and Clock Identity parameter descriptions per the UI. See Configuring Reference for SNP - PTP (on page 351) • Updates to the Mapping Mode parameter. See Video Tab: Color Adjustment (on page 415) • Added Primary/Secondary Largest measured IGMP Leave and Primary/Secondary Largest measured IGMP Join status parameters. See Configuring IP Control for SNP (on page 359) • Added new section "HDR Mapping Mode Defaults" in Configure Element > System Tab. See HDR Mapping Mode Defaults (on page 363) • Note about SQD In to SQD Out not supported in the Sync personality. See Sync Personality and Configuring a Sync Personality (on page 120) • Support for 16 channels of audio. See Main Features (on page 27) and see updates to the Audio IP Tx Packet Time parameter (Configuring a Processor (on page 113)) • Note about the SFP+HDMI20+OUT+CAB SFP. See Video/Audio Expansion Interface Supported SFPs (on page 39)

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2.0.3	March 2022	• Advanced Audio Processing. See:
		  • Configuring AAP (on page 379)
		  • Advanced Audio Processing (on page 275)

2.1 GA	July 2022	• Advanced Audio Processing Updates
		  • Support for MultiMerge. See DTS Neural MultiMerge (on page 280)
		  • MultiMerge Parameters. See AAP Tab: Parameters (MultiMerge) (on page 432)
		  • Support for Loudness Control DTS Neural Loudness Control (on page 281)
		  • Loudness Control parameters. See AAP Tab: Parameters (Loudness Control) (on page 435)
		  • Added Combination codecs. See DTS Processing (on page 277)
		  • Updated credits required for AAP processing. See DTS Credits (on page 289)
		• Updates to JPEG-XS support. See Configuring a JPEG-XS Personality (on page 146)
		• 8K Clean switching. See Support for 8K Clean Switching using IP (on page 315).
		• Updates to field replaceable power supplies Field Replaceable Spares (on page 43)
		• Removed the Collect SFP Power Stats button from the SFP status section in the System tab. See SFP Status (on page 365).
		• Added Chroma Anti-Alias parameter to Video Tab, Color Adjustment. See Video Tab: Color Adjustment (on page 415)
		• Support for SMPTE ST 2031 subtitles. See Subtitles on the SNP (on page 306).
		• JPEG-XS Encoder personality does not support Dolby E. See Audio Tab: General Configuration (on page 449) for Audio tab parameters, and JPEG-XS Encoding (on page 148).
		• SSH is now enabled by default. See Configure Local Host - System Service Control (on page 102)
		• Updated list of QSFPs. See DATA QSFPs (on page 39)
		• List of other supported QSFPs and cables. See Other Supported QSFPs and Cables (on page 41)
		• Added notes to the Force MAB mode and Low Latency Mode parameters. See Configuring a Processor (on page 113).

2.1.2 LTD	September 2022	• Support for Daktronics Scoreboards (on page 318) • Support for VPID information into the ST2110-40 ancillary stream output (on page 326)
2.2 GA	August 2023	• MCL Hardware Panel (on page 489)

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		• Support for PTP, NTP, and UTC. See Time Sources (on page 484). Also see Interaction and Precedence across Configured Time Sources (PTP, NTP, and UTC) (on page 486)
		• Updates to the Console view, including new sections like CCSP Interface Documentation, Export Settings and Data, Import Settings and Data, etc. See Console (on page 91).
		• Note added to to the SSH section in the Console. See Configure Local Host - System Service Control (on page 102)
		• Output Tab: Program Ancillary Data Configuration (on page 459) settings in the Output tab for Conversion personalities.
		• New Parameters and Settings:
		  • New parameter section under Configure > Element > System
		    • Timecode Jamsync (on page 363)
		    • Date and Time (on page 368)
		  • New parameter (Input Tab) that allows IP Receivers to display signal status. See Input Tab: Clock Domain Status (on page 389)
		  • Bouncing Box option available in the Video tab > Test Signal Generator of a Processor set to the Sync personality. See Video Tab: Test Signal Generator (on page 411)
		  • Ability to set a custom program name. See Input Tab (SDI): Program Name (on page 399) and Input Tab: Program Name (on page 387)
		  • New SDP Channel-Order parameter in the Output tab > IP Audio Configuration section. See Output Tab: IP Audio Configuration (on page 457)
		  • Ability to receive and transmit IP 500 ms packet time (in addition to previously supported options). See the *Packet Time* parameter in Output Tab: IP Audio Configuration (on page 457) and Input Tab: IP Audio Status (on page 395)
		  • Updates to the Audio IP Tx Packet Time parameter. See Configuring a Processor (on page 113).
		  • New *Packet time* parameter (to define packet time at a stream level) in the Output Tab > IP Audio Configuration. See Output Tab: IP Audio Configuration (on page 457), allowing a mix of packet times at the processor and stream level.
		  • ANC ATC Present parameter in the Program Ancillary Data Status (Input tab) for Conversion personalities. See Input Tab: Ancillary Data Status (on page 397)
		  • For dual/quad conversion, in case of 1080p-to-1080i, a lower range is now supported for the horizontal and vertical BW parameters. See Video Tab: Scaler Configuration (on page 419)
		  • Updated Playout Delay Parameter. See Configuring IP Control for SNP (on page 359)

Edition	Date	Revision History
		• Updates to Ordering Information. See Orderable Part Numbers (on page 35). • Support for Dolby E Encoding and Decoding. See Dolby E Processing (on page 285) • Information when setting up RC 500/600 Masterclocks. See Masterclock Devices (on page 373) • Support for Generation and Processing of ATC Timecode in Conversion (on page 487) • Updates to the list of ports. See UDP/TCP Ports (on page 102) • MCL Updates
2.2.3 LTD	December 2023	• Updates to DTS Credits (on page 289) and Dolby E Credits (on page 289) • Added a note to the Low Latency section in Configuring a Processor (on page 113) • Added a note about TSG in the STAT Personality. See STAT with SDI Input (on page 180). • Source ID Processing (on page 329) • Ability to set a background color for audio meters. See Configure a Multiviewer Personality (on page 240) • Support for Image Video (UMD Devices) (on page 370) • TSL V5 devices are now UMD Devices. See TSL V5 (UMD Devices) (on page 369) • Additional options added to the Loss of Video parameter. See Video Tab: Output (on page 407) • The Dual Conversion personality now provide copies of the main program on BNC 2, 3 and 4 for HD output. See BNC Output (on page 140). • On the Multiviewer personality, support for setting the Audio Meter Background Color and Audio Meter Scale Color parameters. See Configure a Multiviewer Personality (on page 240). • Added a note about the max playout delay. See Configuring IP Control for SNP (on page 359).

3.0 GA	April 2024	• **SNP-XL Hardware**:
		  • Front Panel (on page 52)
		  • Back Panel (on page 53)
		  • Relay Expansion Board Signaling (on page 54)
		• **SNP-XL Ordering Information**:
		  • Orderable Part Numbers (on page 35)
		• **SNP-XL Hardware Parameters**:
		  • Chassis and Board status. See Miscellaneous Status (on page 367)

Edition	Date	Revision History
		• Updates to the Console page for XL. See System Information (on page 92) • RTC time. See Configuring Reference for SNP (XL only) - RTC (on page 354) • SFP Tx and Rx Status. See SFP Rx/Tx Status (SNP-XL only) (on page 365) • **New Dual Gateway Personality**. • See Configuring a Dual Gateway Personality (on page 157). • **QSFP Updates** • Updates to DATA QSFPs (on page 39) and Other Supported QSFPs and Cables (on page 41) • **Power Supply Updates** See Field Replaceable Spares (on page 43) and Servicing (on page 535) • Upgrade Failure Updates • Updates to Recovering from a Firmware Upgrade Failure (on page 96). • **Parameter Updates**: • Changed an option name for the Clock Domain Next Switch Stream parameter. See Input Tab: Clock Domain Next Switch Stream (on page 388) • Modified Input Tab: Ancillary Data Status (on page 397) to add Source ID and Brandnet. • Added 2 missing formats (1080p/24, 1080psf/24) to Configuring a Section for HD or UHD (on page 116) • Updates to the Daylight Savings Time setting description. See Date and Time (on page 368) • Updated Channel Gain/Invert/Mute parameters in Audio Tab: Output Channel Configuration (on page 450) with a note. • Added new Generate SSRC ID parameter. See Configuring IP Control for SNP • Updates to Security. • **Dolby E Updates** • Dolby E Encoder Latency (on page 286) and Dolby E Decoder Latency (on page 286) • Dolby E A/V Align parameter. See Video Tab: Video Control (on page 405) • **Additional Multi-Unit Cascading examples** including 2/3/4 unit configuration. See: • Cascade Concept/Example Using BNC Connections (on page 477) • Cascade Concept/Example Using SFP Connections (on page 479) • 2 Unit Cascade Layout Configuration (on page 480)

Edition	Date	Revision History
		• 3 Unit Cascade Layout Configuration (on page 481) • 4 Unit Cascade Layout Configuration (on page 481) • **Graphics Prep Tool** Support for running the tool via command line. See Running the Graphics Prep tool via Command Line (on page 227) • **MCL Updates**: • Support for defining Audio channel mixer assignment per Keyer Layer. See the MCL Audio configuration section in MCL Configuration (on page 211). • Updates to the source select parameter options for the MCL Hardware Panel. See MCL Hardware Panel Buttons (on page 496). • Updates to Clean Feed Outputs. See Clean Feed Outputs (on page 214). • Updates to options for the Keyer button on the MCL Hardware Panel. See MCL Hardware Panel Buttons (on page 496). • Information on Max Frame Delay per personality. See Video Tab: Video Control (on page 405). • Updates to QSFP Status (on page 363) to add a note. • Updates to AAP Functions supported on various personalities. See Functions supported on various Personalities (on page 275) • Note about Proxy 3G output on the TR-07 and TR-08 Encoder. See: • JPEG-XS Encoder (on page 147), TR-07 Encoder (on page 167), Configuring Proxy Output (on page 261).

Writing Conventions

This manual adheres to the following writing conventions.

Term or Convention	Description
Bold	Indicates dialog box, property sheet, field, button, check box, list box, combo box, menu, submenu, window, list, and selection names
Italics	Indicates email addresses, names of books and publications, and first instances of new terms and specialized words that need emphasis
CAPS	Indicates a specific key on the keyboard, such as ENTER, TAB, CTRL, ALT, DELETE
`Code`	Indicates variables or command-line entries, such as a DOS entry or something you type into a field.
>	Indicates the direction of navigation through a hierarchy of menus and windows.
hyperlink	Indicates a jump to another location within the electronic document or elsewhere (in PDFs, click the page number to make the jump)

Term or Convention	Description
Internet address	Indicates a jump to a Web site or URL
Note	Indicates important information that helps to avoid and troubleshoot problems

Obtaining Documents

Contact your Customer Service representative to request a document.

Unpacking/Shipping Information

This product was carefully inspected, tested, and calibrated before shipment to ensure years of stable and trouble-free operation.

1. Check equipment for any visible damage that may have occurred during transit.
2. Confirm that you have received all items listed on the packing list.
3. Contact your dealer if any item on the packing list is missing.
4. Contact the carrier if any item is damaged.
5. Remove all packaging material from the product and its associated components before you install the unit.

Keep at least one set of original packaging, in the event that you need to return a product for servicing.

In the unlikely event that your product fails to operate properly, please contact Customer Service to obtain a Return Authorization (RA) number, then send the unit back for servicing.

If the original package is not available, you can supply your own packaging as long as it meets the following criteria:

- The packaging must be able to withstand the product’s weight.
- The product must be held rigid within the packaging.
- There must be at least 2 in. (5 cm) of space between the product and the container.
- The corners of the product must be protected.

Ship products back to us for servicing prepaid and, if possible, in the original packaging material. If the product is still within the warranty period, we will return the product prepaid after servicing.

Safety Standards and Compliances

See the fiber optic section for information about the safe use of fiber optic products.

WARNING: This equipment is not suitable for use in locations where children are likely to be present.

Restrictions on Hazardous Substances (RoHS)

Directive 2011/65/EU (ROHS2)—commonly known as the European Union (EU) Restriction on Hazardous Substances (RoHS)—sets limits on the use of certain substances found in electrical and electronic equipment. The intent of this legislation is to reduce the amount of hazardous chemicals that may leach out of landfill sites or otherwise contaminate the environment during end-of-life recycling. The Directive took effect on July 1, 2006, and it refers to the following hazardous substances:

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent Chromium (Cr-V1)
- Polybrominated Biphenyls (PBB)
- Polybrominated Diphenyl Ethers (PBDE)

According to this EU Directive, all products sold in the European Union are fully RoHS-compliant and "lead-free." (See our website for more information.) Spare parts supplied for the repair and upgrade of equipment sold before July 1, 2006 are exempt from the legislation. Equipment that complies with the EU directive are marked with a RoHS-compliant emblem, as shown.

Figure 1: ROHS Compliance Symbol

Waste from Electrical and Electronic Equipment (WEEE)

The European Union (EU) Directive 2002/96/EC on Waste from Electrical and Electronic Equipment (WEEE) deals with the collection, treatment, recovery, and recycling of electrical and electronic waste products. The objective of the WEEE Directive is to assign the responsibility for the disposal of associated hazardous waste to either the producers or users of these products. Effective August 13, 2005, producers or users are required to recycle electrical and electronic equipment at end of its useful life, and may not dispose of the equipment in landfills or by using other unapproved methods. (Some EU member states may have different deadlines.)

In accordance with this EU Directive, companies selling electric or electronic devices in the EU will affix labels indicating that such products must be properly recycled. (See our website for more information.)

Contact your local sales representative for information on returning these products for recycling. Equipment that complies with the EU directive is marked with a WEEE-compliant emblem, as shown.

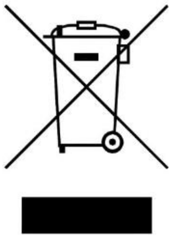


Figure 2: WEEE Symbol

Introduction

Selenio™ Network Processor (SNP) is the industry's first pure-IP media processing platform. This high-density, scalable platform enables media companies to seamlessly transition from SDI to all-IP networks, while adhering to the SMPTE ST 2022-6 and ST 2110 standards.

SNP delivers the essential capabilities required in today's complex production environments, including HD/3G/UHD up/down/cross conversion and color space adjustments including High Dynamic Range (HDR) adaptations and conversions. It also provides critical signal synchronization, supporting different signal types and formats for video production.

SNP interoperates with Imagine's other UHD- and IP-ready solutions, including the Versio™ cloud-native integrated playout platform and EPIC™ MV monitoring and control system, for a seamless end-to-end production workflow.

SNP Variants

The SNP is available as **Standard** or **XL**. Both variants share the same main board, power supplies, software releases, APIs and protocols, and the same feature licenses.

The SNP-XL is the latest addition to the SNP line -- it extends the SNP family to cover more SDI-intensive applications including very high-density synchronizing gateway needs. The SNP-XL chassis has a different I/O board in the back that breaks out the inputs and outputs separately (64 HDBNC connectors, 32 in, 32 out), enabling SDI inputs and outputs simultaneously. SNP-XL is a 2RU unit. The extra vertical space inside allows for lower-RPM fans that are significantly quieter than the standard SNP fans. Using the new Double-Density Gateway personality, the SNP-XL supports twice as many simple gateway ports per unit, significantly reducing the price per port in the IP gateway applications.

Also see:

- Standard SNP Hardware (on page 47)
- SNP-XL Hardware (on page 51)

Main Features

- ST 2110-20 Video
- ST 2110-30 PCM Audio
- ST 2110-31 AES3 Transparent Transport
- ST 2110-40 Data
- ST 2022-6 SDI over IP
- ST 2022-7 Seamless protection switching of IP streams
- ST 2022-8 Timing of ST 2022-6 streams in ST 2110 systems
- ST 2110-22 Constant Bit-Rate Compressed Video over IP networks (e.g. JPEG-XS)

- NMOS IS-04 discovery and registration
- NMOS IS-05 device connection management
- UHD over single ST 2110-20 stream
- UHD over 6G/12G-SDI or Quad-SDI (2SI and SQD)
- HD/3G and UHD clean and quiet switching
- Support for SD (480i & 576i)
- Personalities: Dual Conversion, Quad Conversion, Sync, Remap, Multiviewer, Multiviewer Portrait Mode, Simple Transparent Asynchronous Transport (STAT) Personality and JPEG-XS (Encoder/Decoder Personalities)
- 4 independent processing blocks for various operations (synchronization, conversion, UHD remap of SQD/2SI)
- Multiviewer provides on screen Alarms, Alerts, Indicators, Captions/Subtitles on PiP
- IP to SDI, SDI to IP, IP to IP, SDI to SDI domain transfers
- Frame synchronization to PTP with adjustable output phasing and delay
- Video proc amp, frame delay, and color correction
- Audio proc amp and delay adjustment
- HD/3G/UHD up/down/cross conversion (licensed option)
- HD Proxy (as separate 1080i/p ST 2110-20 stream) for UHD signal monitoring (licensed option)
- SDR/HDR (HLG, PQ, S-Log3) conversion (licensed option)
- Audio embedding and de-embedding between SDI, ST 2022-6, and ST 2110
- Flexible channel support of audio IP streams
- Support for 16-channel audio streams for input and output in ST2110-30 and -31
    - Up to 16 channels per stream
    - On input, the packet time is auto-detected (1ms or 125 microseconds)
    - On output, 125 microsecond packet time must be used for streams with more than 8 channels of ST2110-30 or 6 channels of ST2110-3
- MADI Tx and Rx, including extraction of audio channels from the MADI streams for output as 2110-30, and receipt of 2110-30 for output as MADI (Note: this is a licensed feature and it applies to Sync and Remap personalities)
- Clean switching of synchronous 2110 signals
- Clean switching of synchronous and asynchronous 2022-6 signals
- Support for multi-unit cascading
- System Logging Control with configurable (syslog compliant) logging levels plus the ability to use an External Syslog Server
- DHCP and user-selectable hostname for the SNP
- License management
- On screen display
- Sharpness controls
- Basic frame rate conversion (add/drop frame) in Conversion personality
- Preset save/recall
- Generate Black Burst (BB) output synchronized to received PTP timing
- Dual QSFP28 Flexible Ethernet up to 100GbE

- 32 HD-BNC (8 are 6G/12G capable) connectors for SDI I/O
- Redundant power supplies in single assembly or hot-swappable independent units
- Front serviceable main processing board and power supply
- Local License Server, Local Web UI, and Local REST API Server
- Security Enhancements

SNP Personalities

SNP features personalities that can be applied on a processor-by-processor basis. See SNP Personalities (on page 118).

Supported Formats

SD/HD/3G Formats	Sync		Stat		2xUHD CONV		4x1080p CONV		JPEG XS TR-08		JPEG XS TR-07		SNP MV	MCL DSK
	in	**out**	**in**	**out**	**in**	**out**	**in**	**out**	**in**	**out**	**in**	**out**	**in**	**both**
480x720@29i	☑	☑	☑	☑	-	-	☑	☑	☑	☑	☑	☑	☑	-
up to 512x720@29i (VBI)	☑	☑	☑	☑	-	-	☑	☑					☑	-
576x720@25i	☑	☑	☑	☑	-	-	☑	☑	☑	☑	☑	☑	☑	-
up to 608x720@25i (VBI)	☑	☑	☑	☑	-	-	☑	☑					☑	-
1280x720 @50p	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	-
1280x720 @59p	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	-
1920x1080 @25i	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
1920x1080 @29i	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
1920x1080 @2398p	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	-
1920x1080 @2398psf	☑	☑	☑	☑	☑	-	☑	-	☑	☑	☑	☑	☑	-
1920x1080 @24p	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	-
1920x1080 @24psf	☑	☑	☑	☑	☑	-	☑	-	☑	☑	☑	☑	☑	-
1920x1080 @25p	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	-
1920x1080 @25psf	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1920x1080 @29p	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	-
1920x1080 @29psf	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1920x1080 @50p	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
1920x1080 @59p	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑

3840 x 2160 UHD Video Formats	SYNC		REMAP		2xUHD CONV		JPEG XS TR-08		JPEG XS TR-07		SNP MV	MCL DSK
	in	out	in	out	in	out	in	out	in	out	in	both
UHD@2398 s ingle-raster 2110	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	-
UHD@2398 as 4x1080p 2SI	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	-
UHD@2398 as 6G SDI	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	-
UHD@2398 as 4x1080psf SQD												-
UHD@2398 as 4x1080p SQD	-	-	☑	☑	☑ 1,2	☑ 1,2	-	-	-	-	-	-
UHD@24 single-raster 2110	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	-
UHD@24 as 4x1080p 2SI	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	-
UHD@24 as 6G SDI	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	-
UHD@24 as 4x1080psf 2SI												-
UHD@24 as 4x1080p SQD	-	-	☑	☑	☑ 1,2	☑ 1,2	-	-	-	-	-	-
UHD@25 single-raster 2110	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	-
UHD@25 as 4x1080p 2SI	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	-
UHD@25 as 6G SDI	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	-
UHD@25 as 4x1080psf 2SI												-
UHD@25 as 4x1080p SQD	-	-	☑	☑	☑ 1,2	☑ 1,2	-	-	-	-	-	-
UHD@2997 s ingle-raster 2110	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	-
UHD@2997 as 4x1080p 2SI	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	-
UHD@2997 as 6G SDI	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	-
UHD@2997 as 4x1080psf 2SI												-
UHD@2997 as 4x1080p SQD	-	-	☑	☑	☑ 1,2	☑ 1,2	-	-	-	-	-	-
UHD@50 s ingle-raster 2110	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
UHD@50 as 4x1080p 2SI	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
UHD@50 as 12G SDI	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
UHD@50 as 4x1080p SQD	-	-	☑	☑	☑ 1,2	☑ 1,2	-	-	-	-	-	-
UHD@5994 single-raster 2110	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
UHD@5994 as 4x1080p 2SI	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
UHD@5994 as 12G SDI	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑

UHD@5994 as 4x1080p SQD	-	-	☑	☑	☑ [1,2]	☑ [1,2]	-	-	-	-	-	-
Note 1: UHD CONV can input SQD and downconvert to HD, or upconvert HD into SQD, but not UHD-to-SQD or SQD-to-UHD												
Note 2: UHD CONV cannot input 2SI or 2110 UHD and output SQD, nor can it input SQD and output 2SI or 2110 UHD												

Licensing and Ordering

SNP 1.7 onwards enforces feature licensing. Ensure that you have license keys for the features you expect to use, and note that the basic “Sync” personality requires a license.

Customers who purchased models SNP-GW-3GX32 or SNP-GW-3GX32-HS-QF are entitled to four SYNC personality keys (which includes both SYNC and REMAP) in addition to whatever other feature keys they purchased. Customers who purchase the new SNP-PLATFORM-4A or SNP-PLATFORM-2AU base product must purchase explicit keys from the SNP-PSK-xxx family of licenses for any desired functionality.

See Ordering Information (on page 35) and License Management (on page 44) for more information.

Licensing Notes

- Note that licenses are enforced, so ensure you have keys in place for the features you rely on
- Look in the License Management page (see License Management (on page 44)) of the UI on each SNP unit to determine if the unit is already keyed for the features which you purchased with the unit (or subsequently).
- Please contact Imagine Customer Support, to request license keys for previously shipped units which reflect any licensed features previously purchased, and to purchase any new feature licenses. The service team will require the unit serial number in order to generate feature keys, and may need to know the original purchase order date or order number to confirm the feature purchases in our records in order to create the license feature keys.
- Confirm that the licenses appear in the License Management page after applying the feature key.
- Assign license tokens to the processors as needed, according to your system design.
- These license key can be applied to the unit when running releases 1.5 or 1.6 so please take the time to get keys put onto your units before attempting to upgrade to release 1.7 or 2.0.
- Note regarding the REMAP license: In release 1.7 and beyond, REMAP is enabled by the SNP-SK-SYNC or SNP-PSK-SYNC license key.

Ordering Information

The following items are always included as part of your shipment.

Item Number	Quantity	Description
170-101718Q00 or 170-101403Q00	1	Selenio Network Processor complete base frame assembly Selenio Network Processor with hot-swappable PSU complete base frame assembly
158-100081Q00	1	Rear rack mount and cable support kit
AC power cords	2	Includes region-specific plug

Orderable Part Numbers

SNP 1.7 onwards has shifted to a new model of ordering codes, which separates the base unit from the feature keys. The base unit has no features without keys. The table below summarizes the relationship between old and new ordering information. The old ordering codes have been discontinued, but Imagine order management will work with customers to identify the current orderable items to match the old codes.

Processor Personality licenses can be applied to any processor within an SNP unit. They are tied to the serial number of the SNP unit. The SNP keeps track of the number of simultaneous uses and checks that against the current entitlement.

Note: The original SNP-GW-3GX32 chassis has been retired from sale. The metal shell and front panel assembly and power supplies have been superseded entirely by the SNP-GW-3Gx32-HS-QF chassis, now sold under the SNP-PLATFORM-4A part number. The revised chassis features hot-swappable power supplies and higher-performance fans. In addition, all SNP main boards (regardless of chassis) shipped after November 2019 have been fitted with additional airflow-guides on the main circuit board in order to improve the operating temperature environment on-board.

Type	Part Number	Old Part Number	Description
Platform	SNP-PLATFORM-XL	Not Applicable	**SNP Platform BASE – HW Rev A – XL package** • 64XHDBNC I/O - 4 application processors, central ST2110/20226 IP interfaces. • Includes operating software suitable for installation and configuration. • Requires additional Software keys (SNP-PSX-xxx) for additional functionality. • Redundant, Hot-Swappable Power Supplies
Platform	SNP-PLATFORM-4A	SNP-GW-3GX32 SNP-GW-3GX32-HS-QF	**SNP Platform Base - Hardware REV A** • 4 Application Processors • Common ST2110/2022-6/2022-7 Interface

Type	Part Number	Old Part Number	Description
			• Requires additional Software keys (SNP-PSX-xxx) for any functionality • Redundant, Hot-Swappable Power Supplies To get the same base functionality as the older GW-3Gx32(-HS-QF) requires the SNP-PLATFORM-4A and four **SNP-PSK-SYNC** keys.
	SNP-PLAT-UPG-2A4A	Not Applicable	**SNP Platform Upgrade Key** • Adds 2 Application Processors to an existing PLATFORM-2AU, creating the equivalent of PLATFORM-4A
Hardware	SNP-HW-MCLPNL	Not Applicable	**SNP Hardware Control Panel** • For Master Control Lite (MCL) Personality
	SNP-HW-SSD64GU	Not Applicable	**SNP Hardware Upgrade Kit** • 64 Gbyte SSD (replaces existing drive inside unit). Kit includes preformatted 64G Solid State Drive and installation instructions.
Software	SNP-PSK-SYNC	Not Applicable	**SYNC/Remap/STAT**: SNP Platform Software Key • Enables STAT, SYNC and REMAP AP Personalities, supporting eight (8) 1080P or two (2) UHD Frame Synchronizers, or supporting two UHD SQD/2SI REMAP functions • One Key per AP. (MAX 4 PER SNP) • HDR Conversion or HD Downscale require additional related keys.
	SNP-PSK-2CONVUHD	SNP-SK-DUAL-CONV	**Dual Conversion:** SNP Platform Software Key • Enables DUAL-CONV AP personality, supporting two UHD conversions on one AP (Max 4 per SNP). • HDR Conversion or HD Downscale outputs require additional keys. • This Key alternately enables QUAD-3GCONV personality.
	SNP-PSK-4CONV3G	SNP-SK-QUAD-CONV3G	**Quad Conversion:** SNP Platform Software Key • Enables QUAD-3GCONV AP personality, supporting four 1080P conversions on one AP (Max 4 keys per SNP) • HDR Conversion requires additional related key.

Type	Part Number	Old Part Number	Description
	SNP-PSK-MV	SNP-SK-MV	**Multiviewer:** SNP Platform Software Key • Enables MV (and MV-PORT) AP Personalities supporting two Landscape (or one portrait) UHD-output multiviewer. • HD downscale output is included (does not require the PSK-DOWNHD key). • One Key per multiviewer AP. (MAX 4 PER SNP). • HDR Conversion requires additional HDR key.
	SNP-PSK-JXSE	Not Applicable	**JPEG-XS Encoding:** SNP Platform Software Key • Enables JXSE AP personality, supporting eight 1080p or two 2160p JPEG-XS Encodes to ST2110-22 output (Max 4 keys per SNP) • HD Proxy requires additional related key. ***Note:** With the purchase of the optional software license/key for JPEG-XS encoding or decoding, Imagine Communications pays the applicable license fee into the JPEG-XS PPL patent portfolio license pool, covering use of the device within the context of television "Broadcast Industry" infrastructure.*
	SNP-PSK-JXSD		• **JPEG-XS Decoding:** SNP Platform Software Key • Enables JXSD AP personality, supporting eight 1080p or two 2160p JPEG-XS Decodes from ST2110-22 input (Max 4 keys per SNP). • HD Proxy requires additional related key
	SNP-PSK-HDR	SNP-SK-HDR	**SNP Add-On Feature Key** • Adds HDR Conversion and Adjustment to Sync, Remap, MV, Dual-Conversion, or Quad-Conversion AP • Max 4 per SNP.
	SNP-PSK-DOWNHD	SNP-SK-PROXHD	**SNP Add-On Feature Key** • Adds output of two HD-Downscaled streams to Sync, Remap, or Dual-Conversion AP • Max 4 per SNP
	SNP-PSK-MADIEXP	SNP-SK-DUAL-MADI	**SNP Add-On Feature Key** • Adds 128 additional audio channels to Sync or Remap AP • Max 4 per SNP • MADI SFPs sold separately
	SNP-PSK-ACO	Not Applicable	**SNP Add-On Feature Key** • Adds 4xHD or 1xUHD Automatic Change-Over Switching feature to one Sync AP. Max 4 per SNP.

Type	Part Number	Old Part Number	Description
	SNP-PSK-ADVAUD	Not Applicable	**SNP Add-On Feature Key** • Enables Advanced Audio Processing (One per SNP). Requires additional keys for specific features.
	SNP-PSK-MCL	Not Applicable	**SNP Add-On Feature Key** • Enables 1080P Master Control Branding personality, supports AB inputs, Background Mixer, 3x KeyFill inputs, 4x internal graphics on one AP (Max 4 per SNP). HDR aware.
	SNP-PSK-MCLU	Not Applicable	**SNP Add-On Feature Key** • Enables 2160P Master Control Branding personality, supports AB inputs, Background Mixer, 2x internal graphics on one AP (Max 4 per SNP). HDR aware. This key also enables PSK-MCL functionality. External Key/Fill requires adjacent PSK-SYNC processor(s). HD Proxy requires additional related key.
	SNP-ASK-DTOKEN	Not Applicable	**SNP Add-On Feature Key** • Adds tokens for Advanced Audio Processing functions (DTS). One Software key token for D-CLASS PCM algorithms.
	SNP-ASK-DEE	Not Applicable	**SNP Add-On Feature Key** • Audio Software Key - Enables one Dolby E Encoding Process
	SNP-ASK-DED	Not Applicable	**SNP Add-On Feature Key** • Audio Software Key - Enables one Dolby E Decoding Process
	SNP-PSK-GW88	Not Applicable	**SNP Add-On Feature Key** • Enables Bi-Directional Gateway Personality supporting eight (8) 1080P or two (2) UHD Synchronizing Gateways in each direction (SDI-to-2110 and 2110-to-SDI) at the same time • One key per AP (Max 4 per SNP) • HD Proxy requires additional related key • Does not support ST2022-6

DATA QSFPs

Note: These are #3 on the Back Panel Diagram). See Back Panel (on page 49).

100G QSFP Part Number	Description
OP+QSFP+100G+BIDI	100Gb/s QSFP28 SR4 BiDi, LC Optical Connector, 100m over OM4 MMF
OP+QSFP+TRMM+100G	100GB/S QSFP28 SR4, MTP/MPO Optical connector, 70M with OM3 and 100M with OM4
OP+100G+CWDM4+2K	100Gb/s QSFP28 CWDM4, LC Optical Connector, 2km with single mode fiber (Green Tab)
OP+QSFP+100G+10K	100GB/S QSFP28 LR4, LC Optical connector, 10KM with SMF
OP+100G+LANWDM+40K	100G QSFP28 LAN WDM, 30km (40km with FEC) over SMF
OP+100G+SWDM4+100M	100Gb/s QSFP28 SWDM4, LC Optical Connector, 70m over OM3 or 100m over OM4 with multi-mode fiber (Grey Tab)
OP+QSFP+XSR4+100G	100GB/s QSFP28 Parallel, 850nm, MTP/MPO optical connector, 200m over OM3 and 300m over OM4 MMF
OP+QSFP+DR+100G	100G QSFP28 for use with 400G-DR4 system 500m reach over single-mode fiber
OP+QSFP+FR+100G	100G QSFP28 for use with 400G-XDR4 system2km reach over single-mode fiber
OP+QSFP+100G+PSM4	100Gb/s QSFP28 PSM4, MTP/MPO Optical Connector, 500M over SMF

Video/Audio Expansion Interface Supported SFPs

Note: These are #4 on the Back Panel Diagram). See Back Panel (on page 49).

Note: The SNP hardware does not support Tx/Rx "Transceiver" devices.

SFP Type	Imagine Part Number	Description
MADI Audio	OP+SFP+MADI+2RX	SFP Series: Dual MADI Optical Receiver
	OP+SFP+MADI+2TX	SFP Series: Dual MADI Optical Transmitter
	SFP+MADI+2RX	MADI Coaxial Dual Receiver, Non-MSA, HD-BNC
	SFP+MADI+2TX	MADI Coaxial Dual Transmitter, Non-MSA, HD-BNC

SFP Type	Imagine Part Number	Description
3G Optical/ Coaxial	OP+SFP+TT+13+13	SFP Series: Dual-channel optical outputs of SD/HD/3G 1310 nm wavelength
	OP+SFP+RR	SFP Series: Dual-channel optical inputs of SD/HD/3G PIN Receiver

SFP Type	Imagine Part Number	Description
	SFP+2ETX	SFP Series: Dual-channel HD-BNC outputs of SD/HD/3G (reclocked output)
	SFP+2ERX	SFP Series: Dual-channel HD-BNC inputs of SD/HD/3G (reclocked output)

SFP Type	Imagine Part Number	Description
12G Optical/ Coaxial	OP+SFP+RR+12G	12G/6G/3G/HD/SD-SDI UHD VIDEO SFP, OPTICAL, DUAL RECEIVER, NON-MSA, LC, RECLOCKED
	OP+SFP+TT+12G	12G/6G/3G/HD/SD-SDI UHD VIDEO SFP, OPTICAL, DUAL TRANSMITTER, NON-MSA, LC, RECLOCKED
	SFP+2ETX+12G	12G/6G/3G/HD/SD-SDI UHD VIDEO SFP, COAXIAL, DUAL TRANSMITTER, NON-MSA, HD-BNC, RECLOCKED
	SFP+2ERX+12G	12G/6G/3G/HD/SD-SDI UHD VIDEO SFP, COAXIAL, DUAL RECEIVER, NON-MSA, HD-BNC, RECLOCKED

SFP Type	Imagine Part Number	Description
HDMI	SFP+HDMI+IN	SFP Series: HDMI to SD/HD Converter + Cable
	SFP+HDMI+OUT	SFP SERIES: SD/HD TO HDMI CONVERTER
	SFP+HDMI20+OUT+CAB	12G/3G/HD-SDI TO HDMI 2.0 TRANSMITTER SFP+, 8 AUDIO CH (HDMI), NON-MSA WITH TYPE D TO A CABLE

Note: For the SFP+HDMI20+OUT+CAB SFP, embedded audio channel outputs 3 & 4 are currently swapped. The SFP+HDMI20+OUT+CAB device does not support ST259 SD-SDI.

Other Supported QSFPs and Cables

In addition to the QSFP optical modules and direct-attach cables which are sold by Imagine Communications and listed in DATA QSFPs (on page 39) and Video/Audio Expansion Interface Supported SFPs (on page 39), Imagine Communications has evaluated the following QSFPs and cables for interoperation with the SNP.

As of the time when they were tested, these QSFPs and cables were demonstrated to work with the SNP hardware. While Imagine Communications does not sell or directly support these devices, we do have positive experience with their use with the SNP. Note that optic and cable vendors do make changes within their supply chains from time to time, and past success may change even if the vendor's part number does not reflect a change.

Part Number	**Description**
QSFP-40G/100G-BIDI *(See Note 5)*	Cisco 100G and 40GBASE SR-BiDi QSFP Transceiver, LC, 100m OM4 MMF
QSFP-100G-DR-S	Cisco 100G Base DR QSFP Transceiver, 500m over SMF
QSFP-100G-FR-S	Cisco 100G Base FR QSFP Transceiver, 2 km over SMF
QSFP-100G-SRBD	Arista 100GBASE-BIDI QSFP optical transceiver, up to 70m over OM3 or 100m over OM4 duplex MM
QSFP-100G-SWDM4	Arista 100Gbase-SWDM4 QSFP Transceiver, up to 70m over OM3 or 100m over OM4 Duplex MMF
QSFP-100G-SR4 *(See Note 1)*	ARISTA 100GB/S QSFP28 SR4, MTP/MPO Optical connector, 70M with OM3 and 100M with OM4
QSFP-100G-PSM4 *(See Note 3&4)*	ARISTA 100GBASE-PSM4 QSFP Transceiver, up to 500 M over Parallel single mode fiber
QSFP-100G-XSR4	Arista 100Gbase-XSR4 QSFP100 Transceiver, up to 170m over parallel OM3 or 300m over OM4 MMF
AOC-Q-Q-100G-5M *(See Note 2)*	ARISTA QSFP28 to QSFP28 100GBE active optical cable 5 Meter
AOC-Q-Q-100G-30M *(See Note 2)*	ARISTA QSFP28 to QSFP28 100GBE active optical cable 30 Meter
MCP1600-C003E30L	Mellanox® Passive Copper cable, ETH 100GbE, 100Gb/s, QSFP28, 3m, Black, 30AWG, CA-L
MCP1600-C003E26N	Mellanox® Passive Copper cable, ETH 100GbE, 100Gb/s, QSFP28, 3m, Black, 26AWG, CA-N
MFA1A00-C005	Mellanox® active fiber cable, ETH 100GbE, 100Gb/s, QSFP, LSZH, 5m

Note 1: Supported Serial Numbers for QSFP-100G-SR4 part:

- AMDxxx
- ADPxxx
- ANCxxx
- AFHxxx

Note 2: Supported Serial Numbers for AOC-Q-Q-100G parts:

- ADPxxx
- ASPxxx
- AEBxxx
- AFHxxx

Note 3: Supported Serial Numbers for QSP-100G-PSM4 part:

- XCKxxx

Note 4: Unsupported Serial Numbers for QSP-100G-PSM4 part:

- XBTxxx

Note 5: Supported Cisco QSFP PN:

- SFBR-89BDDZ-CS4

Field Replaceable Spares

The SNP includes tachometer-based alarming on each of the fans in the unit; in the event of a failure of one of the fans, it is strongly recommended that urgent action be taken to replace the failed fan -- the SNP will enter thermal shutdown to try and avoid permanent damage if the internal thermal sensors indicate one of the components become extremely hot.

In order to facilitate timely replacement of the fans, we have introduced ordering codes for the individual fans inside the unit. It is strongly recommended that facilities with a significant population of SNP units purchase spares of these relatively inexpensive fans in order to optimize the time-to-repair of units which exhibit a fan failure alarm.

Field Replaceable Spares	Description
SNP-MAIN-PCB-ASSY	SNP field-replaceable spare main PCB assembly; same part number for both SNP-GW-3GX32 and SNP-GW-3GX32-HS-QF frames
SNP-350W-ACPS-ASSY	SNP field-replaceable spare redundant 350W AC power supply assembly for SNP-GW-3GX32 frames
SNP-400W-ACPS-HS	(OmniPower) SNP field-replaceable single hot-swappable 400W AC PSU for SNP-GW-3GX32-HS-QF or SNP Platform (two per SNP) *Note: This is one of two power supplies provided by Imagine Communications and can be used as the replacement part. For use with SNP Classic and SNP-XL.*
SNP-400W-ACPS-HS	(Zippy Inc.) SNP field-replaceable single hot-swappable 400W AC PSU *Note: This is one of two power supplies provided by Imagine Communications and can be used as the replacement part. For use with SNP-XL only.*
SNP-FPNL-HS-HQF	SNP field-replaceable spare front panel assembly with access door and quiet fans compatible for SNP-GW-3GX32 & SNP-GW-3GX32-HS-QF frames
SNP-SPARE-BBFAN	SPARE FAN FOR SNP BB FPGA FIELD REPLACEMENT
SNP-SPARE-IPFAN	SPARE FAN FOR SNP IP FPGA FIELD REPLACEMENT
SNP-SPARE-FPFAN	SPARE FAN FOR SNP FRONTPANEL QF/HQF FIELD REPLACEMENT

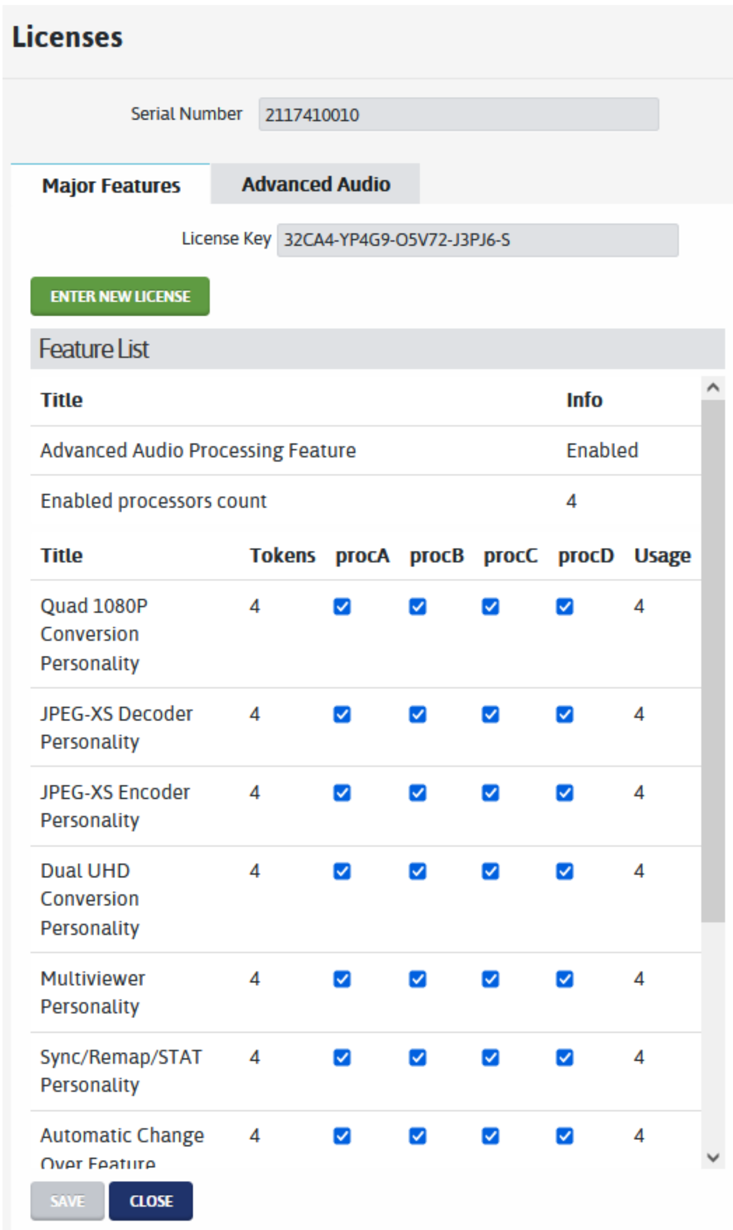
See Servicing (on page 535) for installation and removal instructions.

License Management

From the *local SMM* or *remote SMM* SNP Element UI, go to **Configure** > **Licenses** to open the **Licenses** dialog. From here, you can add, remove, and assign licenses.

This dialog contains 2 tabs:

- Major Features
- Advanced Audio licenses



Licensing Notes

1. Look at the **License Management** page to determine if the unit is already keyed for the features which you purchased with the unit (or subsequently).
2. Contact Imagine Customer Support to request license keys for previously shipped units which reflect any licensed features previously purchased, and to purchase any new feature licenses.

   Note: The service team will require the unit serial number in order to generate feature keys, and may need to know the original purchase order date or order number to confirm the feature purchases in order to create the license feature keys.

3. Confirm that the licenses appear in the License Management page after applying the feature key.
4. Assign license tokens to the processors as needed, according to your system design.
5. License key can be applied to the unit when running releases 1.5 or 1.6, so you can get keys put onto your units before attempting to upgrade to release 1.7.

Applying Major Feature Licenses

Licenses are applied on a per-processor basis. You can apply up to 4 of each license per SNP. Licensing and Ordering (on page 34) contains a complete list of current licenses. The License Management dialog lets you choose processors assigned for a feature, depending on the number of available tokens. For example, if a feature has 4 available tokens, you can select all 4 processors. But if you have only 2 tokens, only 2 of 4 processors can be selected. By default, none of the processors are assigned automatically, so please make selections as appropriate in order to use the desired features on one or more processors. The Usage column updates to reflect your selections.

Applying Advanced Audio Licenses

Licenses

Special Note about the REMAP license

In previous releases of SNP, the Remap personality (SNP-SK-REMAP) was a separate feature key. In release 1.7 and beyond, there is no explicit key for Remap, it is enabled by the Sync/Remap/STAT (SNP-SK-SYNC or SNP-PSK-SYNC) license key.

Other Notes

- **Multiviewer Personality:** The Multiviewer and Multiviewer Portrait mode share the same license
- **Conversion Personality:** The Dual Conversion license covers the Quad Conversion feature. For example, if a processor has been assigned the SNP-PSK-2CONVUHD license token, it can also turn on the Quad Conversion personality.

Acquiring Licenses

To acquire licenses, contact Imagine Communications Customer Service. You will need to provide the **Serial Number** from the **License Management** dialog box.

Also see Acquiring Licenses (on page 381)

Software Versions

Software	Minimum Version for use with SNP	Notes
Remote SNP Manager	3.0	Installed on a PC on the network. See Installing Remote SNP Manager (on page 74)
SNP Firmware	3.0	
Magellan Control System	3.0 or higher	See Using Magellan Control System with SNP (on page 332).
Layout Designer	7.0	
VirtualBox	5.1	Comes pre-installed in the case of a pre-packaged SNP Manager box
Magellan CCS Navigator	5.8.2	See Using Magellan Control System with SNP (on page 332)

Standard SNP Hardware

The standard SNP is currently available in two flavors:

- SNP-GW-3GX32 with standard fans and power supplies
- SNP-GW-3GX32-HS-QF, with dual hot swappable power supplies and quiet fans.
  See Servicing (on page 535) for information on field-serviceable parts.

Controls are on the front panel, and connections are on the back panel. See the following topics:

Front Panel

The SNP front panel contains controls to configure and manage the device. It is a replaceable component of the product. See Front Panel Assembly (on page 538) for more information.

SNP-GW-3GX32-HS-QF/SNP-PLATFORM-4A/SNP-PLATFORM-2AU with Hot-Swappable Power Supplies and Quiet Fans

The front panel is removable as a single piece, as described in Removing the Front Panel (on page 538), or just the access plate at the right can be removed to access one of the two (hot-swappable) power supplies while the SNP remains in operation. See Removing the Individual Hot-Swappable Power Supply (on page 540).

Front Panel Controls

Name	Function
Power	Turns off and on the SNP.
Control knob	Scrolls through parameters or options at the selected level.
Enter	Selects or "takes" an option or value in a parameter.
Exit	Exits from one level in the parameter tree to a higher level in the tree.
Default	When browsing the parameter list, this button flashes to indicate that a parameter is set to the default value. If a parameter is not at the default value, press and hold the Default button for more than one second to reset the parameter to its default value.

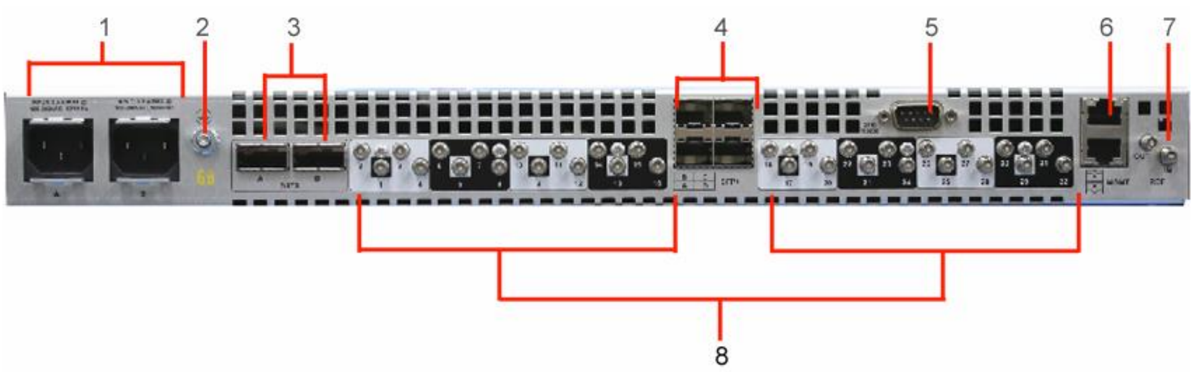
Name	Function
Home	For future use.
Status	For future use.
Help	When the front panel Menu is navigated to a parameter setting, press to display a description of the parameter.
Reset	This recessed button is located in a hole below and to the right of the LEDs on the front panel. It can be pressed using a paper clip.

LED Functions

<table>
<tr><th>LED Name</th><th>Condition Indicated</th></tr>
<tr><td>System</td><td>• Green—Booted up OK, primary flash image, all FPGAs loaded and ready, Zenium running
• Amber—Boot in progress, FPGA re-load in progress, or other "not-ready-yet" status
• Red—Fail-safe image running, FPGA load failed, or other major problems
• Off—Unit is not powered</td></tr>
<tr><td>Data A
Primary Link</td><td rowspan="2">• Green—IPWan link good, link speed > 0, FCS errors below threshold
• Amber—Link good and speed> 0, but FCS error rate above threshold
• Red—Link speed = 0
• Off—QSFP link not connected or system is not ready</td></tr>
<tr><td>Data B
Secondary Link</td></tr>
<tr><td>MGMT</td><td>• Green—At least one SDNO connection is established
• Amber—At least one SDNO connection was established recently (within the last 60 seconds) but there is none currently
• Red—No SDNO connection is currently available, and none have been connected recently
• Off—System is not ready</td></tr>
<tr><td>Timing</td><td>• Green—The unit is well-locked to the selected timing source (PTP)
• Amber—The unit is currently locking to timing source (PTP)
• Red—The unit is not locked
• Off—System is not ready</td></tr>
<tr><td>Alarm</td><td>• Green—No major or minor alarms
• Amber—Only minor alarms
• Red—Major alarms
• Off—System is not ready
Note: Alarms disabled in the UI do not affect the alarm LED.</td></tr>
</table>

Back Panel

The back panel for both SNP-GW-3GX32 and SNP-GW-3GX32-HS-QF has the same layout:



Item	Description
1	IEC power inlets; see Electrical Requirements (on page 56)
2	Ground pin (10/32 or metric M5/standard)
3	QSFP100 Flexible Ethernet I/O • 100 GBE • Main and Protect, full 2022-7 • Can be used for PTP timing slave for synchronization; See Connecting to a PTP Source (on page 485).
4	Four SFP+ sockets support SDI-on-fiber and MADI SFP; See Video/Audio Expansion Interface Supported SFPs (on page 39) for options
5	GPIO/RS-232, for future use
6	Dual 1G Management Ethernet ports; see Initial Setup (on page 60)
7	Analog reference input (for future use) and analog black burst reference output generated from the PTP signal; see Configuring Reference for SNP.
8	SDI inputs/outputs: • Amphenol HD-BNC (8 groups of 4) 8xUHD or 32xHD • 6G/12-G capable BNC of each quartet is labeled with a square of the opposite color

BNC Ports

BNC ports are divided in groups of four. BNCs are hard-coded so that the first four are assigned to Processor A Section1, the next four (numbers 5, 6, 7, and 8) are assigned to Processor A Section 2, etc.

Note that the first numbered port in each group is labeled with an inverse square. This port is the 12G capable port for that group. Ports in each group are numbered in a clockwise fashion. For example, the left-most port on the chassis is port 2, not port 1.

Pinouts: GPIO/RS232 9-Pin Connector (for future use)

Pin No.	Signal	Comments
1	GND	Signal Ground
9	GPIO4	GPIO Data
5	GND	Signal Ground
3	Tx	Transmitted Data
7	GPIO2	GPIO Data
8	GPIO3	GPIO Data
2	Rx	Received Data
4	GND	Signal Ground
6	GPIO1	GPIO Data

SNP-XL Hardware

The SNP-XL runs on the SNP-PLATFORM-XL Base, HW Rev A.

In This Section

Front Panel

The SNP-XL front panel contains controls to configure and manage the device. It is a replaceable component of the product.

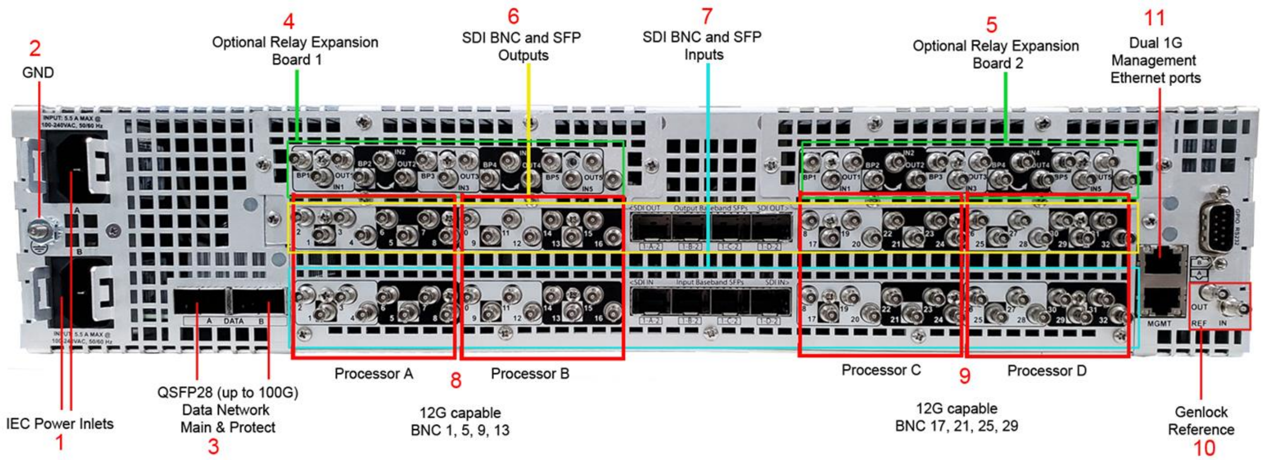
The front panel is removable as a single piece, or just the access plate at the right can be removed to access one of the two (hot-swappable) power supplies while the SNP-XL remains in operation.

Front Panel Controls

Front Panel controls on the XL are similar to the standard SNP.

Name	Function
Power	Turns off and on the SNP-XL.
Control knob	Scrolls through parameters or options at the selected level.
Enter	Selects or "takes" an option or value in a parameter.
Exit	Exits from one level in the parameter tree to a higher level in the tree.
Default	When browsing the parameter list, this button flashes to indicate that a parameter is set to the default value. If a parameter is not at the default value, press and hold the Default button for more than one second to reset the parameter to its default value.
Home	For future use.
Status	For future use.
Help	When the front panel Menu is navigated to a parameter setting, press to display a description of the parameter.
Reset	This recessed button is located in a hole below and to the right of the LEDs on the front panel. It can be pressed using a paper clip.

Back Panel

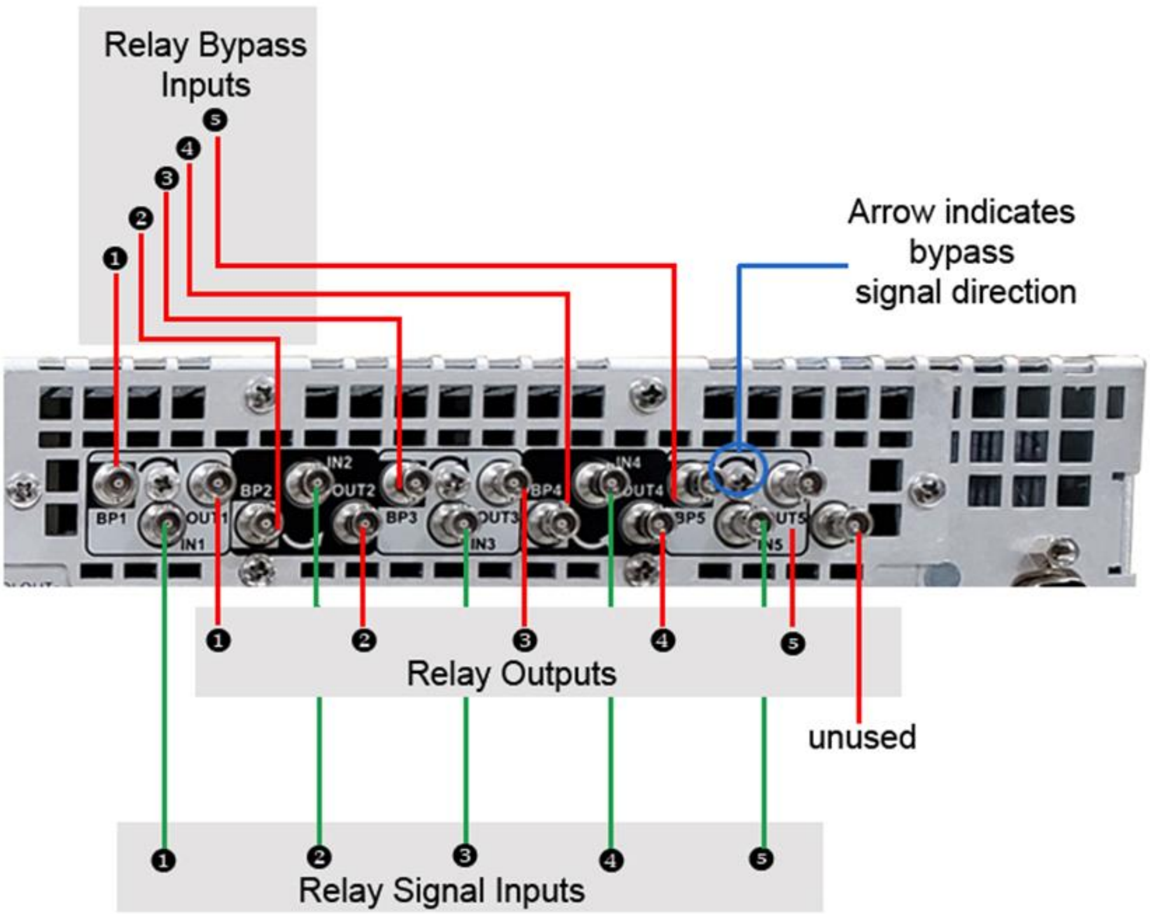


Item	Description
1	IEC power inlets; see Electrical Requirements.
2	Ground pin (10/32 or metric M5/standard)
3	QSFP100 Flexible Ethernet I/O • 100 GbE • Main and Protect, full 2022-7 • Can be used for PTP timing slave for synchronization
4/5	Optional Relay Expansion Boards Also see Relay Expansion Board Signaling.
6	SDI BNC and SFP Outputs
7	SDI BNC and SFP Inputs
8	Inputs and Outputs for Processors A and B
9	Inputs and Outputs for Processors C and D
10	Genlock Reference
11	Dual 1G Management Ethernet ports; see Initial Setup

Relay Expansion Board Signaling

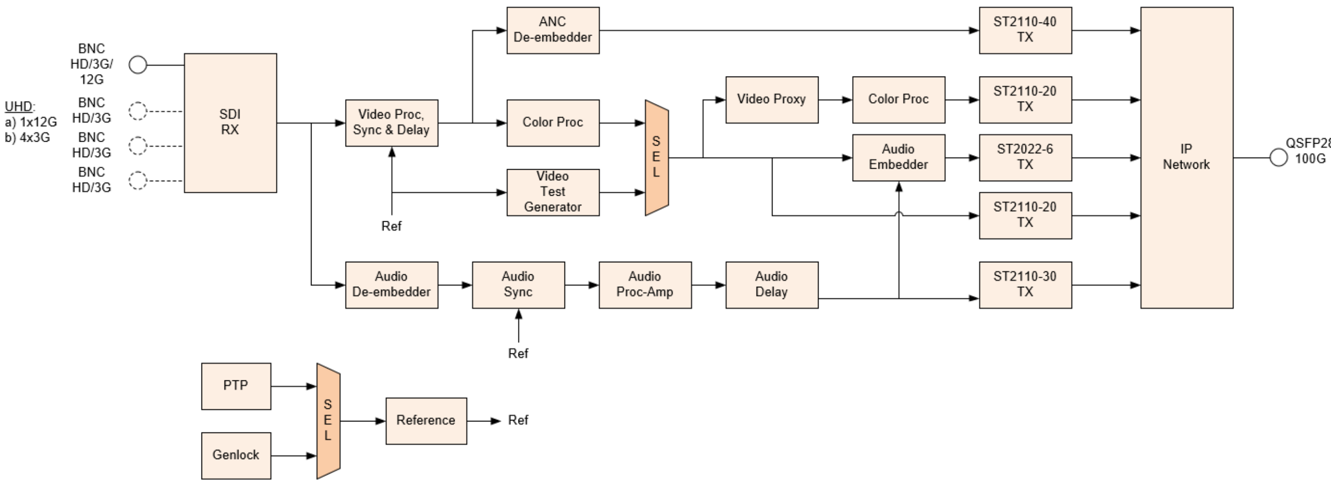
The SNP-XL contains 2 expansion slots for optional expansion boards. In the first release, the Relay Expansion Board will be available. The Relay Expansion boards can be installed in both available expansion slots.

This expansion board contains 5 relays that allow the backup signal to be bypassed on the output due to the loss of power of the protected equipment. The arrow indicates the direction of the bypass signal.

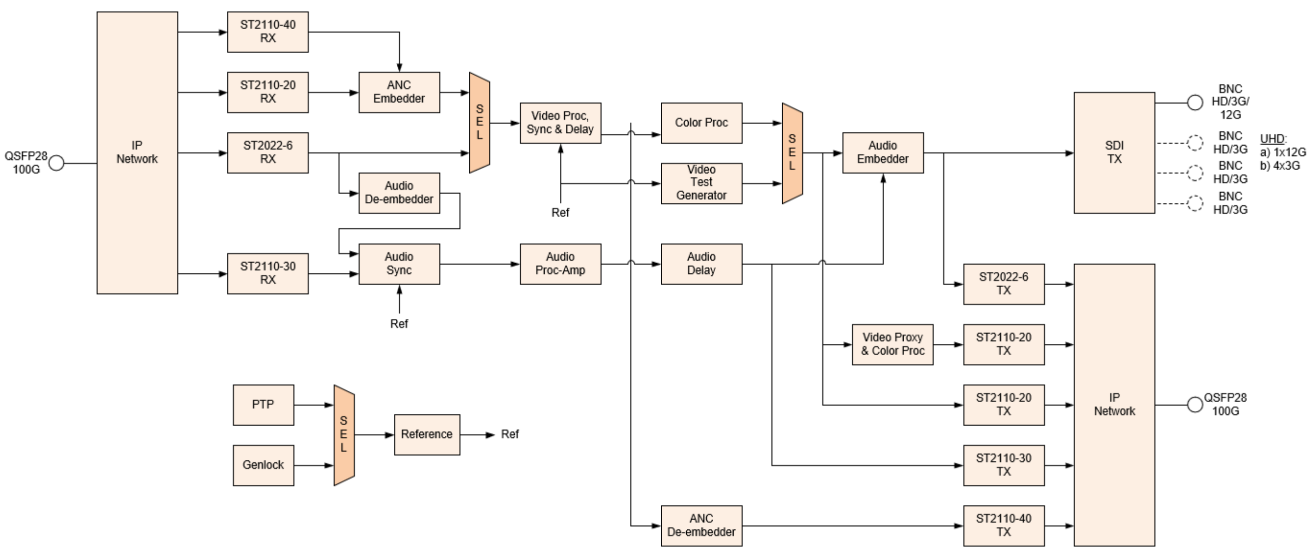


General Signal Flow of the Sync Personality

SDI to IP



IP to SDI/IP



Installation

Prior to installing your system, ensure that certain environmental and electrical conditions are met. You should install it and make some connections.

SNP can be installed in a 19" rack. See Rack Mounting (on page 57).

For timing and synchronization purposes, SNP should be connected to a PTP source. See Configuring a PTP Network (on page 485).

Electrical Requirements

The SNP power supplies have a universal input of 100-240VAC at 47 to 63Hz (nominal), max 5.5A each. There is no voltage selector switch. For power supply specifications, see Power Consumption (on page 516).

The SNP has two independent power supplies, load-sharing when both are functional. In SNP-GW-3GX32 frames, these two power supplies are mounted in a common package and serviced as a pair. In SNP-GW-3GX32-HS-QF frames, each power supply is a separate unit and can be removed individually while the unit remains in operation (hot-swapping). See Servicing (on page 535) for more information.

SNP has two IEC C14 power inlets, one associated with each power supply. Qualified power cords including UK-style, European-style, and U.S.-style plugs are available for international shipment.

You can power down or reset the unit using the Power Switch (or reset soft-switch) on the front of the SNP. If a unit has been previously powered down, you can initiate power up of the unit from the front power switch as well.

When mains power is lost and then later restored, the unit should return to the power state it was in when mains power was lost – either powered down or running.

Environmental Requirements

SNP units are cooled by forced air drawn in from the front, and exhausted through the rear. There must be free passage for air flow at the front and back of each unit to allow for adequate ventilation. Take care to select a dry, well-ventilated location with a minimum of dust.

SNP units are designed for mounting in a standard 19-in. (48-cm) rack using front-mounting ears and rear support brackets, occupying a 1RU vertical space of 1.75 in. (4.4 cm).

When installing an SNP in a rack, ensure that there is adequate space behind the mounting ears and clearance for the rear connecting cables. Allow about 10 inches (25 cm) of slack in the rear connecting cables for frame access and maintenance.

After unpacking the frame, and before installing into a console or rack, allow at least 30 minutes for temperatures to equalize and to eliminate any condensation that may have developed. SNP frames require an ambient temperature of between 32°F and 95°F (0°C to 30°C) with relative humidity of 10% to 90% non-condensing.

Rack Mounting

Although the pre-installed frame-mounting ears provide the main support for the SNP within a rack, you must install arms, brackets, and a cable relief bar at the rear of the unit to support the weight of cabling and frame stacking.

The following items are included in kit 158-100081Q00:

- Rear support arms (164-000306Q00)
- Cable tie bar (164-000305Q00)
- Brackets (164-100556Q00)
- Bracket screws (4-40X1/4 PH_Q)
- Tie bar screws (6-32X3/8 PH)

Figure 3: Mounting Ear on Front Panel

The following procedure describes how to install the rack supports.

1. Locate the support package in the box, consisting of two support arms, two brackets with screws, a tie bar, and tie bar screws.

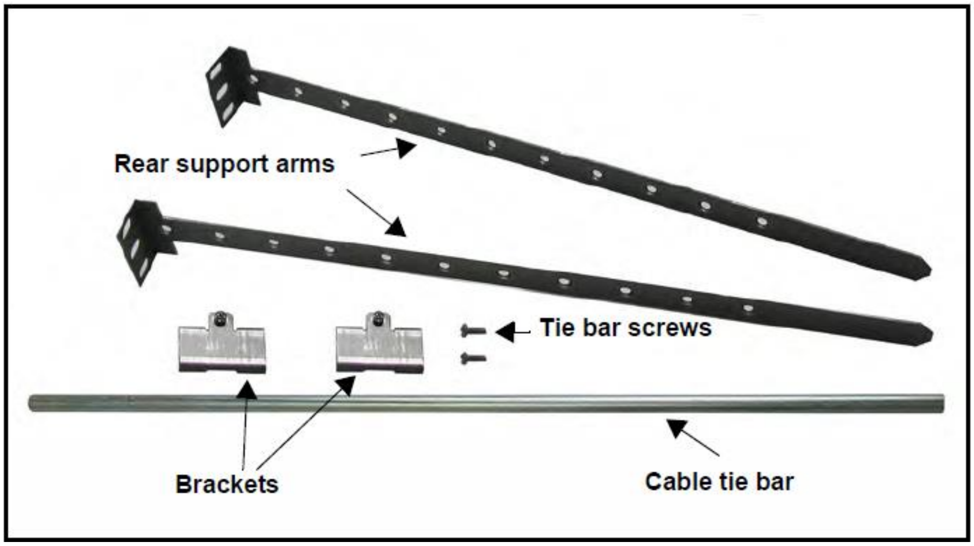


Figure 4: Rack Support Brackets (158-100081Q00)

2. Attach the brackets to the sides of the frame using the screws that are provided.

CAUTION

To prevent damage to components inside the frame, do not use screws longer than those provided.

Figure 5: Bracket Installation

3. Attach the cable relief bar between the two support arms using the screws that are provided.

You can secure the cable relief bar through any of the screw holes on the arm.

Figure 6: Attaching the Cable Relief Bar

4. Push the SNP into the front of the rack, and attach the frame's front-mounting ears to the rack using the appropriate screws (not provided).
5. Slide the two arms into their slots from the back of the frame and attach the arms to the back of the rack.

Figure 7: Installed Support Arms and Cable Relief Bar

6. Make all necessary electrical and optical connections to the back of the frame.

CAUTION

Do not use slide/rail mounted equipment as a shelf or a work space.

Initial Setup

The SNP ships with a default IP address, gateway, and subnet mask. You should change these settings so they are appropriate to your network.

It is strongly recommended that you change the default passwords before connecting your SNP to any other devices. See Configure Local Host - Password Control (on page 103).

For best results, use strong passwords for your user accounts as well. See User and Group Management (on page 67) for more information.

Setting IP Address and Subnet Mask

Ethernet control of SNP is managed through two RJ45-style gigabit ethernet connectors, Control A and Control B. For the location of these connectors, see Back Panel (on page 49).

Depending on whether you're using bonded mode or dual address mode, you will configure these Ethernet management ports in one of the following ways.

- Bonded Active/Backup mode (default): **For best results use this option.** Ports A and B have a common IP address. The two Ethernet connections can be made to your network or switches with no special configuration, since only one Ethernet port is active at any given time. This configuration is used for redundancy, in case one of the links fails. For Control Link configuration, only Control A is used.
- Bonded LACP mode: Ports A and B have a common IP address, and traffic is balanced across the two ports if both are available. The two Ethernet connections can be made to your network via managed switches. This configuration is used for load-balancing and redundancy, in case one of the links fails. For Control Link configuration, only Control A is used.
- Dual Addresses: In this mode the device has two equivalent control plane ports, with distinct IP addresses. The two ports should be on separate IP subnets and gateway addresses may be configured for each port. All management & control protocols and services are available on both ports concurrently.

Setting the Control Link mode is described in Configure Local Host - Control Link Bonding and Configuration (on page 94).

To allow devices to communicate on a network, for best results set all SNP devices to the same subnet (network location). When shipped, all SNP units are configured with the same default IP (device identifier) and subnet addresses. These addresses need to be changed so that each unit is uniquely identified and the network location of all units is accurately reflected. An IP address is made up of a four-item set of numbers (octet). For a class C network, you must change the first three octets to identify the location (address) of the unit on your network, and also change the last octet to uniquely identify the device from other SNP units.

Defaults for Control A	IP address: 192.168.100.250
	Net mask: 255.255.255.0
	Gateway: 0.0.0.0

Defaults for Control B (only for Dual Address mode)	IP address: 192.168.101.250 Net mask: 255.255.255.0 Gateway: 0.0.0.0

Note: For best results, set all SNP devices to the same subnet. Otherwise, you will also need to configure Gateway settings.

Setting the IP Address Via a PC using an Ethernet Cable

All SNP systems ship with a default IP address, subnet mask, and gateway. If you intend to control the unit remotely, or connect it to a network hub/switch along with other SNP units, you will need to reconfigure the IP with unique network settings. Local control (with a direct Ethernet requires an IP configuration on the PC's network interface. The IP address must be on the same subnet as the SNP Control A or Control B, depending on which port you connect to.

For example, use PC IP address 192.168.100.10 for connecting to Control A or 192.168.101.10 for connecting to Control B.

The first time you connect to an SNP frame:

1. Using a cable, connect your PC to the SNP via one of the management ports (#6 in Back Panel (on page 49)).

   Be mindful of which port you are connected to, A or B.
2. From a web browser on your PC, enter the default IP address of the port you are connected to.

   The default for Control Port A is 192.168.100.250, and for Control Port B it is 192.168.101.250.

This takes you to a default **local setup** web page that allows you to configure your element and set the IP Address.

Setting the IP Address at the SNP Front Panel

Depending on the setting for Network Mode, you may need to configure just Control A, or both Control A and Control B.

Follow these steps to configure the network addresses at the SNP front panel:

1. Follow this path: **System Information > System Control > Network Mode** and choose the mode you want for your system.

   For best results, choose **Bonded Active/Backup,** and then configure **Control A**.

   If this is a new unit being configured, the default IP displays. Otherwise, the current IP address of the unit displays.
2. Change the IP address by following these steps:
   a. Press **Enter** to navigate to one of the four octets in the IP address.
   b. Modify the address value by using the scroll knob to set a new number.
   c. Press **Enter** to move to the next octet, and then repeat step (b) above.
   d. Press **Exit** when you are finished configuring the address.
3. Scroll to **Netmask A**, and then press **Enter**.

If this is a new unit being configured, the default subnet mask displays. Otherwise, the current subnet displays.

4. Repeat the procedure described in step 4, this time for the subnet mask.
5. Scroll to the **Gateway A** parameter, and then press **Enter**.

   If this is a new unit being configured, the default gateway displays. Otherwise, the current gateway address displays.
6. Repeat the procedure described in step 3, this time for the gateway parameter.
7. Scroll to **Save Config A** and click **Enter**, and then click **Yes** to commit the changes.
8. If configuring as Dual Address mode, repeat steps 2 - 7 for Control B, this time for the **IP Address B**, **Netmask B**, and **Gateway B** parameters, then scroll to **Save Config B,** click **Enter**, and click **Yes** to commit the changes.
9. Press **Exit** to return to the top of the menu.

Rebooting the SNP is not required.

Using the SNP Manager Interface

SNP has two control interfaces available. The local SNP Manager interface controls the device over a network, including software upgrade, etc. The remote SNP Manager interface allows control of multiple SNP devices, but does not allow console-level access. When operators are logged in at both interfaces, changes made on one interface will automatically update on the other.

The default user name and password you should use the first time you log in are:

Login: admin

Password: password

- To log into the local SNP Manager interface, point the browser to http://<SNP IP>.
- To launch the remote SNP Manager, point the browser to http://<SNP Manager IP> of the SNP Manager installation.

Note: When using SNP 3.0 or higher, you must use remote SNP Manager 3.0 or newer.

Note: When connecting to SNP, use Chrome or Firefox. Other browsers, such as Internet Explorer, Edge, or Safari, are not supported.

This section is divided as follows:

Local SNP Manager

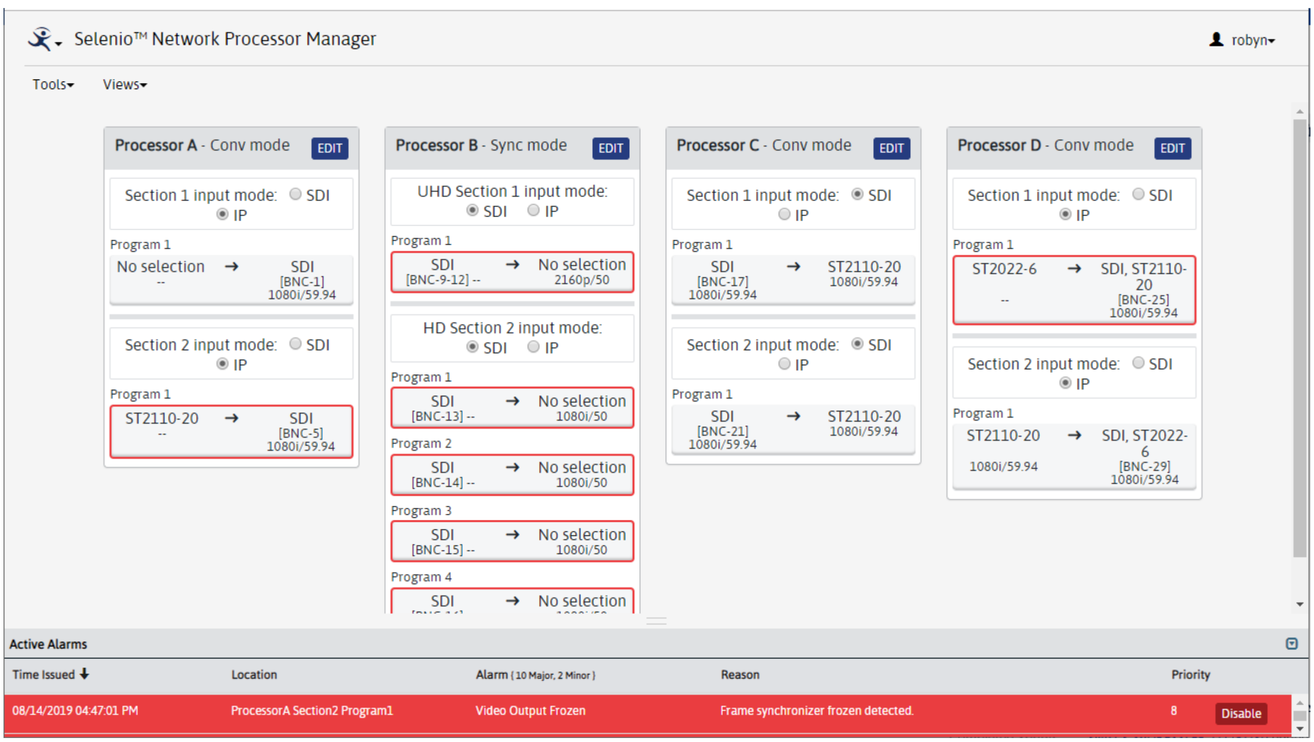
In This Section

Element Overview for Local SNP Manager

When you log into a local SNP Manager, the **Element Overview** shows each SNP as an Element. Click on a program to view controls and statuses for that program, as shown in Controlling a Device (on page 88).

When a Program is surrounded by a yellow box, that Program has at least one minor alarm in a triggered state.

When a Program is surrounded by a red box, that Program has at least one major alarm in a triggered state.

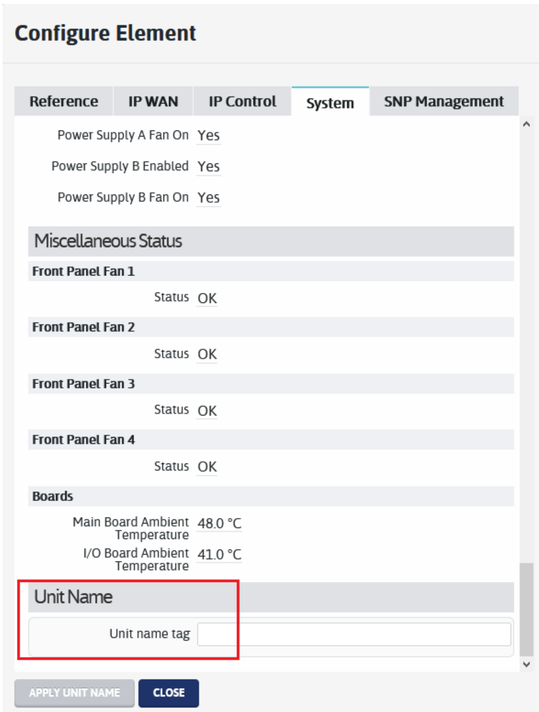


When you navigate away from this screen, you can always return by selecting **Views** > **Element** from the main menu again.

Naming your SNP

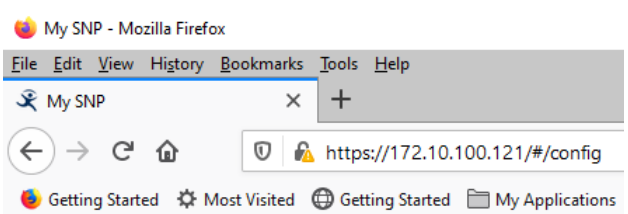
You can give your SNP unit a name by doing the following:

1. Go to **Configure Element** > **System** tab
2. Enter a name in the **Unit Name** section and click **Apply Unit Name**

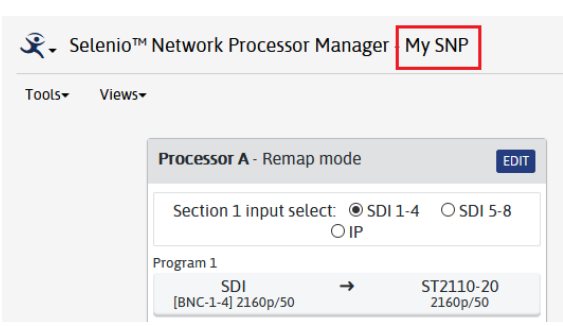


The name you provide helps you identify your SNP meaningfully in your ecosystem. This name is displayed:

- On the browser tab when you access SNP



- At the top of your SNP UI



Note: Apart from the SNP unit name, you can also provide custom hostnames for the SNP. See DNS (on page 357)

About Screen

Check the SNP Manager version by clicking **About** in the menu under the Imagine Communication Icon in the upper left corner of the screen.

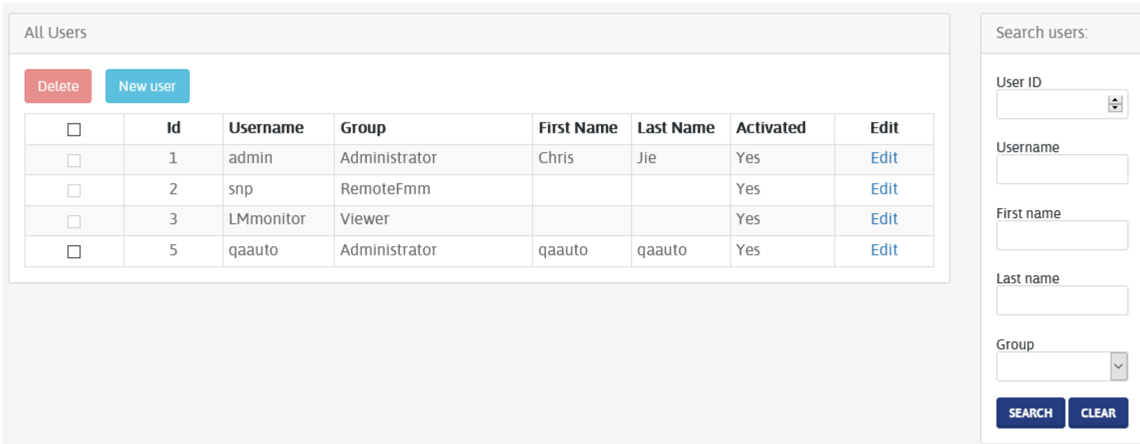
Information about an SNP's hardware and firmware can be found by connecting to the local device. See Configure Local Host - Software Update (on page 95).

Accessing HTML Help

You can open SNP online help by clicking **Help** in the top left corner of the SNP Manager screen, by clicking the Imagine logo.

User and Group Management

Users and Groups can be managed by clicking the logged in user in the top right hand corner of the screen. Select **Manage Users**.



Note: The SNP Manager default login is "**admin/password**". The system only allows one admin user login at a time, so it is good idea that you create your own account and use it. This can be done from Dashboard>Admin>Manage Users>New Users.

User names and passwords are device-specific. If you create a user on a local SNP Manager that user will not automatically be created on a remote SNP Manager, and vice versa.

Users

When first installed, SNP Manager has the following users created by default:

- **Admin**: This user is a member of the Admin group, and can add or remove users, and has full read/write access to parameters on the device where they are logged in.
- **RemoteFmm**: This user (and other members of the RemoteFmm group) can add elements to a remote SNP Manager. See Add Element (on page 85).
- **LMmonitor**: This is the default user for the Live Manager (Magellan Control System) application to connect to the SNP.

Note that you need to be a member of the administrator group to add or remove users.

To manage users, click the logged in user on the top right hand corner and select **Manage Users**. A list of all users created for the system is displayed, along with details such as the username, first name/last name, whether the user is active, and the group that the user is assigned to.

To add a new user to the system:

1. Click the **New User** button.
2. Enter details for the new user, and select the group to assign the user to.
3. Click the **Create** button.

To delete an existing user:

1. Select the checkbox against the user to delete.
   You cannot check the box beside the snp user and admin user because they are system default users.
2. Click the **Delete** button that is displayed on the top.

To search for a user:

If you have a long list of users, use the search functionality to locate a specific user.

1. In the Search box displayed to the right of the Users screen, enter search criteria to narrow down your search for a specific user or users.
2. Click the **Search** button.

To update a user:

1. Click the **Edit** button against a User.
2. Edit any required details including the **Group** the user has been assigned to. For example, you can update the **Name** or **Password**.
3. Click the **Update** button.

Note: Wen you click the **Edit** button against a user, you can see additional details for that user (to the right of the screen).

Group Permissions

You can add users to the following groups:

- Users in the **Administrator** Group have full permissions
- Users in the **Operator** group have Read and Edit permissions
- Users in the **Viewer** group have read-only permissions.
- Users in the **RemoteFmm** group can add and remove devices on the Remote SNP Manager. This group only appears when adding users at a local SNP Manager.

Click the **Show** button against a Group to see users currently assigned to that Group. You can directly delete users from a group (if required) by selecting a user and then clicking the Delete button that is displayed.

SNP Manager Menus

See SNP Manager User Interface (on page 84).

Remote SNP Manager

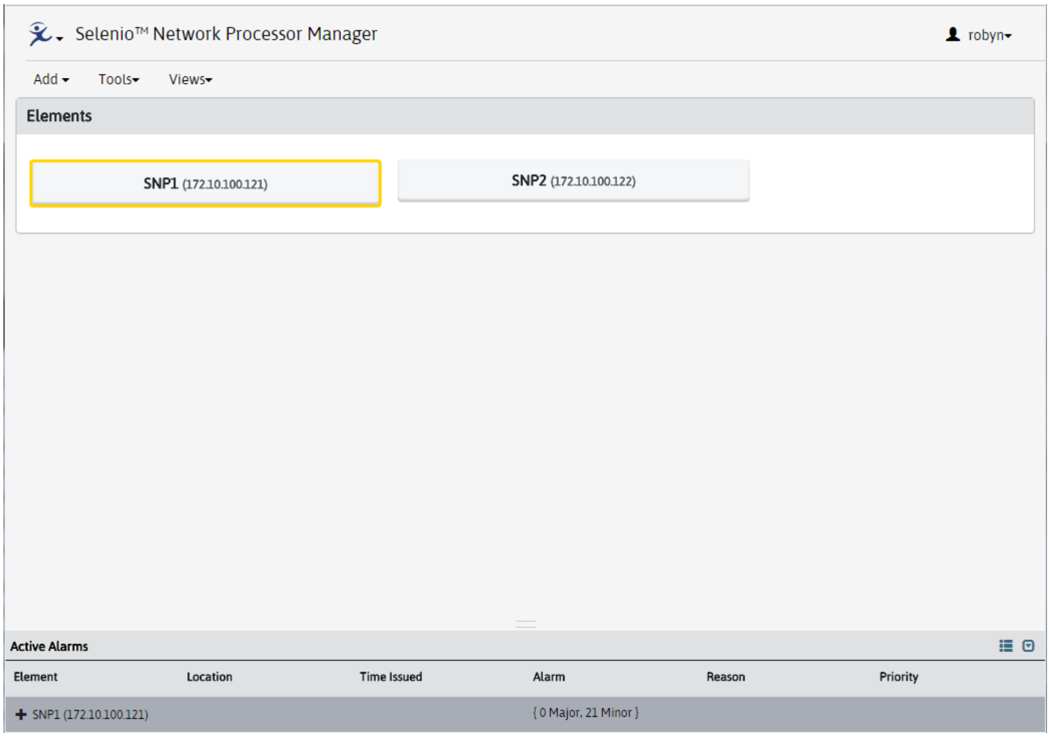
In This Section

Dashboard Overview for Remote SNP Manager

When you log into remote SNP Manager running on a virtual machine, the **Dashboard Overview** shows each SNP as an Element. Click on an element to see the Processors etc. for that device, as shown in Controlling a Device (on page 88).

When an SNP is surrounded by a yellow box, that SNP has at least one minor alarm in a triggered state.

When an SNP is surrounded by a red box, that SNP has at least one major alarm in a triggered state.



When you navigate away from this screen, you can always return by selecting **Views** > **Dashboard** from the main menu again.

Remote SNP Manager Overview

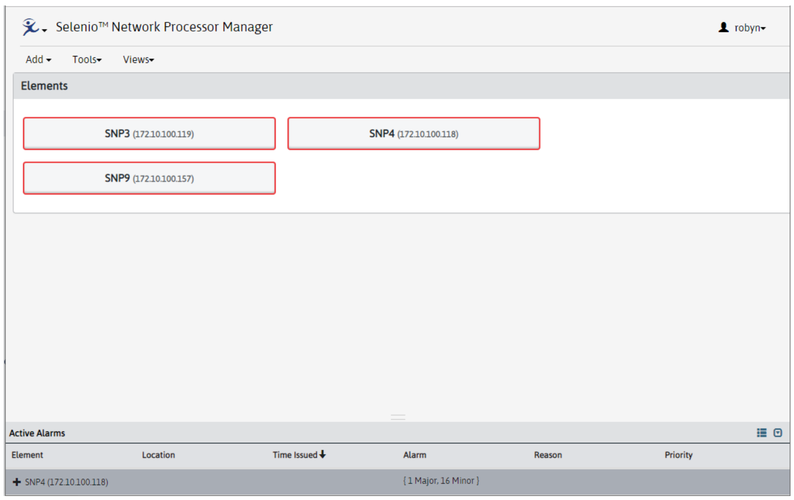
Monitoring of multiple SNP devices can be done in two ways:

- Using SNP Manager
- Individual SNP devices can be monitored over a network by directly connecting to the device's IP

SNP Manager needs to run on a separate PC, and it is recommended to control no more than ten SNPs under a single SNP Manager. See Installing Remote SNP Manager (on page 74).

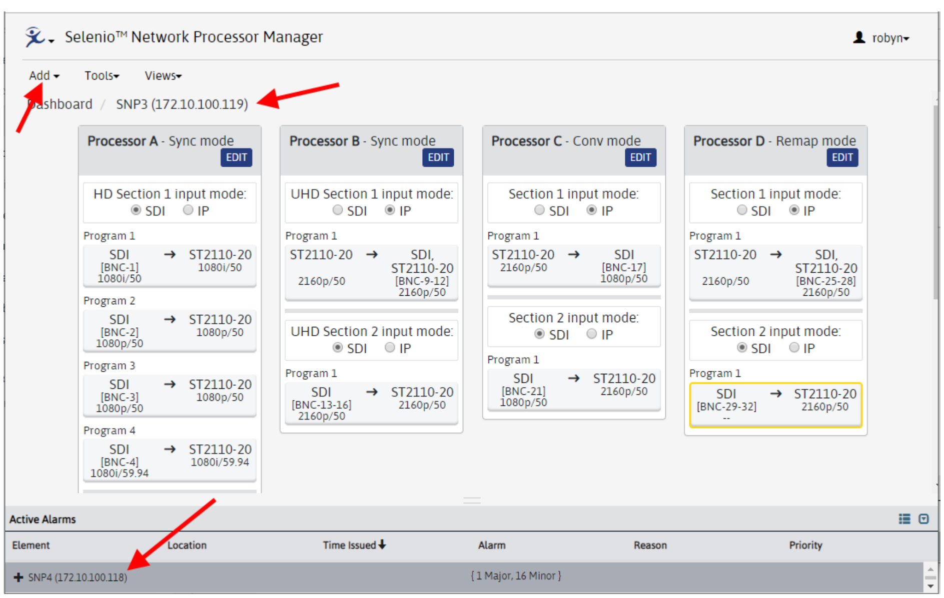
When using the SMM interface operating on a virtual machine, you will notice some differences:

- Dashboard screen to choose which device to connect to.



  Click on an element to view the processors for that device.

- IP address for the device listed in the space above the processors, so you can tell which device is being modified.



- **Add** menu, which allows you to add and remove elements from the interface. See Add Menu (Remote SNP Manager Only) (on page 85).

- IP address in the alarms list so you can tell which device produced the alarm.
- No access to Console in the **Views** menu. Console controls are available using the Local SNP only. See Console (on page 91).

Note: When connecting to SNP, use Chrome or Firefox. Other browsers, such as Internet Explorer, Edge, or Safari, are not supported.

Installing Remote SNP Manager

Remote SNP Manager is a virtual machine created from an ISO file. The virtual machine ISO is tested working on VirtualBox hypervisor. The procedure generally includes installing VirtualBox, creating the SNP Manager VM, and configuring the virtual machine for network access.

Note: When using SNP 3.0 or higher, you must use SNP Manager 3.0 or newer.

System Requirements

The host machine for the SNP VM should meet the following requirements:

- Minimum of 16GB RAM
- VirtualBox hypervisor 5.1 or higher
- Minimum of 30 GB free space on HDD
- 4 cores

When connecting to SNP, use Chrome or Firefox. Other browsers, such as Internet Explorer, Edge, or Safari, are not supported.

With this configuration you can support up to 10 SNP devices per SNP Manager.

Creating the SNP Manager Virtual Machine

SNP Manager will be running inside a virtual machine managed by VirtualBox.

If you have VirtualBox installed, start with step #4 (below).

You need to enable the host machine CPU Virtualization Support from the BIOS in order to run the VM properly. To install VM VirtualBox Manager, follow these steps:

1. Download VirtualBox installer from https://www.virtualbox.org/wiki/Downloads (https://www.virtualbox.org/wiki/downloads).

   You will need VirtualBox 5.1 or newer.
2. Boot or reboot the host machine, and enter BIOS configuration.

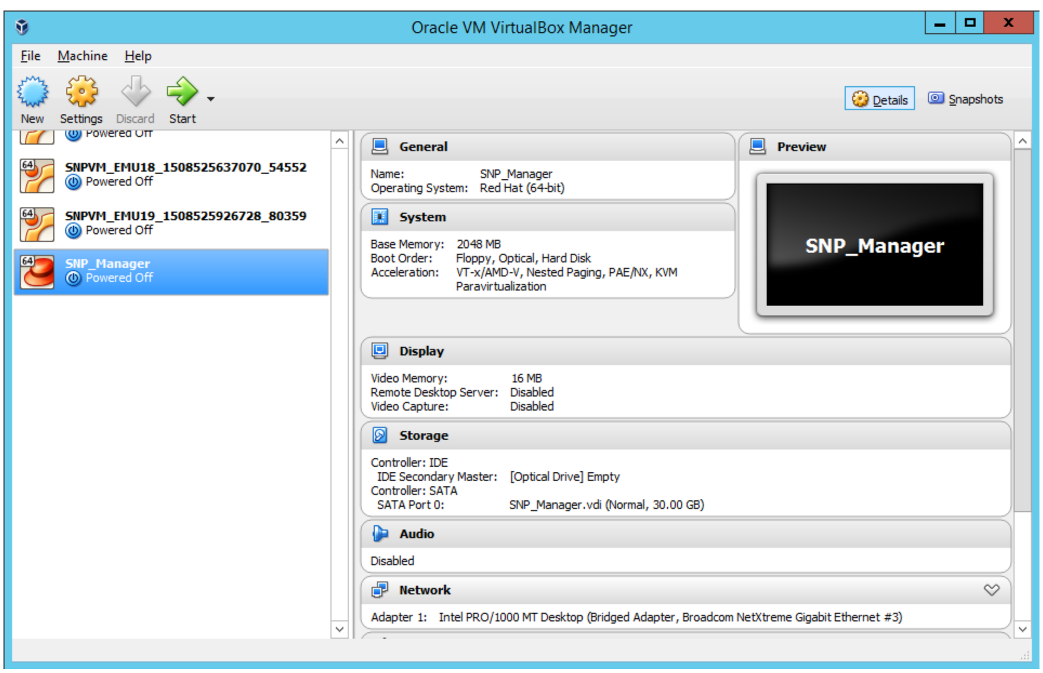
   On many systems, you can enter the BIOS configuration by holding down the F2 key while rebooting. Check the manual for your system if this is not the case.
3. In the BIOS configuration, enable virtualization settings.
4. Run Virtualbox installer and take all default options in setup wizard.

Once installation is complete a VirtualBox icon shows up on the desktop.

5. Copy the SNP Manager ISO file to the VM host machine (or to a network drive that is accessible to this host machine). The file is about 1.5GB in size.

   The latest SNP Manager ISO file can always be found on our website. For complete contact information, see Support Contact Information (on page 3).
6. Click on the VirtualBox icon to open the Virtualbox user interface.
7. Click **New** to open the **Create Virtual Machine** dialog in Guided Mode, and complete the screens as follows.
   a. On the **General** screen's **Basic** tab, complete the following fields:
      - **Name:** Enter something descriptive
      - **Type:** Linux
      - **Version:** Red Hat (64-bit)
   b. On the **Memory Size** screen, configure **Memory Size** to 4GB memory size (4096 MB).
   c. On the **Hard disk** screen, choose the **Create a virtual hard disk now** option, and click **Create.**
   d. On the **Hard disk file type** screen, choose **VDI** and click **Next**.
   e. On the **Storage on physical hard disk** screen, choose **Dynamically allocated** and click **Next**.
   f. On the **File Location and size** screen, configure the virtual disk size limit as 30GB, and click **Create**.

   Your VM appears in the VirtualBox Manager.



8. From the tool ribbon at the top left of the screen, click **Settings**, and from the menu at the left:

- Click **System** and on the **Processing** tab, configure **Processor** to 2 CPUs.
- Click **Audio**, and uncheck **Enable Audio**.
- Click **Network,** and under **Attached to:** select **Host-Only Adapter**.

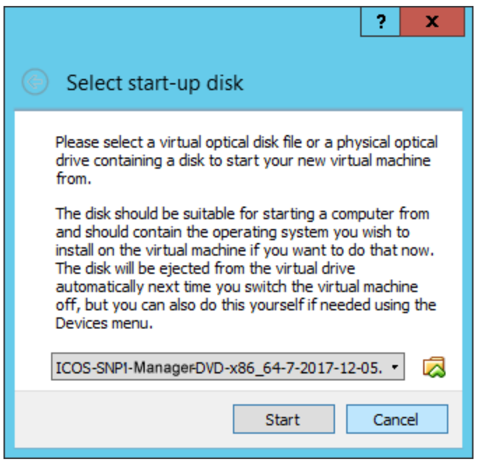
9. Click **OK** to close the **Settings** window.

Installing the ISO on the SNP Manager VM

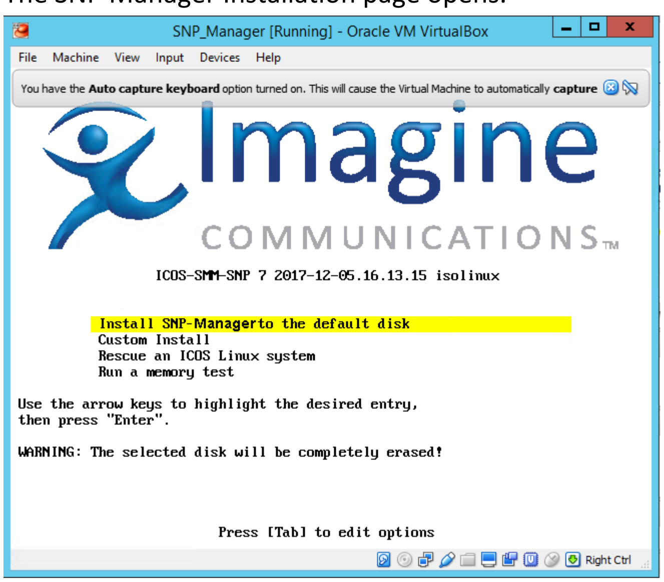
1. Select the Virtual Machine in VirtualBox manager and click **Start** from the ribbon bar at the top of the screen.

   The Virtual Machine launches.

2. In the **Select start-up disk** dialog, click the Folder icon to select the location of your ISO file, and click **Start**.



   The SNP Manager Installation page opens.



3. Select **Install SNP Manager to the default disk** and click **Enter**.

   The SNP Manager installation script runs on the screen.

   The script runs for a few minutes, and then displays "Installation complete" when successful.

The VM screen might go blank if the setup is left unattended for some time. Press any key to wake it up.

4. Press **Return** if prompted to do so on the Install script's screen.

The script cleans up and the Virtual Machine reboots.

When reboot is complete, a command prompt window opens with a login prompt.

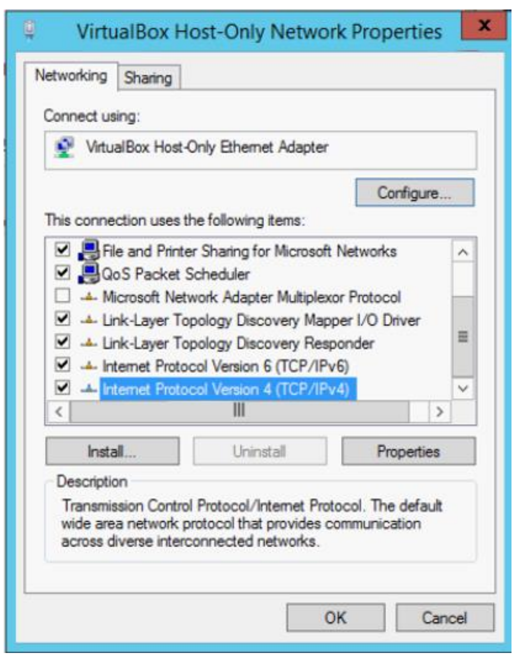
Configuring Host PC VirtualBox NIC

The default IP address for the SNP Manager is **192.168.1.11**. In order to reach the SNP Manager configuration UI, you need to make sure that the IP address of the VirtualBox host-only network adapter is on the same subnet as the default IP address of the SNP Manager VM.

The following steps describe how to accomplish the above on a Windows PC.

1. Choose **Start** > **Control Panel** > **Network and Sharing Center**.
2. Click **Change adapter settings** in the panel at the left of the screen.

   The **Network Connections** window opens.
3. Right-click **VirtualBox Host-Only Network** and select **Properties**.
4. In the **Properties** dialog, Select **TCP/IPv4 configuration**.



5. Configure the VirtualBox Host-only NIC IP address and subnet mask to the default settings:

   IP address: 192.168.1.20

   Subnet mask: 255.255.255.0
6. Click **OK** and exit the **Configuration** window.

At this point, if you open a Command Line window and ping the SNP Manager VM at its default IP, you should get a response.

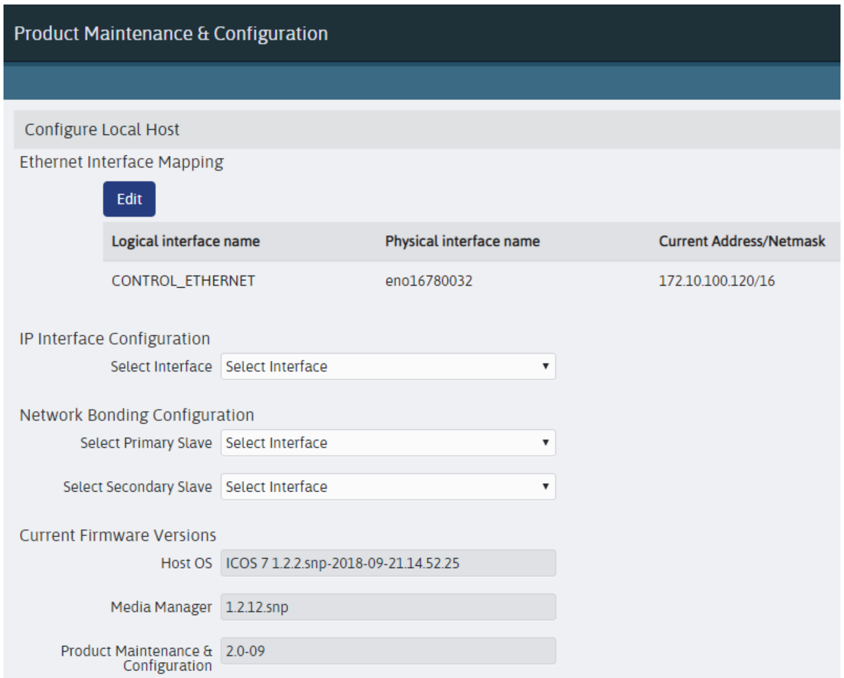
Customizing the Virtual Machine Control IP Address

The next portion of the SNP Manager configuration is done in a web browser.

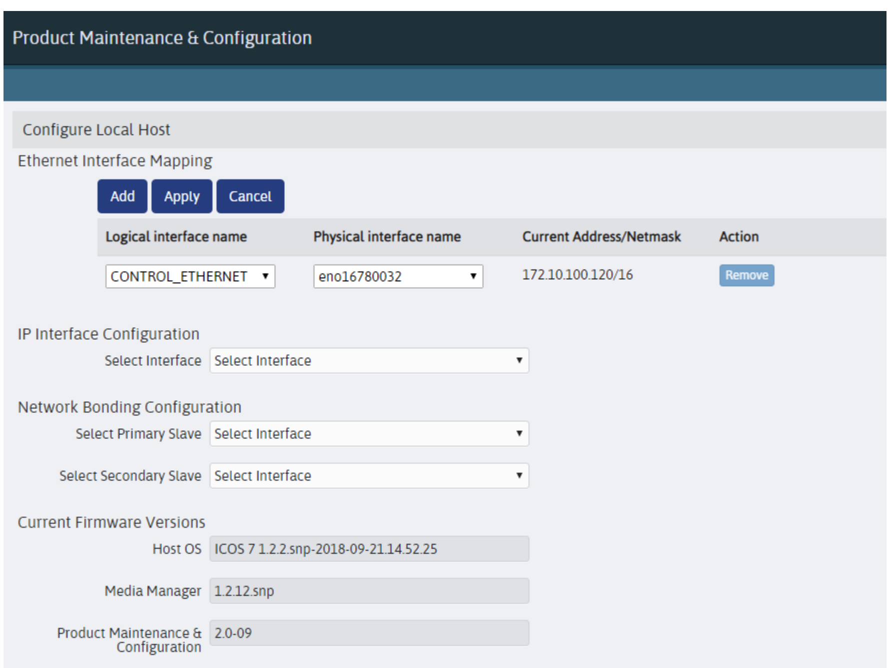
Note: When connecting to the SNP Manager, use Chrome or Firefox. Other browsers, such as Internet Explorer, Edge, or Safari, are not supported.

---

1. Open the SNP Manager VM configure page at **https://192.168.1.11/configure.**

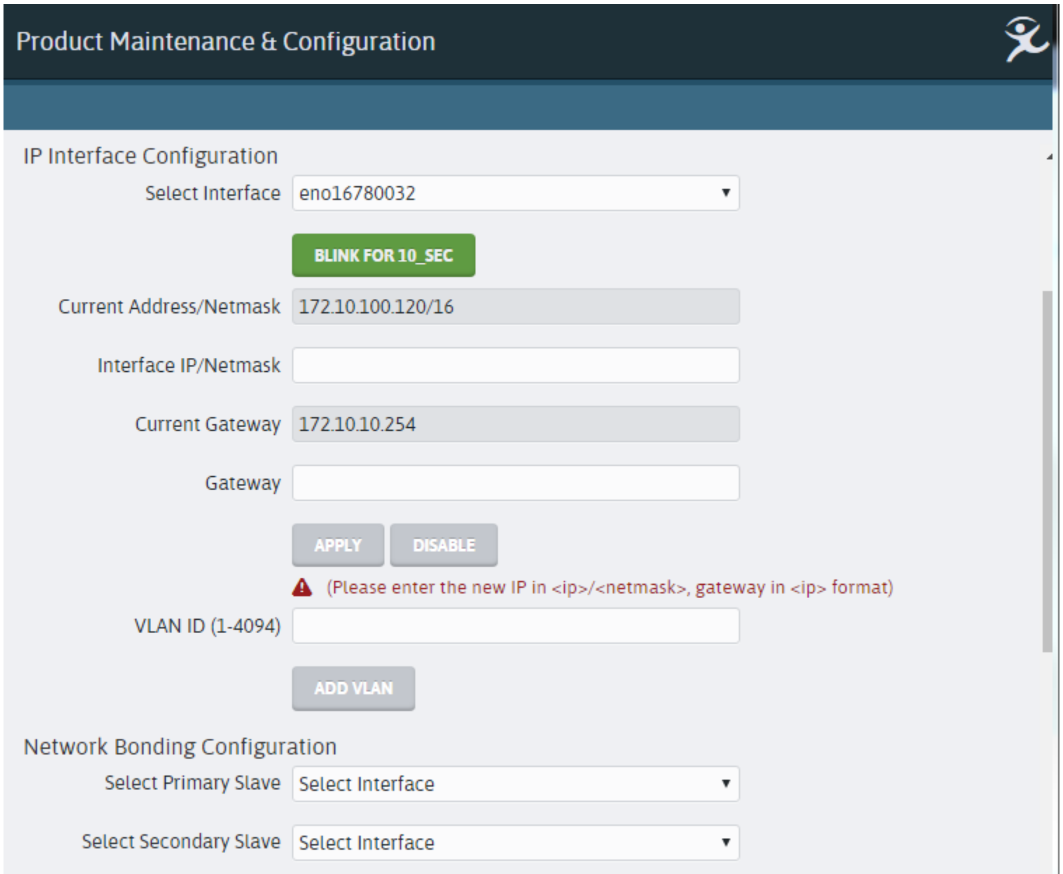


2. Click **Edit**.



3. Under **IP Interface Configuration**, choose "enp0s3" from the **Select Interface** menu.

   The screen updates with the following options:



4. Enter the following information:
   - Interface IP/Netmask (such as "172.25.2.43/15")
   - Gateway
5. Press **Apply.**

The GUI shows the message "IP Change Failed", but this is to be expected. The connection between the SNP Manager virtual machine and the web browser will be lost because the IP address has changed.

Reconfiguring SNP Manager VM Network Adapter to connect to the SNP network

1. Do one of the following:
   - (If the VM is still running) Select **Machine** > **Settings** from the menu in the VM window.
   - (If the VM is not running) In the VirtualBox Manager tool, select the SNP Manager VM and click Settings from the ribbon at the top of the screen.
2. In the panel at the left of the dialog box, select **Network**.
3. In the **Adapter 1** tab, under **Attached to:** select **Bridged Adapter**, and from the **Name** list, select the NIC card that the SNP uses to connect to the network.
4. Press **OK.**
5. Press **Start** again to restart the SNP Manager VM if it is not already running.
6. To test your connection, from a browser on a network computer, type the new IP address for the SNP Manager in the URL field.

   The SNP Manager login page opens. See Using the SNP Manager Interface (on page 62).

Your SNP Manager is ready to connect to SNP devices. See SNP Manager User Interface (on page 84).

Updating Remote SNP Manager

Note: When using SNP 3.0 or higher, you must use SNP Manager 3.0 or newer.

The following procedure is suitable for incremental upgrades. If you are upgrading from SNP 1.2 to 1.3, consult the SNP 1.3 release notes for the correct order of upgrading devices, and which procedures to use.

To update SNP Manager software, follow these steps:

1. Download the most up-to-date version of SNP Manager to your local machine.

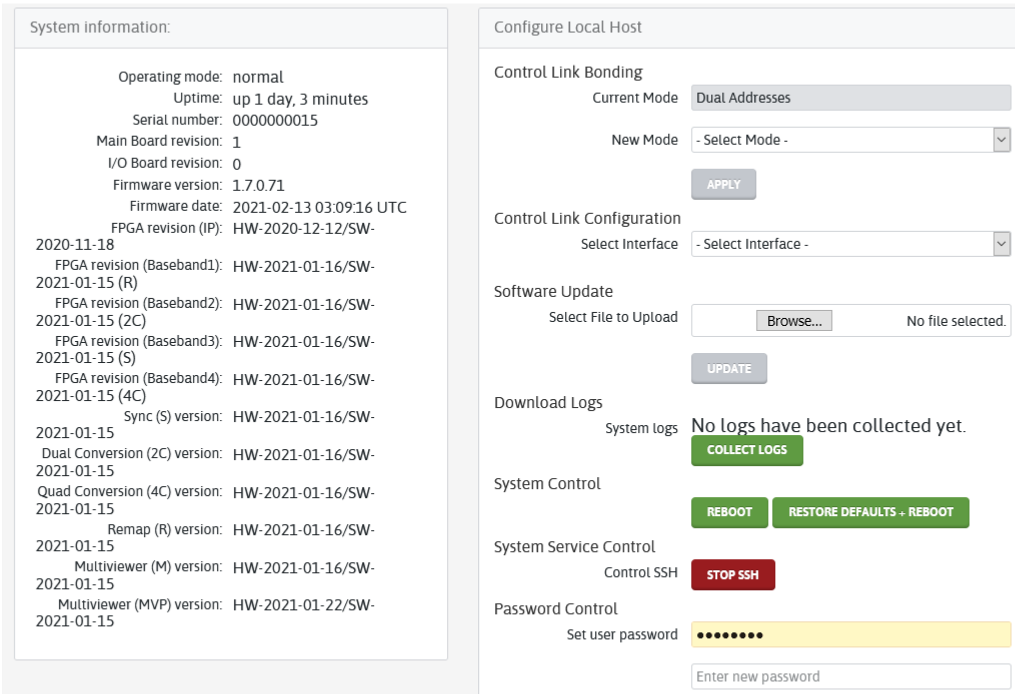
   The latest software version is always available on our website. See Support Contact Information (on page 3) for more information.

   The SNP Manager will have a name like: `SNP-Manager-1.3.0.15.snp.tar`
2. In your favorite browser, type the link as below in the URL field:

   `https://[your SNP Manager  IP]/configure/`

   Note: When connecting to the SNP Manager, use Chrome or Firefox. Other browsers, such as Internet Explorer, Edge, or Safari are not supported.
3. In the **Software Update** section, click **Browse**.

4. In the **File** dialog box, select the SNP Manager .tar file you downloaded



5. To install the software, click **UPDATE** to start the installation.

A progress bar appears. The update may take few minutes. When complete, a message indicates that the upgrade was successful.

Important! Before logging in to the SNP Manager again, you should clear your browser cache.

- To clear the browser cache in Chrome, press Ctrl+H to open the **History** page and select **Clear Browsing Data**. Ensure that **Cached Images and files** is selected, and then click the **Clear Browsing Data** button.
- To clear the browser cache in Firefox, from the main menu choose **Tools** > **Options** > **Privacy & Security**. Scroll down to **Cached Web Content** and click **Clear Now**.

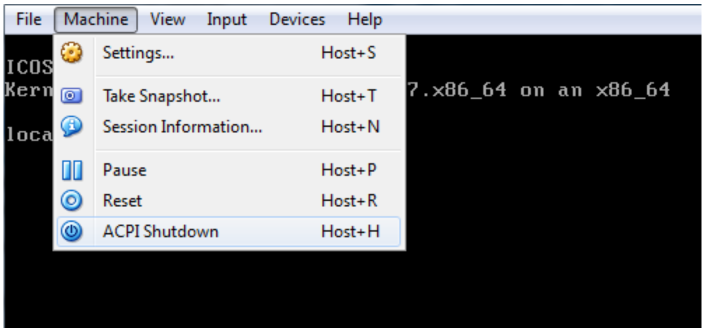
Check the **About** screen to see the SNP version. See About Screen (on page 66).

Recovering from an SNP Manager Upgrade Failure

In the unlikely event that your upgrade should fail, please contact Imagine Communications Customer Service. See Recovering from a Firmware Upgrade Failure.

Shutting down the SNP Manager VM

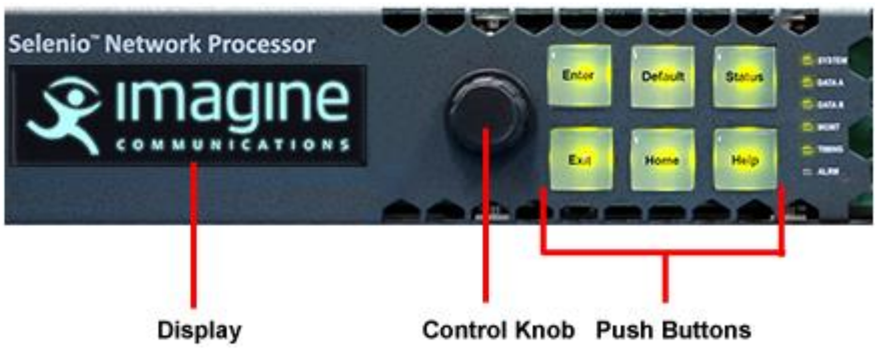
To shut down the SNP Manager VM while minimizing the risk of data loss or file system corruption, select **Machine** > **ACPI Shutdown** from the main menu.



Front Panel Controls

The SNP can be operated at the front control panel. Use the control knob and six buttons to navigate the parameter list and select levels, options, and value.

Many of the parameter order is described in Menu Layout, and descriptions can be found in Configuring an Element (on page 350) and Configuring Programs (on page 384).



Name	Function
Control knob	Turn the knob to see a listing of parameters or options at the selected level on the display.
Enter	Press to selects or "take" an option or value in a parameter.
Exit	Press to move from one level in the parameter tree to a higher level in the tree.
Default	When browsing the parameter list, this button flashes to indicate that a parameter is set to the default value. If a parameter is not at the default value, press and hold the Default button for more than one second to reset the parameter to its default value.
Home	For future use.
Status	For future use.
Help	When the front panel Menu is navigated to a parameter setting, press to display a description of the parameter.

SNP Manager User Interface

Note: You can close dialogs in the SNP Manager interface by pressing the ESC key on your keyboard. If there are changes on the dialog box, you need to confirm the decision. SNP will not just delete your changes without offering you one chance to save them.

- Add Menu (Remote SNP Manager Only) (on page 85)
- Configure Menu (on page 349)
- Views Menu (on page 87)

If you log into SNP Manager, you will see the following menus:

Add Menu (Remote SNP Manager Only)

The **Element** entry in this menu allows you to add and delete SNP devices on the Remote SNP's **Dashboard Overview** screen. See Dashboard Overview for Remote SNP Manager (on page 72).

"Element" in this case is a generic term that refers to an individual SNP device.

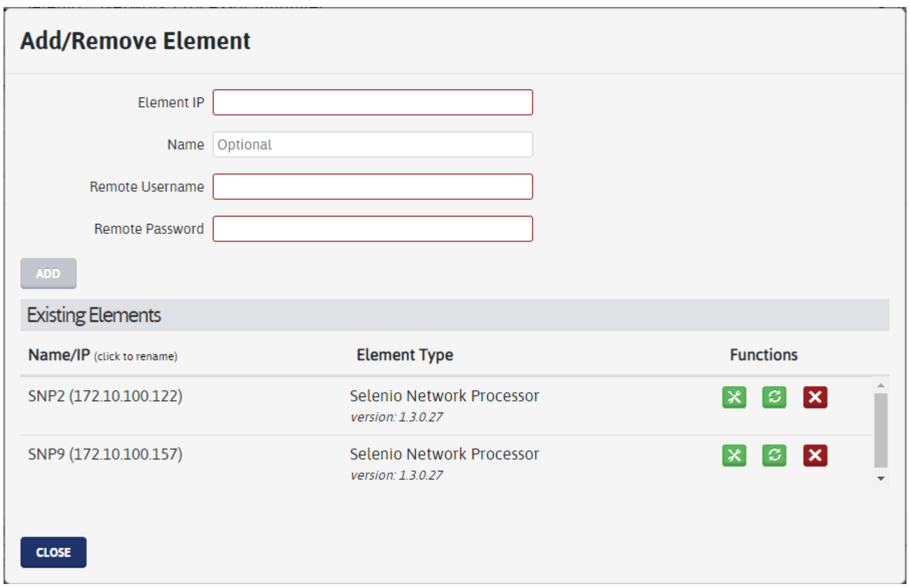
This menu only appears when you are using SNP Manager installed on a virtual machine.

Add Element

To add an SNP device (Element) into the Remote SNP Manager, follow these steps:

1. Click **Add** > **Element** from the ribbon at the top of the screen.

   The **Add/Remove Element** dialog box opens.



2. Enter the SNP IP address and an (optional but recommended) name for the device.

   Note: If you see a message indicating "Potential compatibility issues due to obsolete firmware revision", you need to upgrade your SNP to a newer revision, as described in Configure Local Host - Software Update (on page 95). See your release notes for version compatibility information.

3. Enter the Remote Username and Remote password.

   Use the following credentials:

   Username: snp

   Password: imagine01

   These are the **default system credentials for remote users**. You can also choose to edit the default credentials (change the password for instance) or create new ones. Note that Remote users are members of the **RemoteFmm** group on the local SNP (not the SNP Manager). Members of this group can only be added/removed/edited from a Local SNP Manager. See Group Permissions (on page 69) for more information.

4. Click **Add**.

Click the **Name/IP** field for an element to rename that element at any time.

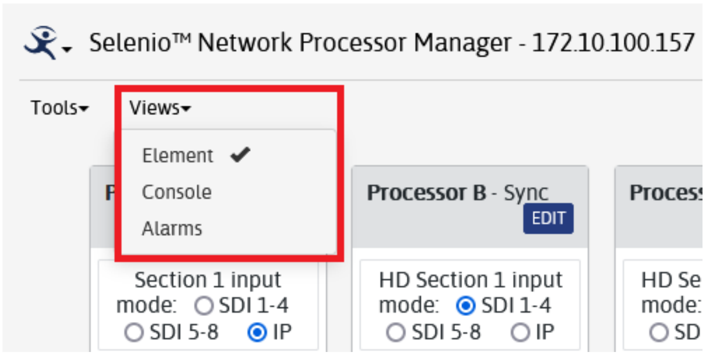
Three buttons are available for each element under the Functions heading. From left to right:

- **Configure Element**: Opens the **Configure Element** page for this particular SNP. See Configuring an Element (on page 350).
- **Reconnect to Element**: Renews the connection between an SNP and SNP Manager if it was cancelled due to the firmware on SNP becoming out-of-date.
- **Remove Element**: Removes this SNP from the Elements list.

For best results, monitor eight or fewer devices in a group.

Views Menu

The following options are displayed on clicking the Views menu:



In This Section

Element View (Dashboard)

When you log into SNP Manager running on a virtual machine, or when you select **View** > **Dashboard**, the first screen that will appear is the Dashboard Overview. See Dashboard Overview for Remote SNP Manager (on page 72). To select a device to control or monitor, click on that device on the dashboard.

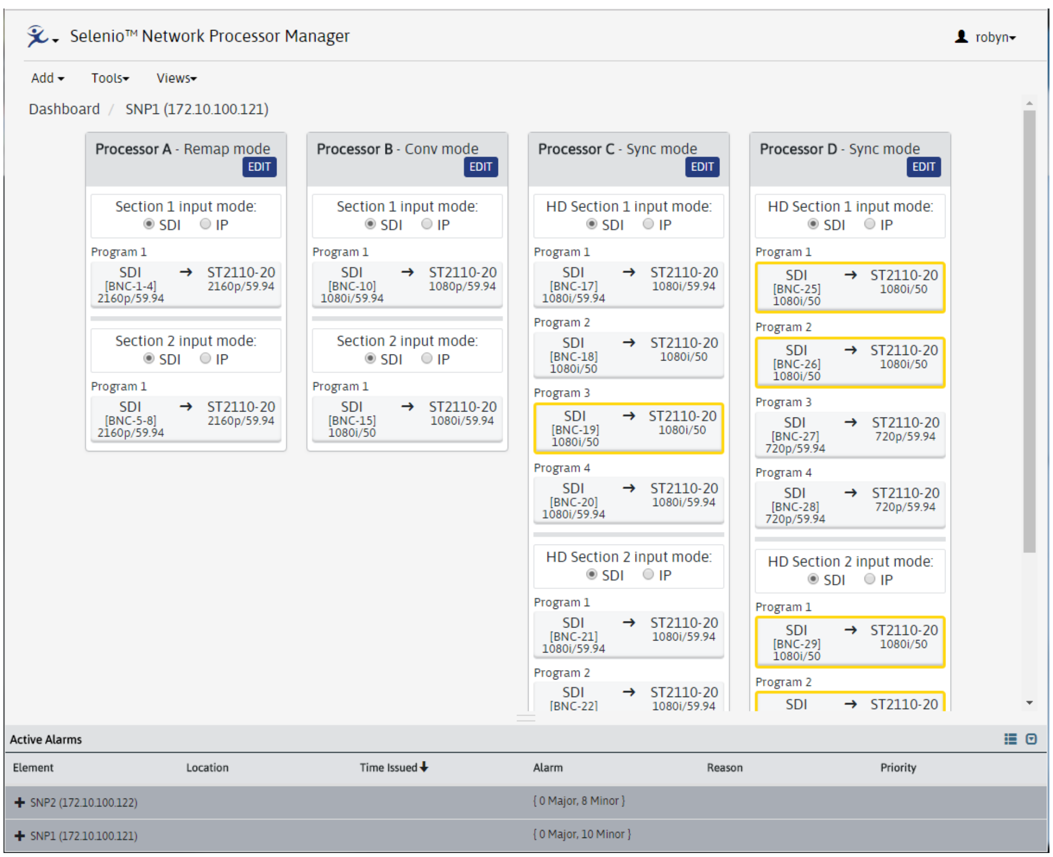
When you run SNP Manager from the local interface, selecting **View** > **Dashboard** loads the control interface for the local SNP device. See Controlling a Device (on page 88).

The **Active Alarms** banner at the bottom of the **Dashboard** screen can be expanded to view alarms for the device (local SNP Manager) or all connected devices (Remote SNP Manager). When the remote SNP Manager is in use, all alarms are identified by the element (device) that trigged them. See Active Alarms (on page 89).

When you navigate away from this screen, you can always return by selecting **Views** > **Element** from the main menu again.

Controlling a Device

When you click on an Element in the Dashboard of SNP Manager on a virtual machine, or when you load the local SNP Manager or select **Views** > **Dashboard** while already connected to that device, controls for that SNP appear.



Note: The above image shows SNP Manager running on a virtual machine, which is why there is an Add menu, and why the display shows the IP address of the device to be controlled or monitored.

When a program block is surrounded by a yellow box, that program block has at least one minor alarm in a triggered state.

When a program block is surrounded by a red box, that program block has at least one major alarm in a triggered state.

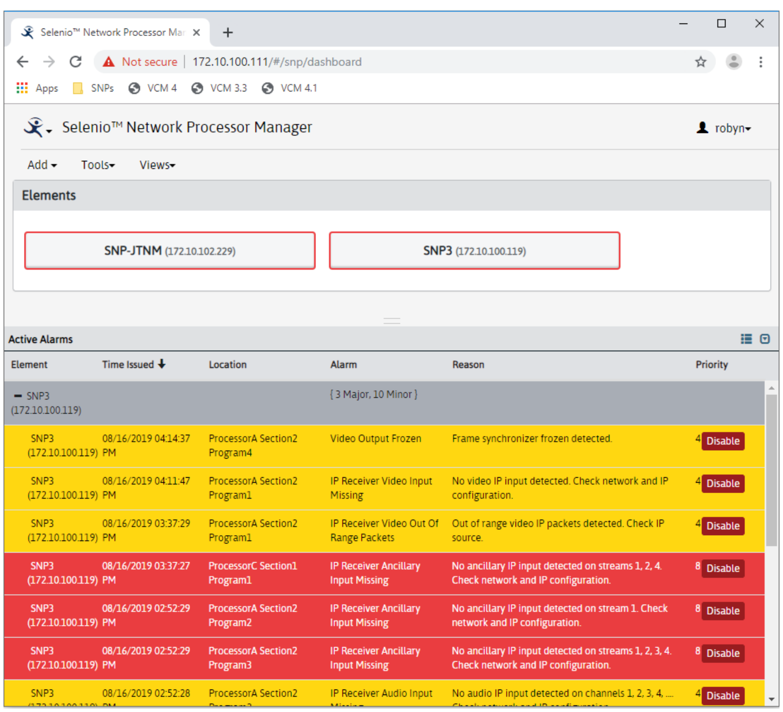
Each Processor block is divided into two sections with one (for UHD) or four (for HD) inputs (progams) that can be configured independently. Click a program to configure it. Controls are described in the following sections:

- Program Configuration: Input Tab (on page 385)
- Program Configuration: Video Tab (on page 404)
- Program Configuration: Audio Tab (on page 449)
- Program Configuration: Output Tab (on page 452)

Active Alarms

The Active Alarms panel at the bottom of the Dashboard allows viewing of active alarms for the monitored SNP device (local SNP Manager) or devices (remote SNP Manager). In a case where multiple devices are monitored from the same interface, devices are indicated in the Element column by their name and IP address on your network.

Each row in the table represents an alarm on a device. The row color indicates the severity of the alarm (yellow for minor, red for major).



The above figure displays the Active Alarms panel on a remote SNP Manager. When displayed on a local SNP Manager, there is no **Element** column.

 Open/close Active Alarms panel

 Group/ungroup elements (remote SNP Manager only)

When alarms are grouped by Element, all alarms for a particular SNP appear together. When they are not grouped, all alarms appear in a single list for sorting.

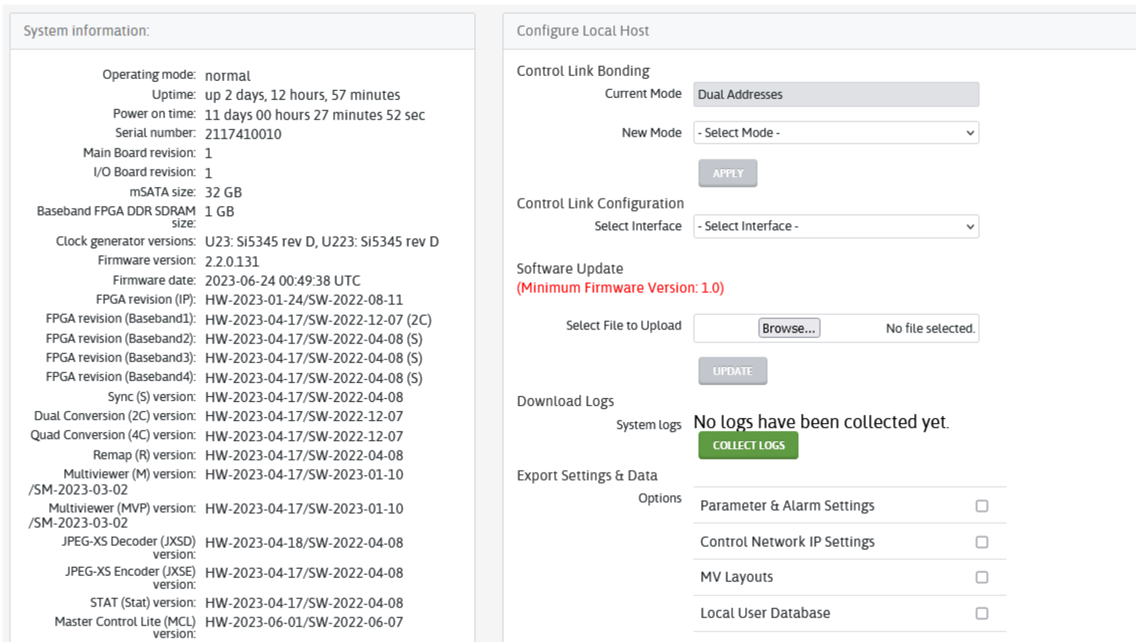
Resize the Active Alarms panel by grabbing the = in the middle of its upper edge with your mouse and dragging it up or down.

Note: When the logged-in user is in the Viewer group, the **Disable** button is not present.

The same alarm descriptions appear here as on the Active Alarms tab. See Alarms (on page 104).

Console

View > **Console** is only available when using the Local SNP Manager. It provides tools to upgrade device firmware, reboot, return to factory defaults, and download logs.



In This Section

System Information

Operating Mode	Displays "normal".
Uptime	Reports how long the system has been running
Power on time	
Serial number	This number is unique to this SNP device. It is required when requesting a License Key from Customer Service
Main Board revision	Displays the revision for the main board
Chassis Type	Displays classic or SNP-XL
I/O Board revision	Displays the revision for the I/O board
Rx I/O Board Revision	*(SNP-XL only)* Displays the revision for the Rx I/O board
Tx I/O Board Revision	*(SNP-XL only)* Displays the revision for the Tx I/O board
Expansion Board 1	*(SNP-XL only)* Displays if expansion board 1 is present
Expansion Board 2	*(SNP-XL only)* Displays if expansion board 2 is present
mSATA size	Displays the mSATA size. Applicable for SNPs shipping with 64 GB modules.
Baseband FPGA DDR SDRAM size	Displays the DDR SDRAM size. Rev Board 1 is 1 GB, Rev Board 2 is 2 GB.
Clock generator versions	Displays the clock generator version.
Firmware version	Displays the number associated with the software installed on the device
FPGA Revision (IP and Baseband)	
Sync (S) Version	Versions for different licensed features. Applicable depending on what is installed. You may be asked for information from this section of the screen when working with Imagine Communications Customer Service.
Dual Conversion (2C) Version	
Quad Conversion (4C) Version	
Remap (R) Revision Version	
Multiviewer (M) Version	
Multiviewer (MVP) Version	
JPEG-XS Encoder (TR-08) version	
JPEG-XS Decoder (TR-08) version	
STAT (Stat) version	

Master Control Lite (MCL) version	
JPEG-XS Encoder (TR-07) version	
JPEG-XS Decorder (TR-07) version	
JPEG-XS Encoder UHD (TR-07) version	
JPEG-XS Decorder UHD (TR-07) version	
Dual Gateway version	

CCSP Interface Documentation

System Information	Includes a link to the complete parameter tree and alarm list.
Processor	Includes a link to processor specific parameter status.
PTP Status	Includes a link to the PTP Status section and associated parameters.

Configure Local Host - Control Link Bonding and Configuration

Control Link Bonding

Current Mode	Indicates the currently selected control link mode.
New Mode	Choose one of the following: • Bonded Active/Backup (Default) • Bonded LACP - Uses Link Aggregation Control Protocol • Dual Addresses **Note:** You must click **Apply** for this change to take effect.

Control Link Configuration

Select Interface	Select which of the 1G Management Ethernet ports to use to connect to SNP Manager. • Control A • Control B If no selection is made, SNP will use the first one it finds a signal on.

Once you have made a selection, further information appears:

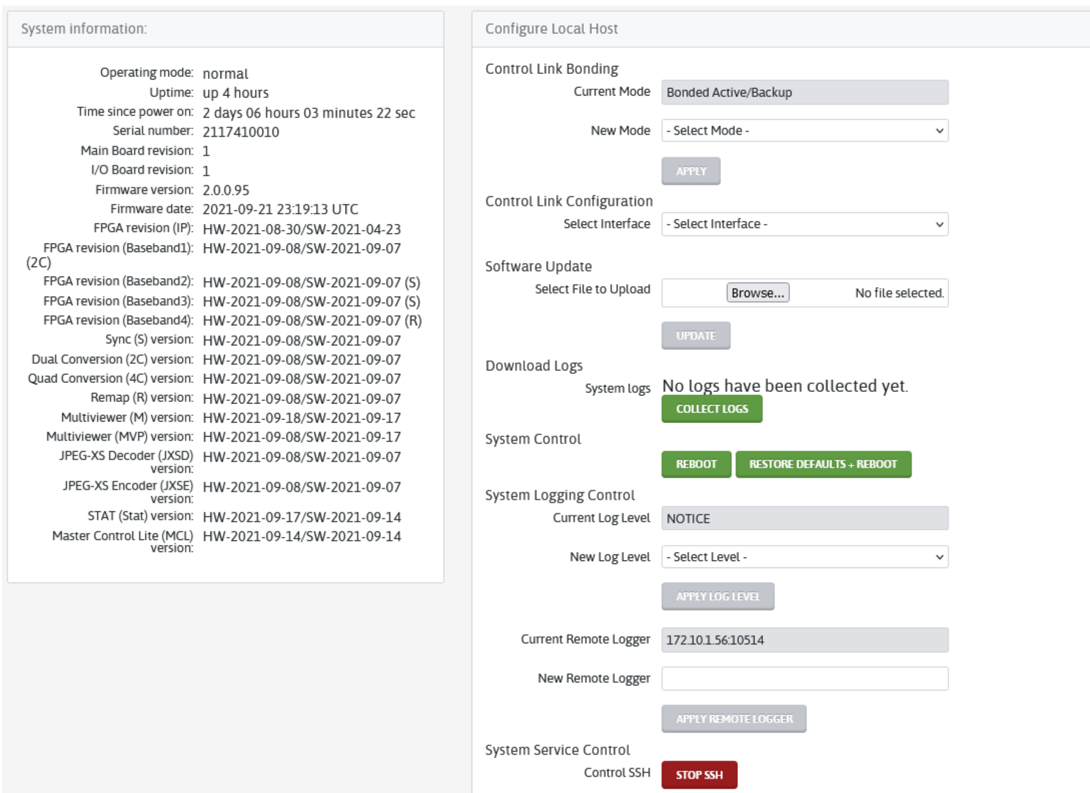
MAC	Displays the MAC address of the selected interface.
DHCP	See Using DHCP for the Control Interface (on page 466)
Current address	Displays the IP address of the selected interface.
Current netmask	Displays the mask of the selected interface.
Current gateway	Displays the gateway of the selected interface.
New address	Enter a new IP address for the device.
New netmask	Enter a new mask for the selected interface.
New gateway	Enter a new gateway for the selected interface.

Configure Local Host - Software Update

Note: When using SNP 3.0 or higher, you must use remote SNP Manager 3.0 or newer.

For SNP firmware upgrade, follow these steps:

1. In the Software Update section, browse to select an upgrade package, then click "**UPDATE**".



The whole upgrade takes about two minutes to copy files and six-eight minutes to reboot (depending on the configuration). Before the reboot happens, "Completed uploading firmware. Rebooting ..." will be displayed on the page. When the reboot is finished, the company logo will be replaced by the menu selection on the front panel display.

2. If remote SNP Manager lists this SNP as "not connected" on the **Add/Remove Element** page, click **Reconnect to element**. See Add Element (on page 85).
3. If a popup appears indicating that the system requires a reboot, click **Yes** to allow the reboot.

You may need to clear your browser cache to show the updated interface correctly.

Recovering from a Firmware Upgrade Failure

Failsafe mode supports upgrade and front panel configuration only. This mode does not support normal product functionality, just recovery. You cannot use SNP in failsafe mode.

1. To force the SNP into Failsafe mode, hold the **Enter** and **Status** buttons at the same time and toggle the **Power** button to the left of the display.

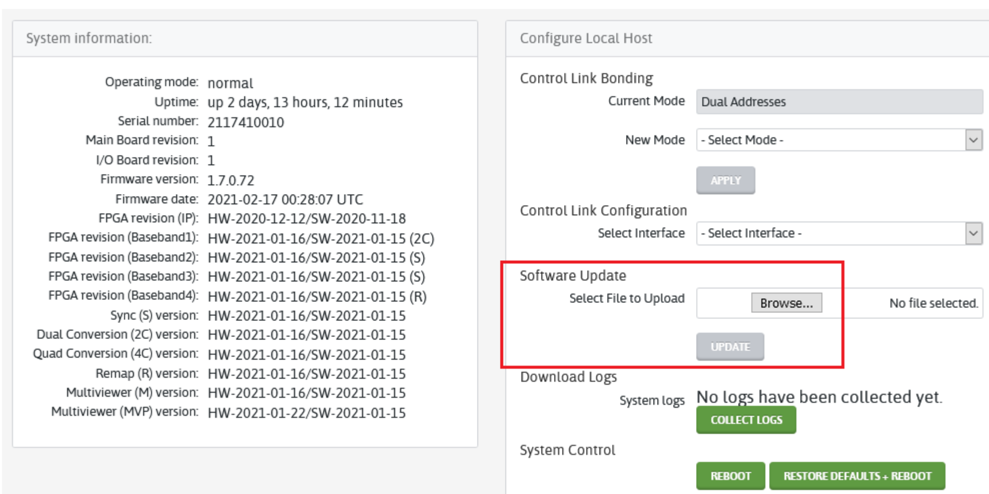
2. As the SNP reboots, continue pressing the **Enter** and **Status** buttons for approximately 20 seconds, until the display shows the Serial Number of the SNP and "Failsafe Mode" indicating Yes.

3. Press the **Exit** button, and scroll to the "Control Link A Config" menu and press the **Enter** button.

4. Verify that the IP Address of the SNP is correct, i.e. has not been reset to the default address of 192.168.100.250. If it has, then update the Control A IP Address. Make sure to Save the IP address update.

5. Now start a web browser and enter in the address bar:
http://<snp_control_A_ip_address>/uilocal/

NOTE: do not enter the IP address directly in the address bar since the browser may default to an https connection. The connection is http (no s). You should see the following Failsafe upgrade GUI page. Browse to a known good software upgrade package and press the UPDATE button.



6. Wait approximately 10 to 15 minutes for software to program the Flash devices in Failsafe mode. SNP will automatically reboot after the Flash devices have been programmed. After the reboot, wait another 8 minutes for the SNP to boot-up.

NOTE: that Preset files are erased during a Failsafe recovery, i.e. download Preset files to back them up before software upgrades.

Configure Local Host - Download Logs

The log file contains debug information in a .tgz file (can be opened by WinZip).

1. From the SNP Local interface, click **Views** > **Console**.

   Note: When connecting to SNP, use Chrome or Firefox. Other browsers, such as Internet Explorer, Edge, or Safari, are not supported.

2. Click the **Collect Logs** button to create a log file for download.
3. Click the SNP_logs_<IP Address>.tgz file to download the log, which can be unzipped for viewing.

To view logs for SNP Manager, see Configuring SNP Manager (Remote SMM only) (on page 383).

Configure Local Host - Export Settings & Data

This section contains settings for SNP configuration information that can be backed up prior to events such as replacing the mSATA disk.

Parameter & Alarm Settings	Select the checkbox beside the desired category to include in the exported file or select all items to include everthing.
Control Network IP Settings	
MV Layouts	
Local User Database	
HDR LUTs	
Saved Presets	
Status	This section either indicates that no data has been exported from this SNP OR it indicates time/data information for the last export.
Collect Settings & Data	Click this button to generate an exported .tgz file that contains all the selected settings. A link to the .tgz file is then displayed; click to save the exported file (saved to the Downloads folder on the local PC)

Configure Local Host - Import Settings & Data

This section contains settings for previously exported SNP configuration information to be restored on the SNP.

Parameter & Alarm Settings	Select the checkbox beside the desired category to include the selected or all items (from the exported file) to restore to the SNP.
Control Network IP Settings	
MV Layouts	
Local User Database	
HDR LUTs	
Saved Presets	
Status	This section either indicates that no data has been restored to this SNP OR it indicates time/data information for the last restore/import.

Apply Settings & Data + Reboot	Click this button to restore the desired configuration settings to the SNP. Note that on clicking **Apply Settings & Data + Reboot**, the imported settings for *Parameter & Alarm Settings*, *Local User Database*, and *Saved Presets* will wipe out and replace any settings you may currently have.

Configure Local Host - System Control

Reboot

The SNP cannot be rebooted through the SNP Manager. To reboot SNP remotely, follow these steps:

1. From the SNP Local interface, click **Views** > **Console**.
2. Click **Reboot**.

There is a reset button recessed on the SNP front panel. See Front Panel Controls (on page 83) for the location and usage of this button.

To do a hard reset of the SNP you can reboot the box through the **Power** button to the left of the display.

Restore Defaults + Reboot

On the SNP Console configuration page (**Views** > **Console**), click **Restore Defaults + Reboot** to return the SNP to its **factory default** settings.

Or on the front panel, navigate to the parameter to delete the previous user setting. The control path from the panel is S**ystem Information** > **System Control** > **Config Reset**. Set it to **Yes**. Then reboot the unit by selecting **System Control** > **Reboot**. Set this to **Yes** as well.

CAUTION

Using the **Restore Defaults + Reboot** option will:
- Wipe out all added users (leaving just the default Admin and RemoteFmm users)
- Delete all user stored LUT files
- Delete all presets
- Set all user-settings/parameters to **default** including the **IP WAN addresses/values**

Note that IP WAN settings are NOT stored in a preset, so please take note of these before performing a factory reset action.

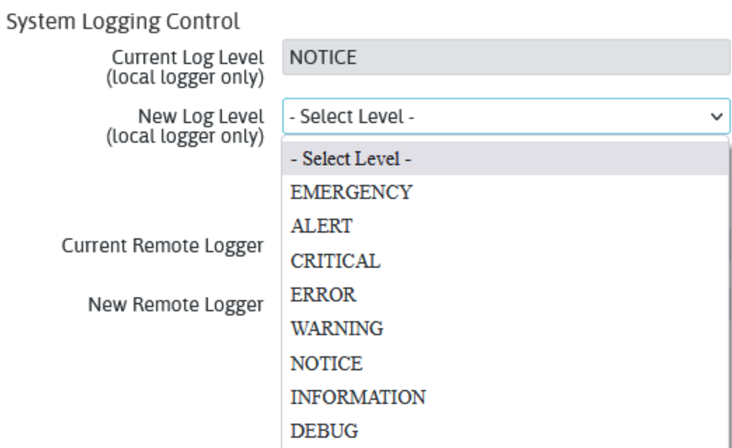
If restoring defaults is not enough, to return the SNP to factory defaults, boot into failsafe mode and click the "Factory Reset" button.

Configure Local Host - System Logging Control

The SNP's firmware is instrumented with messages to indicate various conditions that may occur. System logging level controls are used to filter the type of messages logged and stored in the SNP's file system, and log messages are tagged with a severity level.

Note: There is limited space allocated in the SNP's file system for logs. Once the storage limit has been reached the oldest logs are deleted.

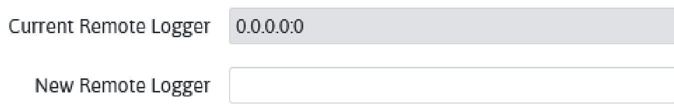
The **New Log Level** parameter lets you select a level, which is then reflected in the **Current Log Level**. The log level from lowest level (or highest severity) of EMERGENCY to the highest level (lowest severity) of DEBUG, determines the amount of details that are logged.



Note: It is recommended you only change these settings under Imagine Support supervision.

Level	Description	Log Data Generated
Debug	This is the highest logging level, use for the lowest severity	A log level of DEBUG generates the highest amount of logger data. These two levels should be used for system debugging only and should be used sparingly under the advice of Customer Service.
Information	Use for Informational messages	
Notice	The default log level	Generates a modest amount of logger data
Warning	Use for warning conditions	
Error	Use for error conditions	
Critical	Use for critical conditions	
Alert	Use for alerts that require immediate action	
Emergency	This is the lowest logging level, use for highest severity	A log level of EMERGENCY should generate no logger data, unless something goes wrong

Remote Logging



You can also choose to use a Remote Syslog Server.
Enter its IP address in the **New Remote Logger** field in the following format:

```
<IP address>:<port>
```

Note: The remote logger will receive messages of all levels or severity without any filtering by the SNP regardless of the log level selected for the local logger. Do not use this option unless you really need it. If using, be mindful of the number of devices you use it on. For example, debug log messages northbound from 100 frames could result in significant network traffic.

Configure Local Host - System Service Control

The SSH server is enabled by default. It is primarily used when Imagine Communications Customer Service needs to access a device. When SSH is running, an external user can enter the user password set in Configure Local Host - Password Control (on page 103) to control and monitor the SNP.

Note: If any connection issues are seen with the client software, (for example, "unknown KEX algorithm"), upgrade your client software to its most recently released version.

To stop SSH, click the **Stop SSH** button.

UDP/TCP Ports

The following public ports are used by SNP:

Port	Type	Usage	Reason
22	TCP	SSH	For customer service
53	UDP/TCP	DNS	Domain Name Service
67-68	UDP/TCP	DHCP	Dynamic Host Configuration Protocol
80	TCP	HTTP	Redirected to https 443 port
443	TCP	HTTPS	User interface control
943	TCP	Policy Server	For Magellan Panel Access Control
4050	UDP	CCSP Server	CCSP control interface
4517	TCP	CCSP Server	CCSP control interface
5353	UDP	mDNS	Multicast DNS
8100	TCP	NMOS Node API	AMWA NMOS IS-04 Node API for 3rd party tool SNP management
9078	TCP	SNP Manager	For remote SNP manager (FMA)
9089	TCP	SNP Manager	User interface control (SMM)
29100	TCP	SEAM Protocol	Magellan Control System communication
31000	TCP	IconMaster Protocol	MCL Icon Master Protocol for Processor A Channel 1
31001	TCP	IconMaster Protocol	MCL Icon Master Protocol for Processor A Channel 2
31002	TCP	IconMaster Protocol	MCL Icon Master Protocol for Processor B Channel 1
31003	TCP	IconMaster Protocol	MCL Icon Master Protocol for Processor B Channel 2
31004	TCP	IconMaster Protocol	MCL Icon Master Protocol for Processor C Channel 1
31005	TCP	IconMaster Protocol	MCL Icon Master Protocol for Processor C Channel 2
31006	TCP	IconMaster Protocol	MCL Icon Master Protocol for Processor D Channel 1
31007	TCP	IconMaster Protocol	MCL Icon Master Protocol for Processor D Channel 2
50000	TCP	LD Gateway	Layout Designer Control Interface

Note: If any additional ports are opened after deployment/installation, they should be closed immediately after use.

Configure Local Host - Password Control

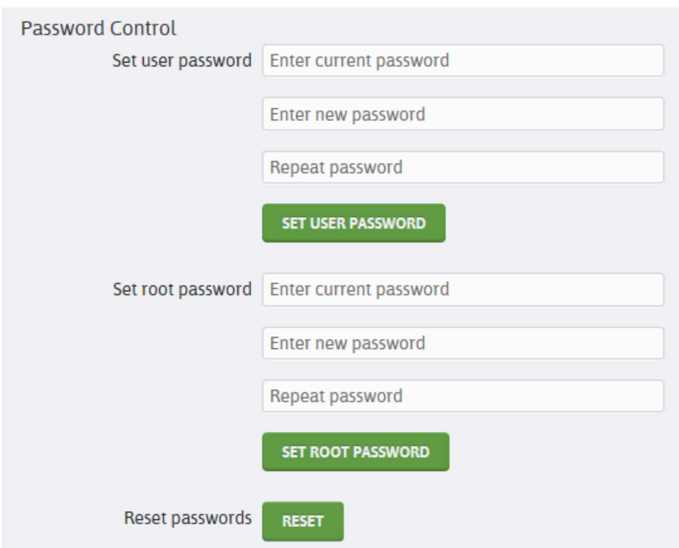
It is strongly recommended that you change the default passwords before connecting your SNP to any other devices.

Note: Only a user logged in as Administrator on the device can set and reset passwords.

The User password configurable on on this page provides access to the System Shell by SSH. From there, you can type SD<space><dash><rootpassword> to enter the root.

To change the default User or Root account password, follow these steps:

1. In local SNP Manager, select **Views** > **Console.**
2. Enter the current password (once) and the new password (twice) in the designated fields for the password you want to change.



The default login account is: Username = user
Password = imagine01

The root account is: Username = root
Password = imagine01

3. Click the appropriate **Set Password** button.

Note: you can’t login as root over SSH, only as "user".

If you forget the User and Root passwords, click **Reset** to set them back to the default (listed above). After reverting to the default, you should change both passwords to something stronger immediately.

For best results, use strong passwords for individual user accounts as well. See User and Group Management (on page 67) for more information.

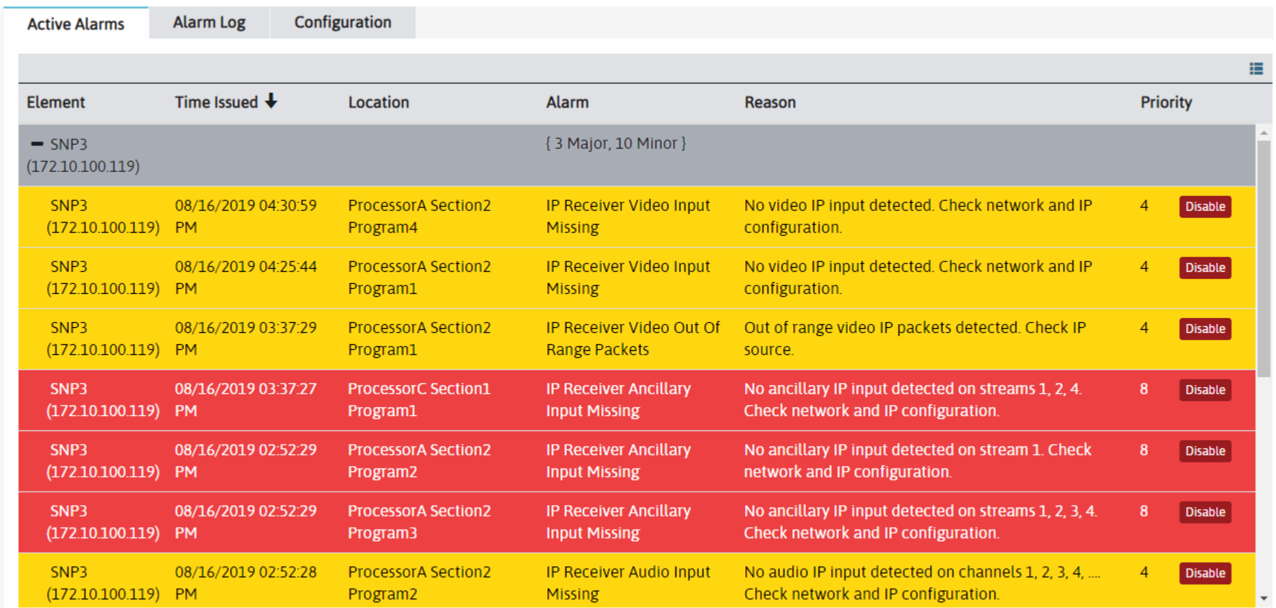
Alarms

The Alarms View provides details on alarms, and is divided into 3 tabs:

- Active Alarms (on page 104)
- Alarm Log (on page 105)
- Configuration (on page 106)

Active Alarms

The **Active Alarms** tab groups and displays all alarms for a given Element, and you can expand or collapse the view.



Details are provided on the Type of the alarm, the Time, Reason, and Priority.

Element	SNP device that originated the alarm Note: This column only appears when monitoring via remote SNP.
Time Issued	When the alarm originated
Location	The location of the alarm within the device, which will be one of the following: Processor_Section_ Program_ (where the specific processor letter, section number, and program number are defined) System/Subsystem (for system-level alarms)
Alarm	The name of the alarm
Reason	Why the alarm was triggered

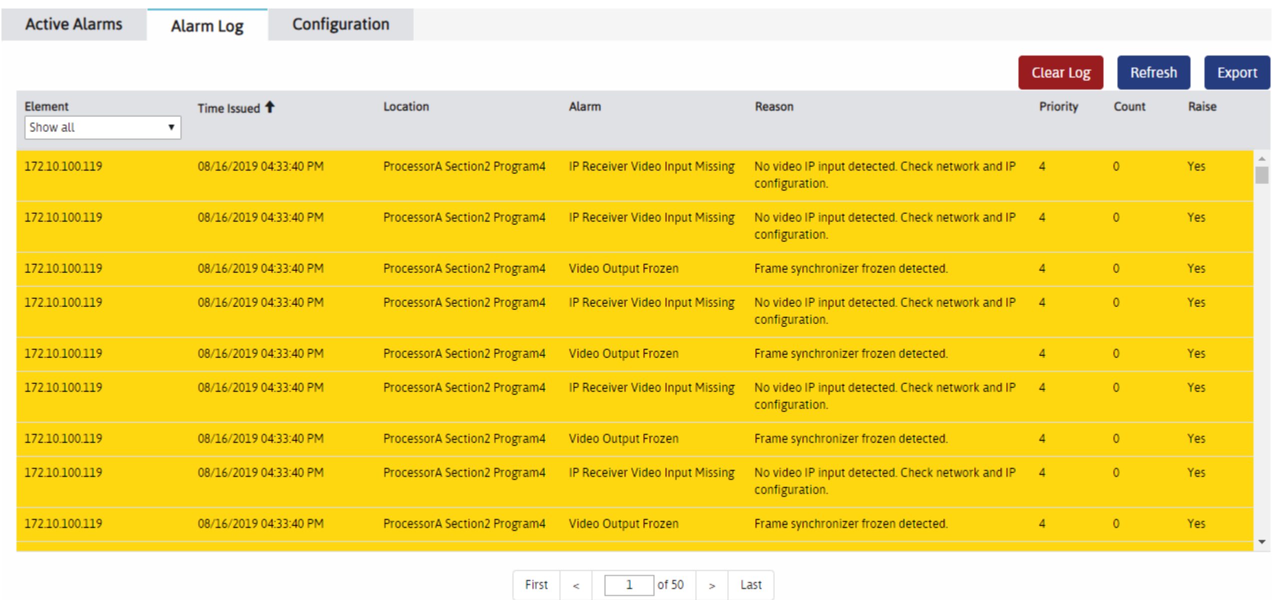
Priority	1-4 is a minor alarm; 5-10 is a major alarm
Disable	Disable/enable an alarm directly from the Active Alarm overlay.This button does not appear when a user is assigned to the Viewers group.

Click on a column header to sort by that column.

Alarm Log

The **Alarm Log** tab lets you view a log or all alarms, clear that log, refresh it, or export it as a CSV file. In addition to the alarm details that are listed on the Active Alarms tab, the Alarm Log also displays the following statistics:

- **Count**: How many times the alarm has triggered
- **Raise**: When the state is **Yes**, the alarm has been triggered, when the state is **No** the alarm has been cleared

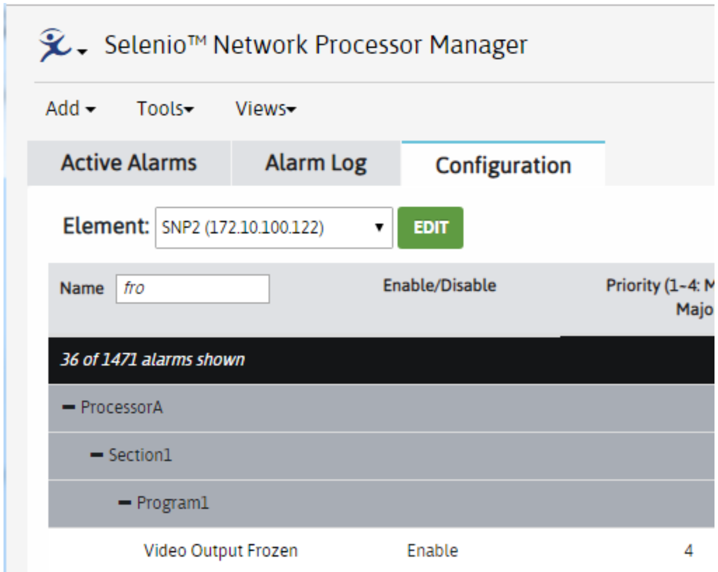


When using a remote SNP Manager, you can select an Element from a drop down list, or view alarms for all devices assigned to the remote SNP Manager. The **Element** column and drop-down menu do not appear on local SNP Manager.

Configuration

The **Configuration** tab lets you edit details for alarms.

1. (If you are using remote SNP Manager only): On the Configuration tab's **Element** drop-down list, select a device.



2. Click **Edit**.

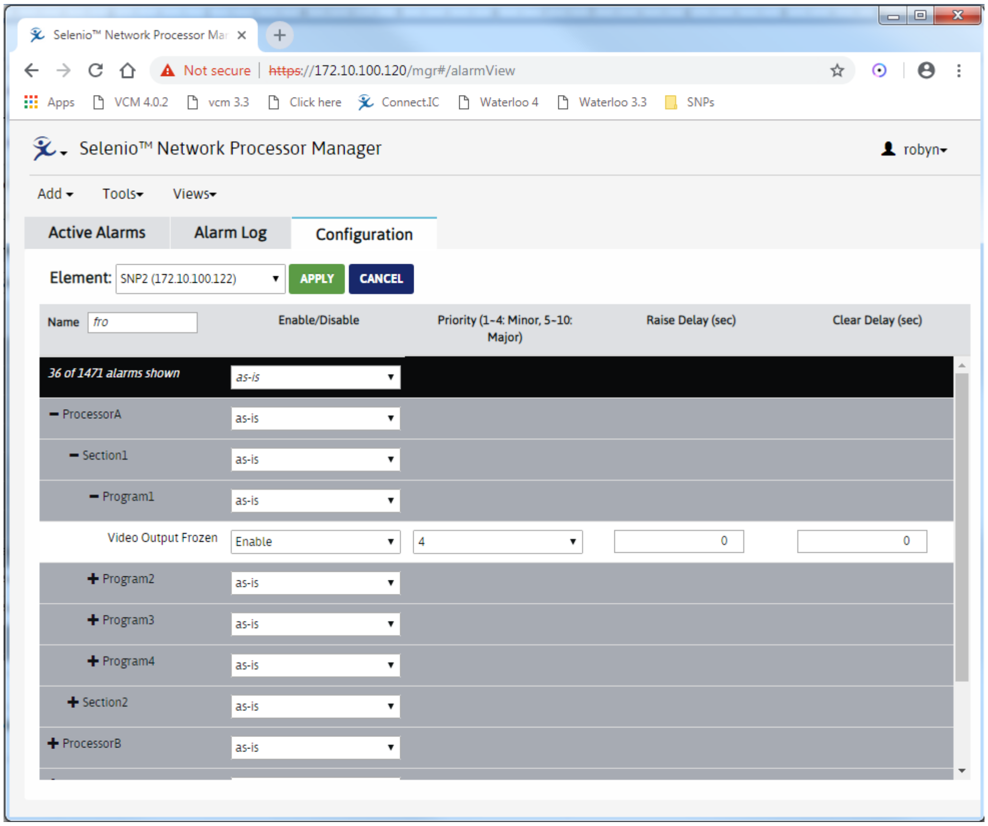
   This button turns the informational fields in the columns to the right of the alarm names into drop-down menus or fillable boxes so you can modify the alarms' thresholds.

3. Click the **+** beside a **Processor** to see the **Programs** within it.

   Using the menu beside each Processor, you can **Enable** or **Disable** all alarms for that processor.

4. Click the **+** beside a **Program** to see all the alarms for that processor.

Using the menu beside each Program, you can **Enable** or **Disable** all alarms for that Program.



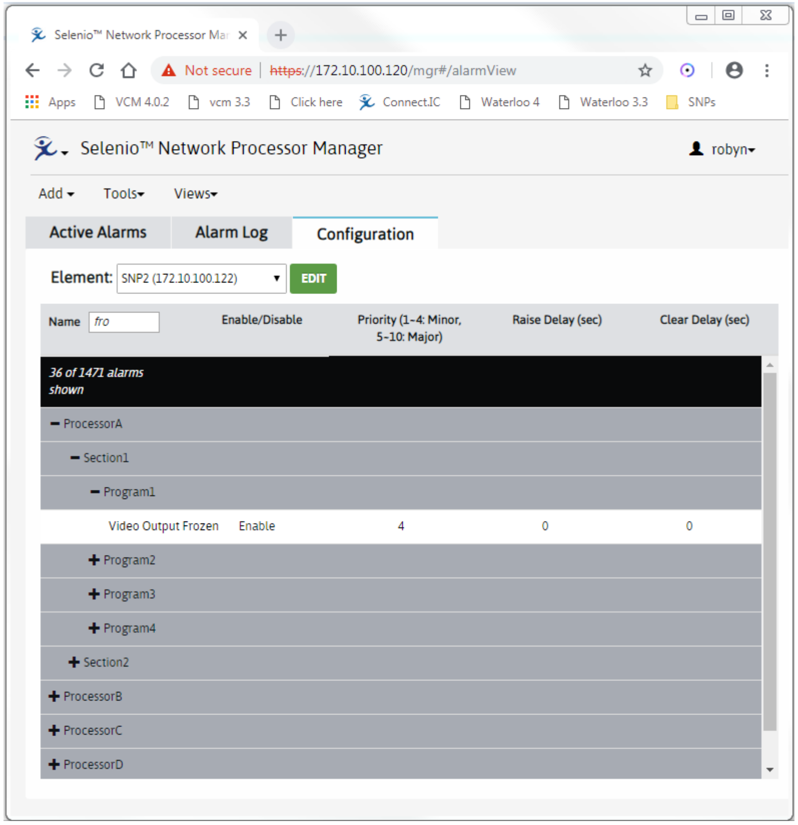
Name	The title of the alarm ***Note:*** *the box to the right of the alarm column header is a filter. Enter text here and the alarms displayed will be limited to only alarms whose name contains the text you have entered. You have to enter three letters minimum.*
Enable/Disable	When an alarm is listed in **Enable** state here, that alarm will trigger when its other conditions are met. In **Disable** state, the alarm will not trigger.
Priority	You can set each alarm a priority from 1 - 10. The • Minor: Priority 1 - 4 • Major: Priority 5 - 10 All alarms have a default priority of 4 (minor).
Raise Delay	How many seconds the alarm conditions must exist before the alarm is triggered. All alarms have a default raise delay of 0 seconds.
Clear Delay	How many seconds the alarm conditions must not be present for before an alarm deactivates. All alarms have a default clear delay of 0 seconds.

Below the Processors, you can access the hardware/device specific alarms by clicking the **+** beside **System**. Alarms in this section are divided in to **Fan**, IP, **Power_Supply**, **QSFP**, **Reference**, and **Temperature**. Click the **+** beside the aspect of the device you want to view or modify to see those selections.

Overall device alarms (for example **Connection loss to Element**) appear at the bottom of the list.

Alarm Filtering

Enter text in the Name field to display only alarms that contain that text. Enter a minimum of three letters to trigger the filter.



Alarms will still be nested within their programs, etc.

List of Alarms

By default all alarms are enabled.

Location		Alarm Name	Reason
+Processor (A/B/C/D) **+Section (1/2)** **+Program (1/2/3/4)**		***Note:*** *Click the + to view the sections and programs associated with that processor.*	
		Audio DMB Grp (1-4) Checksum Error	A checksum (CRC) error is detected in the specified input embedded audio group
		Audio DMB Grp (1-4) DBN Error	Invalid DBN is detected in the input embedded audio group
		Audio DMB Grp (1-4) ECC Error	ECC error(s) are detected in the input embedded audio group
		Audio DMB Grp (1-4) Missing	No input is detected for the specified input embedded audio group
		Audio DMB Grp (1-4) Parity Error	Parity error(s) are detected in the input embedded audio group
		Audio EMB Grp (1-4) Append Error	Append errors are detected in the specified embedded audio group output
		Audio EMB Grp (1-4) Overwrite Error	Overwrite errors are detected in the specified embedded audio group output
		Audio Format Incompatible	One or more connected audio inputs are non-PCM coming in but are sending out as ST2110-30
		IP Receiver Ancillary Input Missing	No ancillary IP input is detected on the specified streams (lists the streams with this error); check network and IP configuration
		IP Receiver Ancillary Missing Packets	Missing ancillary IP packets detected on streams(s) N,... Check IP source
		IP Receiver Ancillary Out of Range packets	Out of range ancillary IP Packets detected on stream(s) n, ... Check IP source
		IP Receiver Ancillary Seamless Protection Missing	Either primary or secondary seamless protection IP input is missing on the specified ancillary streams (lists the streams with this error)
		IP Receiver Ancillary Switch Error	IP input switching error is detected on the specified ancillary streams (lists the streams with this error)
		IP Receiver Audio Input Missing	No audio IP input is detected on the specified channel (lists the first four streams with this error); check network and IP configuration
		IP Receiver Audio Missing	Missing audio IP packets detected on streams(s)

		Packets	N,... Check IP source
		IP Receiver Audio Out of Range packets	Out of range audio IP Packets detected on stream(s) n, ... Check IP source
		IP Receiver Audio Seamless Protection Missing	Either primary or secondary audio seamless protection IP input is missing on the specified ancillary streams (lists the first four streams with this error)
		IP Receiver Audio Switch Error	IP input switching error is detected on the specified audio streams (lists the first four streams with this error)
		IP Receiver Video Input missing	No video IP input is detected. Check network and IP configuration
		IP Receiver Video Missing Packets	Missing video IP packets detected. Check IP source
		IP Receiver Video Out of Range packets	Out of range video IP Packets detected. Check IP source
		IP Receiver Video Seamless Protection Missing	Either primary or secondary video seamless protection IP input is missing
		IP Receiver Video Switch Error	Video IP input switching error has been detected; the cause for this alarm may be listed
		Video Input Lost	No SDI video input is detected; check BNC signals and connections
		Video Output Frozen	Invalid SDI or IP video output is detected; check video source
+System			
	+Calibration		
		FPGA Calibration Failure	FPGA failed to calibrate
	+Fan		
		BB(1-4) FPGA Fan Failure	Fan failure detected on the specified baseband FPGA on the main board
		Front Panel Fan (1-4) Failure	Fan failure detected on the specified front panel fan
		IP FPGA Fan Failure	Fan failure detected on the IP FPGA
	+Internal		
		License Server Not Responding	Internal license server is not responding, system reboot is required
	+IP		
		Playout Delay Too Low	IP Rx playout delay configured below the recommended minimum
		Receiver Bandwidth Exceeded	Total bandwidth for all receivers exceeds the

			maximum
	+Power Supply		
		Power Supply (A-B) Failure	Power supply failure detected
		Power Supply Fan Failure	Power supply fan failure detected
	+QSFP		
		QSFP (A-B) Data Not Valid	Invalid module data detected for the specified QSFP; check QSFP module
		QSFP (A-B) Low Input Power Alarm	Low input power on lane(s) on specified QSFP; check QSFP signals and connections
		QSFP (A-B) Not Present	No module detected for specified QSFP; insert QSFP module
	+Reference		
		PTP Not Locked	The PTP clock is not locked to master. Check network and PTP configuration
	+SFP		
		SFP (A/B/C/D) Part Mismatch	The detected SFP does not indicate the same ID as the SFP selected in the GUI
	+Temperature		
		BB(1-4) FPGA Temperature Alarm	The temperature is out of the expected range on the specified baseband FPGA
		IP FPGA Temperature Alarm	The temperature is out of the expected range for the IP FPGA
		QSFP (A-B) Temperature Alarm	Temperature is out of expected range on specified QSFP module
Cannot login		Only appears for remote SNP Manager. Indicates that the remote SNP Manager cannot login to the SNP specified at the top of the screen.	
Connection Loss to element		Only appears for remote SNP Manager, indicates that connection has been lost to the SNP selected at the top of the screen. ***Note:*** *Element that is selected at the top of the dialog box.*	

Configuring Processors

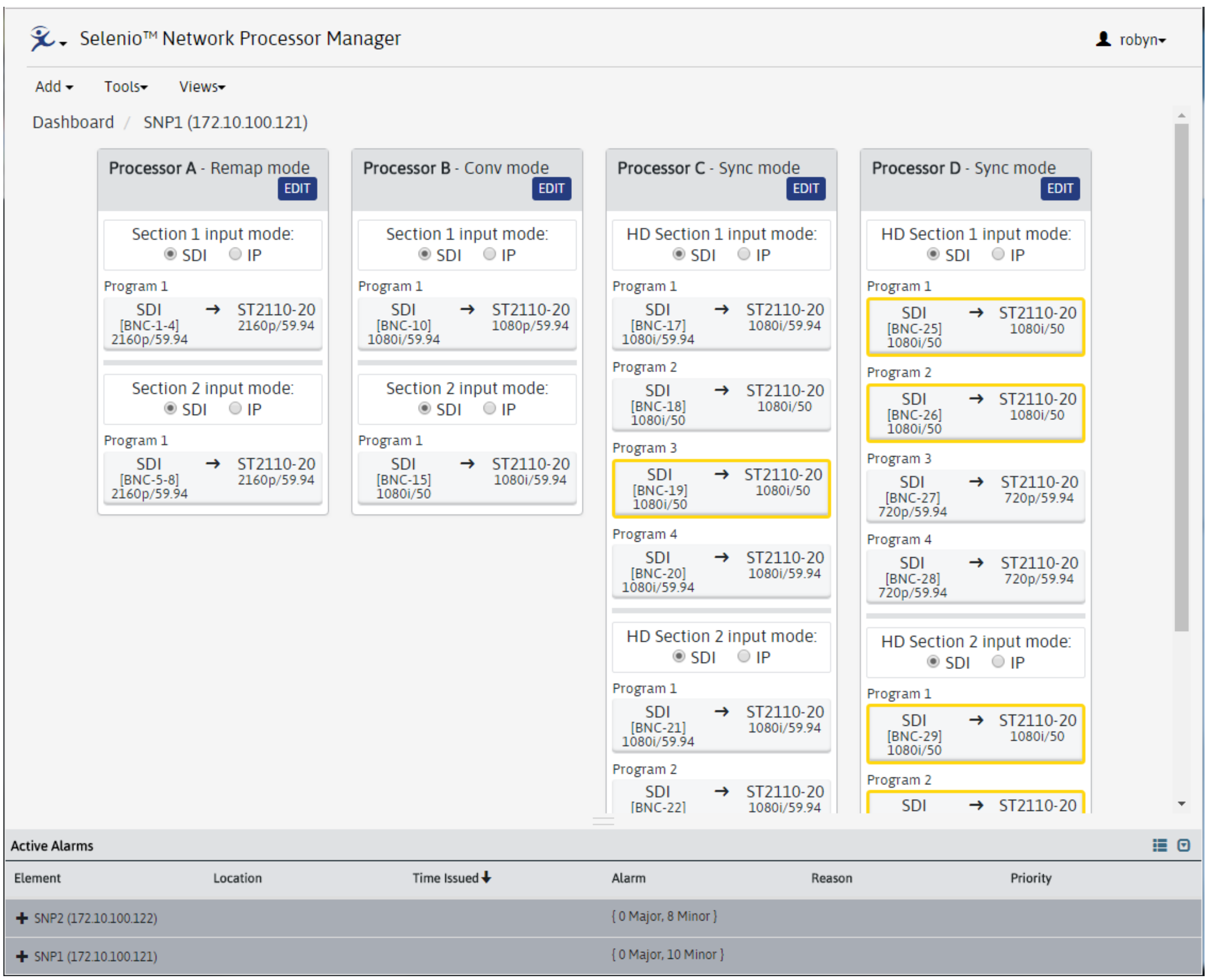
The SNP configuration page has four Processor groups: A, B, C, and D. Each processor can be configured with one of six personalities.

See Assigning a Personality to a Processor (on page 117) for more information.

Note: When using an SNP-GW-3GX32 equipped with standard front panel, if only two conversion personalities are needed, for best results use Processors C and D (instead of A and B) to achieve a more balanced temperature distribution among the four processors.

Each processor can be configured for low latency mode. See Configuring for Low Latency Mode.

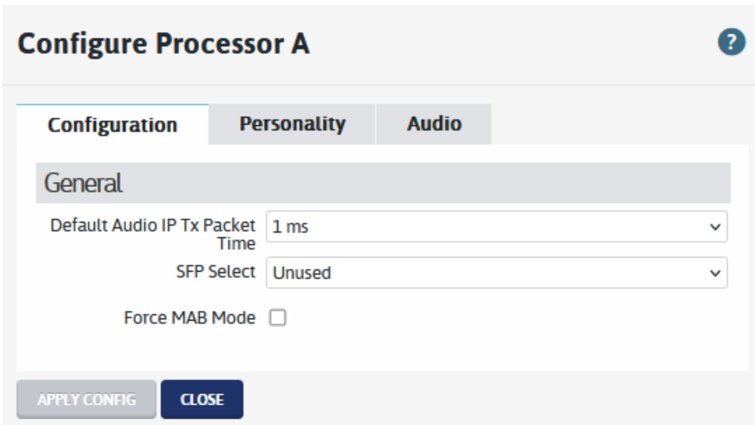
Each processor has two Sections. BNCs for each Section can be assigned with different direction to achieve SDI->IP or IP->SDI transmit with the radio buttons on the Dashboard.



Note: When in 2022-6 mode, due to a bandwidth routing limitation, do not configure more than six channels in a Processor to receive at 1080p/50 or 1080p/59, or the switch mode will revert to Make After Break mode resulting in non-clean switches.

Configuring a Processor

Depending on the mode the processor is set to, the Configuration tab will have different options. For example, when in Sync, Remap, or Conversion mode, the Configuration tab for each processor will appear similar to the following:



Low Latency Mode	**Note: Low Latency Mode is only supported on Sync and JPEG-XS (TR-07 and TR-08) personalities. The system must be synchronous (locked to the same PTP).** This mode improves the system latency for the sync personality by not realigning to reference. Low Latency mode is available for both the SDI to IP Transmit path and the IP Receive to SDI path and is applied to the entire processor. When a processor is configured for Remap personality, low latency setting has no effect. When an output is configured for SDI, don't enable Low Latency unless it is connected to a downstream device that will re-align the signal to a timing reference. When low-latency is enabled, other "delay" controls become unavailable: • Frame delay • H (horizontal) phase • V (vertical) phase • Channel delay (found in the **Audio** tab) *Note: When using the AAP, A/V timing is not achieved since the AAP codecs add latency to the audio path, and video frames are not delayed to compensate for any DSP delays. By design, there is minimum latency in low latency mode.*

Default IP Audio Tx Packet Time	Allows selection per processor. Options are: • 1 ms • 125 us • 500 ms Since 125us and 500us uses more bandwidth than 1ms, it is recommended only to use 125us/500us when combining audio transmitter in 4 to 16-channel configurations. Note that changing this parameter may cause an automatic change to the configured number of channels in individual audio channel configurations. Also see the *Packet Time* parameter (for stream level packet time settings) in Output Tab: IP Audio Configuration (on page 457).
SFP Select	Choose the type of SFP that SNP should be expecting in this position. Options include: • Unused • 2RX 3G • 2RX 12G • RX HDMI • 2 RX MADI • 2TX 3G • 2TX 12G • TX 12G HDMI • 2 TX MADI After you make this selection other options will be revealed depending on the SFP selected. See Configure SFPs (on page 115) and Audio Expansion (on page 303).
Force MAB Mode	When checked, the switch mode is set to Make After Break. Otherwise, the switch mode will depend on whether there's available bandwidth to do a Make Before Break switch. This can help to avoid oversubscribing the switch. See Make-Before-Break (MBB) Video Switching (on page 470). *Note: This parameter does not apply to the Multiviewer and Multiviewer Portrait Mode personalities, since these only support the Make-After-Break mode.*

When in Sync or Multiviewer mode, the Section 1 and 2 areas will be populated. See Configuring a Section for HD or UHD (on page 116).

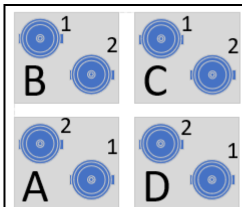
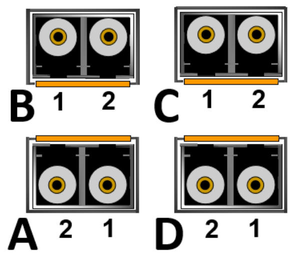
The following sections describe the options on this screen:

Configure SFPs

This section describes options for configuring SFPs when in Conversion, Sync, or Remap modes. For information on configuring SFPs in Multiviewer mode, see Configure a Multiviewer Personality (on page 240).

Each SFP is associated with an SNP Processor as in the following diagram. Insert the correct SFP in each slot prior to configuring it.

Note: The SFPs in slots A and D are oriented differently than SFPs in slots B and C. The positions of connections 1 and 2 are defined below:

	
Electrical SFP Orientation	Optical SFP Orientation

SFPs are configured on a per-processor basis. To configure the SFP, click **Edit** for that Processor.

SFP 1 Output Enable	When disabled, this reduces heat from the SNP frame. This field only appears when a TX SFP is inserted in the slot for this processor and HDMI is not the output of choice.
SFP 2 Output Enable	When disabled, this also reduces heat from the SNP frame. This field only appears when a TX SFP is inserted in the slot for this processor.
HDMI Output Source	Choose Section 1 or Section 2 to be routed to both outputs. This field only appears when SFP Select is set to 12G TX SFP.

Configuring a Section for HD or UHD

Note: This section only applies when the Processor Personality is Sync, Multiviewer, or Multiviewer Portrait Mode. See Configuring a Sync Personality (on page 120).

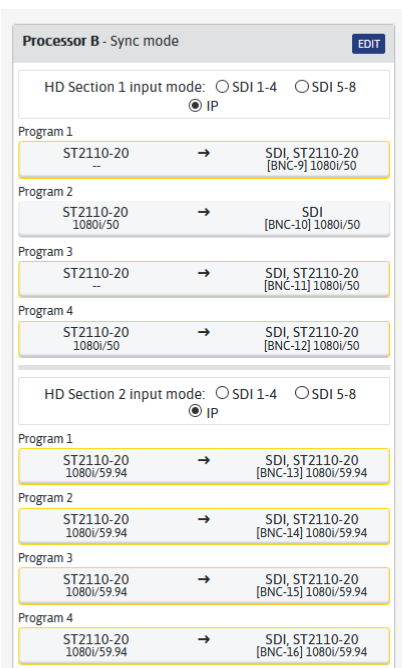
There are two sections per processor and they are independently selectable to be HD or UHD. Input can be SDI or IP. Output can be SDI and IP concurrently.

- **Possible Input and Output Video Standards** include 525i/59.94, 625i/50, 720p/50, 720p/59.94, 1080i/50, 1080i/59.94, 1080p/23.98, 1080p/24, 1080psf/23.98, 1080psf/24, 1080p/25, 1080p/29.97, 1080p/50, 1080p/59.94, 2160p/23.98, 2160p/24, 2160p/25, 2160p/29.97, 2160p/50, 2160p/59.94
- **Possible Input Interface**: SD-SDI, HD-SDI, 3G-SDI, 6G-SDI (2SI), 12G-SDI (2SI), 2110-20
- **Possible Output Interface**: SD-SDI, HD-SDI, 3G-SDI, 6G-SDI (2SI), 12G-SDI (2SI), 2110-20

Note: The SFP video output will follow the *SDI UHD Output Link Selection* in the Output tab for UHD outputs. It is not possible to have 3G-QL on the BNC outputs and a 12G-SL output on the corresponding SFPx output simultaneously.

Each of the four processors has an **Edit** button on the Dashboard. Click **Edit** to see the following dialog box for that processor:

For each section, you can choose:

<table>
<tr><td>Operation Mode</td><td>• HD: The section will contain four programs
• UHD: The section will contain one program</td></tr>
<tr><td>
</td><td>UHD Processor (1 program)

HD Processor (4 programs)</td></tr>
</table>

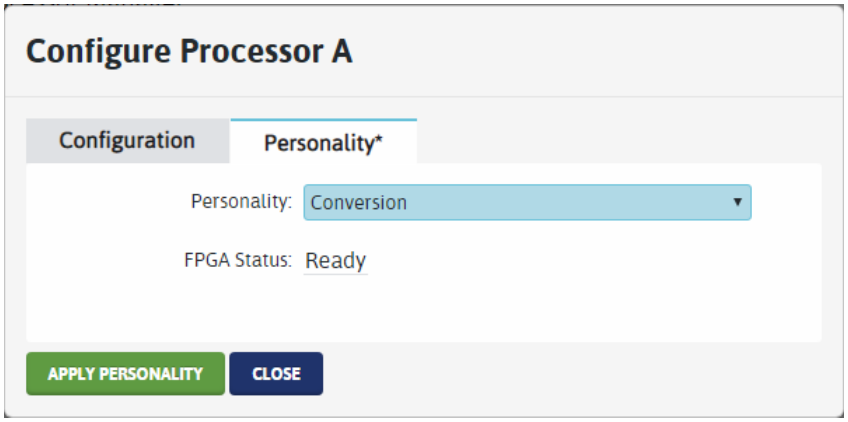
When you are done, click **Apply Sections** and reboot the SNP.

Note: A reboot is required to change a processor's mode between HD and UHD.

Assigning a Personality to a Processor

To assign a personality or change the personality on a Processor, follow these steps:

1. On the Dashboard, with an element selected, click the **Edit** button for a Processor.
2. On the Configure Processor dialog box, choose the **Personality** tab (see SNP Personalities (on page 118))



Personality	• Conversion • Quad Conversion • Remap • Sync • JPEG-XS Decoder • JPEG-XS Encoder • STAT • Multiviewer • Multiviewer Portrait Mode
FPGA Status	(read-only)

3. When you are done making your selections, click **Apply Personality**.
4. Reboot your SNP

The **FPGA Status** field displays **Loading** until the change is complete.

SNP Personalities

SNP personalities are determined on a per-processor basis. The following topics describe the personalities that are currently available:

Personality	How to Configure
Sync Personality	Configuring a Sync Personality (on page 120) Also see: Automatic Change Over (ACO) on the Sync Personality (on page 124)
Dual Conversion Personality	Configuring a Dual Conversion Personality (on page 135)
Quad Conversion Personality	Configuring a Quad Conversion Personality (on page 141)
Remap Personality	Configuring a Remap Personality (on page 133)
JPEG-XS Personality	Configuring a JPEG-XS Personality (on page 146)
TR-07 Personality	Configuring a TR-07 Personality (on page 165)
Dual Gateway Personality	Configuring a Dual Gateway Personality (on page 157)
STAT Personality	Configuring a Simple Transparent Asynchronous Transport (STAT) Personality (on page 179)
Multiviewer Personality	Configuring a Multiviewer Personality (on page 237)
	Configuring a Multiviewer Portrait Mode Personality (on page 250)
Master Control Lite Personality	Master Control Lite (MCL) Personality (on page 186)

The number of supported channels will depend on the personality assigned to a processor, as described in the following table:

Personality	Per Processor	Maximum per SNP
Sync	• 8 x HD • 4 x HD + 1 x UHD • 2 x UHD	• 32 x HD • 16 x HD + 4 x UHD • 24 x HD + 2 x UHD • 8 x UHD • others
Dual Conversion	• 2 Conversions (Up/Down/Cross)	• 8 Conversions
Quad Conversion	• 4 Conversions (Up/Down/Cross)	• 16 Conversions
Remap (UHD)	• 2 Channels	• 8 Channels
JPEG-XS	• 2X UHD • 8 x HD	• 8x UHD • 32 x HD
STAT	• 8 x HD	• 32 x HD

Multiviewer/ Multiviewer Portrait Mode	• 9 x HD • 8 x HD-3G • 2 x UHD • 1 x UHD + 4 x HD-3G • 1 x UHD + 5 x HD	• 36 x HD • 32 x HD-3G • 8 x UHD • 4 x UHD + 16 x HD-3G • 4 x UHD + 20 x HD

SNP contains four processors. Each processor can take on any personality.

Configuring a Sync Personality

Note: This personality supports MADI. See MADI Support (on page 293).

Sync Personality Support	The SNP Sync personality has two sections per processor which are independently selectable to be (one) UHD or (four) HD streams. See Configuring a Section for HD or UHD (on page 116).
HD Mapping	• When mapped entirely for HD, an SNP will have a maximum of 32 HD programs. • Each of the 32 BNCs on the back panel of SNP is one-to-one mapped to one HD channel specifically. • See BNC Ports (on page 49) for more information.
HD Proxies	When in Sync Personality mode, HD proxies are available. See Configuring Proxy Output (on page 261).
SDI/IP Inputs and Outputs	• When using the SNP Sync personality, the input and output video will have the same standard. • The input can be SDI or IP. • If the input is IP, the output can be SDI and IP concurrently. • If the input is SDI, the output can only be IP.
Configuring Sync	See: • Configuring IP to SDI/IP (on page 121) • Configuring SDI to IP (on page 122)
Sync Parameters	See ACO Parameters (on page 130).
Sync Licensing	The required license option is **SNP-PSK-SYNC** (Sync/Remap/STAT Personality). See Orderable Part Numbers (on page 35).

Possible input and output video standards	**Possible Input and Output Interfaces**
HD section mode • 720p/50 • 720p/59.94 • 625i/50 • 525i/59.94 • 1080i/50 • 1080i/59.94 • 1080p/23.98 • 1080psf/23.98 • 1080p/25	• SD-SDI • HD-SDI • 3G-SDI • 2SI-SDI • 6G-SDI • 12G-SDI • 2110-20 • 2022-6

Possible input and output video standards	Possible Input and Output Interfaces
• 1080p/24 • 1080psf/24 • 1080p/29.97 • 1080p/50 • 1080p/59.94 **UHD section mode** • 2160p/50 • 2160p/59.94 • 2160p/23.98 • 2160p/24 • 2160p/25 • 2160p/29.97	

Note: SQD IN – SQD OUT is not supported in the SYNC personality.

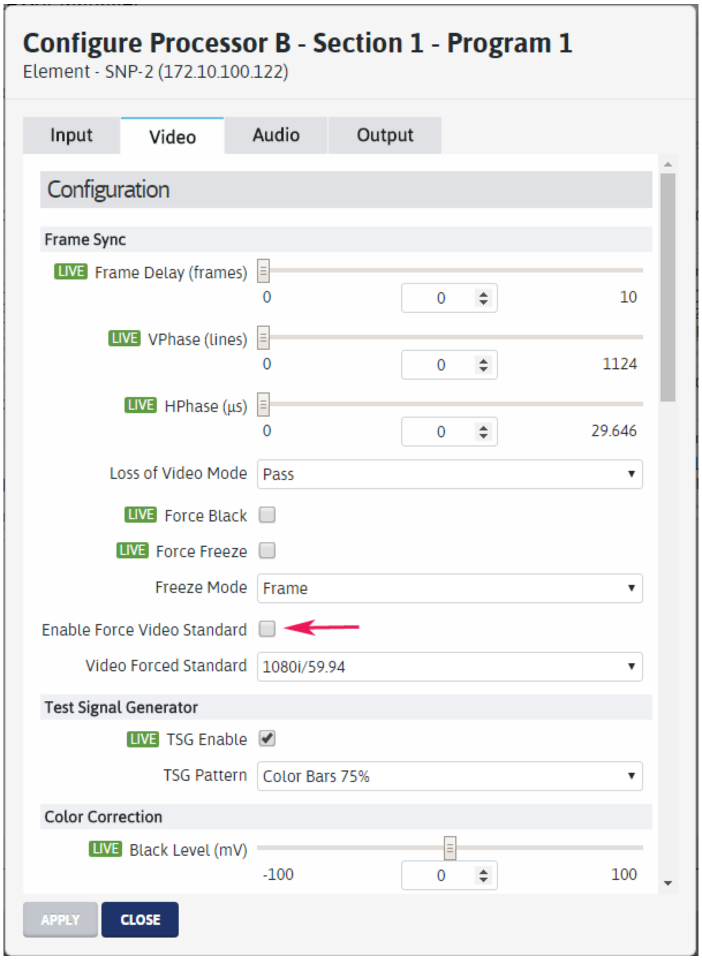
Configuring IP to SDI/IP

Ensure that the IP WAN has been configured before setting up any receivers, and that your SNP is configured for Sync personality.

To configure an SNP program as receiving video from IP input, and transmitting it out as SDI, follow these steps:

1. Choose the **Section Input mode** as **IP** for the section of the processor you're working on.
2. Click the Program you want to configure.
3. On the **Input** tab, make WAN-related configurations as appropriate for your network, including the following:
   - Check the "Video IP Receiver Enable" checkbox.
   - Set the correct Receiver Video Standard.
   - Set the Primary and Secondary WAN selects.
   - Set the Primary IP address, UDP port, and (optional) multicast source.
   - Set the Secondary IP address, UDP port, and (optional) multicast source.

4. On the **Video** tab, remove the check beside **Enable Force Video Standard**.



Your SNP is now ready to convert IP video to output SDI.

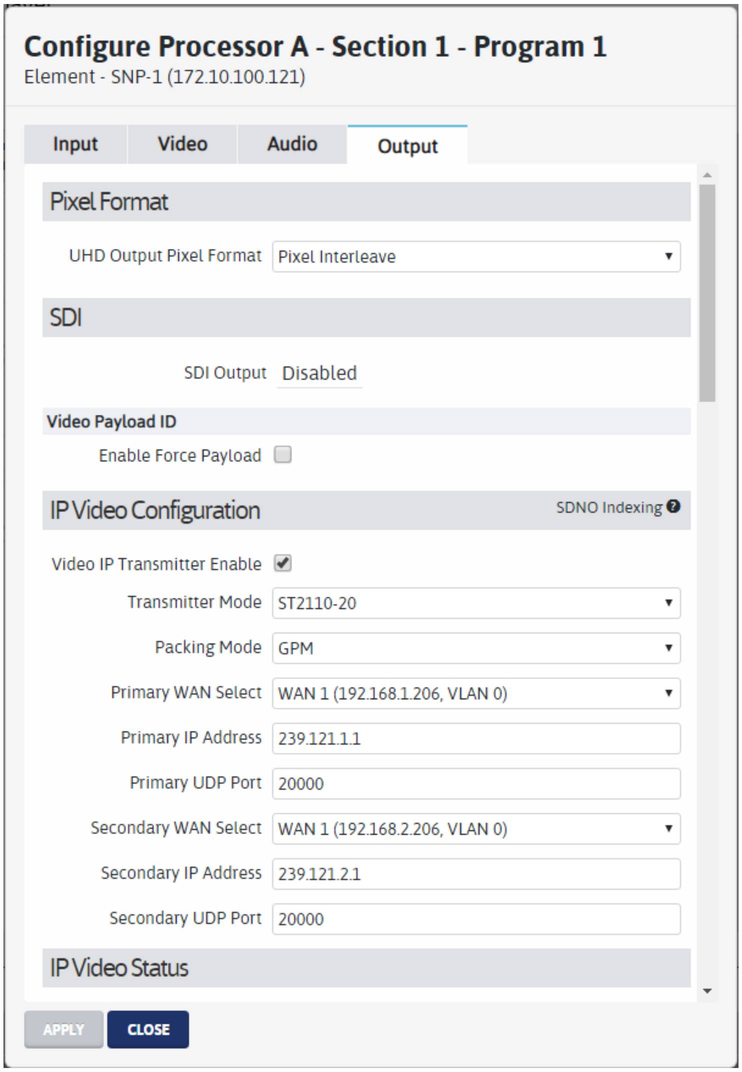
Configuring SDI to IP

Ensure the IP WAN has been configured before setting up IP transmitters, and that your SNP is configured for Sync personality.

To configure an SNP program as receiving video from SDI input, and transmitting it out as IP, follow these steps:

1. Choose the **Section Input mode** as **SDI** for the section of the processor you're working on.
2. Click the Program you want to configure to open its Configuration dialog box.
3. On the **Video** tab, uncheck **Enable Force Video Standard**.
4. On the **Output** tab, make the following selections:
   - Check **Video IP Transmitter Enable** under **IP Video Configuration**.
   - Set **Transmitter Mode** to **ST2110-20**.

- Make Primary and Secondary WAN settings based on your network.



5. Click **Apply** to save the configuration.
6. Repeat steps 5-7 for the audio and ancillary data.

Your channel is now ready to convert SDI to IP.

Automatic Change Over (ACO) on the Sync Personality

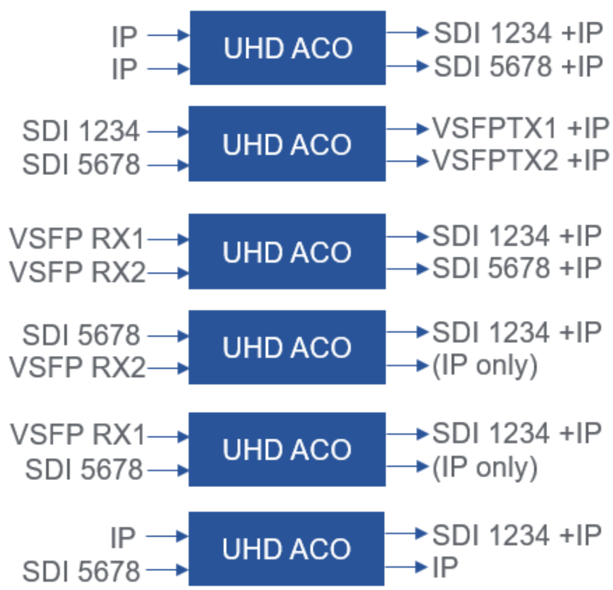
The SNP supports **Automatic Change Over** or ACO. The main goal of automatic change over is to protect IP based systems including SDI/IP mixed.

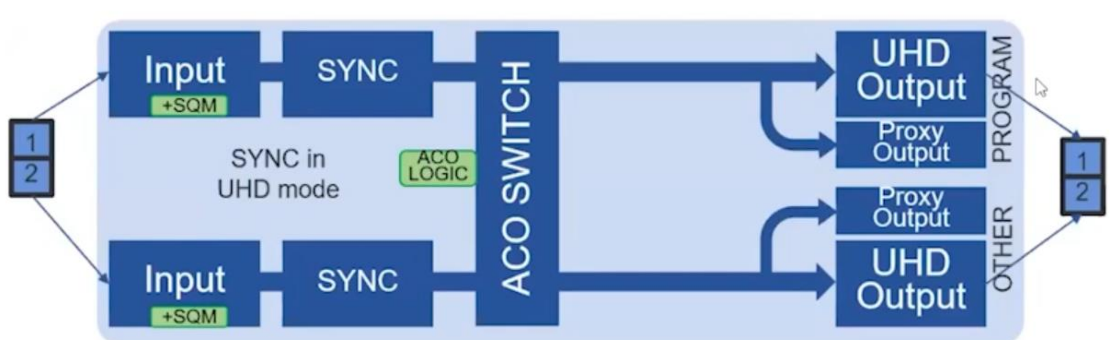
ACO Support	ACO can be used in UHD or HD mode, and gives you two inputs. • ACO on SNP Sync (UHD) (on page 125) • ACO on SNP Sync (HD) (on page 126)
Configuring ACO	See Enabling Automatic Change Over (ACO) (on page 127) for how to configure ACO
Signal Quality Metrics in ACO	In ACO mode, Signal quality metrics (see Signal Quality Monitoring (on page 128)) are determined on both inputs; the better input goes to the **Program output**, thus providing smart switching driven by signal quality metrics. The other signal (that's not going to air) becomes the **Preset output** and can also be seen on a multiviewer. Users can choose to manually override this selection using manual or forced selection of input A or input B. This can be done via the *ACO Manual Control* parameter in the **ACO** tab of the *Program Configuration*. See ACO Parameters (on page 130). The **SNP Management** tab (Configure Element > SNP Management) provides global defaults for SQM settings (thresholds for audio signals, missing ANC packets, etc.) See SQM Global Defaults (on page 376).
Reversion Modes	Reversion modes control failback, or when the ACO switches back to the main input from the backup input (immediate, manual intervention, or manual/failure mode). The Signal Failure threshold determines the point at which a switch is made, based on the **Signal Score**, which is derived from settings in the "Failure point contribution" section (See the "Failure point contribution" section in ACO Parameters (on page 130)). Signal scores in turn, are determined based on weights or thresholds that can be defined for for settings like video loss, black, freeze, missing ANC, audio high/low, etc. effectively allowing for configuration of what is acceptable, and providing more granular control over ACO functionality. What to do in the rare event that both inputs fail can also be configured. (See the **Video Output on Dual Failure** parameter in the ACO Parameters (on page 130) section) The **Onset Time** parameter controls how long the failure needs to occur to trigger the switch and the **Clear Time** parameter determines how long it has to be good before you switch back.
ACO Parameters	See ACO Parameters (on page 130).
ACO Alarms	See Alarms (on page 131)

ACO Licensing	Automatic Change Over is a software key add-on to the SNP SYNC personality. See Automatic Change Over (ACO) Licensing (on page 132) and Orderable Part Numbers (on page 35) Once ACO has been licensed, an **ACO** tab is displayed on processors in Sync mode. ACO can be enabled or disabled per program.
ACO Support from other devices	Status from ACO and the ability to override also extends to Magellan control panels via CCSP parameters. See ACO Support from Control Panels and Third Party Devices (on page 132).

ACO on SNP Sync (UHD)

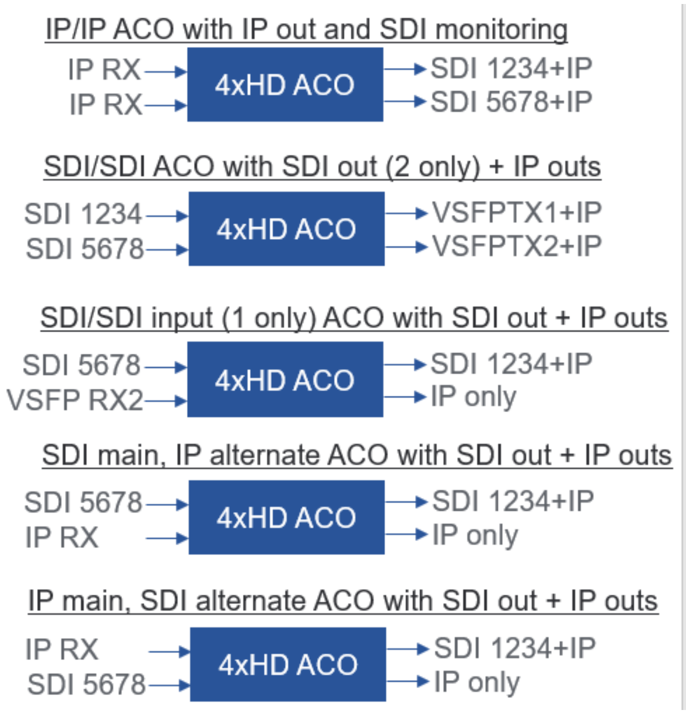
Supported Inputs	• IP, SDI, 12G, or 2SI • Inputs can be mixed (one IP, other SDI)
Supported Outputs	• IP and/or SDI (depending on connector or VSFP)

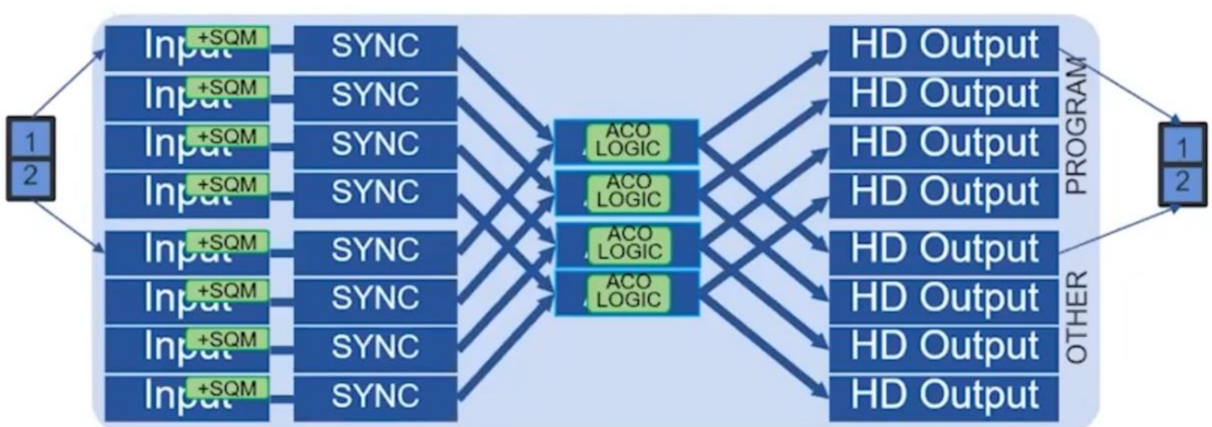




ACO on SNP Sync (HD)

Supported Inputs	• IP or SDI • SD/HD/1080P • Inputs can be mixed (one IP, other SDI)
Supported Outputs	• IP and/or SDI (depending on connector or VSFP)





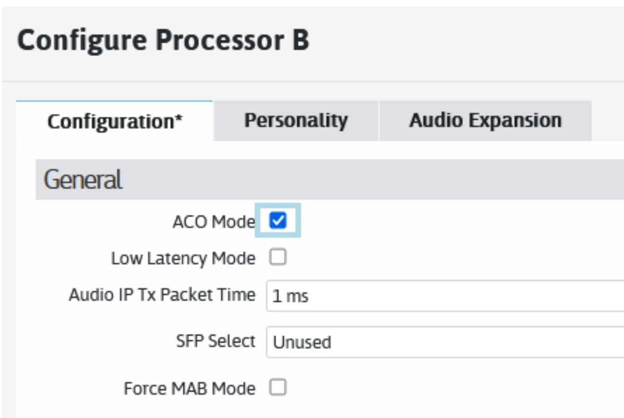
Enabling Automatic Change Over (ACO)

Note: Ensure that you have an ACO license applied before enabling ACO. If you don't enable ACO on the processor, it functions as a normal Sync processor.

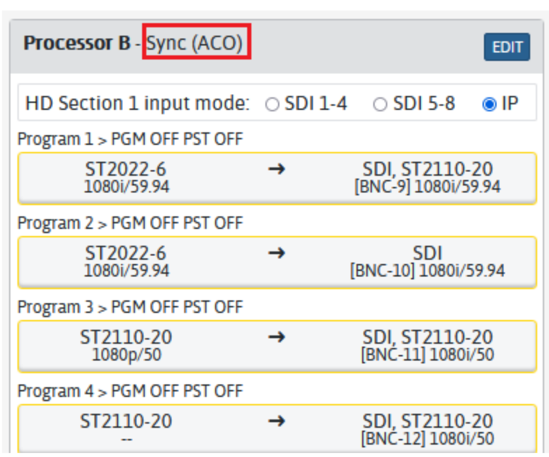
The required license option is **SNP-PSK-ACO** (Automatic Change Over Feature). See Orderable Part Numbers (on page 35).

To enable ACO:

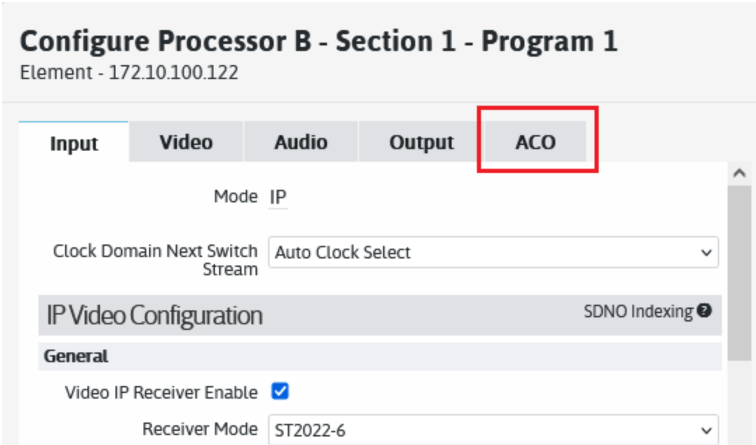
1. Go to the **Configure Processor** dialog
2. In the **Configuration** tab, under **General**, select **ACO Mode** and click **Apply Config**



3. The Processor column then displays Sync (ACO) to indicate the status

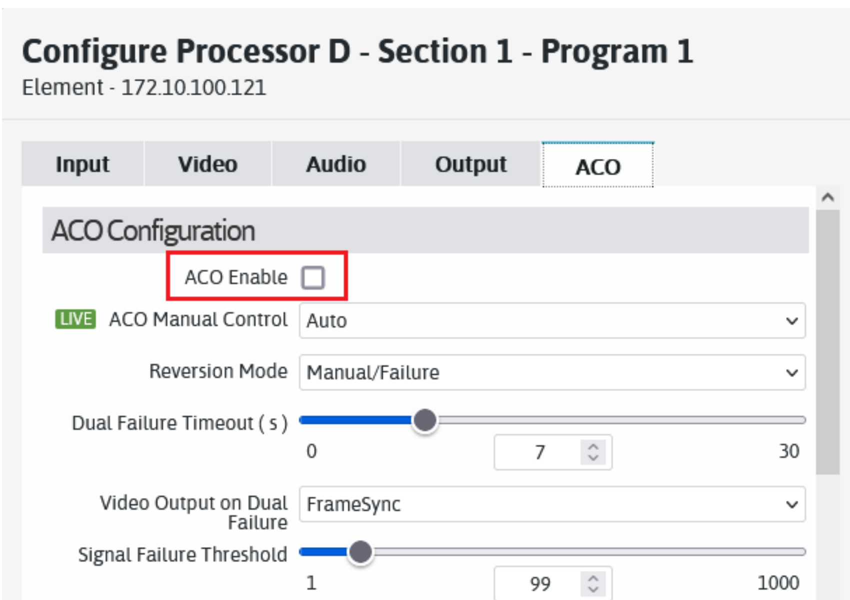


4. The Program Configuration dialog displays an additional tab for **ACO.** See ACO Parameters (on page 130) for more details on settings in this tab.



5. Once ACO has been enabled for a Processor, you also need to enable ACO per program. To do this, click a program within the Processor, and in the **ACO** tab, select **ACO Enable**.

Note: If you skip this step, even though ACO has been enabled for the Processor in question, the individual program will function as Sync. You can also use this control (enable or disable as required) to have a mix of ACO and Sync.



Signal Quality Monitoring

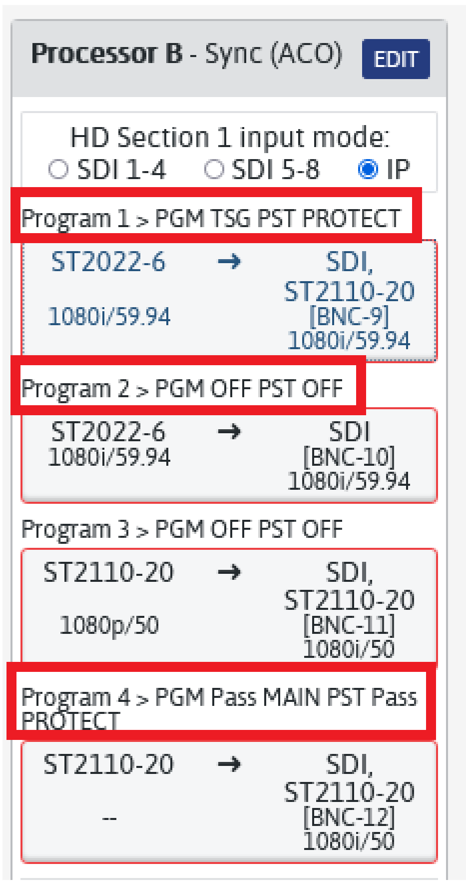
Signal Quality Monitoring is controlled via the **Configure Element** > **SNP Management** tab, which displays a section for SQM Global Defaults. See SQM Global Defaults (on page 376).

These global defaults are used for SQM settings in all non-MV personalities (since in case of MV personalities, these settings may be overwritten by PiP-specific values from the layout) and are displayed regardless of ACO license presence or enabling. In the MV personality, these global defaults are used for things that are not specified in the layout.

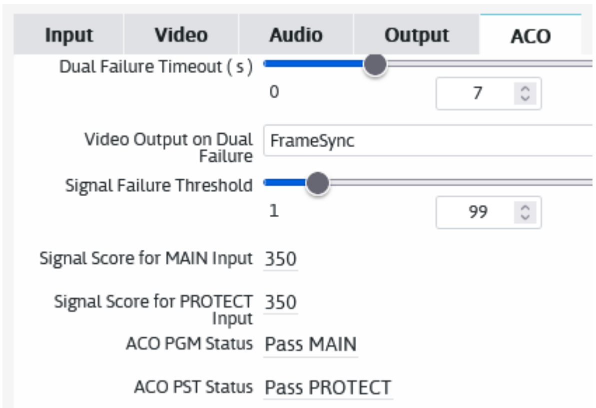
Program and Preset Status

Once set to ACO mode and configured, a Processor shows the **Program** and **Preset** status for each input. You see:

- **PGM**: Set to Off, TSG, Pass, Main, or Protect
- **PST**: Set to Off, TSG, Pass, Main, or Protect



This Program/Preset status is also seen in the **ACO** tab, **ACO PGM Status** and **ACO PST Status** parameters . See ACO Parameters (on page 130)



ACO Parameters

Program Configuration > ACO Tab

ACO Configuration	
ACO Enable	Enables ACO on this Program
ACO Manual Control	The default setting for ACO is **Auto** (where the best input signal is auto detected). The Manual control lets you override that by selecting one of: • Force Main • Force Protect • Force Switch • Force TSG
Reversion Mode	Settings include: • **Immediate** = When the main signal returns to a good state, go back to it immediately after the main signal has remained good for the number of seconds indicated in the *Clear Time* parameter • **Manual** = Do not switch and wait for user intervention. To re-arm the ACO, set **ACO Manual Control** to **Force** (Signal A) and then return the control to **Auto** • **Manual/Failure** = Wait for user intervention, but if the other signal fails for some reason, then switch back (and remain armed to switch again if needed)
Dual Failure Timeout	How long to wait (seconds) when both inputs are in a failed state, before taking the *Video Output on Dual Failure* action. Range is 0-30 (seconds), default is 7
Video Output on Dual Failure	This setting controls what to do if both signals fail. You can keep the frozen frame on the screen or put up a test pattern. Options include TSG and FrameSync.

Signal Failure Threshold	Signal Failure threshold sets the number of failure points for a bad signal or the point at which a switch is done. Range 1-1000, default is 99.
Signal Score for Main Input	Various settings from the "Failure point contribution" section determine and sum up the Signal Score.
Signal Score for Protect Input	Various settings from the "Failure point contribution" section determine and sum up the Signal Score.
ACO PGM Status	The current ACO Program Output Status (Main, Protect, TSG, Freeze, Pass Main, Pass Protect, Black, Off)
ACO PST Status	The current ACO Preset Output Status (Main, Protect, TSG, Freeze, Pass Main, Pass Protect, Black, Off)
Onset Time	How long to wait (seconds) from when the signal failure threshold is crossed, until taking the failure action. Range is 0-20 (seconds), default is 5.
Clear Time	How long to wait (seconds) from when the signal failure threshold is no longer crossed (signal has become good) until the signal is considered good for use. Range is 0-20 (seconds), default is 2.
Failure Point Contribution	
Loss of Video	Failure points for loss of video. Range is 0-500 and default is 100.
Video Freeze	Failure points for video freeze. Range is 0-500 and default is 90.
Video Black	Failure points for video black. Range is 0-500 and default is 90.
Audio High/Low Ch (1-16)	Failure points for audio channel high/low. Range is 0-500 and default is 10.
ANC Missing (1-4)	Failure points for ancillary filter missing packets. Range is 0-500 and default is 0.

Alarms

Audio Level Error N (N:1..16)	Asserts when audio is too high or too low based on the global config for levels and delays. Note that the global delay value affects how long it takes for the condition to be asserted, and then the raise delay in the UI adds onto that until the alarm is asserted.
ANC Missing N (N:1..4)	Asserts when the ANC Missing condition is determined, based on the global config.
ACO Enabled but not armed	Asserts when the manual control is not “Auto”, or when the reversion mode is Manual and fail-over has occurred
ACO in B position	Asserts when fail-over or manual action has put the ACO into the B position (the not-normal position)

ACO Support from Control Panels and Third Party Devices

Status from ACO and the ability to override also extends to Magellan control panels via CCSP parameters.

On Magellan RCP/VRCP Control panels, you can map buttons to ACO functions. For example, while you can control the ACO **Manual Control** from the SNP UI (Program Configuration > ACO tab), you can also map buttons on your Magellan Control Panel so you can Force Main, Protect, etc. And likewise for other functions.

Automatic Change Over (ACO) Licensing

The required license option is **SNP-PSK-ACO** (Automatic Change Over Feature). See Orderable Part Numbers (on page 35).

Configuring a Remap Personality

Note: This personality supports MADI. See MADI Support (on page 293).

Remap Support	• The Remap personality is similar to the Sync personality but adds the ability to transcode to and from the SQD format • In Remap Mode each Processor Section has one Program. • Each program has a configuration page. • SQD is only available on the SDI inputs or outputs. • Each processor handles two UHD channels. • This mode is not for HD or 3G signals. • Processing includes a Color Processor (color space conversion, dynamic range conversion) and Test Signal Generator (TSG).
Supported Formats	• The Remap personality remaps UHD between SQD and ST 2110, 12G (1.2), or 2SI signal formats
Remap Licensing	The required license option is **SNP-PSK-SYNC** (Sync/Remap/STAT Personality). See Orderable Part Numbers (on page 35).

Possible input/output combinations are as follows:

Input	**Output**
UHD-2110	SQD-SDI
SQD-SDI	UHD-2110 (& 6G/12G-SDI via SFP)
UHD-2110	2SI-SDI (pass thru, no re-mapping is required)
2SI-SDI	UHD-2110 (pass thru, no re-mapping is required)
6G/12G-SDI	UHD-2110 (pass thru, no re-mapping is required)
UHD-2110	6G/12G-SDI (pass thru, no re-mapping is required)

Remap 2SI to SQD

Ensure that the IP WAN has been configured before setting up any receivers, and that your SNP is configured for Remap personality.

To configure an SNP program as receiving 2SI video from IP input, and transmitting it out as SQD over SDI (which is the only way SNP can output SQD), follow these steps:

1. Choose the **Section Input mode** as **IP** for the section of the processor you're working on.
2. Click the Program you want to configure to open its Configuration dialog box.
3. On the **Input** tab, make WAN-related configurations as appropriate for your network, including the following:
    - Check the "Video IP Receiver Enable" checkbox.

- Set the correct Receiver Video Standard.
- Set the Primary and Secondary WAN selects.
- Set the Primary IP address, UDP port, and (optional) multicast source.
- Set the Secondary IP address, UDP port, and (optional) multicast source.

  If the IP address is set to 0.0.0.0 and UDP port is set to zero, no input will be expected on this interface.

4. On the **Video** tab, remove the check beside **Enable Force Video Standard**.
5. On the **Output** tab under **Pixel Format**, select **Square Division**.

   Note: Choosing SQD as the pixel format will disable IP output.

6. Click **Apply** to save your changes.

Your SNP is now ready to convert IP video to output SQD.

Remap SQD to 2SI

Ensure the IP WAN has been configured before setting up IP transmitters, and that your SNP is configured for Remap personality.

To configure an SNP program as receiving SQD video from SDI input (which is the only place SNP can get it from), and transmitting it out as 2SI over IP, follow these steps:

1. Choose the **Section Input mode** as **SDI** for the section of the processor you're working on.

   There will only be one program to choose from, as Remap uses UHD video only.
2. On the Input tab, under **Pixel Format**, choose **Square Division**.
3. On the **Video** tab, uncheck **Enable Force Video Standard**.
4. On the **Output** tab, make the following selections:
   - Check **Video IP Transmitter Enable** under **IP Video Configuration**.
   - Set **Transmitter Mode** to **ST2110-20**.
   - Make Primary and Secondary WAN settings based on your network.

     The SDI option won't be available as it's in use on the input side.
5. (Optional) Configure proxy output, as described in Configuring Proxy Output (on page 261).
6. Click **Apply** to save the configuration.

Your channel is now ready to convert SQD to IP (2SI).

Configuring a Dual Conversion Personality

This personality supports 3D LUT Processing and Subtitles. See Color Processing - Built In and Custom LUTs (on page 264) and Subtitles on the SNP (on page 306).

The video conversion personality includes video format conversion and color processor (color correction, color space conversion, and dynamic range conversion).

This is a licensed feature which can be applied to any processor within an SNP. The required license option is **SNP-PSK-2CONVUHD** (Dual UHD Conversion Personality). Each SNP can have up to 4 licenses, and two independent conversions can be done per processor (one per section), so each SNP can perform up to 8 conversions. See Orderable Part Numbers (on page 35).

You can output HD, 3G or UHD. Basic frame rate conversion (drop/repeat) is done automatically, if the input signal has a different frame rate from the output frame rate. UHD can be carried via quad-link SDI, 12G-SDI, IP-2110, or IP-2022-2. HD can be carried via SDI or IP-2110 or IP-2022-6.

When the input is IP, IP Output (UHD-2110) and SDI Output (2SI-SDI) are available concurrently. Associated audio and data streams are delayed, processed and synchronized with the output video. If SQD-SDI output is enabled, then IP Output (UHD-2110) will not be available. Associated audio and data streams are delayed, processed and synchronized with the output video. 2110-40 is supported in this mode, with closed captions and OP547 passed from input to output in all video standards and programs.

Possible Input and Output video standards	Possible Input and Output Interfaces
• 720p50 • 720p59.94 • 1080i/50 • 1080i/59.94 • 1080p29.97 • 1080p/23.98 • 1080p/24 • 1080p/25 • 1080p/50 • 1080p/59.94 • 2160p/50 • 2160p/59.94 • 2160p/23.98 • 2160p/24 • 2160p/25 • 2160p/29.97	• HD-SDI • 3G-SDI • SQD-SDI • 2SI-SDI • 6G-SDI • 12G-SDI • 2110-20 • 2022-6

Input	Output	Valid
HD	HD	Yes
HD	UHD-2SI	Yes
HD	UHD-SQD	Yes *
UHD-2SI	HD	Yes
UHD-2SI	UHD-2SI	Yes
UHD-2SI	UHD-SQD	No
UHD-SQD	HD	Yes *
UHD-SQD	UHD-2SI	No
UHD-SQD	UHD-SQD	No
* UHD-SQD input and output are only available on BNCs.		

In Conversion mode, the maximum number of frames of delay will depend on the output format:

- UHD-SQD output: max delay = 2 frames; min scaler latency = 2 input frames (progressive input), or 2 input fields (interlaced input).
- 1080i output: max delay = 2 frames; min scaler latency = 1 input frame (progressive input), or 1 input field (interlaced input).

In Conversion mode, there is one data filter that can apply EIA-708 closed captions or OP-47 teletext. See Ancillary Data IP Filter (Conversion Mode) (on page 463).

Supported Combinations

The following process combinations are supported on the Conversion personality:

Input	Conversion	Output
HD (SDI or IP)	Convert to different HD	HD (SDI and/or IP)
HD (SDI or IP)	Upconvert to UHD	UHD (12G, 2SI, and/or IP)
HD (SDI or IP)	Upconvert to UHD	UHD (SQD) No IP output when in SQD output mode
UHD (12G or 2SI or IP)	Downconvert to HD	HD (SDI and/or IP)
UHD (SQD)	Downconvert to HD	HD (SDI and/or IP)
UHD (12G or 2SI or IP)	Color process and Sync (no conversion)	UHD (12G, 2SI, and/or IP)

Configuring IP to IP Routing

Ensure that the IP WAN has been configured before setting up any receivers or transmitters, and that your SNP is configured for Conversion personality.

To configure an SNP program as receiving video from IP input, and transmitting it out as IP video with a video standard conversion, follow these steps:

1. Choose the **Section Input mode** as **IP** for the section of the processor you're working on.
2. Click the Program you want to configure to open its Configuration dialog box.
3. On the **Input** tab, make WAN-related configurations as appropriate for your network, including the following:
   - Check the "Video IP Receiver Enable" checkbox.
   - Set the correct Receiver Video Standard.
   - Set the Primary and Secondary WAN selects.
   - Set the Primary IP address, UDP port, and (optional) multicast source.
   - Set the Secondary IP address, UDP port, and (optional) multicast source.

     If the IP address is set to 0.0.0.0 and UDP port is set to zero, no input will be expected on this interface.
4. On the **Video** tab, beside **Output Video Standard**, choose any option in the drop-down menu.
5. On the **Output** tab, make the following selections:
   - Check **Video IP Transmitter Enable** under **IP Video Configuration**.
   - Set **Transmitter Mode** to **ST2110-20**.
   - Make Primary and Secondary WAN settings based on your network.

     When the input is IP, the SDI output is always enabled.
6. (Optional) Configure proxy output, as described in Configuring Proxy Output (on page 261).

Input	Output
3G	3G + 1080i proxy
1.5G	main + proxy both 1.5G (proxy will be the same format as main)
2SI	2SI + 1080i proxy

7. Click **Apply** to save the configuration.

Your channel is now ready to convert IP to IP.

Configuring IP to SDI Video Format Conversion

Ensure that the IP WAN has been configured before setting up any receivers, and that your SNP is configured for Conversion personality.

To configure an SNP program as receiving video from IP input, and transmitting it out over SDI with a video standard conversion, follow these steps:

1. Choose the **Section Input mode** as **IP** for the section of the processor you're working on.
2. Click the Program you want to configure to open its Configuration dialog box.

3. On the **Input** tab, make WAN-related configurations as appropriate for your network, including the following:
   - Check the "Video IP Receiver Enable" checkbox.
   - Set the correct Receiver Video Standard.
   - Set the Primary and Secondary WAN selects.
   - Set the Primary IP address, UDP port, and (optional) multicast source.
   - Set the Secondary IP address, UDP port, and (optional) multicast source.
4. On **Video** tab, beside **Output Video Standard**, choose any option in the drop-down menu.
5. On the **Output** tab under **Pixel Format**, if your video output is an UHD format, select either **Square Division** or **Pixel Interleave**; if the IP input is UHD, SQD-UHD is not available.

   This setting will have no effect if your output video format is HD.

   Note: Choosing Square Division format will disable the IP output.
6. Click **Apply** to save your changes.

Your SNP is now ready to convert IP video to the video standard you selected.

Configuring SDI to IP Video Conversion

Ensure the IP WAN has been configured before setting up IP transmitters, and that your SNP is configured for Conversion personality.

To configure an SNP program to receive video from SDI input, and transmit it out as any format over IP, follow these steps:

1. Choose the **Section Input mode** as **SDI** for the section of the processor you're working on.

   The Conversion personality has only one program to choose from.
2. On the **Input** tab, make the following selections:
   - If your video format is UHD, select either **Square Division** or **Pixel Interleave** from the **UHD Input Pixel Format** menu.
   - SDI Input Link Select (Options correspond to each of the four connectors associated with this program, or all four for UHD)
3. On the **Video** tab, select an **Output Video Standard**.

   Note: If the IP output is UHD, only a 2SI-UHD input can be converted (SQD-UHD input is an invalid selection).
4. On the **Output** tab, make the following selections:
   - Check **Video IP Transmitter Enable** under **IP Video Configuration**.
   - Set **Transmitter Mode** to **ST2110-20**.
   - Make Primary and Secondary WAN settings based on your network.

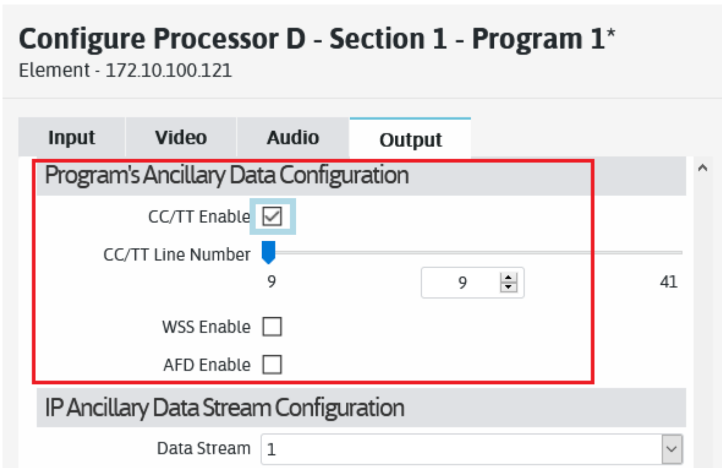
     The SDI option won't be available as it's in use on the input side.
5. (Optional) Configure proxy output, as described in Configuring Proxy Output (on page 261).
6. Click **Apply** to save the configuration.

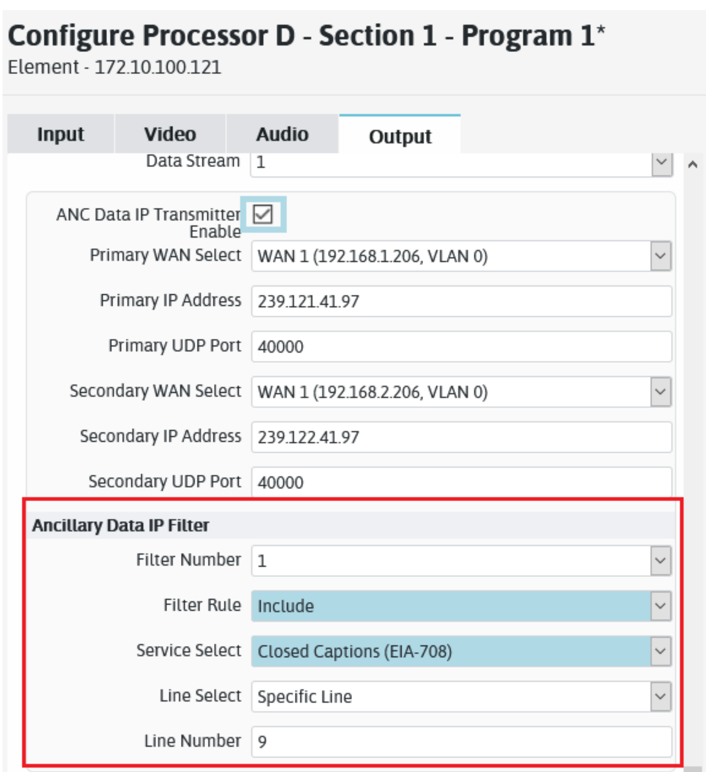
Your channel is now ready to convert SDI video to any output IP format.

Programs Ancillary Data Configuration

In Conversion mode (dual and quad), the **Programs Ancillary Data Configuration** section (Configure Processor > Output tab) affects baseband processing, and setting it is required if the user expects the Ancillary Data to be forwarded to the SDI stream and to the IP TX stream.

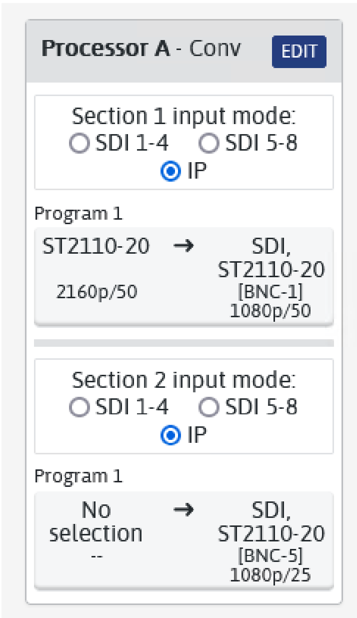
Note that the **IP Ancillary Data Stream Configuration** filters may only pick-up Ancillary Data that has been enabled in the baseband processing and it may only pick-up the data on the respective line number.



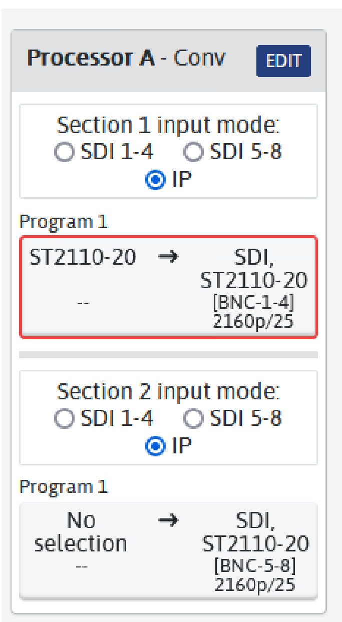


BNC Output

In case of HD (Dual) Conversion, the SNP now provides copies of the main program on the subsequent 3 BNCs.
For example, in this case of Processor A in Dual Conversion Mode, Program 1's HD output is also available on BNCs 2,3,4 in addition to the main BNC 1.



In UHD (Dual) Conversion mode, SNP always has 4 outputs for quad-links.



Configuring a Quad Conversion Personality

This personality supports 3D LUT Processing and Subtitles. See Color Processing - Built In and Custom LUTs (on page 264) and Subtitles on the SNP (on page 306).

The Quad Conversion personality supports up to four video conversion operations (per processor) to and from the following formats:

- **Supported Formats:** 480i/576i/1080i/720p/1080p
- **Supported Standards:** SD, 1.5 HD, and 3G HD

This is a licensed feature that can be applied to any processor within an SNP. The required license option is **SNP-PSK-4CONV3G** (Quad 1080P Conversion Personality).

Each SNP can have one Quad Conversion license (**SNP-PSK-4CONV3G**), with up to 4 license tokens for 4 processors. Four independent conversions can be done per processor, so each SNP can perform up to 16 conversions. See Orderable Part Numbers (on page 35).

Inputs

- Both SDI and IP (ST2022-6 or ST2110) inputs and outputs are supported
- SDI interfaces can be HD-BNC or Baseband SFP
- The input format is auto-detected for ST2022-6. For ST2110, the input standard needs to be set by the user.
- Formats up to 1920x1080p 59.94 are supported, as well as standard definition (525 or 625 interlaced).
- Inputs that are 480i/576i/1080i/720p/1080p can be converted to 480i/576i/1080i/720p/1080p outputs

In the Quad-Conversion personality, the channel will always process signals routed to one of the two supported two (SDI or IP) input paths. The 'None' option is meant to disable the input to the frame sync of the specified channel. There should be no input and no alarm for the channel. Note that the 'None' option does not disable the BNC port. It only disables the processor of the specified channel. For example, if the user selects 'None' for channel 1 and the user also selects 'SDI 1-4' for channel 5, channel 5 will still process the SDI signal of the BNC 1 port.

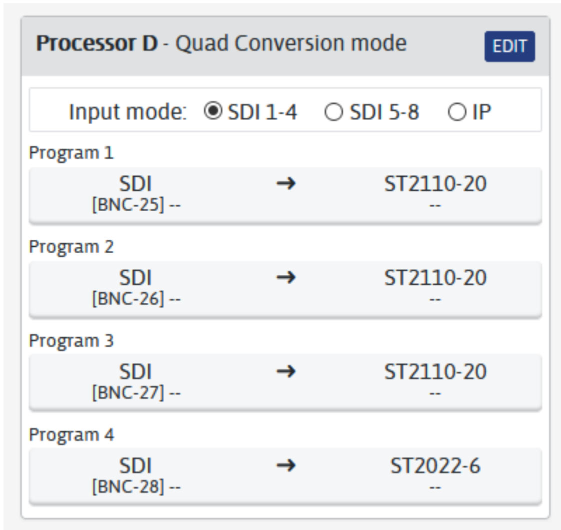
Note that UHD is not supported. For UHD, use the dual conversion personality. See Configuring a Dual Conversion Personality (on page 135)

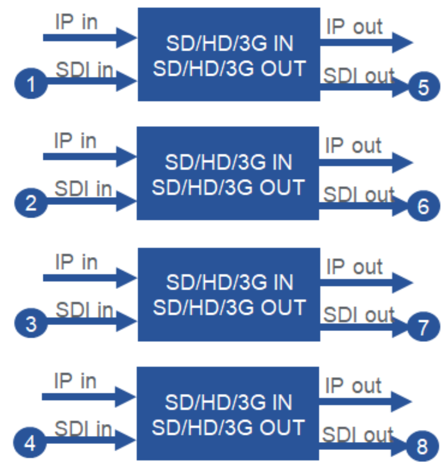
Outputs

Outputs can be SDI, IP, or both. SDI interfaces can be HD-BNC or SFP. Formats up to 1920x1080p 59.94 are supported, as well as standard definition (525 or 625 interlaced).

Any HD-BNCs not used for inputs are assigned as outputs by the SNP.

- If SDI 1-4 is selected as input, SDI 5-8 will be used as output
- If SDI-5-8 is selected as input, SDI 1-4 is used as output
- In case of IP inputs, SDI 1/5 is the first output, followed by SDI 2/6, 3/7, and 4/8.



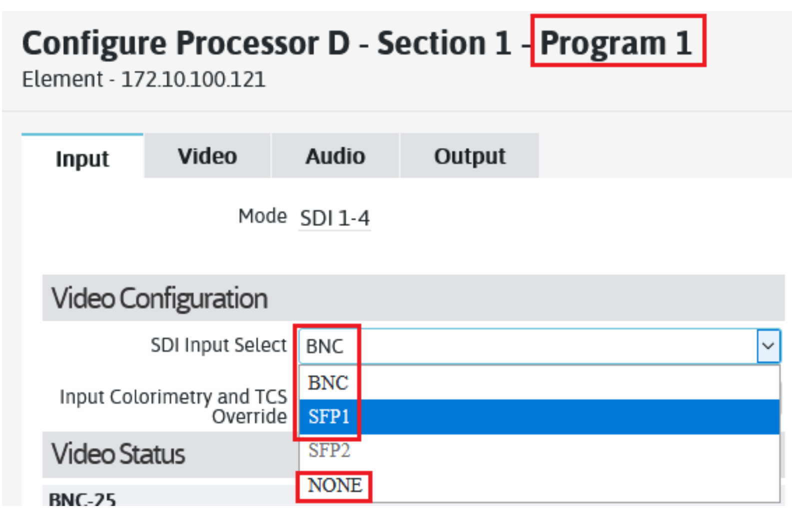


SFPs

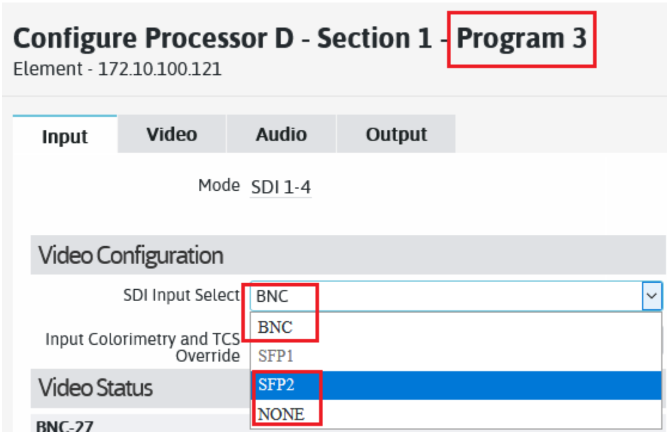
- 3G SFPs are supported
- HDMI SFPs are not currently supported

In case of SDI input, with an input SFP, the following input options apply:

- Programs 1 & 2: Input options include BNC or SFP 1



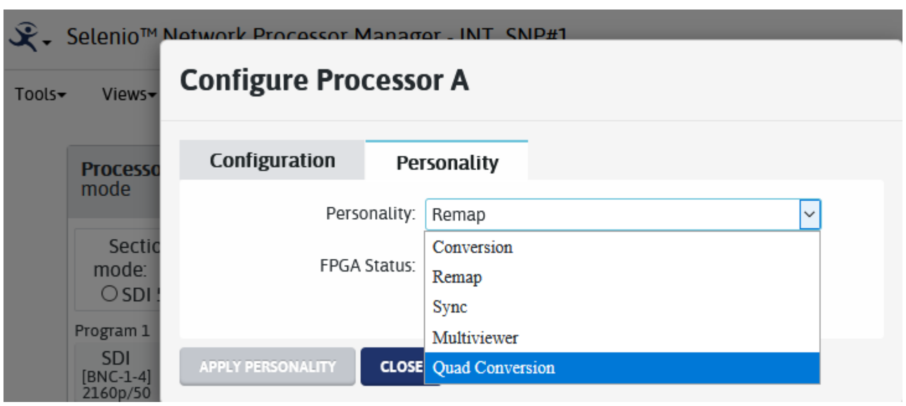
- Programs 3 & 4: Input options include BNC or SFP 2



Also see Programs Ancillary Data Configuration (on page 139)

Configuring IP to SDI Quad Conversion

Ensure that the IP WAN has been configured before setting up any receivers, and that your SNP is configured for Quad Conversion personality.



To configure an SNP program as receiving video from IP input, and transmitting it out over SDI with a video standard conversion, follow these steps:

1. Choose **Input mode** as **IP** for the processor
2. Click the Program you want to configure to open its Configuration dialog box.
3. On the **Input** tab, make WAN-related configurations as appropriate for your network, including the following:
   - Check the **Video IP Receiver Enable** checkbox
   - Select the **Receiver Mode**: ST2022-6 or ST2110-20
   - Set the **Receiver Video Standard**
   - Set the **Primary** and **Secondary WAN** selects
   - Set the **Primary IP** address, **UDP** port, and (optional) **Multicast Source**
   - Set the S**econdary IP** address, **UDP** port, and (optional) **Multicast Source**
4. On **Video** tab, beside **Output Video Standard**, choose any option in the drop-down menu.

5. Click **Apply** to save your changes.

Your SNP is now ready to convert IP video to the video standard you selected.

Configuring SDI to IP Quad Conversion

Ensure the IP WAN has been configured before setting up IP transmitters, and that your SNP is configured for the Quad Conversion personality.

To configure an SNP program to receive video from SDI input, and transmit it out as any format over IP, follow these steps:

1. Choose the **Input mode** as **SDI 1-4** or **SDI 5-8** for the processor
2. Click the Program you want to configure to open its Configuration dialog box.
3. On the **Video** tab, select an **Output Video Standard**.
4. On the **Output** tab, make the following selections:
    - Check **Video IP Transmitter Enable** under **IP Video Configuration**.
    - Set **Transmitter Mode** to **ST2110-20**.
    - Make Primary and Secondary WAN settings based on your network.
5. (Optional) Configure proxy output, as described in Configuring Proxy Output (on page 261).
6. Click **Apply** to save the configuration.

Your channel is now ready to convert SDI video to any output IP format.

Configuring SDI to SDI Quad Conversion

To configure a SNP program to receive video from SDI input, and transmit it out as SDI, follow these steps:

1. Choose **Input mode** as **SDI 1-4** or **SDI 5-8** for the processor
2. Click the Program you want to configure to open its Configuration dialog box.
3. In the **Input** tab, make any video and/or audio configuration selections as applicable
4. In the **Video** tab, select the applicable **Output Video Standard**.
5. On the **Output** tab, select the appropriate **Transmitter Mode** as applicable
6. Click **Apply** to save the configuration.

Note:

If Input mode selection is SDI 1-4, the corresponding SDI outputs will be available at SDI 5-8 respectively for that processor.

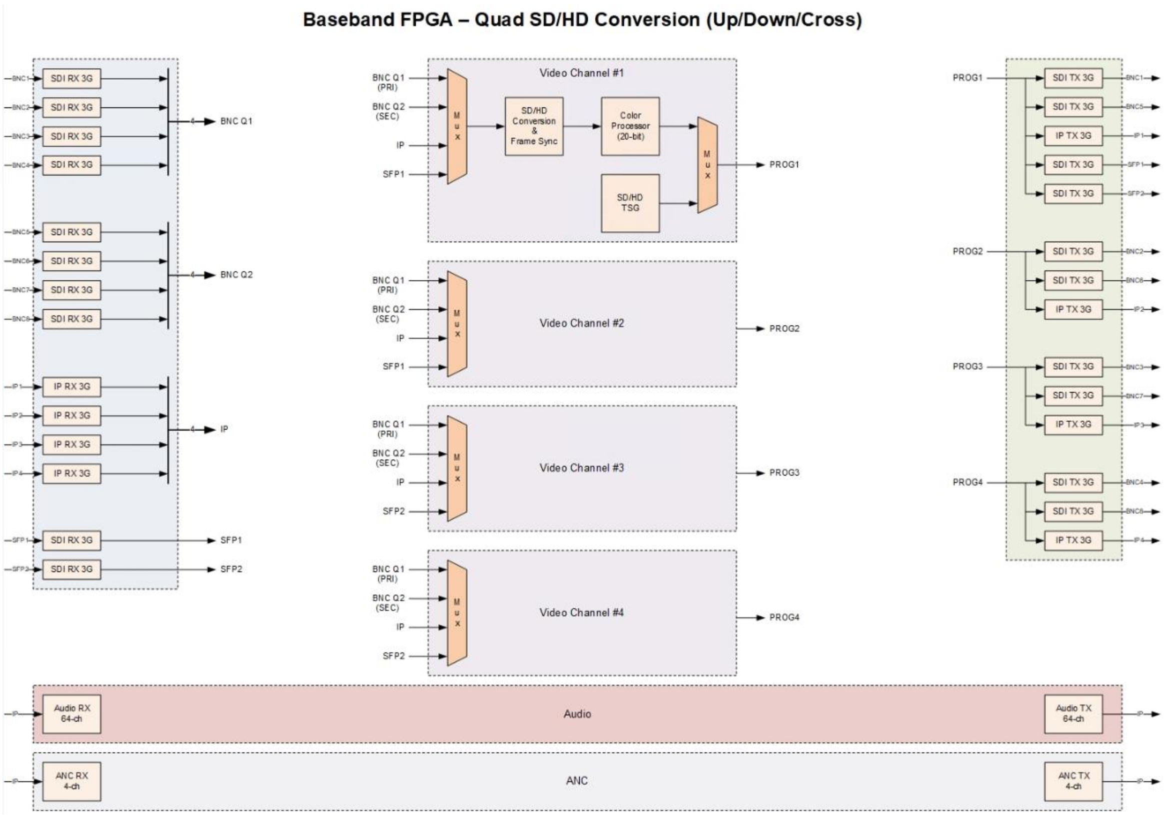
If Input mode selection is SDI 5-8, the corresponding SDI outputs will be available at SDI 1-4 respectively for that processor

---

SFP Routing

Note that from an SFP routing perspective, each program supports one SFP channel at the input, and both SFP channels on the output side.

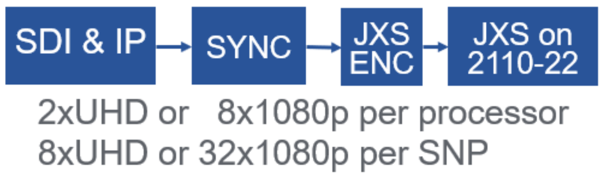
- Status for SFP-A-1 is displayed in the 'Video Status' section for Program 1 and Program 2
- Status for SFP-A-2 is displayed in the 'Video Status' section for Program 3 and Program 4

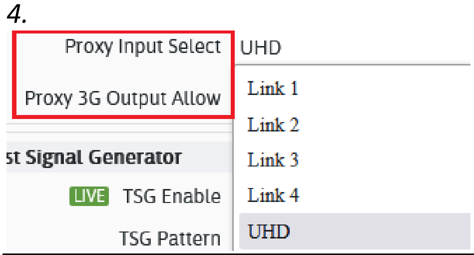


Configuring a JPEG-XS Personality

JPEG-XS Support	• The JPEG-XS personalities (Encoder and Decoder) are structurally similar to the Sync personality, but perform compression or decompression of the video signal in compliance with the JPEG-XS (ISO/IEC 21122) standard. • Different bit rates can be configured (.8 to 4.2 bits per pixel) for compression, depending on the requirement. • Both the encoder and the decoder support audio shuffling and VANC data filtering. Among other applications, these personalities enable inter-facility connection at a reasonable bit rate.
JPEG-XS Components	The JPEG-XS personalities include an encoder, and a decoder with limited video processing. See: • JPEG-XS Encoder (on page 147) • JPEG-XS Decoder (on page 152)
Currently supported uncompressed video source formats:	• 625i/50 • 525i/59.94 • 720p/50 • 720p/59.94 • 1080i/50 • 1080i/59.94 • 1080p/23.98 • 1080psf/23.98 • 1080p/24 • 1080psf/24 • 1080p/25 • 1080p/29.97 • 1080p/50 • 1080p/59.94 • 2160p/24 • 2160p/25 • 2160p/23.98 • 2160p/29.97 • 2160p/50 • 2160p/59.94
JPEG-XS Licensing	The required license option is: • **SNP-PSK-JXSE** (JPEG-XS Encoder Personality) for encoding • **SNP-PSK-JXSD** (JPEG-XS Decoder Personality) for decoding. See Orderable Part Numbers (on page 35)

JPEG-XS Encoder



Configuration (per processor)	• 2xUHD or 8x1080p • 1xUHD + 4x1080p
Inputs	SDI, 2022-6*, or 2110-20
Processing	Audio delay/gain/shuffle, Limited video processing
Video Output format	IP (SMPTE ST 2110-22, VSF TR-08)
Audio and ANC Output	SMPTE ST 2110-30/31/40
Bit-rate for all source formats (SD, HD, 3G, UHD)	0.8 .. 4.2 BPP
Other	Supports HD-proxy of the transmitted UHD videos *Note: Proxy 3G output will not work for the TR08 Encoder in UHD mode if* Proxy Input Select *is either Link 2, Link 3 or Link 4.* 

* When using ST2022-6 for input or output on the SNP, the actual capacity of a processor may be limited by the total bandwidth including overhead of the 2022-6 signals - specifically when operating in 1080p/59 or 1080p/50 formats, using ST 2022-6, 8x 1080p signals will exceed the 24.95Gbit/sec bandwidth ceiling of an SNP processor.

Compression Options

The following table provides a snapshot of compressed bit-rates for different coding rates and formats. This is configured using the *Bit Rate Control* parameter in the *JPEG-XS* section of the *Output* tab for a JPEG-XS Encoder processor.

- 4 BPP is production quality
- 2.5 BPP is contribution grade
- 1.5 BPP and lower is monitoring quality

Representative Bit Rates for Typical Formats (Mbps)

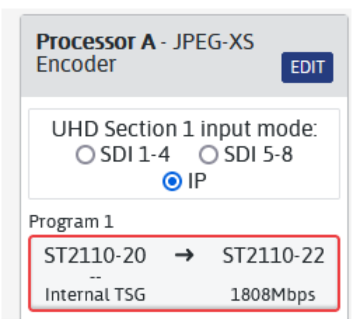
	Monitoring Quality	Near Visually Lossless (Contribution Quality)	Visually Lossless (Production Quality)
	1.5 BPP and lower	2.5 BPP	4 BPP
1080i @ 50	82 Mbps	136 Mbps	218 Mbps
1080i @ 59	98 Mbps	163 Mbps	261 Mbps
1080p @ 50	164 Mbps	272 Mbps	435 Mbps
1080p @ 59	196 Mbps	326 Mbps	522 Mbps
2160p @ 50	653 Mbps	1088 Mbps	1740 Mbps
2160p @ 59	783 Mbps	1304 Mbps	2086 Mbps

See:

- JPEG-XS Encoding (on page 148)
- Configuring Encoding - Input (on page 149)
- Configuring Encoding Output (on page 150)

JPEG-XS Encoding

For Processors configured as JPEG-XS Encoder, each program's *Element* view reports ST2110-22 as the outgoing standard and reflects the bitrate for the outgoing JPEG-XS compressed video stream.



Most of the tabs contain settings similar to the Sync personality. Details and exceptions are listed below.

Input Tab

- Similar to the Sync personality

Audio Tab

- Similar to the Sync personality.

  Note: See the Audio Tab (Audio Tab: General Configuration (on page 449)) for some parameters that do not apply to the JPEG-XS Encoder personality.

Video Tab

- Does not have Output Colorimetry and TCS controls
- No Color Adjustment controls
- Input Colorimetry and TCS settings can be overriden

Output Tab

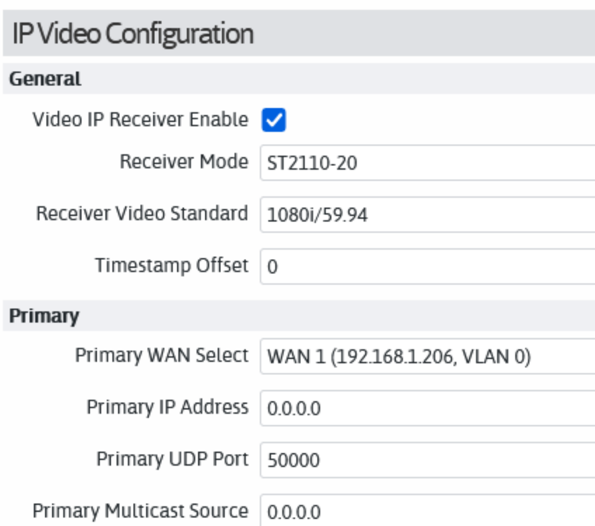
- Since JPEG-XS cannot be encapsulated into SDI, settings related to SDI Outputs are not displayed, including VPID and all Audio Embedder related settings
- In the **IP Video Configuration** section, *Transmitter Mode* is pre-set to ST2110-22 and the *Packing Mode* and *SD Extended Window Size* parameters are not displayed
- In the **IP Video Status** section, the *SD Starting Line* and *Picture Height* parameters are not displayed

Configuring Encoding - Input

Input can be either IP (ST2022-6, ST2110-20) or SDI.

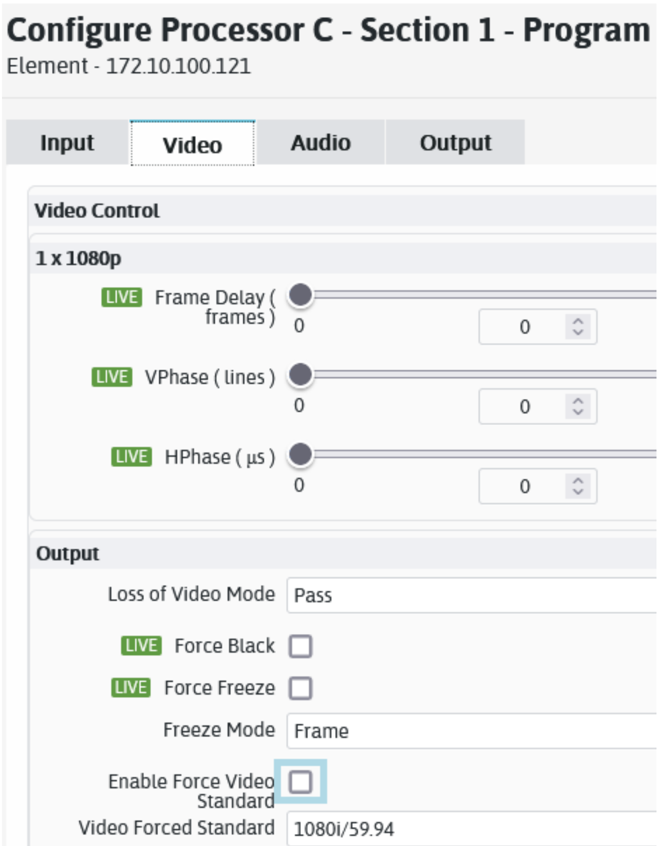
To compress an SNP program from IP/SDI input to to ST2110-22 IP output using JPEG-XS encoding, follow these steps:

1. Choose the **Section Input mode** as **IP** or **SDI** (as applicable) for the section of the processor you're working on.
2. Click the Program you want to configure to open its Configuration dialog box.
3. (*For IP input only*) On the **Input** tab, make WAN-related configurations as appropriate for your network, including the following:



   - Check the **Video IP Receiver Enable** checkbox.
   - Set the correct **Receiver Video Standard.**
   - Set the Primary and Secondary WAN selects.
   - Set the Primary IP address, UDP port, and (optional) multicast source.
   - Set the Secondary IP address, UDP port, and (optional) multicast source.
4. On the **Video** tab, ensure **Enable Force Video Standard** is unchecked

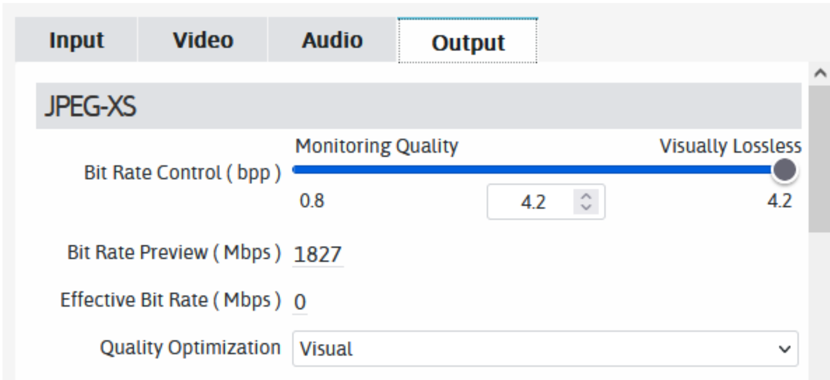
Note: Selecting **Enable Force Video Standard** forces the output video to conform to a pre-selected standard, set in the **Video Forced Standard** drop down.



Configuring Encoding Output

1. On the **Output** tab:
   a. Define the JPEG-XS compression details:
      - Set the *Bit Rate Control* (0.8 to 4.2)
      - Set the *Quality Optimization* (Visual or PSNR)

Note: Changing the *Bit Rate* or the *Quality Optimization* settings (during operation) will cause a momentary disruption of the outgoing ST2110-22 stream. This, in return, will cause the JPEG-XS Decoder to temporarily lose lock, resulting in a loss of video (e.g. black or frozen or whatever the so-called Loss of Video Mode is set to at the Decoder).

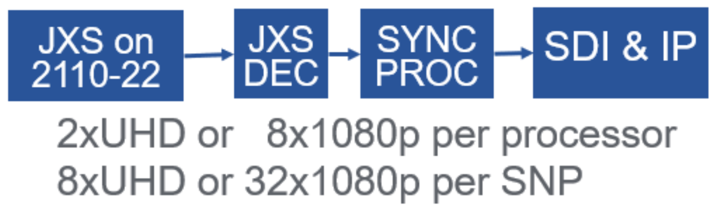


a. Make the following transmission selections:
   - Check *Video IP Transmitter Enable* under **IP Video Configuration**.
   - Make *Primary* and *Secondary WAN* settings based on your network.
   - Do the same for the *Audio* (**IP Audio Configuration** section) and ancillary data (**IP Ancillary Data Stream Configuration**) sections

Notes

- The *Bit Rate Preview* (Mbps) indicates what the currently selected Bit Rate Control (bpp) would result in (in terms of bitrate of the outgoing compressed video) - prior to clicking the 'APPLY' button. The *Effective Bit Rate* (Mbps) indicates the bitrate of the outgoing compressed video, that is currently in effect.
- On the **Video** tab, the *Outgoing Colorimetry and TCS* information can be overwritten if the information is not available from the source or knowingly wrong, i.e. it doesn't match the actual HDR flavor of the source.

JPEG-XS Decoder

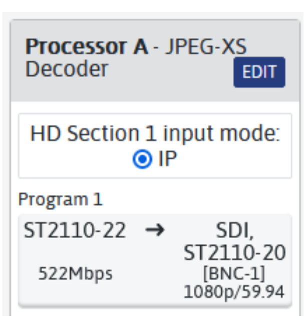


Configuration (per processor)	• 2xUHD or 8x1080p • 1xUHD + 4x1080p
Input Format	• IP (SMPTE ST-2110-22, VSF TR-08) • PTP locked or asynchronous
Video/Audio/ANC formats	• 2110-22 video (JXS) • 2110-30/31 audio • 2110-40 ANC
Processing	Audio delay/gain/shuffle, Limited video processing
Output format	SDI, 2022-6*, 2110-20
Output frame sync	Output is frame synchronized to PTP in destination system
Other	Supports HD-proxy of the received UHD videos

* When using ST2022-6 for input or output on the SNP, the actual capacity of a processor may be limited by the total bandwidth including overhead of the 2022-6 signals - specifically when operating in 1080p/59 or 1080p/50 formats, using ST 2022-6, 8x 1080p signals will exceed the 24.95Gbit/sec bandwidth ceiling of an SNP processor.

Decoding JPEG-XS

When a processor is configured as a JPEG-XS Decoder, the Input mode section is set to IP, and the video stream format is set to ST 2110-22.

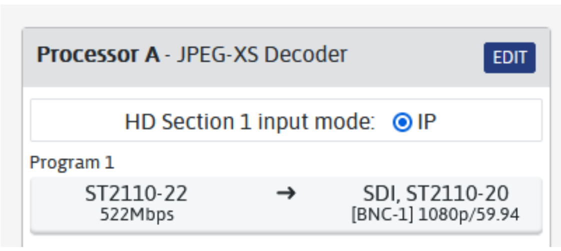


HD/UHD partitioning options similar to the Sync mode are supported and displayed. The following are possible combinations:

Mode for Section 1		Mode for Section 2		Available Decoders
Section 1	HD	Section 2	HD	8x 2K JPEG-XS Decoders

Section 1	UHD	Section 2	UHD	2x 4K JPEG-XS Decoders
Section 1	HD	Section 2	UHD	• 4x 2K Decoders (for the HD section) • 1x 4K Decoder (for the UHD section)
Section 1	UHD	Section 2	HD	• 1x 4K Decoder (for the UHD section) • 4x 2K Decoders (for the HD section)

For Processors configured as JPEG-XS Decoder, each program's 'Element' view displays ST2110-22 as the incoming standard and reports the bitrate of the JPEG-XS codestream.



Input Tab

- In the **IP Video Configuration** section, 'Receiver Mode is pre-set to ST2110-22 (JPEG-XS)
- In the **IP Video Status** section, the **JPEG-XS Stream Details** section reports status of the decoded JPEG-XS stream

Bitrate (in Mbps)	Displays the bit-rate
Compression (bits-per-pixel)	Displays the compression
Profile	Displays the Profile
Level	Displays the Video Level
Video Standard	Displays the Video Standard
Color Depth	• 0 – if input stream is missing or not recognized as an ST2110-22 stream, carrying JPEG-XS • 8 – if a valid ST2110-22 stream is being received, where the encapsulated JPEG-XS codestream originates from a Video source with 8-bit color depth • 10 – if a valid ST2110-22 stream is being received, where the encapsulated JPEG-XS codestream originates from a Video source with 10-bit color depth • 12 - if a valid ST2110-22 stream is being received, where the encapsulated JPEG-XS codestream originates from a Video source with 12-bit color depth Note that the JPEG-XS Decoder cannot process source content with an 8-bit or 12-bit color depth, hence an Alarm will be triggered (when the corresponding Alarm

	condition is enabled).
Color Subsampling	• Unknown - if input stream is missing or not recognized as an ST2110-22 stream , carrying JPEG-XS • 4:2:0 YCbCr – if a valid ST2110-22 stream is being received, where the encapsulated JPEG-XS codestream originates form a Video source with a 4:2:0 color subsampling scheme • 4:2:2 YCbCr – if a valid ST2110-22 stream is being received, where the encapsulated JPEG-XS codestream originates form a Video source with a 4:2:2 color subsampling scheme • 4:4:4 YCbCr - if a valid ST2110-22 stream is being received, where the encapsulated JPEG-XS codestream originates form a Video source with a 4:4:4 color subsampling scheme Note that the JPEG-XS Decoder cannot process source content with a 4:2:0 or 4:4:4 color subsampling, hence an Alarm will be triggered (when the corresponding Alarm condition is enabled).
Video Colorimetry	Displays the Video Colorimetry. If for some reason Color Specification is missing in the received stream, this field displays "Unknown - Color Specification box is missing"
Video Transfer Characteristics	Displays the Video Transfer Characteristics. If Include Video Support Box was unchecked in the Encoder Program, this field displays "Unknown - Color Specification box is missing.

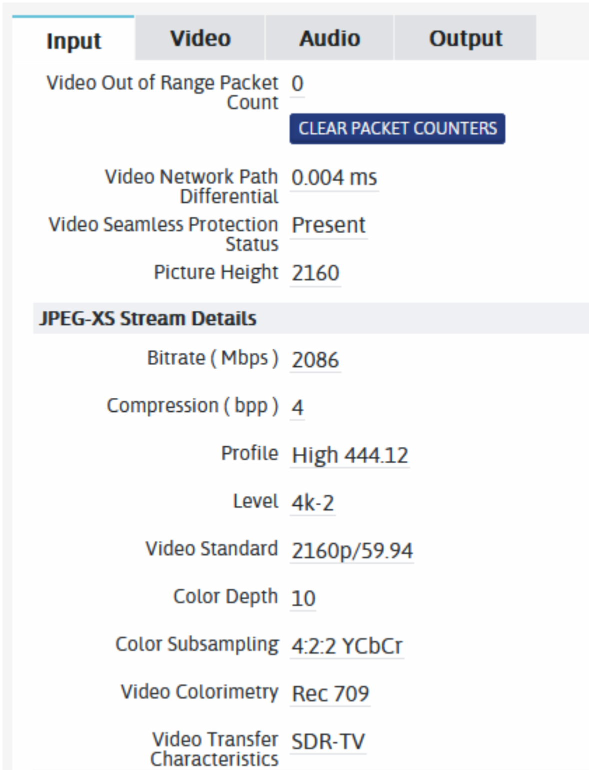


Figure 8: Example of a properly received ST2110-22 JPEG-XS stream with all metadata present, including colorimetry and transfer characteristics.

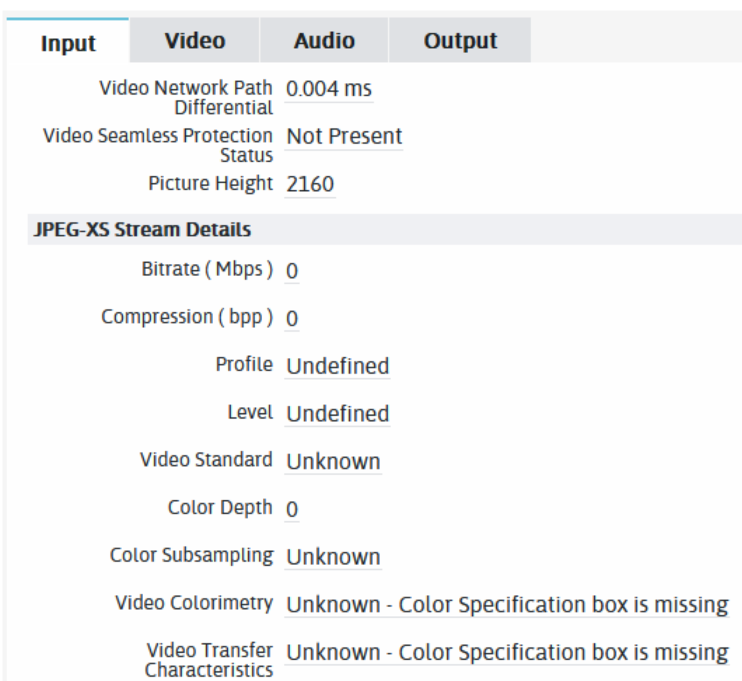


Figure 9: Example when stream is missing altogether or its content cannot be deciphered (e.g. ST2110-22 stream does not carry a standards conform JPEG-XS codestream)

- All other settings are similar to the Sync personality

Video Tab

- The controls and status information are largely identical to the Sync personality
- Note that the JPEG-XS decoder supports only non-linear domain color adjustments

Audio and Output Tabs

- The Audio and Output tabs and their control/status options are similar to the Sync personality, with minor differences

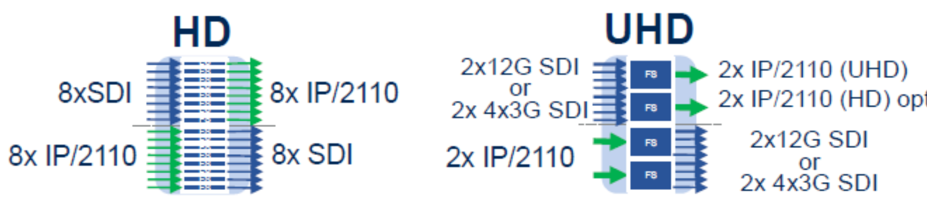
Notes:

- The JPEG-XS Decoder accepts accepts ST 2110-22 formatted IP input containing JPEG-XS compressed video
- The JPEG-XS Decoder does not support MADI
- The JPEG-XS Decoder supports non-linear Color Processor features similar to the Sync personality (e.g. Offset, Gain, Hue), but no linear or 3D-LUT operations

Configuring a Dual Gateway Personality

Note: This personality supports MADI. See MADI Support (on page 293).

Dual Gateway Personality Support	The Dual Gateway personality runs on both the SNP-XL and the Classic SNP. • The Classic SNP only supports UHD mode and automatically runs in this mode. • The SNP-XL supports both HD or UHD with 4 programs for HD and 1 program for UHD per section. Both directions in a section must be either HD or UHD. • Similar to other personalities, there are two sections per processor which are independently selectable to be (1) UHD or (four) HD streams. See Configuring a Section for HD or UHD (on page 116). • Simultaneous VSFP dual-TX and dual-RX support – for 3G, 6G, and 12G signals • All IP inputs and outputs are ST 2110 (2022-6 not supported)
Classic SNP Bi Directional (SDI to IP and IP to SDI)	• The classic SNP supports two path simultaneously. • You can have SDI input to IP output and IP input to SDI output. • The SDI input must be from the BNC and the SDI output must be from a VSFP TX. *Note: This is the only supported configuration on a classic SNP. If IP input is desired (for example 2110), the output can be from a VSFP. It cannot be from SDI output since there is only one set of BNC connectors shared by the input and output path. When running the Dual Gateway personality, the BNC is occupied by the SDI to IP path, and all the BNC connectors are configured as input. Therefore the only way you can get IP input is from the VSFP output.*
SNP-XL - Bi Directional (SDI to IP and IP to SDI)	• The SNP-XL supportS two paths simultaneously. • You can have SDI input to IP output and IP input to SDI output. • Both SDI input and output can be from either BNC or VSFP.

Paths and Channels	**SDI to IP** • 8 channels HD SDI input (16 channels audio) • 2 channels UHD SDI (16 channels audio) - HD proxy required. See Configuring Proxy Output (on page 261). • MADI input supported • Output is 2110 **IP to SDI** • 8 channels 2110 (HD) input (16 channels audio) • 2 channels 2110 (UHD) input (16 channels audio) • MADI output supported • Output is SDI 

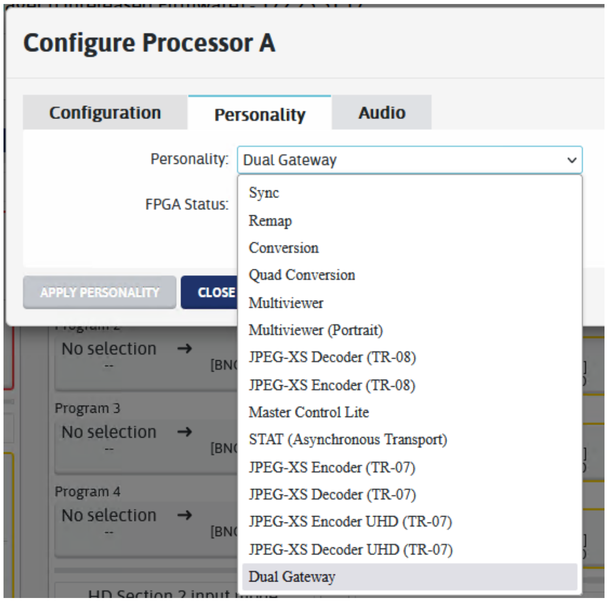
SFPs	• On a Classic SFP:
	  • **Selection:** You can select from Rx and Tx using the **SFP Select** dropdown in the **Configure Processor** dialog.
	  • **Status:** Combined SFP status for both Rx and Tx (A-D, mapping to processors A-D) is shown in the System tab (Configure > Element)
	• On an SNP-XL:
	  • **Selection:** Separate **Rx SFP** and **Tx SFP** selection fields let you select Rx and Tx SFPs separately since these can be used simultaneously.
	  • **Status:** Separate SFP status for Rx and Tx (A-D, mapping to processors A-D) is shown in the System tab (Configure > Element)

Configuring Dual Gateway	See: • Initial Configuration (on page 160) • SDI to IP Path (on page 162) • IP to SDI Path (on page 163)
Dual Gateway Licensing	The required license option is **SNP-PSK-GW88**. It can be run on classic SNP or SNP-XL. See Orderable Part Numbers (on page 35).

Possible input and output video standards	Possible Input and Output Interfaces
HD section mode • 720p/50 • 720p/59.94 • 1080i/50 • 1080i/59.94 • 1080p/23.98 • 1080psf/23.98 • 1080p/25 • 1080p/24 • 1080psf/24 • 1080p/29.97 • 1080p/50 • 1080p/59.94 **UHD section mode** • 2160p/50 • 2160p/59.94 • 2160p/23.98 • 2160p/24 • 2160p/25 • 2160p/29.97	• HD-SDI • 3G-SDI • 2SI-SDI • 6G-SDI • 12G-SDI • 2110-20

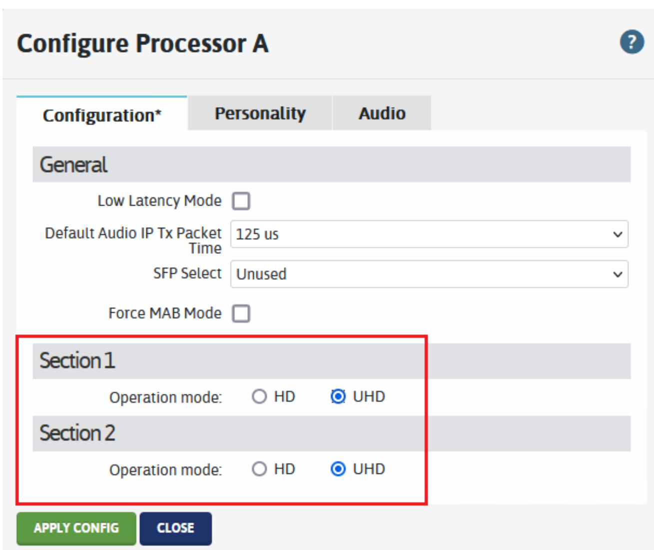
Initial Configuration

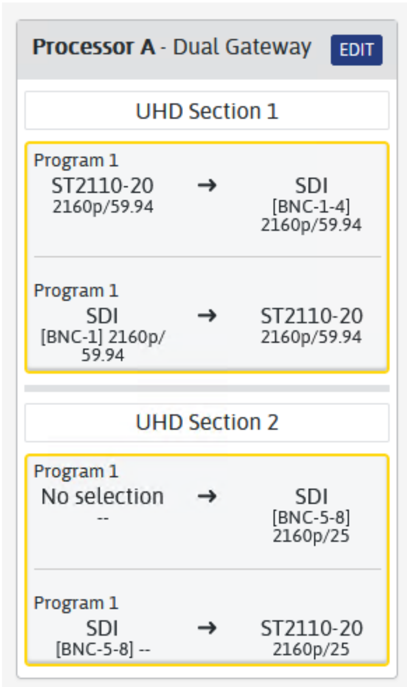
1. Click **Edit** on the Processor, go to the **Personality** tab, and set the Personality to **Dual Gateway**



2. Go to the **Configuration** tab and set the Section operation modes to **HD** or **UHD** as desired.

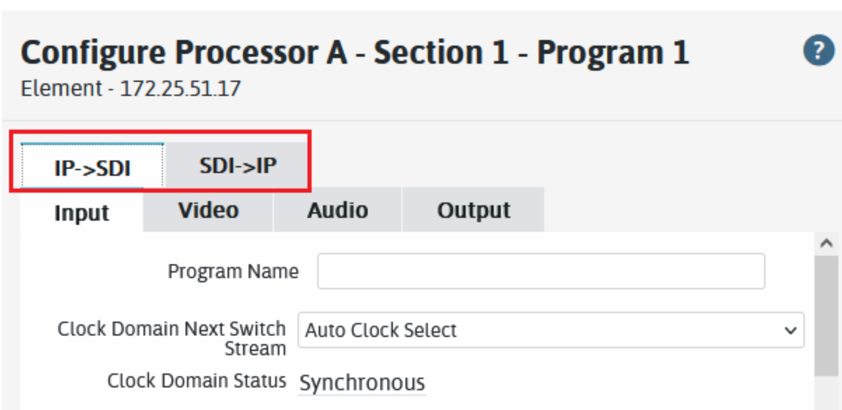
Note that this is only an option on an SNP-XL chassis; on SNP chassis, you will not see the Section operation modes as UHD is used by default.





3. Click the Program you want to configure to open its Configuration dialog box.
4. Select the **IP > SDI** or **SDI > IP** tab depending on what you're configuring

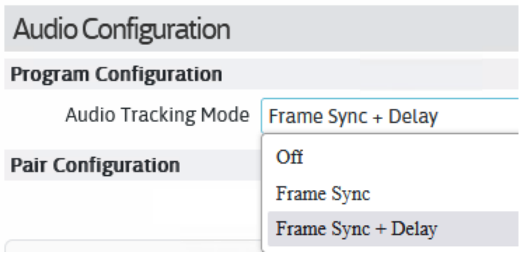
Within these tabs, parameters are filtered to display specific settings. For example, the IP to SDI tab's Input tab contains settings relevant to IP input. And the Output tab contains settings applicable to SDI Output.



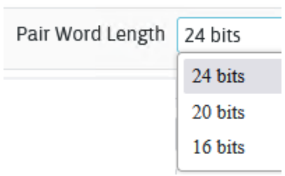
- See SDI to IP Path (on page 162)
- See IP to SDI Path (on page 163)

SDI to IP Path

1. On the **Audio** tab:
   - Audio tracking can be disabled (Off) or enabled with (Frame Sync + Delay) or without delay (Frame Sync).



   - The **Pair Word Length** can be set to 20, 24, or 16 bits



   - In the **Output Channel Configuration** for the Audio, you can choose Input from from DMB (de-embedded channels), EXP (extended channels), TONES (test tones), or APIN (IP channels). DMB is preselected as the **Input Type Select**, since it represents embedded audio.

2. On the **Video** tab:
   - Set **Video Control (Delay), Output, and Test Signal Generator** settings
   - Proxy options are only supported UHD sections (Note that the classic SNP is always UHD when set to the Dual Gateway personality, and can be UHD or HD for SNP-XL). Select:
     - The Proxy Input: UHD, Link 1-4
     - Whether to allow Proxy 3G Output
3. On the **Output** tab:
   - Check **Video IP Transmitter Enable** under **IP Video Configuration**.
   - Set **Transmitter Mode** to **ST2110-20**.
   - Make Primary and Secondary WAN settings based on your network.
   - (Optional) Configure proxy output, as described in Configuring Proxy Output (on page 261).
   - Make Ancillary Data settings as desired. See Output Tab: Ancillary Data Configuration (on page 461)
   - Make IP Ancillary Data Stream configurations as desired. See Output Tab: IP Ancillary Data Configuration (on page 461)

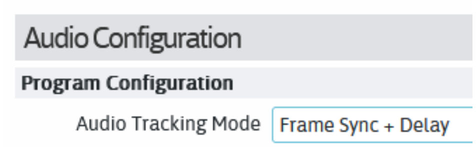
IP to SDI Path

Note: SNP Classic supports two directions: SDI input to IP output, and IP input to SDI output. The SDI input must be from the BNC and the SDI output must be from a VSFP TX.

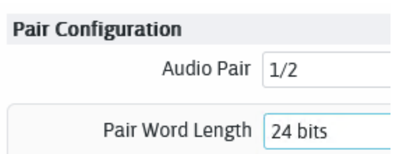
If IP input is desired (for example 2110), the output can be from a VSFP. It cannot be from SDI output since there is only one set of BNC connectors shared by the input and output path.

The IP > SDI path requires a TX SFP configured to output SDI.

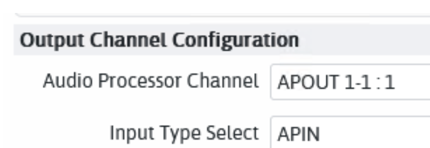
1. On the **Input** tab, make WAN-related configurations as appropriate for your network, including the following:
   - Check the **Video IP Receiver Enable** checkbox.
   - Set the correct **Receiver Video Standard**.
   - Set the Primary and Secondary WAN selects.
   - Set the Primary IP address, UDP port, and (optional) multicast source.
   - Set the Secondary IP address, UDP port, and (optional) multicast source.
2. On the **Audio** tab:
   - Audio tracking is always enabled in Frame Sync with delay mode (Audio Tracking Mode set to **Frame Sync + Delay**). By itself, Frame Sync isn't supported (on or off).



   - For a pair configuration, the **Pair Word Length** is set to 24 bits

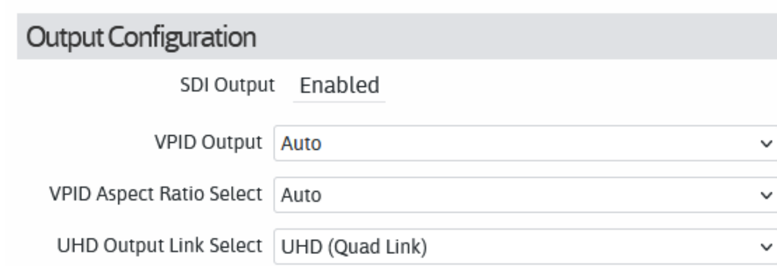


   - In the **Output Channel Configuration** for the Audio, you can choose Input from from DMB (de-embedded channels), EXP (extended channels), TONES (test tones), or APIN (IP channels). APIN is preselected as the **Input Type Select**, since it represents IP audio.



3. On the **Output** tab, make the following selections:

- Make Output configuration selections



- Make SDI Audio Embedding selections.
- Make any Ancillary Data configurations. See Output Tab: Ancillary Data Configuration (on page 461)

4. Click **Apply** to save the configuration.

Configuring a TR-07 Personality

VSF TRF-07 (Video Services Forum Technical Recommendation TR-07) defines profiles for streaming of JPEG XS video, and establishes an interoperable method for transporting that compressed video along with associated audio and ancillary data in an MPEG-2 Transport Stream.

The SNP provides support for sending/receiving TR-07 streams via **JPEG-XS Encoder/Decoder TR-07** personalities. There are four TR-07 personalities, including a dedicated Encoder/Decoder to process UHD. The main purpose of these personalities is transport, so there's limited processing.

JPEG-XS (TR-07) Support	The **JPEG-XS TR-07** personalities (Encoder and Decoder) are structurally similar to the Sync and JPEG-XS classic personalities, and perform compression or decompression of the video signal in compliance with **VSF-TRF's TR-07** standard. • Different bit rates can be configured (.8 to 4.2 bits per pixel) for compression, depending on the requirement. • Both the encoder and the decoder support audio shuffling and VANC data filtering. Among other applications, these personalities enable inter-facility connection at a reasonable bit rate.
JPEG-XS Components	The **JPEG-XS TR-07** personalities include: • **JPEG-XS Encoder (TR-07):** Supports HD and 3G encoding • **JPEG-XS Decoder (TR-07):** Supports HD and 3G decoding • **JPEG-XS Encoder UHD (TR-07):** Supports UHD encoding • **JPEG-XS Decoder UHD (TR-07):** Supports UHD decoding

Support	**HD Encode and Decode Personalities**
	• **Video**
	  • TR-07 Capability Set A with 8 streams of HD/3G (4 per section).
	  • The Encoder uses a hard coded PID (Packet Identifier) for the JPEG-XS transport stream - JXS PID=49.
	
	• **Audio**
	  • TR-07 Capability Set A is partially supported
	(2 instead of 4 Audio PIDs, however, the number of supported Audio channels is still 2 x 8 = 16).
	  • *Encoder*: 2 PID with 4 AES3 per PID. 16 channels.
	The Encoder uses the following hard coded PIDs for the ST302 (Audio) transport streams:
	- Stream #1: PID=50
	- Stream #2" PID=51
	  • *Decoder*: Maximum of 2 ST302 (Audio) PIDs with 1-4 AES3 per PID (for a total of 8 Audio stereo pairs = 16 channels).
	
	• **ANC**
	  • Capability Set A supported.

<table>
<tr><td></td><td>
The Encoder uses a hard coded PID for the ST2038 (ANC) transport stream: ANC PID=54
UHD Encode and Decode Personalities

Video
TR-07 Capability Set B with 2 streams of UHD (1 per section).
The Encoder uses a hard coded PID (Packet Identifier) for the JPEG-XS transport stream - JXS PID=49.
Audio
TR-07 Capability Set B supported except limited to 16 channels
Encoder: 2 PID with 4 AES3 per PID. 16 channels.
The Encoder uses the following hard coded PIDs for the ST302 (Audio) transport streams:
- Stream #1: PID=50
- Stream #2" PID=51
Decoder: Maximum of 2 ST302 (Audio) PIDs with 1-4 AES3 per PID (for a total of 8 Audio stereo pairs = 16 channels).
ANC
Capability Set B supported
The Encoder uses a hard coded PID for the ST2038 (ANC) transport stream: ANC PID=54

</td></tr>
<tr><td>Currently supported uncompressed video source formats:</td><td>

720p/50
720p/59.94
1080i/50
1080i/59.94
1080p/23.98
1080psf/23.98
1080p/24
1080psf/24
1080p/25
1080p/29.97
1080p/50
1080p/59.94
2160p/24 (UHD personality only)
2160p/25 (UHD personality only)
2160p/23.98 (UHD personality only)
2160p/29.97 (UHD personality only)
2160p/50 (UHD personality only)
2160p/59.94 (UHD personality only)

</td></tr>
</table>

Control	• GUI (Local or remote SMM) • RESTFul API • NMOS for device connection management (only for ST-2110-x based interfaces) • SEAM via SDNO for device connection management
JPEG-XS Licensing	TR-07 is enabled by the standard JPEG-XS licensing: • **SNP-PSK-JXSE** (JPEG-XS Encoder Personality) for encoding • **SNP-PSK-JXSD** (JPEG-XS Decoder Personality) for decoding. See Orderable Part Numbers (on page 35)

Note: SNP's TR-07 personalities comply with the TR-07 specification, with a slight deviation in the audio streams. While 16 audio channels are supported, this is done over 2 streams and not 4. The resultant output is the same at the receiver end.

TR-07 Encoder

Configuration (per processor)	• The **JPEG-XS Encoder (TR-07) HD/3G** personality lets you configure four programs per section for a total of 8 programs, and each program supports a total of 16 audio channels. • The **JPEG-XS Encoder (TR-07) UHD** personality lets you configure one programs per section for a total of 2 programs, and each program supports a total of 16 audio channels. See Configuring Encoding Input (on page 170) and Configuring Encoding Output (on page 173)

Inputs	• SDI (BNCs 1-4)
	• SDI (BNCs 5-8)
	• IP
	  • ST 2110-20/30/31/40
	  • ST 2022-6 (Only supported in HD/3G personality)
	Note: VSF TR-07 imposes bandwidth limitations for ANC services being carried as MPEG2 TS via ST2022-2. It is advised not to waste bandwidth by transporting duplicates of services. Allowing duplicated ANC services can render unrelated ANC services unusable.

Processing	• Video test generation, audio tone generator, OSD, audio channel selection

Video Output format (JXS, Audio & ANC, together with program specific information, aka PSI). The PSI is comprised of a Program Association Table (PAT), a Program Map Table (PMT) and the Program Clock Reference (PCR)	• ST 2022-2 TR-07 IP (no FEC). Unicast or multicast. Single-program MPEG2 Transport Stream (per channel) per TR07. Stream is also exposed via SEAM (SDNO support).
Compression	• Operating Range for approximately 1.0 to 4.0 BPP (see compression options below)
Proxy	• Both TR-07 UHD flavors (ENC & DEC) support Proxy outputs (basically the same Proxies supported in other personalities, e.g. SYNC). • Note that the TR-07 UHD Encoder does not transmit the Proxies via TR-07 (MPEG-2 TS wrapped in ST2022-2). Instead, the Proxy outputs are ST2110-20 (or 2022-6 ?) • Proxy 3G output will not work for the TR07 Encoder in UHD mode if the Proxy Input Select is either Link 2, Link 3 or Link 4.

Compression Options

The following table provides a snapshot of compressed bit-rates for different coding rates and formats. This is configured using the *Bit Rate Control* parameter in the *JPEG-XS* section of the *Output* tab for a JPEG-XS Encoder processor.

- 4 BPP is production quality
- 2.5 BPP is contribution grade
- 1.5 BPP and lower is monitoring quality

Representative Bit Rates for Typical Formats (Mbps)

	Monitoring Quality	**Near Visually Lossless (Contribution Quality)**	**Visually Lossless (Production Quality)**
	1.5 BPP and lower	**2.5 BPP**	**4 BPP**
1080i @ 50	82 Mbps	136 Mbps	218 Mbps
1080i @ 59	98 Mbps	163 Mbps	261 Mbps
1080p @ 50	164 Mbps	272 Mbps	435 Mbps
1080p @ 59	196 Mbps	326 Mbps	522 Mbps
2160p @ 50	653 Mbps	1088 Mbps	1740 Mbps
2160p @ 59	783 Mbps	1304 Mbps	2086 Mbps

See:

- Configuring Encoding Input (on page 170)

- [Configuring Encoding Output](#) (on page 173)

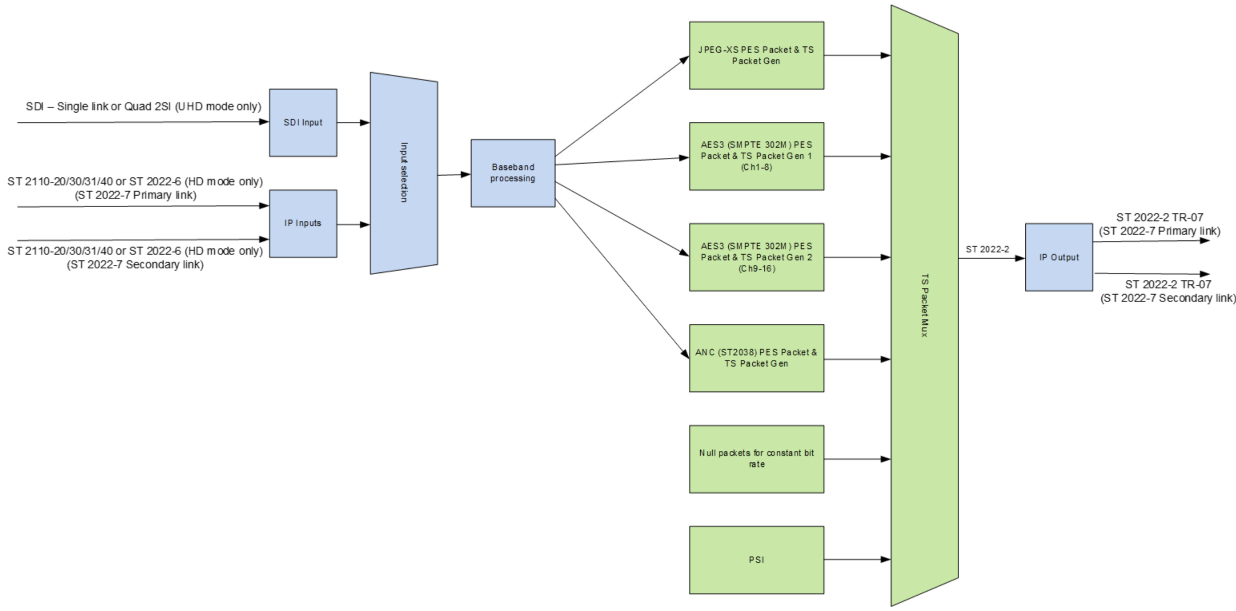
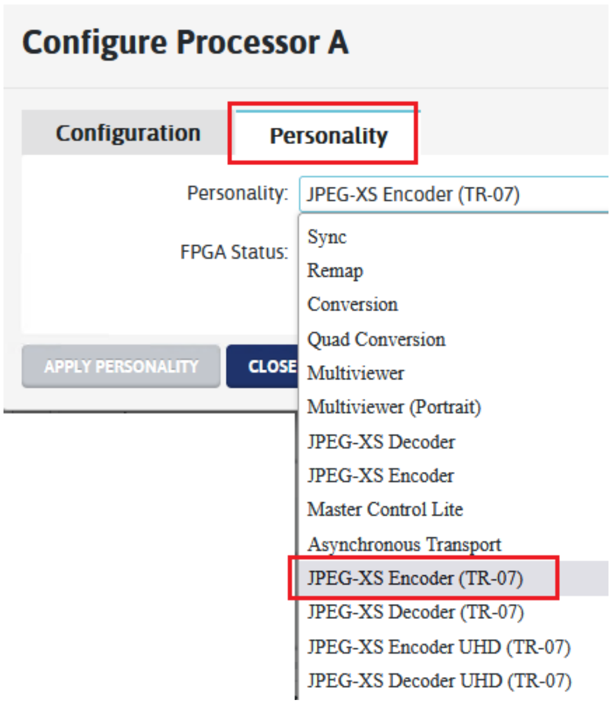


Figure 10: TR-07 Encoder Block Diagram

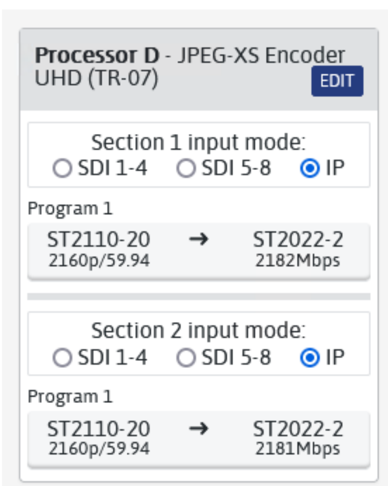
Configuring Encoding Input

To compress an SNP program from IP/SDI input to to ST2110-22 IP output using JPEG-XS TR-07 encoding, follow these steps:

1. Ensure the Processor has been set to **JPEG-XS Encoder (TR-07)**. To do this:
   a. Click the **Edit** button on the desired Processor and go to the **Personality** tab.
   a. Select the **JPEG-XS (TR-07) Encoder** Personality or the **JPEG-XS Encoder UHD (TR-07)** Personality, depending on which one you need. Click **Apply Personality**.

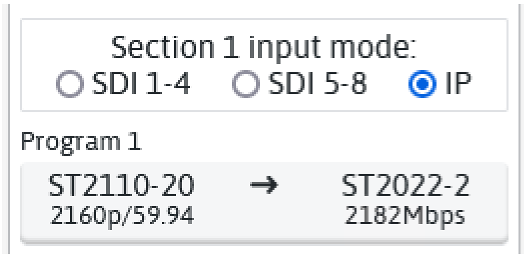


2. Note that there are 2 sections, with 4 programs each for HD/3G, and 1 one program each for UHD.



3. Choose the **Section Input mode** as **IP** or **SDI** (as applicable) for the section of the processor you're working on.
4. Click the **Program** you want to configure to open its Configuration dialog box.

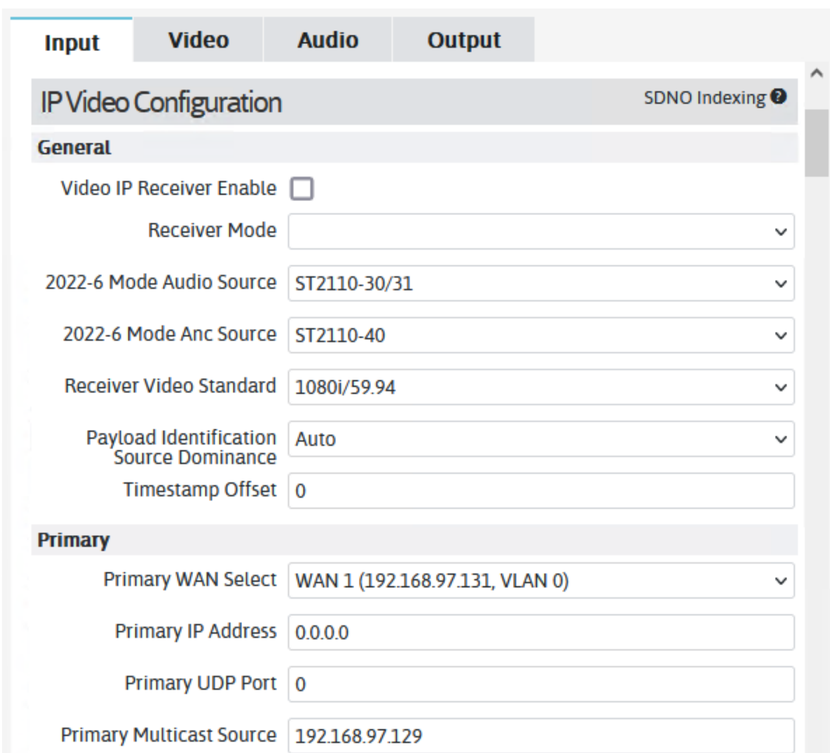
Note: For Processors configured as JPEG-XS Encoder (TR-07), each program's '*Element*' view displays ST2022-2 as the standard (indicating program packaging into an RTP transport stream via the ST2022-2 standard) and reports the bitrate under it. Unlike the classic JPEG-XS personality, the stream container includes not just video, but also audio and ancillary data. All of this is transported as a single stream, at the listed bit rate.



5. The **Input** tab lists options similar to the classic JPEG-XS Encoder personality.

Note that there is no HDR/color processing due to resource restrictions.

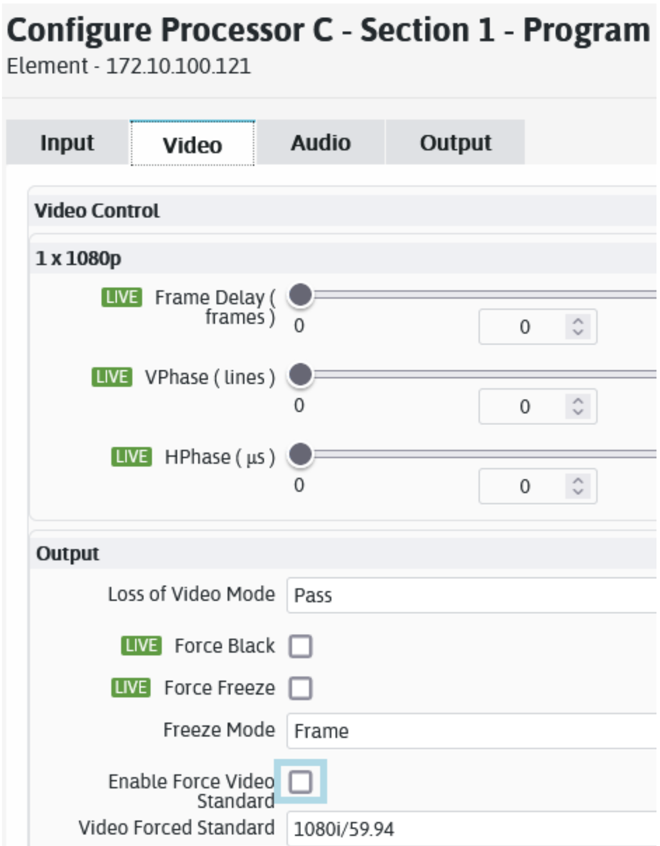
6. (*For IP input only*) On the **Input** tab, make WAN-related configurations as appropriate for your network, including the following:



- Check the **Video IP Receiver Enable** checkbox.
- Set the correct **Receiver Video Standard** or **Receiver UHD Video Standard** (in case of UHD)/
- Set the Primary and Secondary WAN selects.
- Set the Primary IP address, UDP port, and (optional) multicast source.
- Set the Secondary IP address, UDP port, and (optional) multicast source.

7. On the **Video** tab, ensure **Enable Force Video Standard** is unchecked

Note: Selecting **Enable Force Video Standard** forces the output video to conform to a pre-selected standard, set in the **Video Forced Standard** drop down.

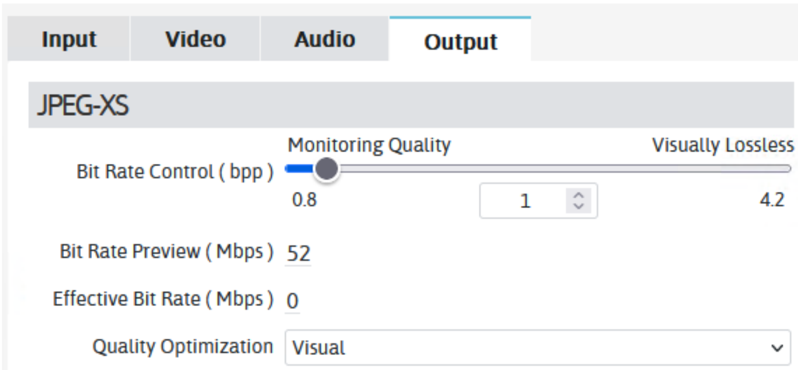


8. Proxy options are only supported on the UHD personality. Select:
   - Whether to force Proxy Output from the Main Program Color Space to SDR-709
   - The Proxy Input: UHD, Link 1-4
   - Whether to allow Proxy 3G Output

9. The **Audio** tab is similar to the classic JPEG-XS Encoder personality, minus any Dolby audio controls.
10. Next, see Configuring Encoding Output (on page 150).

Configuring Encoding Output

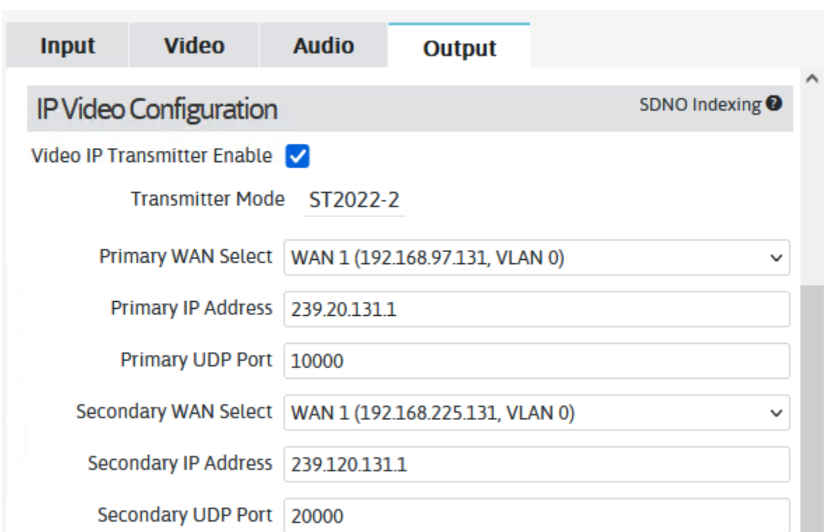
1. The **Output** tab's **JPEG-XS** section is similar to the classic JPEG-XS where you define compresssion settings. Note that the Bit Rate here refers to just the video portion, not the whole stream.



- Set the *Bit Rate Control* (0.8 to 4.2)
- Set the *Quality Optimization* (Visual or PSNR)

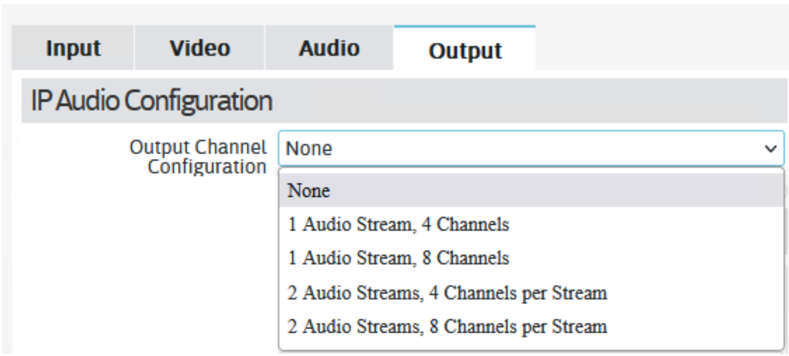
Note: Changing the *Bit Rate* or the *Quality Optimization* settings (during operation) will cause a momentary disruption of the outgoing ST2110-22 stream. This, in return, will cause the JPEG-XS Decoder to temporarily lose lock, resulting in a loss of video (e.g. black or frozen or whatever the so-called Loss of Video Mode is set to at the Decoder).

2. In the **IP Video Configuration** section:



- Check *Video IP Transmitter Enable* under **IP Video Configuration**.
- Enter the multicast IP address. Note that this is a single IP, since everything goes out in a single stream/container.

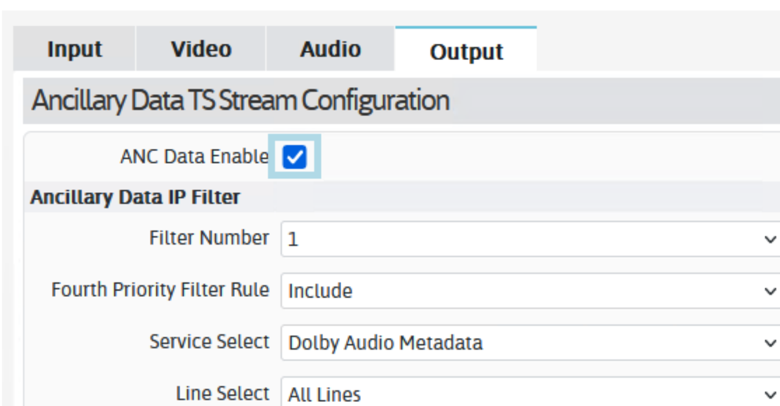
3. In the **IP Audio Configuration** section, select one of the channel configuration options - no audio, a single stream with 4 or 8 channels, or 2 streams with 4 or 8 channels:



- **None**: The outgoing container will not contain any audio
- 1 Audio Stream, 4 Channels
- 1 Audio Stream, 8 Channels
- 2 Audio Streams, 4 Channels per Stream
- 2 Audio Streams, 8 Channels per Stream

Note: The above options comply with ST302 which is limited to 8 channels per stream. The streams are configured using an MPEG-2 transport stream, but JPEG-XS is compression is used instead of MPEG. There is no section for a dedicated multicast address for audio since it all goes on out one stream, defined in the **IP Video Configuration** section.

4. In the **Ancillary Data TS Stream Configuration s**ection, select **ANC Data Enable** to include ancillary data, uncheck to exclude it.



Note: There is no section for a dedicated multicast address for ancillary data since it all goes on out one stream, defined in the **IP Video Configuration** section.

TR-07 Decoder

Configuration (per processor)	• 4 programs per section (HD/3G) • 1 program per section (UHD)
Input Format	• VSF TR-07 Transport Stream (via ST2022-2)
Processing	Frame Sync, Video Test generator, Audio tone generator, OSD, Audio channel section
Output format	SDI, ST 2110-20/30/31/40 IP or ST 2022-6

See:

Decoding TR-07 (on page 176)

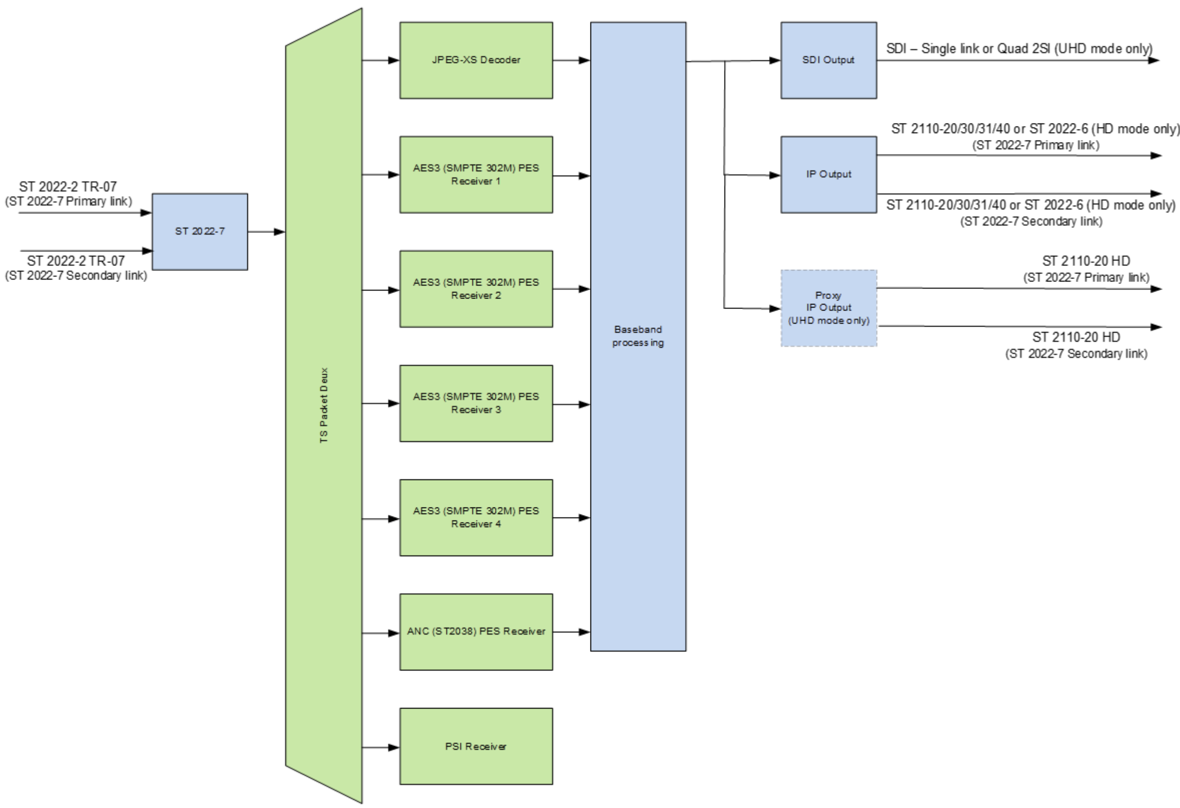
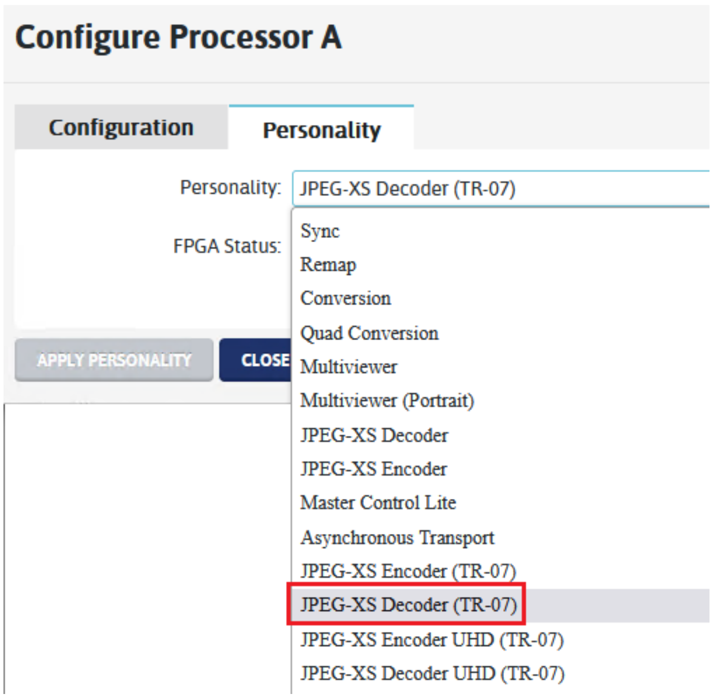


Figure 11: TR-07 Decoder Block Diagram

Decoding TR-07

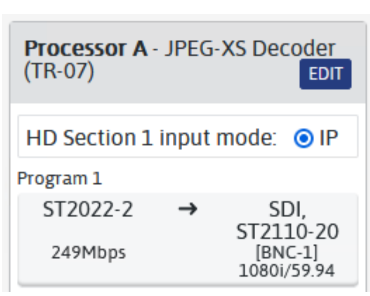
To decode an SNP TR-07 program, follow these steps:

1. Ensure the Processor has been set to **JPEG-XS Decoder (TR-07)** or **JPEG-XS Decoder UHD (TR-07)**. To do this:
    a. Click the **Edit** button on the desired Processor and go to the **Personality** tab.
    a. Select the **JPEG-XS Decoder (TR-07)** or **JPEG-XS Decoder UHD (TR-07)** Personality. Click **Apply Personality**.

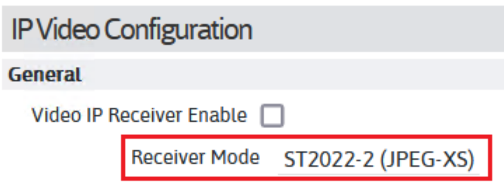


2. The **Section Input mode** is set to **IP.** Click the Program you want to configure to open its Configuration dialog box.

Note: For Processors configured as JPEG-XS Decoder (TR-07), each program's *'Element'* view displays ST2022-2 as the incoming standard (indicating program packaging into an RTP transport stream via the ST2022-2 standard) and reports the bitrate of the JPEG-XS codestream. Note that ST-2022-2 is pre-set, as this is the only accepted input format for a TR-07 Decoder. The sole purpose of the TR-07 Decoder is to work with TR-07 input streams, therefore none of the other formats are supported including JPEG-XS classic. If you attempt to input any of these, you will see 0 on the input for incoming data, and output would be frozen or black depending on what is set.



3. The **Input** tab lists options similar to the classic JPEG-XS Encoder personality. There are no PTP controls (locked, async, etc.) because TR-07 streams are always regarded to be asynchronous.
4. **Receiver Mode** is set to **ST2022-2 (JPEG-XS)** as this is what a TR-07 encoder produces, which is the only valid input for this Decoder.

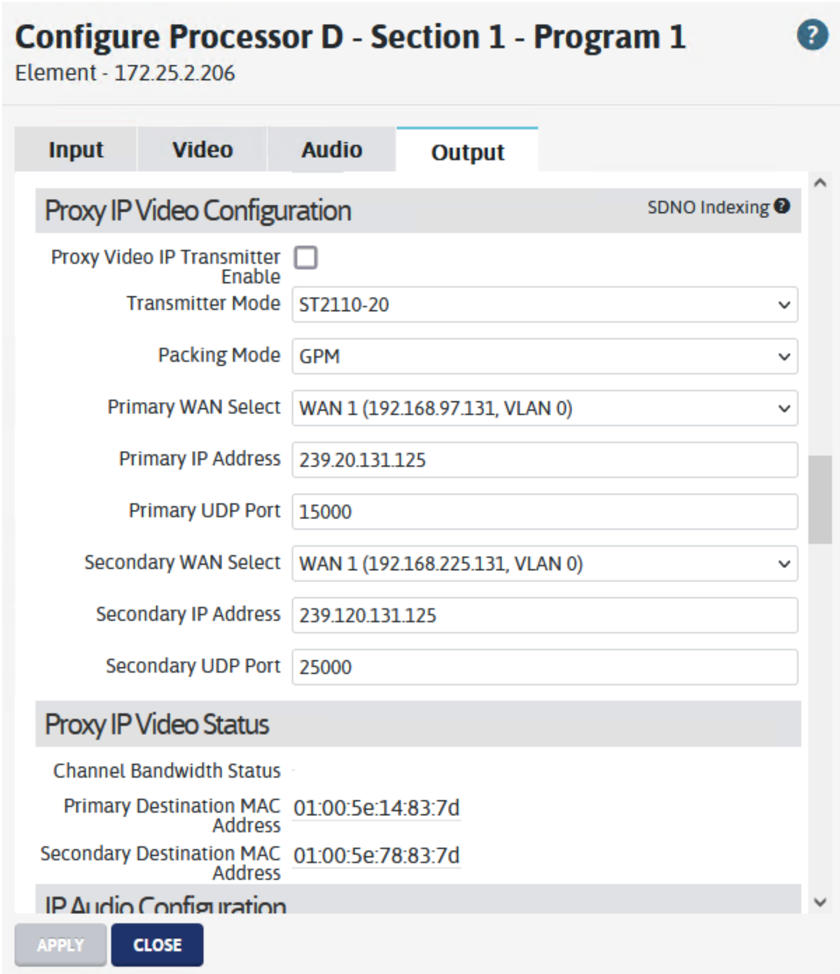


5. In the **IP Video Configuration** section, specify a single multicast address. This is the IP address for the 2022-2 container.
6. The IP Video Status section, **JPEG-XS Stream Details**, lists TR-07 status information:
   - **TR07 Demux Status:** A basic status field that displays PIDs for all PSI packets that don't have a preassigned PID (e.g. PMT and PCR) and PIDs of all so-called essence services, if present (JXS, Audio, ANC).

     For example, when receiving a TR-07 stream originating from the TR-07 Encoder (with 2 Audio PIDs), the Decoder displays:
     `TR07 Demux Status: OK PMT:48 PCR:63 JXS:49 A1:50 A2:51 ANC:54`
   - **TR07 Audio Status**: Displays mapping options (depending on what was selected) . For example. A1 and A2 denote 2 streams, and each stream contains 8 channels, and then the channels within those streams (for example, 0-7 and 8-15)
   - **TR07 Ancillary Data Status**: Reports *Anc OK* if transmission is as expected.
   - **TR07 Audio PCM Status**: Reports if the audio is PCM or non-PCM (for example, Dolby).

   The other Video settings are similar to the TR-07 encoder. Note that there is no HDR/color processing due to resource restrictions.
7. In the **Audio** tab for the Decoder, Dolby header alignment can be set if required. The rest of the audio tab is similar to the classic JPEG-XS.
8. The **Output** tab is similar to classic JPEG XS. The uncompressed output can be sent out as ST2022-6 or ST2110.

9. In case of the UHD personality, if desired, proxy output settings can be defined in **Proxy IP Video Configuration**



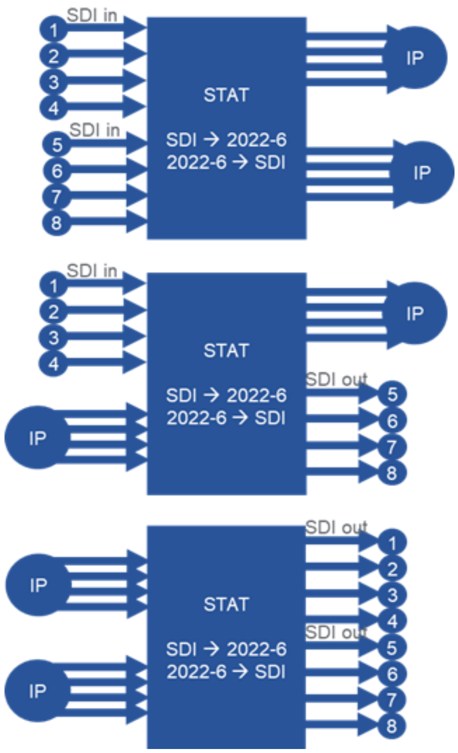
Note: ST302 (Audio) transport streams with a lower PID will be mapped into the lower audio output stereo pairs first unless the channel configuration (`number_channel` and `channel_identification`) in AES3 header indicates otherwise. When switching ST302 streams with different channel configurations, the audio output re-mapping will happen after the switch. In such cases, momentary audio glitches at the output are expected.

Configuring a Simple Transparent Asynchronous Transport (STAT) Personality

STAT Personality	The Simple Transparent Asynchronous Transport (STAT) personality lets you transport SDI or IP signals over an IP network, and output as SDI or IP.
Inputs	• There are eight inputs per processor (4 per section), similar to the Sync personality. • Input is transported asynchronously over IP without any modification, processing, or conversion. • The IP/SDI input becomes 2022-6/7 on the network, and the 2022-6/7 from the network becomes the SDI/IP output. • You can configure up to 4 STAT personalities on a single SNP unit

Inputs/Outputs	• For inputs/outputs, you can have:
	  • All SDI input (both sections)
	  • All IP input (both sections)
	  • Mixed SDI and IP input (one section SDI, the other IP)

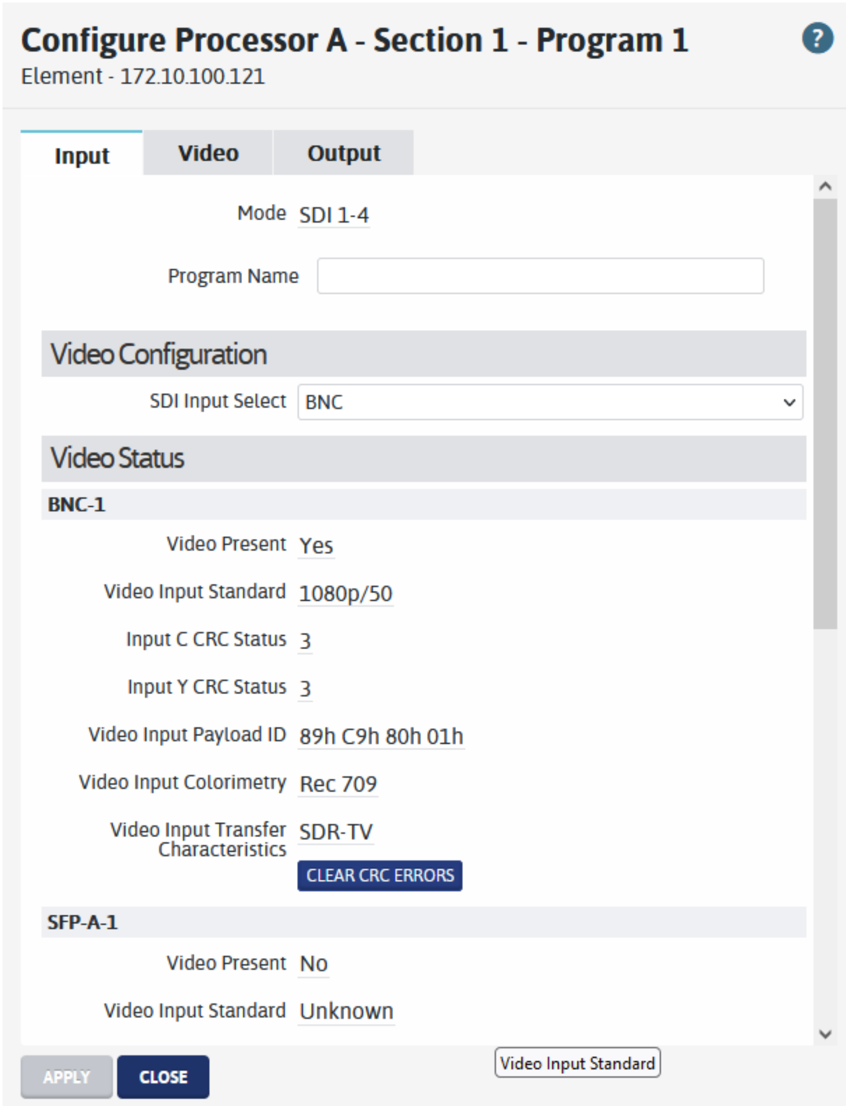
Supported Formats	• All typical SDI formats up to 1080p are supported • The IP format is ST 2022-6 with 2022-7 redundancy • The Operation Mode is currently limited to HD
Supported SDI Formats	• 720p/50 • 720p/59.94 • 625i/50 • 525i/59.94 • 1080i/50 • 1080i/59.94 • 1080p/23.98 • 1080psf/23.98 • 1080p/24 • 1080psf/24 • 1080p/25 • 1080p/29.97 • 1080p/50 • 1080p/59.94



STAT with SDI Input

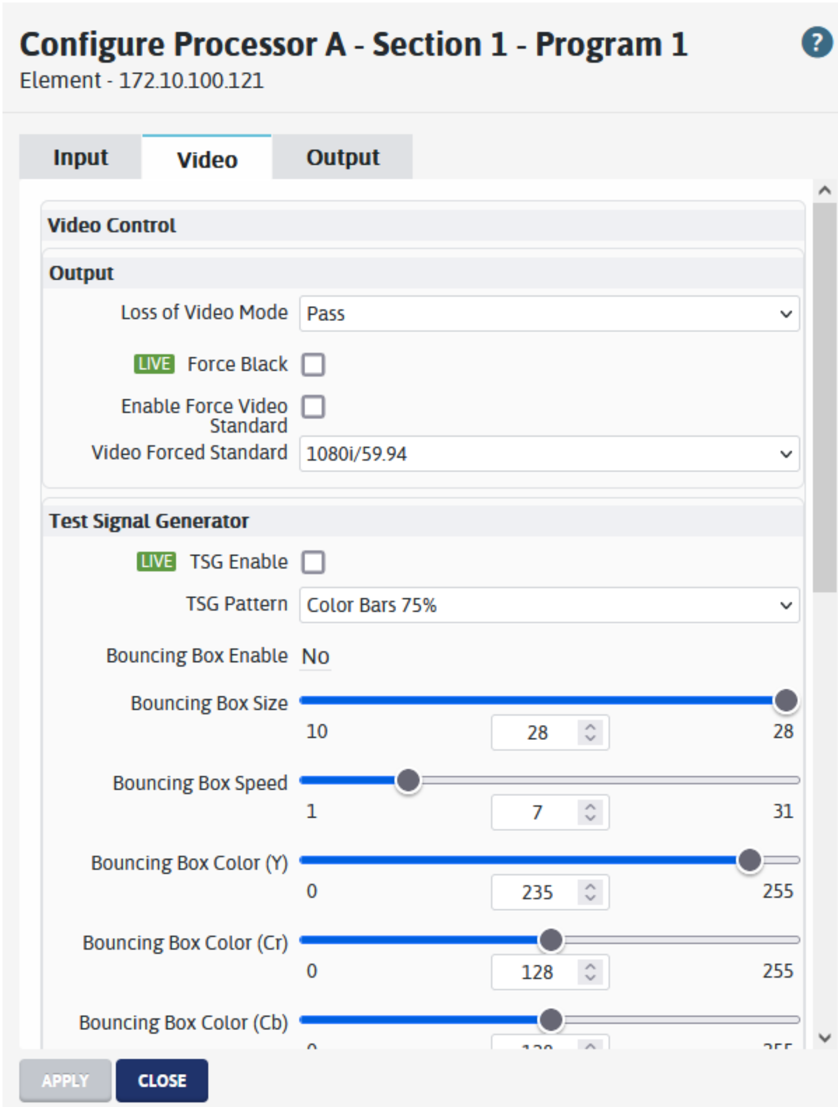
The program configuration tabs for STAT input are similar to the SYNC personality, with the following differences:

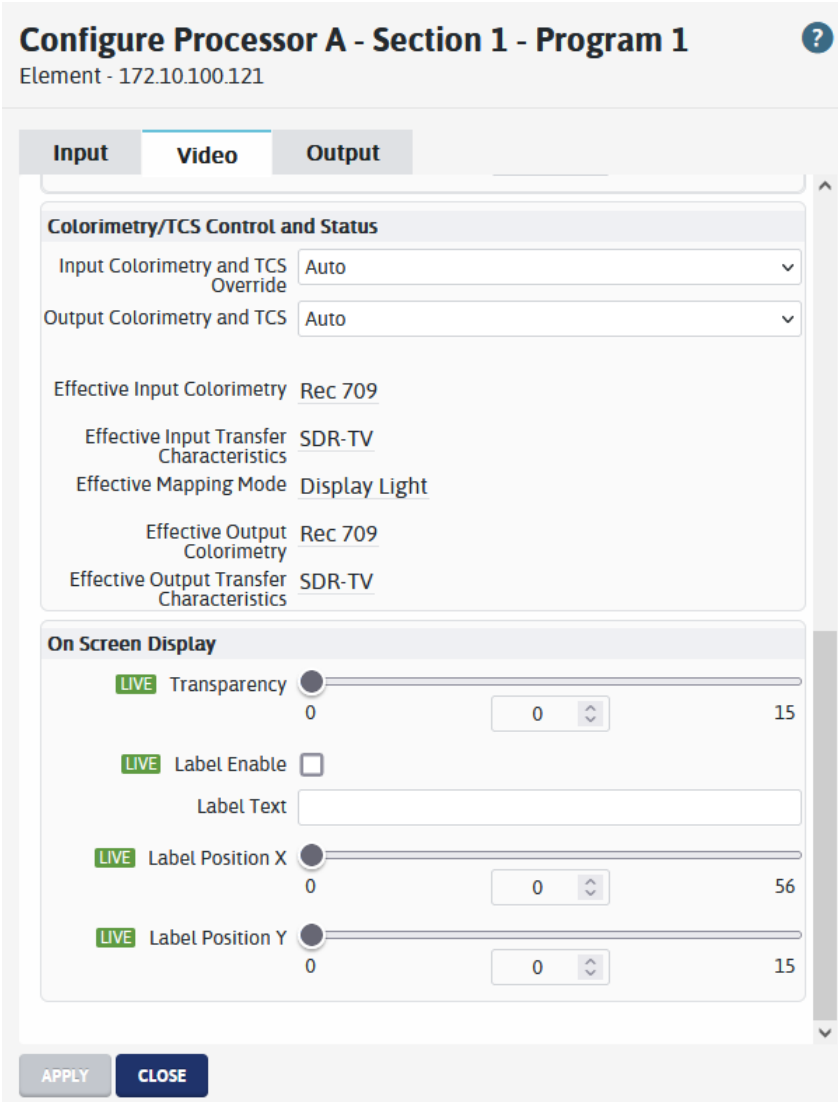
Input Tab



- The **Audio De-Embedder**, **SDI Audio Routing**, **Audio SRC Config/Status** and **Audio Channel Config/Status** sections are not displayed

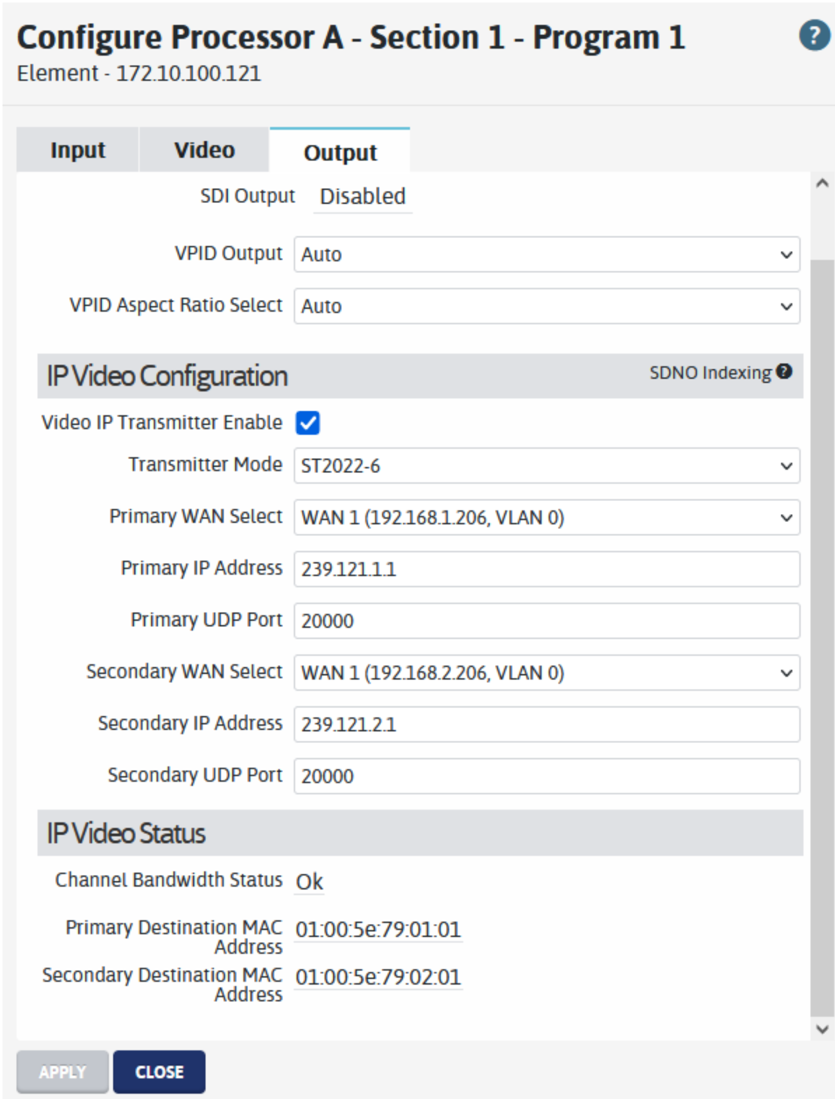
Video Tab


Configure Processor A - Section 1 - Program 1
Element - 172.10.100.121
Input
Video
Output
Video Control
Output
Loss of Video Mode
Pass
LIVE
Force Black
Enable Force Video Standard
Video Forced Standard
1080i/59.94
Test Signal Generator
LIVE
TSG Enable
TSG Pattern
Color Bars 75%
Bouncing Box Enable
No
Bouncing Box Size
10
28
28
Bouncing Box Speed
1
7
31
Bouncing Box Color (Y)
0
235
255
Bouncing Box Color (Cr)
0
128
255
Bouncing Box Color (Cb)
APPLY
CLOSE



- *Delay/Phasing*, *Force Freeze*, *Force Black* controls are not displayed
- *Input Colorimetry and TCS Override* and *Output Colorimetry and TCS* is set to *Auto*
- The **Color Adjustment** section is not displayed
- The **Video Status** section is not displayed
- If you enable TSG, you will not get any audio output because there is no audio embedder after the TSG.

Output Tab



- In the **IP Video Configuration** section, *Transmitter Mode* is set to *ST-2022-6*
- The *Packing Mode* and *SD Extended Window Size* parameters is not available
- In the **SDI section**, *VPID Output* and *VPID Aspect Ratio Select* controls are not displayed
- **IP Audio Configuration**, **IP Audio Status**, **IP Ancillary Data Stream Configuration**, **IP Ancillary Data Stream Status**, **SDI Audio Embedder** sections are not displayed

STAT with IP Input

Input Tab

- *Clock Domain Next Switch Stream* is set to *Asynchronous*
- In the **IP Video Configuration** section, *Receiver Mode* is fixed at *ST-2022-6*
- *Timestamp Offset* and *SD Height* parameters are not available
- **IP Audio Configuration**, **IP Audio Routing**, **IP Audio Status**, **Audio SRC Config Status**, **Audio Channel Config/Status**, **IP Ancillary Data Stream Configuration**, **IP Ancillary Data Stream Status** sections are not displayed

The other tabs are similar to STAT with SDI Input (on page 180).

STAT Licensing

The STAT personality is enabled by the **SNP-PSK-SYNC** (SYNC/REMAP/STAT personality) license. See Orderable Part Numbers (on page 35).

Note: If you do not have a Sync/Remap/STAT license, but still assign this personality to a processor, output will be disabled and forced to black.

Master Control Lite (MCL) Personality

The Master Control Lite (MCL) Personality provides the following features:

- Mixing/switching between two Program (PGM) / Background inputs (A and B)
- Keying other video signals over the Program (PGM) Mixer's output
- Generating internal Logo Key/Fill signals, Audio Over mixer for inserting Voice Over and/or External Key Audio

Note: Audio from the internal logo files not supported in this release.

When you set a processor to the MCL Personality, the Configure Processor dialog displays an additional MCL tab with configuration settings. See:

- MCL Tab (on page 202)
- Configuring the SNP with the MCL Personality (on page 198)

Key Features

External Key/ Fill inputs	The MCL provides up to three independent External Key/ Fill inputs, up to four Master Control playout channels or eight downstream Keyers in one SNP unit.
Inputs (currently supported)	IP (ST-2110 & ST-2022-6) and SDI
Video Formats	UHD (2160p50/59.94), HD (1080p50/59.94), and 1080i50/59.94)
Extended Processors	Only the Sync and Dual Conversion personalities can be set as Extended Processors to the MCL personality, only when the MCL is operating in UHD mode. The Extended Processors can be used to provide Bus A, Bus B, Key and Fill inputs.
Keyers	The Keyer superimposes a Fill / Foreground signal over the Program (PGM) signal The MCL contains 4:2:2, Cb:Y:Cr, 10-bit Keyers with a 12-bit internal video processing path
Keyer Modes	Each Keyer can be configured for internal or external graphics signals. When the signals are provided externally, the keyer can be configured to accept an external alpha and external fill, or can generate the alpha from the provided fill (self-key)."
Mixing/Keying Requirements	The Program (PGM) Mixer consists of video and audio signal mixers. When keying or mixing video signals, the video signals must be the same resolution, frame rate, dynamic range, and colour gamut, for the final composited video output to appear "look" correct.
Input Frame Synchronizers	All inputs are synchronized to an analog reference input or IEEE-1588/ST-2059 Precision Time Protocol (PTP) reference. The MCL's outputs are clean and quiet; the MCL looks after input signal synchronization and timing alignment.

Figure 12: Example of four keys/logos over Colour Bar background

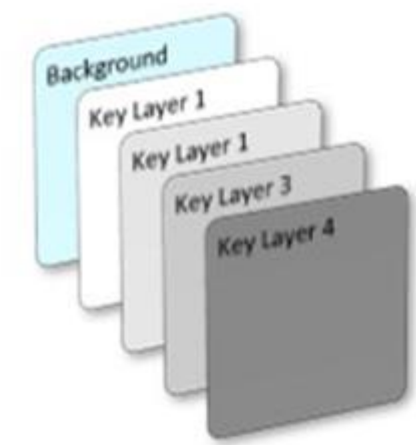


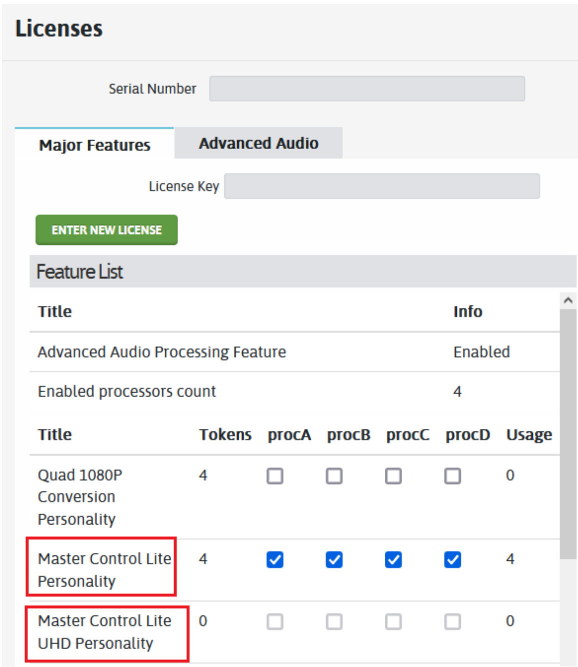
Figure 13: SNP Key Layer Ordering

Note: MCL combines four video layers, one Background layer and four Keyer layers from separate sources into a single composited image.

MCL Licensing

Go to **Configure > Licenses** to ensure that the SNP has MCL licenses installed and available, and to assign the licenses to the required processor(s).

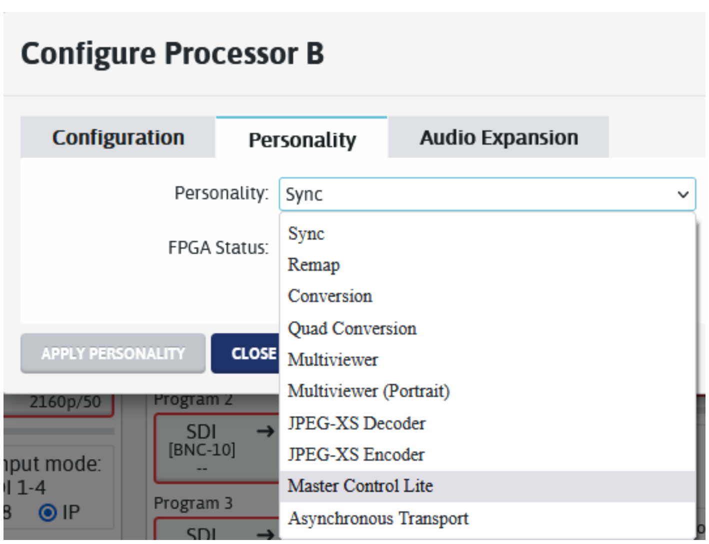
- The **Master Control Lite Personality** provides HD mode MCL functionality
- The **Master Control Lite UHD Personality** provides UHD mode MCL functionality (can also be used for HD)



Apply the desired licensing to the required processors. Click **Save**.

Once licensing has been applied, you can set a processor to MCL Mode:

1. Click **Edit** on a Processor.
2. Set the Processor **Personality** to **Master Control Lite Personality**. Click **Apply Personality**.



Notes:

- With a UHD license, the MCL can function in UHD or HD mode.
- When in MCL UHD mode, if the **Master Control Lite Personality license** is removed after the processor is already operating in UHD mode, the processor will automatically switch to HD mode.
- When in MCL HD mode, attempting to select a UHD resolution without the **Master Control Lite Personality UHD license** results in an error**.**

HD Mode

Note: MCL functions in HD mode if a **Master Control Lite HD** license has been applied. See [MCL Licensing](#) (on page 188).

Inputs	IP, SDI, mixed
Outputs	IP and/or SDI subject to connector or VSFP availability
Video Formats	1080i50, 1080i59, 1080p50, 1080p59
A/B Mixer & Keyer Engine	One per processor
Expansions	None

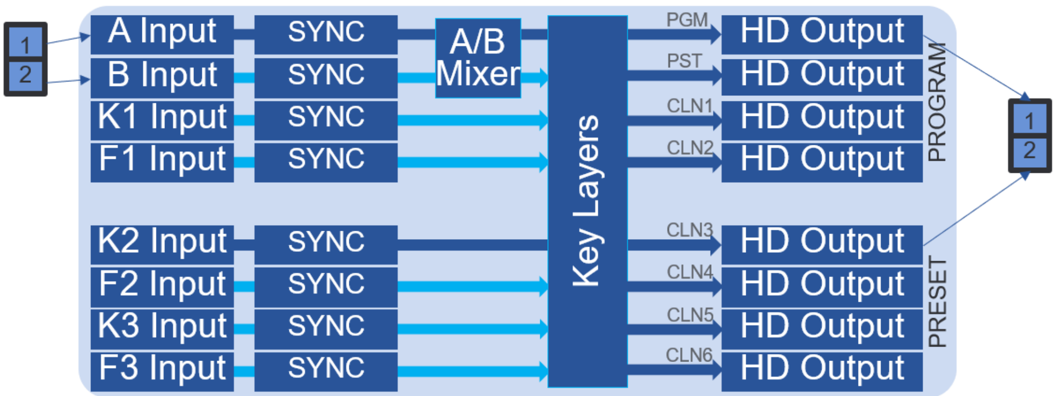


Figure 14: MCL High-level functional diagram in HD Mode

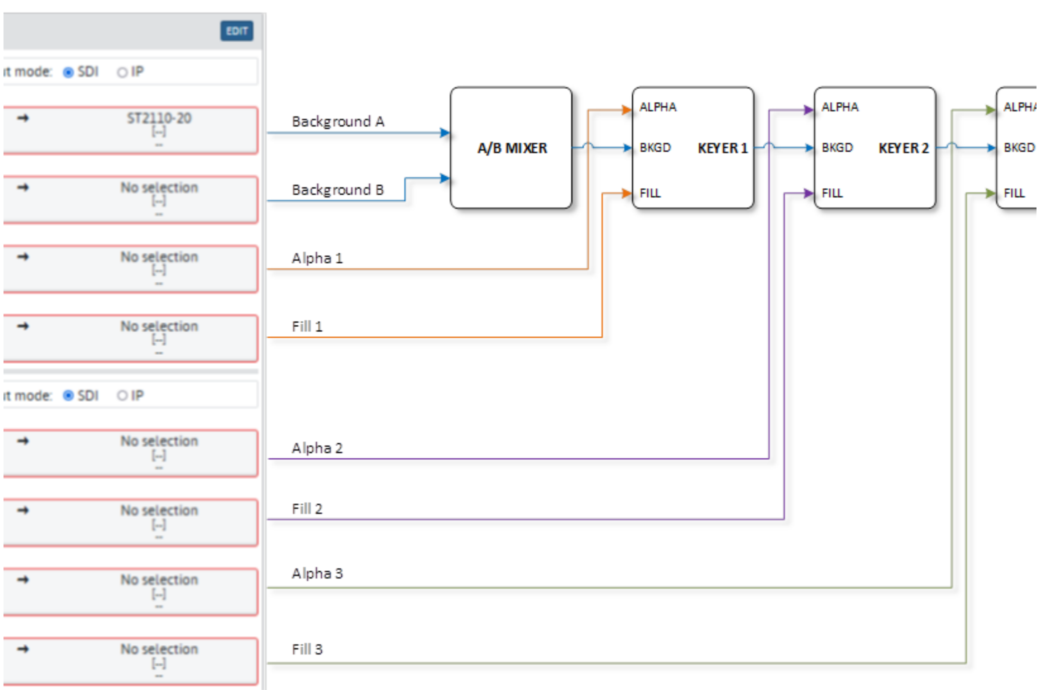


Figure 15: MCL Signal Connections in HD Mode

UHD Mode

Note: MCL functions in UHD mode if a **Master Control Lite UHD** license has been applied. See MCL Licensing (on page 188). Note that with this license, you can also choose to function in HD Mode (see HD Mode (on page 190)).

Inputs	IP or SDI, 12G or 2SI (can be mixed) *Note: 4-wire SQD input is NOT supported on the MCLU.*
Outputs	IP and/or SDI subject to connector or VSFP availability. *Note: SDI output can be 12G or 4x3G(2SI). SQD output is NOT supported.*
Video Formats	2160p50, 2160p59
External Key/Fill inputs from adjacent Processors	IP or SDI input External K/F through adjacent processor running as an extension to the MCLU. Only the Sync and Dual Conversion can be Extensions to the MCL personality.
In KFAB, KFABKF, and KFABKFKF modes:	In AB, ABKF, ABKFKF, and ABKFKFKF modes, the Bus A and Bus B inputs come into the MCLU on the base processor, and the Extended Processors provide the Key and Fill inputs. In KFAB, KFABKF, and KFABKFKF modes, the Bus A and Bus B inputs come into the first Extended Processor, the Key 1 and Fill 1 inputs come into the MCLU on the base processor, and the additional Key and Fill inputs come into the other Extended Processors.

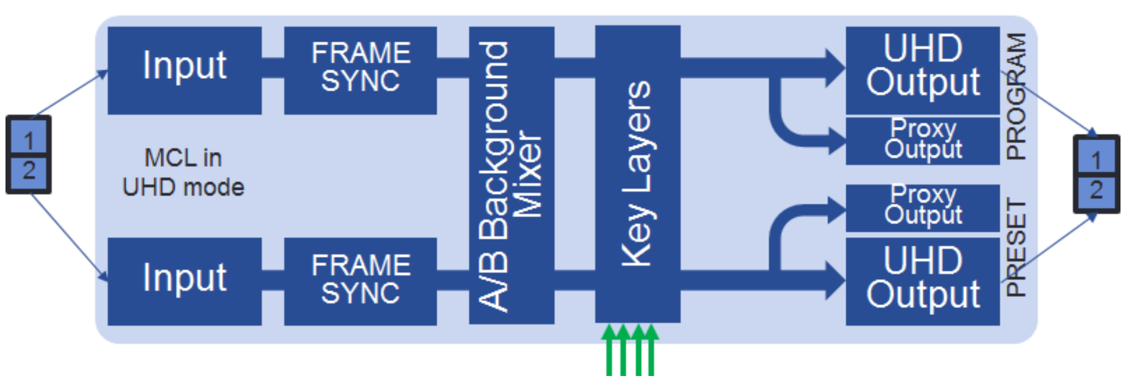


Figure 16: MCL High-level functional diagram in UHD Mode

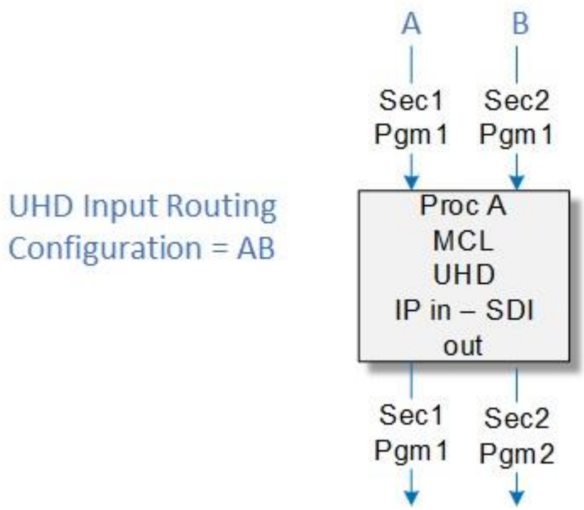


Figure 17: MCL Signal Connections in UHD Mode (AB mode)

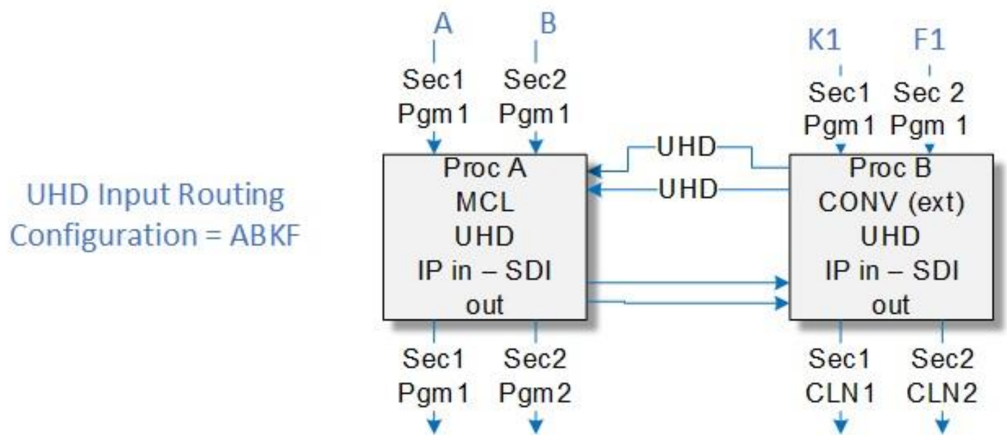


Figure 18: MCL Signal Connections in UHD Mode (ABKF mode)

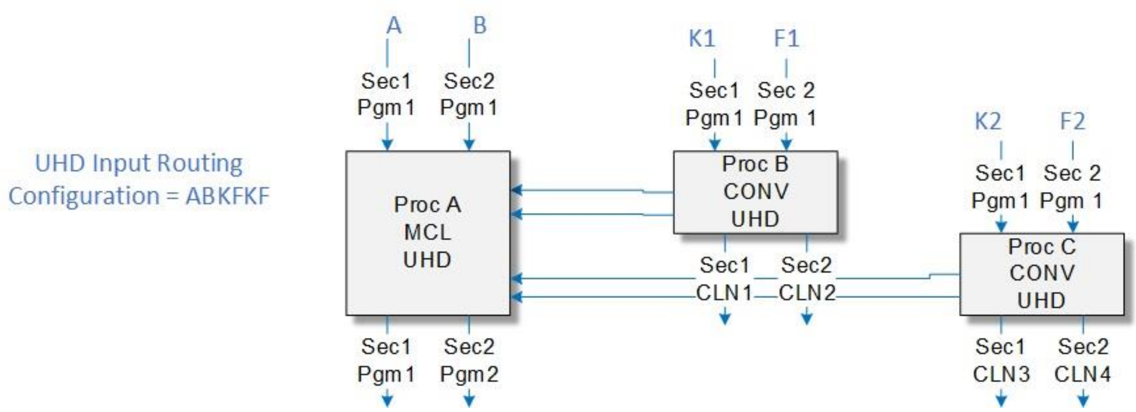


Figure 19: MCL Signal Connections in UHD Mode (ABKFKF mode)

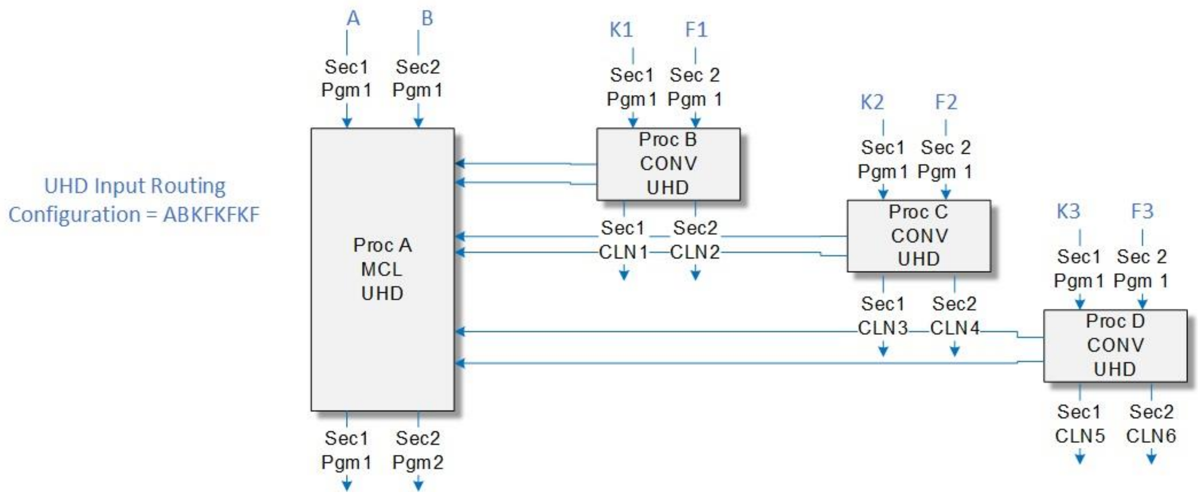


Figure 20: MCL Signal Connections in UHD Mode (ABKFKFKF mode)

Operation Modes

The MCL personality offers two major operating modes:

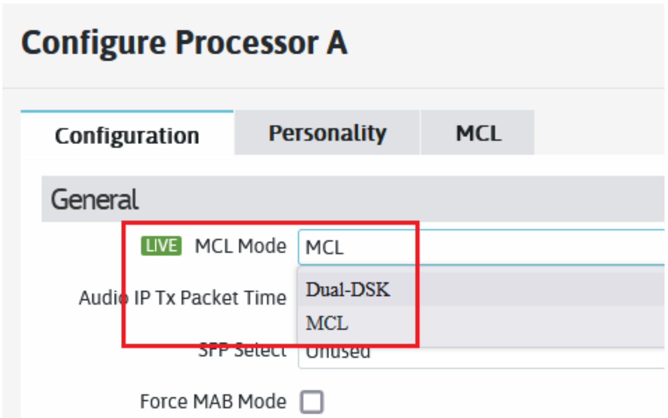
- As a Master Control Switcher (MCL Mode)
- As a Dual Downstream Keyer (Dual-DSK Mode)

The following are details of operation modes, supported inputs, and outputs for the MCL personality:

Operation Modes	• Master Control Switcher mode (MCL) • Dual Downstream Keyer mode (Dual-DSK)
Parameter to set Mode	(MCL Mode parameter). See Setting the MCL Mode (on page 195).
MCL Mode	• A/B Background Mixer is enabled • Allows for Transitions (such as V-fade, Cut-fade, etc) to be performed on the A and B inputs.
Dual-DSK Mode	• A/B Background Mixer is disabled • Transitions on the A and B inputs are not permitted
MCL Mode/Dual-DSK Mode Inputs	Bus A, Bus B, Key1, Fill1, Key2, Fill2, Key3, Fill 3
MCL Mode Outputs	• Program • Preset In MCL Mode, you have the Program Output and the Preview Output.
Dual-DSK Mode Outputs	• Program1 • Program2 In Dual-DSK Mode, there are two main outputs: Program 1 and Program 2

Setting the MCL Mode

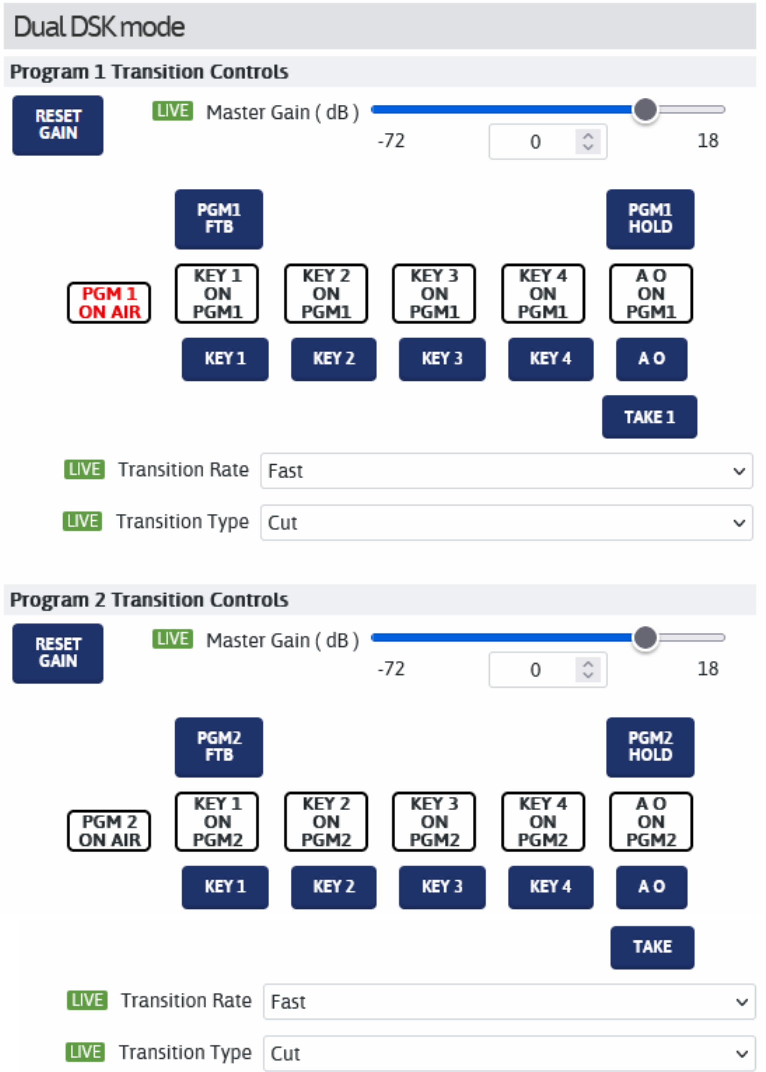
Once a processor has been set to the **MCL** Personality, the **MCL Mode** can be set by going to: **Configure > Processor > Configuration tab > General > MCL Mode**.



The **MCL Mode** parameter can be set to:

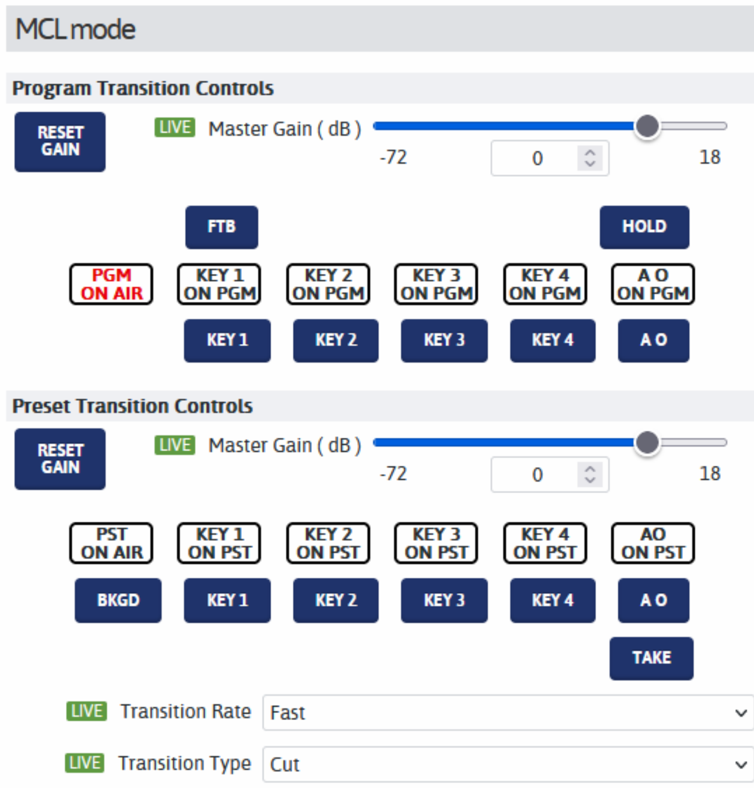
- **Dual DSK**: In this mode, there are two independent Program outputs and a set of controls for each. Keys can be taken on and off each program separately.

In Dual DSK Mode, the **MCL** Tab (Configure Processor > MCL) displays 2 sections, one for the Program 1 Output and another for the Program 2 Output. The TAKE1 and TAKE2 buttons can be used to start Keyer transitions on each Program Output separately..



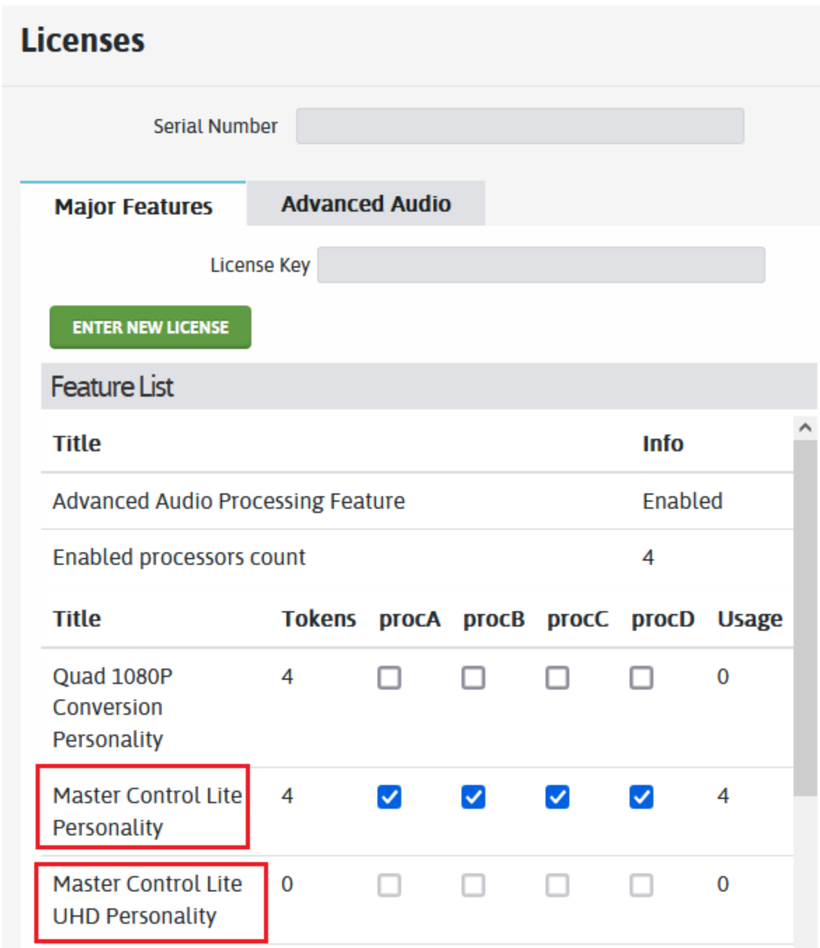
- **MCL**: This is the true master control mode. In MCL Mode:
  - The Program Out is the main output and is what goes on air
  - The Preset Output is a 'next event' preview output. It shows what will be displayed on the Program Output after the TAKE button is pressed, at the end of the transition.

In MCL Mode, the **MCL** Tab (Configure Processor > MCL) displays one section for **Program Transition Controls**, and one for **Preset Transition Controls**

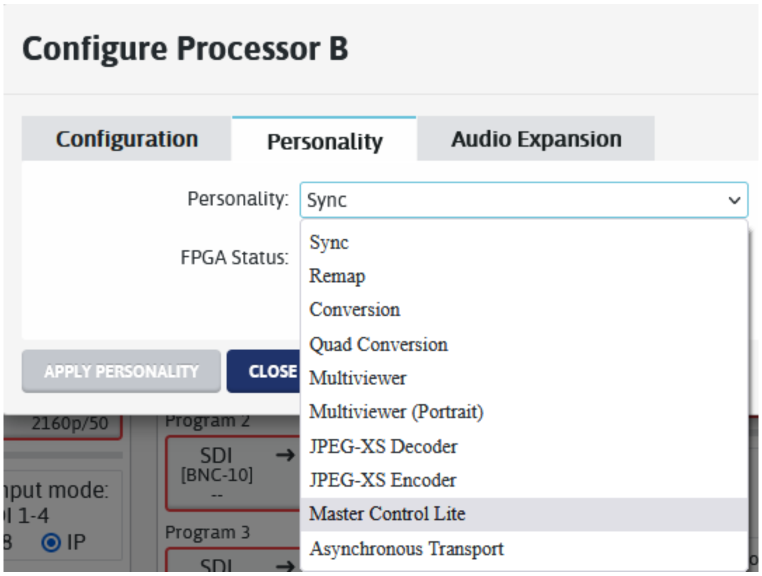


Configuring the SNP with the MCL Personality

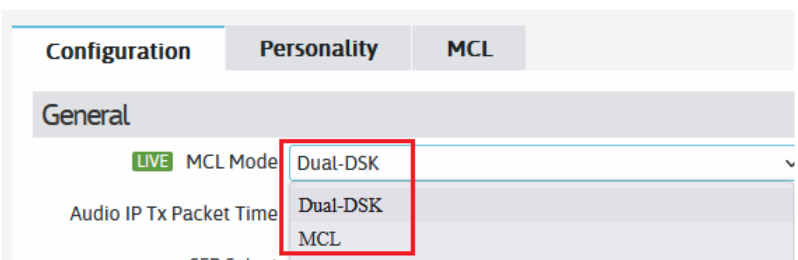
1. Go to **Configure > Licenses** to ensure that the SNP has MCL licenses installed and available, and to assign the licenses to the required processor(s).
   - The **Master Control Lite Personality** license provides HD mode functionality
   - The **Master Control Lite UHD Personality** license provides UHD mode functionality (as well as HD mode)



2. Click **Edit** on a Processor, go to the **Personality** tab, and set the Processor **Personality** to **Master Control Lite**. Click **Apply Personality**.



3. **HD and UHD Mode**: Note that the mode the MCL functions in (HD or UHD) is determined by the output standard set (see Step 8a and 9a). The SNP should also have a UHD license to function in UHD mode.
4. Go to the **Configuration** tab and set the **MCL Mode** to **Dual DSK** or **MCL**.



For more details, see Setting the MCL Mode (on page 195).

5. Set the **Default Audio IP Tx Packet Time**. Range is 1 to 500 ms.

Note: Since 125us or 500us transmit packet timing creates a large number of very small packets, it is strongly preferred to stick with 1ms when possible. 500us or 125us operation can be selected for individual audio streams that require it (see Output Tab: IP Audio Configuration (on page 457)) even when this default setting is 1ms.

6. If using an SFP, select it in the **SFP Select** dropdown.
7. Set **Force MAB Mode** if desired

Note: When checked, the switch mode is set to Make After Break. Otherwise, the switch mode will depend on whether there's available bandwidth to do a Make Before Break switch. This can help to avoid oversubscribing the switch.

8. Set the **MCL Output Colorimetry and TCS** to one of the following:
   - SDR-709
   - SDR-601

- SDR-2020
- HLG-2100
- PQ-2100
- SLOG3-2020

This selection controls the colorimetry/TCS of the output signal from this converter.

9. Follow these steps for **HD mode:**
   a. Set the **MCL Output Video Standard** to one of the following:
      - 1080i/50
      - 1080i/59.94
      - 1080p/50
      - 1080p/59.94

   b. Set the Frame Delay, VPhase, and HPhase parameters to the same value on each Processor (Configure Processor > Video Tab)
   c. All four Processors can be configured with the MCL in Base mode when operating in HD mode, to provide four independent MCL channels
10. Follow these steps for UHD mode:

Note: The MCL personality can be loaded on any Processor.

If using the MCL personality with an Extended Processor, the MCL can be loaded on Processor A or Processor C. For example, SNP does not support Processor B configured with the MCL and Processor C configured with Sync or Dual Conversion set to Extended mode. For extended processors, the HPhase, VPhase, and Frame Delay values must be set to zero.

Some example configurations that are supported: Processor A set to MCL and Processor B set to Dual Conversion with Extended mode enabled, and Processor C and D set to MCL. This configuration would provide three Playout channels in MCL mode.

When using Extended Processors with the MCL, the UHD Input Routing parameter is used to specify which Processor the Bus A, Bus B, Key, and Fill inputs come in on.

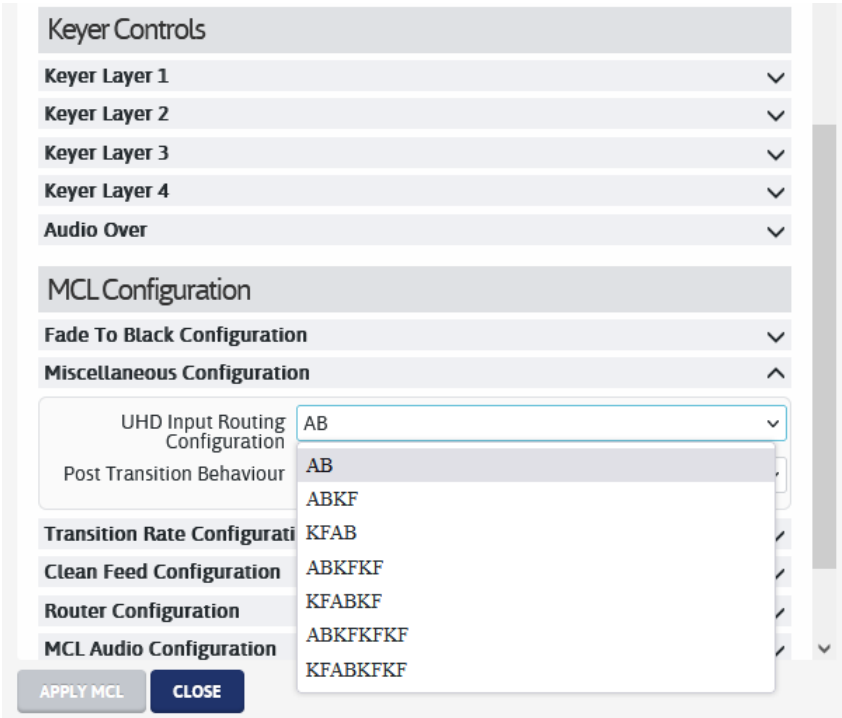
Extended Processors are always the Processor with a higher letter. For example, if Processor A is set to MCL, Processors B, C, and D can be extended to Processor A. Another example, if Processor A and C are set to MCL, the Processor B can be extended to Processor A, and Processor D can be extended to Processor C; in this example Processors B and D can be used to provide external key /fill inputs to the respective MCL processors.

Also see Extending MCL Functionality for UHD Operation (on page 222).

   a. Set the **MCL Output Video Standard** to one of the following:
      - 2160p/50 (can be applied with a UHD license, and this output standard puts the MCL in UHD mode)
      - 2160p/59.94 (can be applied with a UHD license, and this output standard puts the MCL in UHD mode)

   b. Set the Frame Delay, VPhase, and HPhase parameters to zero on all Programs on the Processor (Configure Processor > Video Tab)
   c. Go to the **MCL tab** (Configure > Processor) > **MCL Configuration** > M**iscellaneous Configuration** section, set the **UHD Input Routing Configuration** parameter to the number of External Key and Fill inputs that you are connecting to the MCL.

For more details on the **UHD Input Routing Configuration** parameter, see the MCL Configuration section MCL Configuration (on page 211).



11. Set the **Video Black Level.** Range is 0-700 and default is 0.
12. Set the **Video White Level.** Range is 0-700 and default is 700.

Note: We strongly recommend leaving the Video Black and White Level parameters are their default values to avoid on-air issues with the video level.

13. Set the Transition Controls (see Program Transition Controls (on page 203))
14. Set the Keyer Controls (see Keyer Controls (on page 208))

MCL Tab

The **Configure Processor** dialog displays an **MCL** tab if MCL personality is applied to a Processor.

The **MCL** Tab contains the following sections:

In This Section

Program Transition Controls

The MCL tab contains the **Program Transition Controls** sections, which display the following buttons and status (Tally) parameters:

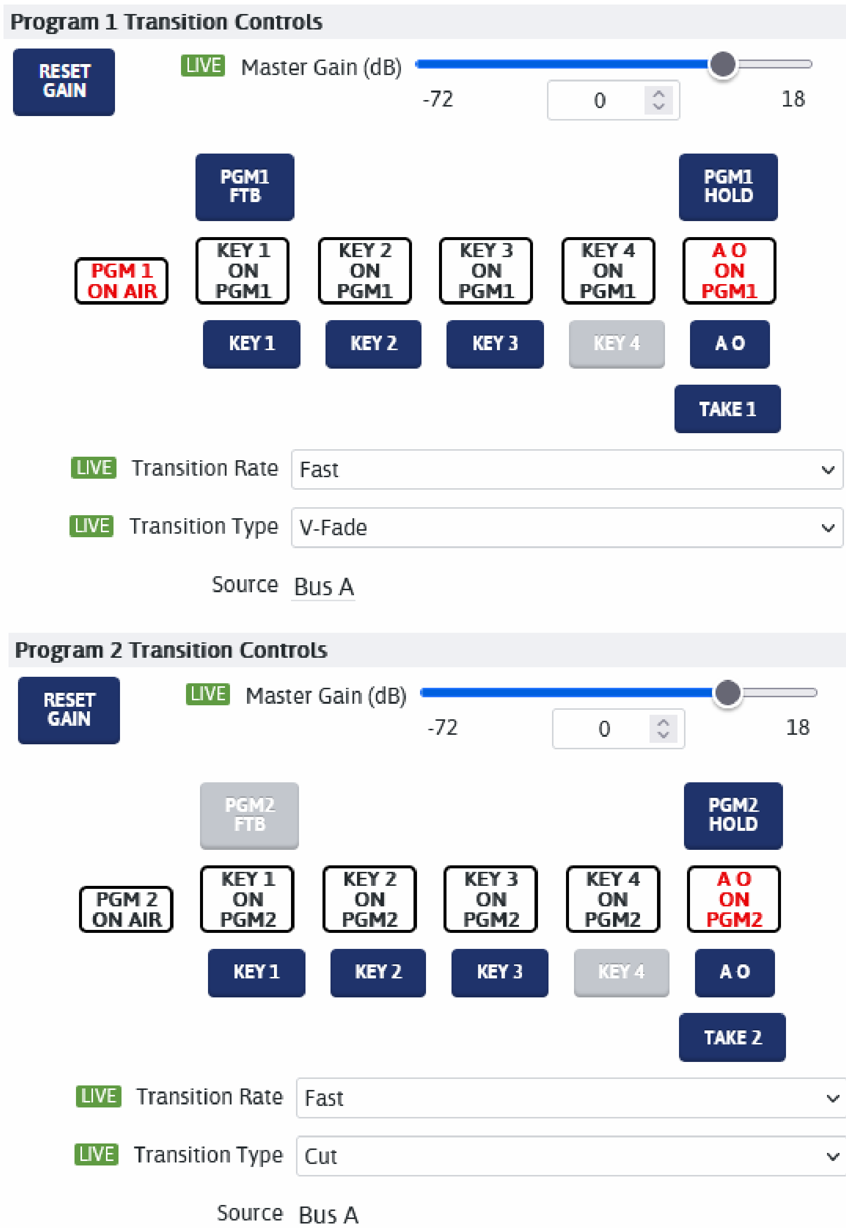


Figure 21: Program Transitions in Dual DSK Mode (with Hot Punch disabled)

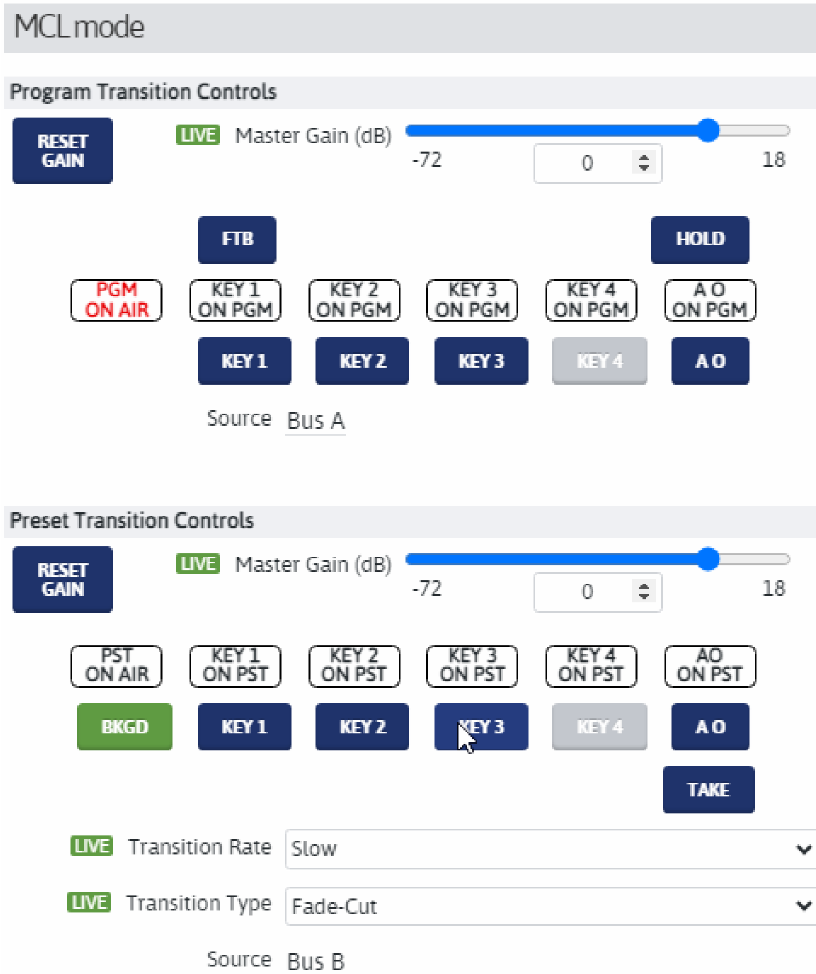
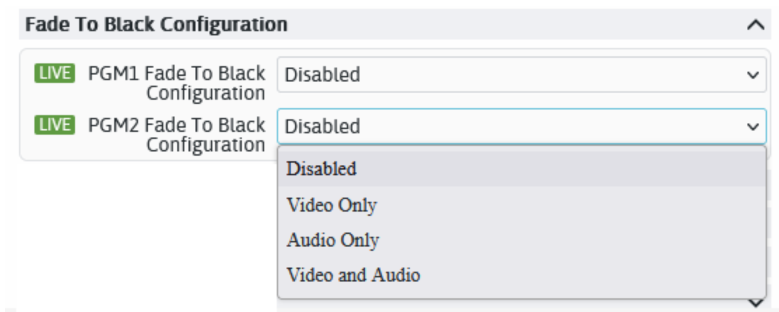


Figure 22: Program and Preset Transitions in MCL Mode

Reset Gain (Program Transition)	This button restores PGM Master Gain to unity gain.
Master Gain (Program Transition)	Used to adjust the program audio level. Note that this gain value will track with the current program source going forward. When the program is transitioned to another source, the program gain will switch to the value for that source. The range for the audio gain control is -72 dB to +18 dB. The default is 0 dB.
Source	Reports the Program Source (Bus A, B)
Reset Gain (Preset Transition)	In MCL and Dual-DSK modes, the Reset Gain control sets the audio gain to 0 dB for the Source routed to the Preset/Program 2 output.
Master Gain (Preset Transition)	Used to adjust the audio gain between -72 dB to +18 dB, in 0.1 dB steps, for the Source routed to the Preset/Program 2 output.

Transition Rate	Both Program 1 and Program 2 have separate Transition Rate parameters. This parameter is used to select the Transition Rate to use for all video and audio transitions. Options are: • Fast • Medium • Slow • Automation The actual frame rate used is specified in the Fast Transition Rate, Medium Transition Rate, and Slow Transition Rate parameters, as applicable. When Automation sets the transition rate to a value which does not match one of the pre-configured Transition Rates: Fast, Medium, and Slow, the Transition Rate is switched to Automation.
Transition Type	Both Program 1 and Program 2 have separate Transition Type parameters. This parameter sets how the Program Background Video Mixer transitions when transitioning from A to B or vise-versa. Options for Program 1 are: • Cut • V-Fade • Cut-Fade • Fade-Cut • X-Fade *NOTE: in Dual-DSK mode, the Transition Type for Program 1 shows all available options however only Cut and X-Fade are valid. In MCL mode, all Transition Types are valid.* Options for Program 2 are: • Cut • X-Fade
Source	Reports the Program Source (Bus A, B) on the Preset Bus.
Key 1-Key 4	Each of these are toggle buttons for key layers, and the action taken on clicking them is determined by the **Hot Punch** parameter (at the bottom of the MCL Configuration section). • If **Hot Punch** is enabled, clicking any of the buttons (Key 1 to Key 4) on Program 1 or 2 takes that key to air immediately. This provides quick access to transitioning individual Key Layers without having to select the Preset Transition Enable controls and pressing the TAKE button to transition a specific Key Layer On or Off. • When the **Hot Punch** parameter is not enabled, the KEY buttons are used to pre-select which Keyer Layers to transition on or off the Program Output when the TAKE button is pressed. • In MCL mode: pressing the "TAKE" (live) button triggers the:

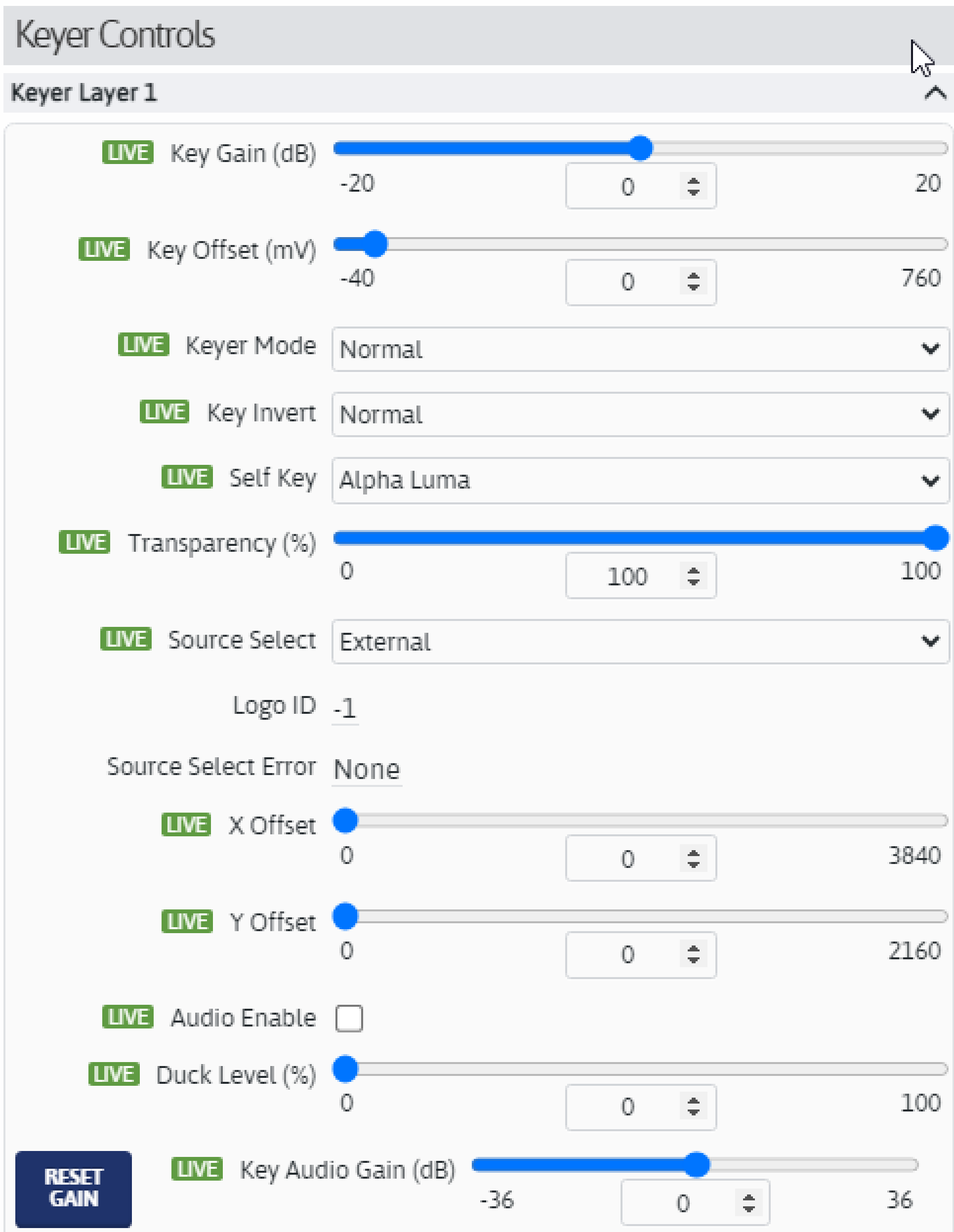
	Background Video and Audio Mixers, and/or Keyers, and/or Audio Over Mixers to start transitioning; depending upon which: Background, PSTx KEY, and PST AUDIO OVER parameters are enabled. • In Dual-DSK mode, pressing the 'PGM 1 TAKE' "live button triggers the: Keyers and/or Audio Over Mixer to start transitioning on the Program 1 output; depending upon which: PGM 1 KEYx and PGM1 AUDIO OVER parameter are enabled. The Tally indicator above each KEY button, when illuminated, indicates that this Keyer Layer is on the Program Output. The Tally is illuminated red, indicating that key layer is on. When the Tally is blinking red, this means the Key should be on the Output but has been taken off by software because a Loss of Video condition has been detected on either the Fill and/or Alpha sources. 
AO	This refers to Audio Over or Voice Over for mixing audio from one of the Alpha inputs with the Background audio. In both (MCL and Dual-DSK with Hot-Punch enabled) modes: • if AO is selected, the Audio Over is immediately cut to be ON the Program Output. • If AO is unselected (OFF) the Audio Over is cut to be OFF the Program/Program1 Output. This provides quick access to transitioning the Audio Over to be ON or OFF the Program/Program1 Output, without having to select the Audio Over Preset Transition Enable control and pressing the TAKE button to transition the Audio Over ON or OFF.

Fade to Black	The Fade button (PGM1 FTB and PGM2 FTB) refers to fading video to black and/or fading audio to silent, and is controlled by settings in the **Fade to Black Configuration** section of the MCL tab.  The Fade to Black settings can be individually enabled or disabled per program, and can be set to fade just video, just audio, or both video and audio. For example, if Fade to black is set to video, and the PGM1 FTB button is clicked, the Program 1 output will be faded to video black. Fade to black needs to be enabled in order to use the FTB buttons. 
Hold	The (Program) Hold buttons are displayed under Program Transition Controls, and labeled as: • *MCL Mode:* HOLD • *Dual DSK ModeL* PGM1 Hold and PGM2 Hold The Hold buttons are essentially separate sets of controls for each of the program outputs. When the system is controlled via automation controls (such as ADC or D-Series automation), Hold pauses the SNP from accepting commands from automation, in order to perform a different action. For example, if a commercial needs to run for 10 seconds at a certain time, before going back to standard control. • In MCL mode, when PGM1 AUTO HOLD is selected (ON), the SNP Host rejects any Automation control messages destined for this MCL channel; only manual control from a Control Panel or SNP GUI are allowed. • In Dual-DSK mode: the SNP Host rejects any Automation control messages destined for this Program Output.
BKGD	(Only available when operating in MCL Mode) This control shows under Preset Transition Controls. • When selected, it specifies that the Background Program and Preset video mixers will transition when the Take parameter is selected. • When Off, the Background video mixers are not transitioned when the Take parameter is selected.

The transition parameters control transitions, for example, from a program to a commercial. For each program, you can opt to do a cut or fade, and then choose the rate which is, if it will slow, fast, or medium. For more details, see MCL Tab

Keyer Controls

The **MCL** tab provides several **Keyer Control** parameters to let you control the appearance of the Key over the Background signal.



Keyer Controls	
Key Gain	Gain applied to the key signal (after the application of the Key Offset value). Range -20 to 20. Default is 1.0 for unity gain. Imagine Communications strongly recommends that this control be left at its default value.
Key Offset	The Key Offset (or Clip), sets the black level of the key signal, and is subtracted from the key signal input. DC shifts the key signal down. Range -40 to 760, increments in steps of 1. Default is 64 (0x40). Imagine Communications strongly recommends that this control be left at its default value.
Keyer Mode	Used to control how the Background and Fill signals are mixed/combined together. • **Normal** - both the Background and Fill signals are multiplied with the Alpha signal. The Default is Normal mode. This is also referred to as unshaped or multiplicative keying. • **Additive** - (also referred to as Shaped keying). Character Generators (CGs) typically produce this type of Fill signal. The Alpha and Fill signals are pre-shaped (bandwidth limited). The Background is multiplied with the Alpha signal and the Fill is added to the resulting signal. The Fill input signal must have a black background.
Key Invert	Used to invert the polarity of the key signal. Set to Normal or Inverted. • **Normal** means the key signal is used without modification. • When **Inverted**, the key video signal is inverted.
Self Key	Used to select the source of the key video signal which 'cuts' the hole in the Background video and where the Fill video is inserted into. Values are: • **Alpha Luma** (also referred to as External Key) uses the Alpha's Luma signal to cut the hole (Default setting). • **Fill Luma** (also referred to as Self Key or Luma Key or Auto-keyed) uses the Fill's Luma signal to cut the hole
Transparency	Sets the transparency of the Fill/Foreground video. 0% transparency means the Fill is completely “off”. 100% transparency means the Fill is completely “on” (opaque). Default is 100%. Range 0-100

Source Select	• No Key • External • If .mg3 Logo files have been uploaded to the SNP unit, then the names of those uploaded files will be displayed under the Source Select parameters. See Creating a Logo File (on page 232), Uploading a Logo (.mg3 graphics file) to an SNP (on page 233), and Selecting an Internal Logo for a Keyer Layer (on page 235). *SNP will only display .mg3 files whose video format matches the MCL's Output Video Standard setting.*
Logo ID	Reports the Logo ID assigned when creating the logo. When the Source Select is set to External, the Logo ID field will report -1. *NOTE: .mg3 files with a Logo ID of zero (0), will not be selectable by Automation. Only .mg3 files with Logo IDs within the range of 1 to 998 are selectable by Automation.*
Source Select Error	Reports any errors if the requested Source Select could not be executed. Types of Logo Select Errors which can be reported are: "Could not open file", "File has no image data", "Not enough memory for file", "File is truncated". In the GA 2.2 release, these error states are not reported to the MCL Hardware Panel.
X Offset	Range is 0-3840. Increments in steps of 1. Used to position the internal logo horizontally. 0 is the most right position of the Active Picture Area; first active pixel.
Y Offset	Range is 0-2160. Increments in steps of 1. Used to position the internal logo vertically. 0 is the top most line of the Active Picture Area.
Audio Enable	Select to enable External Key Audio; audio from the Fill program input.. Keyer Layers 1 to 3 support External Key Audio. When the Keyer is enabled, the External Key Audio will then be mixed with the Background's audio.
Duck Level	Set the Duck Level. Range 0-100. 0% means the Program Audio level is not reduced at all. 100% means the Program Audio level is fully removed and the Audio Over source is fully on the Program Output.
Key Audio Gain (dB)	Used to amplify or attenuate the External Key Audio's PCM audio channels. Range -36 to 36.
Audio Over	
Audio Over Source Select	Used to select which Alpha input to use as the source of the Audio Over, .i.e. ‘Voice Over’ Options include: Alpha1, Alpha2, Alpha3 Default value: Alpha1

Duck Level	Set the Duck Level. Range 0-100. 0% means the Program Audio level is not reduced at all. 100% means the Program Audio level is fully removed and the Audio Over source is fully on the Program Output.
Audio Over Gain (dB)	Used to amplify or attenuate the Logo Audio or External Key Audio channels. Range -36 to 36.
Reset Gain	When the Reset button is pressed, reset the Key Audio Gain parameter to 0 dB. Options: off, on Default value: off

MCL Configuration

Fade to Black Configuration	
PGM 1/2 Fade to Black Configuration	Define whether fade to black is enabled or disabled, and if enabled, define whether it applies to video, audio, or both. Options are: • Disabled (default) • Video Only • Audio Only • Video and Audio
Miscellaneous Configuration	
UHD Input Routing Configuration	This parameter is used to specify where the Background A and B sources, and Keyer Layer 1 to 3 sources come from. Note that SNP 2.2 officially supports **AB**, **ABKF**, and **KFAB**. Options are: • **AB** – A and B are sourced from the Base Processor. There are no External Key/Fill inputs; only Internal Logo. Allows up to 4 MCL channels in UHD mode in one SNP unit. • **ABKF** – for one Base Processor and one Extended Processor. One External Key/Fill pair enabled. A and B are sourced from the Base Processor. The first Key and Fill pair are sourced from the Extended Processor. • **ABKFKF** – for one Base Processor and two Extended Processors. Two External Key/Fill pairs are enabled. A and B are sourced from the Base Processor. The Key and Fill pairs are sourced from the Extended Processors. • **ABKFKFKF** – for one Base Processor and three Extended Processors. Three External Key/Fill pairs are enabled. A and B are sourced from the Base Processor. The Key and Fill pairs are sourced from the Extended Processors.

<table>
<tr><td></td><td>KFAB - for one Base Processor and one Extended Processor. One External Key/Fill pair enabled. A and B are sourced from the first Extended Processor. The first Key and Fill pair are sourced from the Base Processor.
KFABKF - for one Base Processor and two Extended Processors. Two External Key/Fill pairs enabled. A and B are sourced from the first Extended Processor. The first Key and Fill pair are sourced from the Base Processor. The second Key and Fill pair are sourced from the second Extended Processor.
KFABKFKF - for one Base Processor and three Extended Processors. Three External Key/Fill pairs enabled. A and B are sourced from the first Extended Processor. The first Key and Fill pair are sourced from the Base Processor. The second Key and Fill pair are sourced from the second Extended Processor, and the third Key and Fill pair are sourced from the third Extended Processor.</td></tr>
<tr><td>Post Transition Behavior</td><td>This parameter specifies what happens at the end of a transition to the Preset output, Background, and PST KEY transition control parameters.
Keep enabled
In MCL mode: The Background and PGM KEY/PST KEY transition control parameters remain enabled, if previously enabled. The Preset output shows any Keyers enabled by the PST KEY parameters.
In Dual-DSK mode: PGM and PST KEY transition control parameters remain enabled, if previously enabled. Program 1/2 output show the Keyers which were enabled by the PGM KEY and PST KEY parameters.
Disable when transition completes
In MCL Mode: The Background and PST KEY parameters are automatically disabled, when the transition completes, causing the Keys on the Preset Output to no longer be visible, means that the Keys will remain on-air if the TAKE button is pressed again.
In Dual-DSK Mode: The PGM1 and PGM2 KEY buttons are automatically disabled, if previously enabled. The Program 1/2 output show the Keyers which were enabled by the PGM1 and PGM2 KEY parameters.</td></tr>
<tr><td>Hot Punch</td><td>This parameter is only displayed in Dual DSK mode.
If Hot Punch is enabled, pressing any of the Key 1-4 buttons on Program 1 or 2 Outputs, takes that key on/off air immediately.<hr>Note: If Hot Punch is enabled, the Post Transition Behavior parameter is hidden in Dual DSK mode, and the TAKE buttons are hidden in the Program Transition Controls.</td></tr>
<tr><td colspan="2">Transition Rate Configuration</td></tr>
<tr><td>Fast Transition Rate</td><td>Set how many video frames to use, when the 'Transition Rate' parameter is set to 'Fast'.
The range is 5 to 255 (default is 5)</td></tr>
</table>

Medium Transition Rate	Set how many video frames to use, when the 'Transition Rate' parameter is set to 'Medium'. The range is 5 to 255, default is 16.
Slow Transition Rate	Set how many video frames to use, when the 'Transition Rate' parameter is set to 'Medium'. The range is 5 to 255, default is 30.
Automation Transition Rate	When Automation sets the transition rate to a value not matching one of the existing Fast, Medium, or Slow transition rates, this field will display Automation transition rate value.
Clean Feed Configuration	
Clean Feed Output (1-6)	Select the source to route to the Clean Feed output. For more details, see Clean Feed Outputs (on page 214). Options include: • Bkgd Mix/ Pgm1 In • Pgm/Pgm1 Keyer 1 Out • Pgm/Pgm1 Keyer 2 Out • Pgm/Pgm1 Keyer 3 Out • Pgm/Pgm1 Keyer 4 Out • Pgm/Pgm1 final Out
Router Configuration	
See Routing with Magellan Control System (on page 218).	
MCL Audio Configuration	
Audio Mixer Layer	Select the layer to mix with the Background Audio channels. Options are Keyer 1, Keyer 2, Keyer 3, Keyer 4, or Audio Over. Default value is Keyer 1.
Background Audio Channel	Select the Background Audio Channel to configure for the 'Audio Mixer Duck Behavior' parameter. Choose from Channels 1-16. Default value is Channel #1.
Audio Mixer Duck Behavior	Select from the following: • **Duck Only** - this pair of PCM audio channels is reduced to the Duck Level but not mixed. For example, the Rear surround and Low Frequency Effects (LFE) audio channels are attenuated but not mixed. Master Gain and Fade-to-Silence (FTS) can be applied to these pairs. • **Duck and Mix** - this pair of PCM audio channels is reduced in level and mixed with External Key Audio or Voice Over Audio. For example, Voice Over Audio is mixed with the the Front Left, Front Right and Front Center audio channels. Master Gain and FTS can be applied to these pairs. The default value for this parameter is Duck and Mix. • **Unity** - this pair of audio channels is not processed by the: Background Audio Mixer, Audio Over Mixers, Fade-to-Silence Audio Mixer, and Master Gain. This setting is used for audio pairs carrying non-PCM audio or audio channels not to be processed. Cut only transitions

	applied to these audio channels. Master Gain and FTS is not applied to these pairs.
Audio Channel Mix Assignment	Only adjustable (greyed out otherwise) when the 'Audio Mixer Duck Behavior is set to 'Duck and Mix'. Assigned per Audio Mixer Layer per Background Audio Channel. Background Audio Channels which are set to 'Duck Only' or Unity are not mixed with anything. The default value for this parameter is 1-to-1. For example, Background channel #1 is attenuated and mixed External Key Audio or Audio Over channel #1.
Logo Audio Configuration	
Background Audio Channel	This control parameter is not operational in the GA 2.2 or earlier releases.
Logo Audio Channel Mix Assignment	This control parameter is not operational in the GA 2.2 or earlier releases.

Clean Feed Outputs

Clean Feed outputs provide additional outputs from the MCL's video and audio processing pipeline. These outputs can be selected from any processing stage, i.e., after the Background A/B Mixer, after any Keyer Layers, and the final Program Output.

Mode	**MCL (HD or UHD)**
Outputs	Program Output
Source for Clean Feed Outputs	• Various points along the Program Output path (Up to 6 Clean Feed Outputs) • Duplicate Program outputs or the Background A/B Mixer's output can be sent to any Clean Feed output.
Mode	**Dual DSK (HD or UHD)**
Outputs	Program1 and Program2
Source for Clean Feed Outputs 1-3	Program1 Output path
Source for Clean Feed Outputs 4-6	Program2 Output path

When operating in UHD mode, if Clean feed outputs are desired, an Extended Processor must be used. This is becasue all outputs on the Base Processor are used by the Program/Program1 and Preset/Program2 outputs.

For example:

- If ProcA is MCL
- ProcB should be SYNC or CONV in Extended mode

Then specifically in Dual-DSK mode and UHD mode, Proc B will provide:

- Cleanfeed Output 1 = Program1 Cleanfeed 1

- Cleanfeed Output 2 = Program2 Cleanfeed 1

If Proc C and Proc D are also Extended, then the signal mapping is:

- Cleanfeed Output 3 = Program1 Cleanfeed 2
- Cleanfeed Output 4 = Program2 Cleanfeed 2
- Cleanfeed Output 5 = Program1 Cleanfeed 3
- Cleanfeed Output 6 = Program2 Cleanfeed 3

Note: In MCL Mode, Clean Feed Outputs #1 to #6 are restricted to selecting the audio signals from the Program/Program1 path.

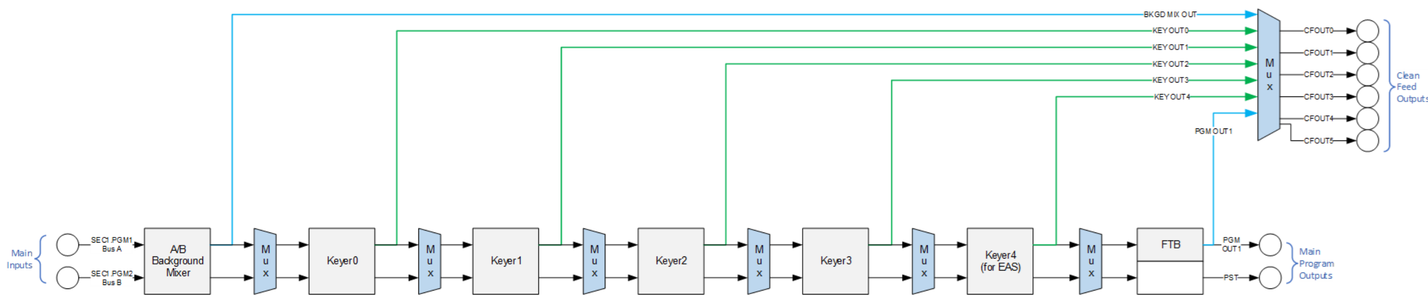


Figure 23: MCL Mode - Clean Feed Outputs

The **Dual-DSK** mode supports up to 3 Clean Feed outputs per Program output.

Note:
- Clean Feed #1 and #3 are restricted to selecting the audio signals from the Program/Program1 path.
- Clean Feed #4 and #5 are restricted to selecting the audio signals from the Preset/Program2 path.

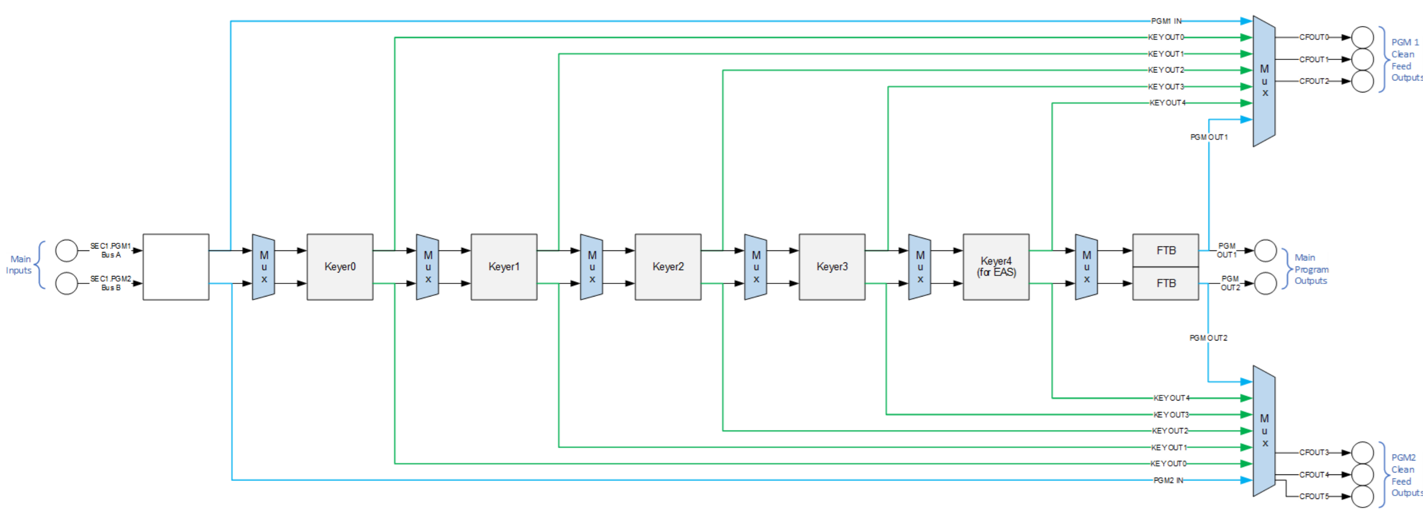
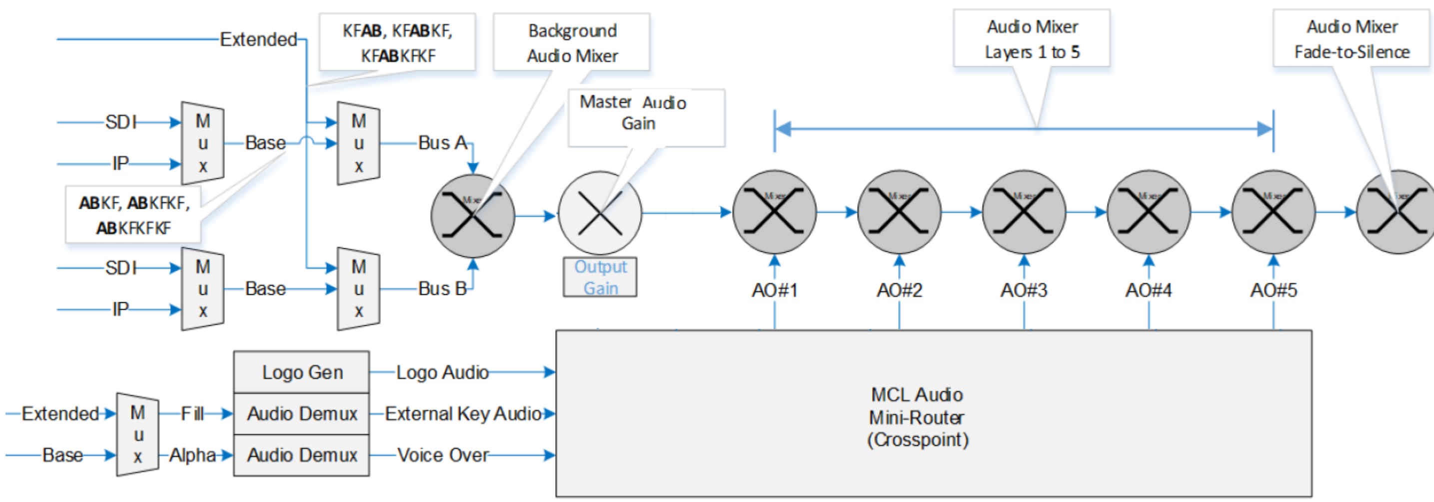


Figure 24: Dual DSK Mode - Clean Feed Outputs

- For Clean Switching, when the IP Receivers are configured to receive 1080p59 ST-2022-6 streams, the number of streams is limited to six. This limits the number of **Key and Fill inputs** when receiving 1080p59 ST-2022-6 streams.

- The number of 1080p59 ST-2022-6 which can be transmitted is limited to 7 streams. This limits the number of **Clean outputs** when transmitting 1080p59 ST-2022-6 streams.

MCL Audio Processor - Functional Block Diagram



Audio Inputs	
Background	(Bus A and Bus B), Fill and Alpha
Signal type	Embedded audio in SDI or ST-2022-6, ST-2110-30/31; -30 for PCM audio, -31 for non-PCM audio
Audio Inputs	Comes from either the Base processor or the Extended Processor (Sync or Dual Conv), i.e. ABKF, KFAB, ABKFKF, KFABKF, … modes
Background Audio, Bus A and Bus	Comes from either the Base (HD mode) or Extended Processor (UHD mode)
Voice Over	Brought into the SNP on the Alpha Inputs; Alpha inputs from either the Base (HD mode) or Extended Processor (UHD mode)
External Key Audio, audio associated with the external Alpha/Fill video source	Brought into the SNP on the Fill Inputs; Fill inputs from either the Base (HD mode) or Extended Processor (UHD mode).
Audio Outputs	Program/Program1, Preset/Program2
Signal types	Embedded audio in SDI or ST-2022-6, ST-2110-30/31

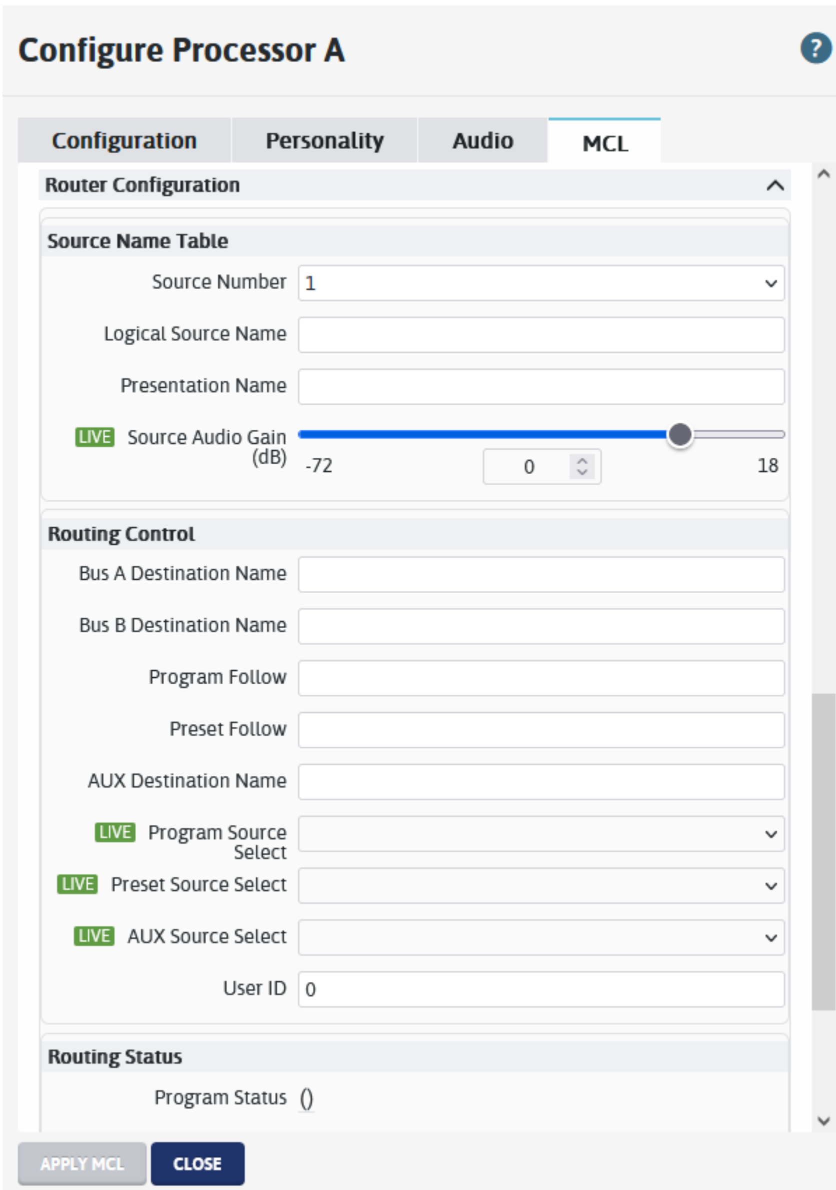
Master Control Panel Devices

See MCL Hardware Panel (on page 489).

Routing with Magellan Control System

The Magellan Control System integrates with the Selenio Network Processor (SNP), and can process inputs from the SNP (sources in Magellan Control System) as well as push outputs to it (destinations in Magellan Control System). For detailed information on how to set up the SNP in Magellan Control System, see the main *SNP User Manual* or the *Magellan Control System User Manual*.

MCL Routing parameters are defined in the **MCL** tab, in the **Routing Control** section. The following parameters need to be defined:



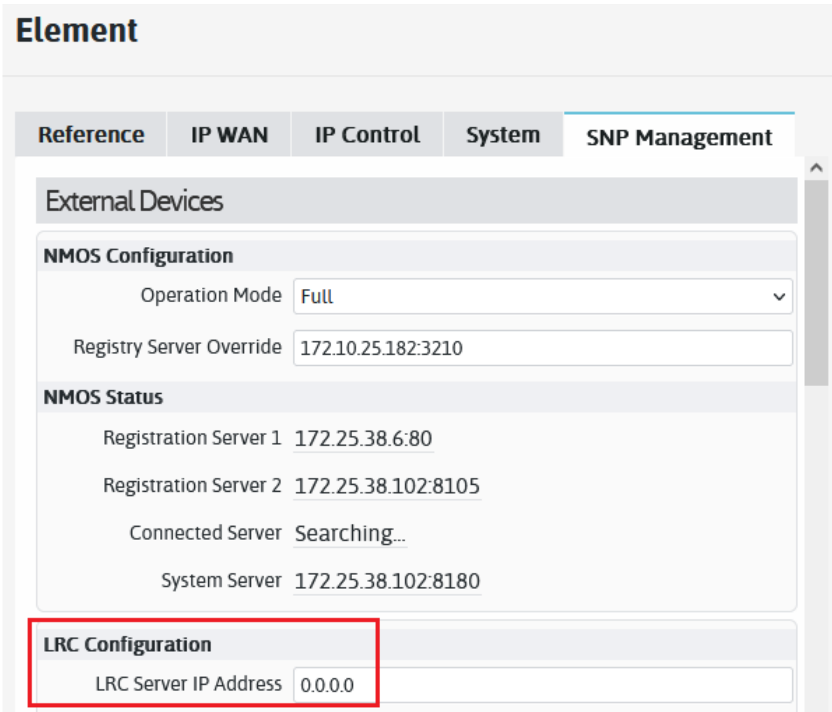
Source Name Table	
Source Number	The index of the Source. Range is 1 to 16. Default is 1. MCL can be configured to select (route) to 16 different sources to the Bus A or Bus B inputs.

Logical Source Name	Enter the Router Logical Source Name. This name must match the Source name used in the Magellan Control System database. *Note: The source entered here is validated against the configured Magellan Control System Server (see below). An error will be displayed if it is not found.*
Presentation Name	Enter the Local presentation name for the Router Logical source name *Note: This name will be displayed on MCL Hardware panels and is a maximum of 16 characters. If left blank, the Router Database Logical Source Name will be used.*
Source Audio Gain	The audio gain value associated with each Source is tracked by MCL, so when that Source is selected again the audio gain value is applied to that source. Range is -72 to +18 dB, in 0.1 dB steps. Default is 0 dB.
Routing Control	
Bus A/B Destination Name	Router destination name of Bus-A/B *Note: The destination entered here is validated against the configured Magellan Control System Server (see below). An error will be displayed if it is not found.*
Program Follow	Router destination name of the Shadow Program. A shadow program is a router destination that the MCL will keep updated with the current program input source - effectively a cuts-only version of the program. this can be useful for tally systems to monitor what source is on-air at any time. Program Follow can be either a real or virtual Destination. It is up to the user to configure the Destination in the Magellan Control System database. The MCL doesn't need to know. Whenever a source is routed to the program output, then MCL will route the same source specified by the Program Follow destination. *Note: The destination entered here is validated against the configured Magellan Control System Server (see below). An error will be displayed if it is not found.*
Preset Follow	Router destination name of the Shadow Preset. Similar to the shadow program, this named router destination will take the source of the preset bus every time the preset bus changes sources. Preset Follow can be either a real or virtual Destination. It is up to the user to configure the Destination in the Magellan Control System database. The MCL doesn't need to know. Whenever a source is routed to the preset output, then MCL will route the same source specified by the Preset Follow destination. *Note: The destination entered here is validated against the configured Magellan Control System Server (see below). An error will be displayed if it is not found.*

AUX Destination Name	Router destination name of the AUX Bus. Currently only selectable in the SNP GUI and not by the MCL Hardware Panel. The Aux Destination Name must match the Magellan Control System Destination Name. *Note: The destination entered here is validated against the configured Magellan Control System Server (see below). An error will be displayed if it is not found.*
Program Source Select	The LRC source to be routed to the Program
Preset Source Select	The LRC source to be routed to the Preset. Used to select 1 of the 16 possible Source Numbers, configured in the Source Name Table section, to route to either the Program Output. MCL keeps track of whether to route to the Bus A or Bus B Destination.
AUX Source Select	The LRC source to be routed to the AUX bus. Used to select 1 of the 16 possible Source Numbers, configured in the Source Name Table section, to route to the Auxiliary (AUX) destination.
User ID	The LRC User ID. This ID is associated with the routing actions taken by the MCL, and logged in the Magellan Control System logging subsystem. The LRC User ID is used for route protection or locking. The default LRC User ID is 0 for unlocked. The user ID should be set to a non-zero value to ensure that the routes are properly locked or protected. Range is 0 to 65535.
Routing Status	
Program Status	LRC status for what Source is routed to the Program. The 'Program Status' indicates the current source routed to the Program Output. If the connection is not successful, then the 'Program Status' will show the ID of the last source. If there is a connection problem to the Magellan Control System, then a Magellan Control System connection alarm should be active. If the Magellan Control System rejects the connection (ie. the route is locked), then the last source is still connected and is shown in the GUI. A Break-away Source is shown in parentheses. For example, the break-away 'Channel 123' source is shown as '(Channel 123)' in the 'Program Status' field.
Preset Status	LRC status for what Source is routed to the Preview
AUX Status	LLRC status for what Source is routed to the AUX

To enter the Magellan Control System Server IP Address, go to **Configure** > **Element** > **SNP Management**, and enter it in the **LRC Server IP Address field**.

For MCL functionality including source selection and shadow buses, it is mandatory to integrate the MCL with a Magellan Control System server. The MCL (and SNP-MV) applications use the Magellan Control System API to access the Magellan Control System routing database and validate names and actions. LRC protocol is then used to make routes within the Magellan Control System, getting the right source to the right inputs. The LRC Server IP Address must be the address of a Magellan Control System server.



For MCL specific routing alarms, see MCL Alarms (on page 225).

Extending MCL Functionality for UHD Operation

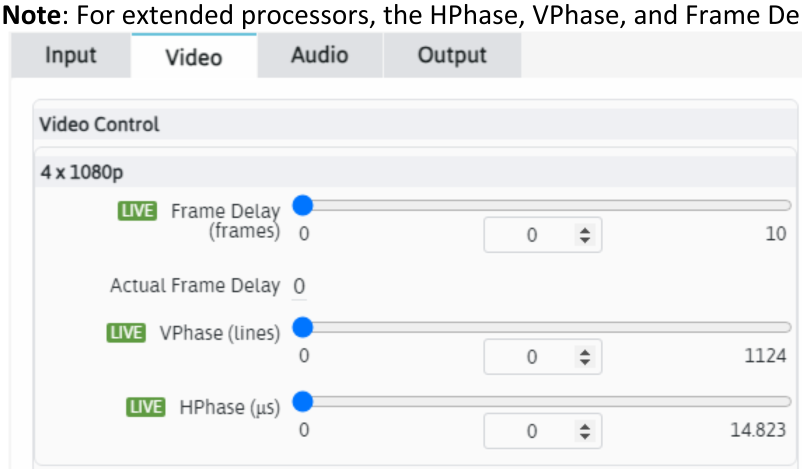
When operating in HD mode, the MCL processor is self-contained and does not require (or allow) any extension. However, for UHD operation, the MCL can be extended using neighboring SYNC or CONV personalities, bringing in Key/Fill inputs (or in some cases A/B bus inputs) and returning clean feed outputs. This is only for UHD mode.

Once a processor has been set to the MCL personality and operating in UHD mode, it can be extended to a Sync or Dual Conversion personality, if these two conditions are fulfilled:

1. The processor adjacent to the MCL is a Sync/Conversion processor, and is in UHD mode.
2. The preceding processor is either an MCL-UHD processor or an MCL-extended processor (Sync or Dual Conversion with Processor Mode set to Extended).

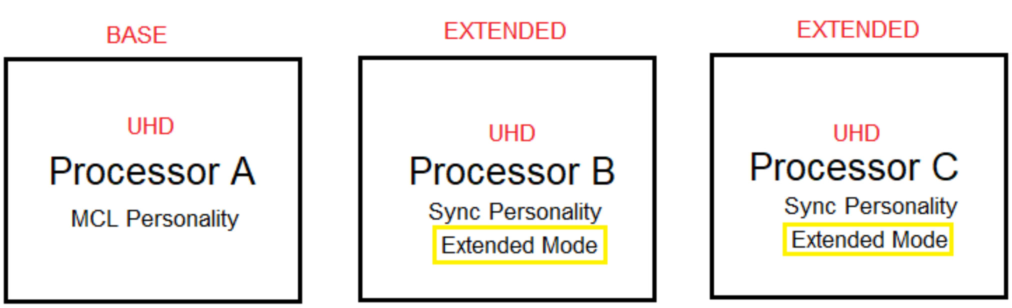
You can effectively have a Base MCL processor extended to a maximum of 3 other processors. Video and audio signals can be routed from an *Extended* MCL Processor to a *Base* MCL Processor to provide External Alpha/Fill inputs and/or Bus A and Bus B inputs.

Note: For extended processors, the HPhase, VPhase, and Frame Delay values must be set to zero.



Extension Example

The following example shows a potential extension scenario, with Processor A set to **MCL**, and Processor B/C set to **Sync**.

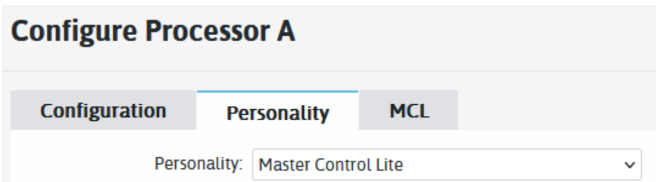


Pre-Requisites

- All processors must be in UHD mode.
- A **Master Control Lite UHD Personality** license should be available for assigning to the Base MCL processor.

Steps on Processor A:

1. Click **Edit** on **Processor A**, go to the **Personality** tab and set to **Master Control Lite**

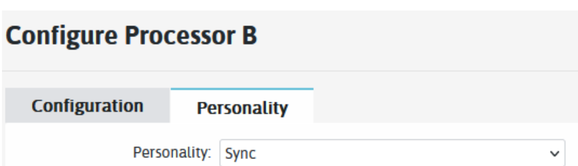


2. Ensure Processor A is in **UHD** mode. To do this :
   a. Go to **Configure** > **Licenses** and ensure the **Master Control Lite UHD Personality** license is available and assigned to **Processor A**
   b. Click **Edit** on **Processor A**, and in the **Configuration** tab, set the **MCL Output Video Standard** to 2160p/50 or 2160p/59.94

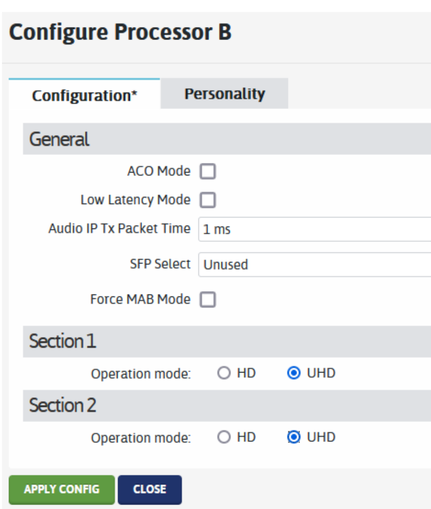
Note: Also see UHD Mode (on page 191).

Steps on Processor B:

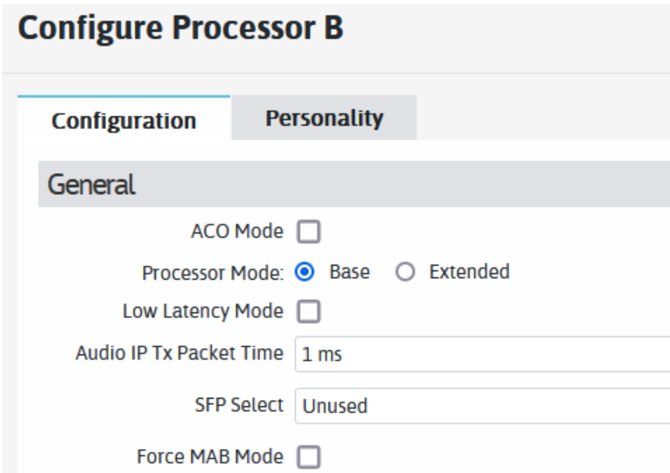
1. Click **Edit** on **Processor B**, go to the **Personality** tab and set to **Sync**



2. Go to the **Configuration** tab and set **Operation Mode** to **UHD**. Click **Apply Config.**



3. Once the mode has been changed to **UHD**, you will see a **Processor Mode** parameter that enables you to set to **Base** or **Extended**. Set to **Extended**. Click **Apply Config**.



Steps on Processor C:

Repeat all the same steps performed on Processor B.

The setup now contains a base MCL Processor A, with Processors B and C as Extended.

MCL Alarms

Type	Alarm	Description
Input	MCL Input Standard Mismatch	Video Input Standard does not match the MCL Output Video Standard.
Input	MCL Input Colorimetry and TCS Mismatch	Video Input Colorimetry and TCS does not match the MCL Output Colorimetry and TCS.
Routing	Master Control Lite Proc (X) Router Connection Error	MCL Proc (X) Router Connection Error. *Note: This alarm is triggered if the SNP cannot download the Magellan Control System database OR if it cannot send a routing command to the Magellan Control System . In general, this alarm indicates a failure communicating with the Magellan Control System .*
Routing	Master Control Lite Proc (X) Invalid Destination/Source Name Error	Displays the errored source or destination name. *Note: The MCL Tab > Router Configuration section contains source/destination name fields (Logical Source Name, Bus A/B Destination Name, Program/Preset Follow, and AUX Destination Name). On clicking Apply MCL, these are validated against the actual names in the configured Magellan Control System Database.*

SNP Graphics Prep Tool

Graphics Prep Tool - Overview

The **SNP Graphics Prep Tool** is a standalone application that allows for defining static or animated logos to include in your program output. The SNP Graphics Prep Tool is used to convert many industry standard graphics file formats such as the Bitmap (.bmp), Portable Network Graphics (.png), QuickTime File Format (.mov), etc. to Imagine Communication's proprietary graphics file format, .mg3. The .mg3 graphics format supports: uncompressed video, 10-bits per component, High Dynamic Range (HDR), and Wide Colour Gamut (WCG). From a workflow standpoint, first go to the SNP Graphics Prep tool to define a logo, and then go to the SNP UI to apply it.

Steps on the SNP Graphics Prep Tool		**Steps on the SNP**	
STEP 1	Installing the SNP Graphics Prep Tool (on page 226)		
STEP 2	Running the Graphics Prep Tool (on page 227) SNP Graphics Prep Tool - Parameters (on page 229)		
STEP 3	Creating a Logo File (on page 232)		
		STEP 4	Uploading a Logo (.mg3 graphics file) to an SNP (on page 233)
		STEP 5	Selecting an Internal Logo for a Keyer Layer (on page 235)

Installing the SNP Graphics Prep Tool

1. The Graphics Prep tool is a Java application that requires Oracle JRE installed in order to work.

   Note: Oracle's JRE license for commercial use has significantly changed since the release of jre-8u-202 version. More information here: https://www.java.com/en/download/release_notice.jsp
   Oracle® and Java are registered trademarks of Oracle and/or its affiliates.

   We recommend you install the jre-8u-202 version. See: https://www.oracle.com/ca-en/java/technologies/javase/javase8-archive-downloads.html

2. Once Java is installed open a Command shell, and at the prompt type '`java -version`'. Verify that the 64-bit version is installed.

   Note: If the Java path hasn't been set in the system, go to the folder that contains Java (for example, `C:\Program Files (x86)\Common Files\Oracle\Java\javapath`), and the run the '`java -version`' command.

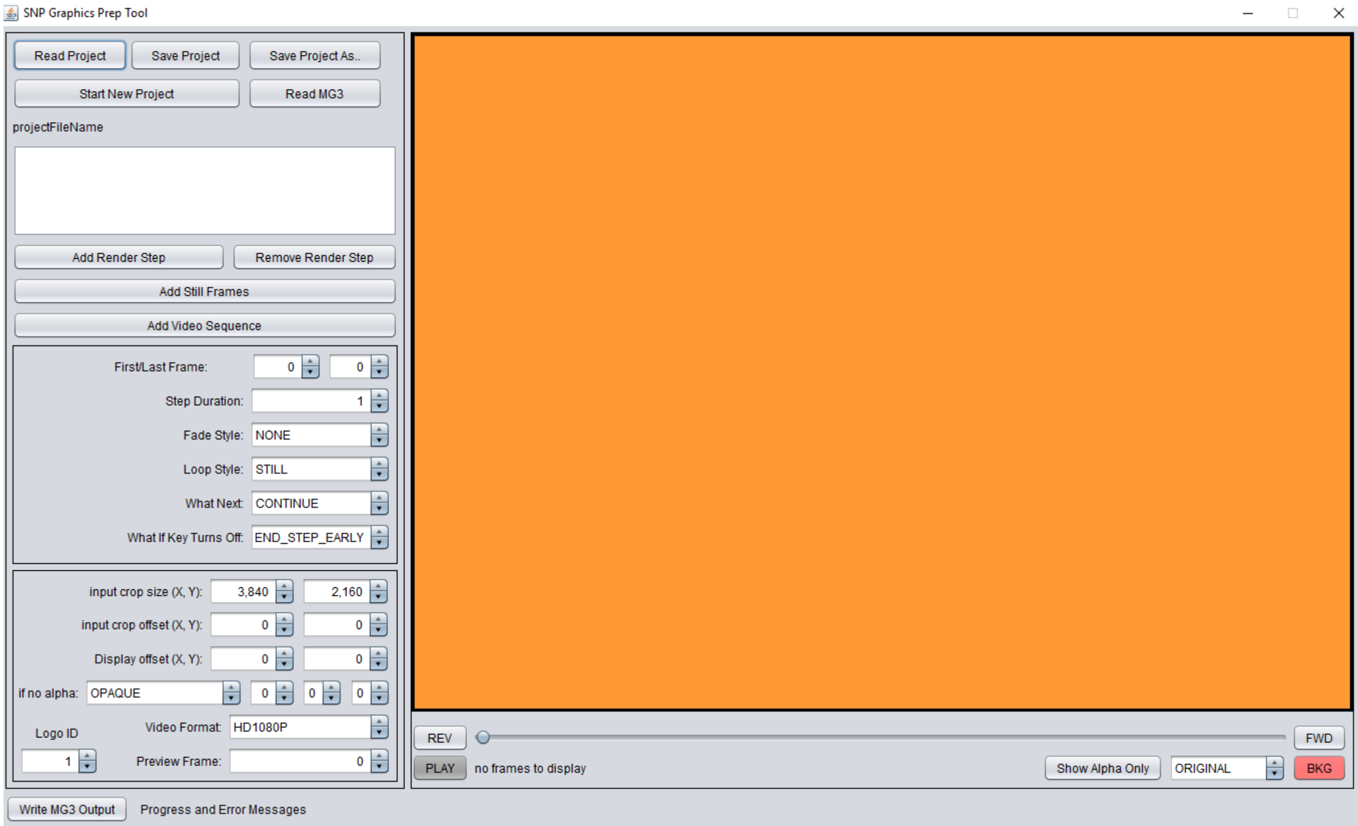
   The command shell should display something similar to the below:

   ```
   java version "1.8.0_321"
           Java(TM) SE Runtime Environment (build 1.8.0_321-b07)
           Java HotSpot(TM) 64-Bit Server VM (build 25.321-b07, mixed mode)
   ```

3. Go the folder where the Graphics Prep tool package was extracted and run the gfxConvert<version> application (exe).

Running the Graphics Prep Tool

The SNP Graphics Prep Tool UI is displayed on running the **gfxConvert-x.x.x.xx** application (exe).



- See SNP Graphics Prep Tool - Parameters (on page 229) for a description of the parameters that can be set
- See Creating a Logo File (on page 232) for details on how to create a logo file in this tool
- See Uploading a Logo (.mg3 graphics file) to an SNP (on page 233) for details on how to input the logo file into the SNP
- See Selecting an Internal Logo for a Keyer Layer (on page 235) for detail on how to assign the logo in a Keyer Layer

Running the Graphics Prep tool via Command Line

The Graphics Prep Tool also offers a command line interface using which you can automate conversion of graphics files to .mg3 file format.

The Command-Line Arguments are as follows:

-nw	No Window will be created, action will be driven by the command line arguments
-p <file>	Load the named json "project" file and all the media it points to. This "file" is a text file that can describe any feature the gfxConvert tool has. One approach to scripted operation is to create the project file in the interactive tool, and then modify it via scripts with different filenames or other properties.

-m <file>	Load the named existing MG3 file.
-s <file>	Load the named still file. This argument can be used multiple times for multiple frames
-h <id>	Use the indicated Logo ID number in the output file. The Logo ID number is used by Automation to reference a specific Logo file. Valid Logo ID numbers are 1 to 998. Do not use 0 or 999. 999 is reserved for External Key inputs. 0 cannot be selected by Automation.
-format <format>	Indicates the video format for the file - default is HD1080P. Choices are HD1080INT, HD1080P, HDP2020, UHD709, UHD2020.
-o <file>	Indicates where to write the mg3 output file. If missing, nothing will be generated.

Command-Line Format

```
C:\test>gfxConvert-0.24.4.24.exe -nw -format <format> -s
<gfx_filename_1.png> -s <gfx_filename_2.png> -s <gfx_filename_3.png> -
s <gfx_filename_4.png> -o <out_filename.mg3> -h <Logo_ID_number>
```

Example of a single static logo:

```
c:\test> gfxConvert-0.24.4.24.exe -nw -format <HD1080INT> -s
stationlogo.png -o id42_stationlogo.mg3 -h 42
```

Example of a multiple static logos used to create a two frame animation:

```
c:\test> gfxConvert-0.24.4.24.exe -nw --format <HD1080P> -s
btsport.png -s icLogo.png -o nbcTest.mg3 -h 47
```

SNP Graphics Prep Tool - Parameters

Parameter Name	Parameter Description
Read Project	Select this option to load a previously saved Project file. Project files are in json format. The Project Name is displayed in the User Interface (UI). The project file includes references to all the graphics, the cropping and offset information, and details of the display sequence.
Save Project	Select to save all of the project parameter settings to a Project file, a json file. Imagine Communications strongly recommends saving a .json Project file, especially for graphics used for UHD formats.
Save Project As	Select to save all of the project parameter settings to a Project file with a new filename, a json file.
Read MG3	Select to open a previously saved .mg3 file. The .mg3 filename is displayed in the UI. When reading-in a previously saved .mg3 file, the image data is passed though the image processing algorithms; this can result in image degradation. Save a project file to avoid this.
Start New Project	Select this option to create a new Project. All previous project settings are reset to their factory default values and any unsaved changes are lost.
Add Render Step	Use this option to manually create an animation sequence from individual image files or a sequence of files.
Remove Render Step	Remove the currently selected Render Step.
Add Still frames	Select this option to import a single image file (for static Logos), or multiple image files of an animation sequence (for animated Logos). If you specify multiple image files, they must be in the same directory, be of the same size and type, and have an ascending numeric sequence as part of their name. The numeric part of the file name must have the same number of digits. For example, the following sequence specifies a 240 frame animation in the Targa format: • myAnim0001.tga • myAnim0002.tga • myAnim0003.tga • myAnim0004.tga • myAnim0005.tga • … • myAnim0238.tga • myAnim0239.tga • myAnim0240.tga *Note: Supported Formats for Still files:* *SVG, WMF, BMP, CUR, ICO, PNG, GIF (as still), JPG, TGA, TIFF, BigTiff, and potentially others.*
Add Video Sequence	Select this option to import single files which contain animation sequences such as QuickTime File Format (.mov). Adds a sequence of frames from a video file. You will be prompted to choose the maximum number of frames to add, and also can skip a number of frames from the file before adding. Supported Formats: Motion codecs: Most 8-bit codecs (MP2, H.264, etc) when contained in MOV wrapper. Also supports QuickTime RLE encoding including 10-bit QTRLE with or without alpha channel.

First Frame	Use this option to specify which image frame is the first frame of an animation sequence. Useful for trimming an animation sequence, i.e., the starting frame. Note that frame numbering starts at 0.
Last Frame	Use this option to specify which image frame is the last frame of an animation sequence. Useful for trimming an animation sequence, i.e., the end frame.
Step Duration	Used to specify how many video frame the current image frame must be played for
Fade Style	Options are: • NONE - Play the current Step as normal • FADEUP - Fade-up the current Step, in steps of 1/'Step Duration' for each video frame. • FADEDOWN - Fade-down the current Step, in steps of 1/'Step Duration' for each video frame. Use this option when manually building an animation sequence from still images.
Loop Style	Options are: • STILL - specifies that the current Step is a still image (default) • LOOP - specifies that the current Step is to be looped on • PLAYFIT - specifies that the current Step is fit to the Step Duration
What Next	Options are: • CONTINUE - Go to the next step in the sequence • WAITFORKEYOFF - Repeat the current Step, until the Key has been turned off. The whole Step is repeated. If the key is turned off while this Step is in progress, the Step either runs to completion, or concludes immediately, depending upon the 'What if Key Turn Off' parameter is set to.
What if Key Turns Off	• End Step Early - If the key is turned off while this Step is in progress, then end this Step immediately • Finish Step - If the key is turned off while this Step is in progress, continue this Step to completion before proceeding.
Input crop size x	Used to specify how much horizontal crop to apply to the image
Input crop size y	Used to specify the vertical crop to apply to the image
Input crop offset x	Used to specify how much horizontal crop offset to apply to the image
Input crop offset y	Used to specify the vertical crop offset to apply to the image
Display offset x	Used to specify the horizontal position offset of the cropped or non-cropped image. The original of the image, (0,0), is the top-left corner of the screen.
Display offset y	Used to specify the vertical position offset of the cropped or non-cropped image

If no alpha	If no Alpha channel is embedded with the Fill channel, this parameter specifies how to generate the Alpha channel data. Options are: • BLACK_CLEAR • WHITE_CLEAR • OPAQUE • LUMA Use the three controls to the right to define offset values to apply when creating an alpha channels based on thresholding the white or black part of the image. • Synthesized Alpha Offset - Offset value applied when creating an alpha channel based on thresholding the white or black part of the image. • Synthesized Alpha Erosion/Dilation - Iterations of Erosion (if a positive value) or Dilation (if a negative value), to apply to the synthesized alpha channel prior to filtering. • Synthesized Alpha Filter - iltering level applied after creating an alpha channel synthetically. A value of zero means no filtering is applied.
Video Format	Used to specify the target video format and color space of the .mg3 file. Options are: • HD720 – for progressive 1280 pixels x 720 lines resolutions in BT.709 HD SDR. *Format not supported by MCL.* • HD1080INT – for interlaced 1920 pixels x 1080 lines resolutions in BT.709 HD SDR • HD1080P – for progressive 1920 pixels x 1080 lines resolutions in BT.709 HD SDR • HDP2020 – for progressive 1920 pixels x 1080 lines resolution in BT.2020 HD HDR/WCG • UHD709 – for progressive 3840 pixels x 2160 lines in BT.709 HD SDR • UHD2020 – for progressive 3840 pixels x 2160 lines in BT.2020 UHD HDR/WCG
Preview Frame	The frame number that will be used to represent the sequence when it is displayed on the preset bus. For rendered graphics with a fade-in, it is often helpful to choose a preview frame that fully reveals the graphic for use as the preview frame. NOTE: the preview frame does not need to be part of the active graphic.
Logo ID	Enter an ID for the logo. If using Automation, unique Logo IDs must be assigned to each .mg3 graphics file. Automation uses these IDs to recall .mg3 graphics files. It is recommended to track Logo IDs in use.
Write MG3 Output	Select this button to render the final MG3 formatted image file - this is the file that is uploaded to the SNP in the next step. Be sure to select the correct target video format before rendering the output, as the file's format must match the operating format of the SNP MCL. We also recommend saving a project file to facilitate future edits to the graphics project.
"Graphics Prep Tool status"	General display area for messages generated by the tool
REV	Select this button to step back one frame in an animation sequence
FWD	Select this button to move forward one frame in an animation sequence

PLAY	Select this to play the animation sequence from the currently selected frame on the 'Animation Slider Bar'. Press the PLAY button to stop the animation sequence from playing.
"PLAY status"	Information about the current image frame being displayed in the UI is displayed in this area
"Graphics Display Mode"	Options are: • ORIGINAL – select this mode to view the original image file • CROPPED – select this mode to view the cropped image file • IN_FRAME – select this mode to view the cropped or non-cropped image file at the specified Horizontal and Vertical Display Offsets
BKG	This option allows to you select a different UI Background color to preview the Logo image over. Depending upon the colours and brightness in the original Logo image, where it may be difficult to distinguish the UI Background color from the Logo image.

Creating a Logo File

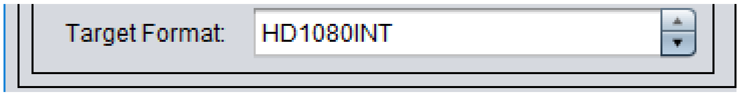
1. Create a new project by clicking **Start New Project**
2. Click the **Add Still frames** button
   - If creating a static logo, select a single file (frame)
   - If creating an animated logo, select multiple files/frames by bulk selecting
3. Click **Add Video sequence** if adding one file which contains the entire animation sequence. When adding frames from a video file, you will be prompted in a pop-up to specify the number of frames to import, and also be able to skip a number of frames off the front of the file before importing.
4. Click the **background** button if required to adjust the background color so the logo shows correctly (depending on the colors in the logo)
5. In case of a static logo, the **First Frame** and **Last Frame** parameters will show as **0**
6. In case of an animated logo, the **First Frame** parameter will show as **0**, and the **Last Frame** parameter will increment to show the final frame

Note: Animation sequences can also be trimmed by altering the first and last frames of the render steps. when the final output is rendered into MG3, only frames that actually appear in the render steps are put into the final file.

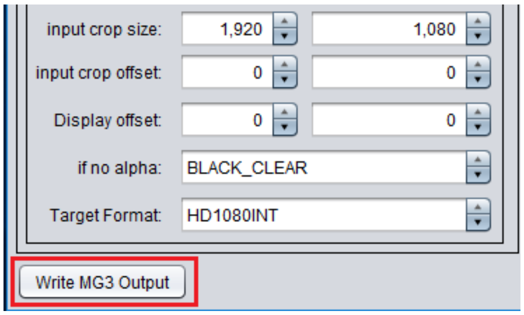
7. Set the **Step Duration** - This refers to the number of video frames the current image frame must be played for
8. Set the **Fade Style** - This option applies if creating an animated sequence from still images. Choose from Fadeup, FadeDown, or None
9. Set the **Loop** Style - Choose whether the logo is a still image or an animation. Options are:
   - Still: Specifies that the Render Step is a still image
   - Loop: Specifies that the Render Step is to be looped on

Note: When first importing content, if there are no render steps then the tool will automatically create a step that displays the imported content. Feel free to edit or replace this step with more steps that perform the desired sequencing.

10. Select the **Target Format** or the Output format. Choose from: HD 1080P, HDP2020, HD1080P, 1080INT, or 720P (720P not currently supported)



11. Click the **Write MG3 Output** button at the bottom. Enter a filename and select a location for the logo file. This creates an output file, specially formatted for the selected output, that can then be inputted into the SNP system on a Key Layer.



12. Click **Save Project**. This saves the logo file project, a JSON file, for future use or editing.

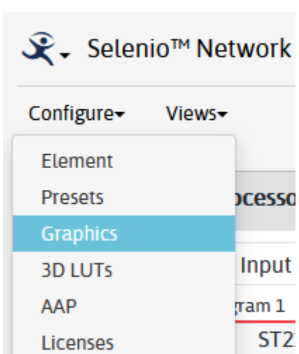
See:

- Uploading a Logo (.mg3 graphics file) to an SNP (on page 233)
- Selecting an Internal Logo for a Keyer Layer (on page 235)

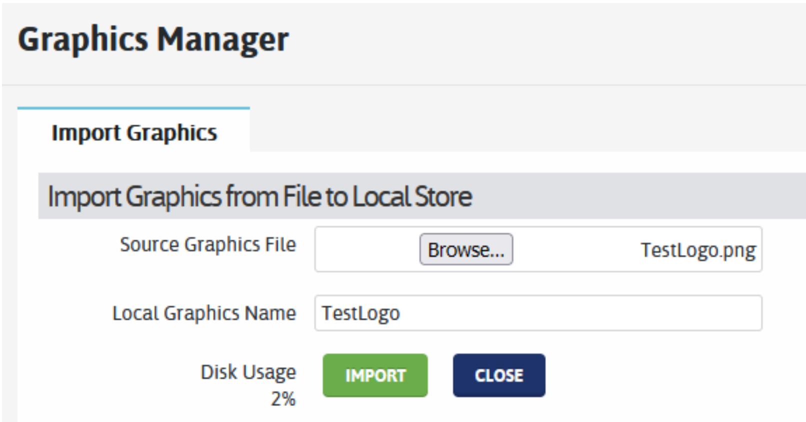
Uploading a Logo (.mg3 graphics file) to an SNP

Note: Ensure that a .mg3 logo file is available. This is created using the SNP Graphics Prep Tool. See Creating a Logo File (on page 232).

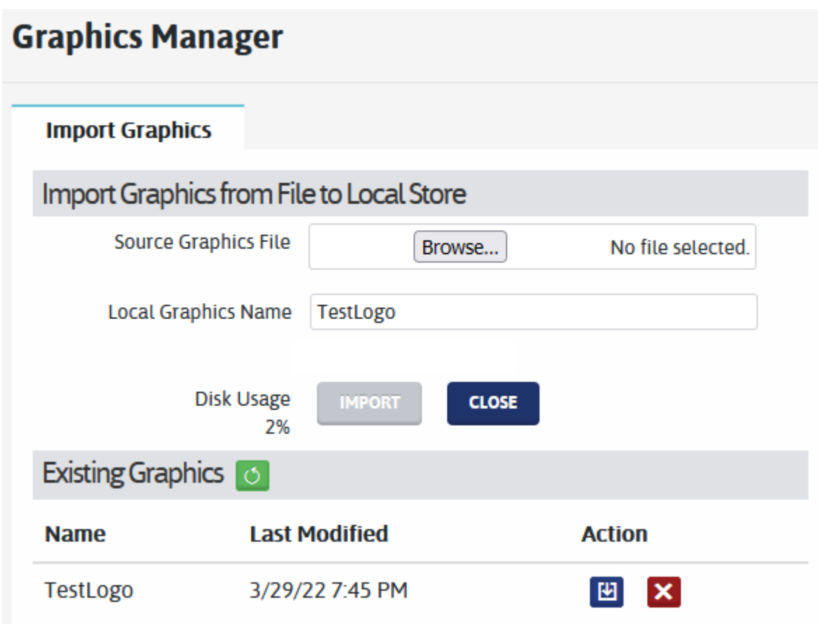
1. Log into the SNP UI
2. Go to **Configure > Graphics**



3. Input the previously created logo by clicking the **Browse** button. Local graphics name is the name that operators will see when selecting this graphic - this is useful in case the file names are not the operator names.



4. Once selected, click **Import.** Progress is indicated as the file uploads.
5. Once imported, the file is displayed in the Existing Graphics section, from where it can be downloaded to the local machine or deleted.



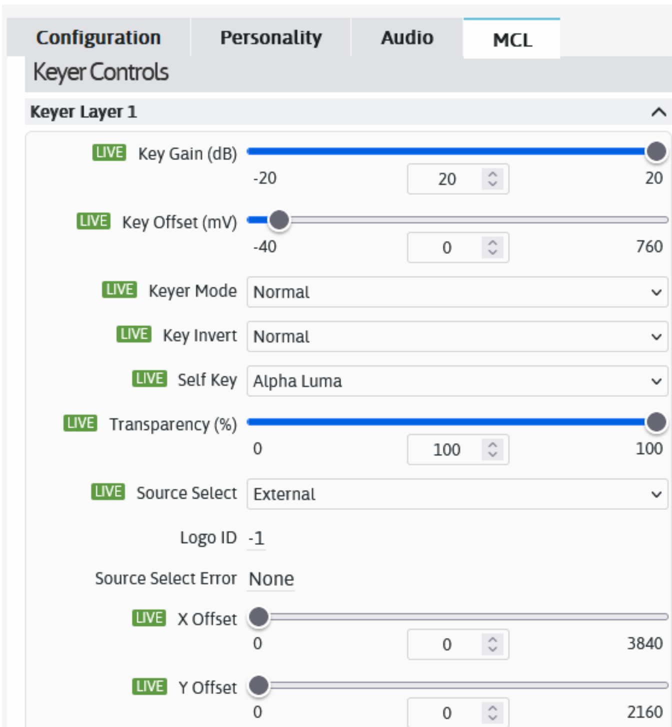
Note: .mg3 graphics files are stored on the SNP file system's sub-directory: `/mnt/ssdu/snp-media`.

The logo will now be available in the SNP system, and can be set on a Keyer Layer. See Selecting an Internal Logo for a Keyer Layer (on page 235).

Selecting an Internal Logo for a Keyer Layer

1. Ensure the desired Processor has been set to the **MCL** personality and then go to the **Configure** > **Processor** > **MCL Tab**
2. Scroll down to the **Keyer Controls** section
3. Select the desired **Keyer Layer** and in the **Source Select** field, select the recently added logo (mg3 file)

Note: The Source Select list is a filtered list for the applicable logos for the selected MCL Output Video Standard.

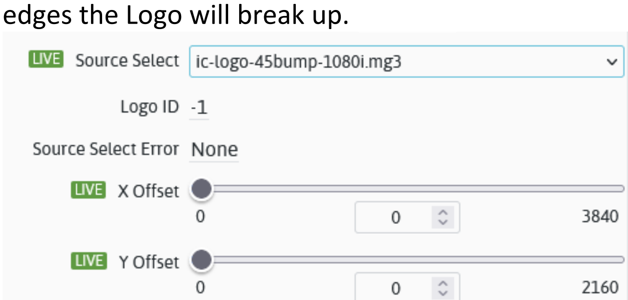


Note that this is a *Live* parameter so the selection is immediately applied without the need to click Apply MCL. The graphics logo or animation will then be played on the selected layer and displayed on the program output.

A spinning icon will be displayed for large .mg3 files which take a long time to load. When the logo loading completes, the spinning icon will disappear.

.mg3 Logo files are loaded from the mSATA drive into real-time memory.

Note: When the X Offset plus Logo width, or Y Offset plus Logo height exceed the Active Picture Area edges the Logo will break up.



SNP-MCL and Automation

MCL can be controlled by automation using a variation of the IconMaster protocol. For more details, see the *IconMaster Automation Interface Protocol User Manual*.

MCL automation was tested against Imagine's Automation Device Controller (ADC) automation system version 12, using its IconMaster driver. The MCL expects the protocol to arrive over a TCP/IP socket, and many automation systems supply the protocol on a serial port. In our testing we used a MOXA adapter in the ADC system to convert the serial port from automation into a TCP/IP socket for interfacing with the MCL.

Configuring a Multiviewer Personality

SNP **Multiviewer** and **Multiviewer Portrait Mode** are additional Processor "Personalities" for the SNP. These can be mixed and matched with the other SNP personalities.

SNP-MV processors have two modes: Base and Extended. When individual SNP-MV processor is assigned Base mode, it supports output of two UHD canvases and nine PiPs. Any or all SNP-MV processors can be assigned this way, and each one will have two UHD canvases and nine PiPs. After one SNP-MV processor has been assigned as Base mode, an upper-adjacent processor can also be assigned to Extended mode. These processors do not support any UHD canvases, but instead each provide nine more PiPs to the related SNP-MV base, for the following possibilities:

- Two Processors Together: Two UHD canvases, 18 pips
- Three Processors Together: Two UHD canvases, 27 pips
- Four Processors together: Two UHD canvases, 36 pips

The canvases are always rendered as 12G-UHD, and also output 1080i or 1080p down-sampled versions. Canvases can be output as IP and/or SDI and/or HDMI. The UHD Canvas can be rendered in SDR or HDR, and 1080i or 1080p versions can be mapped to SDR.

PiPs are organized into Layouts, which can also have digital clocks, titles, tallys, and audio meters. Layouts are created in the Layout Designer application. See your Layout Designer manual for complete information.

The first Processor in an SNP device that is assigned a Multiviewer personality must be assigned Base mode. Subsequent processors can be assigned as Base or as Extend. When a Processor assigned as Multiviewer personality is in Extend mode, it provides extra PiPs to the Base processor, which can then use them as additional inputs to the output UHD displays.

Each processor that is assigned to Multiviewer personality has eight BNC inputs plus one from the video SFP for SDI inputs, or nine IP inputs. If the BNC and SFP are not used for inputs, the rendered display is available through them (and also over IP).

Each of the nine input channels is assigned to one of the displays based on the number of PiPs used in each of the current layouts. Therefore, if you have a MV Base but no extend processors, you can have a single UHD output with up to nine PiPs, or you can have two displays that divide those nine between them.

Adding a single Extended mode processor makes nine more PiPs available to be divided between those two UHD outputs, for a total of 18 outputs. A third Extended mode processor adds 9 more PiPs for a total of 27, and a fourth means a total of 36 outputs on those two UHD outputs.

The extend processor(s) must directly follow the Base processor, so if Processor A is the base, then Processor B, C, and D can be assigned as extend in that order. If only one extend is to be assigned to the base, it must be processor B in that case. The processors can be configured as Base and Extended, in the following configurations:

Proc A	Proc B	Proc C	Proc D	Number of Multiviewers	Number of PiPs per Display
base	base	base	base	4	4x (9 across 2 displays)

Proc A	Proc B	Proc C	Proc D	Number of Multiviewers	Number of PiPs per Display
base	base	base	extended	3	2x (9 across 2 displays), and 1x (18 across 2 displays)
base	base	extended	base	3	2x (9 across 2 displays), and 1x (18 across 2 displays)
base	extended	base	base	3	2x (9 across 2 displays), and 1x (18 across 2 displays)
base	base	extended	extended	2	1x (9 across 2 displays), and 1x (27 across 2 displays)
base	extended	base	extended	2	2x (18 across 2 displays)
base	extended	extended	base	2	1x (9 across 2 displays), and 1x (27 across 2 displays)
base	extended	extended	extended	1	1x (36 across 2 displays)

Note: If the number of PIPs in a display exceeds the available ports, an error message - There are not enough input ports available for the requested layout - will be displayed. This error message is seen even if you switch to a layout in another display where the total PIPs equal the available ports. As a workaround, either republish the PiP layout on the affected display OR switch to another layout and then switch back to the affected display - this should resolve the issue.

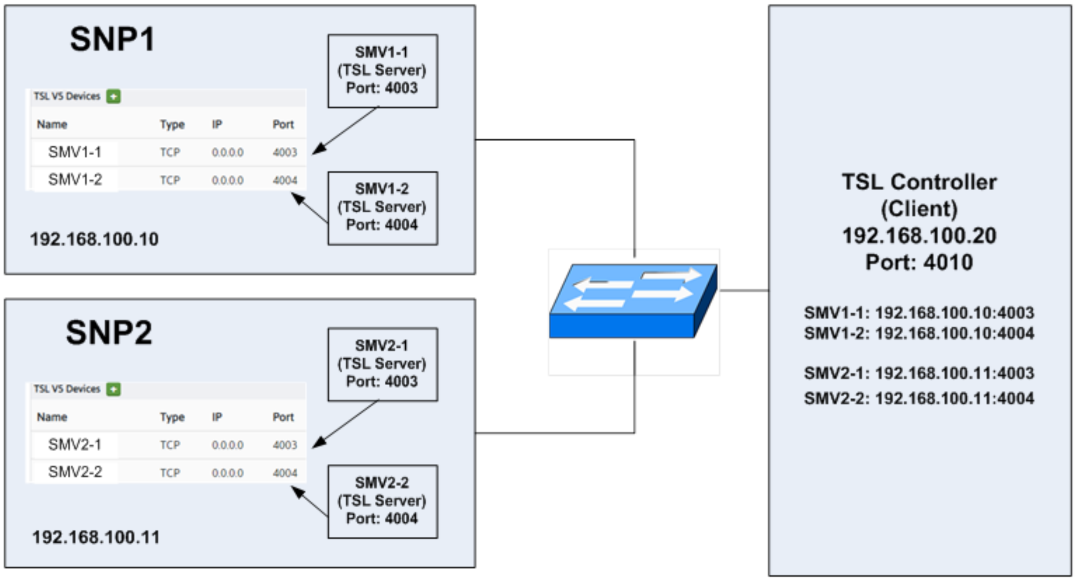
TSL5 Configuration

It is recommended to configure the SNP-MV unit(s) as TSL server and the controller as client device. When the SNP unit is configured for multiple MV personalities, multiple TSL servers should be added to each frame with the host IP address of 0.0.0.0 and unique port numbers.

The example below is based on SNP unit configured for two MV personalities.

SNP Unit	MV Name	IP Address	Port
SNP 1	SMV1-1	0.0.0.0	4003
	SMV1-2	0.0.0.0	4004
SNP2	SMV2-1	0.0.0.0	4003
	SMV2-2	0.0.0.0	4004

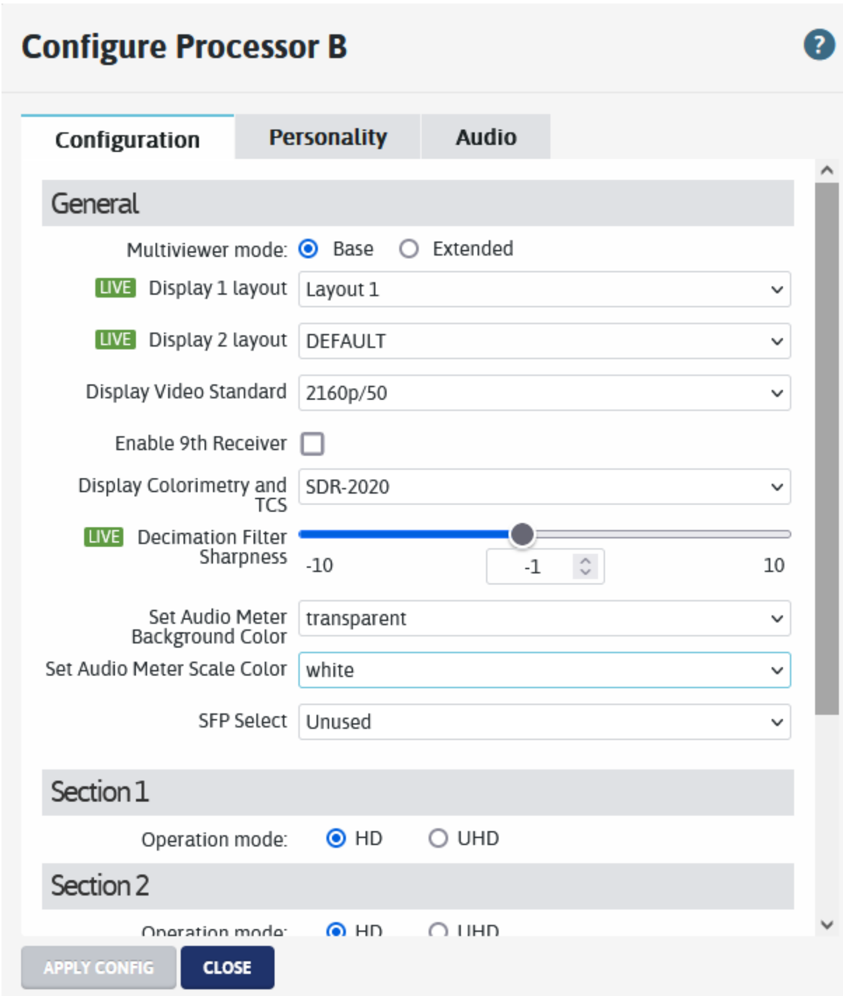
1. From the **Tools > Configure Element > IP WAN** option, add the TSL V5 devices.
   The conceptual drawing is shown below:



2. Select **Views > Element** option.
3. Select the **Multiviewer mode [Base] > Edit** option.
4. In **Configuration > External Devices**, select the proper TSL server port device.

Configure a Multiviewer Personality

When a Processor's mode (on the **Personality** tab) is set to **Multiviewer**, the following options will appear on the **Configuration** tab.



General

Multiviewer Mode	There are two options: • **Base**: This processor appears in Layout Designer as a device to which output devices (display monitors) are connected and layouts can be assigned. • **Extended**: This processor has no display monitors of its own. It provides additional PiPs to the related Base processor, forming a single multiviewer from the perspective of the Layout Designer application.
Cascade Output Select	Only displayed on Processor A of a Processor in Multiviewer Mode. Lets you set Cascade Output to BNC/SFP or unused. See Multi-Unit Cascading (on page 473).
Cascade Input Select	Only displayed on Processor D of a Processor in Multiviewer Mode. Lets you set Cascade Input to BNC, SFP, or unused. See Multi-Unit Cascading (on page 473).
Cascade Level	

Display (1 - 2) Layout	The layout name in this field is the layout that is currently assigned to the specified display. *Choose a layout from the menu. Selecting immediately publishes that layout to the display.* This menu is populated with all layouts that have been published to this particular display output from Layout Designer.
Display Video Standard	The SNP Multiviewer provides two 3840x2160 (UHD) rendered displays. Both displays are the same video format. The video format options are: • 2160p/50 • 2160p/59.97
Enable 9th Receiver	In cases where the Multiviewer cannot receive 9 IP input signals due to input bandwidth limitations, you can choose to include or exclude the 9th pip (in the process of optimally mapping layout pips to physical receivers). This setting is disabled by default. The 9th pip cannot be used under the following conditions: 1. If there are eight 1080p59 signals in use (or planned to be in use) 2. If the first or second section is UHD and the other is using (or planning to use) 4x 1080p59 signals 3. If the first and second sections are both UHD *Note that in this case (both sections UHD), the SNP treats the 9th pip control as if it had been disabled, and this setting is greyed out/unavailable.*
Display Colorimetry and TCS	Set Display Colorimetry and Transfer Characteristics Override. • SDR-709 • SDR-601 • SDR-2020 • HLG-2100 • PQ-2100 • SLOG3-2020
Decimation Filter Sharpness	The SNP Multiviewer supports a set of filter coefficients that are allocated to PiPs according to the PiP size. This setting offers you control over a sharper or harder filter. The larger the value, the higher the sharpness. Smaller or negative values are less sharp. The value set here applies to all PiPs in the multiviewer. Values: -10 to +10 (default is zero)

Set Audio Meter Background Color	Set the background color for Audio Meters as desired. Options are: • Transparent • black 25% opacity • black 62.5% opacity • black • blue • green 50% opacity • green • purple • black 50% opacity • red • orange • yellow • grey 25% • grey 50% • grey 75% • white Set to Transparent if meters need to be placed on top of video.
Set Audio Meter Scale Color	Set the color for the Audio Meter scale as desired. *Note: A scale is displayed on an audio meter if enabled in the audio meter properties in Layout Designer.* Options are: • Transparent • black 25% opacity • black 62.5% opacity • black • blue • green 50% opacity • green • purple • red 50% opacity • red • orange • yellow • grey 25% • grey 50% • grey 75% • white

SFP Select	Choose the type of SFP that SNP should be expecting in this position. Options include: • Unused • 2RX 3G • 2RX 12G • RX HDMI • 2TX 3G • 2TX 12G • TX 12G HDMI ***Note:*** *SFP orientation is different depending on the slot the SFP is inserted into. See Configure SFPs for more information. The 2 means dual.*
Force MAB Mode	When checked, the switch mode is set to Make After Break. Otherwise, the switch mode will depend on whether there's available bandwidth to do a Make Before Break switch. This can help to avoid oversubscribing the switch. See Make-Before-Break (MBB) Video Switching (on page 470)

Section 1/Section 2

Operation Mode	• HD • UHD

External Devices

The 'External Devices' group contains the communication parameters for TSL, Plura, and Masterclock devices. These parameters are available when the 'Multiviewer Mode' parameter is set to 'Base'. Plura and TSL V5 devices are defined per SNP device.

- See Configuring Plura and TSL V5 Devices for use with the Multiviewer (on page 244)
- See Masterclock Devices (on page 373)

TSL V5	Provides Tally data for multiviewers. TSL must also be selected on tallies etc. in Layout Designer for this data to be transmitted/received.
Clocks/Timers	Provides Clock/timer data for multiviewers (Masterclock and Plura devices). Select a configured Plura or Masterclock devicefrom the drop-down menu, or leave as "unused" if not using Plura or Masterclock. If using Plura, note that Plura must be specified on any clocks in Layout Designer for data to be transmitted/received.

Configuring Plura and TSL V5 Devices for use with the Multiviewer

From the main menu, choose **Tools** > **Configure Element**, and then click on the **SNP Management** tab. Scroll down to the **External Devices** section.

TSL V5 Devices +

Name	Type	IP	Port	Actions
TSL Ver5	TCP	172.25.7.120	4004	Edit | Delete
TSL V5 U	UDP	172.25.7.120	4003	Edit | Delete

Plura Devices +

Name	IP	Port	Actions
SPT 90	172.25.7.90	8851	Edit | Delete

There is a table that lists configured TSL V5 Devices, and another that lists all configured Plura devices.

- To add a TSL V5 or Plura device, click + for that device type. See TSL V5 (UMD Devices) (on page 369) and Plura Devices (on page 371).
- To remove a device, click **Delete** (under Actions).
- To modify an already-defined device, click **Edit**.

To commit changes, click **Apply SNP Config**.

Configuring Masterclock Devices

From the main menu, choose **Tools** > **Configure Element**, and then click on the **SNP Management** tab. Scroll down to the **External Devices** section.

Masterclock Devices +

Name	Clock number	Multicast group	Source IP	Port#	Control source ID	Channel
NewClock1	1	239.252.0.0	0.0.0.0	6168	0	0

There are tables that list configured TSL V5 Devices, configured Plura devices, and Masterclock Devices

- To add a Masterclock device, click + for that device type. See Masterclock Devices (on page 373)
- To remove a device, click **Delete** (under Actions).
- To modify an already-defined device, click **Edit**.

To commit changes, click **Apply SNP Config**.

Configuring Multiviewer Inputs

Ensure that the IP WAN has been configured before setting up any receivers, and that your SNP is configured for Multiviewer (Base or Extend) personality.

When configured as part of a multiviewer, each section can receive either IP streams or SDI input.

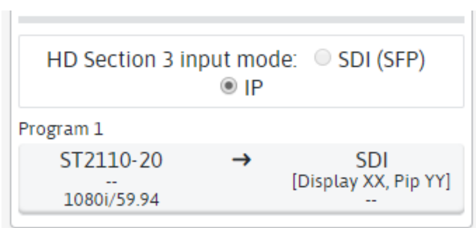
To configure an SNP program as receiving video from IP input, follow these steps:

1. Choose the Section Input mode as IP for the section of the processor you're working on.
2. Click the Program you want to configure.
3. On the Input tab, make WAN-related configurations as appropriate for your network, including the following:
   - Check the **Video IP Receiver Enable** checkbox.
   - Set the correct Receiver Video Standard.
   - Set the Primary and Secondary WAN selects.
   - Set the Primary IP address, UDP port, and (optional) multicast source.
   - Set the Secondary IP address, UDP port, and (optional) multicast source.

To configure an SNP program as receiving video from SDI input, choose the **Section Input mode** as **SDI** for the section of the processor you're working on.

Ninth input:

On SNP-MV processors only (both Base and Extend), you will see below the HD Section 3 Input Mode section, the following:



This ninth input is configured the same as the other eight. The ninth input gets its SDI input from the SFP port only.

Configuring Multiviewer Outputs

Configuration options for Multiviewer (Base) Processor Outputs are on Program 1 and Program 5. Extended Multiviewer mode processors do not have **Output** tabs on any program.

These UHD canvases are rendered as either SDR or HDR, output as IP and/or SDI and/or HDMI. Additional 1080i or 1080p proxy outputs can be mapped to SDR.

1. Click **Edit** for the Multiviewer mode (base) Processor and choose one of the following under **SFP Select**:
   - Unused
   - 2TX 3G
   - 2TX 12G

2. To configure Display 1, open the **Configure Processor** dialog box for **Program 1.**
3. On the **Output** tab, make the following selections:
   - Make a selection for **Proxy 3G Output Enable.**
     - **Unchecked**: the Proxy output format is 1080i (interlaced).
     - **Checked**: the Proxy output format is 1080p (progressive).

     The Proxy output frame/field rate follows the Multiviewer's Display frame rate.
   - Under **SDI**, choose either **UHD (12G)** or **UHD (2SI 4x 3G-SDI)** under **SDI UHD Output Link Select**, depending on the type of monitors you are using
   - Your options under **SFP Output**, will vary depending on your choice under SFP Select (above):
     - If you chose **Unused**, SFP Output will be unavailable. Make your selecting under **IP Video Configuration**
     - If you chose **2TX 3G**, make your video output selections under **Proxy IP Video Configuration**
     - If you chose **2TX 12G**, **Main SDI** will also be available
4. Repeat steps 2 and 3 for **Program 5** (Display 2).
5. Click **Apply** to save the configuration.

Now, when you connect to the SNP-MV device in Layout Designer and publish a layout to the associated display, it appears on the connected output.

Or, if layouts have already been created and assigned for the display, click **Edit** for the Processor, and choose a layout from the **Display 1 layout** or **Display 2 layout** menu.

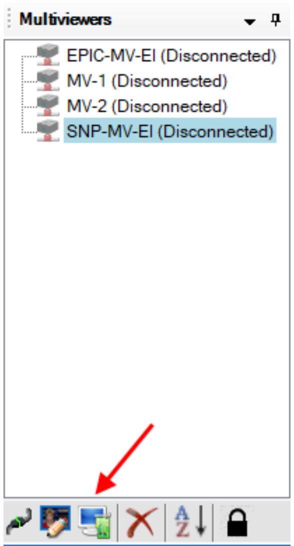
Connecting to Layout Designer (Multiviewer Personality)

Layout Designer recognizes the hardware device it is connected to, so if you have EPIC-MV devices and SNP-MV devices,

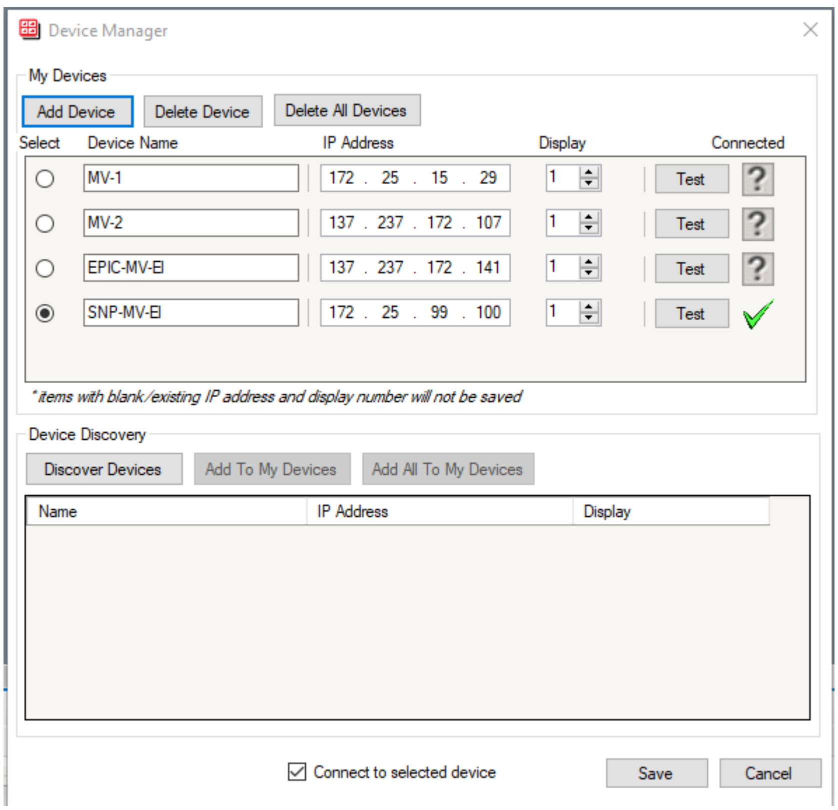
1. To install Layout Designer, double-click the PlatinumSXHybridDesigner-20xx-xx-xx-xx.exe file (where X denotes a variable number).

   Layout Designer uses an InstallShield Wizard. Follow the instructions that appear on the screen. All required plug-ins and extensions are installed as part of the executable procedure.
2. When installation is complete, launch Layout Designer.

3. In the **Multiviewers** palette that appears by default in the upper right of the screen, click **Device Manager**.



4. In the **Device Manager** screen, click **Add Device** and enter a name and IP address for your SNP-MV.



5. Select the display number.

   For SNP-MV devices, the **Display** column defines which display you want to publish to.

SNP Processor	Display #1	Display #2
A	Display 1	Display 2
B	Display 3	Display 4

SNP Processor	Display #1	Display #2
C	Display 5	Display 6
D	Display 7	Display 8

6. To test the connection, click **Test**.

   A green check appears in the Connected column for successful connections.

   If there is no SNP-MV Base device at the selected processor, your connection will be rejected and a red X will appear.

   For SNP-MV devices, you can have several displays at the same IP address. These are the various displays on that device. You will make a Device row for each display you want to publish to. Connections made the Extended SNP-MV processors will be rejected, as the Extended SNP-MV does not output displays, but provides video feeds for other (Base) SNP-MV devices.
7. Click **Save**.

   The SNP-MV appears in the **Multiviewers** list, and the **Device Manager** dialog box closes.
8. Click on this device.

   If there are layouts assigned to the device, they appear in an alphabetized list underneath it in this dialog box.
9. Do either of the following:
   - To modify a layout, click on it to open it in the canvas.

     Note: You cannot use an existing EPIC-MV layout as the starting point for an SNP-MV layout.
   - To create a new layout, choose **File** > **New Blank Layout** or **File** > **New Layout using Layout Creation Wizard**.

   See your Layout Designer manual for complete information on how to develop layouts.

   Each PiP in a layout has its source defined by Magellan Control System and routed through the SNP-MV processor(s). Create a window for each PiP or it will not be shown on the output.

   Each channel is allocated to one of the two displays. PiPs are populated on Display 1 of a processor starting from 1. PiPs are populated on Display 2 starting from the highest number available -- so, if you have a Base processor that is extended by one Extend processor, the PiPs on Display 2 will start with PiP 18, then PiP 17, etc. When creating layouts, ensure that the layouts of the two displays do not ask for more inputs than the processors can supply. If the two layouts contain more PiPs than are available, the PiPs are filled in increasing order within each display, but the missing PiPs (which will render as blank) could be on either display depending on the sequence of layout selections.
10. When your layout is complete, click **File** > **Save**.
11. To publish your layout to the SNP-MV, click **Publish**.

    The layout appears in the XML file list on the **Configuration** tab for the Processor in the SNP web interface.

Note about Digital Clock

The Layout Designer options of Internal Clock and External PTP both show the 'SNP system time'. Note that both types of clocks are not supported simultaneously.

NTP Server Configured	PTP Configured	SNP System Time
No	No	Indeterminate

NTP Server Configured	PTP Configured	SNP System Time
No	Yes	PTP time
Yes	No	NTP time
Yes	Yes	NTP time

Configuring a Multiviewer Portrait Mode Personality

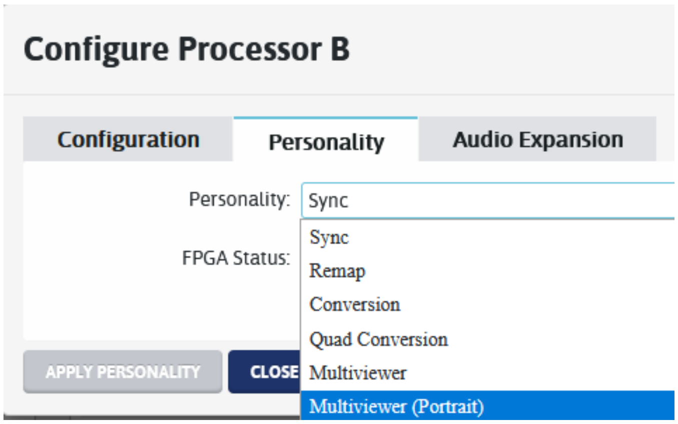
The **Multiviewer Portrait Mode** Personality is similar to the Multiviewer personality, but with the ability to rotate the multiviewer's display.

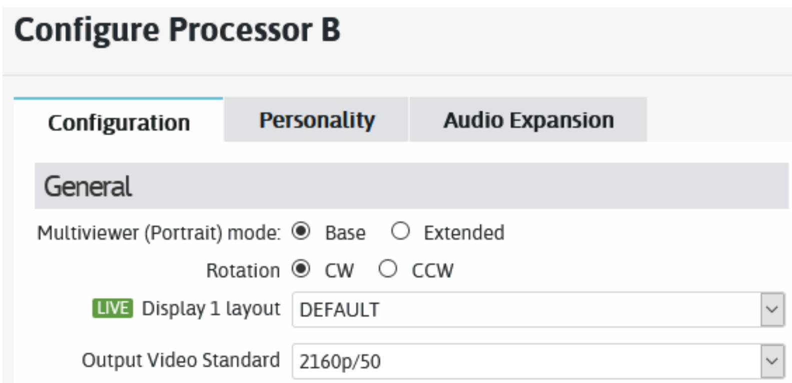
For all details and configuration options, see Configuring a Multiviewer Personality (on page 237). Note that two differences include support for a single display, and the Output tab only being available in Section 1. For more details, see:

In This Section

Portrait Mode: Display Output Rotation

The display output can be rotated clockwise or counter clockwise, by either 90 or 270 degrees, depending upon how the monitor is mounted.





Portrait Mode: Support for a Single Display

The Multiviewer Portrait Mode supports a single display (as compared to the Multiviewer landscape mode) which allows for 2 displays.

Portrait Mode: Output Configuration

For this personality, the output set in Section 1 is automatically applied to Section 2. Section 2 does not have it's own Output tab and will match the output (for SDI, etc.) of Section 1.

Portrait Mode: Key Features

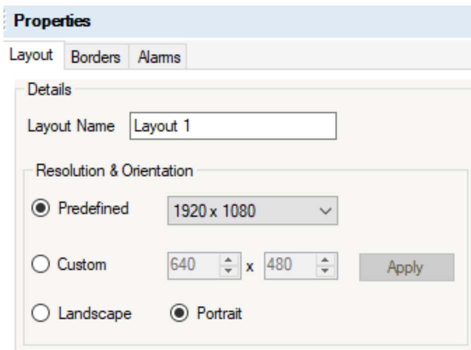
The following are some of the features of this personality:

- **Rotation Support:** Portrait mode provides support for rotating a single UHD 3840x2160p50/59.94 image (one display)
- **PIP Width:** The Portrait mode is limited to support up to a maximum of two large PIPs with sizes greater than 1920x1080 – regardless of the input signal (HD or UHD)
- **Outputs:** Portrait mode outputs are available over SDI and IP (ST2110-20)

- **Proxy Output:** Proxy output is available in Portrait mode. Proxy outputs are available over SDI and IP (ST2110-20 and ST2022-6)
- **Video Input and Output formats:** 3840x2160p50/59.94 2SI.
- **Audio:** Embedded Audio is de-embedded, delayed by 1 video frame, and then re-embedded
- **Extension**: Portrait mode can also be extended similar to the regular MV personality.

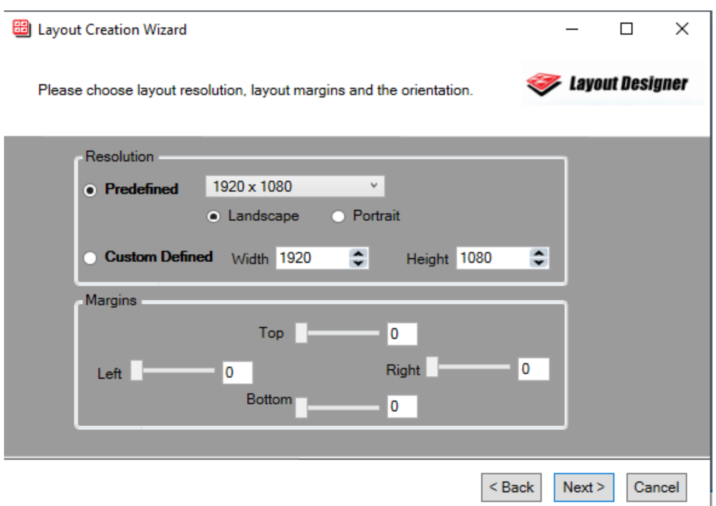
Portrait Mode: Layout Designer Configuration

In Layout Designer, the Properties window > Layout tab displays orientation settings - **Landscape** and **Portrait**. On connecting to a multiviewer, the assigned mode orientation is auto detected.



Layouts can also be created using the wizard (which now has a portrait selection). To do this:

1. Go to **File** > **New Layout Using Layout Creation Wizard**
2. Provide a **Name** for your Layout
3. Select the **Resolution** and **Orientation**



4. Select the **component type** (Window or PiP)
5. If **Window**, then select a window from the library
6. If **PiP**, select a PiP
7. Select a **Layout style**
8. Click **Finish** to complete

SDI Inputs to SDI Outputs within a Program

The SNP can be used for both SDI inputs and outputs. Each program within a processor can directly provide an SDI output locally, without the need for IP domain connectivity.

Each processor personality allows SDI inputs and SDI outputs, by using the available HD-BNC connections as inputs or outputs. See more details on personalities.

Important: 12G SDI input will not work if Section 1 is configured as SDI 5-8 input mode or if Section 2 is configured as SDI 1-4 input mode.

Note: In addition to the SDI outputs, IP outputs can also be available simultaneously from any given program within a processor. Depending on your configuration, some sections may provide IP outputs only because the SDI connections are used in other ways.

SDI Input/Output Assignments

Each of the SNP's processor section's input mode selections will determine which group of four SDI BNCs will operate as outputs. It is important to note that if either of **SDI 1-4** or **SDI 5-8** are not selected as the section's input mode, then that group of four SDI BNCs will be assigned as outputs for the section that is native to the SDI BNCs.

SDI 1-4 is native to **Section 1** and **SDI 5-8** is native to **Section 2**.

Examples:

1. If **Section 1**'s *Input* mode is set to **SDI 5-8** and **Section 2**'s *Input* mode is set to **IP**, then **SDI 1-4** BNCs will be assigned to **Section 1**'s program outputs.
2. If both **Section 1** and **Section 2**'s input modes are set to **IP**, then **SDI 1-4** BNC outputs will be assigned to **Section 1** and **SDI 5-8** BNC outputs will be assigned to **Section 2**.

The following table illustrates the SDI 1-4, SDI 5-8 and IP input mode selections and SDI BNC output assignments.

Section 1 Input Mode	Section 2 Input Mode	Section 1 Output	Section 2 Output
SDI 1-4	SDI 1-4	IP only	SDI 5-8 and IP
SDI 1-4	SDI 5-8	IP only	IP only
SDI 5-8	SDI 5-8	SDI 1-4 and IP	IP only
SDI 5-8	SDI 1-4	IP only	IP only
SDI 1-4	IP	IP only	SDI 5-8 and IP
IP	SDI 1-4	IP only	SDI 5-8
SDI 5-8	IP	SDI 1-4 and IP	IP only
IP	SDI 5-8	SDI 1-4 and IP	SDI 5-8 and IP
IP	IP	SDI 1-4 and IP	SDI 5-8 and IP

For the Quad-Conversion personality, since there is only a single section, the following table illustrates the SDI BNC input and output assignments:

Section 1 Input Mode	Section 1 Output
SDI 1-4	SDI 5-8
SDI 5-8	SDI 1-4
IP	SDI 1-4 and SDI 5-8

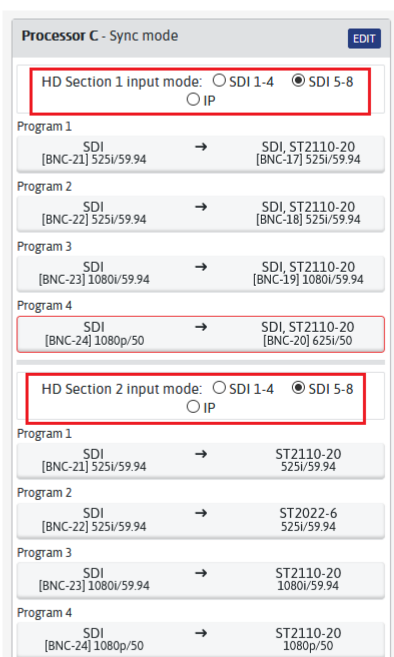
SDI Inputs and Outputs

When selecting the Input in the UI, three options are available for each section. You can pick either **SDI 1-4** or **SDI5-8** for both sections.

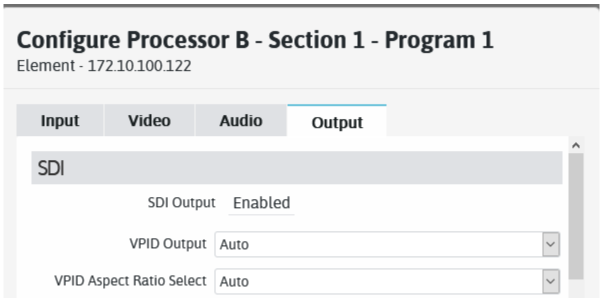
Note that SDI output is only possible if the input mode SDI selection is the same in both sections. For example: if SDI 5-8 is selected in Sections 1 & 2, SDI 1-4 will automatically be configured as SDI outputs which will be available for the corresponding programs in Section 1.

If an IP input is selected, the associated SDI port is an output port. In general, if the SDI port is not selected as an input port, then it becomes an output port.

Note: Input overrides output so the SDI output is only available if neither section is using those connectors for input.

<table>
<tr>
<td>
</td>
<td>
SDI 1-4
SDI 5-8
IP
</td>
</tr>
</table>

For example, if you select SDI 1-4 in Section 1 and SDI 5-8 in Section 2, you won't have any BNC connectors available for output, so IP output would be the only option. But if you select just SDI 1-4 in one or both sections, you would still have SDI 5-8 available for output (and vice versa). SDI Output is configured in the **Output** tab for a Processor, under the **SDI** section.

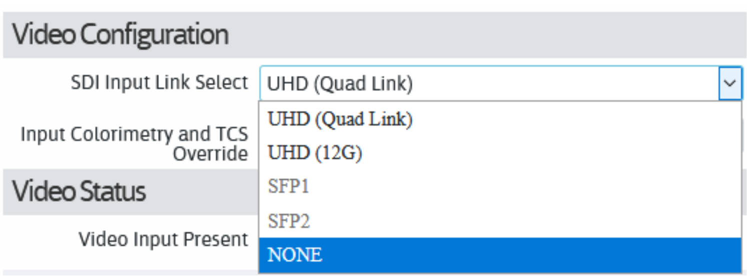


Silencing Input on a Channel

Unused inputs can have their **SDI Input Link Select** set to NONE. This is done in the **Input tab > Video Configuration** section for a Processor.

The 'None' option is meant to disable the input to the frame sync of the specified channel. There should be no input and no alarm for the channel. Note that the 'None' option does not disable the BNC port. It only disables the processor of the specified channel. For example, if the user selects 'None' for channel 1 and the user also selects 'SDI 1-4' for channel 5, channel 5 still processes the SDI signal of the BNC 1 port.

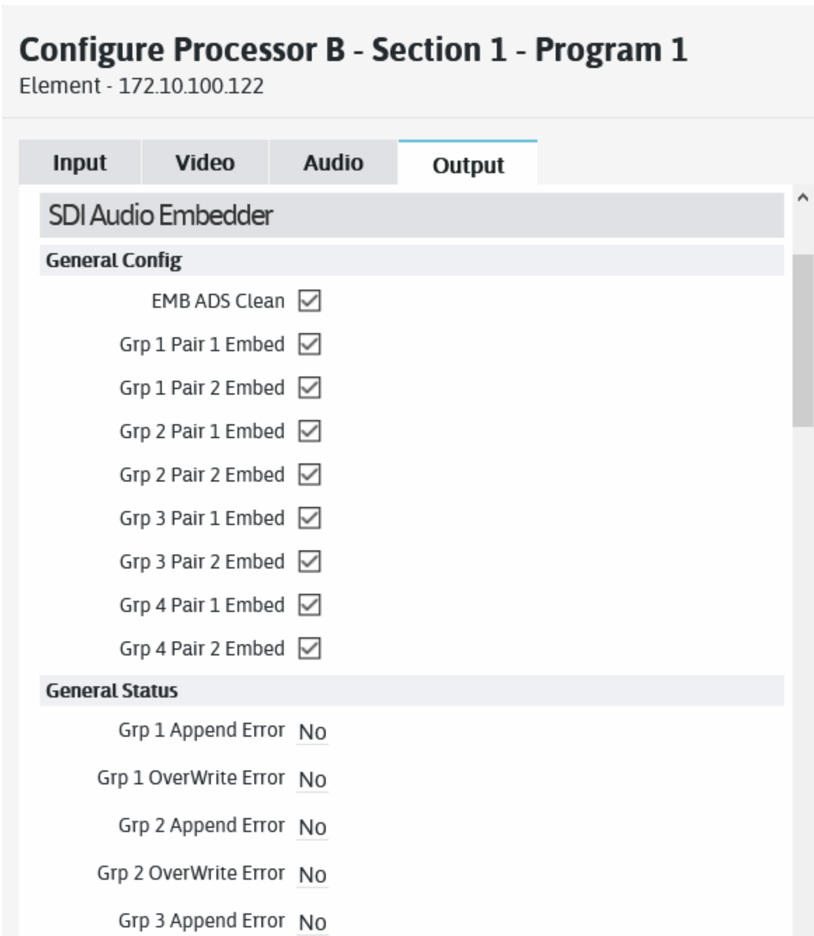
There is no SDI input signal when the 'None' option is selected for any given program.



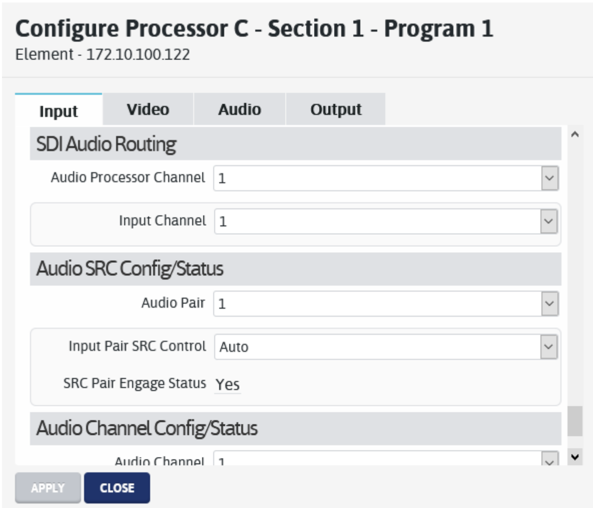
SDI Audio Routing

Incoming audio can be routed to a given SDI output regardless of whether that audio came in as IP or SDI (embedded).

- **IP Input:** If you're receiving IP audio, you have options to route it to SDI. This is done in the **Output** tab for a Processor.



- **SDI input:** Audio, if any, is embedded. In case of SDI input routed to SDI output, audio is configured in the **Input** tab for a Processor, under the **SDI Audio Routing** section.

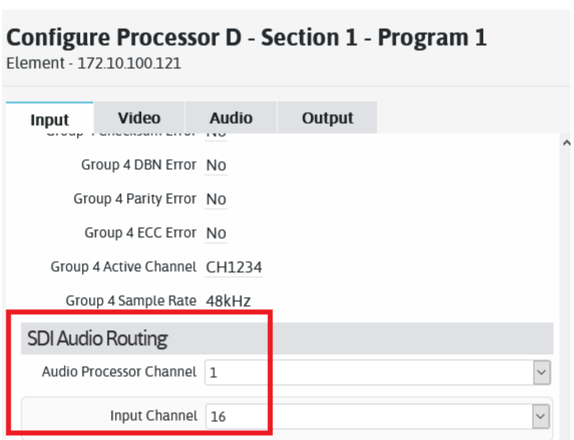


Audio Shuffling

The SNP supports basic audio shuffling for SDI inputs. Note that you can shuffle the **base** audio but not the **extended** audio (see note about MADI below).

To shuffle the base audio:

1. Go to to the **Input** tab, **SDI Audio Routing** section



2. In the **Audio Processor Channel** dropdown, select from 16 base audio channels, and in the **Input Channel** dropdown, pick the source.

   Note that you do this only if you want to shuffle. Leave the 1-to-1 mapping if you don't want to shuffle.

Note: You cannot shuffle extended channels that come from MADI (MADI RX SFP). Currently, you cannot process these extended channels in any way, other than routing into IP or SDI. For base channels, you can fix delay etc.

Sync Personality

Outputs

If used as output, the following SDI outputs are available:

- Section 1: HD-BNC SDI Outputs 1-4
- Section 2: HD-BNC SDI Outputs 5-8

Inputs

HD Operation Mode

Section 1: Input Mode: SDI 5-8 Section 2: IP or none	• This configures the program for SDI input on 5/6/7/8 and SDI output on 1/2/3/4 from Section 1. • Section 2 can still be used as IP-to-IP if required.

Section 1:Input Mode: IP or None Section 2: Input Mode: SDI 1-4	• This allows SDI input on 1/2/3/4 and SDI output on 5/6/7/8 from Section 2 • Section 1 can still be used as IP-to-IP if required.

VSFPs, if present, optionally can be used as alternate inputs to programs, or outputs. When the VSFP-RX is selected, the corresponding BNC port becomes an output port. This feature is especially important for the dual-conversion and REMAP personalities, since it allows 2 distinct SDI to SDI streams per processor instead of 1.

UHD Mode

Functions similar to HD mode in terms of user settings. For VSFP the dual-RX VSFP can be used for 12G input even as the HD-BNC are used for 2SI (or 12G) output - and conversely same with dual-TX 12G VSFP while all HD-BNCs are used for inputs.

Dual Conversion Personality

Similar to Sync Personality (on page 258).

VSFPs

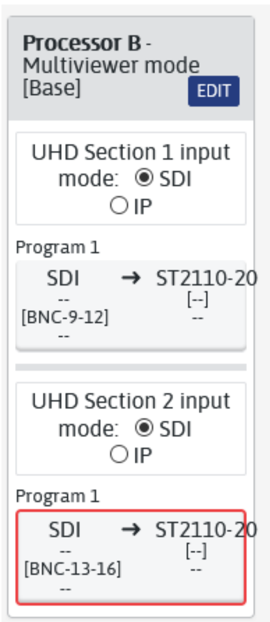
- **Using VSFPs:** VSFPs can be used as additional inputs or outputs
- **Dual-RX VSFP (upconversion)**: VSFPs can be used as input, and HD-BNC as output for all modes, both sections
- **Dual-TX VSFP (downconversion)**: VSFPs can be used as output, and HD-BNC as input for all modes, both sections

Remap Personality

- **With an input or output VSFP**: You can use the VSFP for one of 12G input or output, and HD-BNC for the other. Applies to both sections.
- **In case of no VSFP**: user sets the section 2 "SDI Connector Mode" to "Section 1 Outputs", and can use any feature available, but only on section 1 (in SDI-to-SDI) with SDI outputs on 5/6/7/8. section 2 can be used but only IP-to-IP.

Multiviewer/Multiviewer Portrait Mode Personality

In Multiviewer mode, the options are just SDI or IP.



Configuring for Unicast

You will need to configure both the transmitting and receiving devices.

To configure the transmitting SNP:

1. Open the Configure Processor dialog box for the Program that will be transmitted.
2. On the **Output** tab, enter the Primary IP address on the Primary WAN of the remote device, and the Secondary IP address on the Secondary WAN of that same device.
3. Enter a number for the Primary and Secondary UDP port.

   Normally these will be the same number.

To configure the receiving SNP:

1. Open the Configure Processor dialog box for the Program that will be received.
2. On the **Input** tab, enter 0.0.0.0 for both the Primary IP address and the Secondary IP address.
3. Enter the same numbers for the Primary and Secondary ports that were entered on the transmitter side.

Configuring Proxy Output

Proxy output provides UHD signal monitoring at a lower resolution (minimizing the required bandwidth and processing by a multiviewer, for example). The proxy consists of video only, with audio and ancillary data not handled.

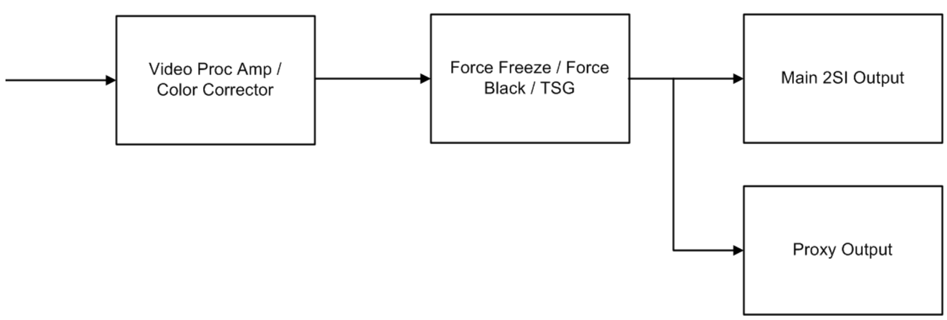
Proxy video output (1080i) is at the same frame rate as input. Proxy video is 709 color space and SDR, and 2110-20 only.

Proxy output requires the **SNP-PSK-DOWNHD (**HD Downsample Feature) license which enables dual proxy video per processor. Each SNP can have up to four licenses, so that an SNP could provide up to eight proxy outputs. In HD mode, Proxy can be enabled on the first program of every section.

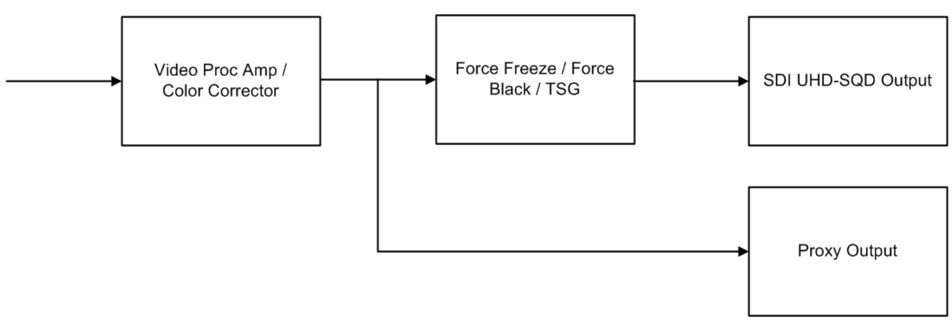
Parameters for controlling proxy video output appear in the following locations:

- Configuration (Video)
  - UHD Proxy Input Select -- (choose to monitor one of the four links or all four)
  - Proxy Output Force SDR-709
  - Proxy 3G output enable
- Output Tab: Proxy IP Video Configuration (on page 456)
- Output Tab: Proxy IP Video Status (on page 457)

When the baseband processor output is configured as UHD-SQD (in both Remap and Conversion personalities), the proxy is configured to monitor the input signal of the baseband processor instead of its output. As a consequence, the proxy output will not reflect any adjustments made to video TSG, force freeze, or force black settings.



Main and Proxy Processing Paths When using Pixel Interleave Output Formats



Main and Proxy Processing Paths When using Square Division Output Format

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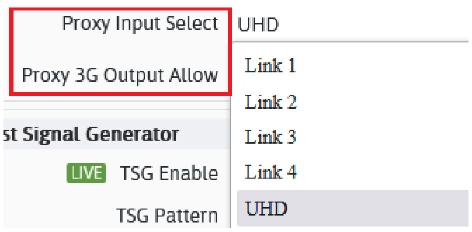
Note: In addition, when the HDR Adjustment feature license is enabled for this program, HDR color conversion is available on the proxy.

Proxy Output in the Multiviewer Personality

Proxy output is available on the 4th BNC of a section if the *SDI UHD Output Link Select* is set to *UHD (Single Link)*, which is 12G. In this case, since the output goes out on a single link, the 4th BNC can be used as a proxy. This applies in case of Multiviewer Mode and Multiviewer Portrait mode.

Proxy Output in the TR-07 and TR-08 Encoders

Proxy 3G output will not work for TR07 or TR08 Encoder in UHD mode if *Proxy Input Select* is either Link 2, Link 3 or Link 4.



Configuring HDR conversion

The SNP provides a Color Space Processor (CSP) for each available video program. The SNP CSP has the ability to convert between different color gamuts or Standard Dynamic Range for SD and HD video and High Dynamic Range (wide color gamut) for HD and UHD video.

The SNP offers user controls for selecting both the input colorimetry and transfer characteristics and the expected outgoing colorimetry and transfer characteristics. When the selected input and output color spaces are different, the SNP CSP will perform a conversion transformation as per the various standards. The supported colorimetry and transfer characteristics are:

SDR-709	Specified in Rec. 709
SDR-601	Specified in Rec. 601
SDR-2020	Specified in Rec. 2020
HLG-2100	Specified in Rec. 2100
PQ-2100	Specified in Rec. 2100
SLOG3-2020	Specified by Sony

Licensing option (SNP-PSK-HDR) must be purchased for the CSP to be enabled.

Configuring for 12G UHD

When using 12G UHD as your input source, if the video channel/section supports UHD input on BNC, you can configure the first BNC (SDI In) for either 12G or 3G/HD. If you select the 12G option, the channel will receive the UHD stream as a 12G signal from the first BNC connector and all other three BNC inputs will be ignored. If the 3G/HD option is selected, the channel will receive the UHD stream as a Quad-Link from all four BNC connectors.

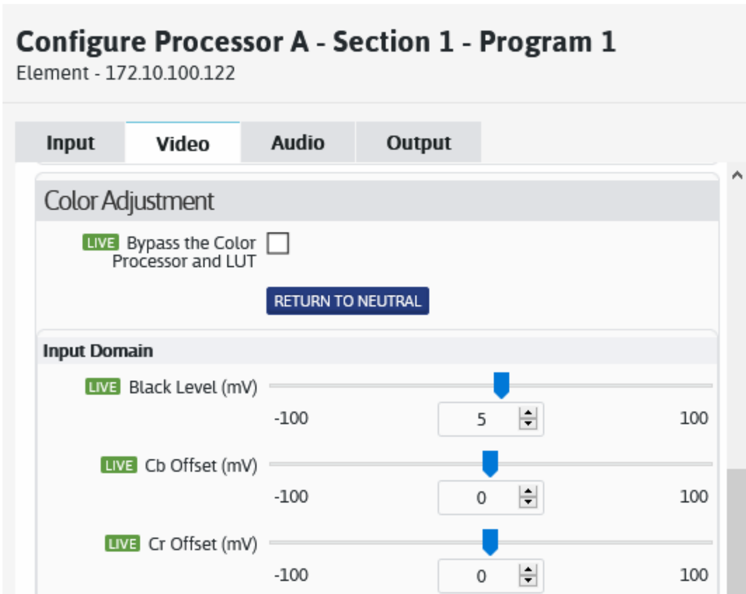
When using 12G UHD as your input source, if the video channel/section supports UHD output on BNC, you can configure the first BNC (SDI Out) for either 12G or 3G/HD. If the 12G option is selected, the channel will output the UHD stream on the first BNC connector only as a 12G signal. If the 3G/HD option is selected, the channel will output the UHD stream on all 4 BNC connectors as a Quad-Link (2SI or SQD).

12G specific settings appear in the following areas of the interface:

- For input 12G UHD, Input Tab (SDI): Video Configuration (on page 400)
- For output 12G UHD, Output Tab: SDI (on page 453)

Color Processing - Built In and Custom LUTs

The SNP offers built-in color processing, settings for which are defined in the **Video** tab: **Color Adjustment**. See Video Tab: Color Adjustment (on page 415).



Users also have the option to upload their own 3D cube LUT which may be used instead of the built-in "Linear Domain" color processing.

Note:
- LUT processing is supported on the Dual-UHD and Quad-1080P conversion personalities (only)
- Customers need to generate their own custom 3D LUT files to import to the SNP system.
- LUT Files must be in the 33-point 3D CUBE LUT format (.cube). Other LUT format files are currently not supported.
- Use of 3D LUTs is only supported in the following personalities:
  * Dual Conversion
  * Quad Conversion

Once generated, to use a custom LUT in the SNP, follow these steps:

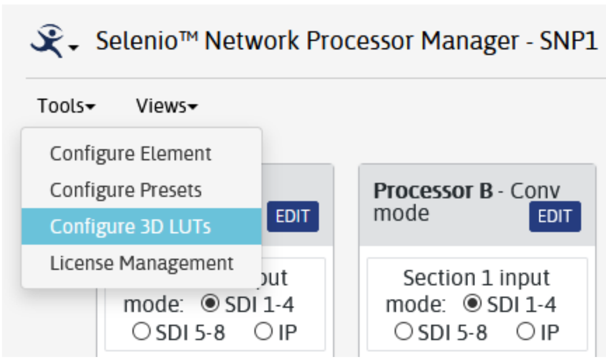
1. **Step 1: Load the LUT to the system and define metadata**
   See Loading Custom LUT Files to the SNP System and Defining Metadata (on page 265)
2. **Step 2: Use the LUT when processing**
   See Using Custom LUT Files when Processing (on page 269)

Also see:

- LUTs on the Remote SMM (on page 271)
- General Notes about LUTs (on page 272)

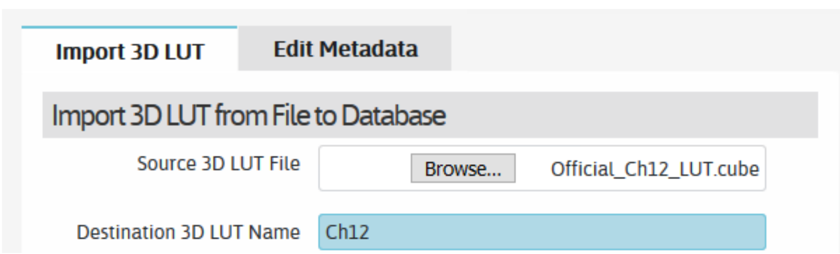
Loading Custom LUT Files to the SNP System and Defining Metadata

1. Go to **Tools** > **Configure 3D LUTs**



2. In the **Configure 3D LUTs** dialog displayed, browse and select the 3D LUT from your local PC
3. On selecting a LUT, its name is populated in the **Destination 3D LUT Name** field, but the name can optionally be changed

Note that this name will be used to refer to the LUT file elsewhere in the SNP operating interface.



4. Next, associate metadata for input/output colorimetry and TCS of the LUT. Make the appropriate selections in the following fields based on your LUT details:

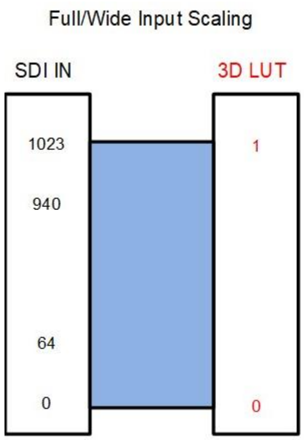
Note: For example, if the conversions defined for your 3D LUT are PQ-2100 to HLG-2100, select those two options in the LUT's metadata section for the Input and Output Colorimetry and TCS respectively.

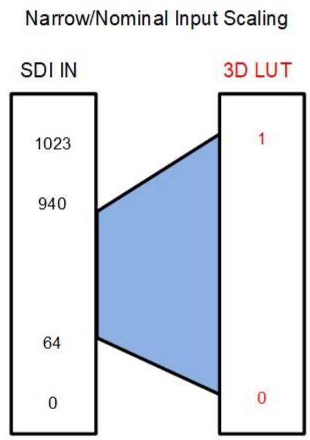
- **Input Colorimetry and TCS**: Options are:
  - SDR-709
  - SDR-601
  - SDR-2020
  - HLG-2100
  - PQ-2100
  - SLOG3-202

  See Using Custom LUT Files when Processing (on page 269), 3D LUT Operating Mode, Auto, for details on how this metadata is used.
- **Output Colorimetry and TCS**: Options are the same as Input Colorimetry
- **LUT Input**: Options are:
  - Full/Wide Signal Range

- Nominal/Narrow Signal Range

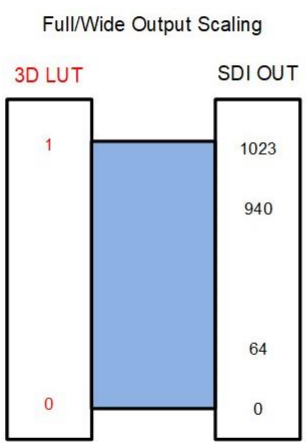
The following diagram illustrates how the "Full/Wide" and "Nominal/Narrow" SDI signal ranges, map to the input of the LUT:

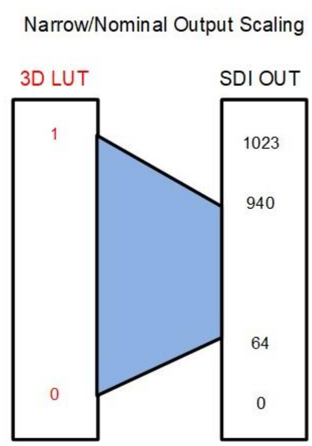


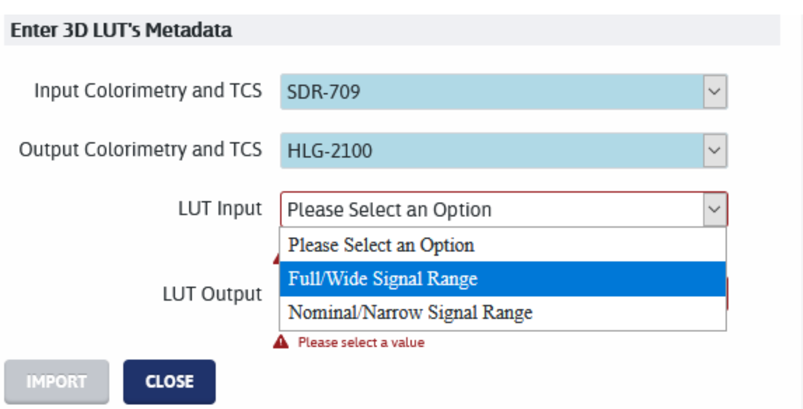


- **LUT Output**: Options are the same as LUT Input

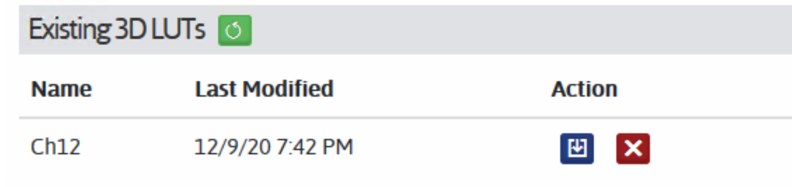
The following diagram illustrates how the LUT output maps to "Full/Wide" and "Nominal/Narrow" SDI signal range:







5. Click **Import** to complete the LUT import process
6. The imported LUT will then be displayed in the **Existing 3D LUTs** section. From here, you can **download** or **delete** a LUT.

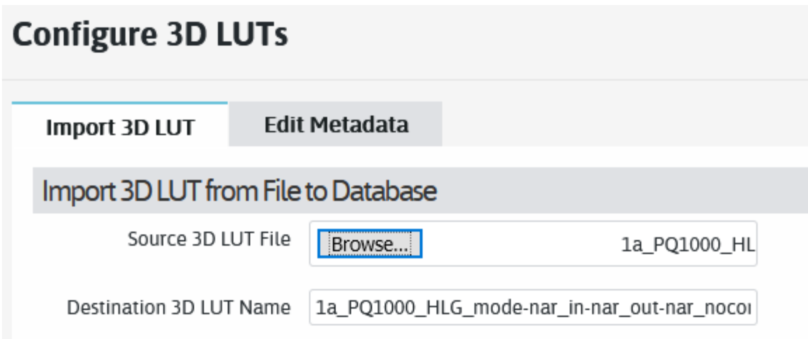


Note: The name of the LUT displayed in the **Exisiting 3D LUTs** section is per the name provided in the Destination 3D LUT Name field. The original filename is maintained and used when the file is downloaded.

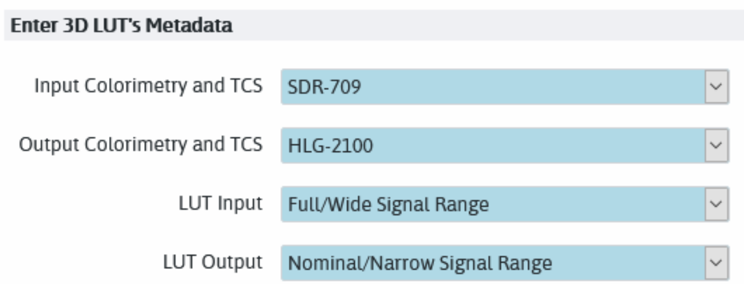
Editing Metadata for LUTs (Optional)

Do the following to edit metadata for a LUT in the system and resave it to the system:

1. Go to the **Edit Metadata** tab
2. Browse and select a LUT file



3. Fields are populated with the original settings. These settings can be changed as required.



4. Click **Update** once done to resave the LUT's metadata to the SNP system.

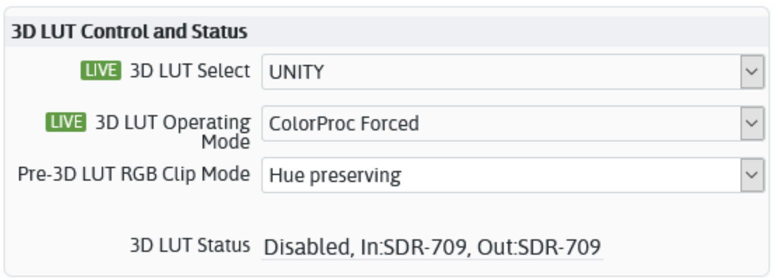
Note: The SNP system currently supports a maximum of 30 LUTs. Once this limit has been reached, no additional LUTs may be imported. Delete any unused LUTs to make room for any new LUTs.

This completes adding a LUT to the system.

Using Custom LUT Files when Processing

Note: LUT processing is supported on the Dual-UHD and Quad-1080P conversion personalities (only) and requires the **SNP-PSK-HDR** (HDR Adjustment Feature) license.

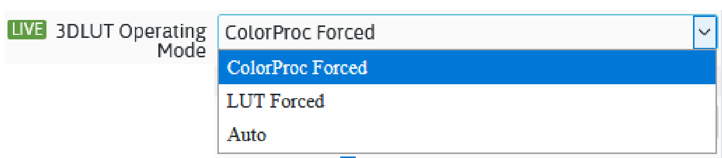
1. Click on a program and go to the **Video** tab
2. Go to the **3D LUT Control and Status** section



- **3D LUT Select**: This dropdown contains a listing of LUTs in the system and UNITY - a default LUT. Select the LUT to use.

  Note: If using the Remote SMM, the list of LUTs displayed here differs from the LUTs in the Tools > Configure 3D LUTs dialog. The list displayed in the Tools > Configure 3D LUTs dialog is what's on the remote SMM. The list here (Video tab) is what's on the SNP.

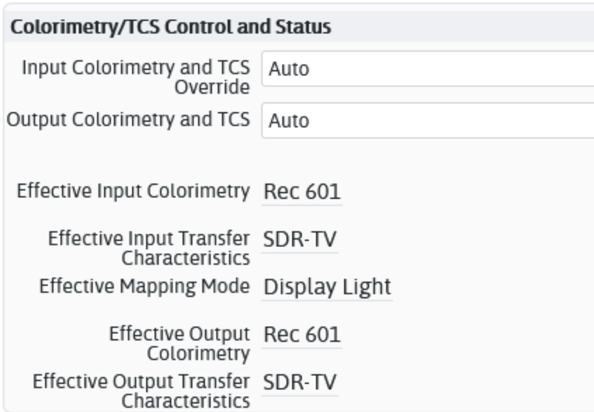
- **3D LUT Operating Mode**: There are three options here:



  - **ColorProc Force**: This option (the default) uses the SNP's non-linear and linear domain mathematical pipelines and does not route the signal through the selected LUT
  - **LUT Forced:** This option uses the SNP's input (non-linear) domain color processing engine, followed by the user selected LUT, regardless of whether the colorimetry or transfer characteristic of the input signal are appropriate for the selected LUT
  - **Auto**: This option uses the SNP's input (non-linear) domain color processing engine, followed by an automated selection of:
    (A) The selected LUT or
    (B) The SNP's linear domain mathematical pipeline
    The automated selection is based on the colorimetry and transfer characteristic (TCS) and colorimetry of the incoming signal, and the requested colorimetry and TCS of the converter's output. If the input and output TCS match the metadata of the selected LUT, then the selected LUT will be used, otherwise the SNP linear domain pipeline will be used.

- **Pre-3D LUT RGB Clip Mode**: The clipping mode of the RGB values prior to 3D LUT processing. Select from *Hue Preserving* and *Per component*.
- **3D LUT Status**: Displays the effective 3D LUT operating mode.

3. Scroll up to the **Colorimetry/TCS Control and Status** section and set the following fields:

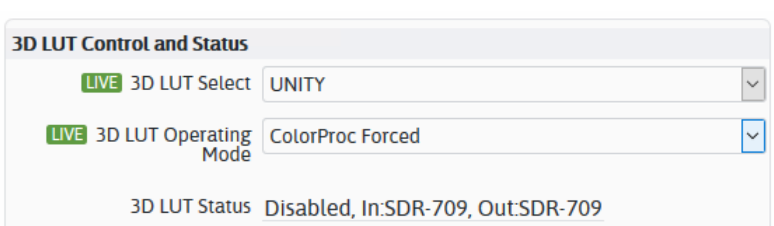


- Set **Input Colorimetry and TCS Override:** In the case of SDI inputs, the Colorimetry/TCS is detected from the Payload ID (VPID) on the SDI. If the VPID is not detected an assumption is made based on the video standard. In the case of IP signals, the Colorimetry/TCS is set by the control system as part of switching between different IP signals. In either case, there is the possibility that the value is not actually correct for the signal. This control allows the user to override the automatic detection with a manual setting.
- Set **Output Colorimetry and TCS:** This selection controls the colorimetry/TCS of the output signal from this converter. “Auto” (the default) will choose an SDR value based on the output video standard. Note that HDR conversion and HDR LUT/Linear processing requires the HDR conversion license key.

Note: The Effective Input and Output Transfer Characteristics and Colorimetry status fields will reflect the current values chosen by the SNP in response to the currently applied user controls above. After Applying any changes to the selections above, these fields may update. The values of these effective input and output TCS and colorimetry status parameters are used in controlling the automatic LUT switching feature.

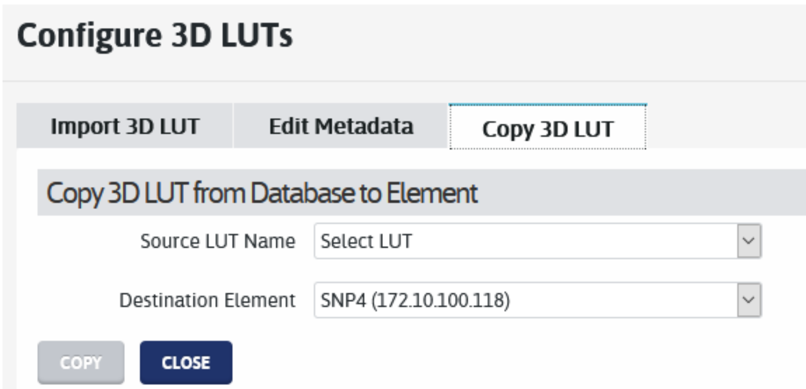
4. Click **Apply** to save changes
5. LUT Status is displayed in the **3D LUT Control and Status** section. Use this to validate your settings.

Note: The LUT status contains three fields separated by commas. The first field indicates whether the selected LUT is currently being used (Enabled) or not (Disabled). The second and third fields reflect the metadata of the selected LUT, used in controlling the automatic LUT switching feature.



LUTs on the Remote SMM

On the Remote SMM, **Tools > Configure 3D LUTs** displays tabs and settings similar to what is displayed on the local SMM. In addition, it has one extra tab - **Copy 3D LUT**.

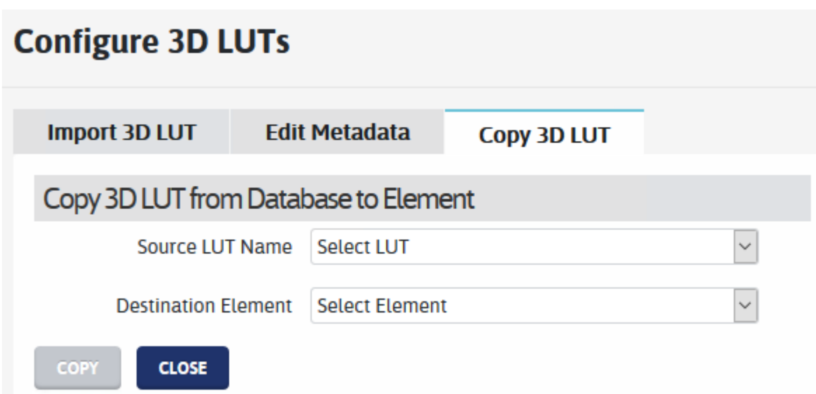


LUTs on the Remote SMM vs the Local SNP

When a user works with the local SNP, they upload the LUT file to the local SMM. When working with a remote SMM, the LUT file is uploaded to the remote SMM and not an SNP. To use a LUT with a specific SNP, transfer the LUT to the SNP.

Copying a LUT from the Remote SMM to an SNP

1. On the Remote SMM, go to **Tools > Configure 3D LUTs > Copy 3D LUT**



2. Select a LUT in the **Source LUT Name** dropdown
3. Select the **Destination Element** (or SNP) to copy the LUT to
4. Click **Copy**

Note: If the SNP contains the maximum allowable LUTs (30), the copy will fail with an error message.

General Notes about LUTs

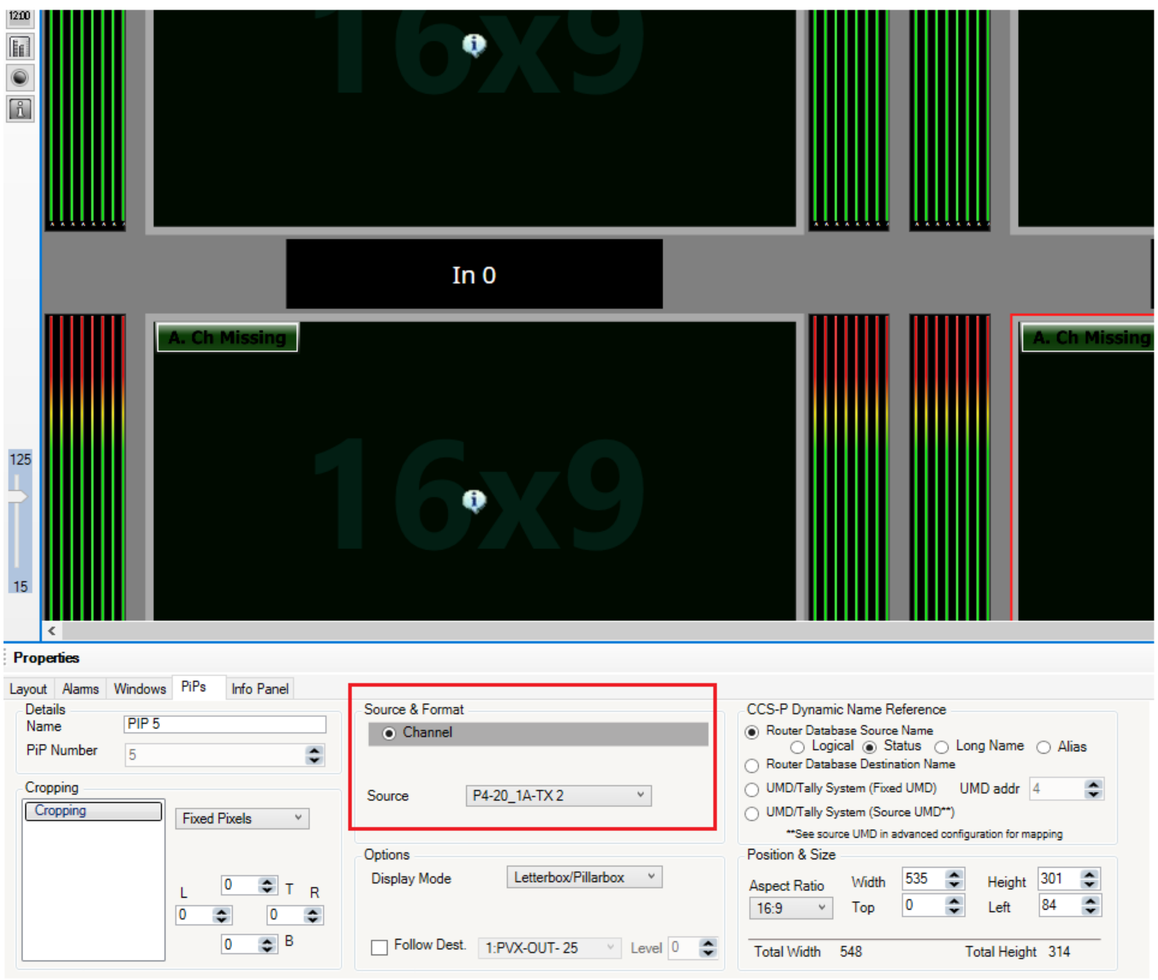
- 3D LUT files are not included with the SNP, except for the default 'UNITY' LUT. Customers will be required to generate their own custom 3D LUT files to input to the SNP system
- LUT files used with the SNP must be in the 33-point (N=33) 3D CUBE format as specified in section 7 of the cube lut file specification from Adobe – found at https://wwwimages2.adobe.com/content/dam/acom/en/products/speedgrade/cc/pdfs/cube-lut-specification-1.0.pdf
  The domain of the LUT table must be within the bounds [0.0, 1.0] as required in section 8.
- LUT processing is supported on the Dual-UHD and Quad-1080P conversion personalities (only)
- LUT processing requires the **SNP-PSK-HDR** (HDR Adjustment Feature) license
- A maximum of **30 LUTs** are supported on the SNP system. The remote SMM as well supports a maximum of 30 LUTs.
- When using the Remote SMM, the list of LUTs displayed in the **Tools** > **Configure 3D LUTs** dialog (uploading LUTs) differs from the list in **Video** tab for a program (applying LUTs) . Tools > Configure 3D LUTs displays LUTs on the remote SMM and the Video tab displays LUTs on the local SNP.

LRC Routing

This feature puts routing in the layout, so that every time you apply a given layout, it routes those signals. The layout contains the routing information and it sends LRC commands to the configured control system (Magellan Control System) to establish the routes.

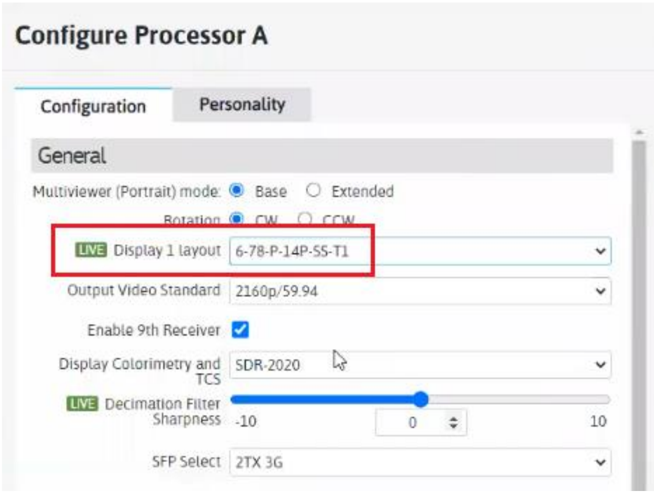
To set this up, do the following:

1. Open **Layout Designer** and load your layout
2. For each PiP, select the channel and source to put on the PiP in the layout
   a. Select a PiP
   b. Go to the **PiPs** tab in **Properties** pane.
   c. In the **Source and Format** section, select **Source** from the dropdown lists
   d. Repeat for each PiP in your layout
   e. **Save** and **publish** the layout



3. Go to the SNP

4. Go to **Configure Processor > Configuration** Tab
5. Select the layout for the **Display Layout**



6. Click **Apply Config**

On selecting the layout in the SNP and applying, the routes take place automatically.

Note: It could take a while to route depending on how many channels you have.

Advanced Audio Processing

Supported Personalities	See Functions supported on various Personalities (on page 275)
AAP Overview	The SNP offers a wide variety Advanced Audio Processing options, via **DTS Neural** technology and **Dolby** technology. These options enable advanced audio processing for high-definition and surround sound programming using 5.1 and stereo sources.
Creating AAP Sessions	All existing SNPs contain two Digital Signal Processors (DSPs) that are capable of providing this advanced audio functionality. Once licensed, as you enable functions (such as UpMix, DownMix, Dolby E Encoding/Decoding, etc.) AAPs are automatically configured by the system. See: • Creating AAP Sessions (on page 290) • AAP Settings/Parameters (on page 292)
AAP Licensing	See AAP Licensing (on page 287) for Advanced Audio Licensing. For DTS, license allocation is dynamic, using a flexible token system to allow users to change the type of processing without purchasing additional licenses. For more details, see DTS Credits (on page 289).
Special Notes	• Each processor can have a maximum of 5 AAP sessions. • AAP cannot be combined with the Automatic Change-Over (see Automatic Change Over (ACO) on the Sync Personality (on page 124)) operation.

Functions supported on various Personalities

Personality	AAP – UpMix/DownMix/MM/LC	AAP-Dolby E ENC / DEC
SYNC	Yes	Yes
DUAL-UHD-Conversion	Yes	Yes
Quad-1080p-Conversion	Yes	Yes
REMAP	No	No
STAT	No	No
Multiviewer	No	No
Master Control Lite MCL	No	No

JPEG-XS ENC (TR-08)	No	No
JPEG-XS DEC (TR-08)	No	No
JPEG-XS ENC (TR-07)	No	No
JPEG-XS DEC (TR-07)	No	No
Dual Gateway	No	No

DTS Processing

The SNP currently implements UpMix, DownMix, MultiMerge, and Loudness Control AAP functions, and offers the following processing options:

Single Codes	Combination Codecs
DTS Neural Surround UpMix (on page 278)	DTS Neural UpMix+Loudness (on page 282)
DTS Neural Surround DownMix (on page 279)	DTS Neural DownMix+Loudness (on page 283)
DTS Neural MultiMerge (on page 280)	DTS Neural MultiMerge+Loudness (on page 284)
DTS Neural Loudness Control (on page 281)	

DTS license allocation is dynamic, using a flexible token system to allow users to change the type of processing without purchasing additional licenses. For more details, see DTS Credits (on page 289).

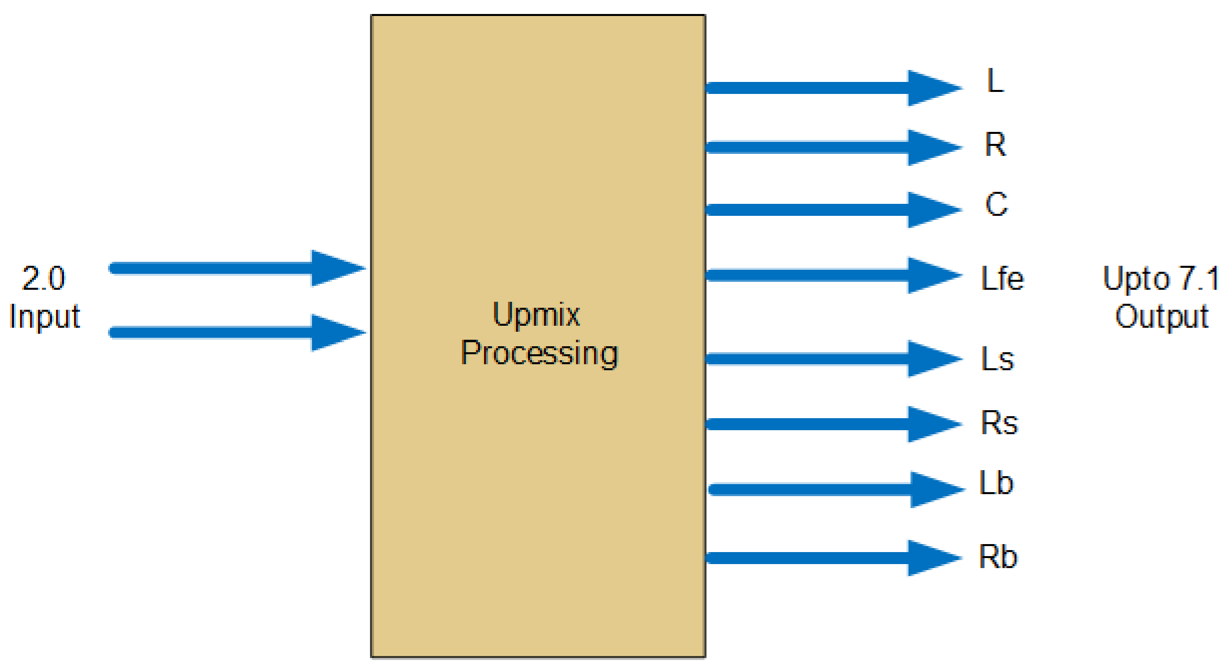
DTS Neural audio products are manufactured under license from DTS Licensing Limited. DTS and the Symbol are registered trademarks & the DTS Logos are trademarks of DTS, Inc.

DTS Neural Surround UpMix

The DTS Neural Surround UpMix renders any two channel audio source (stereo, matrix encoded stereo, LtRt, or DTS Neural Surround LwRw) as surround sound. The DTS Neural Surround UpMix can simultaneously position individual elements within the surround field, creating high levels of image stability and granularity.

The UpMix technology avoids taking "artistic license" with content by placing audio exactly where it would be heard in a professional LEDE (Live End Dead End) listening environment. For example, mono or pan-pot stereo will image in front of the listener, whereas stereo containing depth information will surround the listener.

You can use the DTS Neural Surround UpMix as a stand-alone unit to monitor stereo production, or you can use it in tandem with the DTS Neural Surround DownMix as a complete 5.1 transport solution. The following figure shows an UpMix taking a two-channel audio source (stereo, matrix encoded stereo, LtRt or DTS Neural Surround LwRw) and rendering a 5.1 multi-channel mix.



To configure UpMix on your SNP, see AAP Tab: Parameters (UpMix) (on page 430).

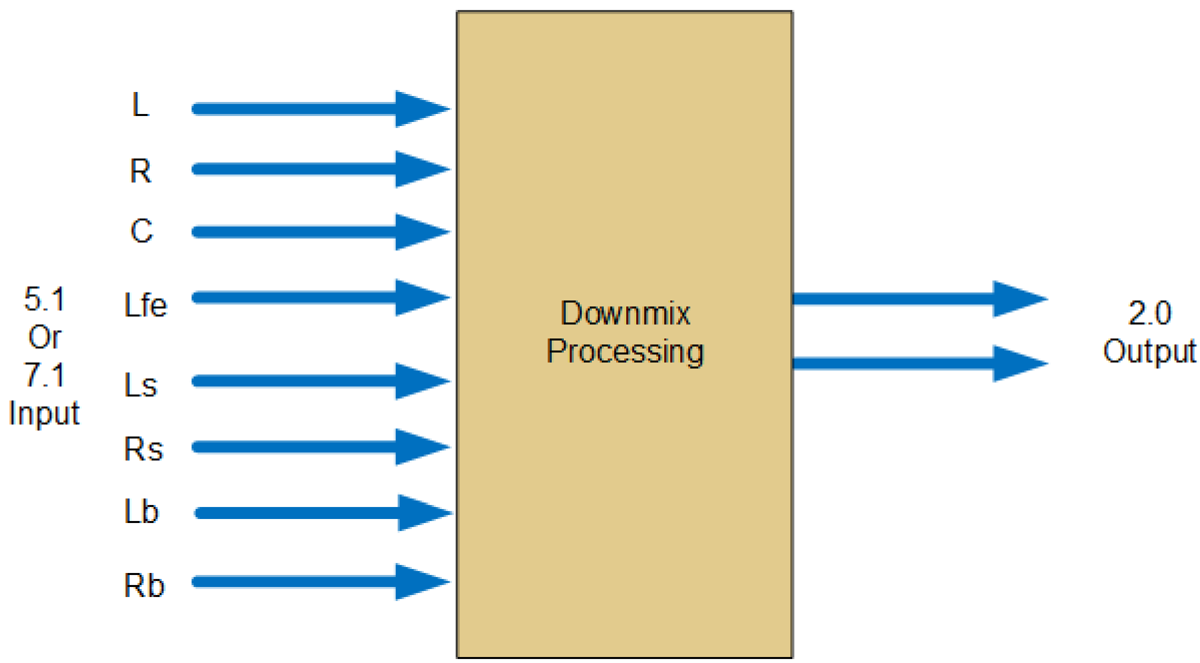
DTS Neural Surround DownMix

The DTS Neural Surround DownMix enables 5.1 surround sound to be transported through any stereo infrastructure. The DownMix process is based upon the principle that both natural stereo and 5.1 content are two-dimensional; both contain width and depth spatial attributes.

The DTS Neural Surround DownMix can represent six channels of discrete audio sources in a stereo downmix by transforming the sources into pure intensity and coherence encoding. By correcting overlaps of the signal sources in intensity, time, coherence, polarity, and phase before the six channel are combined, the DTS Neural Surround DownMix accounts for the problems suffered in traditional matrix encode systems—such as comb filtering, spatial location distortion, etc.

The proprietary Neural Audio "watermark process" faithfully reproduces surround information when it is rendered by the DTS Neural Surround UpMix or any LtRt system. In brief, the DTS Neural Surround DownMix produces a stereo downmix that accurately represents the original content whether monitored in mono, stereo, matrix or DTS Neural 5.1 Surround Sound.

The following figure shows a DownMix taking a multi-channel audio source. The DownMix creates two channel audio source using the Neural Audio approach of embedding a watermark signal within the stereo audio signal patch. The watermark signal contains spatial and steering positioning information. The resulting stereo audio signal is also known as LwRw.



To configure DownMix on your SNP, see AAP Tab: Parameters (DownMix) (on page 431).

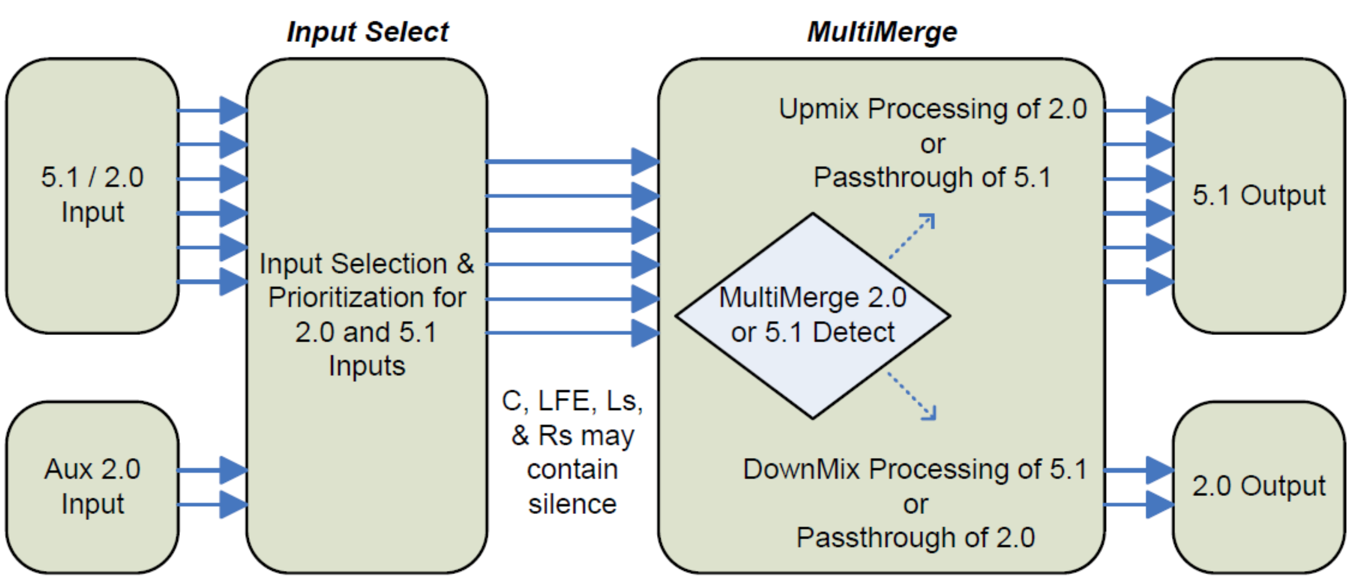
DTS Neural MultiMerge

The DTS Neural Surround MultiMerge enables broadcasters to transition from stereo to 5.1 surround sound, providing viewers with a 24/7 surround sound experience. With MultiMerge inline, 5.1 original content is passed unaffected to the viewer while original stereo content is upmixed to a 5.1 surround sound image. This provides the viewer with a consistent surround experience.

The transition between 5.1 and stereo occurs seamlessly without the need of operator intervention. By offering a 24/7 5.1 signal, AC3 metadata does not transition between 2/0 and 3/2 mode. This prevents audio clicks, pops, and dropouts. The process also avoids taking "artistic license" with content by placing audio exactly where it would be heard in a professional LEDE (Live End Dead End) listening environment. For example, mono or pan-pot stereo will image in front of the listener, whereas stereo containing depth information, or LtRt encoding, will surround the listener.

You can use MultiMerge in combination with the DTS Neural Surround DownMix device to pass 5.1 through stereo-only facilities and therefore eliminate the need for costly master control upgrades.

The following figure shows how the MultiMerge takes a two-channel audio source (stereo, matrix encoded stereo, LtRt or DTS Neural Surround LwRw) and renders a 5.1 multi-channel mix; in combination with taking original multi-channel content and creating a stereo downmixed signal, depending on the input configuration and content source used.



To configure MultiMerge on your SNP, see [AAP Tab: Parameters (MultiMerge)] (on page 432).

DTS Neural Loudness Control

Neural Loudness Control options manage loudness levels within a specific desired volume range. Advanced psychoacoustic and signal processing techniques detect and regulate the perceived loudness, for example to maintain audio perceived loudness between programming and commercials.

Neural Audio's perceptual loudness measurement tool treats each audio channel (L, R, C, LFE, Ls, Rs, Lb, Rb) as a separate mono channel. The tool accounts for spectral and density differences and temporal overlaps in modeling how the human ear perceives the loudness of the audio content. DTS Neural loudness measurement accommodates both stereo and multi-channel audio equally well.

After measurement, DTS Neural Loudness Control applies gain or attenuation to achieve the target loudness level (Dial Norm) while preserving the spectral balance of the original signal. It adapts the frequency response of the low and high frequencies to compensate for level differences within the original signal. You can use DTS Neural Loudness Control in the following roles:

- Protection—only affecting content that falls aggressively outside the desired target
- Management—tightly controlling loudness to guarantee intelligibility without the distracting side effects of traditional volume management solutions

The following Loudness Control configurations are supported:

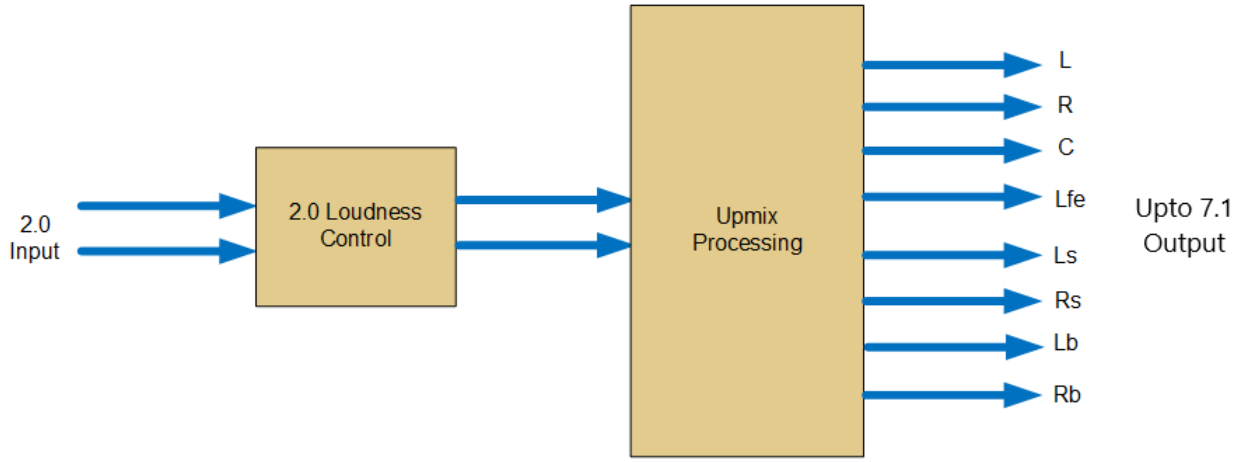
Loudness 1.0	1 instance of mono loudness control
Loudness 2.0	1 instance of stereo system loudness control
Loudness 5.1	1 instance of surround system loudness control
Loudness 7.1	1 instance of surround system loudness control (includes Lb and Rb channels)
Loudness 2x1.0	2 separate instances of mono loudness control
Loudness 8x1.0	8 separate instances of mono loudness control
Loudness 4x2.0	4 separate instances of stereo system loudness control
Loudness 5.1 + 2.0	2 separate instances of loudness control - one for the 5.1 system and the other for the 2.0 system.

To configure Loudness Control on your SNP, see:

- AAP Tab: Parameters (Loudness Control) (on page 435)

DTS Neural UpMix+Loudness

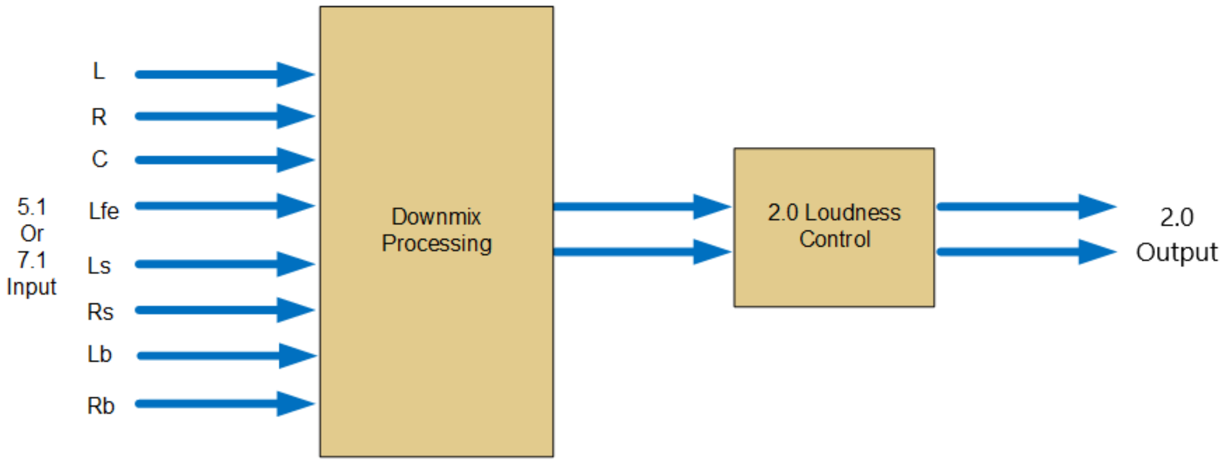
This is a combination codec and combines UpMix and Loudness Control functions. See DTS Neural Surround UpMix (on page 278) and DTS Neural Loudness Control (on page 281).



To configure UpMix+Loudness on your SNP, see AAP Tab: Parameters (UpMix+Loudness Control).

DTS Neural DownMix+Loudness

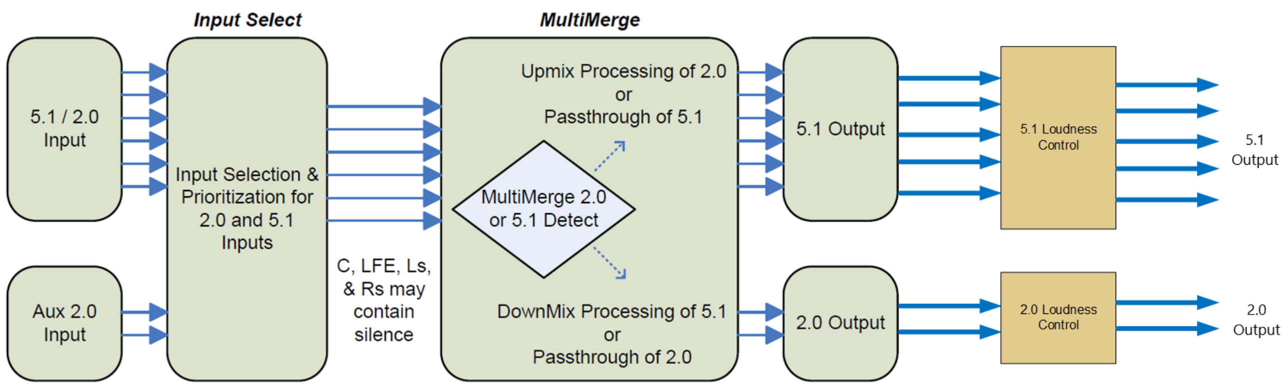
This is a combination codec and combines DownMix and Loudness Control functions. See DTS Neural Surround DownMix (on page 279) and DTS Neural Loudness Control (on page 281).



To configure DownMix+Loudness on your SNP, see AAP Tab: Parameters (DownMix+Loudness Control) (on page 441).

DTS Neural MultiMerge+Loudness

This is a combination codec and combines MultiMerge and Loudness Control functions. See DTS Neural MultiMerge (on page 280) and DTS Neural Loudness Control (on page 281).



To configure MultiMerge+Loudness on your SNP, see AAP Tab: Parameters (MultiMergeMix+Loudness Control) (on page 444).

Dolby E Processing

The SNP currently supports Dolby E Encoding and Decoding.

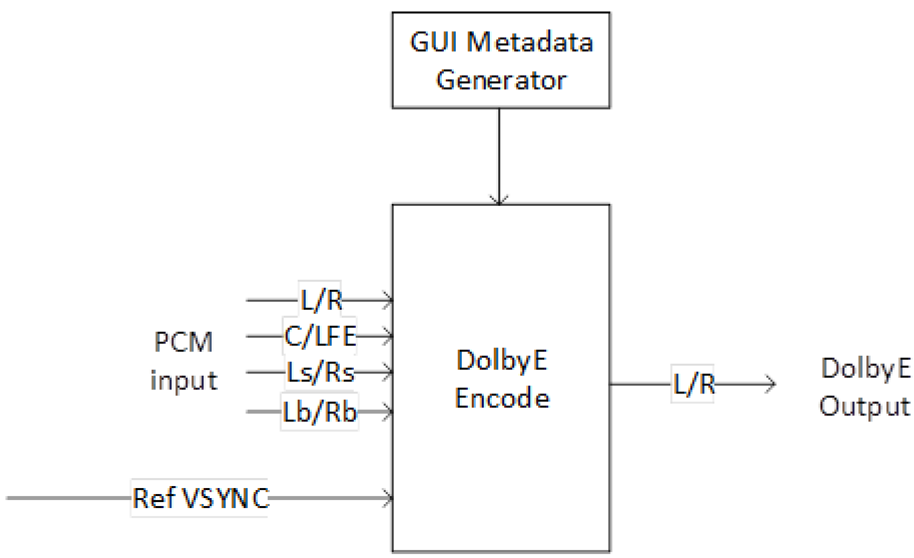
Each SNP can have a max of 4 Dolby E Encoders or max of 8 Dolby E Decoders using these licenses (SNP-ASK-DEE and SNP-ASK-DED) See Orderable Part Numbers (on page 35).

For Dolby E parameters, see:

AAP Tab: Parameters (Dolby E Encoder) (on page 423)	Dolby E Encoder Parameters
AAP Tab: Parameters (Dolby E Decoder) (on page 429)	Dolby E Decoder Parameters
Video Tab: Video Control (on page 405)	See *Dolby E A/V Align* parameter
Audio Tab: General Configuration (on page 449)	See *Dolby E Header Alignment* and *Dolby E Line Position* parameters

Dolby E Encoding

The SNP has two DSP cores, and each core can support up to two Dolby E Encoding sessions for most video formats, or up to four Dolby E Decoding sessions. The SNP Dolby E encoder supports a selection of fixed metadata formats. Dynamic (externally input) metadata is not currently supported.



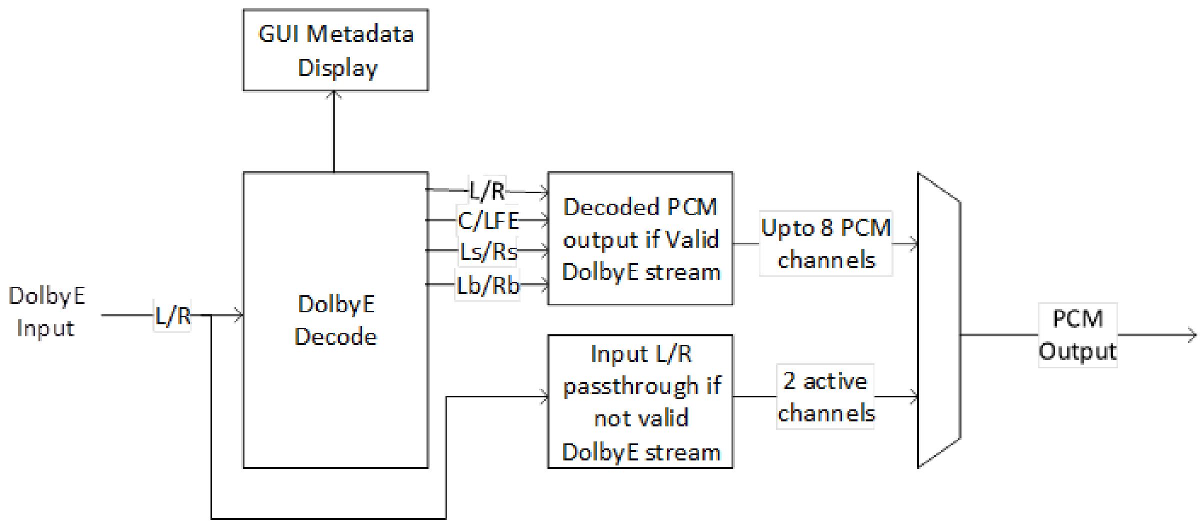
To configure Dolby E Encoding, see AAP Tab: Parameters (Dolby E Encoder) (on page 423).

Dolby E Encoder Latency

Encoder Latency	58ms + 1.25 Dolby Frame	
AV Aligned	p50/p59	6 Video Frames
	Others	3 Video Frames

Dolby E Decoding

Dolby E signals must be decoded for any audio processing tasks (such as voice-over or mixing) in any other audio elements.



To configure Dolby E Decoding, see AAP Tab: Parameters (Dolby E Decoder) (on page 429)

Dolby E Decoder Latency

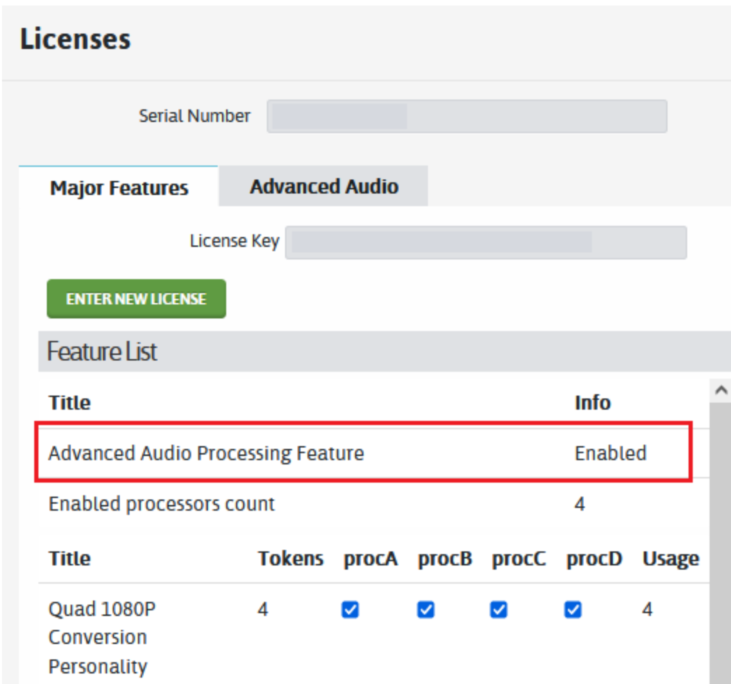
Decoder Latency	58ms + 1 Dolby Frame	
AV Aligned	p50	5 Video Frames
	p59	6 Video Frames
	Others	3 Video Frames

AAP Licensing

Note: You need the **SNP-PSK-ADVAUD** license to enable advanced audio processing, the **SNP-ASK-DTOKEN** license for DTS token credits, and S**NP-ASK-DEE/SNP-ASK-DED** for Dolby E Encoding/Decoding. See Orderable Part Numbers (on page 35) for AAP license options.

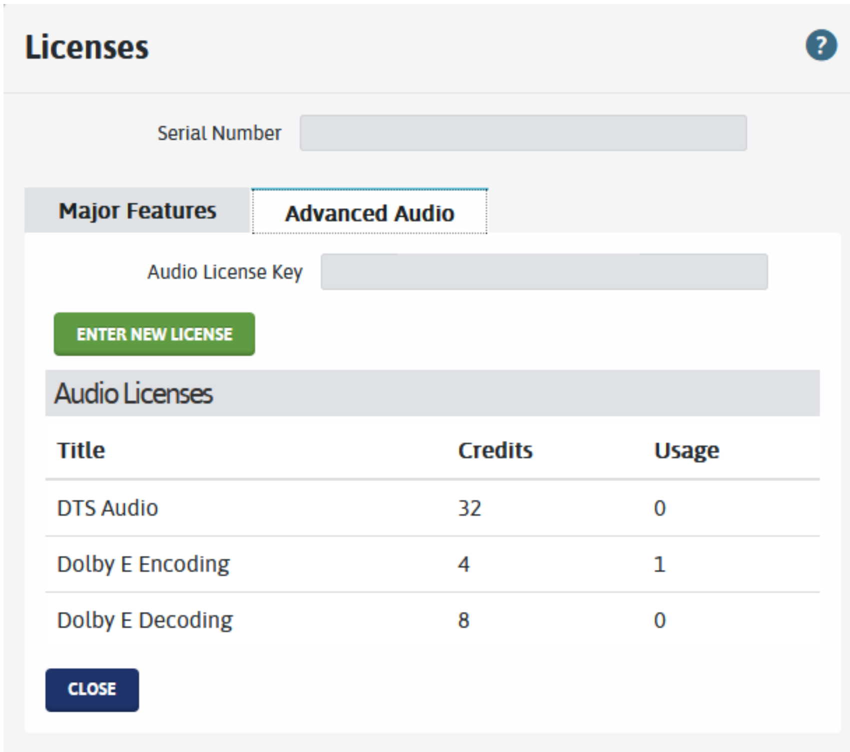
Follow these steps to set up AAP Licensing:

1. Go to **Configure** > **Licenses**
2. Ensure the SNP unit is enabled for Advanced Audio Processing



3. Go to the **Advanced Audio** tab

4. Input the **Advanced Audio** license key by clicking **Enter New License**



5. Once the license has been accepted, the **Audio Licenses** section below will display the **DTS Audio** and/or **Dolby E Encoding/Decoding Credits.**
6. Go to the **Major Features** tab
7. In the **Feature List** section, **Advanced Audio Processing Feature** should show as **Enabled**

Once enabled, Advanced Audio can now be configured on specific processors. See:

- Creating AAP Sessions (on page 290)
- AAP Reporting
- AAP Settings/Parameters (on page 292)

DTS Credits

The number of credits determines how many DTS functions are available. The following table provides the number of credits required for each DTS function.

Session Algorithm	Latency Setting	Latency (ms)	% Utilization	Credits
UpMix 2.0 to 5.1/7.1	Low Latency	80	24%	3
	Standard Latency	101		
DownMix 5.1/7.1 to 2.0		53	13%	3
MultiMerge (automatic UpMix/DownMix)	Low Latency	80	32%	4
	Standard Latency	101		
Loudness + Upmix	Low Latency	128	30%	4
	Standard Latency	149		
Loudness + Downmix		112	19%	4
Loudness + MultiMerge	Low Latency	128	52%	8
	Standard Latency	149		
Loudness 1.0		112	12%	1
Loudness 2.0		112	13%	1
Loudness 5.1		112	21%	2
Loudness 7.1		112	24%	3
Loudness 2x1.0		112	17%	1
Loudness 8x1.0		112	41%	3
Loudness 4x2.0		112	31%	3
Loudness 5.1+2.0		112	27%	3

You can have a maximum of 32 credits. For example, a combination of UpMix and DownMix will require 6 credits (3+3). Credits are flexible. Available credits can be used for different functions at different times.

Dolby E Credits

The number of credits determines how many Dolby E functions are available. The following table provides the number of credits required for each function.

Algorithm	Latency	% Utilization	Credits
Dolby E Encode	58ms + 1.25 Dolby frames	40%	1
Dolby E Decode	58ms + 1 Dolby frame	21%	1

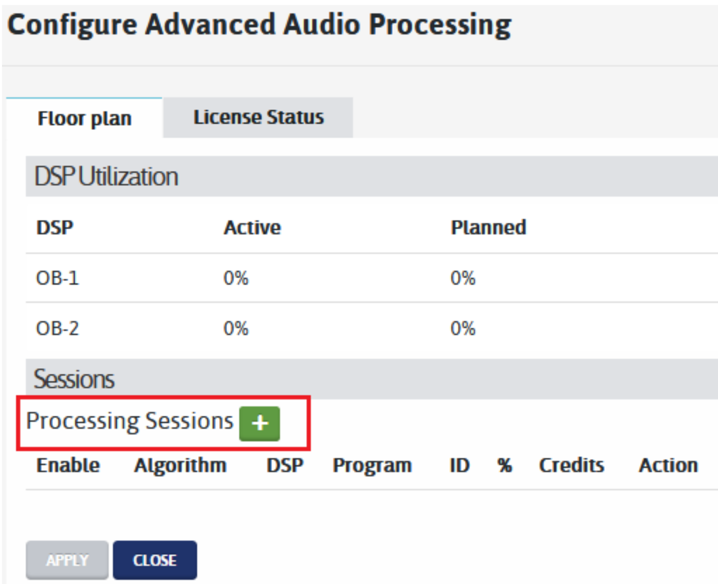
Creating AAP Sessions

Note: Ensure AAP is enabled and licensed (see AAP Licensing (on page 287)) before creating a session.

To use Advanced Audio Processing (AAP) functions, create an AAP session.

1. Go to **Configure > AAP**
2. Go to the **Floor Plan** Tab. Under **Sessions**, add a new Processing Session

   Note: Each processor can have a maximum of 5 AAP sessions.

3. In the **New Session** dialog displayed, do the following:
   a. Click **Enable**
   b. Select an Algorithm from the drop-down list, depending on the type of audio function to be performed. Options are:
      - UpMix
      - DownMix
      - MultiMerge
      - UM+Loudness
      - DM+Loudness
      - MM+Loudness
      - Loudness 1.0
      - Loudness 2.0
      - Loudness 5.1
      - Loudness 7.1
      - Loudness 2x1.0
      - Loudness 8x1.0
      - Loudness 4x2.0
      - Loudness 5.1 + 2.0

- Dolby E Encode
- Dolby E Decode

Note: The Loudness Control options follow the **"Audio_System"** or **"Num" x "Audio_System"** format.
Where **"Num"** represents the instances created
And **"Audio_System"** is one of mono (1.0), stereo (2.0), or surround (5.1, 7.1).

For example, selecting **Loudness 4x2.0** implements 4 separate instances of stereo system loudness control.
Selecting **Loudness 5.1+2.0** implements 2 separate instances of loudness control - one for the 5.1 system and the other for the 2.0 system.

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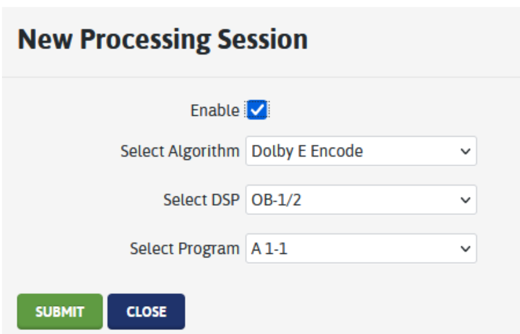
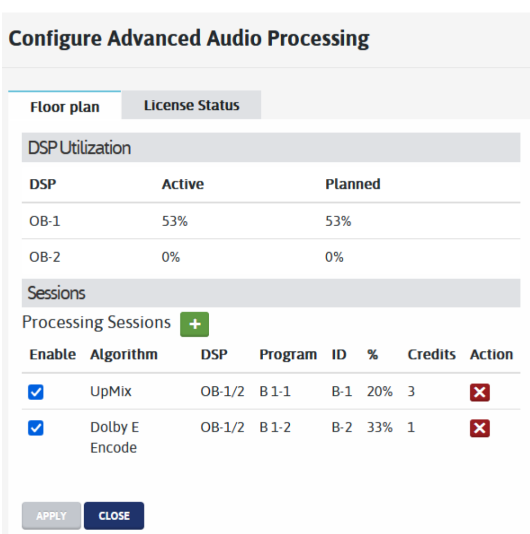
c. Select the DSP. In the current release, the DSP is auto-assigned.
d. Select the **Program**
e. Click **Submit**



4. The selected AAP function is then displayed in the **Configure Advanced Audio Processing** dialog. Select it to enable it, and click **Apply**.

Processing sessions can be enabled/disabled via this tab by using the enable check box and the Apply button.

Note: If you intend to disable some sessions and enable others, first disable any sessions and apply the setting and then enable any sessions that fit within the 100% utilization limit of either "On Board DSP", i.e. "OB-1 DSP" or "OB-2 DSP".



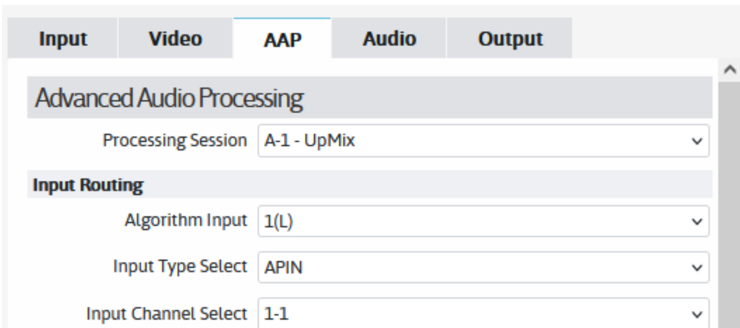
AAP Settings/Parameters

Once AAP has been enabled (see Creating AAP Sessions (on page 290)), an **AAP** tab is displayed on clicking a Program. See Program Configuration: AAP Tab (on page 420).

Note: The AAP tab is hidden if there are no associated AAP sessions for a program.

To configure AAP:

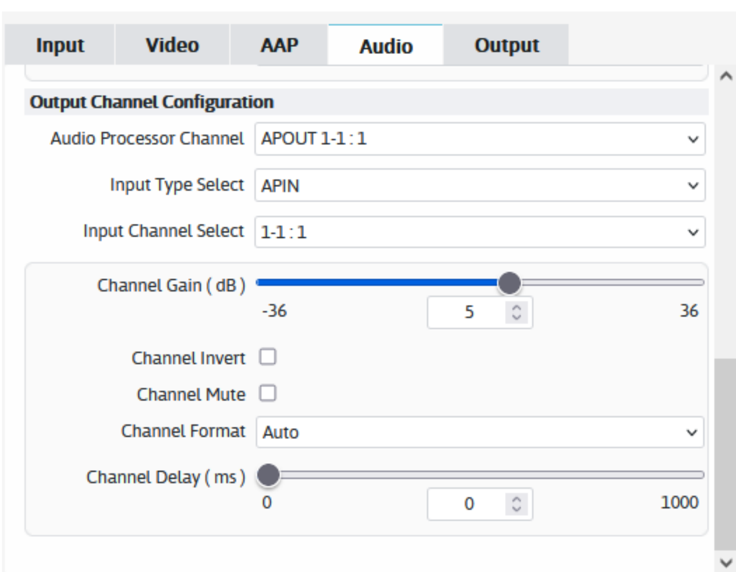
1. In the program's **AAP** tab, choose the signal that feeds the AAP process by selecting the following:



- The **Processing Session**
- The **Algorithm Input** Channel
- The **Input Channel Select** (where the input comes from)

  See AAP Tab: Input Routing and Gain (on page 421)

2. Define the AAP settings. This section displays parameters for the selected algorithm (for example, DownMix). See Program Configuration: AAP Tab (on page 420).
3. On the Output side, you can choose which channels are in the Program Audio Output.



- Go to the **Audio** Tab > **Output Channel Configuration** and select the channels

MADI Support

Note: MADI is supported on Sync, Remap, and Quad Conversion personalities.
This is a licensed feature enabled by the **SNP-PSK-MADIEXP** (+128 Audio/MADI Feature) license. See Orderable Part Numbers (on page 35).

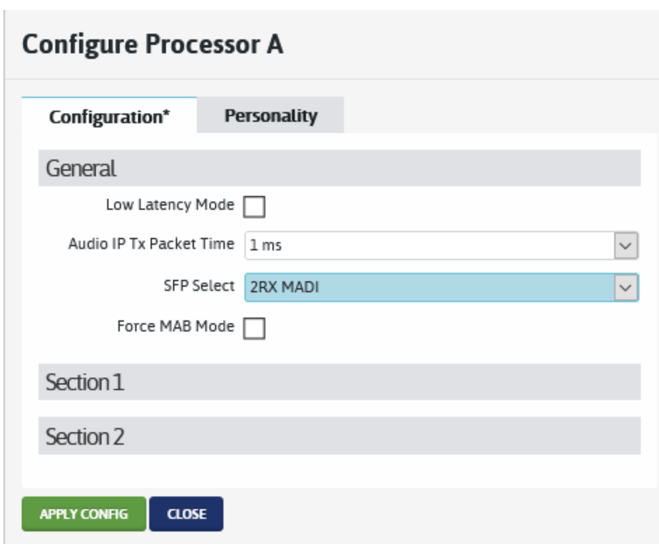
SNP can be configured to send and receive MADI streams, to extract audio channels from the MADI streams and send them as 2110-30 streams, and also receive 2110-30 streams and output the audio as MADI.

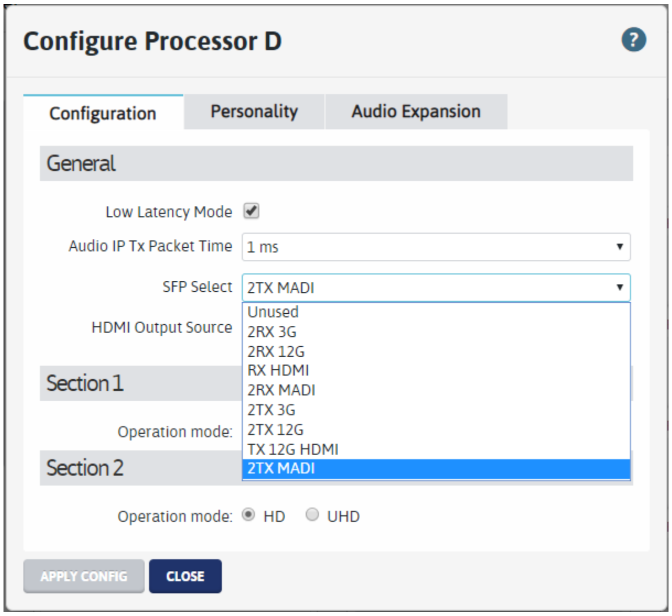
The SNP supports MADI audio via MADI SFPs listed in Video/Audio Expansion Interface Supported SFPs (on page 39).

MADI support is via SFP per processor. Any given processor will accept either a MADI TX SFP or a MADI RX SFP in its assigned SFP slot. 48kHz MADI signals are supported. MADI signals are assumed to be PCM audio.

MADI Inputs and Outputs

- MADI audio inputs/outputs are in addition to, and independent of, the audio channels from/to the SDI interfaces. In other words, these are **additional** audio channels to be supported, not a replacement of other channels.
- In addition to the 16 base mono audio channels, via a MADI-Rx SFP you can route up to 128 extended mono channels (64/port x 2 ports). See Audio Expansion (on page 303)and MADI Extended Channels (on page 302)
- Similarly, 128 extended mono channels can be output via the MADI-Tx SFP.





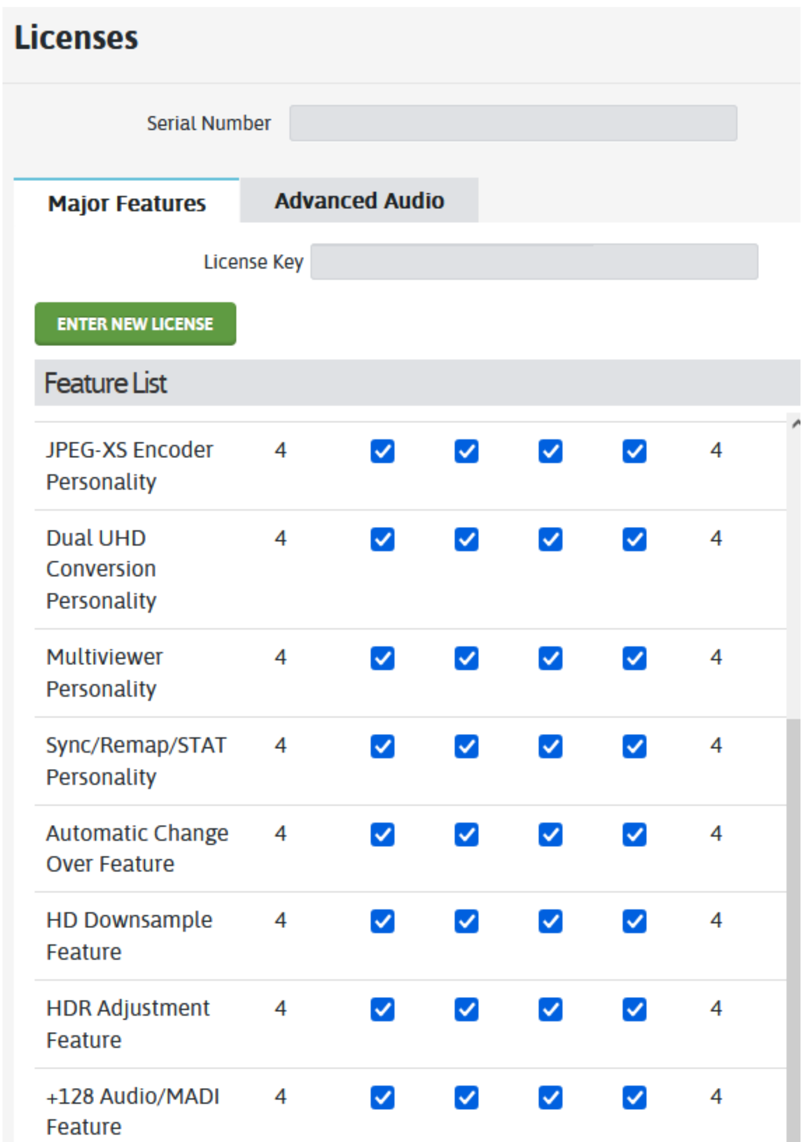
- MADI channels from a given Processor can only be transmitted via IP on the same Processor.

MADI Licensing

Note: MADI is supported on Sync, Remap, and Quad Conversion personalities.

The **SNP-PSK-MADIEXP** (+128 Audio/MADI Feature) license key enables dual (2) MADI processing which can be either both Tx or both Rx depending on the SFP installed. The license is per Baseband processor and SNP supports up to 4 licenses. See License Management (on page 44) for instructions. SFPs to be ordered separately.

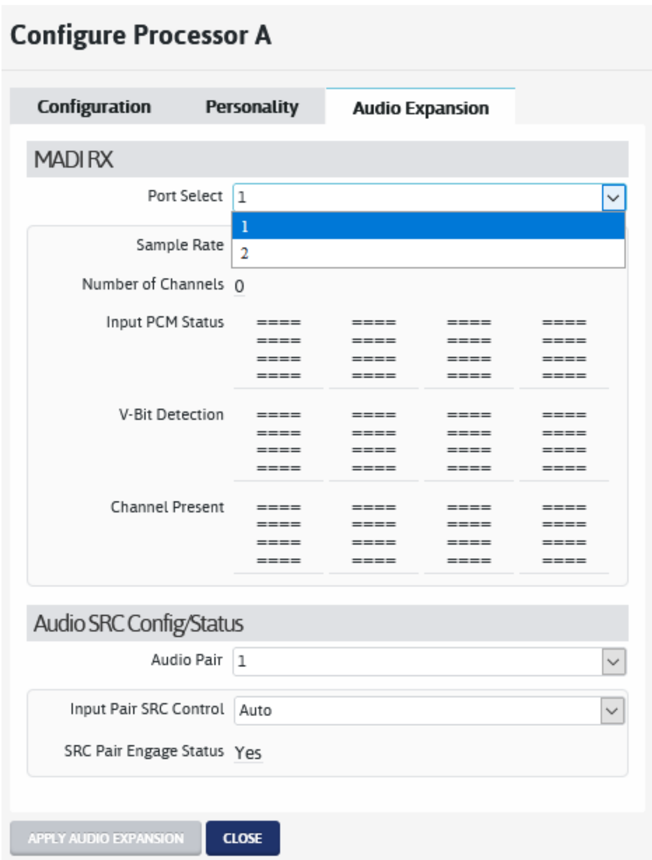
The **Licenses** dialog allows for assignment of the license to the processors intended for MADI processing. By default, no processor assignments are made.



Receiving MADI (Inputs)

Note: When an RX MADI SFP is inserted in the SFP slot for a processor, and configured (via the SFP Select option), that processor can receive MADI streams, extract audio channels from the MADI streams and send them as 2110-30.

Once you configure an RX MADI SFP (by clicking the Edit button for a Processor, and then selecting the SFP via the SFP Select drop down in the Configuration tab), the **Configure Processor** dialog displays an **Audio Expansion** tab that provides details of the incoming (expanded) audio.



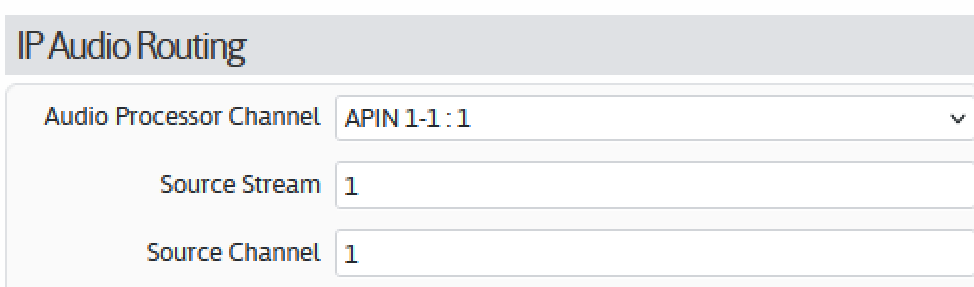
Within a program, you cannot currently perform processing on these extended channels (like gain, delay, etc.) like you can on the base channels, but you can route these extended channels into IP or SDI. The SDI Audio Routing section in the Input tab lets you define audio processing. The Audio Processor Channel control lets you select the audio processor channel to route to, including the expansion channel routed to.

Processing Audio

Note: MADI is received via IP, so the Processor Section input mode should be set to IP.

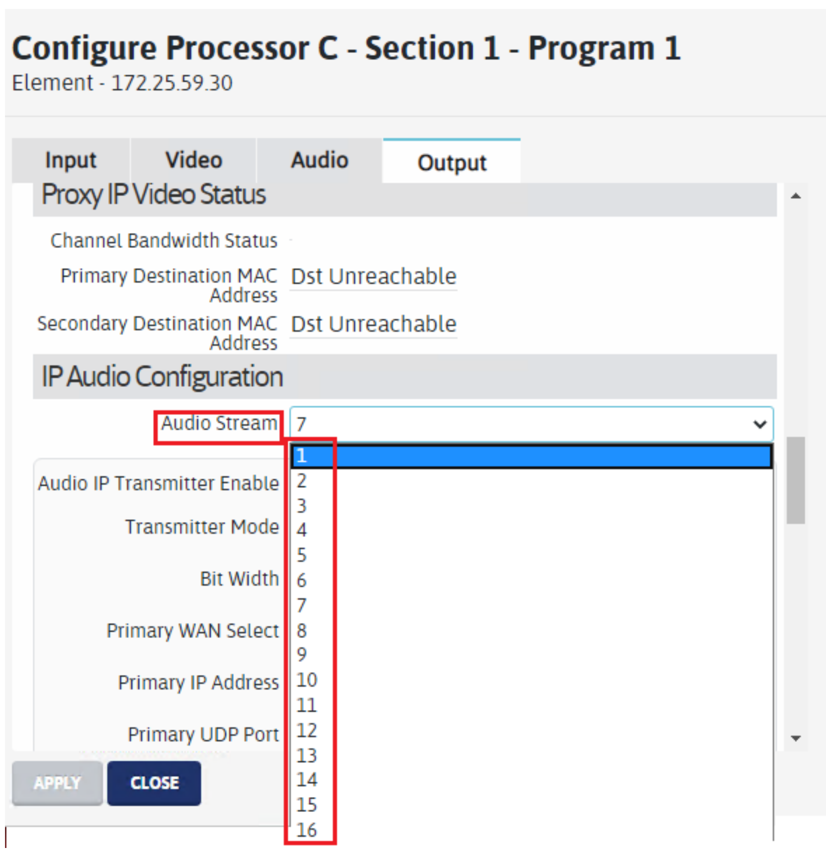
- The *IP Audio Routing* section in the *Input* tab lets you define audio processing. You can define the following:
  - **Audio Processor Channel**: The audio processor channel to route to (within the same processor, for example, APIN 1-1:1 to APIN 1-1:16). This includes the expansion channel routed to within the 16 channels.

- **Source Stream**: The audio stream receiver the channel comes from (1-6)
- **Source Channel:** The Channel within the incoming audio stream (1-8)

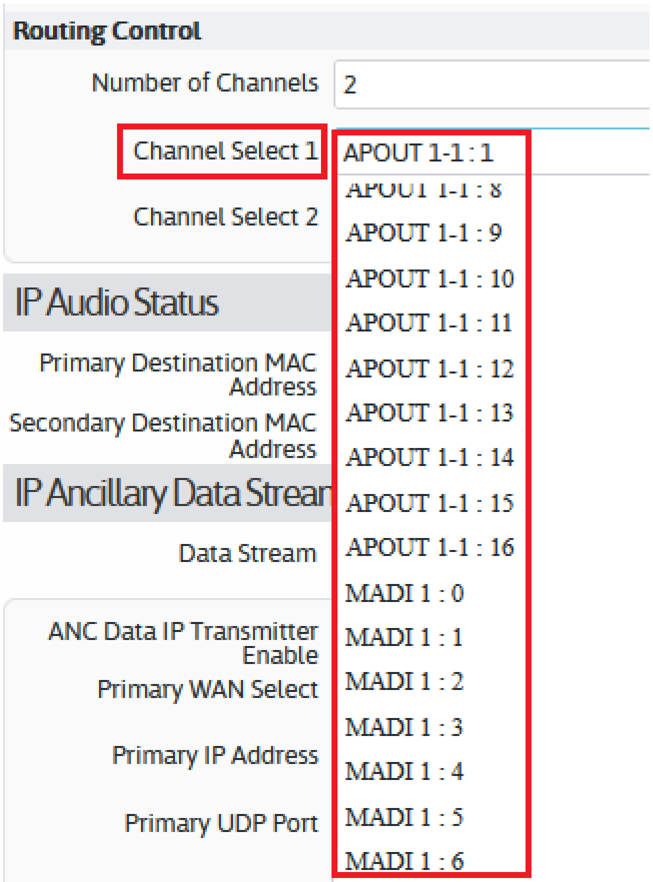


On the Output side, routing to IP audio channels is configured in the **Output** tab.

- In the **IP Audio Configuration** section, select the **Audio Stream**



- In the **Routing Control** section, select the channels. You can include both base channels (APOUT 1-16) and extended channels (MADI 1:128).

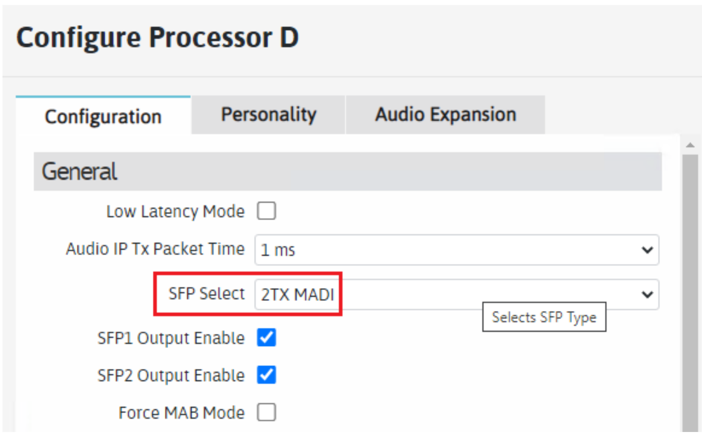


IP streams generated from MADI channels, like other SNP audio streams, are available as IP sources, assuming appropriate licenses are available and assigned.

Transmitting MADI (Outputs)

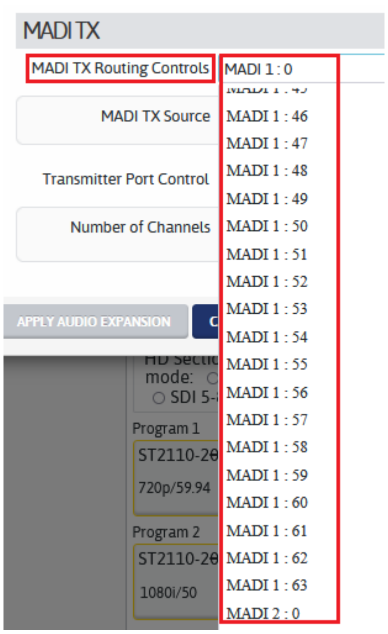
Note: When a TX MADI SFP is inserted in a SFP slot, the 128 channels in the two MADI output signals can be composed of any combination of the 16 main channels from each program section, and the 128 extended channels. Since there is no MADI input SFP, these extended channels can come from the IP receivers.

In order to transmit MADI audio, a MADI transmitter (Tx MADI) appropriately configured in the **Configure Processor** dialog, is required.



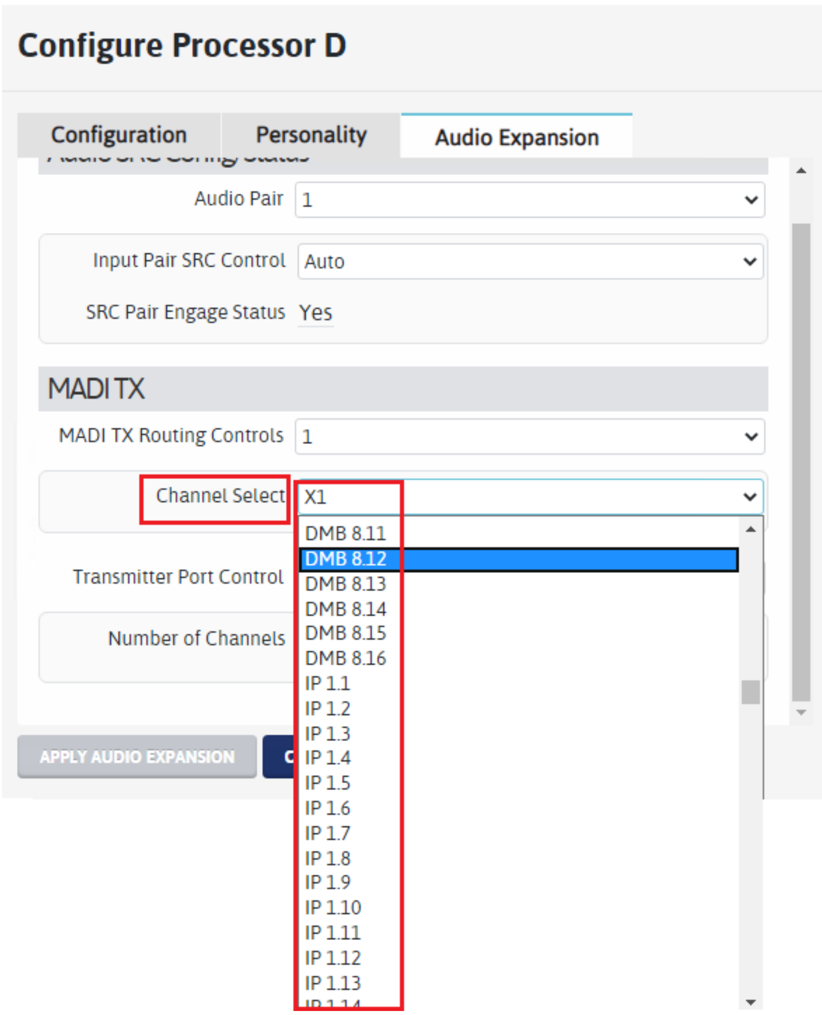
Once a MADI Transmitter (TX SFP) has been selected, the **Configure Processor** dialog displays an **Audio Expansion** tab.

- Audio can be routed into MADI SFP channels (**MADI TX Routing Controls**). Select from:
  - MADI 1 : 0-63
  - MADI 2: 0-63



- Pick the source in the **MADI TX Source** drop down. Options include:

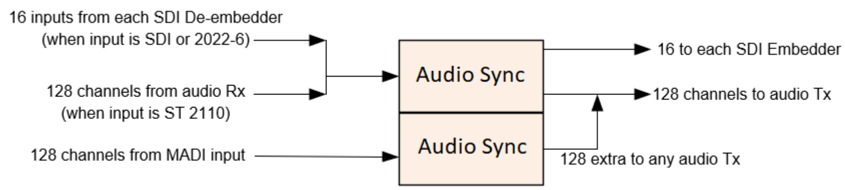
- Any of the dembedded channels (DMB 1-1:1 to 1-2:16)
- Any of the IP channels (APIN 1-1:1 to 2-4:16)
- Any the extended channels (EXP 1-128)
- Test tones (400 Hz, 1 kHz, 2 kHz, Mute)



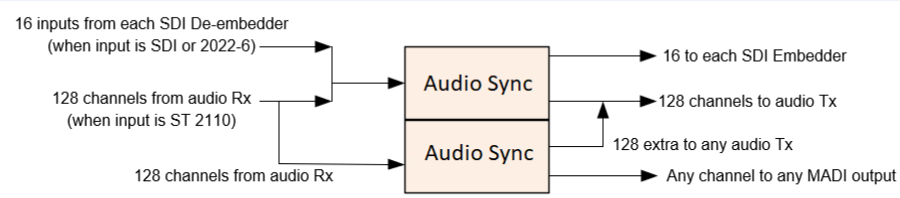
MADI Parameters

MADI features appear in parameter lists whether or not a MADI license is currently assigned to the processor. When a preset that includes MADI settings is applied to a processor that does not have a MADI license available, the default settings for that parameter are assigned instead.

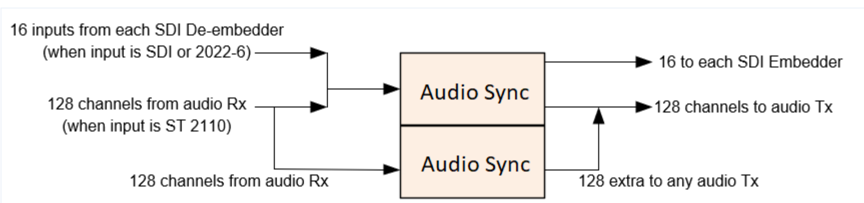
In the input routing dialogs, the terminology **X1..X128** is used to refer to the 128 “extended” channels enabled in the synchronizer by the MADI license. For MADI input, these are populated directly by the MADI input; however if no MADI input is configured, then the X1..X128 channels in the syncrhonizer can come from the existing audio IP receivers, through the input channel routing controls. Likewise, the terminology X1..X128 is used in the output routing controls for both IP and MADI outputs, to refer to the 128 extended channels in the synchronizer when composing output streams or output MADI signals.



MADI Input (via MADI SFP)



MADI Output (via MADI SFP)



Without MADI SFPs

MADI SFPs are defined on the Configure Processor dialog box. See Configure SFPs (on page 115) and Audio Expansion (on page 303) for more information.

if you don’t have a MADI input or output configured, but you have a MADI license applied, then you can use the 128 extended channels in the synchronizer for IP input and IP output.

MADI Extended Channels

The **Routing Control** section (**Output** tab) lets you select:

- Up to 16 Base Channels
- Up to 128 Extended Channels (prefixed by EXP)

If **2RX MADI** is selected in the **SFP Select** drop down, **EXP1-EXP128** represents the **MADI inputs from the SFP**

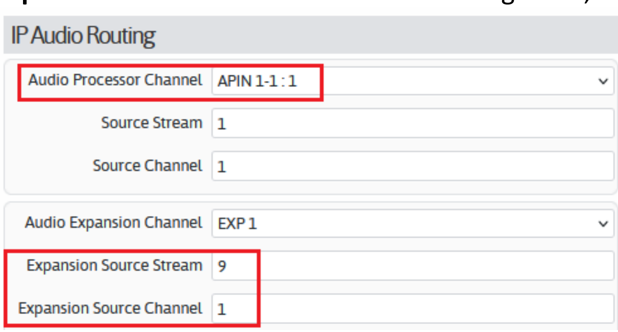
EXP1-X64	Port 1	MADI channels 1-64
EXP65-X128	Port 2	MADI Channels 1-64

If anything other than 2RX MADI is selected in the **SFP Select** dropdown, **X1-X128** comes from the **Expansion IP audio channels**

Channels	**Source**	**Location**
EXP1-EXP16	IP audio streams	Program 1
EXP17-EXP32	IP audio streams	Program 2
EXP113-EXP128	IP audio streams	Program 16

Extended Channel Configuration

Channels EXP1-EXP16 are configured by the **Audio Processor Channel**, **Expansion Source Stream,** and **Expansion Source Channel** controls on Program 1, where:



- **Audio Processor Channel** controls which of the APIN1-1 :1 -16 is being configured (In additional to the IP channel used by the program for the specified channel)
- **Expansion Source Stream** controls which IP stream to use for the selected expansion “Audio Processor Channel”
- **Expansion Source Channel** controls which channel within the IP stream to use for the selected expansion “Audio Processor Channel”

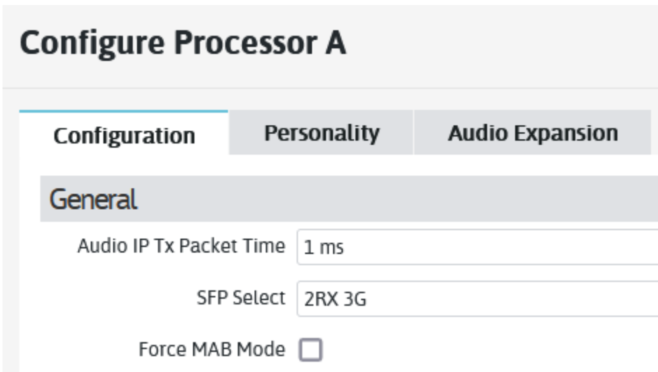
Note: The same applies to Program 2, 3, etc., except for each subsequent program, **Audio Processor Channel** 1-16 represents EXP17-EXP32, EXP33-EXP48 etc.up to EXP113-EXP128.

Expansion Source Stream and **Expansion Source Channel** parameters only matter in case of Expansion IP Audio Channels and have no effect if 2RX MADI is selected in the SFP Select drop down.

Audio Expansion

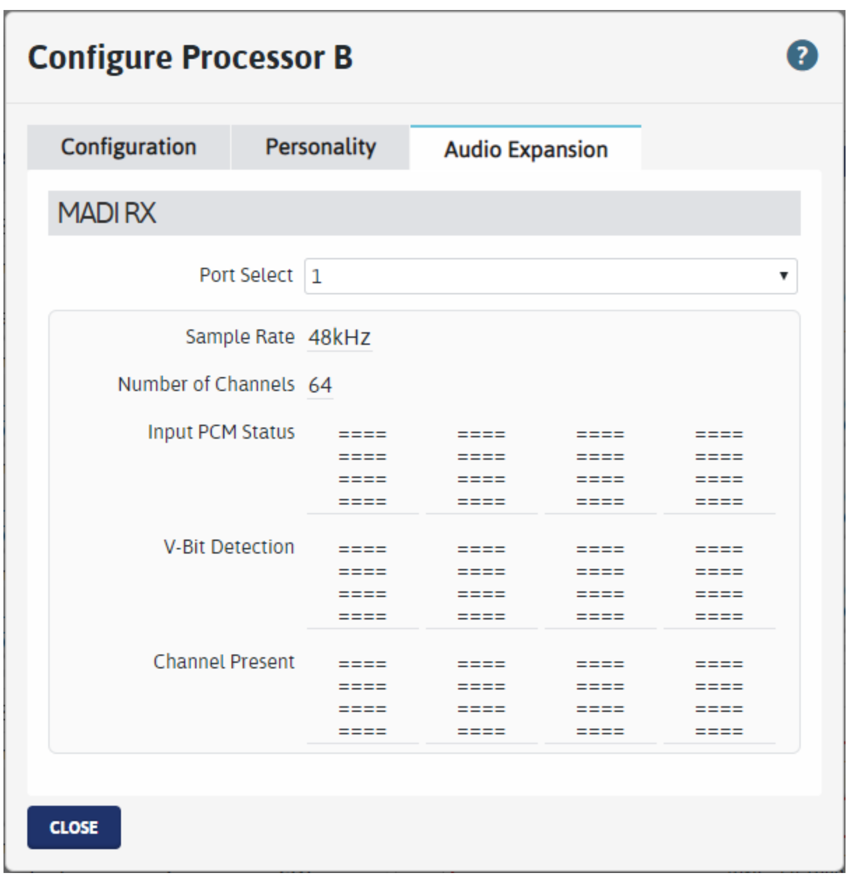
Note: Starting SNP 1.7, MADI is only supported on Sync and Remap personalities.

The following MADI settings apply to all programs in both Sections on the Processor. After SFPs have been defined within the Processor's **Configuration** settings, an **Audio Expansion** tab is displayed on the same dialog box. Depending on whether the SFP is RX MADI or TX MADI, the tab will appear differently.



RX MADI Parameters

When you select an RX MADI SFP, the **Audio Expansion** tab has a **MADI Rx Status Parameters** menu. From this menu, choose index 1 or 2 to view status indicators for that index.



Status parameters include the following:

- **Sample Rate** (should be 48kHz)
- **Number of Channels** (56 or 64)
- **C-Bit Detection** for each channel
- **V-Bit Detection** for each channel
- **Channel Format** for each channel

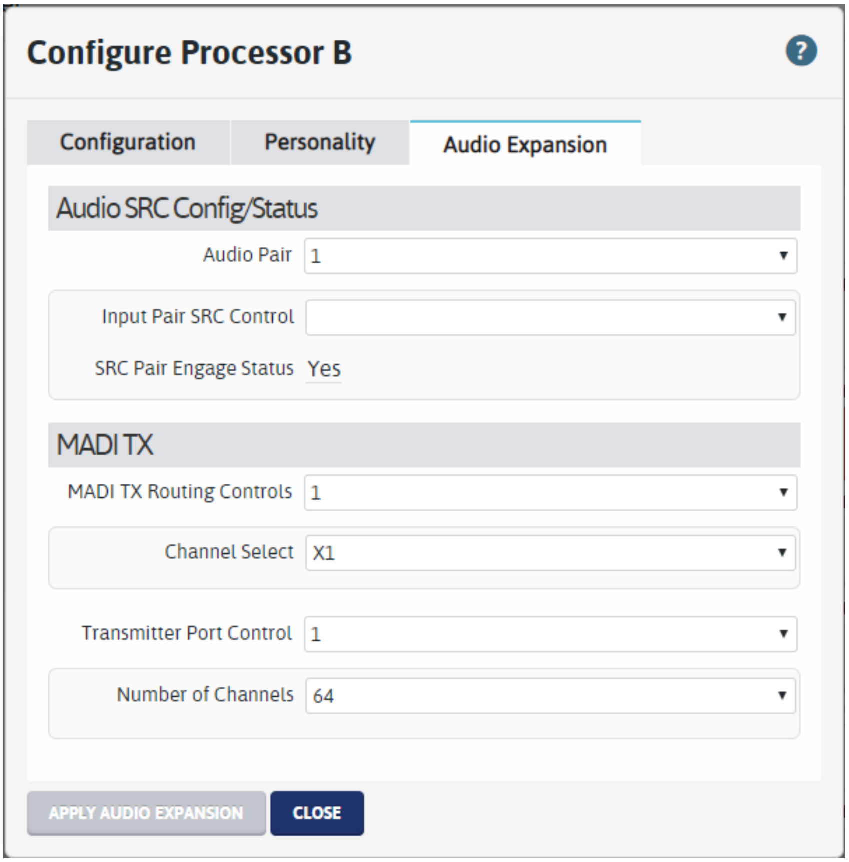
Input receivers X1 - X128 are only operational when the receiver is not selected. In all other cases, extra IP receivers are available.

Audio SRC Config/Status

Audio Pair	Each audio pair is configured independently. Choose the audio pair, from 1 - 64, for which the rest of the parameters in this group will apply.
Input Pair SRC Control	These controls configure the operation mode of the selected sample rate converter. Options are **Engage**, **Auto**, and **Bypass**. When an SRC Control parameter is set to **Auto**, the Audio Channel Status bits determine whether the audio data is PCM or non-PCM, and whether the audio data is passed through the Audio Sample Rate Converters (SRC). The **Engage** option always forces the audio data through the audio SRC, and **Bypass** always forces the audio data around the audio SRC.
SRC Pair Engage Status	Feedback parameter that indicates the SRC status for this pair as **Yes** or **No**.

TX MADI Parameters

When you select a TX MADI SFP, the **Audio Expansion** tab has the following options:



- From the **MADI TX Audio Routing Controls** menu, choose the destination you want to modify. Options are 1 - 128. Indexes 1 - 64 go to MADI Tx port 1, and Indexes 65 - 128 go to MADI Tx port 2
- From **Channel Select** choose the source for that destination. If you are operating with 56 channels of output, channels 57 to 64 are not routed. The list also includes test tones at 400 Hz, 1 kHz, 2 kHz, and 4 kHz.
- **MADI Transmitter Control**: Choose 1 or 2, and then for that index, select the **Number of Channels** (56 or 64).

Subtitles on the SNP

Subtitles are supported on Conversion (Dual and Quad) as well as Sync and Multiviewer Personalities.

For details on configuring subtitles for a Multiviewer personality, see the Layout Designer documentation.

The SNP accepts and auto-detects subtitle input as either OP-47 or SMPTE ST-2031. It also supports outputting subtitles as **OP-47** or **SMPTE ST-2031**. A combination of the two - for example, OP-47 input and ST-2031 output - is also supported.

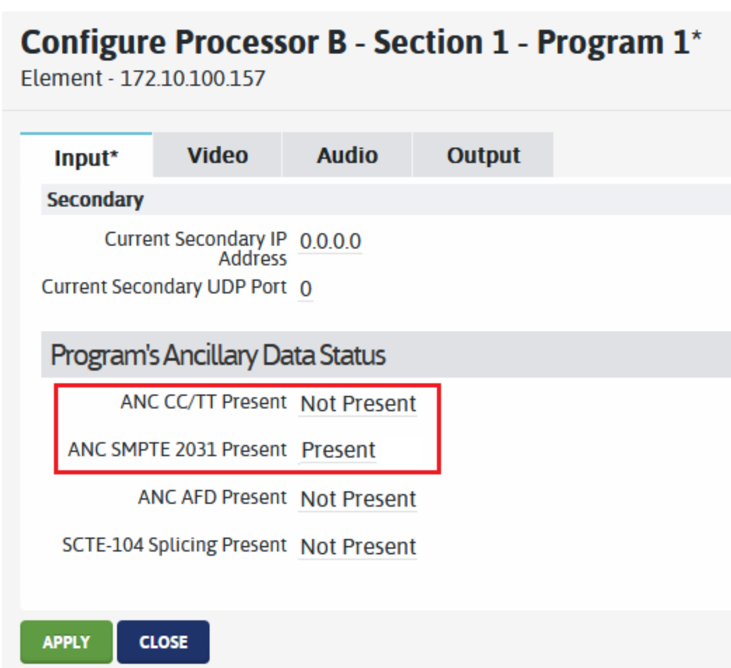
See:

- Receiving Subtitles (on page 306)
- Outputting Subtitles (on page 307)

Receiving Subtitles

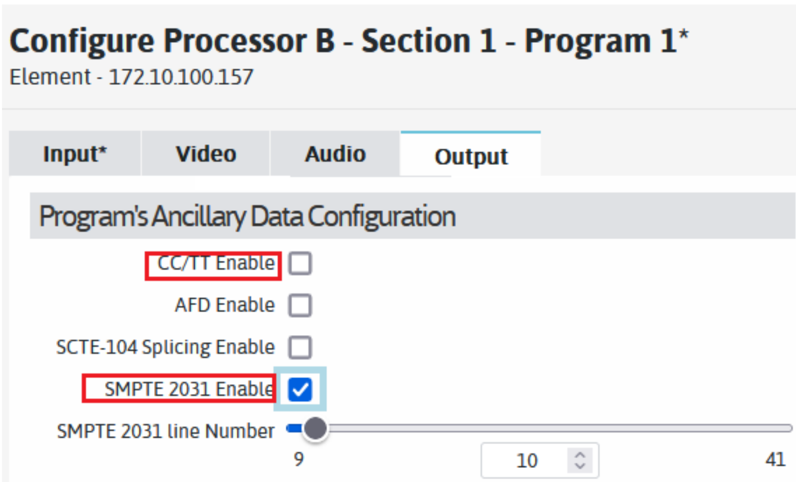
If your input stream contains subtitle information (OP47 or SMPTE ST-2031), the Program's **Input** tab will display the following:

- **Input Tab > Program's Ancillary Data Status** will indicate subtitle presence under one of the following:
  - ANC CC/TT Present
  - ANC SMPTE 2031 Present



Outputting Subtitles

1. Go to the Program's **Output** tab
2. In the Program's **Ancillary Data Configuration** section, select either **CC/TT Enable** or **SMPTE 2031 Enable**, as applicable



3. Select the **SMPTE 2031 Line Number**

Note: On the **conversion and quad conversion** personality, the program's ancillary data configuration has a line number for the user to select the line to embed the metadata on.
- For output standard 1080p or 2160p, the full range of lines 9 to 41 applies
- For output standard 1080i, metadata can be embedded on lines 9 to 20
- For output standard 720p, metadata can be embedded on lines 9 to 25

With the **quad conversion** personality:
- Output standard 525i/59.94 supports CC on line 21 and AFD metadata can be embedded on lines 9 to 19
- Output standard 626i/50 supports TT/AFD embedded on lines 9 to 22. WSS can be embedded on lines 9 to 23.

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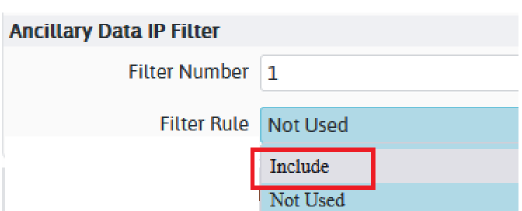
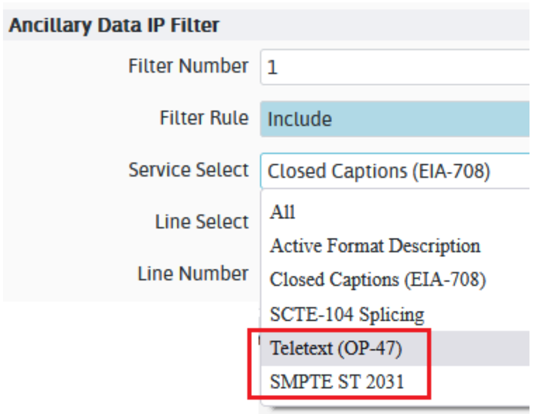
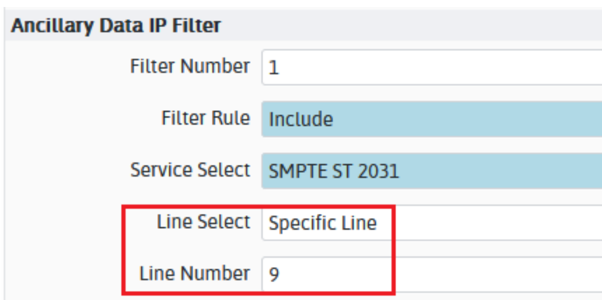
4. In the **IP Ancillary Data Stream Configuration > Ancillary Data IP Filter** section, do the following:
   a. Set **Filter Rule** to **Include**



b. In the **Service Select** dropdown, select the either **Teletext (OP-47)** or **SMPTE ST 2031**



c. In the **Line Select** drop-down, select **Specific Line** and enter the line on which subtitles are expected to come in on



5. Click **Apply**

Support for SD over 2110

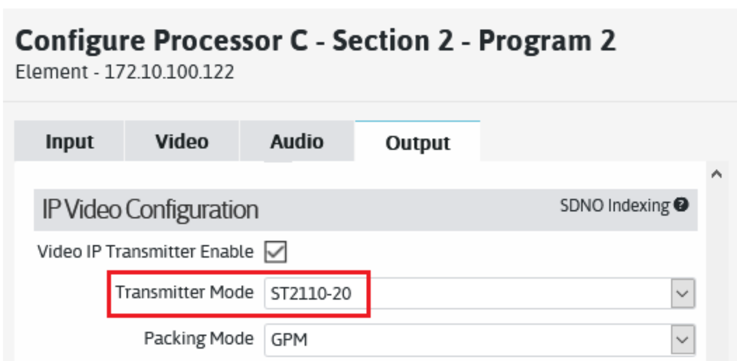
The SNP now supports SD (480i and 576i) over ST-2110, in addition to ST-2022-6 that was previously supported. This support is only available on the *Sync, Quad Conversion*, and *Multiviewer (HD) (Input only)* personalities, and is enabled by setting the *Transmitter Mode* or *Receiver Mode* to ST-2110-20.

Since SD signals can carry non Ancillary ST-291M data (digitized analog waveform), the *Picture Height* parameter allows non ANC data and ANC data in the Active Picture region or Vertical Blanking region to be encapsulated in an ST-2110-20 stream (following the RP-2110-24). Note that digitized analog waveform data cannot be encapsulated in ST-2110-40 streams.

In addition, some modifications need to be made to the picture size to accommodate and correctly process any ancillary data such as closed captions. The following sections highlight settings that need to be made on the Transmitter and Receiver side.

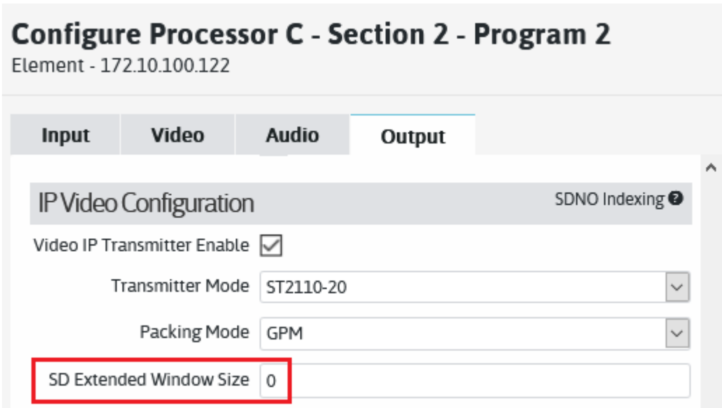
ST-2110 support - IP Transmitter Configuration

- **Transmitter Mode**: In the **Output** tab > **IP Video Configuration**, set the **Transmitter Mode** to **ST2110-20**.



- **Extended Video Size:** On the transmitter side, the **SD Extended Video Size** parameter in the **Output** tab lets you adjust the height of the image. This backs up the beginning of the image to include vertical blanking. This parameter only applies to SD formats. Range is 0-16 lines.
  - The default of 0 encapsulates the active image and non Ancillary ST-291 (digitized analog waveform data) placed in the active picture region
  - To include ancillary data, enter the number of lines, for example, entering 10 extends the height of the image by 10 lines per Field or 20 lines in total. In this case, the active picture plus the content from the vertical blanking will be encapsulated into the 2110-20 packet.
  - Closed Captions: If you leave the default height as 0, note that it does not include closed captions (on line 21 by default). Extend the video to include closed captions info in the active picture, and higher if you want to include any data in the vertical blanking region.

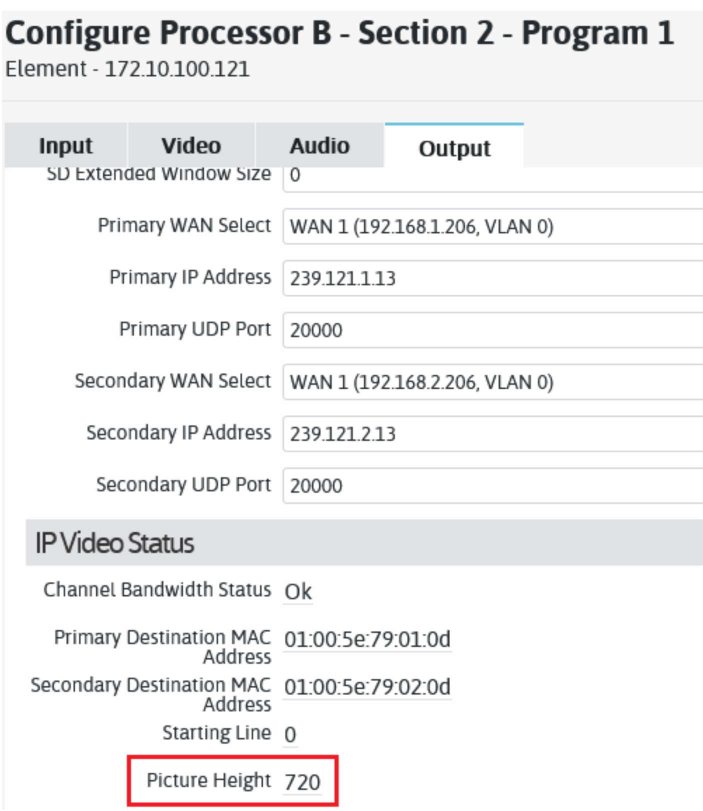
Note: If you're using Magellan Control System, based on your IP Transmitter configuration, SEAM info will indicate the actual image height (in the IPVR Stream properties).



Important: When setting the "SD Extended Window Size" parameter to values greater than zero to include one or more lines from the VBI, please consider ancillary services present in those lines that will be received over the ST 2110-20 stream and make sure they do not conflict with any of the ancillary services received over ST 2110-40 streams. All the ancillary packets from the ST 2110-40 streams will be embedded into the baseband signal extracted from the ST 2110-20 stream into the target line, which could result in either

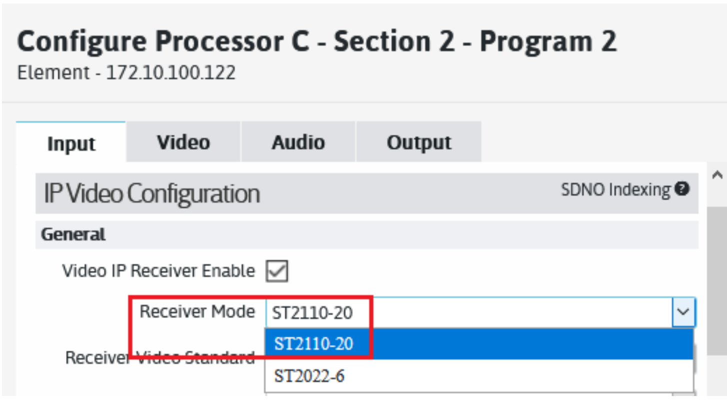
a) overwriting an existing VBI service embedded as a waveform, or
b) duplicating an existing ancillary packet.

The **Picture Height** status parameter indicates the height of the image being transmitted. This value can be set on IP receivers to correctly configure the receiver to de-encapsulate the image correctly.



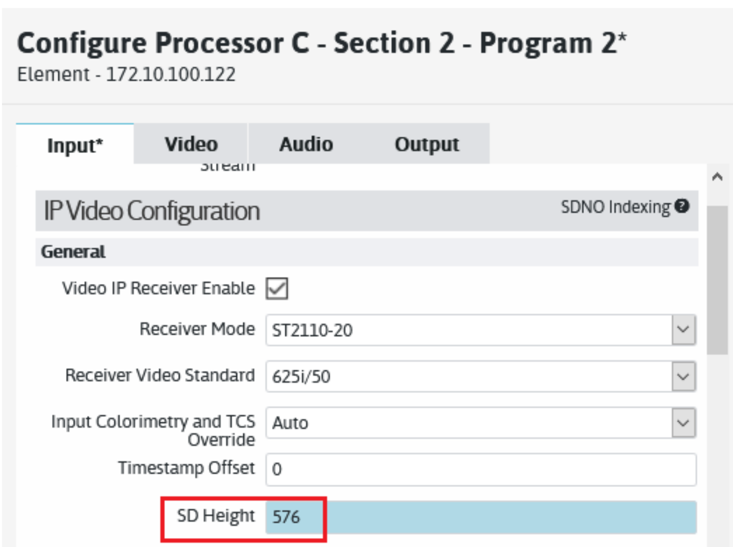
ST-2110 Support- IP Receiver Configuration

- **Receiver Mode**: In the **Input** tab > **IP Video Configuration**, set the **Receiver Mode** to **ST2110-20**.



- **SD Height**: In order to receive the modified image, the IP Receiver needs the actual height of the picture. The following parameter in the **Input** tab lets you modify the picture height.

Note: This parameter is only displayed if the input is SD, and the default displayed depends on the detected resolution (525 or 625).



Parameter	Range
SD Height	For 525, the range is 480 to 512 (default is 480) For 625, the range is 576 to 608 (default is 576)

Enter the SD Height on the Receiver based on what you have on the Transmitter side. The Receiver will pick up the active picture information and de-encapsulate all the vertical blanking information from the lines leading up to the first active picture.

- The **Picture Height** status parameter in the **Output** tab > **IP Video Status** section displays the result of any changes made to the SD Height parameter. If no changes are made, the default is displayed.

Color Processing for SD

In case of SD signals, the **Video** tab > **Color Adjustment** section displays two parameters:

Parameter	Range
525 First AP Line	20-23 (default is 22)
626 First AP Line	23-26 (default is 24)

These parameters specify the first line in SD to which color processing controls should be applied. The first few lines of the active picture may carry closed captioning, WSS, etc. so to avoid any processing of such data (and possible corruption), the first line to be processed can be modified.

Other Parameters

When the input is in SD format, certain additional parameters are displayed and some are replaced, and these are noted in the parameters section. See Input Tab (SDI): Video Status (on page 400).

Support for 8K Workflows

Also see Support for 8K Clean Switching using IP (on page 315).

SNP Personalities that support 8K Workflows

Handling of 8K is supported in the following personalities:

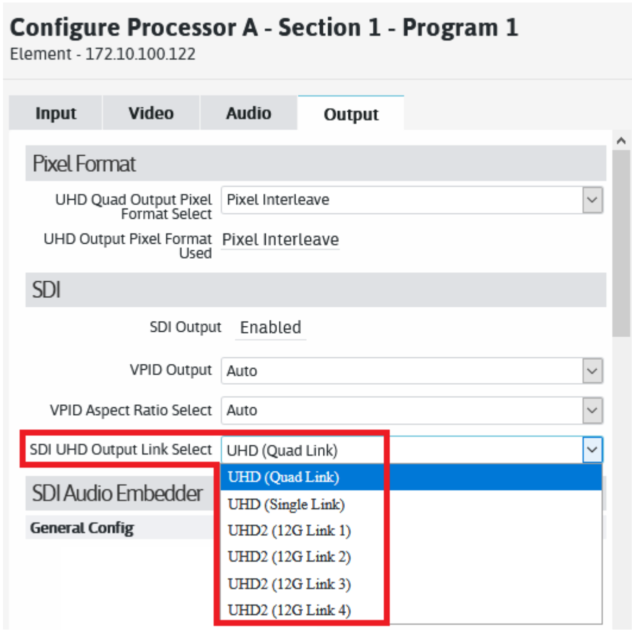
Personality	Input/Output Support
Sync	SDI Input and SDI Output (UHD mode only)
Remap	SDI Input and SDI Output
Dual Conversion	SDI Input and SDI Output
Multiviewer	SDI Input only
Multiviewer Portrait Mode	SDI Input only

The SNP recognizes and accepts 8K (ST 2082-12) SDI input as 12G SDI. In order to support such streams on the output side, the SNP allows to mark a 12G UHD output signal as one of four links of an 8K stream by inserting the proper 8K Video Payload Identifier (VPID). On the input side, the incoming signal is identified as valid UHD (single link 12G input) based on the VPID detected, and the 8K link is treated identically to a 12G.

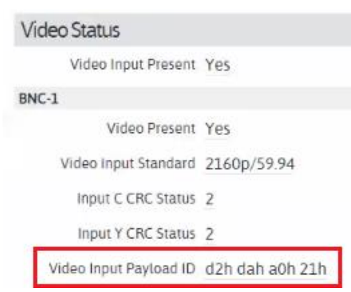
The 8K stream can be thought of as a quad of 12G streams. Since the four 12G links of an 8K stream have a similar marking in VPID, the user has the option to select or flag the output SDI as a link of 8K. Essentially, on the output side, the user can choose to output as a normal 12G over UHD or an 8K link. For 8K, the user must tag the output with a link ID, basically telling the output that this is one part of an 8K quad. The VPID embedded in the SDI output will contain Byte1 = D2 (8K stream) and Byte4 = link number, per the ST 2082-12 standard.

To configure handling of 8K workflows, once the rest of your workflow is defined, ensure your Output is tagged correctly with the appropriate link ID as follows:

1. Go to the **Output** tab
2. In the SDI section, set **SDI UHD Output Link** select to the desired option. Select the appropriate 12G link (Link 1 to 4) in case of 8K signals. The options include:
   - UHD (Quad Link): Normal UHD over four 3G signals
   - UHD (Single Link): Normal UHD on a single 12G link
   - UHD2 (12G Link 1): Option for signaling the first link of an 8K quad
   - UHD2 (12G Link 2): Option for signaling the second link of an 8K quad
   - UHD2 (12G Link 3): Option for signaling the third link of an 8K quad
   - UHD2 (12G Link 4): Option for signaling the fourth link of an 8K quad

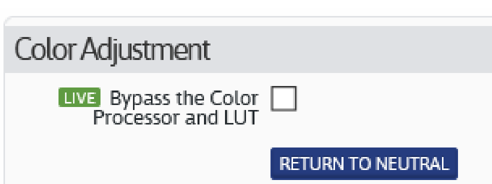


3. Repeat for the other 3 Links so that you have Link 1-4 properly tagged.
4. To validate your output, go to the SNP Processor that this output currently feeds and do the following:
   - Go to the *Input* tab and validate that Video is present, that the Video Input Standard is correct (should be 2160p/59.94), and that video is not frozen
   - In the *Input* tab, see the VPID parameter status. It should identify an 8K with the proper link signaled in byte 4.



Color Processing for 8K

When working with UHD-2 (8K) signals, users are cautioned that the color processing and conversion controls are implemented separately on each link. This can cause visual artifacts at the seams of the quadrants (in SQD) or other peculiar visual effects (in 2SI). In order to ensure that the color processor is fully disabled and the pixels are being organized and transmitted without any alteration, users can bypass the color processor using the control below.



Support for 8K Clean Switching using IP

Note: 8K clean switching is supported in the Sync and JPEG-XS Encoder Personalities.

In this Section

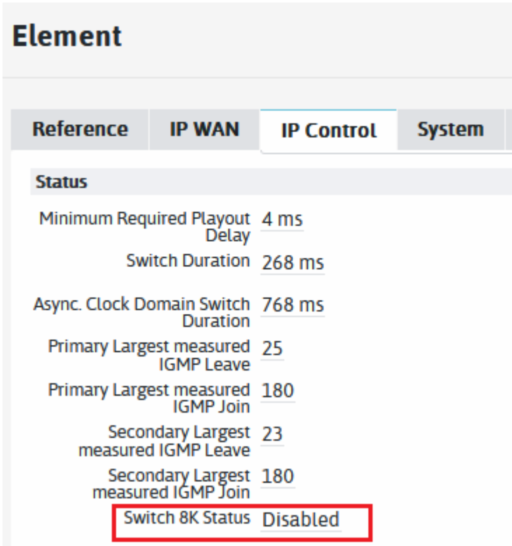
Step 1 - Pre-Requisites for 8K Clean Switching

Ensure the following conditions are met before setting up the SNP for 8K switching:

- All sections must be configured as **UHD**
- All processors must be configured for the **same personality** (currently, Sync or JPEG-XS Encoder personalities are supported)
- All input modes must be set to **IP** (for the 4 UHD sections defined by the **Enable 8K Mode** parameter)
- **Force MAB Mode** must not be enabled on any of the processors

The **Switch 8K Status** parameter (Configure > Element > IP Control) reports whether the system is properly configured for 8K switching. If any of the above conditions are not satisfied, the **Switch 8K status** parameter reports *Disabled* and will not attempt to switch the quad UHD sections simultaneously. The following are possible status messages that the **Switch 8K Status** parameter reports:

Disabled	Feature not enabled
Config Error	Pre-conditions were not met - four processors in same mode, UHD input from IP on one section but not the other, etc.
Ready	Conditions are met, four receivers are available for next switch
Switching	In progress
Switch Done	Cutover occurred, waiting for leave delay and/or actual stream going away on the old streams
Switch Partial	Four switching commands were not received before the IGMP join delay of the first command - a partial switch was performed.



Step 2: Enabling 8K Mode (IP Receiver)

The **Enable 8K mode** parameter allows for definition of the sections to be used for 8K clean switching using IP Rx. To do this:

1. Go to **Configure** > **Element** > **IP Control** > **Rx Setup**
2. Set the **Enable 8K Mode** parameter to one of the following:
   - **Processor A/B Section 1/2:** Only the first 2 processors will be used for input/output of the 8K signal
   - **Processor A/B/C/D Section 1**: Only the first section in each processor will be used for input/output of the 8K signal
   - **Disabled**: Disables ganging of the sources for the switch

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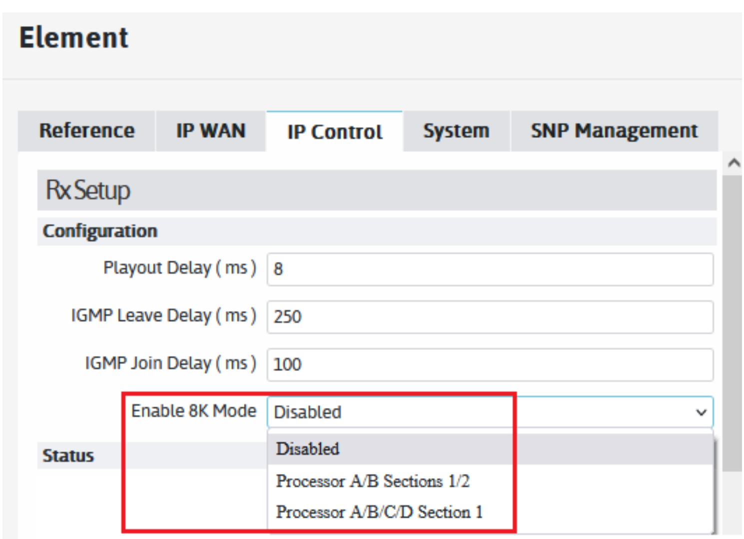
When 8K mode is enabled (set to something other than disabled), the other sections not used for input/output of the 8K signal are blocked from being enabled. They will be used to perform the clean switch.



Step 3: Setting up the SDI Output Payload ID

After deciding on the sections to be used for 8K switching (using the Enable 8K mode parameter), set up the payload ID output for SDI on the selected sections. See Support for 8K Workflows (on page 313) for details.

Step 4: Switching IP Sources

The SNP attempts to time-coordinate the switching of the four UHD signals so that they switch at the same frame boundary. In order for this coordination feature to work, the following conditions must be fulfilled:

- The SNP must be configured in a specific way (as defined by the **Enable 8K Mode** parameter)
- The four switching requests must come within a reasonable time proximity – ideally within 100ms of each other.

The special configuration is required in order to ensure that four "spare" UHD receivers are available to receive the four new signals before switching to them.

For example, if the *Enable 8K Mode* parameter was set to *Processor A/B Section 1/2*, the SNP should be configured as follows:

Processor A	SYNC, UHD Mode, both sections IP input, SDI/IP output
Processor B	SYNC, UHD Mode, both sections IP input, SDI/IP output
Processor C	SYNC, no IP inputs, SDI-to-IP operation OK
Processor D	SYNC, no IP inputs, SDI-to-IP operation OK

Support for Daktronics Scoreboards

SNP offers support for Daktronics scoreboards. SNP communicates with external devices via IP, so an **eBox (Quad Serial/Ethernet/GPI Interface)** is used as an intermediate device (to map to serial data from Daktronics to TCP). For more details on eBox, contact Imagine Communications Customer Support.

The following are high-level steps in configuring the SNP for communication with Daktronics scoreboards:

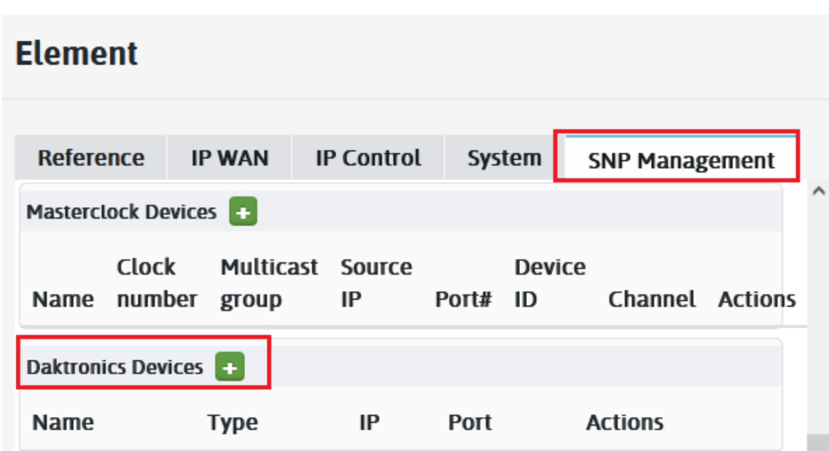
STEP 1	Configure the eBox with 9600 baud rate and no parity.	
STEP 2	Add the Daktronics device as an external device to the SNP, and select the sport to configure.	See Adding Daktronics Devices to the SNP (on page 318).
STEP 3	Configure a SNP processor as Multiviewer and assign the Daktronics device to it.	See Assigning the Daktronics Device to a Multiviewer Processor (on page 320).
STEP 4	Create a layout for the Daktronics device.	See Creating a Layout for the Daktronics Device (on page 321).

Notes:

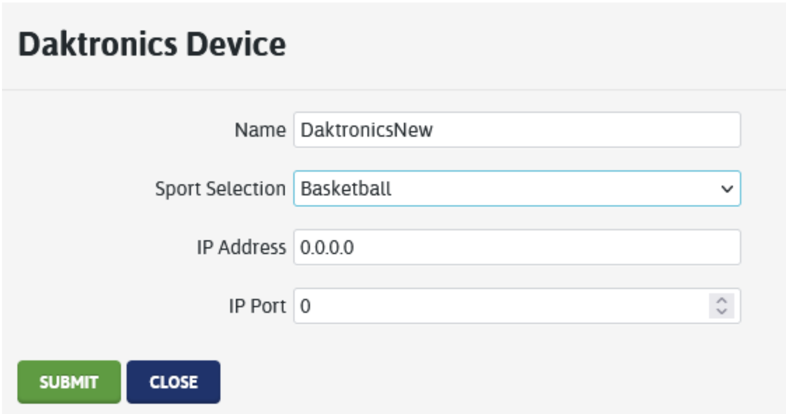
- Each Multiviewer Processor on the SNP supports a single Daktronics device.
- Labels are used in Layout Designer to configure the data feed.
- Info Panel indicators are not currently supported.

Adding Daktronics Devices to the SNP

1. Click **Configure Element**
2. Go to the **SNP Management** tab
3. In the **External Devices** section, scroll down to **Daktronics Devices**
4. Click **+** to add a new Daktronics device



5. Enter a **Name** for the device
6. Select the **Sport**



Note that in this release, only **Football**, **Hockey**, and **BasketBall** are functional options, even though a more extensive list is displayed.

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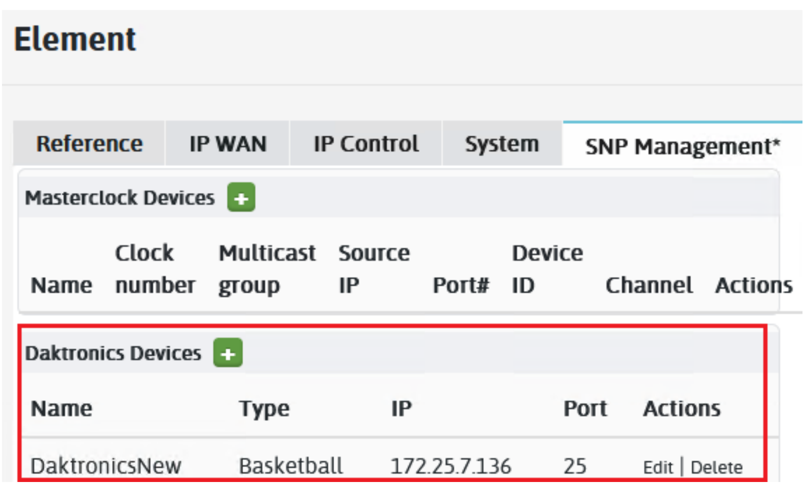
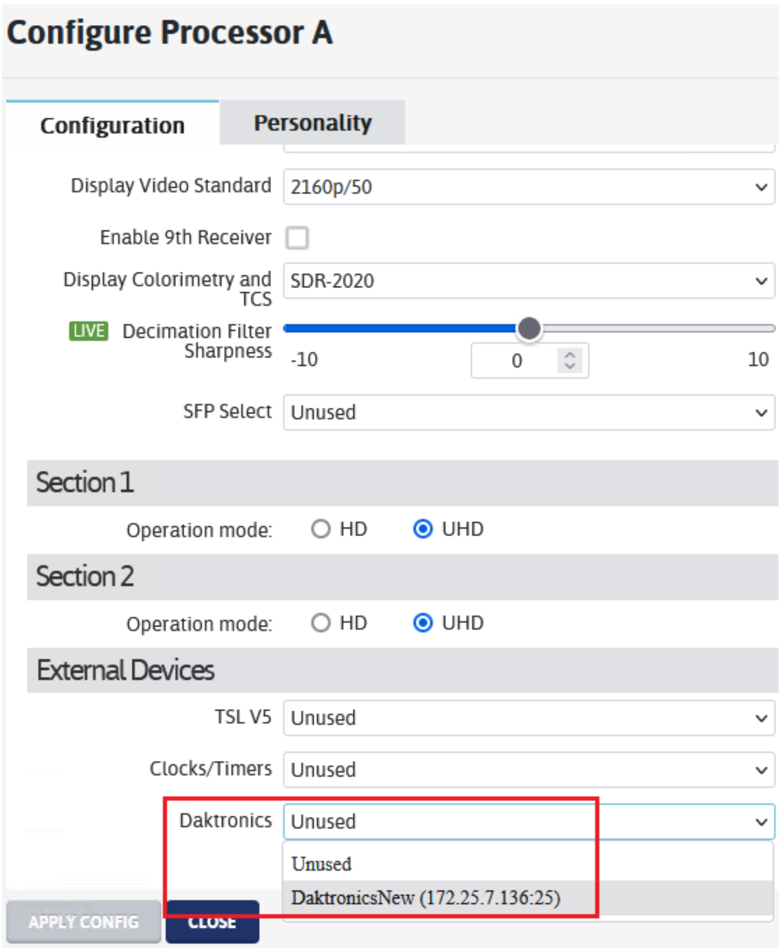
7. Enter the **IP Address** - enter the eBox's IP Address in this case, since SNP uses eBox as an intermediate device to communication with Daktronics.
8. Enter the **Port** - enter the eBox Port
9. Click **Submit**
10. The device is then displayed in the **Daktronics Devices** section, from where it can be edited or deleted by clicking the **Edit** or **Delete** button under **Actions.**



Assigning the Daktronics Device to a Multiviewer Processor

1. Go to a processor that has been set to **Multiviewer** (Base), or if this has not yet been done, set a Processor to the **Multiviewer** personality
2. Click **Edit** on the processor
3. In the **Configuration** tab, under **External Devices**, select the Daktronics device

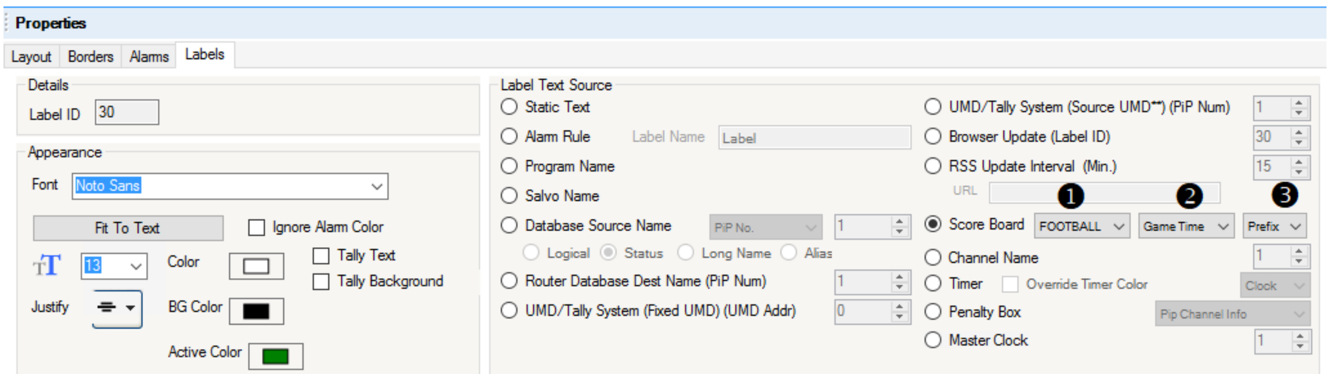


4. Click **Apply Config**

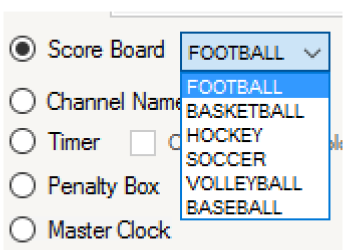
Creating a Layout for the Daktronics Device

Note: Layouts are created in the Layout Designer application. Daktronics Sports are supported using labels in Layout Designer.

1. Run the **Layout Designer**
2. Open your layout or create one if a layout does not exist
3. Insert a **label** into your layout (Insert > Label)
4. Select the label, and go to the **Labels** tab
5. Select the **Score Board** field. There are three options to set here:

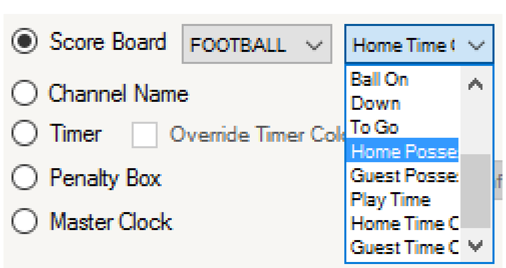


a. In the first dropdown, select the **Sport**. Select from Football, Hockey, and BasketBall.

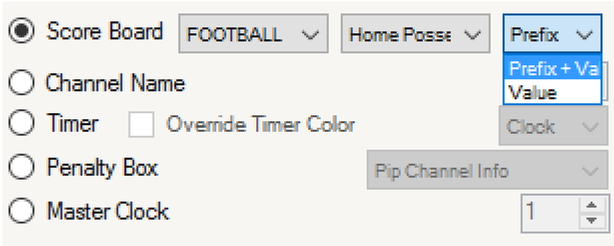


Note that in this release, only **Football**, **Hockey**, and **BasketBall** are functional options, even though a more extensive list is displayed.

b. In the second dropdown, select the Label Text. Commonly used display text is available for selection, and you can also define your own. See Sport Labels (on page 324) for a list of available text per sport.



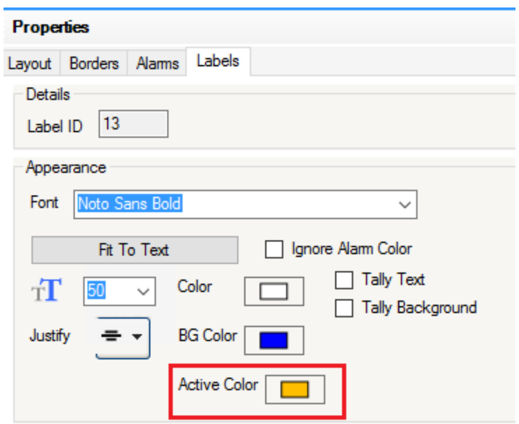
c. In the third dropdown, select whether to display just the value or the prefix+value on a label



For example, in the layout below, the blue boxes indicate prefix+value and the black boxes are value only.

6. Set the background and active colors on labels as desired.

If you change the active color, ensure it is legible on the background color.

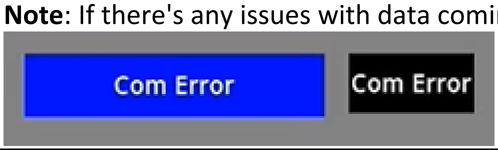


Note that the active color is used to indicate specific things, based on the sport:

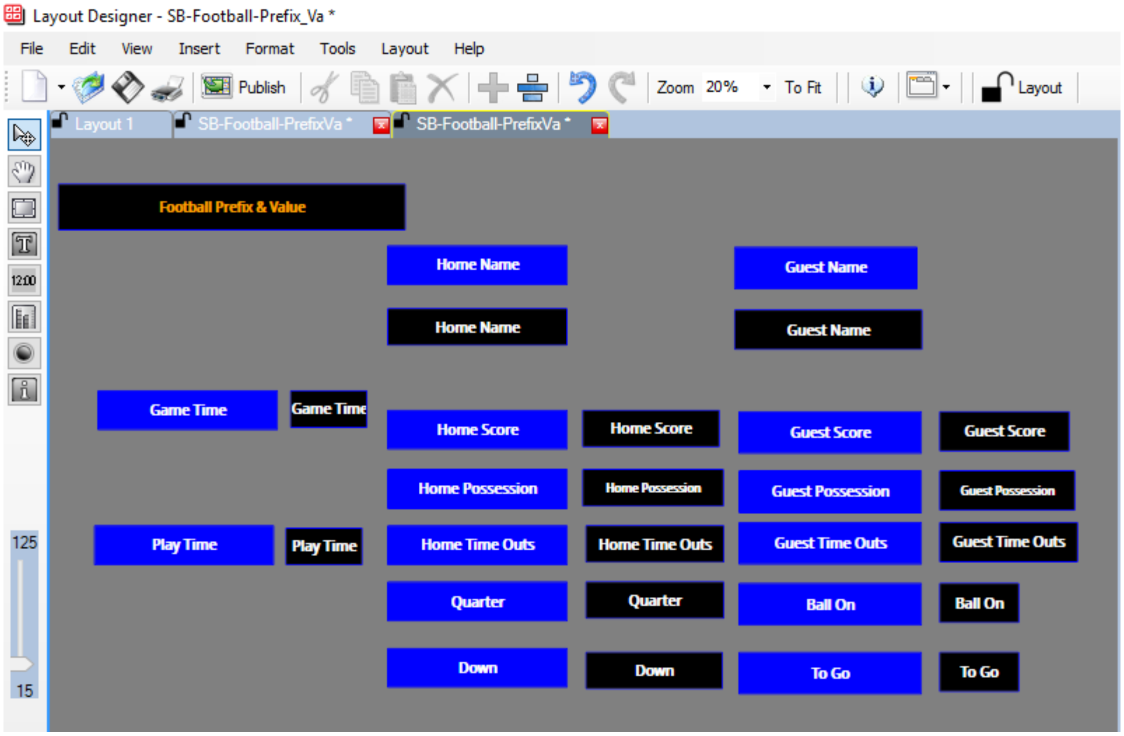
- **Football**: Active color indicates guest/home possession
- **Basketball**: Active color indicates game status
- **Hockey**: Active color indicates game status

7. Save and publish your layout
8. View the output to validate settings and to ensure everything works correctly.

Note: If there's any issues with data coming in, labels will display "COM ERROR".



Layout Examples



Football Layout Example

Basketball Layout Example

Sport Labels

The following is a list of labels available for different sports:

Labels for Football

Label	Description
Game Time	Game Clock Time
Home Name	Home Team Name
Guest Name	Guest Team Name
Home Score	Home Team Score
Guest Score	Guest Team Score
Quarter	Quarter
Ball On	Ball On
Down	Down
To Go	To Go
Home Possession	Home Possession Indicator
Guest Possession	Guest Possession Indicator
Play Time	Play Clock Time
Home Time Outs	Home Time Outs Left
Guest Time Outs	Guest Time Outs Left

Labels for Basketball

Label	Description
Game Time	Game Clock Time
Game Status	Game Clock Status
Shot Time	Shot Clock Time
Home Score	Home Team Score
Guest Score	Guest Team Score
Home Fouls	Home Team Fouls
Guest Fouls	Guest Team Fouls
Home T.O. Full	Home Time-Outs Left -Full
Home T.O. Partial	Home Time-Outs Left -Partial
Home Time Outs	Home Time-Outs Left -Total
Guest T.O. Full	Guest Time-Outs Left - Full
Guest T.O. Partial	Guest Time-Outs Left - Partial
Guest Time Outs	Guest Time-Outs Left - Total

Period	Period
Time Out	Time-Out Time

Labels for Hockey

Label	**Description**
Game Time	Game Clock Time
Game Status	Game Clock Status
Home Score	Home Team Score
Guest Score	Guest Team Score
Home Time Outs	Home Time Outs Left
Guest Time Outs	Guest Time Outs Left
Home S.O.G.	Home Shots On Goal
Guest S.O.G.	Guest Shots On Goal
Period	Period
H. Penalty #1 Player	Home Penalty #1 - Player Number
H. Penalty #1 Time	Home Penalty #1 - Player Time
H. Penalty #2 Player	Home Penalty # 2 - Player Number
H. Penalty #2 Time	Home Penalty #2 - Player Time
G. Penalty #1 Player	Guest Penalty #1 - Player Number
G.Penalty #1 Time	Guest Penalty #1 - Player Time
G. Penalty #2 Player	Guest Penalty #2 - Player Number
G. Penalty #2 Time	Guest Penalty #2 - Player Time

Support for VPID information into the ST2110-40 ancillary stream output

SNP now supports VPID insertion into 2110-40 output streams, and provides users with additional controls over how VPID information from incoming signals is used.

Note: Transmission of VPID within 2110-40 remains a topic of study and discussion, and as a matter of general design, Imagine recommends that systems should NOT depend on the VPID information in the 2110-40 stream. However, in order to be compatible with certain industry equipment which unwisely depends on the VPID of 2110-40 we have added this feature on the <ProductName's> output.

The design intent of the ST2110 standards is that the information of the SDP is prevalent and correct.

Since ST2110-20 streams are video only, ANC information, if any, is in one or more ST2110-40 streams. As an informative guide, any VPID received in ST2110-40 streams (program input) is detected and displayed on the SNP Program's **Input** tab under **Video Status**. See Configuring VPID (on page 327).

VPID is governed by the SDI standard, and encoding of VPID bytes differs based on the SDI standard. In **SDI** systems, the received VPID is used to determine the Video standard, colorimetry, TCS, and sometimes structural information about the incoming video.

In **ST2022-6** systems, the VPID from within the ST2022-6 stream remains vital and is used in a manner similar to the SDI VPID.

However, in **ST2110** systems, the relevant technical metadata about image structure and interpretation (colorimetry, TCS, frame rate, width, height, etc) are contained in the Session Description Protocol (SDP) object relayed through the control system. Some ST2110 systems mistakenly rely on the VPID from a related 2110-40 stream to carry TCS and/or colorimetry information. In order to accommodate these systems, SNP provides a mechanism to use the VPID information from a 2110-40 stream to override information from the SDP.

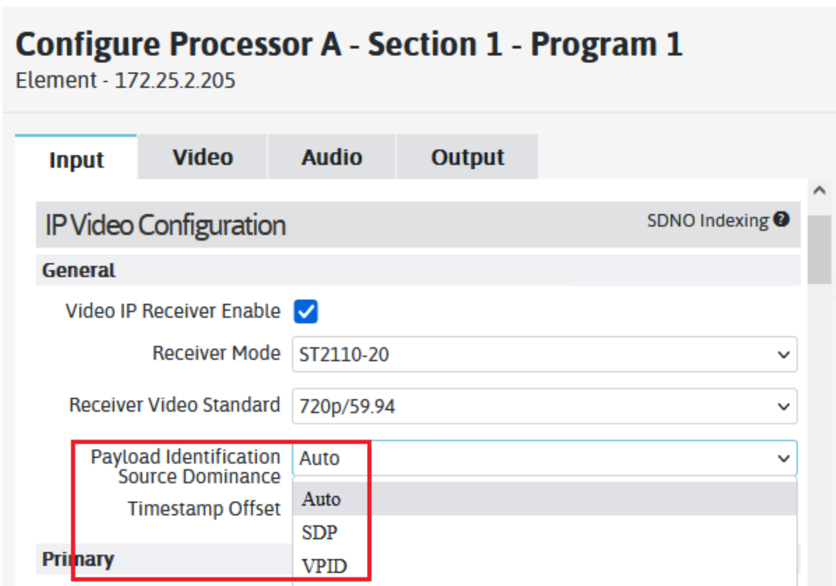
The table below summarizes the default behavior of SNP and how the related control can alter that behavior with respect to the VPID -vs- other controls and how they affect overall input signal determination.

Input Type	**VPID Handling**
SDI	If VPID is present, SNP extracts the VPID from the SDI. If there is no VPID, assumptions are made based on the clock rate and structure of the SDI.
ST2022-6	VPID (if available) is extracted from the encapsulated SDI. If there is no VPID, assumptions are made, similar to SDI. The Payload Information Source Dominance control can be used to cause information from the control system to override the VPID contents
ST2110	Does not contain VPID information in the ST2110-20 stream, however a VPID may be present in the ST2110-40 input stream. SNP provides a mechanism (not default operation) to use this VPID to override information provided through the control system via SDP.

Configuring VPID

In the **Input** tab, the **Payload Identification Source Dominance** parameter (IP Video Configuration section) allows for determining priority for determining Colorimetry and TCS. Select from:

- Auto
- SDP
- VPID



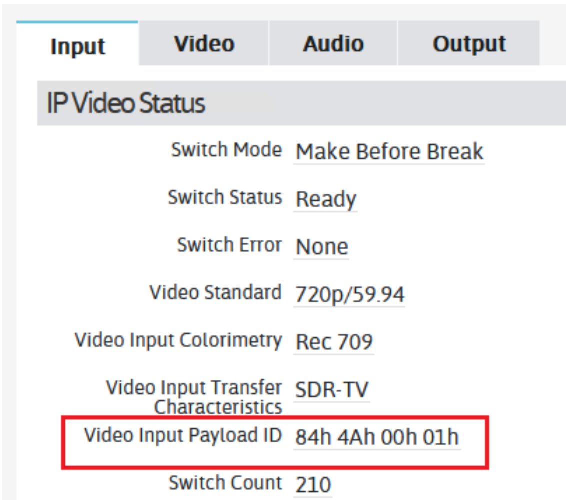
The following table describes how VPID dominance is determined:

Rx Mode	Auto	SDP	VPID
SDI	1. VPID 2. Internal Algorithm	1. VPID 2. Internal Algorithm	1. VPID 2. Internal Algorithm
ST2022-6	1. VPID 2. SDP 3. Internal Algorithm	1. SDP 2. VPID 3. Internal Algorithm	1. VPID 2. SDP 3. Internal Algorithm
ST2110-20/40	1. SDP 2. VPID 3. Internal Algorithm	1. SDP 2. VPID 3. Internal Algorithm	1. VPID 2. SDP 3. Internal Algorithm

The VANC filter settings for 2110-40 ancillary data streams have been updated to include the ability to select **Payload Identification** in the filter configurations. See Ancillary Data IP Filter (Remap and Sync modes) (on page 462) and Ancillary Data IP Filter (Conversion Mode) (on page 463).

VPID Status

The VPID received from the ANC data status is displayed in the Input tab > IP Video Status section > Video Input Payload ID parameter.



Source ID Processing

The SNP recognizes and processes ancillary packets in video signals, carried as a VANC packet in SDI. On the input side, if the input video contains a special identifier field (Source ID) in the ancillary packet, it is recognized and reported. On the output side, each SNP Program can be configured to process (pass/insert/override) the Source ID.

Personality Support

This functionality works as follows on various personalities:

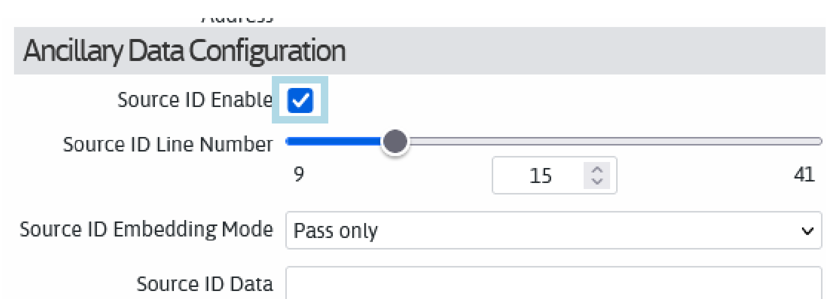
SYNC, REMAP, MCL, JPEG-XS, Conversion	Source ID is detected on the input, and passed from input to output. See Enabling Source ID in the Program Output (on page 329).
MultiViewer/MultiViewer Portrait	Source ID is captured and displayed on-PiP. For more details, see the *Layout Designer User Manual*.

Enabling Source ID in the Program Output

When enabled, the Source ID, if present in the incoming video is processed, and embedded into the SDI and/or 2022-6 output.

To enable Source ID processing:

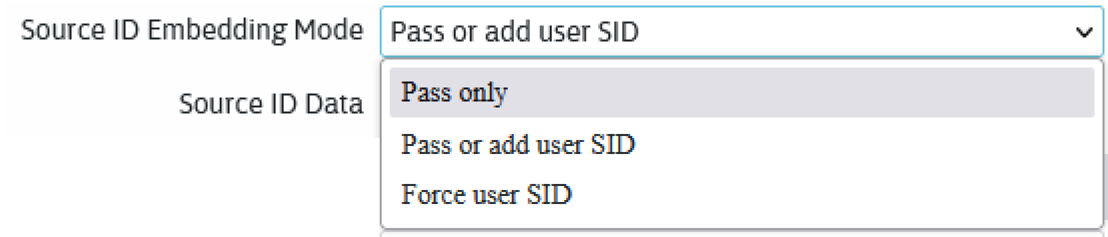
1. Go the Program's **Output t**ab
2. In the **Ancillary Data Configuration** section, set the following:



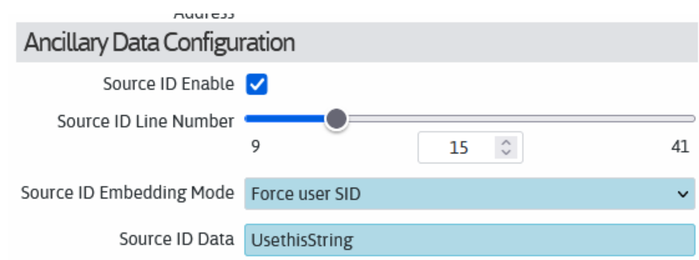
   a. Check the **Source ID Enable** checkbox. This enables processing/passing of the source ID from input to output OR inserting it if absent.
   b. In the **Source ID Line Number,** set the line on which the Source ID should be carried. The range depends on the Output standard, for example, in case of 1080p, the range is 9 to 41 and the default is 15.

Note: The Line number setting will be effective only if there is no input source ID packet already coming in on a specific line.

c. Select the **Source ID Embedding Mode.** Options include:



- **Pass only**: If present, the Source ID is passed through to the output. This is the default setting.
- **Pass or add User SID**: If present, Source ID is passed through to the output. If not present, the string in the Source ID Data field will be used.
- **Force User SID:** Source ID even if present, will be be overridden in the output by the string set in the **Source ID Data** field.

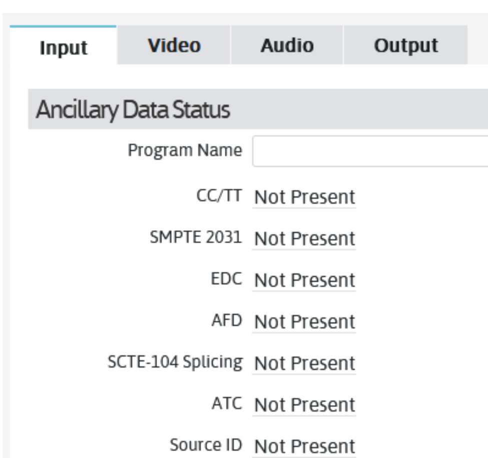


Note that the **Force User SID** setting replaces the contents of identifier text in the packet, and not the line number. The Line number set in the **Source ID Line Number** setting will be effective only if there is no input source ID packet coming in.

d. **Source ID Data**: The string entered here overrides any identifier text present in the packet OR inserts it if there no incoming Source ID.

Source ID Status

Any incoming Source ID is reported in a Program's **Input** tab, in the **Program Ancillary Data Status** section.

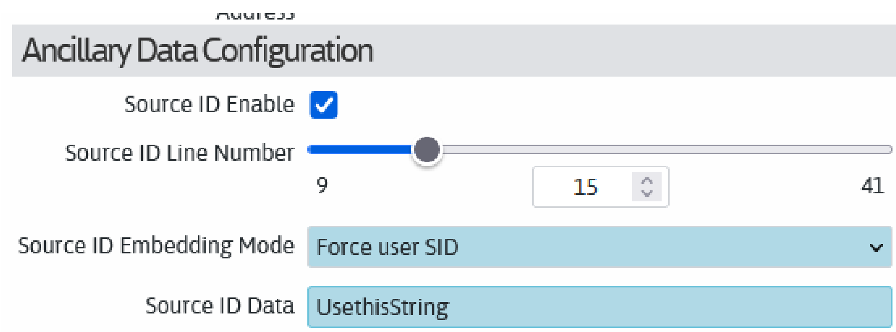


If the Source ID is not found, the Source ID field reports **Not Present**.

Overriding Source ID

Note: These instructions force the Source ID to a user inputted string, and Source ID present in the input (if any) will be replaced. The Source ID can be overridden on any personality other than on TR-07 and Multiviewer/Multiviewer Portrait.

1. Go to the Program's **Output** tab
2. In the **Ancillary Data Configuration** section, enable **Source ID Enable**
3. Set the **Source ID Embedding Mode** to **Force User ID**
4. In the **Source ID data** field, enter the string to be used



Using Magellan Control System with SNP

SNP requires Magellan Control System version 3.0 or higher.

Configure the SNP independently via the SNP Manager UI. Specific SNP settings that the Magellan Control System requires are covered here.

Note: Magellan Control System only supports multicast routing.

For the purposes of the Magellan Control System, an SNP transmitter channel is a source, because it is receiving SDI and its output is IP. An SNP receiver channel is a destination, because it is receiving IP and its output is SDI.

Magellan Control System 2.6 and up support reading and setting source addresses for SNP. This functionality is useful when using Source Specific Multicast as the method of routing multicast signals; for example, if you have SNP in your Magellan Control System, you can now route their signals via Magellan Control System in an SSM environment.

As of Magellan Control System 2.5, the source address is read from the transmitting device and written/populated onto the receiving device channel that corresponds with the multicast group being requested. When a Take operation is performed, the Primary Mcast Src 2 address is set to the transmitter's secondary stream source address and the Secondary Mcast Src 2 address is set to 0.0.0.0 .

Also see Selenio™ Network Processor Devices (on page 333)

Selenio™ Network Processor Devices

The SNP integrates with the Selenio Network Processor (SNP), and can process inputs from the SNP (sources in the SNP) as well as push outputs to it (destinations in the SNP).

If you have **Selenio™ Network Processor** (SNP) Devices in your SDNO:

1. Configure the Selenio™ Network Processor independently, following the instructions in the Selenio™ Network Processor documentation
2. Define a Logical Template that has the required signals (Video/Audio/Data) or use an existing one. See Creating a Logical Template for your SNP Sources/Destinations (on page 334)
3. Add the Selenio™ Network Processor as an Endpoint Device. See Adding a Selenio Network Processor Device (on page 336)
4. Set up your Sources/Destinations. See Sources and Destinations for SNP

Also see:

- SDNO Routing Database Editor Configuration Summary (on page 341)
- Configuring for Switching (on page 342)
- Configuring Magellan Control System for Multiviewer Mode (on page 343)
- Configuration Examples (on page 344)

Special Note for SNP

Transmitters in SNP correspond to Sources in the SNP, and Receivers in the SNP correspond to Destinations in the SNP.

The **SNP setup** must be as follows in order to be correctly recognized by the SNP:

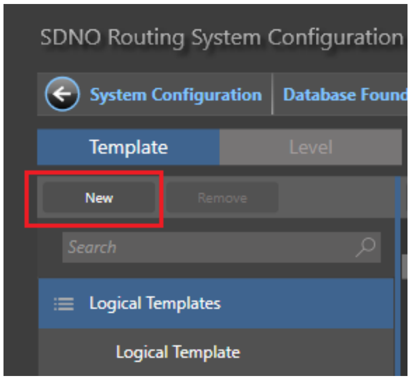
- For **Sources**: *Input Mode* should be set to *SDI* (which defines the section as a *transmitter*)
  - For **Video**: Ensure that *Video IP Transmitter Enable* (in the Output tab) is enabled
  - For **Audio**: Ensure that *Audio IP Transmitter Enable* (in the *Output* tab) is enabled
  - For **Data**: Ensure that *ANC Data IP Transmitter Enable* (in the *Output* tab) is enabled

- For **Destinations**: *Input Mode* should be set to *IP* (which defines the section as a *receiver*)
  - For **Video**: Ensure that *Video IP Receiver Enable* (in the *Input* tab) is enabled
  - For **Audio**: Ensure that *Audio IP Receiver Enable* (in the *Input* tab) is enabled
  - For **Data**: Ensure that *ANC Data IP Receiver Enable* (in the *Input* tab) is enabled

Note: To avoid multicast stream over-subscription, when defining your logical templates, configure your UHD stream sources and destinations on a different level from your HD/3G sources and destinations. This will prevent SNP from routing UHD IP steams to a HD receiver channel (or vice versa), which could cause network over-subscription problems.

Creating a Logical Template for your SNP Sources/Destinations

1. Go to the **Logical Templates Editor** (Database Foundry > Logical Templates Editor).
2. Click the **New** button to create a logical template in the Logical Templates pane.

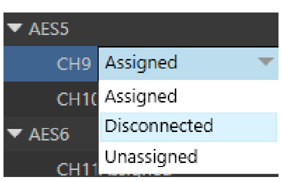


3. Go to the **Add Signal Template** on the right of the Editor and do the following:
   a. Select the *number* of (signal) instances to add
   b. Select if this is a *DA signal*
   c. Select the Signal *Type* (HD Video, HD Embedded, etc.)
   d. Select the number of *Audio Channels* (if applicable)
   e. Select whether to *break away audio* or do a *mono breakaway* (if applicable)
   f. Select the *level* to start at
   g. Click the *Add to Selected Logical Template* button
4. Repeat to add any additional signals to the logical template

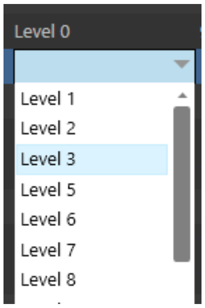
Note: To avoid multicast stream over-subscription, configure your UHD stream sources and destinations on a different level from your HD/3G sources and destinations. This will prevent SNP from routing UHD IP steams to a HD receiver channel (or vice versa).

When a transmitter changes between HD and UHD video (e.g. SNP), you should also change the IP address. To simplify the process, consider configuring a preset to perform the switch, instead of changing multiple parameters manually at the same time.

5. In the middle (Logical Template Details) pane, make any required changes:
   a. You can change the *Route Type* for a signal - from Assigned to Disconnected or Unassigned



b. You can change *Levels* as required

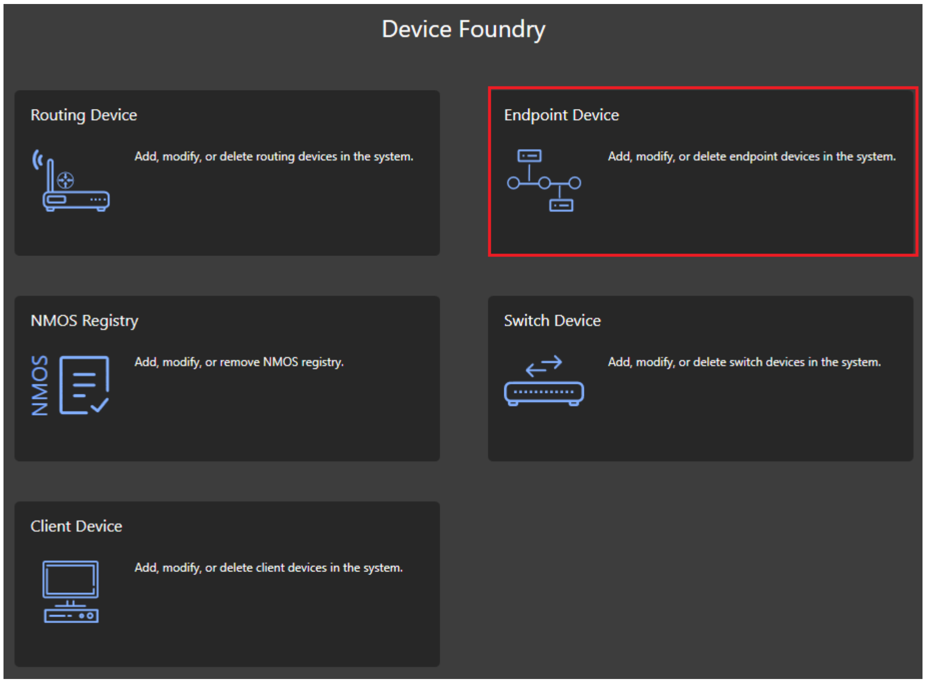


c. You can *link* signals (see Linking Signal Templates)

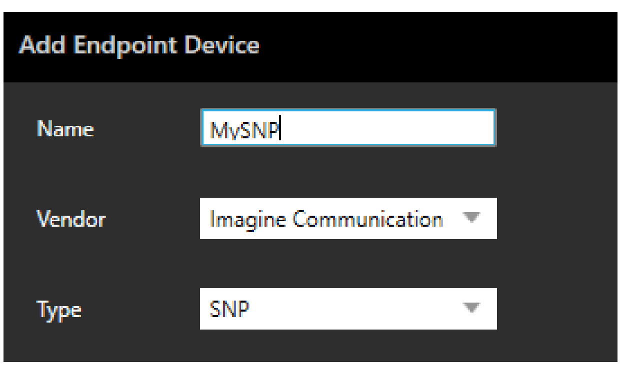
6. Click **Save** when done

Adding a Selenio Network Processor Device

1. Go to **System Configuration > Device Foundry > Endpoint Device**

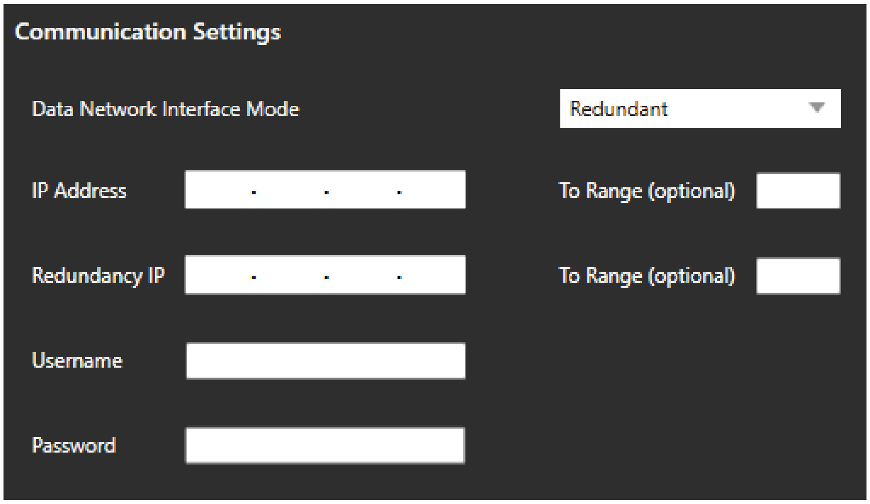


2. Click the **Add Device** button
3. In the **Add Endpoint Device** dialog, enter the following:
   - **Name**: Enter a label for the device
   - **Vendor:** Select Imagine Communications
   - **Type:** Select SNP



   - **IP Address**: Enter the IP Address
   - **Redundancy IP**: Enter a redundant IP Address (if applicable)

- **To Range:** For IP Address and Redundancy IP, optionally specify a To Range - if adding devices with sequential IP addresses, can bulk add a range of addresses in one go by entering the last octet in the To Range field.



- **Username** (optional): Enter the username
- **Password** (optional): Enter the password

Note: Providing user credentials to access the SNP device is optional, but it is required if you intend to use the System Snapshot utility to capture or restore system configuration (that includes the SNP device). Provide an Administrator/Operator credential here to ensure full SNP device configuration can be saved and restored. Snapshot capture or restore for the SNP device will fail if the user credential is not provided. See Capturing Selenio Network Processor Devices.

4. Click **OK** to add the device

Sources and Destinations from SNP Devices

Once your Selenio Network Processor device has been independently configured and set up as an endpoint device, source/destination definition is done via the Database Foundry.

Note: You need one or more logical template definitions before using the Database Foundry to add sources/destinations.

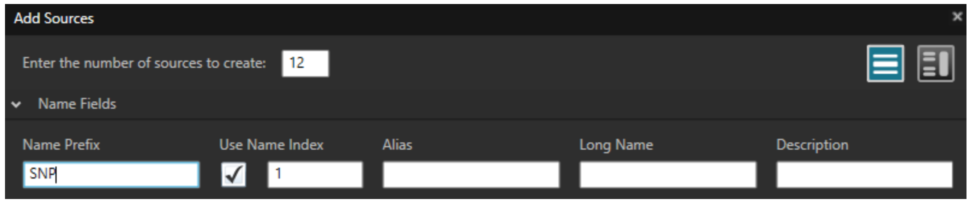
See Adding Sources and Destinations for the SNP (on page 338)

Adding Sources and Destinations for the SNP

<table>
<tr><th colspan="2">ADD SOURCES/DESTINATIONS</th></tr>
<tr><td>

- Go to the **Sources** or **Destinations** tab in the Database Editor
- Click the **Add** button
- Enter **number** of Sources/Destinations to create
- Enter a **Name**, **Alias**, **Long Name**, **Description**, and select whether to **Use Name Index**.

</td><td>



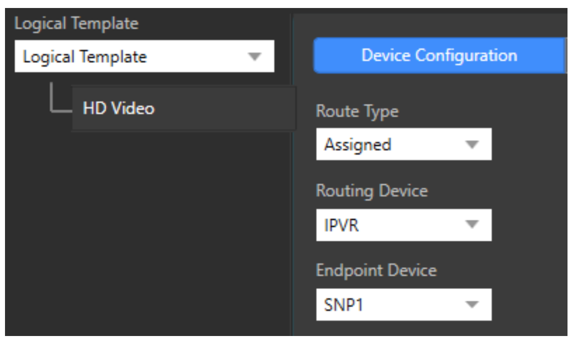
</td></tr>
<tr><th colspan="2">SELECT ROUTING DEVICE/ENDPOINT DEVICE/LOGICAL TEMPLATE</th></tr>
<tr><td>

Select the appropriate **Logical Template.**

In the **Routing Device** drop-down, select the IPVR frame/device set up for the SNP.

In the **Endpoint Device** drop-down, select the SNP Endpoint device.

</td><td>

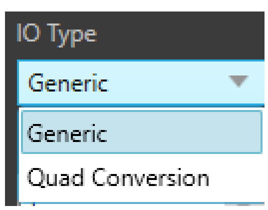


</td></tr>
<tr><th colspan="2">SELECT IO TYPE</th></tr>
<tr><td>

Once you select an SNP endpoint device, the IO Type dropdown is displayed. Select from:

- **Generic:** Use this to define your own settings within the available ranges
- **Quad Conversion**: Select if you SNP is in Quad Conversion mode

</td><td>

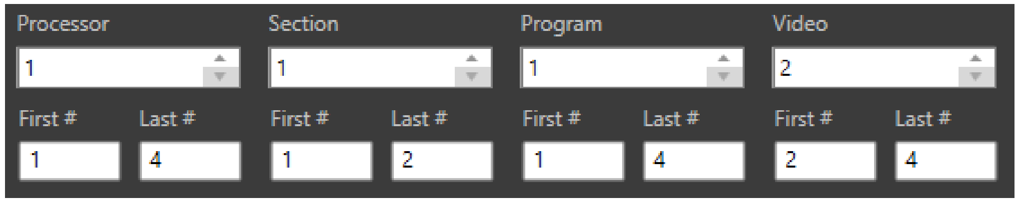


</td></tr>
<tr><th colspan="2">SELECT IO TYPE</th></tr>
</table>

<table>
<tr>
<td>Enter the following for Video Channels:

Processor: A, B, C, D on the SNP map to 1, 2, 3, 4 on the SNP
Section: Enter 1 or 2 depending on your SNP configuration
Program: Enter the starting program index
Video/Audio/Data: Enter the SNP index:

2 = HD/3G
3 = UHD
4 = Proxy

First# and Last#: The first and last fields determine the index advancing range. There are default values for these fields, but you can change them.
</td>
<td>
</td>
</tr>
<tr>
<td colspan="2">SAVE</td>
</tr>
<tr>
<td>Once complete, save changes and close the Database Editor. See Final Steps (on page 339)</td>
<td></td>
</tr>
</table>

Final Steps

1. **Publish** your database.
2. To check that your routing is correct,
   a. On the SNP Manager, select a **Processor**, **Section**, and **Program**, and click to open the **Configuration** window. On the x tab, scroll down to the Status section.
   b. On the SNP **Soft Panel**, and with the SNP Manager open, select a source and a destination and Take.
   c. In the SNP Manager, the status updates to recognize the change.

   You can also view the SNP monitor output to view the change.

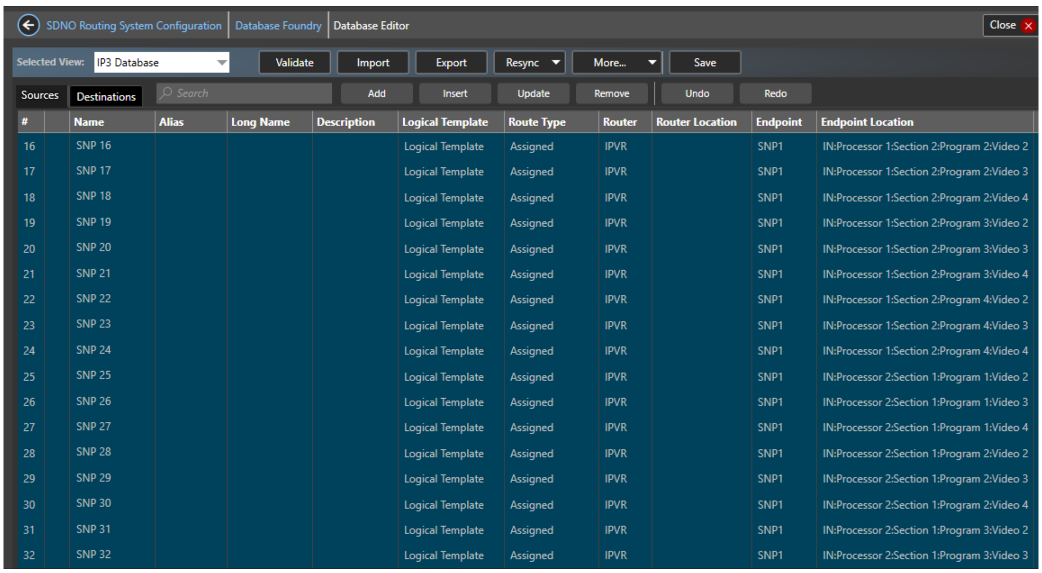
Note: When routing from one source to multiple destinations in one operation on the same processor from the control panel, routing is processed sequentially. It can take a few seconds for the operation to complete.

Bulk Adding/Updating Sources/Destinations for Selenio Network Processor

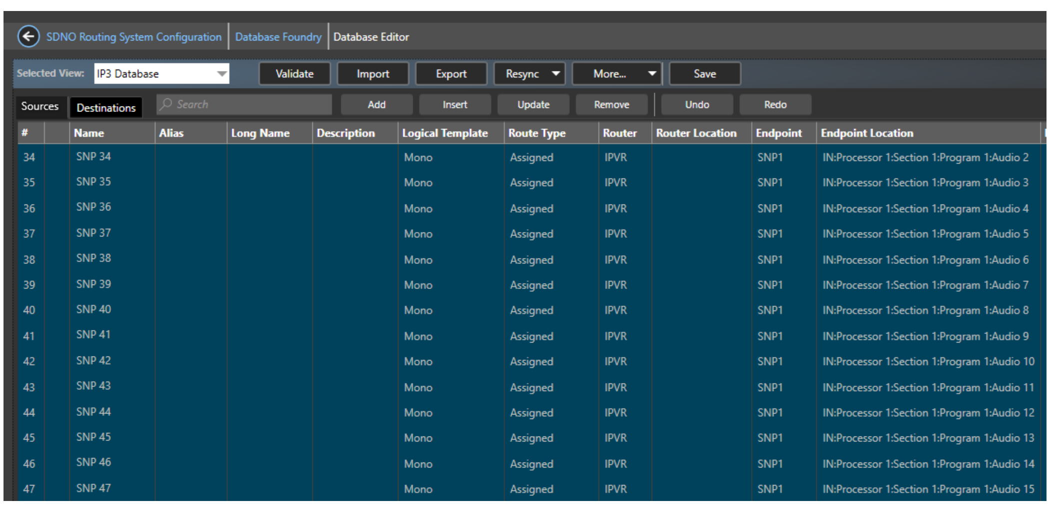
When adding sources/destination for the Selenio Network Processor, it is recommended you add all the audio sources at the same time, then the video sources, and then do the same thing for the destinations. The benefit of doing it this way is you can bulk add up to 32 video channels and 512 audio channels, which will then be present sequentially in the Database Editor. Any updates can also easily be done in bulk since the entries will be sequential.

For example, you can configure your SNP in four easy steps:

1. Go to the **Sources** Tab. Click the **Add** button and choose to add as many video sources as required (up to 32)

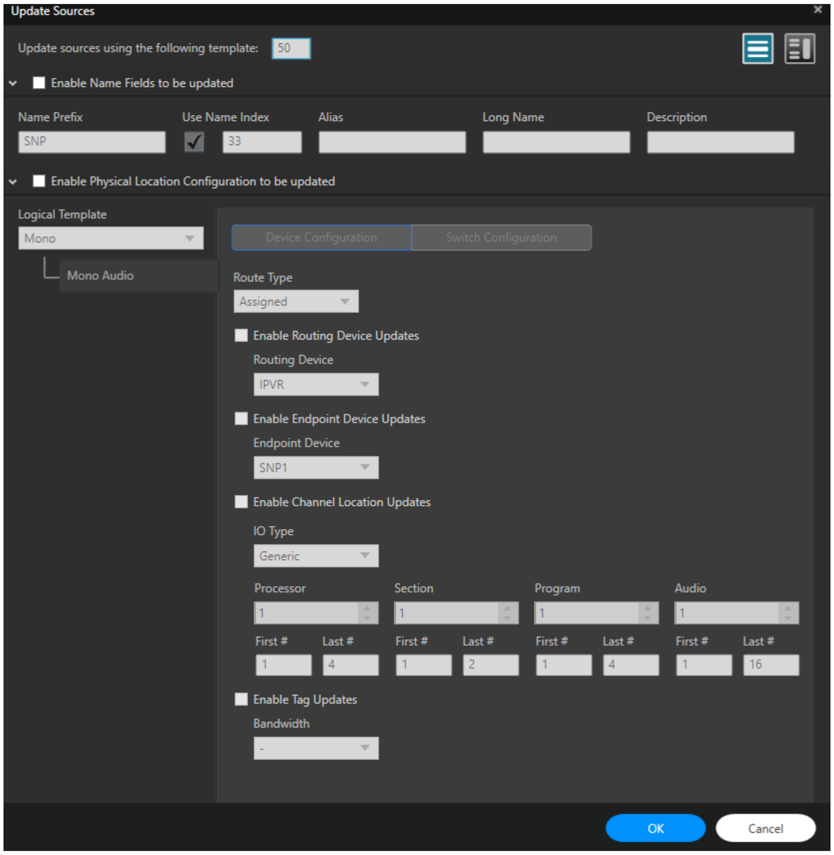


2. Next, choose to add add as many audio sources as required (up to 512)



3. Go to the **Destinations** tab and create your **audio** destinations and your **video** destinations

4. When you need to update, bulk select the **audio** or **video sources/destinations** and click the **Update** button



SDNO Routing Database Editor Configuration Summary

SNP Video Channel configuration			SDNO Router DB configuration		
Personality	**Tx/Rx**	**Channel Type**	**Direction**	**CH Indexing**	**SDNO Database Editor Configuration**
Sync	SDI In, IP Out	HD/3G	Source	2	Configure HD video source, video CH Index = 2
	SDI In, IP Out	UHD	Source	3	Configure HD video source, video CH Index = 3
	SDI In, IP Out	Proxy	Source	4	Configure HD video source, video CH Index = 4
	IP In, SDI Out	HD/3G	Destination	2	Configure HD video destination, video CH Index = 2
	IP In, SDI Out	UHD	Destination	3	Configure HD video destination, video CH Index = 3
	IP In, SDI Out	Proxy	Source	4	Configure HD video source, video CH Index = 4
	IP In, IP Out	HD/3G	Source	2	Configure HD video source, video CH Index = 2
	IP In, IP Out	UHD	Source	3	Configure HD video source, video CH Index = 3
Remap	SDI In, IP Out	UHD	Source	3	Configure HD video source, video CH Index = 3
	SDI In, IP Out	Proxy	Source	4	Configure HD video source, video CH Index = 4
	IP In, SDI Out	UHD	Destination	3	Configure HD video destination, video CH Index = 3

SNP Video Channel configuration			SDNO Router DB configuration		
Personality	**Tx/Rx**	**Channel Type**	**Direction**	**CH Indexing**	**SDNO Database Editor Configuration**
	IP In, SDI Out	Proxy	Source	4	Configure HD video source, video CH Index = 4
Conversion	SDI In, IP Out	HD/3G or UHD	Source	2, 3	Configure 2 HD video sources for this program, one video CH Index = 2, one video CH Index = 3
	SDI In, IP Out	Proxy	Source	4	Configure HD video source, video CH Index = 4
	IP In, SDI Out	HD/3G or UHD	Destination	2, 3	Configure 2 HD video destinations for this program, one video CH Index = 2, one video CH Index = 3
	IP In, SDI Out	Proxy	Source	4	Configure HD video source, video CH Index = 4
	IP In, IP Out	HD/3G or UHD	Source	3	Configure 2 HD video sources for this program, one video CH Index = 2, one video CH Index = 3

Configuring for Switching

Note: To avoid multicast stream over-subscription, configure your UHD stream sources and destinations on a different level as the HD/3G sources and destinations. This will prevent Magellan Control System from routing UHD IP steams to a HD receiver channel.

SNP does not support clean switch between two different audio types, for example switching between sources with stereo and monitor audio. Quiet switching, which mutes down, then switches, then unmutes, can switch between various types of audio.

The Conversion personality supports both HD and UHD sources and destinations at the same time. The last one used will be the one that is updated on the soft panel control.

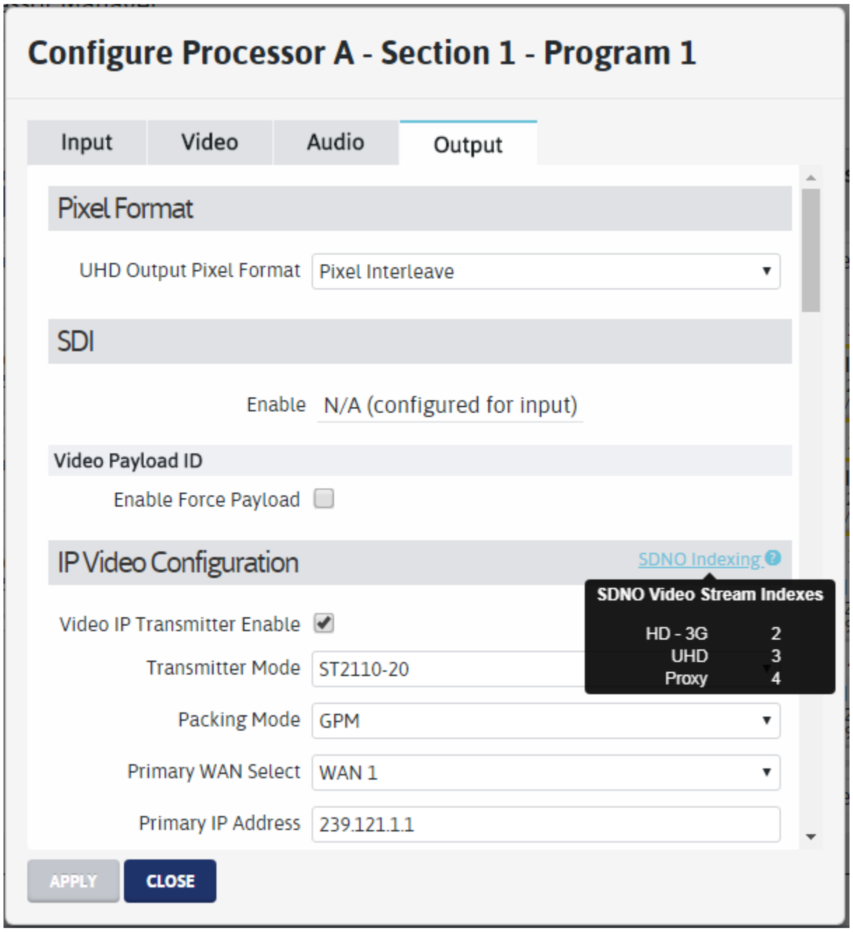
Note: If you switch to an empty multicast stream, the output video will freeze or go to black depending on the setting for the Loss of Video (LOV) mode parameter. If it is set to freeze, the previous stream's content will not be preserved.

Magellan Control System Indexing

Programs in the SNP Manager GUI are indexed 1 to 4 per section. A popup lists the Magellan Control System video stream indexes for the different types of video streams (3G, UHD, and Proxy) in the header for each of the following sections:

- IP video Rx
- IP video Tx (as below)

- IP proxy Tx

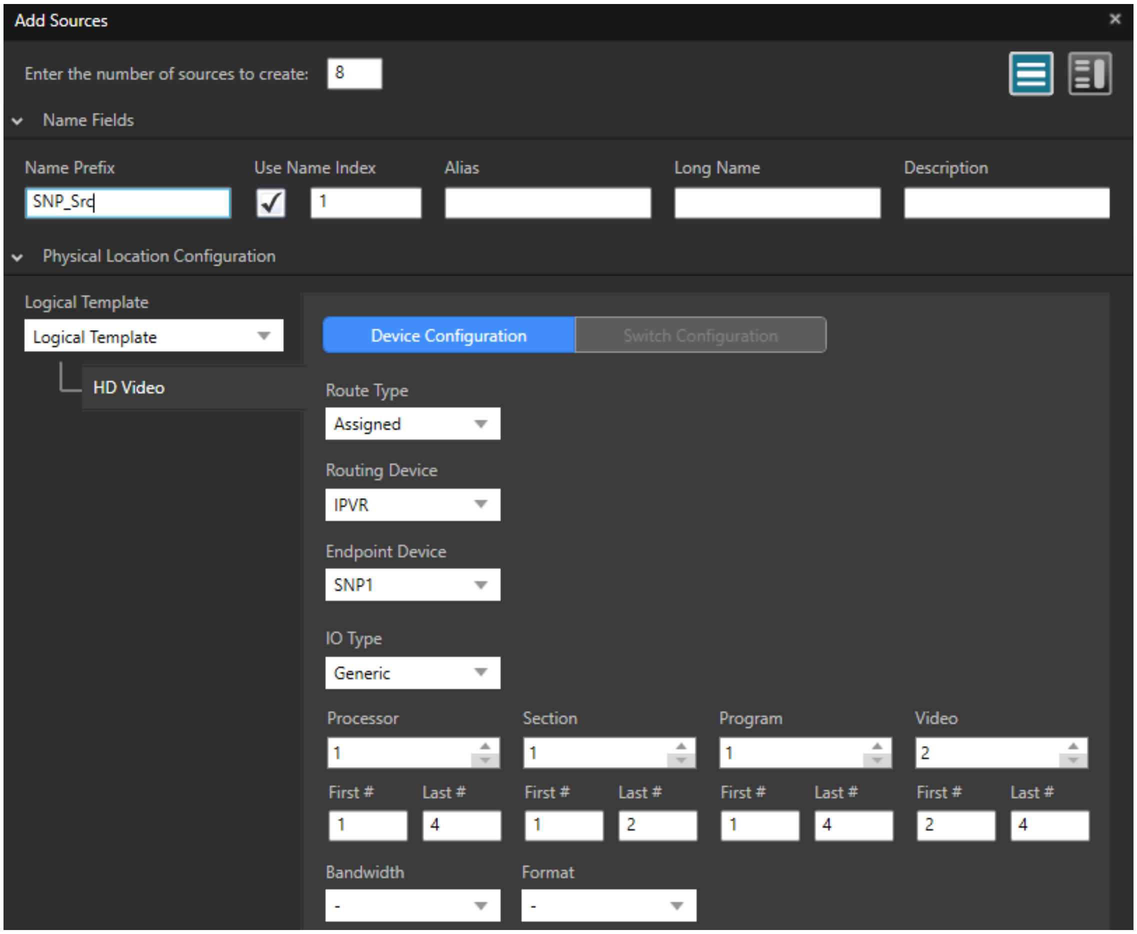


Configuring Magellan Control System for Multiviewer Mode

SNP-MV destinations in Magellan Control System are associated with the Base processor of the multiviewer. Even the inputs of the Extended processors are associated with the Base processor when building the SNP database for SNP-MV. Where the other SNP personalities have Sections, the multiviewer uses the Section address to refer to a display. In a fully extended (Base plus three Extensions) SNP-MV, the Magellan Control System would have entries for [processor 1, section/display 1, program 1] through [1, 1, 36] and then also similar entries for [1, 2, 1] through [1, 2, 36]. Magellan Control System will only allow routes to PiPs that are active on the display - so if all 24 PiPs are on display 1, and 12 on display 2, then the destinations associated with the others will not accept routes. This dynamically changes as different layouts with different numbers of PiPs are loaded.

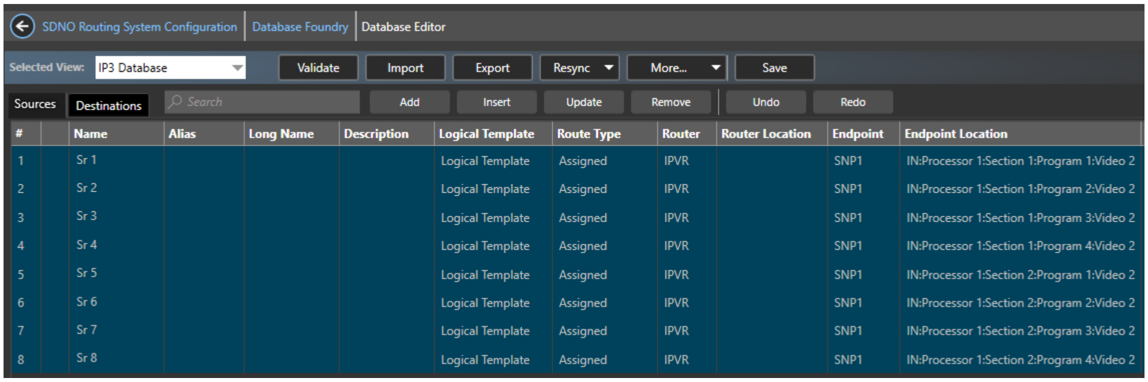
Configuration Examples

Example 1: Configuring SNP Processor A in HD Mode



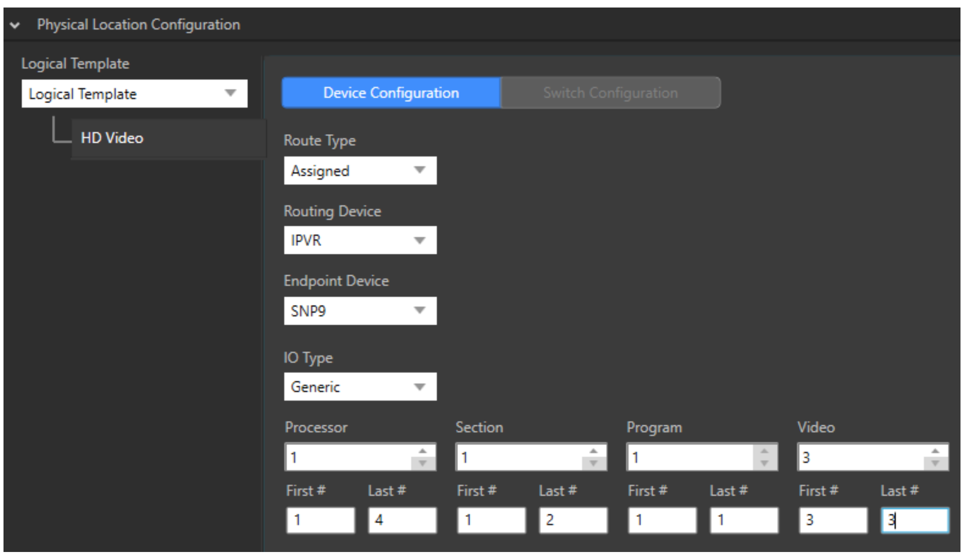
1. Create an **HD Video** logical template
2. In the Database Editor, click **Add Sources**
3. Enter number of sources to create as **8** (corresponding to 8 HD channels in the SNP processor)
4. Enter **Processor=1** (leave First# and Last# default settings - 1 and 4)
5. Enter **Section=1** (leave First# and Last# default settings - 1 and 2)
6. Enter **Programs=1** (leave First# and Last# default settings - 1 and 4)
7. Enter **Video=2** (set First# and Last# to 2 and 2)
8. Click OK

This creates 8 (1.5G or 3G) sources on Processor A - 4 for Section 1 (Programs 1-4) and 4 for Section 2 (Programs 1-4)



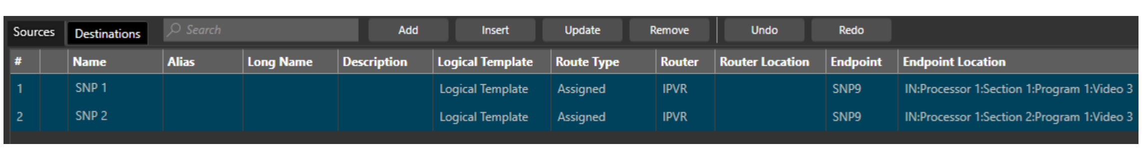
#		Name	Alias	Long Name	Description	Logical Template	Route Type	Router	Router Location	Endpoint	Endpoint Location
1		Sr 1				Logical Template	Assigned	IPVR		SNP1	IN:Processor 1:Section 1:Program 1:Video 2
2		Sr 2				Logical Template	Assigned	IPVR		SNP1	IN:Processor 1:Section 1:Program 2:Video 2
3		Sr 3				Logical Template	Assigned	IPVR		SNP1	IN:Processor 1:Section 1:Program 3:Video 2
4		Sr 4				Logical Template	Assigned	IPVR		SNP1	IN:Processor 1:Section 1:Program 4:Video 2
5		Sr 5				Logical Template	Assigned	IPVR		SNP1	IN:Processor 1:Section 2:Program 1:Video 2
6		Sr 6				Logical Template	Assigned	IPVR		SNP1	IN:Processor 1:Section 2:Program 2:Video 2
7		Sr 7				Logical Template	Assigned	IPVR		SNP1	IN:Processor 1:Section 2:Program 3:Video 2
8		Sr 8				Logical Template	Assigned	IPVR		SNP1	IN:Processor 1:Section 2:Program 4:Video 2

Example 2: Configuring SNP Processor A in UHD Mode



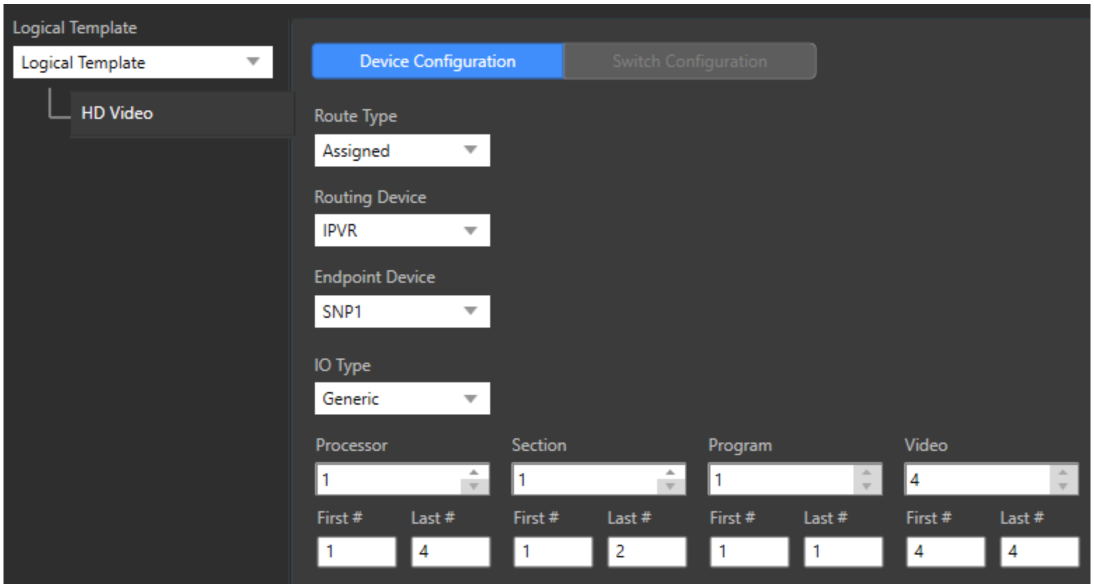
1. Create an **HD Video** logical template
2. In the Database Editor, click **Add Sources**
3. Enter number of sources to create as **2** (when configured as UHD, there are 2 channels in SNP)
4. Enter **Processor=1** (leave First# and Last# default settings - 1 and 4)
5. Enter **Section=1** (leave First# and Last# default settings - 1 and 2)
6. Enter **Programs=1** (set First# and Last# to 1 and 1)
7. Enter **Video=3** (set First# and Last# to 3 and 3)
8. Click **Add Rows**

This creates 2 UHD sources on Processor A - one for Section 1 and one for Section 2



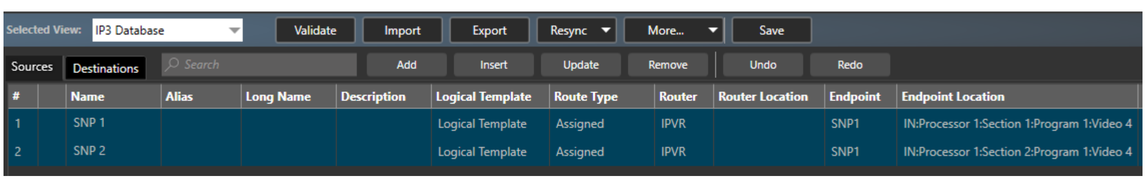
#		Name	Alias	Long Name	Description	Logical Template	Route Type	Router	Router Location	Endpoint	Endpoint Location
1		SNP 1				Logical Template	Assigned	IPVR		SNP9	IN:Processor 1:Section 1:Program 1:Video 3
2		SNP 2				Logical Template	Assigned	IPVR		SNP9	IN:Processor 1:Section 2:Program 1:Video 3

Example 3: Configuring Proxy Video for UHD Channels on Processor A



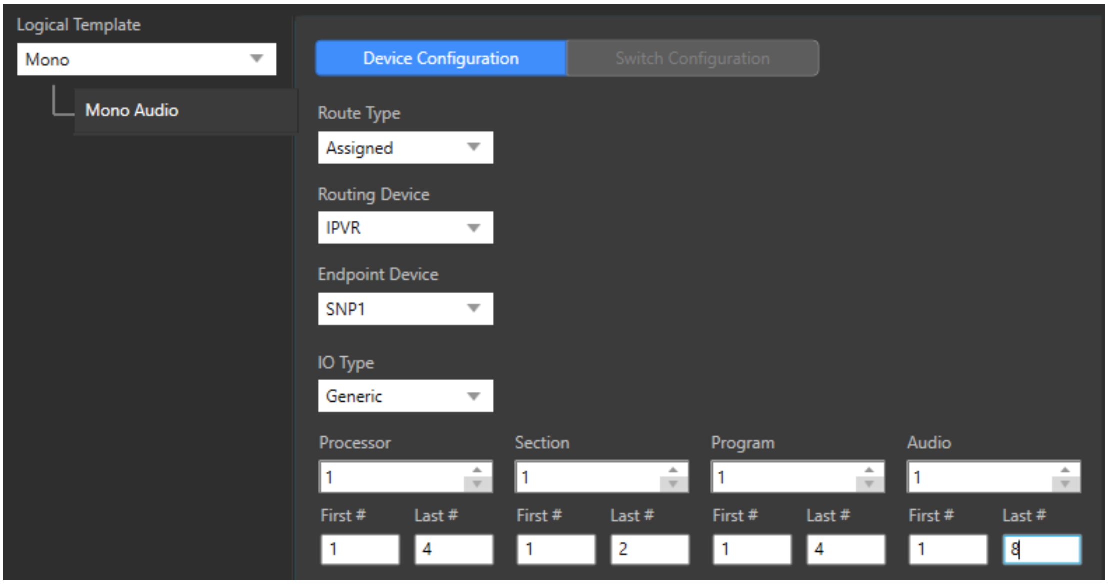
1. Create an **HD Video** logical template
2. In the Database Editor, click **Add Sources**
3. Enter number of sources to create as **2**
4. Enter **Processor=1** (leave First# and Last# default settings - 1 and 4)
5. Enter **Section=1** (leave First# and Last# default settings - 1 and 2)
6. Enter **Programs=1** (set First# and Last# to 1 and 1)
7. Enter **Video=4** (set First# and Last# to 4 and 4)
8. Click **Add Rows**

This creates 2 proxy video sources on Processor A - one for Section 1 and one for Section 2.



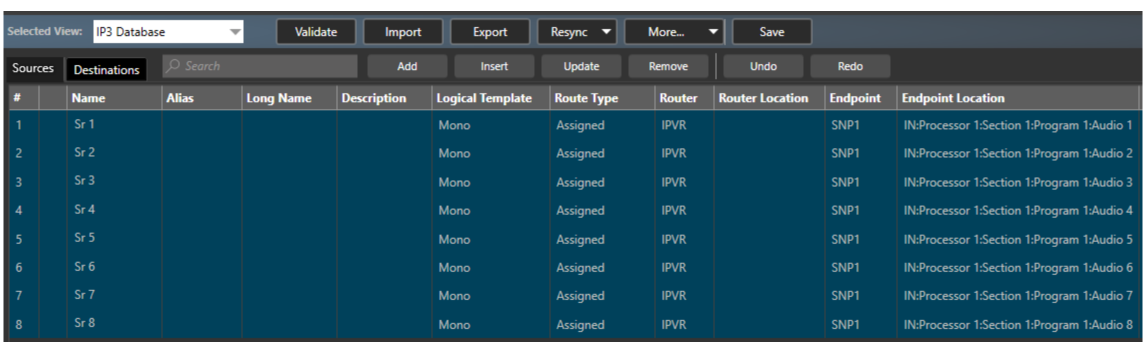
#		Name	Alias	Long Name	Description	Logical Template	Route Type	Router	Router Location	Endpoint	Endpoint Location
1		SNP 1				Logical Template	Assigned	IPVR		SNP1	IN:Processor 1:Section 1:Program 1:Video 4
2		SNP 2				Logical Template	Assigned	IPVR		SNP1	IN:Processor 1:Section 2:Program 1:Video 4

Example 4: Configuring 8 Mono Audio Channels on Processor A (Section 1, Program 1)



1. Create a logical template with **Mono Audio**
2. In the Database Editor, click **Add Sources**
3. Enter the required number of sources
4. Enter **Processor=1** (leave First# and Last# default settings - 1 and 4)
5. Enter **Section=1** (leave First# and Last# default settings - 1 and 2)
6. Enter **Programs=1** (leave First# and Last# default settings - 1 and 4)
7. Enter **Audio=1** (set First# to 1 Last# to 8)
8. Click **Add Rows**

Audio sources are added per your definition. In this example, we have 8 audio sources (Audio 1-8), all for Section 1, Program 1.

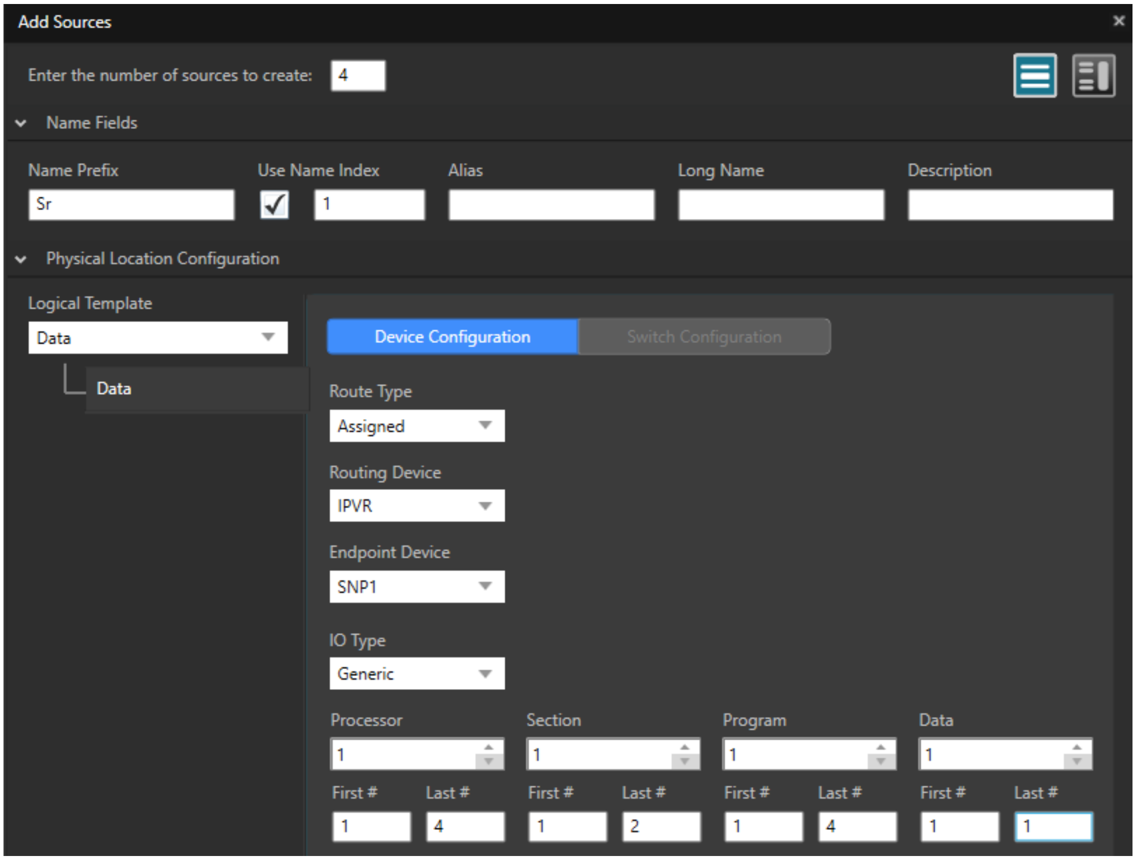


Selected View: IP3 Database | Validate | Import | Export | Resync | More... | Save

Sources | Destinations | Search | Add | Insert | Update | Remove | Undo | Redo

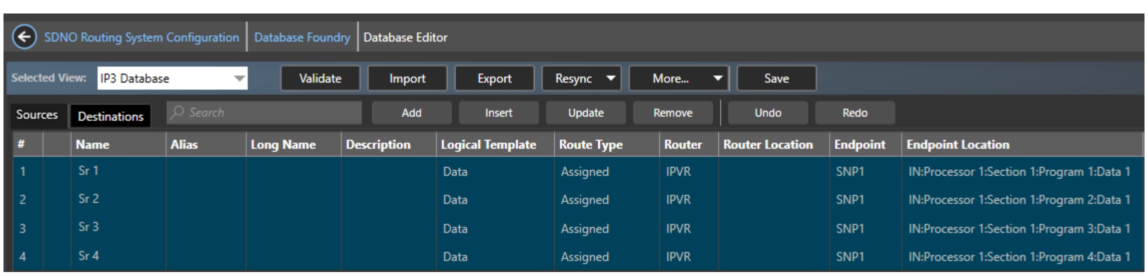
#		Name	Alias	Long Name	Description	Logical Template	Route Type	Router	Router Location	Endpoint	Endpoint Location
1		Sr 1				Mono	Assigned	IPVR		SNP1	IN:Processor 1:Section 1:Program 1:Audio 1
2		Sr 2				Mono	Assigned	IPVR		SNP1	IN:Processor 1:Section 1:Program 1:Audio 2
3		Sr 3				Mono	Assigned	IPVR		SNP1	IN:Processor 1:Section 1:Program 1:Audio 3
4		Sr 4				Mono	Assigned	IPVR		SNP1	IN:Processor 1:Section 1:Program 1:Audio 4
5		Sr 5				Mono	Assigned	IPVR		SNP1	IN:Processor 1:Section 1:Program 1:Audio 5
6		Sr 6				Mono	Assigned	IPVR		SNP1	IN:Processor 1:Section 1:Program 1:Audio 6
7		Sr 7				Mono	Assigned	IPVR		SNP1	IN:Processor 1:Section 1:Program 1:Audio 7
8		Sr 8				Mono	Assigned	IPVR		SNP1	IN:Processor 1:Section 1:Program 1:Audio 8

Example 5: Configuring Data for Processor A (Section 1)



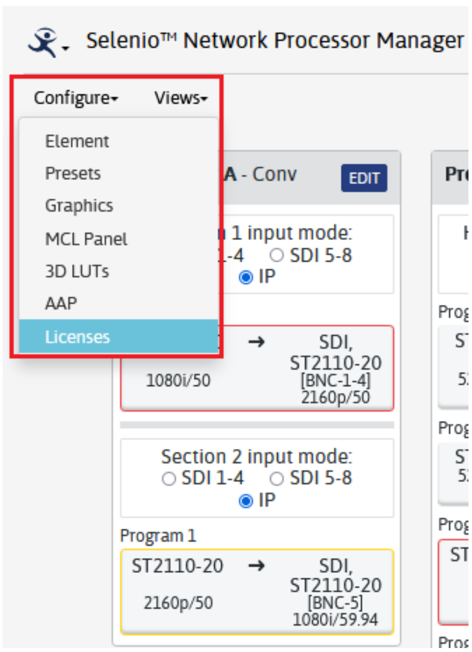
1. Create a logical template with **Data**
2. In the Database Editor, click **Add Sources**
3. Enter number of sources to create
4. Enter **Processor=1** (leave First# and Last# default settings - 1 and 4)
5. Enter **Section=1** (leave First# and Last# default settings - 1 and 2)
6. Enter **Programs=1** (leave First# and Last# default settings -1 and 4)
7. Enter **Data=1** (set First# and Last# to 1 and 1)
8. Click **Add Rows**

Data sources are added per your definition. In this example, we have 4 data sources, programs 1-4.



Configure Menu

In This Section



Configuring an Element

When using remote SNP Manager you can configure any SNP device connected to the SNP Manager. Select an SNP from the **Configure** menu (**Configure > Element**). The Element field displays the IP address of the device currently primed for configuration. You can switch devices by choosing from the drop-down menu. The menu displays all devices that have been Added to the remote SNP, but you can only select those devices that are currently connected and powered on.

Choosing this menu item from a local SNP Manager always opens the **Configuration** page for the local device, with the following tabs:

In this Section

Configuring Reference for SNP - Genlock

Genlock comes in and optionally loops through via two HD-BNC connectors; see item 7 in Back Panel (on page 49).

Configuration

Output Frame Rate	Currently supported options are **25/50 Hz** and **29/59 Hz**, with **25/50 Hz** as the default.
Genlock Sync Out Mode Select	Options are **Loop** and **Generator**. The default is **Loop**.

Click **Apply Genlock** for the changes to take effect. If you do not click **Apply Genlock** and click **Close** to navigate away from the page, your changes will be lost.

Status

GenLock Locked	Displays **Yes** or **No**.
Genlock Sync Input Present	Displays **Yes** or **No**.
Genlock Input Video Standard	Displays the standard, or **Unknown**.

Configuring Reference for SNP - PTP

Configuration

Having an inappropriate master can create strange network behavior for other devices.See Connecting to a PTP Source (on page 485).

Manual PTP Domain	The PTP domain number that the SNP will listen to. Choose a domain from 0 - 255 with a default of 127. Clocks that share a domain are synchronized to each other.
Announce Interval	The announce interval is 2 to the power of this value in seconds. For example, 0 is one second. The full range is -3 to 4, presented as follows: • 8 Hz(-3) • 4 Hz(-2) • 2 Hz(-1) • 1 Hz(0) • 0.5 Hz(+1) • 0.25 Hz(+2) • 0.125 Hz(+3) • 0.0625 Hz(+4) The default is 0. For the ST2059-2 profile, the range is -3 to +1

Manual Announce Receipt Timeout	The number of announce Intervals that have to pass, before declaring a timeout. The range is from 2 to 10, with a default of 3. The lower the value, the faster SNP will failover to a redundant master. Select a higher value for a stable clock regardless of network conditions. PTP Timeout = AnnounceReceiptTimeout * announceInterval (in seconds as defined above).
Network from master/boundary clock	Compensates the OWD based on the network configuration from the PTP master or boundary clock to the SNP. Options include: • 100M->1G->100G • 100M->100G • 1G->100G • 10G->100G • 100G->100G (default) *Note that the control makes an assumption based on how the switch normally behaves internally. Use the OWD Offset parameter (below) to manually compensate.*
OWD Offset (microseconds)	Enter a compensation value to adjust the OWD setting that comes from the Network From Master/Boundary Clock parameter (above). The range is from -1000 to 1000 microseconds, with a default of 0. See Connecting to a PTP Source (on page 485) for more information.
Negotiated PTP Unicast Interface	When configured for Negotiated Unicast, you must select the interface to receive timing data. Options are the four primary and four secondary IP WANs, with **IP WAN 1 Primary** as the default.
Negotiated PTP Unicast Master IP	When configured for negotiated Unicast, you must enter the IP address of the PTP master device.
PTP Unicast Mode	By default, SNP uses Multicast mode. To reduce network traffic, you can configure it to instead use Mixed or Unicast mode. When Negotiated Unicast (Unicast mode) is enabled, you must select a single source IP for the PTP data, and the specific IP WAN to receive it. In Non-Negotiated Unicast (Mixed mode), SNP will use the first one it finds exclusively. Options are: • Disabled (default) • Non-Negotiated Unicast • Negotiated Unicast

PTP Locking Mode	Options are: • **PTP Only:** System timing and frequency locking are based on ST 2059-1 signal in the IP network. Operating in this mode, due to the IP network and ST 2059-1 tolerances, you may see a few microseconds of wander on the SNP's SDI outputs. There is no operating impact of such wander in a modern SDI facility, as all receivers will be able to lock and track to such signals. However, if there is any concern then use another mode as described below. • **PTP with Black Assist:** This mode uses analog black reference input for the frequency locking and PTP for the time. Network time will be adjusted so outputs are 0 phased to analog black. If the external analog black is not zero phase-aligned to ST 2059-1, then PTP locking status will report unlocked. **If PTP is not present, SNP can still operate in this mode maintaining all outputs aligned to the analog black reference.**

PTP Mode	Options are:
	• Slave Only
	  • The SNP will be in Slave mode.
	• Master/Slave
	  • When a device is set to master/slave mode, it first determines if there is a master on any interface (including VLAN) that it should listen to by using the best master algorithm. Once it determines the best master on an interface, it becomes a slave on that interface. It becomes master if it is the best master.

Click **Apply PTP** for the changes to take effect. If you do not click **Apply PTP** and click **Close** to navigate away from the page, your changes will be lost.

PTP Master Parameters

The following are parameters that need to be set if your SNP is a Master (PTP Mode set to Master/Slave).

Priority 1	The priority 1 value when master. Lower the value, higher the priority.
Priority 2	The priority 2 value when master. Lower the value, higher the priority.
PTP Step Select	Preset to **Two Step**
Sync Interval	The range for an ST2059-2 profile is "-7 to -1". Sync interval is 2 to the power of this value in seconds.
LogMinDelayReq Interval Adj	PTP Delay Request message interval adjustment from Sync Interval. It specifies the minimum permitted mean time interval between PTP Delay Request messages (2 to the power of (SyncInterval + logMinDelayReqIntervalAdj))
PTP Master Communication Model	The PTP Master Communication mode. Set to **Multicast** for Master/Slave mode.

PTP Profile	The PTP Profile to use. Set to **SMPTE ST 2059-2** for Master/Slave mode.

Status

These items are displayed for informational purposes only.

PTP State	Reports the following options: • Locked • Locking • Unlocked
PTP Mode Status	Reports if Master or Slave
Master Present	Reports if a remote master is presently being listened to.
Master IP Address	IP address of the master being listened to.
Master Interface IP Address	IP address of the local interface of the master being listened to.
Grandmaster UUID	Universally Unique Identifier for the grandmaster
Master Delay	The transmission latency for a message in one direction.
Master Offset	The time difference between the master and the SNP. A positive value indicates that the SNP is ahead of the master.
UTC Time	Reports the UTC time.
Clock Identity	Universally Unique Identifier to uniquely identify the current SNP

Configuring Reference for SNP (XL only) - RTC

Note: This section is only displayed for SNP-XL.

Configuration

RTC Time - Set now	The benefit of setting the RTC time is that once set, even if the unit is powered donw, the time is still valid since the real time clock contains a capacitor to retain the time. This is a two-step process: • First set the data and time for the real time clock chip in in **YYYY-MM-DD hh:mm:ss** format. • Then click the **Set RTC Time now** button.

Status

RTC Time and Date	Reflects the RTC Time and Date in **YYYY-MM-DD hh:mm:ss** format.

Configuring IP WAN for SNP

This tab contains parameters for configuring the following:

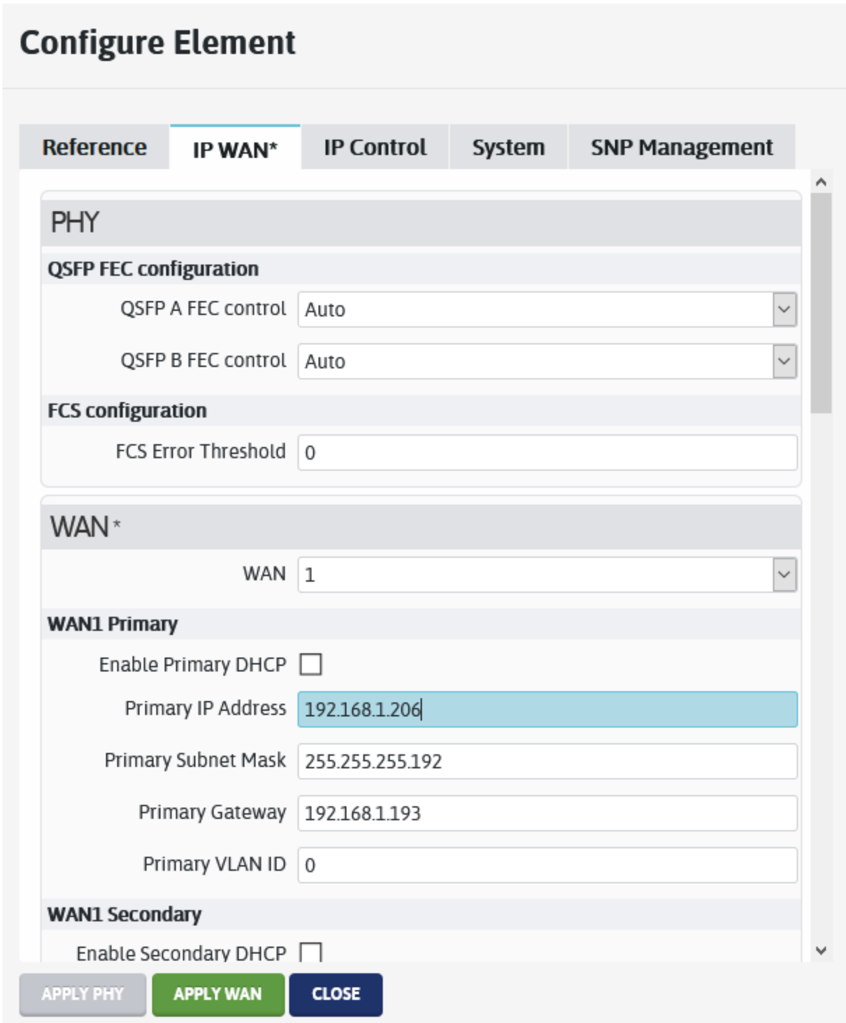
PHY

QSFP FEC Configuration	
QSFP A/B FEC Control	Lists Forward Error Correction controls that are applied per QSFP. Options are: • Auto • On • Off
FCS Configuration	
FCS Error Threshold	Lets you set the FCS error counter threshold for alarm activation.

FEC settings will not be activated until you click **Apply PHY**.

WAN

The SNP has four IP WANs. Each IP WAN has the same parameter options, and they can be configured independently. To access the IP WAN settings, select **Tools** > **Configure Element** from the main menu, and click the **IP WAN** tab.



Primary and Secondary WAN

Choose the IP WAN to configure from the WAN dropdown menu.

Enable Primary DHCP and **Enable Secondary DHCP** allow you to set the respective IP addresses.

The changes you make are reflected in the IP Transmitter and IP Receiver parameters, and therefore change those configurations. The settings have both Primary and Secondary values.

Before configuring the values in the primary and secondary IP WANs, ensure that you are aware of the following conditions:

- All of the IP Addresses must be unique.
- An IP Address value of 255.255.255.255 is invalid.

- The primary IP WAN subnets and Subnet Masks must be different than the secondary IP WAN subnets and Subnet Masks.
- The VLAN ID numbers must be different for each primary interface set (IP WAN 1, IP WAN 2, IP WAN 3, etc.), but you can re-use those primary VLAN ID numbers in the secondary interface set.

IP WAN settings will not be activated until you click **Apply WAN**.

DNS

User-Defined Host Name	By default, the SNP host name is automatically generated using: **SNP-<serial>**. This default setting ensures that names are unique on the network by default when nothing else is configured. You can also enter a custom hostname. Ensure that the name is unique within the system and that it is a different name than the "System Name Tag" field (Naming your SNP (on page 65)) Also see User Defined Host Name (on page 469).
Status	
Host Name	Displays the SNP host name
Primary DNS	The address of this device as assigned by the network administrator
Alternate DNS	An alternate address also assigned by the network administrator

Interface

Primary and Secondary Status

Below the IP WAN settings, a status list indicates the following information for both Primary and Secondary IP WANs:

Ethernet Mac Address	Imagine Communications Customer Service may request these numbers for licensing purposes.
Tx Packets	The number of packets sent since the **Counter Reset** was last clicked
Tx Rate	The current rate of transmission, measured in Gbps
Rx Packets	The number of packets received since **Counter Reset** was last clicked
Rx Rate	The current receive rate, measured in Gbps
Rx FCS Errors	The number of FCS errors since **Counter Reset** was last clicked
Switch Info	Reports Data switch information (address and speed) that the specified data port is connected to.
Port Info	Reports port information for the data switch that the specified data port is connected to.

Bandwidth Status

Tx Configured	This number should be similar to the Primary Tx Rate (above), which is configured on the individual processors. If the bandwidth goes over what the system is capable of transmitting, then IP Proxy Output may be disabled.
Processor Tx Configured	The transmission bandwidth configured for each processor. From left to right, four numbers refer to Processors A, B, C, and D
Primary Rx Configured	This number should be similar to the Primary Rx Rate (above)
Processor Rx Configured	The total receiver bandwidth configured for each processor. From left to right, four numbers refer to Processors A, B, C, and D. When this number exceeds approximately 21K for any processor, that processor will be configured to Make After Break mode when switching. See General (IP Video Input Status) for more information

Status Counters

Press **Counter Reset** to reset the status counters for the Primary, Secondary, and Bandwidth Status items above. When reset is clicked, the counters are reset for this element only, and all SNP Manager devices connected to this SNP will see the change.

Configuring IP Control for SNP

Divided into Rx Setup and Tx Setup, these settings define how input and output will operate when set to IP mode.

Rx Setup

Configuration

Playout Delay	This parameter sets the desired nominal delay, with a range of 4 - 120 ms (8 ms is the default). The maximum playout delay that can be set/configured is 120ms regardless of the personality. However, it will be internally restricted to a maximum value of 35ms for **non-JPEG-XS TR-07/08 Decoder** personalities, despite the GUI displaying up to 120ms. The Playout Delay value should be greater than or equal to or the **Minimum Required Playout Delay** (ms) status value. The **Minimum Required Playout Delay** (in the **Status** section below) is the sum of the maximum network jitter and the network path differential. Keep the **Playout Delay** above the **Minimum Required Playout Delay** for proper operation of IP receivers. *Note: The Playout Delay should be greater than or equal to 8 ms in an asynchronous system.*
IGMP Leave Delay (ms)	When in Make After Break Switch Mode, as set on the Program Configuration: Input Tab (on page 385), this value (measured in milliseconds) is how long this device will wait for the current stream to leave before timing out on the Next Source switch. Check with the network switch documentation to determine how long the switch will take to perform an IGMP leave.
IGMP Join Delay	When in Make Before Break Switch Mode, as set on the Program Configuration: Input Tab (on page 385), this value (measured in milliseconds) is how long this device will wait for the current stream to join before timing out on the Next Source switch. Check with the network switch documentation to determine how long the switch will take to perform an IGMP join.
MAB Leave Check	When enabled, MAB switches are rejected if leave fails. When disabled, a failed leave will not prevent the switch which may lead to overbandwidth issues. Only disable if overbandwidth is not an issue.
Enable 8K Mode	Allows for definition of sections to be used for 8K clean switching using IP Rx. See Step 2: Enabling 8K Mode (IP Receiver) (on page 316)

Status

Minimum Required Playout Delay (ms)	This read-only parameter reports the minimum required playout delay level in milliseconds.
Switch Duration	The Switch Duration indicates now long a switch will take to perform a change from one multicast stream to another. This value is affected by the Playout Delay as well as the IGMP join & leave Delay values.
Async. Clock Domain Switch Duration	The length of time an asynchronous switch will take.
Primary/Secondary Largest measured IGMP Leave	Reports the largest measured IGMP leave in milliseconds
Primary/Secondary Largest measured IGMP Join	Reports the largest measured IGMP join in milliseconds
Switch 8K Status	Reports whether the system is properly configured for 8K switching. For more details, see Step 1 - Pre-Requisites for 8K Clean Switching (on page 315).

Tx Setup

General

Generate SSRC ID	Enables or disables insertion of an automatically generated Synchronization Source (SSRC) ID. SSRC is a 32-bit numeric identifier, carried in the RTP header. • When disabled, the SSRC ID field will be set to 0. • When enabled, the inserted SSRC is unique for each RTP stream, generated by an SNP, however, the upper 22 bits are common for all streams, that originate from the same SNP. The lower 10 bits are encoded as follows: • Bits[9:8] identify the Processor (i.e. A, B, C D), a stream originates from • Bits[7:5] identify the Program, a stream belongs to • Bits[4:0] are used to identify individual essence services, that make up a program (e.g. Video, Audio, ANC) Note that the SSRC is ignored by SNP receivers, but a 3rd party receiver might require each stream to have a unique SSRC value.

Video

Video IP DSCP	This field allows you to choose the Differentiated Services Code Point (DSCP) value. Options include:		
	• Default Forwarding: best effort traffic • Expedited Forwarding: low-loss, low-	• AF12 • AF13	• AF41 • AF42

	latency traffic • Voice Admit: the same as default forwarding, except with a call-admission control that prevents oversubscription • AF11	• AF21 • AF22 • AF23 • AF31 • AF32 • AF33	• AF43 • CS1 • CS2 • CS3 • CS4 • CS5
	The twelve Assured Forwarding (AF##) options present twelve separate DSCP encoding classes that create a traffic priority. Higher first digit and lower last digit are higher priority.		
Video IP Time to Live	(1 - 255)		
ST 2110-20 RTP Payload Type	Sets the Payload ID for video, with a Range of 77 - 127. Default: 96		
ST 2110-22 RTP Payload Type	Sets the Payload ID for e.g. JPEG-XS compressed video, with a Range of 96 - 127. Default: 102		
Join IGMP for Tx Streams	Enables Join IGMP for all Tx Streams		

Audio

Audio IP DSCP	Options include:		
	• Default Forwarding • Expedited Forwarding • Voice Admit • AF11 • AF12 • AF13 • AF21	• AF22 • AF23 • AF31 • AF32 • AF33 • AF41 • AF42	• AF43 • CS1 • CS2 • CS3 • CS4 • CS5
Audio IP Time to Live	(1 - 255)		
ST 2110-30 RTP Payload Type	Sets the Payload ID for ST 2110-30 audio, with a Range of 77 - 127. Default: 97		
ST 2110-31 RTP Payload Type	Sets the Payload ID for ST 2110-31 audio, with a Range of 77 - 127. Default: 101		

Ancillary Data

Ancillary IP DSCP	Options include:		
	• Default Forwarding • Expedited Forwarding • Voice Admit • AF11 • AF12	• AF22 • AF23 • AF31 • AF32 • AF33	• AF43 • CS1 • CS2 • CS3 • CS4

	• AF13 • AF21	• AF41 • AF42	• CS5
Ancillary IP Time to Live	(1 - 255)		
ST 2110-40 RTP Payload Type	Sets the Payload ID for ancillary data, with a Range of 77 - 127. Default: 100		

System

This tab contains parameters for configuring the following:

HDR Matching White Gain

The following are global HDR gain matching parameters, when converting between SDR and HDR.

SDR to HLG	range -20.0 to +20.0, step 0.1, default 0dB
SDR to PQ	range -20.0 to +20.0, step 0.1, default 0dB
SDR to SLOG3	range -20.0 to +20.0, step 0.1, default 0dB

- When going from SDR to HDR, the appropriate global gain value is added to the channel-specific gain adjustment and then applied in the conversion
- When going from HDR back to SDR, the appropriate global gain value is subtracted from the channel-specific gain value and then applied in the conversion
- When going from HDR to a different HDR the values are used in combination to determine the matching gain

HDR Mapping Mode Defaults

SDR-709 Mapping Mode	When the Mapping Mode parameter (see Video Tab: Color Adjustment (on page 415)) is set to Auto, When in Auto mode, set the SDR-709 Mapping Mode parameter to indicate how SDR-709 signals should be handled.

Timecode Jamsync

The following parameters allow you to jam the timecode generator.

Jam Timecode to PTP	Click this button to jam timecode generator time to PTP
Jam timecode Time	Click this button to jam timecode generator time to a specified time (in HH:MM:SS format)

QSFP Status

QSFP Status parameters are listed separately for QSFP A and QSFP B.

For a list of supported QSFPs, see DATA QSFPs (on page 39)

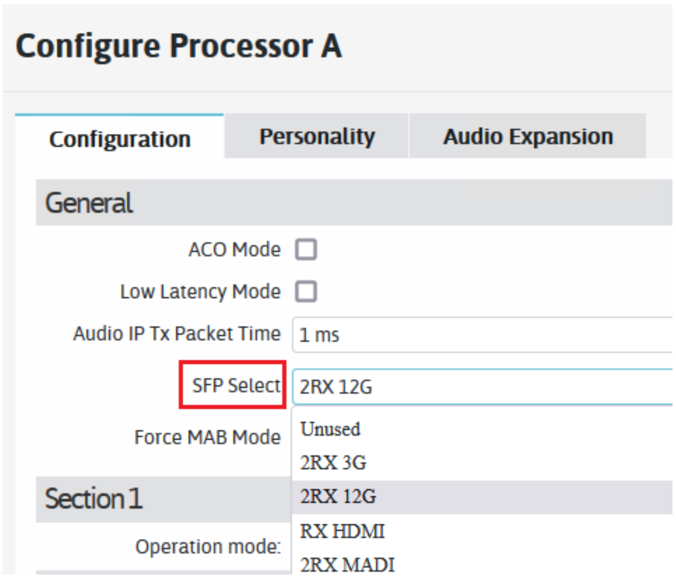
Present	Reports if a QSFP has been inserted in the slot and is available
Data Valid	Reports whether the data is valid from the specified QSFP
Power Measurement Type	Reports the optical power measurement type as either Average or OMA

Link (1 - 4) Rx Power	Reports the Rx power measurement for links 1, 2, 3, and 4 in dBm
Link (1 - 4) Tx Power	Reports the Tx power measurement for links 1, 2, 3, and 4 in dBm *Note: If installed QSFPs do not support Tx power measurements, the GUI will display "N/A" in the QSFP Tx power readings.* 
Temperature	Reports the QSFP temperature in degrees Celsius
FEC ON/OFF Control	Indicates whether FEC is currently on or off. FEC is set on the IP WAN tab. See PHY (on page 355).
Vendor Name	Reports the QSFP Vendor name
Vendor Part Number	Reports the QSFP Part number
Vendor Serial Number	Reports the QSFP Vendor serial number
Current Tx EQ	The Tx Equalization in effect for all links

Note: Link power does not display for CQSFP-100G-AOC5M cables.

SFP Status

Note: For a list of supported SFPs, see Video/Audio Expansion Interface Supported SFPs (on page 39)



Note: Rx SFPs display Rx power, Tx SFPs display Tx power, and HDMI SFPs do not display power.

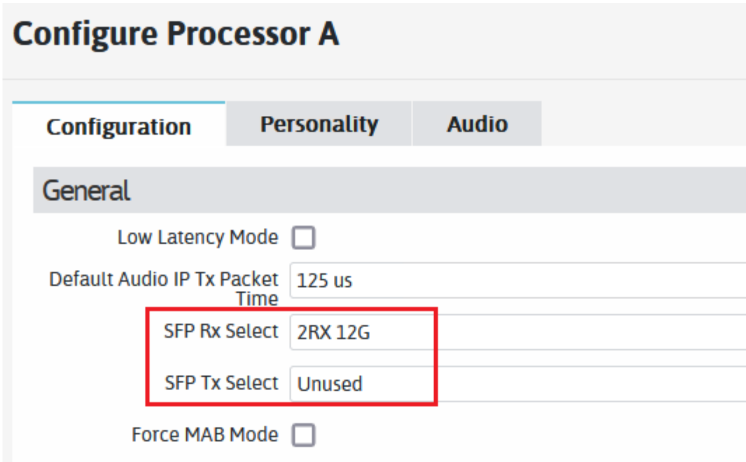
The **SFP Status** section displays status for each of the four SFP sockets (A-D) and indicates the following information:

Present	Reports if an SFP has been inserted in the slot and is available
Power Measurement Type	Reports the optical power measurement type as either Average or OMA
Rx (1-2) Power	Reports the optical Rx power measurement for channel 1 and 2 in dBm
Tx (1-2) Power	Reports the optical Tx power measurement for link 1 and 2 in dBm
Temperature	Reports the SFP temperature in degrees Celsius
Vendor Name	Reports the SFP Vendor name
Vendor Part Number	Reports the SFP vendor part number
Vendor Rev	Reports the SFP revision
Vendor Serial Number	Reports the SFP serial number

SFP Rx/Tx Status (SNP-XL only)

Note: This section is only displayed for SNP-XL.

Note: For a list of supported SFPs, see Video/Audio Expansion Interface Supported SFPs (on page 39)



Note: In case of SNP-XL, you can select the Rx and Tx SFPs. Rx SFPs display Rx power, Tx SFPs display Tx power, and HDMI SFPs do not display power.

SFP Status for SNP-XL is divided into **SFP Rx Status** and **SFP Tx Status** sections, that display status for each of the four Rx and Tx SFP sockets (A-D):

Present	Reports if an SFP has been inserted in the slot and is available
Power Measurement Type	Reports the optical power measurement type as either Average or OMA
Rx (1-2) Power	Reports the optical Rx power measurement for channel 1 and 2 in dBm
Tx (1-2) Power	Reports the optical Tx power measurement for link 1 and 2 in dBm
Temperature	Reports the SFP temperature in degrees Celsius
Vendor Name	Reports the SFP Vendor name
Vendor Part Number	Reports the SFP vendor part number
Vendor Rev	Reports the SFP revision
Vendor Serial Number	Reports the SFP serial number

FPGA Status

The following information is displayed for the IP FPGA, and for each of Baseband FPGA 1-4.

FPGA Temperature	The temperature of the FPGA in degrees Celsius.
FPGA Fan Status	The current status of the FPGA fan.

Power Supply Status

The following power supply information is displayed:

Power Supply Type	This field indicates: • Non hot swappable • Hot swappable
Power Supply (A-B) Present	When the power supply type (above) is **hot swappable**, these parameters display whether or not a power supply is in the indicated slot. This parameter does not appear if the power supply is Non hot swappable.
Power Supply (A-B) Enabled	Reports the enabled or disabled status of the specified power supply.
Power Supply (A-B) Fan On	When the power supply is **Non hot swappable**, these parameters report the On/Off status of the indicated fan. This parameter does not appear if the power supply is Hot swappable.

Note: If one power supply is working, both fans will run (unless a fan is in a failed state).

Miscellaneous Status

The following information is displayed:

Front panel Fan (1-4)		
	Status	Displays OK or not.
	Speed	Displays the fan speed in RPM
Chassis		
	Chassis Type	Displays the chassis type. Either Classic or SNP-XL.
Boards		
	Main Board Ambient Temperature	Displays the temperature in degrees Celsius.
	I/O Board Ambient Temperature	Displays the temperature in degrees Celsius.
	Rx I/O Board Ambient Temperature	*SNP-XL only* Displays the temperature in degrees Celsius.
	Tx I/O Board Ambient Temperature	*SNP-XL only* Displays the temperature in degrees Celsius.
	Expansion Board 1 Ambient Temperature	*SNP-XL only, if an expansion board is used.* Displays the temperature in degrees Celsius.
	Expansion Board 2 Ambient Temperature	*SNP-XL only, if an expansion board is used.* Displays the temperature in degrees Celsius.

Unit Name

Unit Name Tag	Lets you provide a name for your SNP. This name appears on the browser tab when SNP is accessed and the the top of the SNP UI.

Security

Disable CCSP Port	Disables Port Access for the Magellan Control Panel (version 4.6 or later). If disabled, the SNP will not be discoverable by the Magellan Control Panel. Disable if not using Magellan Control Panels, to prevent any security issues. Leave enabled if using Magellan RCP control panels that need to connect to the SNP via CCSP protocol (TCP/IP connection mode).
Disable SEAM Port	Disables SEAM access. Leave enabled if using the Magellan Control System which uses SEAM for router switches.
Disable LD Port	Disables the Layout Designer application from reaching the SNP.
Disable Icon Master Port	Disables the Icon Master Control port and related Icon Master functionality.

Date and Time

Adjust for daylight saving time	When enabled, an hour is added to the time display to account for daylight saving time.

SNP Management

This tab contains parameters for configuring the following external devices:

In This Section

NMOS

NMOS Configuration

Operation Mode	This parameter has the following options: • Off: No NMOS running • Read-only: Registers the SNP into an IS-04 registry and exposes the IS-04 node and IS-05 connection management APIs, but does not allow connections to be changed. • Full: Registers the SNP into an IS-04 registry and exposes the IS-04 node and IS-05 connection management APIs.
Registry Server Override	Overrides the DNS-SD discovered registry servers. If this is blank, use DNS-SD to find the registries, and use the TXT record priorityto choose which one to use if both are available. If this override string is present, then it contains the list of allowed registries ignoring DNS-SD. Order entries in this string by priority. Format is <IP Address>:<Port Number>

NMOS Status

Registration Server	List of detected NMOS registration servers (IP address and port)
Connected Server	Displays the IP address and port of the server this node is connected to
System Server	List of detected NMOS system servers (IP address and port)

LRC

LRC Configuration

LRC Server IP Address	Enter the IP address of the router controller. Also see LRC Routing (on page 273).

NTP

NTP Configuration

NTP Server IP Address	Enter the IP address of the NTP Server.

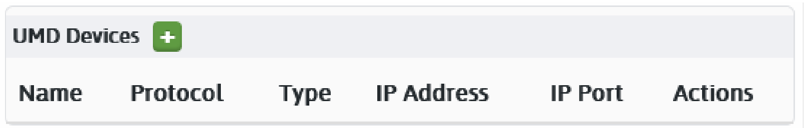
TSL V5 (UMD Devices)

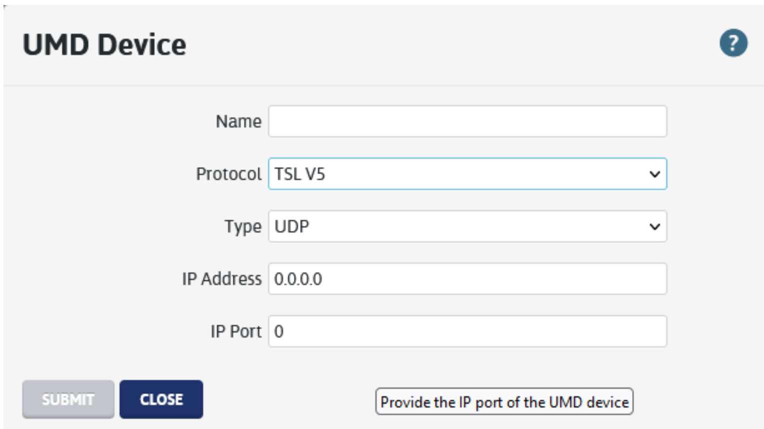
TSL V5 devices provide UMD/Tally data to layouts output by SNP-MV. There is a row for each configured TSL V5 device.

- To add a TSL V5 device, click +
- To remove a TSL device, click **Delete** (under Actions)
- To modify an already-defined TSL device, click **Edit**.

Note: Each SNP-MV processor can receive inputs from a single TSL V5 device. See Configure a Multiviewer Personality (on page 240).

When you click **+** beside **UMD Devices**, the following dialog box opens:





Name	Enter a descriptive name for the device
Protocol	Set to TSL V5
Type	Select TCP or UDP
IP Address	Enter the IP address for the TSL device or leave it at 0.0.0.0.
IP Port	Enter the port; the default is 0, 4001-4004 is recommended.

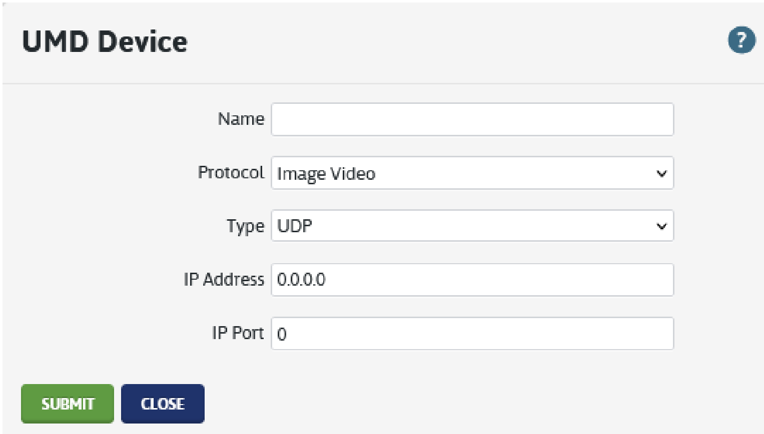
When you click **Submit**, the TSL V5 device appears in the list of UMD devices on the **SNP Management** screen.

Image Video (UMD Devices)

Image Video devices provide UMD/Tally data to layouts output by SNP-MV. The TSI Image Video Tally Controller collects information from signal routing and processing equipment to operate displays and tallies as directed by its internal configuration information. There is a row for each configured Image Video device.

- To add an Image Video device, click +
- To remove an Image Video device, click **Delete** (under Actions)
- To modify an already-defined Image Video device, click **Edit**

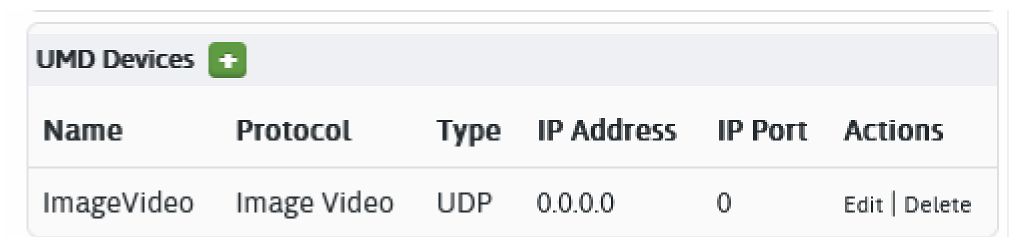
To add an Image Video Device, click **+** beside **UMD Devices.** The following dialog box opens:



Complete the fields to describe the device:

Name	Enter a descriptive name for the device
Protocol	Select Image Video
Type	This is typically TCP
IP Address	Enter the IP address for the TSI device or leave it at 0.0.0.0.
IP Port	Enter the port; the default is 0, 9800-9803 is recommended.

When you click **Submit**, the Image Video device appears in the list on the **SNP Management** screen.



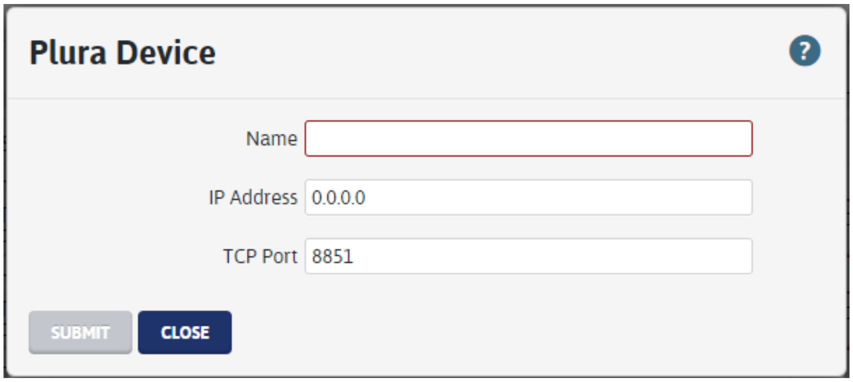
Plura Devices

Plura devices can be used to provide clock information on layouts output by SNP-MV. There is a row for each configured Plura device.

- To add a Plura device, click +
- To remove a Plura device, click **Delete** (under Actions)
- To modify an already-defined Plura device, click **Edit**

Note: Each SNP-MV processor can receive inputs from a single Plura device. See Configure a Multiviewer Personality (on page 240).

When you click **+** beside **Plura Devices**, the following dialog box opens:



Complete the fields to describe the device:

Name	Enter a descriptive name for the device
IP Address	Enter the IP address for the device
TCP Port	Enter the TCP port; the default is 8851

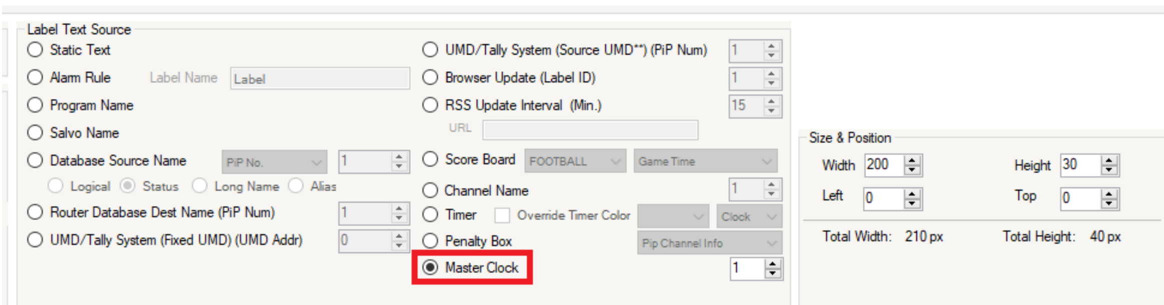
When you click **Submit**, the Plura device appears in the list on the **SNP Management** screen.

Masterclock Devices

The SNP-MV provides support for the Masterclock Timer Protocol. Masterclock devices can be used to provide clock information on layout outputs by SNP-MV. You can set up multiple concurrent clocks, using different layouts or the same one. Follow these steps to define masterclocks:

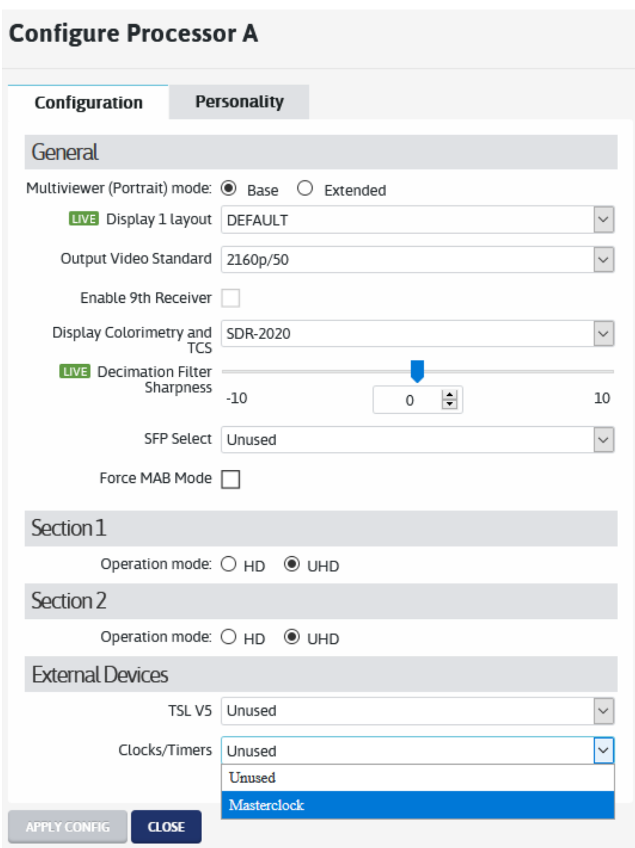
1. **Masterclock Layout**

   To define your masterclock in Layout Designer, add a **Label** and set its source to **Master Clock**. Set the number and ensure that you set the same number when defining the clock in the SNP (see step 3). Each defined Masterclock has a different ID. You can control the color, background, font color, and size on the label. Once complete, publish your layout to your SNP.



2. **Enabling Masterclock usage in SNP**

   In the SNP, go to **Configure** > **Processor**, and under **External Devices**, set **Clocks/Timers** to **Masterclock**.



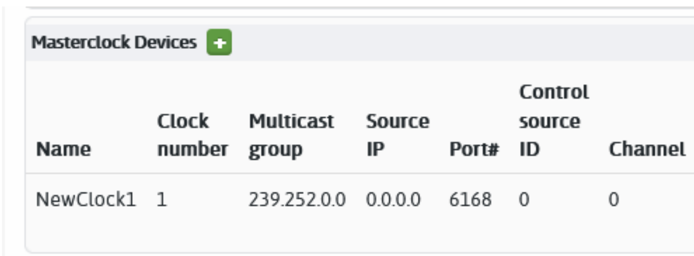
Note that if this is not configured, the MV will display a flashing --:--:-- on the Masterclock label.

3. **Defining a Masterclock in the SNP**

In the SNP, to add a masterclock, go to:

Configure Element > Tools > SNP Management > Masterclock devices

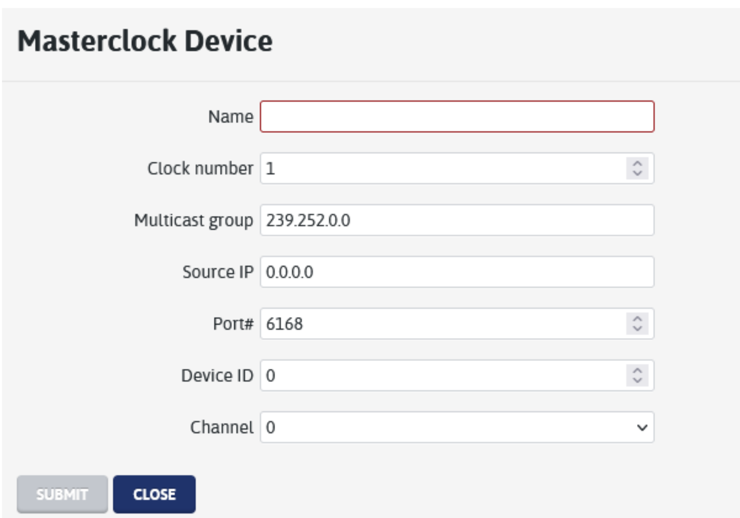
- To add a masterclock device, click +
- To remove a masterclock device, click Delete (under Actions)
- To modify an already defined masterclock device, click Edit



Masterclock Devices +

Name	Clock number	Multicast group	Source IP	Port#	Control source ID	Channel
NewClock1	1	239.252.0.0	0.0.0.0	6168	0	0

When you add a new Masterclock Device, provide the following info:



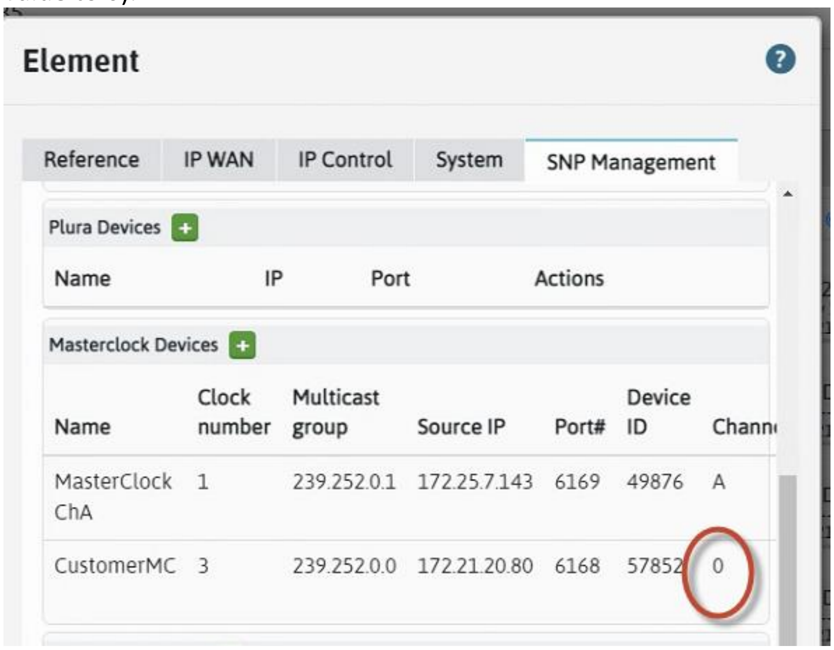
- **Name**: A relevant name for your clock
- **Clock number**: A unique Clock number
- **Multicast group**: The IP address of the multicast group that the clock is streaming from
- **Source IP**: The IP address of the masterclock device
- **Port #**: The port number that the stream comes from
- **Device ID (Formerly Control Source ID)**: The last 2 digits of the MAC address of your clock device.
- **Channel**: A/B/C or 0 (default) from the current device (dual channel)

Note: If there's a loss of connection to the masterclock, the last data received is shown frozen on the label, and it flashes.

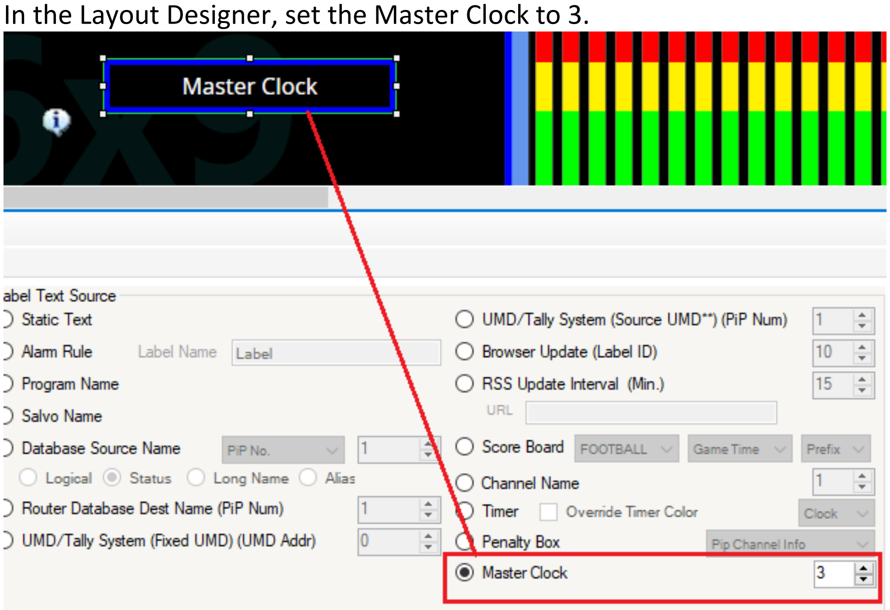
Note for RC500/600 Masterclocks

If implementing an RC500/600 into an Imagine SNP Multiviewer, the steps are slightly different (from RC1000) since the protocol used by RC500/600 is different. Follow these steps:

For an RC500/600 Masterclock, when adding the device via the Configure > Element > SNP Management > Master Clock Devices, set the Channel value to 0 (or edit an existing Masterclock device to set the value to 0).



In the Layout Designer, set the Master Clock to 3.



Daktronics Devices

See Adding Daktronics Devices to the SNP.

SQM Global Defaults

Parameter	Description	Range
Video Black Threshold (%)		0 to 100, default is 95
Video Black/Freeze Threshold		0 to 30, default is 5
Black Luma Threshold		0 to 940, default is 72
Video Freeze Sensitivity Level		High, Medium, Low, Truly Static Image, Default is Medium
Number of Frozen Zones (%)		0 to 100, default is 95
Audio Low Threshold (dBFS)		-100 to -20, default is -90
Audio High Threshold (dBFS)		-20 to 0, default is -2
Audio Filter Window(s)		0 to 40, default is 30
Anc Packet (1-4) DID		
Anc Packet (1-4) SDID		
Anc Packet (1-4) Detect Timeout(s)		0 to 100, default is 60

Configuring Presets

Presets are used to save an entire configuration of an SNP for later use, or for use on another SNP. A preset includes parameter and alarm settings. When a preset is applied, the entire configuration of that SNP is replaced with that contained in the preset.

Presets are specific to the device they are created on. A preset can be transferred from one HARDWARENAME to another when you are using a remote SNP Manager. However, if you want to transfer presets from one HARDWARENAME to another while using local SNP Manager, you should use Save Preset and then Import Preset to the other device.

The **Configure Presets** dialog is accessed by going to **Tools > Configure Presets** (under Element Tools) and is divided into 3 tabs:

Save Preset (on page 377)

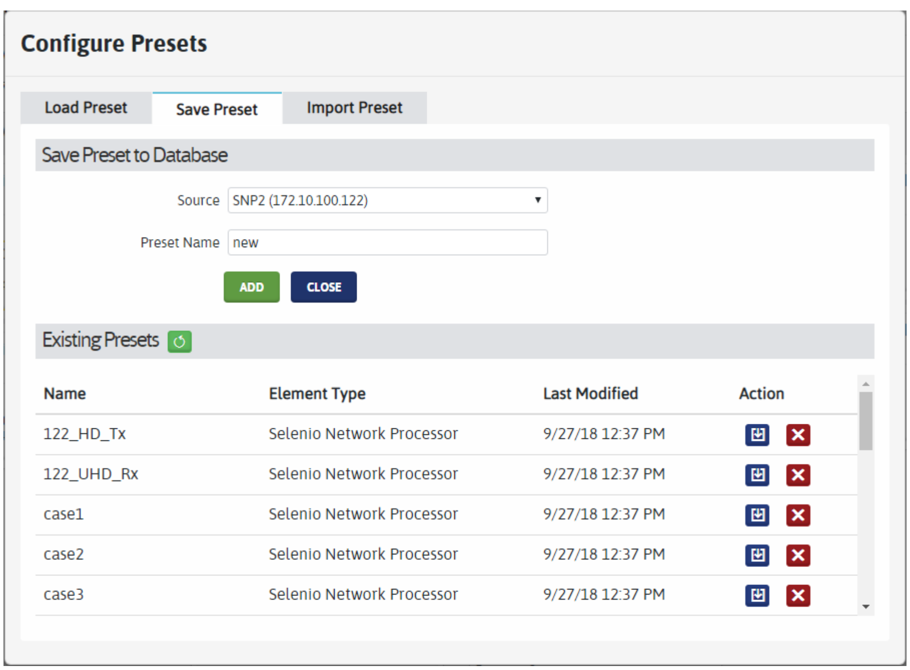
Save Preset

The **Save Preset** tab lets you save settings from an SNP to **create** a preset. To do this:

1. Select an *Element* as Source to copy its current settings

   Note: This field is only shown if using a Remote SMM. On a local SMM, this field is not displayed since the Element itself is considered as source.

2. Provide a Name for the Preset. Names are case-sensitive.
3. Click **Add** to create the Preset.



All created presets are displayed in the *Existing Presets* section of the **Configure Presets** dialog, with an option to delete or download them. To load any of these presets, see Load Preset (on page 378).

The SNP device can store a maximum of 20 presets. When using remote SNP Manager, the maximum is 200 presets.

Note: Presets are saved to the SNP Manager database, so they can be loaded to other SNP devices via the *Load Preset* tab, when using a remote SNP Manager only. Loading a preset erases any current configuration and starts new processes on that SNP. Presets are saved in .prst format and can be opened in a text editor like Notepad. When a preset involves licensed features, licenses are applied on a first come, first served basis. An error message will be displayed if the preset requires a license that is not available.

You can also save a preset to file by doing the following:

- Click the **Download** icon in the **Action** column against a preset in the **Existing Presets** list.
- Re-import it from the **Import Preset** tab.

Load Preset

Note: For SNP, a reboot is required to load a preset. Always click Load + Reboot to load a preset. Note that there could be unexpected behavior without a reboot, so ensure that this is done.

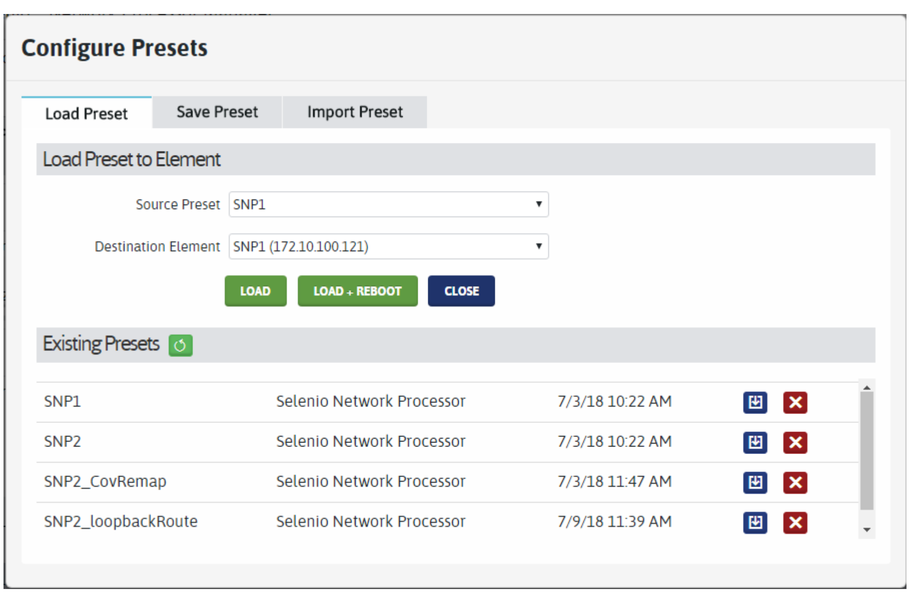
The **Load Preset** tab allows you to select from existing presets in the *Source Preset* drop down list. To load a preset:

1. Select a Preset from the *Source Preset* drop down.
2. Select the *Destination Element* (IP Address) to load the Preset to

   Note: This field is only shown if using a Remote SMM. On a local SMM, the preset is loaded to the current Element.

3. Click **Load + Reboot**.

   A spinning icon on the element indicates that a preset is being loaded.



If a preset cannot be loaded onto an element, a descriptive error message will appear in the bottom right corner of the dialog box. A preset may not load, for example, if the element has insufficient licenses for the settings being applied.

Preset loading will appear in system log files. See Configuring SNP Manager (Remote SMM only) (on page 383).

Import Preset

Use this option if you've previously saved a preset to file.

The **Import Preset** tab allows you to **Import** a preset from a file by doing the following:

1. Browse and select the source preset file
2. Optionally, give a present a new name
3. Click **Import**

Note: After you've imported a preset, you still need to load it. See Load Preset (on page 378). Licenses are applied on a first come, first served basis, and if the license is not available you'll see an error.

Configuring MCL Panels

See Configuring MCL Panels (on page 502)

Configuring 3D LUTs

See Color Processing - Built In and Custom LUTs (on page 264)

Configuring AAP

For more details on Advanced Audio Processing (AAP), see Advanced Audio Processing (on page 275).

AAP is supported on the following personalities:
- Dual/Quad Conversion
- Sync

The **Configure Advanced Audio Processing** dialog contains two tabs:

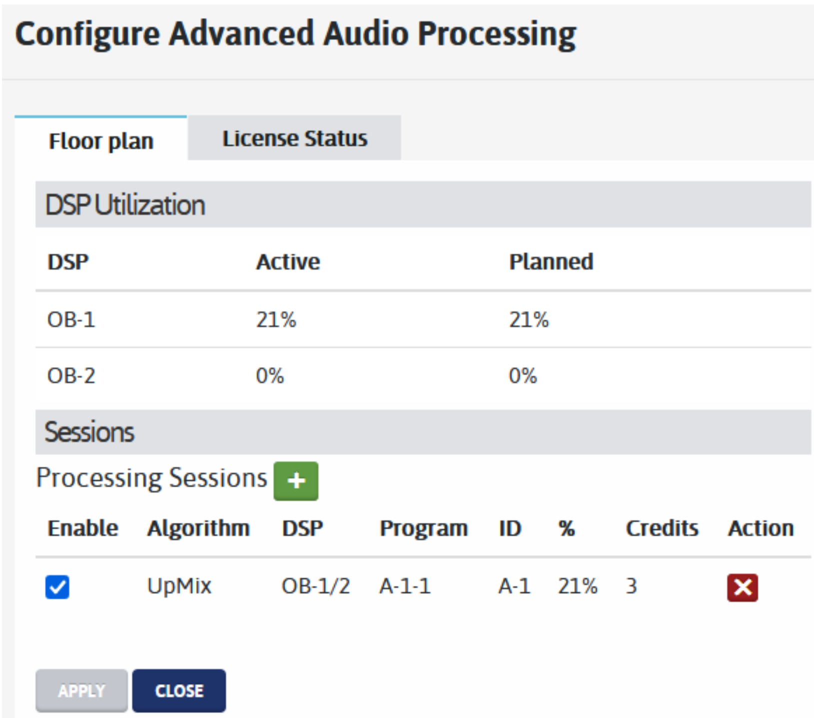
The **Floor Plan** tab displays the following:

- **DSP Utilization**: Provides a quick overview of the current DSP utilization including what is active or actually enabled and running, and what is planned (but not yet enabled). The Floor Pan tab allocates functions to each DSP.

- DSP1 supports processors A&B
- DSP2 supports processors C&D

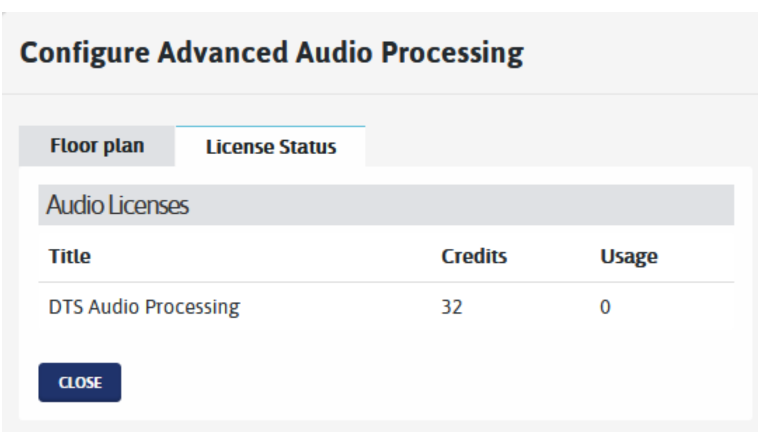
As Advanced Audio functions are enabled, the SNP keeps track of DSP utilization and reports the current total. Reviewing these percentages as workflows are configured will help understand how much processing is utilized by currently defined configuration and settings, how much is available for additional processing, and whether any limits have been reached.

- **Sessions**: Allows for creation of Processing Sessions. For more details. see Creating AAP Sessions (on page 290)



The **License Status** tab displays the following:

- **Audio Licenses:** Reports on available audio licenses and usage. For more details, see AAP Reporting and AAP Licensing (on page 287).



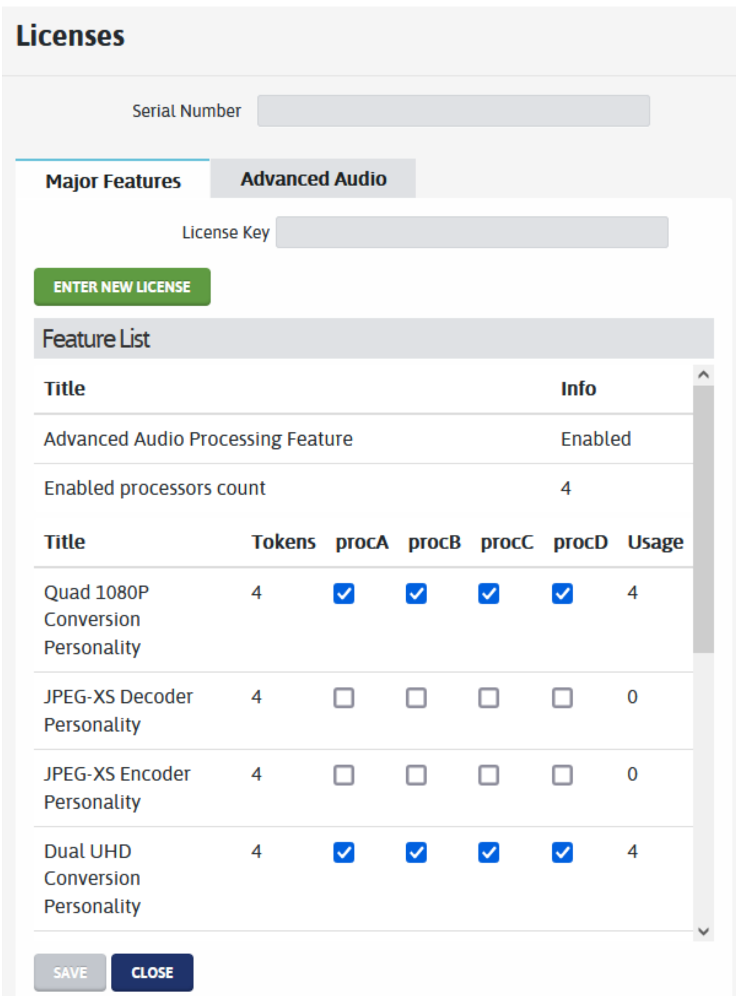
License Management

See License Management (on page 44).

Acquiring Licenses

To add or remove licenses, follow these steps:

1. Login to the SNP Manager Web interface.
2. Select **Configure** > **Licenses** from the menu bar at the top of the screen.
3. The **License Management** dialog is displayed with feature license details. This dialog contains 2 tabs: **Major Features** and **Advanced Audio licenses.** See License Management (on page 44).



4. Provide Imagine Communications with the **Serial Number,** the licenses that you require, and the current license key displayed in the **License Key** field.

   Imagine Communications Customer Service has a form to facilitate this process.
5. Obtain the new license key numbers from Imagine Communications.

Customer Service will provide a device-specific license key.

6. On the License Management dialog box, click **Enter New License** and and enter the license key in the field provided.
7. Click **Submit**.

The new license(s) appear in the **Feature List**.

Title	Names of various feature licenses available
Tokens	Shows the limit for license tokens that can be assigned to processors
Usage	Shows the currently assigned usage of licenses on processors
ProcA/B/C/D	Allows you to assign feature license tokens to specific processors

To free up a license for usage elsewhere on the device, select away from the feature on the Processor where it is currently assigned and click Save.

Licensing Notes

- SNP 1.7 onwards enforces licensing
- License tokens must be assigned to a processor for that feature to function
- In case of unassigned licenses (tokens not applied to a processor), functionality will available but the output may be forced to black or the audio muted
- Licenses are not saved in SNP presets

Note: If the REST API is used to set license values, note that partial configuration (for example, just the Conversion license) will result in license information being wiped out in the GUI. If using the the REST API to set licenses, ensure that the complete structure is sent - all 7 unique keys and 4 x 7 tokens must be set.

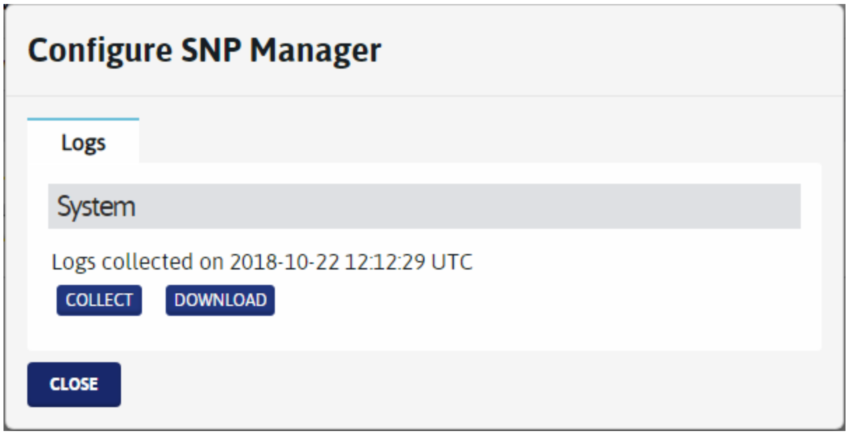
Behavior when a Licensed Feature is not Assigned to a Processor

Processor	Behavior
Dual Conversion Personality	Program outputs black video, system license alarm
Multiviewer Personality	Program outputs black video, system license alarm
Sync/Remap Personality	Program outputs black video, system license alarm
Quad Conversion Personality	Program outputs black video, system license alarm
HD Downsample Feature	Program outputs black video, system license alarm
HDR Adjustment Feature	Program output HDR setting has no effect, system license alarm
+128 Audio/MADI Feature	Program audio output muted, system license alarm

Configuring SNP Manager (Remote SMM only)

The SNP Manager dialog box provides tools to collect and download SNP Manager system logs.

Note: To view logs for a specific SNP, see Configure Local Host - Download Logs (on page 98).

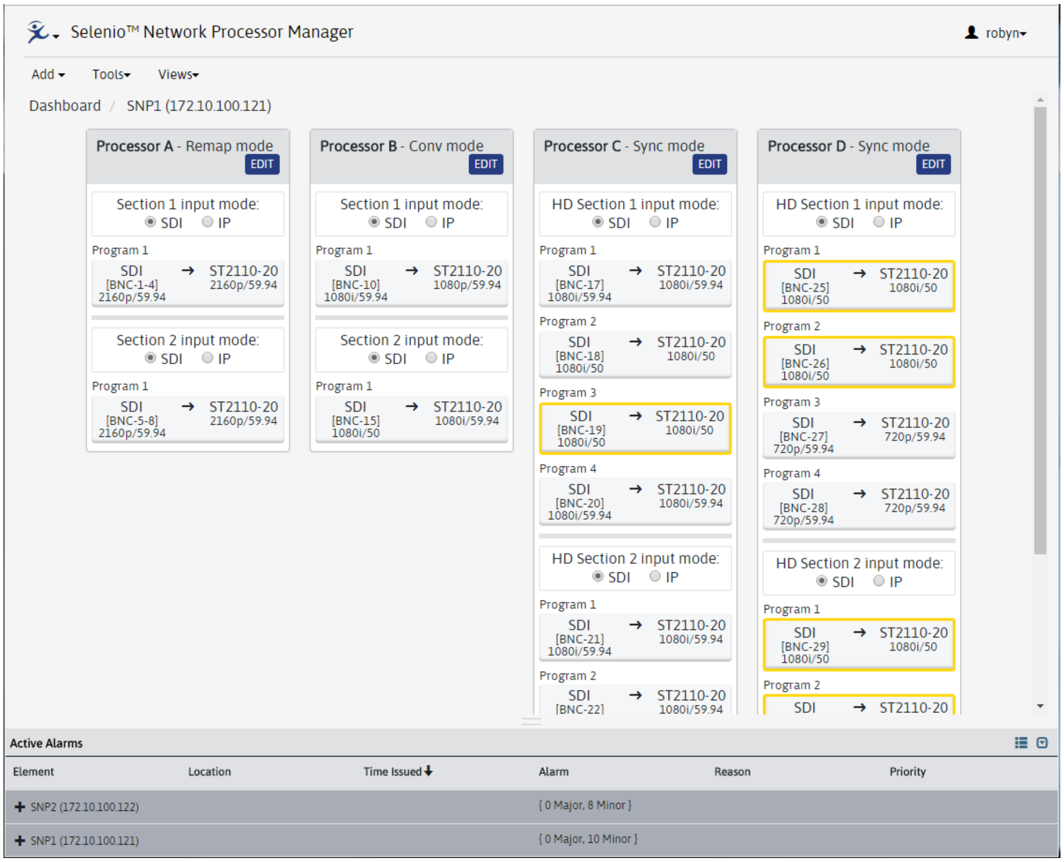


Collect: Collates recent system events into log files.

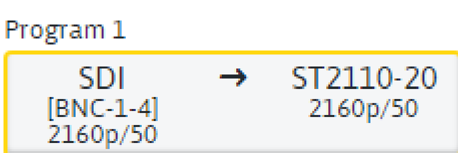
Download: Downloads the recently created log files onto a local PC, where they can be reviewed. If no logs have been saved, the **Download** button will not be available.

Configuring Programs

Programs appear in the Elements screen of the dashboard. For a general overview of this screen, see Controlling a Device (on page 88).



In Sync Mode, each Processor section has one (UHD) or four (HD) programs. In Remap and Conversion mode, each Processor section has one program. Each program has a tile that displays general overview information for that program.



The program's tile displays the BNC(s) used by the video and the formats of both the incoming and outgoing video.

Click the program's tile to open a **Configuration** page for that program.

- Use the **Apply** button at the bottom of the GUI page to apply the change.
- Changes to the controls that are marked with the green LIVE tag will be sent to the device immediately without clicking the **Apply** button.

Program Configuration: Input Tab

Depending on the mode for the section (group of four inputs in the section), different options will appear.

- Input Tab: IP Input Mode (on page 385)
- Input Tab: SDI Input Mode (on page 398)

Input Tab: IP Input Mode

When a Section/Channel is in IP Input Mode, parameters will be available, divided into the following groups:

In this Section

Statistical Counters

Missing Packet and Out-of-Range Packet statistics counters are reported by the 2022-7 component. There are three each of these parameters, described in the following topics:

- Input Tab: IP Video Status (on page 391)
- Input Tab: IP Audio Status (on page 395)
- Input Tab: IP Ancillary Data Stream Status (on page 397)

The Missing Packet statistics counters have a higher order of precedence than the Out-of-Range statistic counter.

These are the conditions for a packet to be considered as missing from an IP Receiver Stream (video, audio, or ANC):

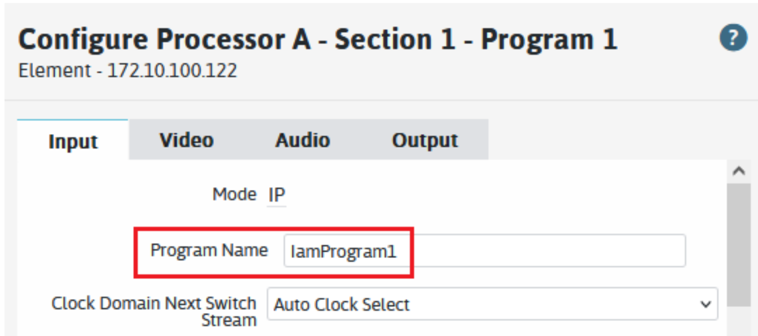
- if both Ethernet ports are present, it has to be missing on both Primary and Secondary ports
- if only the Primary Ethernet port is connected, it is missing from the Primary port
- if only the Secondary Ethernet port is connected, it is missing from the Secondary port

A missing packet's time label exceeds not only the Playout Delay value (the Receiver's programmable buffer depth) but also the physical hardware buffer size. All RTP packets are written into the Receiver's buffer and marked with a time label, which is derived from the local PTP clock. Under normal operations, packets read from the Receiver's buffer will have a time label which is less than the physical hardware buffer size. If a packet is read from memory and it has an old time label, then it's considered to be missing.

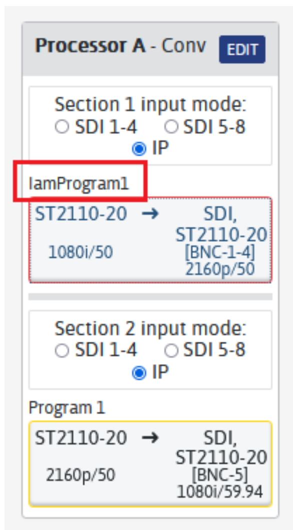
The Out-of-Range statistic counter increments when the time label exceeds the Playout Delay value plus some margin of error.

Input Tab: Program Name

<table>
<tr>
<td>Program Name</td>
<td>Allows for setting a custom program name. There is a 50 character limit for the Program Name.



This program name then shows in place of the default Program 1/2/3/4.



If left blank, the Program shows the default name (for example, Program 1, Program 2, etc.).</td>
</tr>
</table>

Input Tab: Clock Domain Next Switch Stream

<table>
<tr><td rowspan="3">Clock Domain Next Switch Stream</td><td>This parameter facilitates clean switching for untimed/not-phase-aligned 2022-6 and 2110-20 signals. For best results, use the "Freeze" option for the "Loss of Video Mode" control parameter. Options are:
Auto Clock Select - (Requires SDNO)
SNP receives the Grand Master ID of the Transmitter, and if it matches the SNP's Grand Master ID, and is expected to be synchronous (clean and without freeze). In this mode, SNP sets the receiving mode based upon analyzing the received essence packet.
If SNP receives a 2110-20 stream with the same PTP master and it is PTP phase-aligned with the receiver, it will choose Sync mode.
If SNP receives a 2110-20 stream with a different PTP master, it will choose Async mode.
If SNP receives a 2022-6 stream, it works the same as 2110-20 if the SDNO provides a PTP Master. If it doesn't, the default clock mode is Async
SNP Sync - The next stream will have the same PTP Grand Master ID as the SNP
Asynchronous - The next stream is expected to have a different PTP Grand Master ID from the SNP and will freeze for up to two frames.
Force Sync- Allows the video and all associated audio streams to use synchronous mode with never falling back to asynchronous mode.</td></tr>
<tr><td>Clean Switching
All 2110-20 streams, synchronous and asynchronous, will be cleanly switched
All 2022-6 streams are switched cleanly when the ‘Loss Of Video Mode’ parameter is set to "Freeze". One video frame will be lost during the switch however with the SNP set to “Freeze” mode, the video output will be clean.
The Proxy Video outputs are not clean switched
The SNP Multiviewer does not support clean switching</td></tr>
<tr><td>Asynchronous Clean Switching
The SNP IP Receivers can switch cleanly between source streams that are asynchronous relative to the SNP Receiver’s ST 2059/PTP Domain for the following use cases:
Switching between source streams which originate from a different ST 2059/PTP Domain, that are synchronized to each other
Switching between source streams which originate from a different ST 2059/PTP Domain, that are frequency locked to each other but are phase offset from each other
Switching between source streams which originate from a different ST 2059/PTP Domain, that are sliding relative to each other. Each source stream has either a faster or slower video clock relative to the SNP Receiver’s PTP locked video clock.</td></tr>
</table>

	A source stream is composed of a group of streams: 1 video IP stream, 16 audio IP streams, and 4 ancillary data IP streams. For the SNP IP Receiver to be able to receive the group of video, audio, and ancillary IP streams, the streams must be synchronous to each other, i.e. belong to the same ST 2059/PTP Domain. **Note:** Switch cleanly means no video glitches/distortion or audio pops/clicks/distortion, and no disruption to video and audio timing

Input Tab: Clock Domain Status

Clock Domain Status	Allows IP Receivers to display the status of incoming signals: whether signal is synchronous or asynchronous.

Input Tab: Pixel Format

This section only appears when the Processor is in Remap or Conversion mode.

UHD Quad Input Pixel Format Select	If the input is UHD, this selection determines how incoming video is interpreted: • Square Division • Pixel Interleave The Square Division option is only available when the Input Mode is SDI. This selection only has an effect when using Quad inputs; 12G is always interleave.
UHD Input Pixel Format Used	*This status is only available in Conversion mode.* This read-only parameter indicates **Yes** (indicating a mismatch) when both input and output are configured to UHD and either one is set to SQD in Conversion mode. This setting is independent of the real input/output standard, which can be HD.
UHD Pixel Format Mismatched	Reports if the pixel format is mismatched

Input Tab: IP Video Configuration

Video IP Receiver Enable	Enables this receiver
Receiver Mode	Choose the video receiver mode for this input. • ST 2110-20 (preset to 2110-22 in case of JPEG-XS decoder) • ST 2022-6 (only available when the standard is HD) ***Note:*** *When in 2022-6 mode, due to a bandwidth routing limitation, you should not configure more than six channels in a Processor to receive at 1080p/50 or 1080p/59, or the switch mode will revert to Make After Break mode resulting in non-clean switches.*

2022-6 Mode Audio Source	This parameter appears when the Receiver mode (above) is ST 2022-6 only. Options are: • ST 2110-30/31 • ST 2022-6 Audio
2022-6 Mode Anc Source	This parameter appears when the Receiver mode (above) is ST 2022-6 only. Options are: • ST 2110-40 • ST 2022-6 Anc
Receiver Video Standard **Note:** Sync and Multiviewer(s) modes only. HD Mode.	Selects the input video standard. Options include the following: • 525i/59.94 • 625i/50 • 720p/50 • 720p/59.94 • 1080i/50 • 1080i/59.94 • 1080p/23.98 • 1080p/24 • 1080psf/23.98 • 1080psf/24 • 1080p/25 • 1080p/29.97 • 1080p/50 • 1080p/59.94
Receiver UHD Video Standard **Note**: Always available in Remap mode and available in Sync and Multiviewer(s) mode when the section is configured as UHD.	Selects the input video standard. Options include the following: • 2160p/23.98 • 2160p/24 • 2160p/25 • 2160p/29.97 • 2160p/50 • 2160p/59.94
Payload ID Source Dominance	Allows for determining priority for determining Colorimetry and TCS. Select from: • Auto • SDP • VPID Also see Configuring VPID (on page 327).
Timestamp Offset	Specifies the RTP timestamp offset for this channel. The offset is measured in video samples.

Primary and Secondary

The following parameters appear for both the **Primary** and **Secondary** networks.

WAN Select	Specifies the WAN for this channel. Choose from WAN 1 - 4. This field also displays the IP address and VLAN defined in the Element's IP WAN menu.
IP Address	Specifies the IP address for the channel.
UDP Port	Specifies the UDP port for the channel.
Multicast Source	Specifies the source address for multicast assignment.

Note: For a Primary or Secondary interface, if the IP address is set to 0.0.0.0 and the UDP port is set to zero, no input will be expected.

Input Tab: IP Video Status

Switch Mode	This read-only parameter displays the switch mode for the selected channel. In **Make Before Break** mode, the "Next Source" stream is acquired by IGMP Joins. The previous stream is removed after a clean transition of video and audio by IGMP Leaves. There must be enough bandwidth remaining on the 100G Ethernet Links to have the "Next Source" stream to be present alongside the current stream. In **Make After Break** mode, the current stream is lost by IGMP Leaves. If you receive an error message under "Switch Error" indicating that the switch failed due to timeout, change the **IGMP Leave Delay** parameter value as described in Configuring IP Control for SNP (on page 359), then perform the switch again by clicking **Take**. Assuming the timeout does not occur, after waiting for the delay indicated in the **IGMP Leave Delay** parameter and for the current stream to be lost, the "Next Source" stream will be acquired by IGMP joins. There will not be a clean transition of video and audio in this switch mode. **Make After Break** will only work if the amount of bandwidth being received by the device can dynamically change due to IGMP Leaves/Joins or with SDNO. Otherwise **Make After Break** will always fail with a timeout message.
Switch Status	This read-only parameter confirms the success of the switch to the next source. The possible values are: **Ready**, **Switching**, **Switch Complete**, and **Switch Failed**.
Switch Error	Indicates whether an error has occurred on the recent switch.

Video Standard	• 625i/50 • 525i/59.94 • 720p/50 • 720p/59.94 • 1080i/50 • 1080i/59.94 • 1080p/23.98 • 1080psf/23.98 • 1080p/24 • 1080psf/24 • 1080p/25 • 1080p/29.97 • 1080p/50 • 1080p/59.94 • 2160p/23.98 • 2160p/24 • 2160p/25 • 2160p/29.97 • 2160p/50 • 2160p/59.94 • Not Present
Video Input Colorimetry	The input colorimetry used for conversion. Without SDNO, this will always indicate "Unknown". • Rec 601 • Rec 709 • Rec 2020/2100 • Unknown
Video Input Transfer Characteristics	Without SDNO, the input TCS will always display "Unspecified". • SDR-TV • HLG • PQ • Unspecified/SLOG3
Video Input Payload ID	Reports on the presence of VPID if received from the ANC data. Also see VPID Status (on page 328)
Switch Count	Indicates how many switches have taken place since the last reboot.
Video Packet Count	Total packets counted since counting started. This is reset to 0 with **Clear Packet Counters** (below).
Video Missing Packet Count	Reports the number of video packets missing since the last time the **Clear Packet Counters** button was clicked.

Video Out of Range Packet Count	Reports the number of video packets out of range since the last time the **Clear Packet Counters** button was clicked. Counters are explained more in Statistical Counters (on page 386).
Clear Packet Counters	Click to clear all of the counters for this IP Receiver channel, including • Video Packet Count • Video Missing Packet Count • Video Out of Range Packet Count
Video Network Path Differential	Reports the delay between receiving the same packet from path 1 and path 2 for seamless protection (in milliseconds).
Video Seamless Protection Status	Reports whether redundant video is available for seamless protection.
Picture Height	Reports the picture height

Primary and Secondary

The following parameters appear for both the Primary and Secondary networks.

Current (Primary/Secondary) IP Address	This read-only parameter displays the IP address values that you entered in one of two places: • If the configuration is unicast, the values entered in the IP WAN table appear here. • If the operation is multicast, the Next Address value appears here.
Current (Primary/Secondary) UDP Port	This read -only parameter reports the Primary or Secondary IP address of the associated IP Receiver channel.

Input Tab: IP Audio Configuration

Audio Stream	Choose an audio stream from the drop-down menu. The rest of the controls will affect the selected audio stream only.

General

Audio IP Receiver Enable	Select On or Off to enable or disable this Audio IP Receiver stream. Each audio IP Receiver must be enabled separately. ***Note:*** *Each SNP device can receive a maximum of 256 mono audio channels across all processors.*
Receiver Mode	Choose the audio receiver mode for this stream. Options are: • ST2110-30 • ST2110-31
Bit Width	Bit width options depend on the Set Rx Mode setting. The full set of options are: • 16 bits • 24 bits

Number of Channels	Indicates the number of audio channels present in this stream. For ST2110-31, must be a multiple of 2.
Timestamp Offset	Specifies the TRP timestamp offset for this channel, measured in video samples.
Packet Time	Set the packet time for incoming audio channels: • Auto (default) • 125 us • 250 us • 333 us • 1 ms • 4 ms • 500 ms

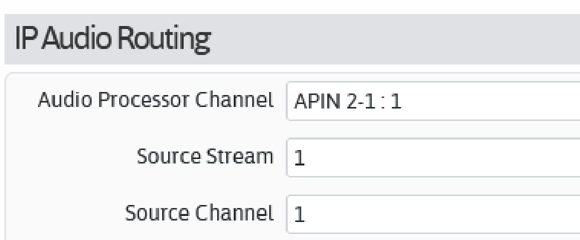
Primary/Secondary

The following parameters appear for both the Primary and Secondary networks.

WAN Select	Specifies the WAN for this stream. Choose from WAN 1 - 4. This field also displays the IP address and VLAN defined in the Element's IP WAN menu.
IP Address	Specifies the IP address for the stream.
UDP Port	Specifies the UDP port for the stream.
Multicast Source	Specifies the source address for multicast assignment.

Input Tab: IP Audio Routing

As you select a channel and streams, a field updates to show the SDNO stream, slot, port etc.



Audio Processor Channel	Choose a channel from 1 - 16, applies to the routing controls below. *APIN is an internal, virtual routing point for use in the AAP and Audio TABs.*
Source Stream	Selects the IP audio receiver stream (within this program) which will supply this channel
Source Channel	Selects the channel within the selected input stream

Input Tab: IP Audio Status

Switch Error	Indicates whether an error has occurred on the recent switch.
Switch Count	Indicates how many switches have taken place since the last reboot.
Packet Count	Reports the total number of packets since the last time **Clear Packet Counters** were reset.
Out of Range Packet Count	Reports the number of audio packets out of range since the last time Clear Packet Counters were reset. Counters are explained more in Statistical Counters.
Missing Packet Count	Reports the number of audio packets missing since the last time Clear Packet Counters were reset.
Clear Packet Counters	This button resets the following counters to 0: • Switch Count • Audio Packet Count • Audio Missing Packet Count • Audio Out of Range Packet Count
Network Path Differential	Reports the delay between receiving the same packet from path 1 and path 2 for seamless protection (in milliseconds).
Seamless Protection Status	Reports whether redundant audio is available for seamless protection.
Packet Time	Reports the audio packet interval time in milliseconds. It will report "Unsupported" if the packet time can't be determined. This status correlates to the packet time set in the Transmitter - see Packet time in Output Tab: IP Audio Configuration (on page 457).

Primary and Secondary

These parameters are read-only and for informational purposes only.

Current (Primary and Secondary) IP Address	This read-only parameter displays the IP address values that you entered in one of two places. If the configuration is unicast, the values entered in the IP WAN table appear here. If the operation is multicast, the Next Address value appears here.
Current (Primary and Secondary) UDP Port	These read-only parameters report the Primary and Secondary IP addresses of the four IP Receiver channels.

Input Tab: Audio Status

Channel Quick View	
Audio V-bit Status	
Audio Format Status	
Channel Full View	
Source Channel	

Input PCM Status	

Input Tab: Audio SRC Configuration and Status

Audio Pair	Each audio pair is configured independently. Choose the audio pair, from 1 - 8, for which the rest of the parameters in this group will apply.
Input Pair SRC Control	These controls configure the operation mode of the selected sample rate converter. Options are **Engage**, **Auto**, and **Bypass**. When an SRC Control parameter is set to **Auto**, the Audio Channel Status bits determine whether the audio data is PCM or non-PCM, and whether the audio data is passed through the Audio Sample Rate Converters (SRC). The **Engage** option always forces the audio data through the audio SRC, and **Bypass** always forces the audio data around the audio SRC.
SRC Pair Engage Status	Feedback parameter that indicates the SRC status for this pair as **Engaged** or **Bypassed**.

Input Tab: Audio Channel Configuration and Status

Source Channel	Each audio channel is configured independently. Choose the audio channel, 1 - 16, for which the rest of the parameters in this group apply.
Input PCM Status	Indicates whether the audio data for this channel is PCM or non-PCM.

Input Tab: IP Ancillary Data Stream Configuration (IP Input)

Data Stream	Choose a stream from the drop-down menu. The rest of the controls will affect the selected data stream only.

General

ANC Data IP Receiver Enable	Select On or Off to enable or disable this data IP Receiver stream. Each data IP Receiver must be enabled separately.
Timestamp Offset	Specifies the TRP timestamp offset for this channel, measured in video samples.

Primary/Secondary

The following parameters appear for both the Primary and Secondary networks.

WAN Select	Specifies the WAN for this stream. Choose from WAN 1 - 4. This field also displays the IP address and VLAN defined in the Element's IP WAN menu.
IP Address	Specifies the IP address for the stream.
UDP Port	Specifies the UDP port for the stream.
Multicast Source	Specifies the source address for multicast assignment.

Input Tab: IP Ancillary Data Stream Status

Switch Error	Indicates whether an error has occurred on the recent switch.
Switch Count	Indicates how many switches have taken place since the last reboot.
ANC Data Packet Count	Reports the total number of packets since the last time **Clear Packet Counters** were reset.
ANC Data Out of Range Packet Count	Reports number of data packets out of range since the last time Clear Packet Counters were reset. Counters are explained in Statistical Counters.
ANC Data Missing Packet Count	Reports the number of data packets missing since the last time Clear Packet Counters were reset.
Clear Packet Counters	This button resets the following counters to 0: • Switch Count • Data Packet Count • Data Missing Packet Count • Data Out of Range Packet Count
ANC Data Network Path Differential	Reports the delay between receiving the same packet from path 1 and path 2 for seamless protection (in milliseconds).
ANC Data Seamless Protection Status	Reports whether redundant data is available for seamless protection.

Primary and Secondary

These parameters are read-only and for informational purposes only.

Current (Primary and Secondary) IP Address	This read-only parameter displays the IP address values that you entered in one of two places. If the configuration is unicast, the values entered in the IP WAN table appear here. If the operation is multicast, the Next Address value appears here.
Current (Primary and Secondary) UDP Port	These read-only parameters report the Primary and Secondary IP addresses of the four IP Receiver channels.

Input Tab: Ancillary Data Status

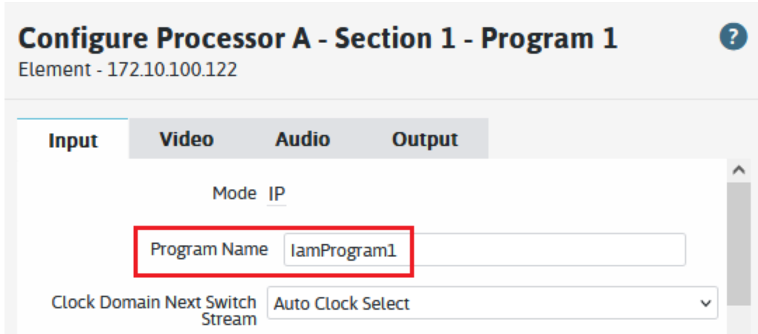
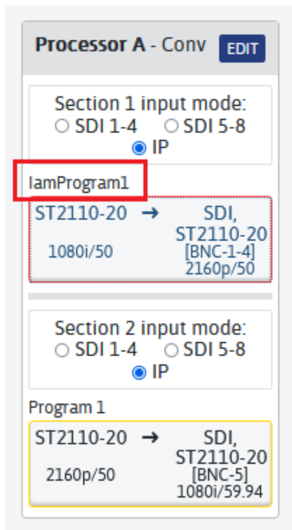
CC/TT	This read-only parameter reports if closed captions or teletext is present, and what line it is on
SMPTE 2031	This read-only parameter reports on the presence of SMPTE ST-2031 subtitles
EDC	This read-only parameter reports if Evertz Dreamcatcher is present
AFD	This read-only parameter reports if active format description is detected
SCTE-104 Splicing	This read-only parameter reports if SCTE-104 Splicing is detected
ATC	This read-only parameter reports if Ancillary Timecode (SMPTE-12M) is detected (currently displayed for Conversion Personalities)
Source ID	This read-only parameter reports if Source ID is present.
BrandNet	This read-only parameter reports if BrandNet triggers are present.

Input Tab: SDI Input Mode

Below the Pixel Format settings described in Input Tab: Pixel Format (on page 389), you will find Input SDI options divided into the following groups:

In this Section

Input Tab (SDI): Program Name

Program Name	Allows for setting a custom program name. There is a 50 character limit for the Program Name.  This program name then shows in place of the default Program 1/2/3/4.  If left blank, the Program shows the default name (for example, Program 1, Program 2, etc.).

Input Tab: Pixel Format

This section only appears when the Processor is in Remap or Conversion mode.

UHD Quad Input Pixel Format Select	If the input is UHD, this selection determines how incoming video is interpreted: • Square Division • Pixel Interleave The Square Division option is only available when the Input Mode is SDI. This selection only has an effect when using Quad inputs; 12G is always interleave.

UHD Input Pixel Format Used	*This status is only available in Conversion mode.* This read-only parameter indicates **Yes** (indicating a mismatch) when both input and output are configured to UHD and either one is set to SQD in Conversion mode. This setting is independent of the real input/output standard, which can be HD.
UHD Pixel Format Mismatched	Reports if the pixel format is mismatched

Input Tab (SDI): Video Configuration

Options in this section will vary depending on the mode the Processor is in.

SDI Input Link Select (UHD only)	Determines which SDI input to use. Options will vary depending on the processor mode. • 1st Link (TL) top left • 2nd Link (TR) top right • 3rd Link (BL) bottom left • 4th Link (BR) bottom right • UHD (Quad Link) (Convert mode only) • UHD (12G) Across all personalities except Sync when in HD mode, 1st BNC • SFP 1 (if an SFP module is installed; see Configure SFPs (on page 115).) • SFP 2 (if an SFP module is installed) ***Note:*** *If the SFP module is HDMI This option will only appear in the second section, but will be routed to both sections when chosen.*

Input Tab (SDI): Video Status

The contents of this tab may vary depending on the **Processor Section** setting. See Configuring a Section for HD or UHD (on page 116) for more information.

- When the Section is set to HD, the display will show the options for the one BNC associated with this SDI input.
- When the Section is set to UHD, most of these parameters will appear four times, once for each of the associated inputs. These parameters will also repeat for input SFP (i.e., SFP-B-1) on Channels 1, 5, 9, etc.

Video Input Present (UHD mode only)	This read-only parameter indicates **Yes** there is UHD video present or **No** there is not.
BNC-# or SFP-#	Displays the number of the BNC or SFP for which the following parameters are relevant. This option will appear once when the Processor Section mode is HD, or four times when in UHD mode.
Video Present (HD mode only)	Indicates presence or absence of video on the designated input.

Video Input Standard	Indicates the input standard for video, which can be any of the following: • 625i/50 • 525i/59.94 • 720p/50 • 720p/59.94 • 1080i/50 • 1080i/59.94 • 1080p/23.98 • 1080psf/23.98 • 1080p/24 • 1080psf/24 • 1080p/25 • 1080p/29.97 • 1080p/50 • 1080p/59.94 • 2160p/23.98 • 2160p/24 • 2160p/25 • 2160p/29.97 • 2160p/50 • 2160p/59.94
Input C CRC Status	Counts the CRC (cyclic redundancy check) errors on input C.
Input Y CRC Status	Counts the CRC errors on input Y.
AP EDH Errors	When the input is SD-SDI, this parameter replaces the **Input C CRC** parameter
FF EDH Errors	When the input is SD-SDI, this parameter replaces the **Input Y CRC** parameter
EDH Present	When the input is SD-SDI, the **EDH Present** parameter replaces the **Input C CRC Status** and **Input Y CRC Status** parameters which are hidden (since these parameters would display "0" and could be misleading in case of a bad input signal)
Video Input Payload ID	The unique ID assigned to the payload based on the video input standard.
Video Input Colorimetry	The input colorimetry used for conversion, the SDI status is derived from VPID. • Rec 709 • Reserved • UHDTV • Unknown

Video Input Transfer Characteristics	SDI TCS status is derived from VPID. • SDR-TV • HLG • PQ • Unspecified/SLOG3
Clear CRC Errors	Clears the input video CRC errors.
Clear EDH Errors	When the input is SD-SDI, this parameter replaces the **Clear CRC Errors** parameter

Input Tab (SDI): Audio De-Embedder

General Configuration

Ignore Checksum Error	Determines whether the Channel will respond when there are checksum errors in the incoming stream.
Ignore ECC Error	Determines whether the Channel will respond when there are ECC errors in the incoming stream.
Ignore Parity Error	Determines whether the Channel will respond when there are parity errors in the incoming stream.
Group (1 - 4) Error Control	Determines the group response when errors are received, when Ignore is not selected for that type of error (above). Options are: • Mute • Repeat
Group (1 - 4) DBN Error Ignore	Determines whether the group will respond when there are DBN errors in the incoming stream.

General Status

Demux V-bit status	Lists the status for each of the 16 channels as EEEE EEEE EEEE EEEE where E indicates present and = indicates absent.
Group (1 - 4) Present	Indicates whether the specified group is present.
Group (1 - 4) Checksum Error	Indicates an error in the Checksum category.
Group (1 - 4) DBN Error	Indicates an error in the Data Block Number category.
Group (1 - 4) Parity Error	Indicates an error in the Parity category.
Group (1 - 4) ECC Error	Indicates an error in the Error Correction Code category.
Group (1 - 4) Active Channel	Lists the active channel in the demux group.
Group (1 - 4) Sample Rate	Indicates the sample rate for the demux group.

Input Tab (SDI): Audio Status

Channel Quick View	
Audio V-bit Status	
Audio Format Status	
Channel Full View	
Source Channel	
Input PCM Status	

Input Tab (SDI): Audio SRC Configuration and Status

Audio Pair	Choose the audio pair to configure, can be 1 - 8. Other controls on this page will then just configure that pair.
Input Pair SRC Control	These controls configure the operation mode of the sample rate converters. Options are **Engage**, **Auto**, and **Bypass**. When an SRC Control parameter is set to **Auto**, the Audio Channel Status bits determine whether the audio data is PCM or non-PCM, and whether the audio data is passed through the Audio Sample Rate Converters (SRC). The **Engage** option always forces the audio data through the audio SRC, and **Bypass** always forces the audio data around the audio SRC.
SRC Pair Engage Status	The characters in this read-only parameter each represent an audio sample rate converter. Yes = Engaged and No = Bypassed. Both the left and right audio channels of an audio pair are either Synchronized (Engaged) or not Synchronized (Bypassed). Non-PCM audio data must be Bypassed around the Audio Synchronizer; otherwise it will be corrupted.

Input Tab (SDI): Ancillary Data Status

CC/TT	This read-only parameter reports if closed captions or teletext is present, and what line it is on
SMPTE 2031	This read-only parameter reports on the presence of SMPTE ST-2031 subtitles
EDC	This read-only parameter reports if Evertz Dreamcatcher is present
AFD	This read-only parameter reports if active format description is detected
SCTE-104 Splicing	This read-only parameter reports if SCTE-104 Splicing is detected
ATC	This read-only parameter reports if Ancillary Timecode (SMPTE-12M) is detected (currently displayed for Conversion Personalities)
Source ID	This read-only parameter reports if Source ID is present.
BrandNet	

Program Configuration: Video Tab

This tab contains different options depending on whether the Processor section is configured for UHD or HD mode. See Configuring a Section for HD or UHD (on page 116).

Note: This tab does not appear on Processors configured for Multiviewer mode.

This tab contains the following sub-sections:

In This Section

Video Tab: Video Control

Parameters with a LIVE indicator will update on the actual stream as you change them, without the **Apply** button being pressed.

Note: These three parameters are 4 x 1080p when in UHD mode. When in UHD mode (i.e., 4 x 1080p), delay parameters are applied to each individual frame quadrant.	

Frame Delay (frames)	***Note:*** *This parameter is disabled when in Low Latency mode. See Configuring a Processor (on page 113).*
	The Frame Delay parameter compensates for other external processes by providing a delay of the video signal in one-frame increments. The amount of achievable delay is based on the video input standard. Note that the actual frame delay shown on the GUI is the maximum frame delay plus the minimum latency for the conversion, which is 2 frames/fields for SQD formats and 1 frame/field for all other formats.
	The following are the Max frame delays depending on personality and format:
	• MCL, TR07/TR08, Dual/Quad Conversion
	  • 5 frames (interlaced/psf inputs)
	  • 10 frames (progressive input)
	• SYNC, REMAP
	  • 10 frames
	• Dual Gateway
	  • 30 frames

Vphase (lines)	Adjusts the vertical phase of the frame sync from 0 to 1124 with units of "lines" and precision of 0 decimal places. • 720p (0 to 749) • 1080p/i (0 to 1124) • 525i - (0 to 524) • 625i - (0 to 624) This parameter is unavailable when in Low Latency mode and when **IP Video Tx is enabled**. See Configuring a Processor (on page 113).

Hphase (µs)	Adjusts the horizontal phase of the frame sync, with a precision of three decimal places. The range varies depending on the video standard and frame rate: • 625i/50 (0 to 63.963) • 525i/59.94 (0 to 63.519) • 720p/50 (0 to 26.653) • 720p/59.94 (0 to 26.653) • 1080i/50 (0 to 35.542) • 1080i/59.94 (0 to 29.646) • 1080p/23.98 (0 to 37.061) • 1080psf/23.98 (0 to 37.061) • 1080p/24 (0 to 37.061) • 1080psf/24 (0 to 37.061) • 1080p/25 (0 to 35.542) • 1080p/29.97 (0 to 29.646) • 1080p/50 (0 to 17.771) • 1080p/59.94 (0 to 14.823) UHD section mode • 2160p/23.98 (0 to 37.024) • 2160p/24 (0 to 37.024) • 2160p/25 (0 to 35.542) • 2160p/29.97 (0 to 29.646) • 2160p/50 (0 to 17.771) • 2160p/59.94 (0 to 14.823) This parameter is unavailable when in Low Latency mode and when **IP Video Tx is enabled**. See Configuring a Processor (on page 113).
Dolby E A/V Align	Dolby E header alignment control (See the *Dolby E header alignment* parameter in the Audio Tab: General Configuration (on page 449) tab) delays Dolby E audio to ensure the Dolby E gets embedded on the right line number. This causes a mismatch in A/V sync between Dolby E and Video as Video will now be early. To resolve this, 1 Dolby E frame equivalent delay is added to Video to ensure Dolby E to Video A/V is aligned at the output. Video delay can be 1 or 2 video frames (for p50/59). Also see Dolby E Encoder Latency (on page 286) and Dolby E Decoder Latency (on page 286).

Video Tab: Output

Parameters with a LIVE indicator will update on the actual stream as you change them, without the **Apply** button being pressed.

<table>
<tr><td rowspan="3">Loss of Video Mode</td><td>Selects the behavior when Loss of video (LOV) happens. Options are:
Pass: Continues to output bad signal (default)
Black: Outputs a black signal
Freeze: Outputs a still frame
Off: The output is turned off
Freeze, then X: This mode freezes the output when there is an input glitch, and if the glitch persists then the output follows the Delayed LOV mode after Freeze setting.</td></tr>
<tr><td>Note: Use this setting if you don't want the output to go to black as a result of input glitches that are very short, and then to go to one of Black/pass/off/TSG (to indicate something is wrong) if the glitch lasts longer.</td></tr>
<tr><td>Pass settings are more useful when commissioning a system and detecting unreliable sources. Freeze, being less noticeable, may be more desirable on a live system.</td></tr>
<tr><td rowspan="2">Delayed LOV mode after Freeze</td><td>This setting is displayed if Loss of Video Mode is set to Freeze, then X.
It lets you determine what to do after the defined time (Delayed LOV Time) has elapsed and there is still a persistent input glitch. Options are:
Black: Outputs a black signal
Pass: Continues to output bad signal
Off:The output is turned off
TSG: Outputs the set TSG</td></tr>
<tr><td>Note: If set to TSG, TSG needs to be preconfigured as desired, but does not need to be enabled explicitly (LOV enables TSG when LOV occurs).</td></tr>
<tr><td>Delayed LOV Time</td><td>This setting is displayed if Loss of Video Mode is set to Freeze, then X.
This is the the period of time (in seconds) to tolerate any input glitches and have it not affect the output.

The range is 1-10 seconds and the default is 2 seconds.</td></tr>
<tr><td>Force Black</td><td>Forces the output video to black when checked.</td></tr>
<tr><td>Force Freeze</td><td>Forces the output video to freeze when checked.</td></tr>
</table>

Output Video Standard	***Note:*** *This parameter only appears in Conversion mode.* The standard the video will be converted to. Options are: • 720p/50 • 720p/59.94 • 1080i/50 • 1080i/59.94 • 1080p/23.98 • 1080psf/23.98 • 1080p/24 • 1080psf/24 • 1080p/25 • 1080p/29.97 • 1080p/50 • 1080p/59.94 • 2160p/23.98 • 2160p/24 • 2160p/25 • 2160p/29.97 • 2160p/50 • 2160p/59.94 ***Note:*** *The 2160p standards are invalid when the input is UHD-SQD.*
Output Video Standard (Quad Conversion)	The standard the video will be converted to. Options are: • 625i/50 • 525i/59.94 • 720p/50 • 720p/59.94 • 1080i/50 • 1080i/59.94 • 1080p/23.98 • 1080psf/23.98 • 1080p/24 • 1080psf/24 • 1080p/25 • 1080p/29.97 • 1080p/50 • 1080p/59.94

Freeze Mode	***Note:*** *This parameter appears in Sync mode only.* Sets the type of frozen output video. Options are: • **Field1** • **Field2** • **Frame** (default)
Enable Force Video Standard	***Note:*** *This parameter does not appear in Conversion modes.* Forces the output video to conform to a pre-selected standard (selected in the **Video Forced Standard** parameter below) when checked.
Video Forced Standard	***Note:*** *This parameter does not appear in Conversion modes.* The standard the video will conform to when **Enable Force Video Standard** is selected. Options are: • 625i/50 • 525i/59.94 • 720p/50 • 720p/59.94 • 1080i/50 • 1080i/59.94 • 1080p/23.98 • 1080psf/23.98 • 1080p/24 • 1080psf/24 • 1080p/25 • 1080p/29.97 • 1080p/50 • 1080p/59.94 UHD section mode • 2160p/23.98 • 2160p/24 • 2160p/25 • 2160p/29.97 • 2160p/50 • 2160p/59.94

Proxy Output Force SDR-709	If this parameter is enabled and the main video is 1080p59 or 2160p59, the proxy output will be 1080p59. If the main video is 1080p50 or 2160p50, the main video will be 1080p50. If this parameter not enabled, the proxy will be 1080i59 or 1080i50 for those inputs. For other main video resolutions like 1080i/720p/SD, the proxy video will always be the same as main video regardless of whether the checkbox is enabled or not. ***Note:*** *The processor can only support up 8 x 1080p main video + 1 x 1080p59 proxy, the second proxy will be disabled due to bandwidth.*
Proxy Input Select	Selects the source for the proxy output. Output will be 1080i for 3G signals, or whatever the input is for lower bandwidth signals. This option only appears when the Processor Section is set to UHD. Options are: • Link 1 • Link 2 • Link 3 • Link 4 • UHD (Quad Link in Conversion mode, 12G across all personalities except Sync when in HD mode, 1st BNC)
Proxy 3G Output Allow	Enables up to 3G for proxy output. If the SNP is not licensed for proxies, there is no proxy output. When this parameter is checked: • If input is UHD, proxy is 3G • if input is 3G, proxy is 3G • if input is 1.5G or SD, proxy is same as input When this parameter is not checked: • if input is UHD, proxy is 1.5G • if input is 3G, proxy is 1.5G • if input is 1.5G or SD, proxy is same as input *Note: Proxy 3G output will not work for TR07 or TR08 Encoder in UHD mode if the Proxy Input Select is either Link 2, Link 3 or Link 4.*

Video Tab: Test Signal Generator

Parameters with a LIVE indicator will update on the actual stream as you change them, without the **Apply** button being pressed.

TSG Enable	Activates or deactivates the test signal generator.	
TSG Pattern	Selects the test pattern to display. HD Options are: • Black • Color Bars 75% • Horizontal Sweep Y-only • Horizontal Sweep • White • Cross Hatch	UHD options are: • Black • White • COLOR BARS 75 UHD • Horizontal Sweep Y-only • Horizontal Sweep • Cross Hatch
Bouncing Box Enable	Note that *TSG Enable* must be checked for this option to be enabled. Selecting this moves a square along the screen and off the edges and allows you to determine if your pictures are updating. This option is useful for debugging purposes, and useful in cases where you don't have a live signal, just a test pattern, but want motion. Note that this option is only currently available on the Sync personality.	• Enable • Disable
Bouncing Box Size	Sets the size of the bouncing box.	Range is 10-28 Default: 28
Bouncing Box Speed	Sets the speed of the bouncing box.	Range is 1-31 Default: 7
Bouncing Box Color (Y)	Sets the Y parameter YCrCb scale of the bouncing box.	Range is 0-255 Default: 235
Bouncing Box Color (Cr)	Sets the Cr parameter YCrCb scale of the bouncing box.	Range is 0-255 Default: 128
Bouncing Box Color (Cb)	Sets the Cb parameter YCrCb scale of the bouncing box.	Range is 0-255 Default: 128

Video Tab: Video Status

Video Input Present	Indicates whether the frame sync is operating on this processor and channel.
Video Input Standard	Indicates the standard of incoming video for this processor and channel.
Video Output Standard	Indicates the standard of output video for this processor and channel.
Frozen Status	Indicates whether the frame sync is frozen.
Close Captions/Teletext Present	Indicates if closed captions or teletext is detected.
Close Captions/Teletext Present Line	Reports the video line number of closed captions or teletext if detected.

Video Tab: Colorimetry/TCS Control and Status

The following status parameters indicate what coloversion is being used, which is especially useful when Auto override is selected for Colorimetry and TCS parameters.

Input Colorimetry and TCS Override	Configures input override of colorimetry and transfer characteristics of video for input color conversion. • SDR-709 • SDR-601 • SDR-2020 • HLG-2100 • PQ-2100 • SLOG3-2020 • Auto (default) For **SDI input**, the colorimetry information is taken from the stream unless it is set by SDNO. If SDNO is not configured, input colorimetry will not be auto-detected, because it may not be part of the stream. • When the input is unknown, and the video input standard is SD – the effective input Colorimetry/TCS is SDR-601 • When the input is unknown, and the video input standard is HD or 3G – the effective input Colorimetry/TCS is SDR-709 • When the input is unknown, and the video input standard is UHD – the effective input Colorimetry/TCS is SDR-2020 For **IP input,** the colorimetry information is provided by SDNO. If SDNO is not configured properly, the input colorimetry will not be auto-detected, because it may not be part of the IP stream. • When the input is unknown, and the video input standard is SD – the effective input Colorimetry/TCS is SDR-601 • When the input is unknown, and the video input standard is HD or 3G – the effective input Colorimetry/TCS is SDR-709 • When the input is unknown, and the video input standard is UHD –

	the effective input Colorimetry/TCS is SDR-2020. **Note:** If you had a setting of "SLOG3" for this parameter and were using firmware earlier than 1.2, after upgrading to the latest firmware and restarting the SNP, you must re-select this option, but as "SLOG3-2020".
Output Colorimetry and TCS	Configures override of colorimetry and transfer characteristics during output video color conversion. • SDR-709 • SDR-601 • SDR-2020 • HLG-2100 • PQ-2100 • SLOG3-2020 • Auto (default) In Sync and Remap modes, the colorimetry will follow the input override. In Conversion mode, SDR-709 is used for HD/3G converted output video standard, and SDR-2020 is used for UHD output. **Note:** If you had a setting of "SLOG3" for this parameter and were using firmware earlier than 1.2, after upgrading to the latest firmware and restarting the SNP, you must re-select this option, but as "SLOG3-2020". **Note:** This parameter is only available when the **SNP-PSK-HDR** (HDR Adjustment Feature) license is enabled for this program. **Note:** This parameter is not displayed for the JPEG-XS personality
Effective Input Colorimetry	Indicates the input colorimetry used for conversion, one of: • Rec 601 • Rec 709 • Rec 2020/2100 • Unknown
Effective Input Transfer Characteristics	Transfer characteristics used for the input conversion
Effective Mapping Mode	Indicates the mapping mode actually in use based on user defined settings and other considerations. See the *Mapping mode* parameter (Video Tab: Color Adjustment (on page 415))
Effective Output Colorimetry	The output colorimetry used for conversion: • Rec 601 • Rec 709 • Rec 2020/2100 • Unknown **Note:** This parameter is not displayed for the JPEG-XS personality

Effective Output Transfer Characteristics	Transfer characteristics used for output conversion. • SDR-TV • HLG • PQ • Unspecified/SLOG3 **Note:** This parameter is not displayed for the JPEG-XS personality

Video Tab: 3D LUT Control and Status

Parameters with a LIVE indicator will update on the actual stream as you change them, without the **Apply** button being pressed.

3D LUT Select	Select the LUT to use. The dropdown contains a listing of LUTs in the system and UNITY - a default LUT.
3D LUT Operating Mode	• **ColorProc Force**: This option (the default) uses the SNP's non-linear and linear domain mathematical pipelines and does not route the signal through the selected LUT • **LUT Forced**: This option uses the SNP's input (non-linear) domain color processing engine, followed by the user selected LUT, regardless of whether the transfer characteristic or colorimetry of the input signal are appropriate for the selected LUT • **Auto**: This option uses the SNP's input (non-linear) domain color processing engine, followed by an automated selection of: (A) The selected LUT or (B) The SNP’s linear domain mathematical pipeline The automated selection is based on the transfer characteristic (TCS) and colorimetry of the incoming signal, and the requested TCS and colorimetry of the converter’s output. If the input and output TCS match the metadata of the selected LUT, then the selected LUT will be used, otherwise the SNP linear domain pipeline will be used.
Pre-3D LUT GBR Clip Mode	Clipping mode of the GBR values prior to 3D LUT processing. Options are: • Hue Preserving • Per Component
3D LUT Status	Displays LUT status. The LUT status contains three fields separated by commas. • The first field indicates whether the selected LUT is currently being used (Enabled) or not (Disabled) • The second and third fields reflect the metadata of the selected LUT, used in controlling the automatic LUT switching feature.

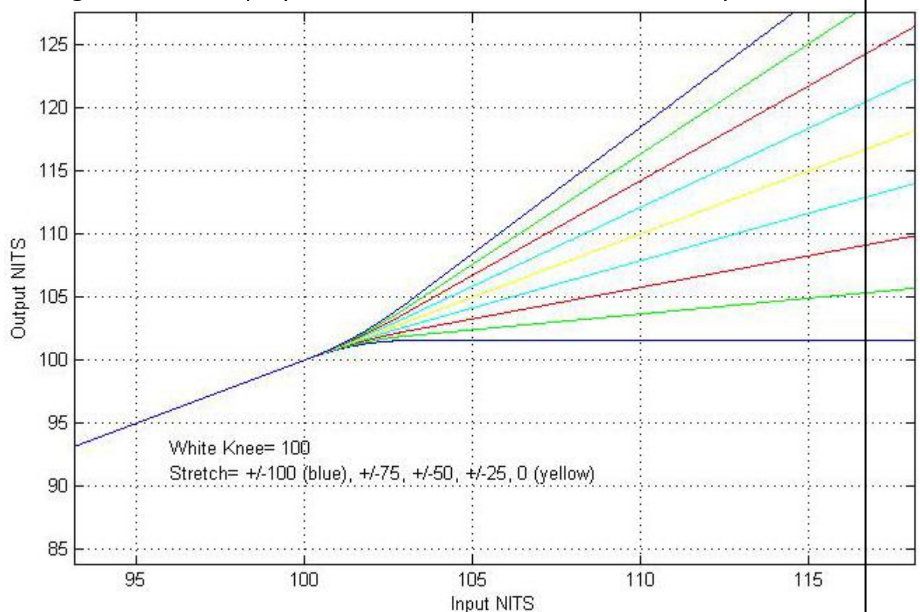
Video Tab: Color Adjustment

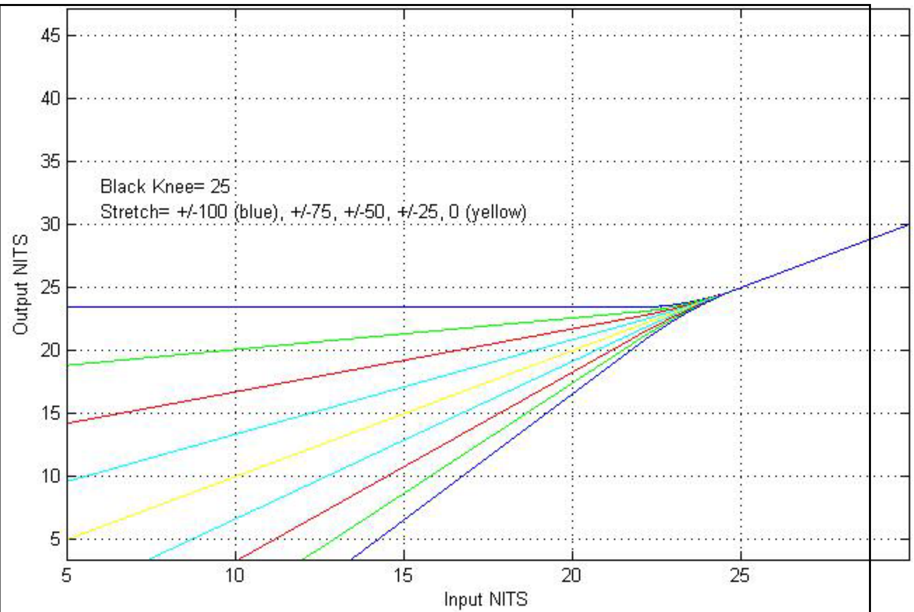
Note: This section is not displayed for the JPEG-XS personality.

Parameters with a LIVE indicator will update on the actual stream as you change them, without the **Apply** button being pressed.

Bypass the Color Processor	Bypasses the Color Processor
SD-525 First AP Line SD-625 First AP Line	These parameters specify the first line in SD to which color processing controls should be applied. The first few lines of the active picture may carry closed captioning, WSS, etc. so to avoid any processing of such data (and possible corruption), the first line to be processed can be modified. • For 525, the range is 20-23 (default is 22) • For 626, the range is 23-26 (default is 24)
Return to Neutral	This button restores all color processing controls for the related channel back to their neutral/default values.
Input Domain	
Black Level	Adjusts the black level of the video input across a range from -100.0 to 100.0 with units of "mV" and precision of 1 decimal place.
Cb Offset / Cr Offset	Adjusts the offset of the respective component of the video. The range is -100 to 100 mV.
Hue	Adjusts the hue phase of the input across a range from -180.00 to 179.90 with units of "deg" and precision of 2 decimal places.
Luma Gain	Adjusts the luminance gain of the video input across a range from -6.00 to 6.00 with units of "dB" and precision of 2 decimal places.
Chroma Gain	Adjusts the chrominance gain of the video input across a range from -6.00 to 6.00 with units of "dB" and precision of 2 decimal places.
Cb Gain / Cr Gain	Adjusts the gain of the respective component of the video. The range is -6.00 to 6.00 dB.
G Offset / B Offset / R Offset	Adjusts the offset of the respective component of the video. The range is -100 to 100 mV.
G Gain / B Gain / R Gain	Adjusts the gain of the respective component of the video. The range is -6.00 to 6.00 dB.
Linear Domain	

Mapping Mode	Select from: • Display Light • Scene Light • Scene Light (AIM) • Auto Auto is the default setting for Mapping Mode. When the input or the output Colorimetry is SDR-709, this control selects the default mapping mode behavior for the programs with Auto selected in the program's Video Color Mapping mode. If the *Proxy Output Force SDR-709* parameter (Video Tab: Output (on page 407) section) is selected, the Auto mode is used in that conversion. When in Auto mode, set the SDR-709 Mapping Mode parameter (Configure Element > System > HDR Mapping Mode Defaults) to indicate how SDR-709 signals should be handled. **General rules for conversion with automatic mode** • *Scene-Light* conversion is used in general, except in case of the below • If the input/output format is SDR-709, the user-specified SDR-709 control value is used • If the input/output format is PQ-2100, *Display-Light* conversion is used • The *Effective Mapping Mode* parameter (Video Tab: Colorimetry/TCS Control and Status (on page 412)) indicates the mapping mode actually in use *This parameter is displayed for Sync, Remap, and Conversion personalities. SNP-MV personalities do not display the Mapping Mode parameter but use the Auto setting internally.* *SNPs with older versions of the firmware that have been upgrade to 1.7 and beyond will not have Auto as the default mapping mode in the programs unless the user resets his configuration.*
GBR Gamma	
Optical G / B / R Offset	Set the G, B, or R offset
Optical G /B / R Gain	Set the G, B, or R gain
Optical Cb / Cr Gain	Set the Cb or Cr gain
Saturation	Set the saturation level
Optical White Gain	Adjust the gain of the video in the linear (optical) domain. The default is 0, and the range is -9.00 to 9.00 dB.

<table>
<tr><td>Optical White Knee</td><td>Adjusts the point at which the white stretch is applied to the white portion of the video. The range is 50-3200 nits.</td></tr>
<tr><td>Optical White Knee Contour</td><td>Adjust the white knee contour percentage</td></tr>
<tr><td>Optical White Stretch</td><td>Adjusts the amount of white knee applied to the video.
White knee determines the amount of additional gain applied to the white end of the RGB transfer functions in the look-up tables.
The value displayed is a percent of the available correction.
A positive white knee increases the slope of the last 15% of RGB values, and decreases the slope of the preceding 15%.
The figure below displays increased and decreased white slope.

The default is 0, and the range is ±100.</td></tr>
<tr><td>Optical Black Knee</td><td>Adjusts the point at which the black stretch is applied to the black portion of the video. The range is 0-50 nits.</td></tr>
<tr><td>Optical Black Knee Contour</td><td>Adjust the black knee contour percentage</td></tr>
<tr><td>Optical Black Stretch</td><td>Adjusts the amount of black knee applied to the video.
Black knee determines the amount of additional gain applied to the black end of the RGB transfer functions in the look-up tables.
The value displayed is a percent of the available correction.
A positive black knee parameter will increase the slope of the first 15% of the transfer function by the amount entered and decrease the slope of the next 15%, to return to the unmodified transfer function.
The figure below displays increased and decreased black knees.</td></tr>
</table>

	 The default is 0, and the range is ±100.
Output Domain	
GBR Clip Enable	Check to enable the following sliders to control Green/blue/red clipping. These sliders aren't visible until enabled.  Both parameters are measured in mV.
GBR Black Clip Level	The range is -100 to 100mV with a default of 0.
GBR White Clip Level	The range is650-770mV with a default of 700.
Black Clip Enable	Check to enable the **Black Clip Level** slider. This slider isn't visible otherwise.
Black Clip Level	The range is -100 to 100mV.
White Clip Enable	Check to enable the **White Clip Level** slider. This slider isn't visible otherwise.
White Clip Level	The range is 640 to 770mV.
Chroma Clip Enable	Check to enable the **Chroma Clip Level** slider and **Chroma Clip Mode** setting
Chroma Clip Level	Set the Chroma Clip Level. Range is 400 to 800 mV
Chroma Clip Mode	Set the Chroma Clip Mode. Select from Independent Cb/Cr or Locked Cb/Cr

Chroma Anti-Alias	The Chroma anti-alias setting allows for control over chrominance filtering ringing. Options are: • Bypass - No filtering • Default - Highest cutoff, sharpest roll-off • 2-7 - Decreasing cutoff (7 is lowest) and roll-off (7 is gentlest)

Video Tab: Scaler Configuration

Note: These parameters are only displayed for Conversion personalities.

This section includes sharpness controls for down conversion. These parameters have a LIVE indicator and will update on the actual stream as you change them, without the **Apply** button being pressed.

Horizontal BW	Adjusts the horizontal bandwidth across a range from -20 to +20 with 0 as the default. In case of 1080p-to-1080i conversion, the range is 20 to -35.
Vertical BW	Adjusts the vertical bandwidth across a range from -20 to +20 with 0 as the default. In case of 1080p-to-1080i conversion, the range is 20 to -35.
Reinterlace BW	Adjusts the reinterlace bandwidth across a range from -10 to 2.

Video Tab: On Screen Display

On Screen Display (OSD) provides a simple overlay text on the output for signal identification or downstream stream signal flow troubleshooting. These parameters are found on the Configure Program's **Video** tab.

Transparency	Range 0 - 15
Label Enable	Turns on the label.
Label Text	Enter text for the label to display. This field can contain up to 19 characters.
Label Position X	The horizontal starting position of the text. The range varies depending on your video standard: • 1080 standards: 0-57 • 720 standards: 0-49 • 2160 (SQD): 0-114 • 2160 (2SI): 0-57
Label Position Y	The vertical starting position of the text. The range varies depending on your video standard: • 1080 standards: 0-15 • 720 standards: 0-15 • 2160 (SQD): 0-30 • 2160 (2SI): 0-15

Program Configuration: AAP Tab

This tab contains parameters for Advanced Audio Processing operations.

Note: This tab is only displayed if AAP has been enabled. See Creating AAP Sessions (on page 290).

AAP is supported on the following personalities:
- Dual/Quad Conversion
- Sync

Only these Personalities display the AAP tab. The AAP tab is hidden if there are no associated AAP operations for a program.

In This Section

AAP Tab: Advanced Audio Processing

Processing Session	Select the desired function (subject to what has been licensed/enabled on the processor): UpMix, DownMix, etc. Options seen here depending on configuration include: • UpMix • DownMix • MultiMerge • UM+Loudness • DM+Loudness • MM+Loudness • Loudness 1.0 • Loudness 2.0 • Loudness 5.1 • Loudness 7.1 • Loudness 2x1.0 • Loudness 8x1.0 • Loudness 4x2.0 • Loudness 5.1 + 2.0 • Dolby E Encoder • Dolby E Decoder For more details, see DTS Processing (on page 277) and Dolby E Processing (on page 285).

AAP Tab: Input Routing and Gain

The settings in this section apply to all audio channels in the selected processor.

Algorithm Input	Select the Algorithm input. Options displayed here depend on the selected algorithm. For example, for Loudness 7.1, the following is displayed: • 1(L) • 2(R) • 3 (C) • 4 (LFE) • 5 (Ls) • 6 (Rs) • 7 (Lb) • 8 (Rb)

Input Type Select	Select the source input type to the AAP algorithm input. Options are: • APIN • MADI • TONES Based on the selection made, the Input Channel Select parameter is populated.

Input Channel Select	Select the source input channel, within the type of source, to the AAP algorithm input.
	The options displayed here depend on what is selected in the *Input Type Select* parameter.
	• If *Input Type Select* is **APIN**
	  • APIN is an internal, virtual routing point for use in the AAP and Audio TABs, fed by input audio channels configured on the Program's Input Tab. Choose an audio processor channel from 1 - 16.
	• If *Input Type Select* is **MADI**
	  • 1-128 extended channels are displayed for selection
	• If *Input Type Select* is **TONES**: The following tones are displayed for selection:
	  • 400 Hz
	  • 1 kHz
	  • 2 kHz
	  • Mute

Channel Gain	Set the gain for the audio input channel
Channel Invert	Select to invert the selected audio input channel to correct phase errors
Channel Mute	Select to enable muting for the selected audio input channel

AAP Tab: Parameters (Dolby E Encoder)

These parameters are displayed if Dolby E Encoder is selected.

Dolby E Encoder Status

Dolby E Frame Rate	The reference frame rate for the Encoder.

Dolby E Encoder

Dolby E Frame Bit Depth	Sets the Bit Depth of the Dolby E audio stream to 16-bit or 20-bit. To use all eight audio channels, set the Bit Depth to 20. A Bit Depth of 16 allows reduced bandwidth (Dolby E-2000k instead of Dolby E-2400k) but only supports a maximum of six audio channels. • 16 Bits • 20 Bits (default)
Program Configuration	Sets the Dolby E audio program mix. Options include: • 5.1+2 (default) • 5.1+2x1 • 4+4 • 4+2 • 3x2+2x1 • 2x2+4x1 • 2+6x1 • 8x1 • 5.1 • 4+2 • 4+2x1 • 3x2 • 2x2+2x1 • 2+4x1 • 6x1 • 4 • 2x2 • 2+2x1 • 4x1
Metadata Source	Sets the source for audio metadata. Currently limited to I**nternal**.
Metadata Reversion Mode	Defines what to do if an interruption in the Metadata Source is detected. The response can be set to: • Last Used (if available) • Internal (internal generator)

Metadata Controls Per Program

Program	Select the Program for metadata control
Audio Coding Mode	Sets the audio coding mode: • 1/0 (C) • 2/0 (L, R) • 3/0 (L, C, R) • 2/1 (L, R, S) • 3/1 (L, C, R, S) • 2/2 (L, R, Ls Rs) • 3/2 (L, C, R, Ls, Rs)
Bitstream Mode	Describes the audio service contained within the Dolby bitstream. A complete audio program may consist of a main audio service (a complete mix of all the program audio), an associated audio service comprising a complete mix, or one main service combined with an associated service. To form a complete audio program, it may be (but rarely is) necessary to decode both a main service and an associated service using a maximum total bit rate of 512 kbps. Select from: • Complete Main (default) • Music and Effects • Visually Impaired • Hearing Impaired • Dialogue • Commentary • Emergency • Voiceover • Karaoke
LFE Channel	Indicates whether an LFE (Low Frequency Effects) Channel is present within the bitstream. Select from: • LFE Channel nor present • LFE Channel present

Dialogue Normalization (dBFS)	Sets the average dialogue level. If the source of this encoding is Loudness Control processing, the value of Dialog Normalization should match the Target Loudness Level setting. Dialogue Level is also known as dialogue normalization or dialnorm. When received at the consumer's Dolby Digital decoder, this parameter setting determines a level shift in the decoder that sets, or normalizes, the average audio output of the decoder to a preset level. This aids in matching audio volume between program sources. A proper setting of Dialogue Level ensures that the consumer receives a standard listening level, so switching channels or watching a program through the commercial breaks doesn't require adjusting the volume. Using the same standard for all content, whether conveyed by broadcast television, DVD, or other media, enables the consumer to switch between sources and programs while maintaining a comfortable and consistent listening level. The proper setting of the Dialogue Level parameter also enables the Dynamic Range Control profiles chosen by the content producer to work as intended in less-than optimal listening environments, and is essential in any content production. **Range -31 to -1 (-27 default)**
Audio Production Information	Indicates whether the mixing level and room type values are valid. If Yes, then a receiver or amplifier can use these values. If No, then the values in these fields are invalid. In practice, only high-end consumer equipment implements these features. Select from: • Audio production information exists • Audio production information does not exist
Mix Level (dB SPL)	Sets the Dolby acoustic sound pressure level used during final audio mixing. The Mix Level control is only active if the Audio Production Info control is enabled. **Range 80 to 111 (105 default)**
Room Type	Sets the type and calibration of the mixing room used for the final audio mixing session. The Room Type controls are only active if the Audio Production Info control is set to Yes. Select from: • Not Indicated • Large room, X-Curve monitor • Small room, flat monitor
Copyright Bit	Sets whether the encoded bitstream is copyright protected. It has no effect on Dolby decoders and its purpose is purely to provide information. Select from: • Copyright protected • Not Copyright protected

Original Bitstream	Sets whether the encoded Dolby bitstream is the master version or a copy. It has no effect on Dolby decoders and its purpose is purely to provide information. Select from: • No • Yes
Extended Bitstream Information Present	Dolby E encoders always transmit Extended Bitstream Information values.
Preferred Stereo Downmix Mode	Specifies the preferred downmix to be used by a decoder with fewer speakers than the number of encoded channels. Select from: • Not Indicated (no preference specified during the encoding process) • Lt/Rt downmix preferred (the decoder should favor Left total/Right total or “Pro Logic” downmix) • Lo/Ro downmix preferred (the decoder should favor a Left only/Right only “simple stereo” or mono downmix). This control is enabled when Extended Bitstream Information is set to Enable and Coding Mode is greater than 2-0.
Lt/Rt Center Mix Level	Sets the center mix levels for Left total/Right total downmixing.
Lt/Rt Surround Mix Level	Sets the surround mix levels for Left total/Right total downmixing.
Lt/Ro Center Mix Level	Sets the Extended Lo-Ro (Left-Only/Right Only) Center Mix levels to 3.0 dB, 1.5 dB, 0.0 dB, -1.5 dB, -3.0 dB, -4.5 dB, -6.0 dB, and -Inf dB
Lt/Ro Surround Mix Level	Sets the Extended Lo-Ro (Left-Only/Right Only) Surround Mix levels to 3.0 dB, 1.5 dB, 0.0 dB, -1.5 dB, -3.0 dB, -4.5 dB, -6.0 dB, and -Inf dB
Dolby Digital Surround EX Mode	Indicates if multiple surround channel audio signals have been encoded with Extended Dolby Digital Surround EX Mode. Select from: • Not Dolby Digital Surround EX encoded • Dolby Digital Surround EX encoded • No Indication
Dolby Headphone Mode	Select from: • Not Dolby Headphone encoded • Digital Headphone encoded • No Indication
A/D Converter Type	Allows audio that has passed through a particular A/D conversion stage to be marked as such, so that a decoder may apply the complementary D/A process. Select from: • Standard • HDCD

Highpass Filter	Determines whether a DC-blocking 3 Hz highpass filter is applied to the main input channels of a Dolby encoder prior to encoding. This parameter is not carried to the consumer decoder. It is used to remove DC offsets in the program audio and would only be switched off in exceptional circumstances. Select from: • Filter enabled • Filter not enabled
Bandwdth Lowpass Filter	Determines whether a lowpass filter is applied to the main input channels of a Dolby encoder prior to encoding. This filter removes high frequency signals that are not encoded. At the suitable data rates, this filter operates above 20 kHz. In all cases it prevents aliasing on decoding and is normally switched on. This parameter is not passed to the consumer decoder. Select from: • Filter enabled (default) • Filter not enabled
LFE Channel Lowpass Filter	This parameter determines whether a 120 Hz eighth-order lowpass filter is applied to the LFE channel input of a Dolby Digital encoder prior to encoding. It is ignored if the LFE channel is disabled. This parameter is not sent to the consumer decoder. The filter removes frequencies above 120 Hz that would cause aliasing when decoded. This filter should only be switched off if the audio to be encoded is known to have no signal above 120 Hz. Select from: • Filter enabled (default) • Filter not enabled
Surround Channel 90-degree Phase Shift Filter	Enables a 90 degree phase shift to the surround channel(s). Select from: • Filter enabled (default) • Filter not enabled
Surround Attenuation	Enables the encoder’s 3 dB attenuation of the surround channel(s). Disabled by default. Select from: • Not enabled • Enabled

RF Mode Dynamic Range Compression Profile	Select one of six standard dynamic range control profiles used by the decoder when producing an output that is suitable for inclusion in an RF signal (NTSC baseband). Select from: • Film Standard • Film Light • Music Standard • Music Light • Speech
Line Mode Dynamic Range Compression Profile	Selects one of six standard dynamic range control profiles to be used by the decoder when producing line-out audio. Select from: • Film Standard • Film Light • Music Standard • Music Light • Speech
Dolby Surround Mode	Specifies if the program is a Dolby surround encoded stream. Select from: • Not Indicated • Not Dolby Surround Encoded • Dolby Surround Encoded

AAP Tab: Parameters (Dolby E Decoder)

These sections are displayed if Dolby E Decoder is selected.

Dolby E Decoder Status

Dolby E Frame Rate	Frame rate of the incoming Dolby E stream
Dolby E Frame Bit Depth	Number of bits per word used to carry the Dolby E stream
Program Configuration	The Program configuration used by the Dolby E frame

Dolby E Decoder Metadata Status per Program

Program	The Program for which to display metadata status.
Data Rate(kbps)	The data rate used to encode the bitstream associated with the specific program.
Bitstream Mode	The mode of the bitstream associated with the program.
Audio Coding Mode	The audio coding mode of the bitstream associated with the program.
Center Level Mix	The center mix level of the bitstream associated with the program.
Surround Mix Level	The suround mix level of the bitstream associated with the program.
Dolby Surround Mode	Indicates if the program is a Dolby Surround encoded stream.
LFE Channel	Indicates whether an LFE (Low Frequency Effects) Channel is present within the bitstream.
Dialogue Normalization	The dialnorm level set.
Audio Production Information	Indicates if audio production information exists.
Mix Level (dB SPL)	The mix level set.
Room Type	The room type set.
Copyright Bit	Indicates if the encoded Dolby Digital bitstream is copyright protected.
Original Bitstream	Indicates if the encoded Dolby Digital bitstream is the master version or a copy.
Extended Bitstream Information Present	Indicates if Extended Bitstream Information is present.
Preferred Stereo Downmix Mode	The selected stereo downmix mode.
Lt/Rt Center Mix Level	The downmix level of the center channel with respect to the left and right channels in an Lt/Rt downmix.
Lt/Rt Surround Mix Level	The downmix level of the surround channels with respect to the left and right channels in an Lt/Rt downmix.
Lt/Ro Center Mix Level	The downmix level of the center channel with respect to the left and right channels in an Lo/Ro downmix.

Lt/Ro Surround Mix Level	The downmix level of the surround channels with respect to the left and right channels in an Lo/Ro downmix.
Dolby Digital Surround EX Mode	Indicates if the signal was encoded with Extended Dolby Digital Surround EX Mode
Dolby Headphone Mode	Indicates if Dolby Headphone Mode was enabled.
A/D Converter Type	Indicates the type of A/D Converter used.
Highpass Filter	Indicates if Highpass Filter was enabled.
Bandwdth Lowpass Filter	Indicates if Bandwdth Lowpass Filter was enabled.
LFE Channel Lowpass Filter	Indicates if LFE Channel Lowpass Filter was enabled.
Surround Channel 90-degree Phase Shift Filter	Indicates if 90-degree Phase Shift was enabled.
Surround Attenuation	Indicates if Surround Attenuation was enabled.
RF Overmodulation Protection Function	Indicates whether RF Overmodulation Protection was used.
RF Mode Dynamic Range Compression Profile	The selected RF mode dynamic range control profile.
Line Mode Dynamic Range Compression Profile	The selected line mode dynamic range control profile.

AAP Tab: Parameters (UpMix)

The settings in this section apply to all audio channels in the selected processor.

Implementation	This parameter is currently set to DTS.
Channel Configuration	Select the output channel format. Options include: • 2.1 - L, R, LFE • 3.1 - L, R, C, LFE • 4.1 - L, R, Ls, Rs, LFE • 5.1 (default) - L, R, C, Ls, Rs, LFE • 6.1 - L, R, C, Ls, Rs, Cb, LFE • 7.1 - L, R, C, Ls, Rs, Lb, Rb, LFE • Phantom 6.1 - L, R, Ls, Rs, Cb, LFE • Phantom 7.1 - L, R, Ls, Rs, Lb, Rb, LFE
Latency	Select from: • Low Latency Mode (default) • High Latency Mode
DICE Process Level	Set the amount of DICE Processing to apply. This parameter only applies when the Mode is set to Digital Music Mode. Range is 0 to 1 (default is 0.5).

Depth	Set the amount of front to back bias to apply to the standard soundstage. Range is -1 to 1 (default is 0).
Front Width	Set the amount of widening or narrowing to perform on the front channels Range is -1 to 1 (default is 0).
Surround Width	Set the wideness of the surround channels. Range is 0 to 1 (default is 1).
LFE Cutoff (Hz)	Set the low pass cutoff frequency (Hz) of the LFE channel after the upmix process. Select from: • 0 • 60 • 80 (default) • 100 • 120 • 140
Final Limiters Ceiling (dB)	Set the threshold in dB where final limiting on UpMix output occurs. Range is -12 to 0 (default is 0).

AAP Tab: Parameters (DownMix)

The settings in this section apply to all audio channels in the selected processor.

Implementation	This parameter is currently set to DTS.
L R Encoding Mode	Select the encoding mode for left and right channels. Options include: • Phantom Center (default) • Hard Center
LFE Cutoff	Set the low pass cutoff frequency (Hz) of the LFE channel after the upmix process. Options are: • 0 • 60 • 80 (default) • 100 • 120 • 140
Final Limiters Ceiling (dB)	Set the threshold in dB where final limiting on UpMix output occurs. Range is -20 to 0 (default is 0)
Active Correction	Select to enable correction to the DownMix ICLD, ICPD, and spectrum

AAP Tab: Parameters (MultiMerge)

The settings in this section apply to all audio channels in the selected processor.

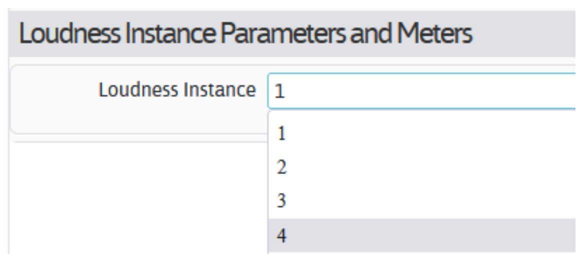
Input Select	
Input Select Mode	This parameter specified how input channels are selected. Select from the following: • **Aux 2.0 and multi-channel inputs mixed (default)** Mixes the auxiliary 2.0 inputs into the multichannel 5.1 inputs • **Multi-channel inputs only** Always uses the multichannel 5.1 inputs • **2.0 from multi-channel inputs only** Uses the stereo L/R pair from the multichannel inputs • **Aux 2.0 inputs only** Always uses the auxiliary 2.0 inputs • **Multi-channel inputs if detected, else Aux 2.0 inputs** Uses multichannel 5.1 inputs if they are active, otherwise auxiliary 2.0 inputs are used • **2.0 from multi-channel inputs if detected, else Aux 2.0 inputs** Uses the stereo L/R pair from the multichannel inputs if they are active, if not, auxiliary 2.0 inputs are used • **Aux 2.0 inputs if detected, else multi-channel inputs** Uses the auxiliary 2.0 inputs if they are active, if not, the multichannel 5.1 inputs are used • **Multi-channel inputs if detected, or Aux 2.0 inputs if detected, else 2.0 from multi-channel inputs** Uses multichannel inputs if they are active, or uses the auxiliary inputs if they are active. If neither is active, it uses the stereo L/R pair from the multichannel inputs
Input Noise Floor Threshold (dB)	Select the level of signal (in dB) required to detect a signal as active Range is -80 to -50 (default is -60)
Input Cross Fade Time (ms)	Select the speed (in msec) at which transitions from different Input Selection Modes occur. Range is 50 to 750 (default is 250)
MultiMerge	

MultiMerge Mode	Select the MultiMerge Output mix configuration. Options are: • **Auto-detect, 2.0 to 5.1, ot 5.1 to 2.0 (default)** Determines if content is stereo (2.0) or surround (5.1), and adapts to the correct UpMix/Passthrough mode for consistent 5.1 output. When in Auto, the Threshold parameter controls the noise floor level for the detection. Any content above this threshold on the surround channel inputs 3-6 (C, LFE, Ls, Rs) is considered surround and MultiMerge will be in passthrough mode. • **Passthrough** Dorces MultiMerge to always pass through 5.1 content to the 5.1 outputs untouched, while creating a downmix for the Aux output. • **Upmix 2.0 channels to 5.1** Forces MultiMerge to always upmix stereo content on both of the Left/Right 5.1 inputs and the Aux 2.0 inputs.
Input Noise Floor Threshold (dB)	Select the level of signal (in dB) required to detect a signal as active Range is -80 to -50 (default is -60)
Input Cross Fade Time (ms)	Select the speed (in msec) at which transitions from different Input Selection Modes occur. Range is 50 to 750 (default is 250)
Latency	Specifies the latency profile of the multimerge. Select from: • Low Latency (default) • High Latency
UpMix Depth	Select the amount of front-to-back bias to apply to the standard soundstage. Range is -1 to 1 (default is 0)
UpMix Front Width	Select the amount of widening or narrowing to perform on the front channels. Range is -1 to 1 (default is 0).
Upmix Surround Width	Select the wideness of the surround channels. Range is 0 to 1 (default is 0).
UpMix LFE Cutoff (Hz)	Select the low pass cutoff frequency (Hz) of the LFE channel after the upmix process. Options are: • 0 • 60 • 80 (default) • 100 • 120 • 140

Downmix LR Encoding Mode	Select the encoding mode for left and right channels. Options are: • Phantom Center (default) • Hard Center
Downmix LFE Cutoff (Hz)	Select the low pass cutoff frequency (Hz) of the LFE channel before the downmix process. Options are: • 0 • 60 • 80 (default) • 100 • 120 • 140
Multimerge Final Limiters Ceiling (dB)	Select the threshold (dB) where final limiting on 5.1 output occurs. Range is -20 to 0 (default is 0).
Stereo Final Limiters Ceiling (dB)	Select the threshold (dB) where final limiting on 2.0 output occurs. Range is -20 to 0 (default is 0).

AAP Tab: Parameters (Loudness Control)

The settings in this section apply to all audio channels in the selected processor.

Loudness Instance	Select the loudness instance in cases where there is more than one loudness audio system. In case of: • Loudness 2x1.0 • Loudness 8x1.0 • Loudness 4x2.0 • Loudness 5.1 + 2.0 the first number represents the instances created, and Loudness 5.1 + 2.0 has 2 instances - one for stereo and one for surround. For example, Loudness 4x2.0 has 4 stereo instances, so select each one from the dropdown list to configure.  Each instance will have its own settings of the parameters listed below.
Implementation	The implementation is currently set to DTS.
Bypass the processing block	Indicates whether or not to bypass the loudness control algorithm and this CODEC will behave as a delay only.
LMS Type	Specifies the type of loudness measurement to make prior to performing loudness control. Options are: • NLM (default) • LEQ_1770
Target Loudness (dBEq)	Select the target loudness level that the algorithm will attempt to achieve on output. Range is -40 to 0 (default is -24)
Target Ratio	Controls the amount of gain or attenuation that is applied when loudness differences are measured. For example: A setting of 1.00 indicates that for every dB of loudness difference measured between the input signal and the target level, 1 dB of gain or attenuation will be applied. For example, a setting of 0.50

	indicates that for every dB of loudness difference measured between the input signal and the target level, 0.5 dB of gain or attenuation will be applied. Range is 0 to 1 (default is 1)
Upper Loudness Threshold (dB)	Represents the allowable distance above the Target Level the input signal can range before attenuation. If an input signal falls between the Upper Thresh and the Lower Thresh in reference to the Target Level, no correction will be applied. For example: A setting of +4dB indicates that audio content can range 4 dB above the Target Level before attenuation is applied. Content arriving louder than 4 dB above the Target will be appropriately attenuated. -27 dBFS (Target) + 4 dBFS (Upper Thresh) = -23 dBFS (Upper Thresh Value) For example: A setting of 0 dB indicates that attenuation will be applied to any input signal exceeding the Target Level. Range is 0 to 20 (default is 1)
Lower Loudness Threshold (dB)	The Lower Threshold parameter represents the distance below the Target Level the input signal can range before gain is applied. If an input signal falls between the Upper Thresh and the Lower Thresh in reference to the Target Level, no correction will be applied. For example: A setting of -5 dB indicates that audio content can range 5 dB below the target level before gain is applied. Content arriving quieter than 5 dB below the Target will be appropriately raised. -27 dBFS (Target) + -5 dBFS (Lower Thresh) = -31 dBFS (Lower Thresh Value) For example: A setting of 0 indicates that gain will be applied to any input signal falling below the Target Level. Range is -20 to 0 (default is -1)
Freeze Window (dB)	Sets the size of a window in dB where small loudness differences that fall within this window are deemed allowable. When loudness differences fall outside of this allowable window then appropriate gain or attenuation is applied to control loudness. The Freeze Window parameter can be effectively used to limit the amount of small range gain variability. For example: A window setting of 4 dB indicates that when the loudness level is measuring within ±2 dB of the target level that no further correction is required. When the loudness level becomes further than ±2 dB from the target level then appropriate gain or attenuation is applied. Range is 0 to 10 (default is 1)

Quiet Threshold (dB)	Prevents increasing the noise floor level. Input signals below the threshold are considered too low and are not managed by the loudness processing to avoid bringing up the noise level. Input signals above the Noise Floor are considered valid and are managed by the loudness processing. Range is -80 to -20 (default is -40)
Attack (ms)	Controls how quickly the processing will respond to sharp onsets in loudness level. Note: A compressor is present after the attack time processing to catch any short-term loudness peaks which may pass through. Range is 5 to 150 (default is 40)
Release (ms)	Controls how quickly the processing will respond to sharp drops in loudness level. Range is 20 to 500 (default is 120)
Compressor Threshold (dB)	A compressor is present to catch any short-term loudness peaks which aren't fully captured by the attack time processing of Loudness Control. The compressor threshold parameter is set as the allowable short-term peak above the Target Level. Range is 0 to 16 (default is 2)
Compressor Ratio	Controls the amount of attenuation that is applied when short-term peaks exceed the compressor threshold. Range is 0 to 1 (default is 0.5)
Loudness Shaping	Specifies the amount of loudness shaping desired. A value of zero is no loudness shaping. Range is 0 to 1 (default is 0.5)
Final Limiter Ceiling (dBFS)	A final limiter is present to control the absolute waveform peak level for the stereo output. This parameter controls the output peak level in dBFS. A value of zero disables limiter. Range is -20 to 0 (default is 0)
Run Final Limiters	Select this parameter for final limiters to be applied according to the value of the Final Limiter Ceiling (dBFS) parameter.
Metering Enable	Select this parameter to activate real-time meter values in the status output. Turning on metering will consume a small amount of DSP resources.

AAP Tab: Parameters (UpMix+Loudness Control)

The settings in this section apply to all audio channels in the selected processor.

Implementation	This parameter is currently set to DTS.
Channel Configuration	Select the output channel format. Options include: • 2.1 - L, R, LFE • 3.1 - L, R, C, LFE • 4.1 - L, R, Ls, Rs, LFE • 5.1 (default) - L, R, C, Ls, Rs, LFE • 6.1 - L, R, C, Ls, Rs, Cb, LFE • 7.1 - L, R, C, Ls, Rs, Lb, Rb, LFE • Phantom 6.1 - L, R, Ls, Rs, Cb, LFE • Phantom 7.1 - L, R, Ls, Rs, Lb, Rb, LFE
Latency	Select from: • Low Latency Mode (default) • High Latency Mode
DICE Process Level	Set the amount of DICE Processing to apply. This parameter only applies when the Mode is set to Digital Music Mode. Range is 0 to 1 (default is 0.5).
Depth	Set the amount of front to back bias to apply to the standard soundstage. Range is -1 to 1 (default is 0).
Front Width	Set the amount of widening or narrowing to perform on the front channels Range is -1 to 1 (default is 0).
Surround Width	Set the wideness of the surround channels. Range is 0 to 1 (default is 1).
LFE Cutoff (Hz)	Set the low pass cutoff frequency (Hz) of the LFE channel after the upmix process. Select from: • 0 • 60 • 80 (default) • 100 • 120 • 140
Final Limiters Ceiling (dB)	Set the threshold in dB where final limiting on UpMix output occurs. Range is -12 to 0 (default is 0).
Bypass the processing block	Indicates whether or not to bypass the loudness control algorithm and this CODEC will behave as a delay only.
Implementation	This parameter is currently set to DTS.

LMS Type	Specifies the type of loudness measurement to make prior to performing loudness control. Options are: • NLM (default) • LEQ_1770
Target Loudness (dBEq)	Select the target loudness level that the algorithm will attempt to achieve on output. Range is -40 to 0 (default is -24)
Target Ratio	Controls the amount of gain or attenuation that is applied when loudness differences are measured. For example: A setting of 1.00 indicates that for every dB of loudness difference measured between the input signal and the target level, 1 dB of gain or attenuation will be applied. For example, a setting of 0.50 indicates that for every dB of loudness difference measured between the input signal and the target level, 0.5 dB of gain or attenuation will be applied. Range is 0 to 1 (default is 1)
Upper Loudness Threshold (dB)	Represents the allowable distance above the Target Level the input signal can range before attenuation. If an input signal falls between the Upper Thresh and the Lower Thresh in reference to the Target Level, no correction will be applied. For example: A setting of +4dB indicates that audio content can range 4 dB above the Target Level before attenuation is applied. Content arriving louder than 4 dB above the Target will be appropriately attenuated. -27 dBFS (Target) + 4 dBFS (Upper Thresh) = -23 dBFS (Upper Thresh Value) For example: A setting of 0 dB indicates that attenuation will be applied to any input signal exceeding the Target Level. Range is 0 to 20 (default is 1)
Lower Loudness Threshold (dB)	The Lower Threshold parameter represents the distance below the Target Level the input signal can range before gain is applied. If an input signal falls between the Upper Thresh and the Lower Thresh in reference to the Target Level, no correction will be applied. For example: A setting of -5 dB indicates that audio content can range 5 dB below the target level before gain is applied. Content arriving quieter than 5 dB below the Target will be appropriately raised. -27 dBFS (Target) + -5 dBFS (Lower Thresh) = -31 dBFS (Lower Thresh Value) For example: A setting of 0 indicates that gain will be applied to any input signal falling below the Target Level. Range is -20 to 0 (default is -1)
Freeze Window (dB)	Sets the size of a window in dB where small loudness differences that fall within this window are deemed allowable. When loudness differences fall outside of this

	allowable window then appropriate gain or attenuation is applied to control loudness. The Freeze Window parameter can be effectively used to limit the amount of small range gain variability. For example: A window setting of 4 dB indicates that when the loudness level is measuring within ±2 dB of the target level that no further correction is required. When the loudness level becomes further than ±2 dB from the target level then appropriate gain or attenuation is applied. Range is 0 to 10 (default is 1)
Quiet Threshold (dBEq)	Prevents increasing the noise floor level. Input signals below the threshold are considered too low and are not managed by the loudness processing to avoid bringing up the noise level. Input signals above the Noise Floor are considered valid and are managed by the loudness processing. Range is -80 to -20 (default is -40)
Attack	Controls how quickly the processing will respond to sharp onsets in loudness level. Note: A compressor is present after the attack time processing to catch any short-term loudness peaks which may pass through. Range is 5 to 150 (default is 40)
Release	Controls how quickly the processing will respond to sharp drops in loudness level. Range is 20 to 500 (default is 120)
Compressor Threshold	A compressor is present to catch any short-term loudness peaks which aren't fully captured by the attack time processing of Loudness Control. The compressor threshold parameter is set as the allowable short-term peak above the Target Level. Range is 0 to 16 (default is 2)
Compressor Ratio	Controls the amount of attenuation that is applied when short-term peaks exceed the compressor threshold. Range is 0 to 1 (default is 0.5)
Loudness Shaping	Specifies the amount of loudness shaping desired. A value of zero is no loudness shaping. Range is 0 to 1 (default is 0.5)
Final Limiter Ceiling (dBFS)	A final limiter is present to control the absolute waveform peak level for the stereo output. This parameter controls the output peak level in dBFS. A value of zero disables limiter. Range is -20 to 0 (default is 0)
Run Final Limiters	Select this parameter for final limiters to be applied according to the value of the Final Limiter Ceiling (dBFS) parameter.
Metering Enable	Select this parameter to activate real-time meter values in the status output. Turning on metering will consume a small amount of DSP resources.

AAP Tab: Parameters (DownMix+Loudness Control)

The settings in this section apply to all audio channels in the selected processor.

Implementation	This parameter is currently set to DTS.
L R Encoding Mode	Select the encoding mode for left and right channels. Options include: • Phantom Center (default) • Hard Center
LFE Cutoff	Set the low pass cutoff frequency (Hz) of the LFE channel after the upmix process. Options are: • 0 • 60 • 80 (default) • 100 • 120 • 140
Final Limiters Ceiling (dB)	Set the threshold in dB where final limiting on UpMix output occurs. Range is -20 to 0 (default is 0)
Active Correction	Select to enable correction to the DownMix ICLD, ICPD, and spectrum
Bypass the processing block	Indicates whether or not to bypass the loudness control algorithm and this CODEC will behave as a delay only.
Implementation	This parameter is currently set to DTS.
LMS Type	Specifies the type of loudness measurement to make prior to performing loudness control. Options are: • NLM (default) • LEQ_1770
Target Loudness (dBEq)	Select the target loudness level that the algorithm will attempt to achieve on output. Range is -40 to 0 (default is -24)
Target Ratio	Controls the amount of gain or attenuation that is applied when loudness differences are measured. For example: A setting of 1.00 indicates that for every dB of loudness difference measured between the input signal and the target level, 1 dB of gain or attenuation will be applied. For example, a setting of 0.50 indicates that for every dB of loudness difference measured between the input signal and the target level, 0.5 dB of gain or attenuation will be applied. Range is 0 to 1 (default is 1)

Upper Loudness Threshold (dB)	Represents the allowable distance above the Target Level the input signal can range before attenuation. If an input signal falls between the Upper Thresh and the Lower Thresh in reference to the Target Level, no correction will be applied. For example: A setting of +4dB indicates that audio content can range 4 dB above the Target Level before attenuation is applied. Content arriving louder than 4 dB above the Target will be appropriately attenuated. -27 dBFS (Target) + 4 dBFS (Upper Thresh) = -23 dBFS (Upper Thresh Value) For example: A setting of 0 dB indicates that attenuation will be applied to any input signal exceeding the Target Level. Range is 0 to 20 (default is 1)
Lower Loudness Threshold (dB)	The Lower Threshold parameter represents the distance below the Target Level the input signal can range before gain is applied. If an input signal falls between the Upper Thresh and the Lower Thresh in reference to the Target Level, no correction will be applied. For example: A setting of -5 dB indicates that audio content can range 5 dB below the target level before gain is applied. Content arriving quieter than 5 dB below the Target will be appropriately raised. -27 dBFS (Target) + -5 dBFS (Lower Thresh) = -31 dBFS (Lower Thresh Value) For example: A setting of 0 indicates that gain will be applied to any input signal falling below the Target Level. Range is -20 to 0 (default is -1)
Freeze Window (dB)	Sets the size of a window in dB where small loudness differences that fall within this window are deemed allowable. When loudness differences fall outside of this allowable window then appropriate gain or attenuation is applied to control loudness. The Freeze Window parameter can be effectively used to limit the amount of small range gain variability. For example: A window setting of 4 dB indicates that when the loudness level is measuring within ±2 dB of the target level that no further correction is required. When the loudness level becomes further than ±2 dB from the target level then appropriate gain or attenuation is applied. Range is 0 to 10 (default is 1)
Quiet Threshold (dBEq)	Prevents increasing the noise floor level. Input signals below the threshold are considered too low and are not managed by the loudness processing to avoid bringing up the noise level. Input signals above the Noise Floor are considered valid and are managed by the loudness processing. Range is -80 to -20 (default is -40)

Attack	Controls how quickly the processing will respond to sharp onsets in loudness level. Note: A compressor is present after the attack time processing to catch any short-term loudness peaks which may pass through. Range is 5 to 150 (default is 40)
Release	Controls how quickly the processing will respond to sharp drops in loudness level. Range is 20 to 500 (default is 120)
Compressor Threshold	A compressor is present to catch any short-term loudness peaks which aren't fully captured by the attack time processing of Loudness Control. The compressor threshold parameter is set as the allowable short-term peak above the Target Level. Range is 0 to 16 (default is 2)
Compressor Ratio	Controls the amount of attenuation that is applied when short-term peaks exceed the compressor threshold. Range is 0 to 1 (default is 0.5)
Loudness Shaping	Specifies the amount of loudness shaping desired. A value of zero is no loudness shaping. Range is 0 to 1 (default is 0.5)
Final Limiter Ceiling (dBFS)	A final limiter is present to control the absolute waveform peak level for the stereo output. This parameter controls the output peak level in dBFS. A value of zero disables limiter. Range is -20 to 0 (default is 0)
Run Final Limiters	Select this parameter for final limiters to be applied according to the value of the Final Limiter Ceiling (dBFS) parameter.
Metering Enable	Select this parameter to activate real-time meter values in the status output. Select this parameter to activate real-time meter values in the status output. Turning on metering will consume a small amount of DSP resources.

AAP Tab: Parameters (MultiMergeMix+Loudness Control)

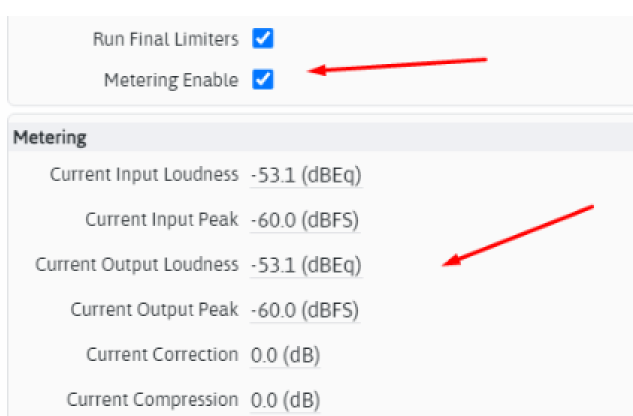
The settings in this section apply to all audio channels in the selected processor.

Input Select	
Input Select Mode	This parameter specified how input channels are selected. Select from the following: • **Aux 2.0 and multi-channel inputs mixed (default)** Mixes the auxiliary 2.0 inputs into the multichannel 5.1 inputs • **Multi-channel inputs only** Always uses the multichannel 5.1 inputs • **2.0 from multi-channel inputs only** Uses the stereo L/R pair from the multichannel inputs • **Aux 2.0 inputs only** Always uses the auxiliary 2.0 inputs • **Multi-channel inputs if detected, else Aux 2.0 inputs** Uses multichannel 5.1 inputs if they are active, otherwise auxiliary 2.0 inputs are used • **2.0 from multi-channel inputs if detected, else Aux 2.0 inputs** Uses the stereo L/R pair from the multichannel inputs if they are active, if not, auxiliary 2.0 inputs are used • **Aux 2.0 inputs if detected, else multi-channel inputs** Uses the auxiliary 2.0 inputs if they are active, if not, the multichannel 5.1 inputs are used • **Multi-channel inputs if detected, or Aux 2.0 inputs if detected, else 2.0 from multi-channel inputs** Uses multichannel inputs if they are active, or uses the auxiliary inputs if they are active. If neither is active, it uses the stereo L/R pair from the multichannel inputs
Input Noise Floor Threshold (dB)	Select the level of signal (in dB) required to detect a signal as active Range is -80 to -50 (default is -60)
Input Cross Fade Time (ms)	Select the speed (in msec) at which transitions from different Input Selection Modes occur. Range is 50 to 750 (default is 250)
MultiMerge	

MultiMerge Mode	Select the MultiMerge Output mix configuration. Options are: • **Auto-detect, 2.0 to 5.1, ot 5.1 to 2.0 (default)** Determines if content is stereo (2.0) or surround (5.1), and adapts to the correct UpMix/Passthrough mode for consistent 5.1 output. When in Auto, the Threshold parameter controls the noise floor level for the detection. Any content above this threshold on the surround channel inputs 3-6 (C, LFE, Ls, Rs) is considered surround and MultiMerge will be in passthrough mode. • **Passthrough** Dorces MultiMerge to always pass through 5.1 content to the 5.1 outputs untouched, while creating a downmix for the Aux output. • **Upmix 2.0 channels to 5.1** Forces MultiMerge to always upmix stereo content on both of the Left/Right 5.1 inputs and the Aux 2.0 inputs.
Input Noise Floor Threshold (dB)	Select the level of signal (in dB) required to detect a signal as active Range is -80 to -50 (default is -60)
Input Cross Fade Time (ms)	Select the speed (in msec) at which transitions from different Input Selection Modes occur. Range is 50 to 750 (default is 250)
Latency	Specifies the latency profile of the multimerge. Select from: • Low Latency (default) • High Latency
UpMix Depth	Select the amount of front-to-back bias to apply to the standard soundstage. Range is -1 to 1 (default is 0)
UpMix Front Width	Select the amount of widening or narrowing to perform on the front channels. Range is -1 to 1 (default is 0).
Upmix Surround Width	Select the wideness of the surround channels. Range is 0 to 1 (default is 0).
UpMix LFE Cutoff	Select the low pass cutoff frequency (Hz) of the LFE channel after the upmix process. Options are: • 0 • 60 • 80 (default) • 100 • 120 • 140
Downmix LR Encoding Mode	Select the encoding mode for left and right channels. Options are: • Phantom Center (default) • Hard Center

Downmix LFE Cutoff (Hz)	Select the low pass cutoff frequency (Hz) of the LFE channel before the downmix process. Options are: • 0 • 60 • 80 (default) • 100 • 120 • 140
Multimerge Final Limiters Ceiling (dB)	Select the threshold (dB) where final limiting on 5.1 output occurs. Range is -20 to 0 (default is 0).
Stereo Final Limiters Ceiling (dB)	Select the threshold (dB) where final limiting on 2.0 output occurs. Range is -20 to 0 (default is 0).
Bypass the processing block	Indicates whether or not to bypass the loudness control algorithm and this CODEC will behave as a delay only.
Implementation	This parameter is currently set to DTS.
LMS Type	Specifies the type of loudness measurement to make prior to performing loudness control. Options are: • NLM (default) • LEQ_1770
Target Loudness (dBEq)	Select the target loudness level that the algorithm will attempt to achieve on output. Range is -40 to 0 (default is -24)
Target Ratio	Controls the amount of gain or attenuation that is applied when loudness differences are measured. For example: A setting of 1.00 indicates that for every dB of loudness difference measured between the input signal and the target level, 1 dB of gain or attenuation will be applied. For example, a setting of 0.50 indicates that for every dB of loudness difference measured between the input signal and the target level, 0.5 dB of gain or attenuation will be applied. Range is 0 to 1 (default is 1)

Upper Loudness Threshold (dB)	Represents the allowable distance above the Target Level the input signal can range before attenuation. If an input signal falls between the Upper Thresh and the Lower Thresh in reference to the Target Level, no correction will be applied. For example: A setting of +4dB indicates that audio content can range 4 dB above the Target Level before attenuation is applied. Content arriving louder than 4 dB above the Target will be appropriately attenuated. -27 dBFS (Target) + 4 dBFS (Upper Thresh) = -23 dBFS (Upper Thresh Value) For example: A setting of 0 dB indicates that attenuation will be applied to any input signal exceeding the Target Level. Range is 0 to 20 (default is 1)
Lower Loudness Threshold (dB)	The Lower Threshold parameter represents the distance below the Target Level the input signal can range before gain is applied. If an input signal falls between the Upper Thresh and the Lower Thresh in reference to the Target Level, no correction will be applied. For example: A setting of -5 dB indicates that audio content can range 5 dB below the target level before gain is applied. Content arriving quieter than 5 dB below the Target will be appropriately raised. -27 dBFS (Target) + -5 dBFS (Lower Thresh) = -31 dBFS (Lower Thresh Value) For example: A setting of 0 indicates that gain will be applied to any input signal falling below the Target Level. Range is -20 to 0 (default is -1)
Freeze Window (dB)	Sets the size of a window in dB where small loudness differences that fall within this window are deemed allowable. When loudness differences fall outside of this allowable window then appropriate gain or attenuation is applied to control loudness. The Freeze Window parameter can be effectively used to limit the amount of small range gain variability. For example: A window setting of 4 dB indicates that when the loudness level is measuring within ±2 dB of the target level that no further correction is required. When the loudness level becomes further than ±2 dB from the target level then appropriate gain or attenuation is applied. Range is 0 to 10 (default is 1)
Quiet Threshold (dBEq)	Prevents increasing the noise floor level. Input signals below the threshold are considered too low and are not managed by the loudness processing to avoid bringing up the noise level. Input signals above the Noise Floor are considered valid and are managed by the loudness processing. Range is -80 to -20 (default is -40)

Attack	Controls how quickly the processing will respond to sharp onsets in loudness level. Note: A compressor is present after the attack time processing to catch any short-term loudness peaks which may pass through. Range is 5 to 150 (default is 40)
Release	Controls how quickly the processing will respond to sharp drops in loudness level. Range is 20 to 500 (default is 120)
Compressor Threshold	A compressor is present to catch any short-term loudness peaks which aren't fully captured by the attack time processing of Loudness Control. The compressor threshold parameter is set as the allowable short-term peak above the Target Level. Range is 0 to 16 (default is 2)
Compressor Ratio	Controls the amount of attenuation that is applied when short-term peaks exceed the compressor threshold. Range is 0 to 1 (default is 0.5)
Loudness Shaping	Specifies the amount of loudness shaping desired. A value of zero is no loudness shaping. Range is 0 to 1 (default is 0.5)
Final Limiter Ceiling (dBFS)	A final limiter is present to control the absolute waveform peak level for the stereo output. This parameter controls the output peak level in dBFS. A value of zero disables limiter. Range is -20 to 0 (default is 0)
Run Final Limiters	Select this parameter for final limiters to be applied according to the value of the Final Limiter Ceiling (dBFS) parameter.
Metering Enable	Select this parameter to activate real-time meter values in the status output. Select this parameter to activate real-time meter values in the status output. Turning on metering will consume a small amount of DSP resources. Once metering is enabled, status shows below. 

Program Configuration: Audio Tab

This tab contains the following:

In this Section

Audio Tab: General Configuration

The settings in this section apply to all audio channels in the selected processor.

V-Bit Mute Enable	Enables automatic muting of PCM outputs when the V-bit is set.	
Audio Fade Enable	Enables audio V-fade (clean audio hotswitch).	
Audio Fade Time (s)	Adjusts the audio fade rate, with a range of 0 to 10.000 seconds, and a default of .500 (half a second).	
Audio Fade Mute time (s)	Adjusts the mute time during audio fade, with a range of .010 to 1 seconds, and a default of .2 of a second.	
Dolby E header alignment	Enables Dolby E header alignment processing as normal. Also see the Dolby E A/V Align parameter in Video Tab: Video Control (on page 405) *Note: This parameter does not apply in case of the JPEG-XS Encoder personality.*	
Dolby E Vid Std Select	Choose a standard from the menu. Options include: *Note: This parameter does not apply in case of the JPEG-XS Encoder personality.*	
	• 525i/59.94 • 625i/50 • 720p/50 • 720p/59.94 • 1080i/50 • 1080i/59.94 • 1080p/23.98	• 1080psf/23.98 • 1080p/25 • 1080p/29.97 • 1080p/50 • 1080p/59.94
Dolby E Line Position	Each video standard has a pre-defined range and default. You can make a setting for each video standard, and that setting will apply to all programs and sections in the processor. Note: This parameter does not apply in case of the JPEG-XS Encoder personality.	

Audio Tab: Program Configuration

Note: These parameters do not appear when the Processor's mode is Multiviewer.

Audio Tracking Mode	This parameter makes it possible to independently delay the audio track separately from the video track, typically to correct delays added by other equipment or processing paths. Options are: • **Off**: Disables the Audio Tracking feature • **Frame Sync**: Adds delay from the video frame synchronization, plus delay added by the H-Phase and V-Phase parameters • **Frame Sync + Delay**: Adds delay from the video frame synchronization plus delay added by the H-Phase, V-Phase, and Frame Delay parameters

Audio Tab: Pair Configuration

Audio Pair	Choose a pair to configure. Options are 1/2,3/4,5/6, 7/8, 9/10, 11/12, 13/14, 15/16 . The following parameter will only affect the selected pair.
Pair Word Length	Adjusts the sample resolution for that audio pair, options are: • 24 bits (default) • 20 bits • 16 bits

Audio Tab: Output Channel Configuration

Note: These parameters do not appear when the Processor's mode is Multiviewer.

Audio Processor Channel	Selects the audio channel (APOUT), from 1 - 16. The rest of the controls on this page will then adjust that channel.
Input Type Select	Select the source input type to the Audio processor output channel. Options are: • APIN: These are the Audio Processor Input channels • EXP: These are the expanded MADI channels • TONES: These are the Tones

Input Channel Select	Select the source input channel, within the type of source, to the Audio processor output channel. The options displayed here depend on what is selected in the *Input Type Select* field.
	• If *Input Type Select* is APIN:
	Select a channel displayed in the "Section-Program-Channel" format. For example, *2-4: 12* refers to Section 2, program 4, channel 12.
	• If *Input Type Select* is EXP:
	Select an expanded MADI channel from 1-128
	• If *Input Type Select* is TONES:
	Select one of the following tones
	  • 400 Hz
	  • 1 kHz
	  • 2 kHz
	  • Mute
	Tones are @-20 dBFS

Channel Gain	Adjusts the gain of the selected audio channel. *Note: This control is applied only if the audio data is PCM.*
Channel Invert	Inverts the selected audio channel to correct for phase error. *Note: This control is applied only if the audio data is PCM.*
Channel Mute	Enables muting for the selected audio channel. *Note: This control is applied only if the audio data is PCM.*
Channel Format	Determines the format for the selected audio channel. Options include: • Auto • ST 2110-30 (PCM) • ST 2110-31 (Non-PCM)
Channel Delay	Determines the amount of delay to apply to the specified audio channel, with a range from 0 - 1000 ms. This parameter is unavailable when in Low Latency mode. See Configuring a Processor (on page 113).

Program Configuration: Output Tab

There is always the option to output to IP. If the input is IP, then SDI output is automatically enabled. If the input is using the SDI connector, then the SDI output options, Output Tab: SDI (on page 453) and SDI Audio Embedder (Output Tab) (on page 454) will not appear. This page indicates whether SFP output is enabled, but configuration for SFP output is handled elsewhere. See Configure SFPs (on page 115).

IP output settings are always present on this tab. See the following topics:

- Output Tab: IP Video Configuration (on page 454)
- Output Tab: IP Video Status (on page 456)
- Output Tab: IP Audio Configuration (on page 457)
- Output Tab: IP Audio Status (on page 458)
- Output Tab: IP Ancillary Data Configuration (on page 461)
- Output Tab: IP Ancillary Data Status (on page 463)

HD Proxy options also appear on this tab. See Output Tab: Proxy IP Video Configuration (on page 456) and Output Tab: Proxy IP Video Status (on page 457). HD Proxy video is always sent over IP.

Note: When the Processor is configured for Multiviewer mode, the **Output** tab is only available for **Program 1** of **Section 1** and **Program 1** of **Section 2** of the "base" processor. Each section output configuration is associated with a display. Output tabs are not available on Multiviewer "extend" processors at all.

Output Tab: Pixel Format

This section does not appear when the Processor is configured for Multiviewer Mode.

UHD Quad Output Pixel Format Select	If the output is UHD, this selection determines how output video is interpreted: • Square Division • Pixel Interleave The Square Division option is only available when the Output Mode is SDI. This selection only has an effect when using Quad outputs; 12G is always Pixel Interleave.
UHD Output Pixel Format Used	This read-only parameter indicates what pixel format is being output: • Square Division • Pixel Interleave

Output Tab: SDI

SDI Output	Displays Enabled or Disabled. Shows as disabled in case of the JPEG-XS Encoder.
SFP Output	Displays Enabled if the output is configured. For non-HDMI SFPs, section 1 outputs SFP output 1, and Section 2 outputs SFP output 2. For HDMI SFPs, both will output the same source, which can be selected on the VSFP Configuration page. See Configure SFPs (on page 115).
VPID Output	Determines whether and where VPID is output. Options are: • Auto • No VPID on HD, include VPID on other formats • No C VPID on any formats • No VPID on HD and no C VPID on any formats *Note that VPID in the C data stream will be preceded by other ancillary data such as audio, etc. since it is the last embedder block in the chain.*
VPID Aspect Ratio select	If the hardcoded Aspect Ratio VPID is incorrect, you can override it. Options are: • 4:3_unknown: Sets the aspect ratio bit in the video payload identification byte to 0 • 16:9: Sets the aspect ratio bit in the video payload identification byte to 1 • Auto (Default): Sets the bit to the default selection based on the video format
UHD Output Link Select	Determines which SDI output to use. Options will vary depending on the processor's mode. **Conversion/Sync/Remap/ JPEG-XS/MCL mode:** • UHD (Quad Link) • UHD (Single Link) • UHD2 (12G Link 1) • UHD2 (12G Link 2) • UHD2 (12G Link 2) • UHD2 (12G Link 4) **Multiviewer Mode:** • UHD (2SI 4x 3G-SDI) • UHD (Single Link) Note: When the "UHD Output Link Select" is set to "UHD (Quad-Link)", then the Line number is tracked from the 3G equivalent standard. If configured otherwise (i.e. single link), then the line number is tracked from the actual 2160 standard. *UHD (Quad Link): Normal UHD over four 3G signals* *UHD (Single Link): Normal UHD on a single 12G link* *UHD2 (12G Link 1): Signals the first link of an 8K quad* *UHD2 (12G Link 2): Signals the second link of an 8K quad* *UHD2 (12G Link 3): Signals the third link of an 8K quad* *UHD2 (12G Link 4): Signals the fourth link of an 8K quad*

SDI Audio Embedder (Output Tab)

Note: These options only appear when SDI output is enabled. They do not appear for the JPEG-XS Encoder personality, or when the Processor's mode is Multiviewer.

General Config

ADS Clean	Clears the audio data space before embedding.
Grp (1 - 4) Pair (1 - 2) Control	Enables embedding of the selected pair in the audio group. By default all groups are enabled.

General Status

Grp (1 - 4) Append Error	Read-only parameter that indicates whether there is an append error on the specified embedder group.
Grp (1 - 4) OverWrite Error	Read-only parameter that indicates whether there is an overwrite error on the specified embedder group.

Output Tab: IP Video Configuration

Video IP Transmitter Enable	Enables this transmitter.
Transmitter Mode	Configures the operational mode of this transmitter. Options are: • ST 2110-20 • ST 2022-6 (only available when the standard is HD; not supported for Multiviewers in this release) **Note:** In case of the JPEG-XS personality, Transmitter Mode is pre-set to ST2110-20.
Packing Mode	*Note: This parameter is only available when the Transmitter Mode (above) is set to ST 2110-20. This parameter is not available for the JPEG-XS personality*. Select one of the following: • **GPM** (General packing mode) - This is the default. This packing mode is suitable for general applications of the ST 2110-20:2017 standard. When operating in this mode, the Line Continuation (“C”) bit may be used in order to pack samples from more than one sample row into the current packet, to avoid making packets that are too small. • **BPM** (Block packing mode) - This mode is a constrained subset of the General Packing Mode (GPM). When operating in this mode, the Line Continuation (‘C’) bit is used in order to pack samples from more than one sample row into the current packet, in order to maintain a consistent number of 180 octet blocks per packet. • **GPMC0** - In this mode, the number of pixels per packet is such that there is an exact number of packets per line (no packets containing video data from adjacent video lines). Therefore, the Continuation (C

	bit) is not required. Pixels per packet are as follows: • UHD video and 1080p/1080i/1080psf video standards: 480 pixels per packet • 720p video standards: 320 pixels per packet • SD (525i/59.94 and 625i/50) video standards : 360 pixels per packet
SD Extended Window Size	Lets you adjust the height of the image. This backs up the beginning of the image to include vertical blanking. This parameter only matters in case of SD. Range is 0-16 lines. • The default of 0 encapsulates just the active image • To include ancillary data, enter the number of lines, for example, entering 10 extends the height of the image by 10 lines. In this case, the active picture plus the content from the vertical blanking will get encapsulated into 2110. • Closed Captions: If you leave the default height as 0, note that it does not include closed captions (on line 21 by default). Extend the video to include closed captions info in the active picture, and higher if you want to include any blanking. Also see Support for SD over 2110 (on page 309) This parameter is not available for the JPEG-XS personality. ***Important****: When setting the "SD Extended Window Size" parameter to values greater than zero to include one or more lines from the VBI, please consider ancillary services present in those lines that will be received over the ST 2110-20 stream and make sure they do not conflict with any of the ancillary services received over ST 2110-40 streams. All the ancillary packets from the ST 2110-40 streams will be embedded into the baseband signal extracted from the ST 2110-20 stream into the target line, which could result in either a) overwriting an existing VBI service embedded as a waveform, or b) duplicating an existing ancillary packet.*

The following parameters appear twice, once each for **Primary** and **Secondary**.

WAN Select	Use this parameter to set the source WAN IP address for transmitting this IP Transmitter's data. Possible options are WAN 1 to WAN 4. This field also displays the IP address and VLAN defined in the Element's IP WAN menu.
IP Address	Set the address of the destination IP device. The IP address should be unique and within the range from 239.0.0.0 to 239.255.255.255
UDP Port	(User Datagram Protocol) Use this field to set the destination port number. The range is 1 to 65535.

Output Tab: IP Video Status

Channel Bandwidth Status	This read-only parameter reports if the channel is disabled due to bandwidth over-subscription.
Primary Destination MAC Address	This read-only parameter reports the MAC address of the receiver's primary SFP+ port. If no destination is using this IP Transmitter's Destination IP Address, the parameter reports the DST as unreachable.
Secondary Destination MAC Address	This read-only parameter reports the MAC address of the receiver's secondary SFP+ port. If no destination is using this IP Transmitter's Destination IP Address, the parameter reports the DST as unreachable.
Starting Line	Reports the picture starting line *Note: This parameter is not available for the JPEG-XS personality.*
Picture Height	Reports the picture height *Note: This parameter is not available for the JPEG-XS personality.*

Output Tab: Proxy IP Video Configuration

These settings are for the HD Proxy transmission channels.

Proxy Video IP Transmitter Enable	Enables this transmitter. **Note:** this parameter is only available when the **SNP-PSK-DOWNHD** (HD Downsample Feature) license is enabled for this program.
Transmitter Mode	Configures the operational mode of this transmitter. Options are: • ST 2110-20
Packing Mode	Selects either General packing mode (GPM), GPM0, or Byte packing mode (BPM). GPM is the default.

The following parameters appear for Primary and Secondary.

WAN Select	Use this parameter to set the source WAN IP address for transmitting this IP Transmitter's data. Possible options are WAN 1 to WAN 4. This field also displays the IP address and VLAN defined in the Element's IP WAN menu.
IP Address	Set the address of the destination IP device.
UDP Port	(User Datagram Protocol) Use this field to set the destination port number. The range is 1 to 65535.

Output Tab: Proxy IP Video Status

These settings are for the HD Proxy transmission channels. Parameters in this section appear for both Primary and Secondary.

Channel Bandwidth Status	Reports if the channel is disabled due to bandwidth over-subscription.
Destination MAC Address	This read-only parameter reports the MAC address of the receiver's primary or secondary SFP+ port. If no destination is using this IP Transmitter's Destination IP Address, the parameter reports the DST unreachable.

Output Tab: IP Audio Configuration

Note: These parameters do not appear when the Processor's mode is Multiviewer.

Audio Stream	Choose the audio stream (1 - 16) to configure. The rest of the parameters in this section will then apply to that stream.
Audio IP Transmitter Enable	Enables the audio IP transmitter for this stream.
Transmitter Mode	Configures the operational mode of the transmitter on this stream. Options include: • ST2110-30 • ST2110-31 (Recommended when routing sources from a Dolby E Encoder)
SDP Channel-Order	Used for Controller clients like NMOS registries. Contains information on stream contents (stereo, 5.1, mono, etc.) that is propagated to clients. This is a text field, and you can enter any data you want to be propagated, that best describes your stream. Note that this string becomes part of the SDP, and while there is a specific syntax for the channel order string in the SDP, the SNP doesn't currently enforce it via the UI. But this is something to be aware of when using with a system where it matters.
Bit Width	Sets the sample bit width for this audio transmitter stream. Options are: • 16 bits • 24 bits • 32 bits (ST2110-31 only)

Packet Time	This setting lets you define the audio packet time at a stream level. The audio packet time can also be defined at the processor level (see Configuring a Processor (on page 113)). Any stream level settings will apply for the stream in question (over the processor level setting). Ability to transmit audio streams with the following packet time options: • Default • 1 ms • 125 ms • 500 ms If Default is selected, the setting in the (Edit > Processor) *Default Audio IP Tx Packet Time* setting is used.

The following parameters can be set for both Primary and Secondary.

WAN Select	Use this parameter to set the source WAN IP address for transmitting this IP Transmitter's data. Possible options are WAN 1 to WAN 4. This field also displays the IP address and VLAN defined in the Element's IP WAN menu.
IP Address	Set the address of the destination IP device.
UDP Port	(User Datagram Protocol) Use this field to set the destination port number. The range is 1 to 65535.

Routing Control

Number of Channels	Determines the number of channels in this audio stream, which can be from 1 to 8. The default is 2. For ST2110-31, must be a multiple of 2.
Channel Select (1-8)	Selects the source for the specified audio channel in this RTP stream. If the processor has a RX MADI SFP configured, as described in MADI Support (on page 293), MADI channels X1 to X128 will appear in addition to the original 16 channel inputs. Note: There will be as many channels to select as Number of Channels defined above.

Output Tab: IP Audio Status

Note: These parameters don't appear when the Processor's mode is Multiviewer.

Options in this section appear separately for Primary and Secondary.

Destination MAC Address	This read-only parameter reports the MAC address of the receiver's primary or secondary SFP+ port. If no destination is using this IP Transmitter's Destination IP Address, the parameter reports the DST unreachable.

Output Tab: Program Ancillary Data Configuration

This section only applies to Conversion personalities.

CC/TT Enable	Enables Closed Captions/Teletext ancillary data transmission
CC/TT Line Number	Set the horizontal scan line number that Closed Captions/Teletext is transmitted on
WSS Enable	Enables Wide Screen signaling ancillary data transmission
WSS Line Number	Set the horizontal scan line number that WSS is transmitted on.
WSS Code	Overrides the WSS code to transmit
AFD Enable	Enables Active Format Description ancillary data transmission
AFD Line Number	Sets the horizontal scan line number the AFD is transmitted on Range is 9 to 41 (23 is default)
AFD Code	Overrides the AFD data stream to transmit. Options include: • Pass • (4:3) 0000-UNDEF • (4:3) 0001-RSVD • (4:3) 0010-16:0 top • (4:3) 0011-14:9 top • (4:3) 0100-gt 16:9 • (4:3) 0101-RSVD • (4:3) 0110-RSVD • (4:3) 0111-RSVD • (4:3) 1000-4:3 full • (4:3) 1001-4:3 full • (4:3) 1010-16:9 1 • (4:3) 1011-14:9 1 • (4:3) 1100-RSVD • (4:3) 1101-4:3 a 14:9 • (4:3) 1110-16:9 la 14:9 • (4:3) 1111-16:9 la 4:3 • (16:9) 0000-UNDEF • (16:9) 0001-RSVD • (16:9) 0010-16:9 full • (16:9) 0011-14:9 cntr • (16:9) 0100-gt 16:9 • (16:9) 0101-RSVD • (16:9) 0110-RSVD • (16:9) 0111-RSVD • (16:9) 1000-16:0 full

	• (16:9) 1001-4:3 p • (16:9) 1010-16:9 prtctd • (16:9) 1011-14:9 p • (16:9) 1100-RSVD • (16:9) 1101-4:3 pa 14:9 • (16:9) 1110-16:9 a 14:9 • (16:9) 1111-16:9 a 4:3
SCTE-104 Splicing Enable	Enables SCTE-104 Splicing
SCTE-104 Splicing Line Number	Sets the horizontal scan line number the SCTE-14 splicing is transmitted on. Range is 9 to 41 (13 is default)
SMPTE 2031 Enable	Enables SMPTE 2031 ancillary data transmission
SMPTE 2031 Line Number	Sets the horizontal scan line number the SMPTE 2031 is transmitted on. Range is 9 to 41 (10 is default)
ATC Enable	Enables Ancillary Timecode
ATC Line Number	Sets the horizontal scan line number that the Ancillary Timecode is transmitted on Range is 9 to 41 (10 is default)
ATC Ancillary Location	Selects the location for embedding the Ancillary Timecode. Options include: • VANC • HANC
ATC Embedding Mode	Sets the mode for embedding Ancillary Timecode. Options include: • Copy • Generate LTC • Generate VITC
ATC Drop Frame Enable	Enables drop frame for Ancillary Timecode.
ATC Hour Offset	Sets the hour offset for the Ancillary Timecode. Range is -11 to 12 (0 is default)

Output Tab: Ancillary Data Configuration

When enabled, the Source ID, if present in the incoming video is processed, and embedded into the SDI and/or 2022-6 output. The following parameters control Source ID processing:

Source ID Enable	Enables processing/passing of the source ID from input to output OR inserting it if absent.
Source ID Line Number	Sets the line on which the Source ID should be carried. The range depends on the Output standard, for example, in case of 1080p, the range is 9 to 41 and the default is 15.
Source ID Embedding Mode	Options include: • Pass only: If present, the Source ID is passed through to the output. This is the default setting. • Pass or add User SID: If present, Source ID is passed through to the output. If not present, the string in the Source ID Data field will be used. • Force User SID: Source ID even if present, will be be overridden in the output by the string set in the Source ID Data field. Note that the Force User SID setting replaces the contents of identifier text in the packet, and not the line number. The Line number set in the Source ID Line Number setting will be effective only if there is no input source ID packet coming in.
Source ID Data	The string entered here overrides any identifier text present in the packet OR inserts it if there no incoming Source ID.

Output Tab: IP Ancillary Data Configuration

Note: These parameters don't appear when the Processor's mode is Multiviewer.

Data Stream	Choose the data stream (1 - 4) to configure. The rest of the parameters in this section will then apply to that stream.

The following parameters can be set for both **Primary** and **Secondary**.

ANC Data IP Transmitter Enable	Enables the data IP transmitter for this stream.
WAN Select	Use this parameter to set the source WAN IP address for transmitting this IP Transmitter's data. Possible options are WAN 1 to WAN 4. This field also displays the IP address and VLAN defined in the Element's IP WAN menu.
IP Address	Set the address of the destination IP device.
UDP Port	(User Datagram Protocol) Use this field to set the destination port number. The range is 1 to 65535.

Ancillary Data IP Filter (Remap and Sync modes)

In Remap and Sync modes, there are four filters for each ANC channel. These filters allow you to choose specific Ancillary data to include or exclude. The rules for each filter are handled in a sequential manner from 1 to 4.

By default, no ancillary data is passed through. In order to have any data to filter, you must first include something on Filter 1. This is why there is no **Exclude** option on **Filter 1**.

Example:

> If you set the first filter to **Include** (Filter Rule) **All** (Service Select) on **All Lines** (Line Select), then set the second filter to **Exclude** (Filter Rule) **Closed Captions** (Service Select) on **Line 21** (Specific Line), then the second filter will override the first and Line 21 closed captioning will be excluded but all other ancillary data will be passed through.

Filter Number	Determines the filter you are currently modifying. There are four filters.
Filter Rule	Defines the function of the filter on the selected elements (below): • Exclude (only available for filters 2, 3, and 4; not available on Filter 1) • Include • Not Used
Service Select	This parameter is displayed when *Filter Rule* is set to *Include*. Selects the services the filter will apply to: • All (default for Filter 1, only available on Filter 1) • Active Format Description • Ancillary Time Code (default for Filter 2) • Closed Captions (EIA-708) **Note:** This option will also read EIA-608 data placed within the EIA-708 packet. • Dolby Audio Metadata • Film Codes • KLV Encoded Metadata • Payload Identification • Program Description • SCTE-104 Splicing • Broadcast Flag • Broadcast Alert System • Local IDentification Inserted Automatically • Teletext (OP-47) • SMPTE ST 2031
Line Select	Selects where the filter rule will be applied: • All Lines (default) • Specific Line
Line Number	This field only appears when **Specific Line** is selected above in the **Line Select** parameter. Choose the line the service is expected on.

Ancillary Data IP Filter (Conversion Mode)

In Conversion mode, there is one data filter, and when applied to Data Stream 1, it is applied to the other data streams as well.

Filter Rule	Defines the function of the filter on the selected elements (below): • Include • Not Used
Service Select	Selects the services the filter will apply to: • Active Format Description • Closed Captions (EIA-708) **Note:** This option will also read EIA-608 data placed within the EIA-708 packet. • Payload Identification • SCTE-104 Splicing • Teletext (OP-47) • SMPTE ST 2031
Line Select	Select where the filter rule will be applies, All Lines or Specific Line.
Line Number	Choose a number between 9-1125 (inclusive).

Note: In addition to setting Ancillary Data for Tx mode, these settings also automatically embed captioning on SDI outputs.

Output Tab: IP Ancillary Data Status

Note: These parameters do not appear when the Processor's mode is Multiviewer.

Options in this section appear separately for Primary and Secondary.

Destination MAC Address	This read-only parameter reports the MAC address of the receiver's primary or secondary SFP+ port. If no destination is using this IP Transmitter's Destination IP Address, the parameter reports the DST unreachable.

Output Tab: Video Control

Note: These parameters only appear when the Processor's mode is Multiviewer.

Parameters with a LIVE indicator will update on the actual stream as you change them, without the **Apply** button being pressed.

Proxy 3G Output Allow	When unchecked, the Proxy output format is 1080i (interlaced). When checked, the Proxy output format is 1080p (progressive). The Proxy output frame/field rate follows the Multiviewer’s Display frame rate.

Vphase (lines) (Live)	Adjusts the vertical phase of the frame sync from 0 to 1124 with units of "lines" and precision of 0 decimal places. This parameter is unavailable when in Low Latency mode and when **IP Video Tx is enabled**. See Configuring a Processor (on page 113).
Hphase (µs) (Live)	Adjusts the horizontal phase of the frame sync, with a precision of three decimal places. The range varies depending on the video standard and frame rate: • 625i/50 (0 to 63.963) • 525i/59.94 (0 to 63.519) • 720p/50 (0 to 26.653) • 720p/59.94 (0 to 26.653) • 1080i/50 (0 to 35.542) • 1080i/59.94 (0 to 29.646) • 1080p/23.98 (0 to 37.061) • 1080psf/23.98 (0 to 37.061) • 1080p/24 (0 to 37.061) • 1080psf/24 (0 to 37.061) • 1080p/25 (0 to 35.542) • 1080p/29.97 (0 to 29.646) • 1080p/50 (0 to 17.771) • 1080p/59.94 (0 to 14.823) UHD section mode • 2160p/23.98 (0 to 37.024) • 2160p/24 (0 to 37.024) • 2160p/25 (0 to 35.542) • 2160p/29.97 (0 to 29.646) • 2160p/50 (0 to 17.771) • 2160p/59.94 (0 to 14.823) This parameter is unavailable when in Low Latency mode and when **IP Video Tx is enabled**. See Configuring a Processor (on page 113).
TSG Enable (Live)	Enables the test signal generator, which plays the signal displayed below
TSG Pattern	Options are: • Black • White • Color Bars 75% • Horizontal Sweep Y-only • Horizontal Sweep • Cross Hatch

General System Configuration Considerations

In This Section

Using DHCP with your SNP

If your SNP is connected to a network switch with a configured DHCP (Dynamic Host Configuration Protocol) server, you can opt to use DHCP for the following:

- For the Control Interface. See Using DHCP for the Control Interface (on page 466)
- For the Media Network Interface . See Using DHCP for the Media Interface (on page 467)
- For the SNP Host Name. See User Defined Host Name (on page 469)

Using DHCP for the Control Interface

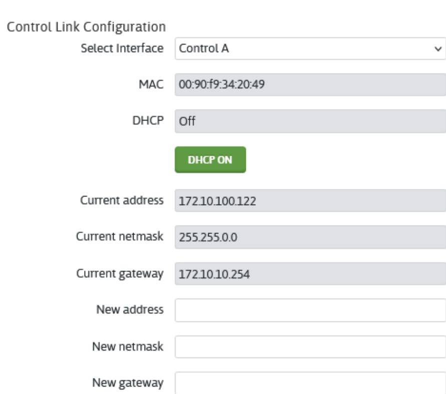
Go to the **SNP Console** (**Views > Console** or simply enter https://<SNP_IPAddress>/console#/console).

The SNP has 2 Control interfaces, **Control A** and **Control B,** and you can select these interfaces under **Control Link Configuration.**

Note: The **Control Link Bonding** offers two modes:
- **Dual Addresses** (different addresses for Primary and Secondary) and
- **Bonded Active/Backup** which is the SNP default
If you have the first option selected, Control A and B can be defined separately, and DHCP can be enabled or disabled separately on each interface. In case of the latter, only Control A is configurable, and the Control A settings will be used across the bonded pair.

On selecting an interface, you will see:

- The MAC Address
- Whether DHCP is currently enabled
- The Current address
- The Current netmask
- The Current gateway



To use DHCP for an interface, click the **DHCP On** button. This overrides the current IP and the DHCP assigns a new IP.

Note that enabling or disabling DHCP on the control interface will change the IP address and may impact your ability to communicate with the SNP.

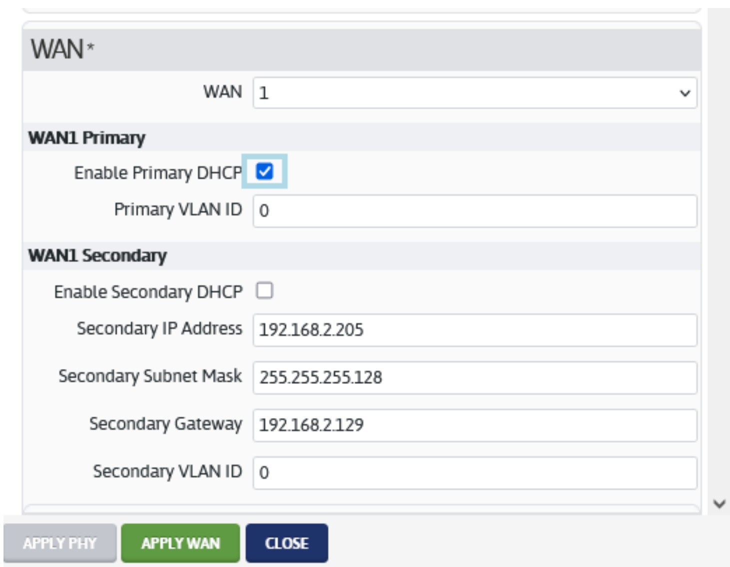
Using DHCP for the Media Interface

The SNP's **Media Network Interface** is defined by going to **Configure Element > IP WAN. WAN1 Primary** and **WAN1 Secondary** contain settings for IP addresses for the data network; video and audio goes through this network. There is a DHCP capability here, both on the primary and the secondary.

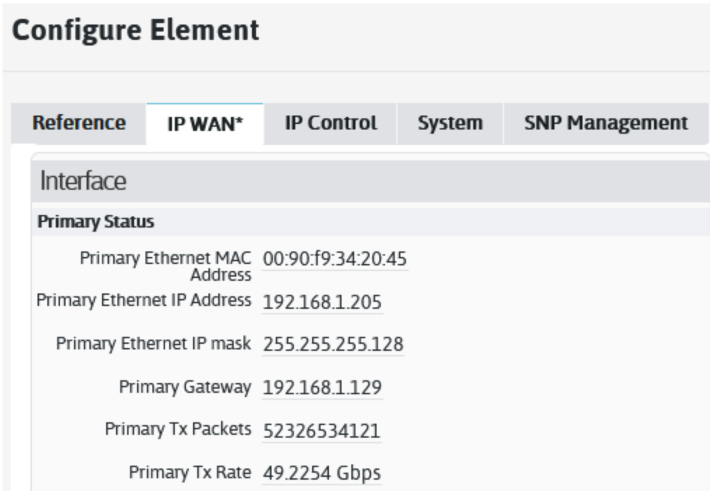
Note: Currently, WAN1 supports DHCP if used as an untagged (VLAN ID = 0) interface. In this release, DHCP is not supported when used with trunk mode (tagged VLANs) and is not supported on WAN2-4.

To use DHCP for a primary or secondary WAN (WAN1 only):

1. Select the **Enable** (**Primary/Secondary**) **DHCP** checkbox
2. Click the **Apply WAN** button at the bottom of the dialog to assign the DHCP IP address(es)
3. **Reboot** the SNP after clicking Apply WAN, for the IP address change to take effect

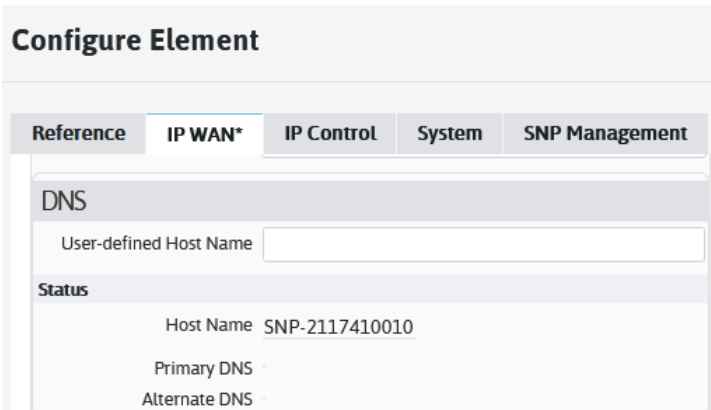


Note: The **Interface** section at the bottom of the dialog shows the **Primary Status** and **Secondary Status**. Note the **Primary/Secondary Ethernet IP Address** fields. If you had a static IP applied, and enabled DHCP, no change will be visible to these status fields on clicking Apply WAN. In other words, the static IP is still applied and a reboot is needed for the DHCP IP addresses to be applied.


Configure Element
Reference
IP WAN*
IP Control
System
SNP Management
Interface
Primary Status
Primary Ethernet MAC Address
00:90:f9:34:20:45
Primary Ethernet IP Address
192.168.1.205
Primary Ethernet IP mask
255.255.255.128
Primary Gateway
192.168.1.129
Primary Tx Packets
52326534121
Primary Tx Rate
49.2254 Gbps

User Defined Host Name

A **custom** host name can be set for the SNP via the **Configure Element** dialog (IP WAN tab, DNS section). Note that by default this field is blank, and the SNP host name is automatically generated using:
SNP-<serial>



This default setting ensures that names are unique on the network by default, when nothing else is configured.

You can choose enter a custom name here by entering it in the **User-defined Host Name** field. This overrides the default SNP-<serial> hostname, however there is one exception. If DHCP is enabled and the DHCP Server uses DHCP Option 12 to send a hostname to the SNP, then the SNP will take the hostname provided by the DHCP Server instead of the name provided in this field.

Note: Once you delete a custom name, it goes back to the default of using **SNP-<serial>.**

Bandwidth/Stream Limitations

If you configure to transmit and receive more than 7 channels of 3G video at 1080p59 or UHD video at 2160p59 and more than 64 IP audio streams per processor, you may experience audio pops and glitches or no audio.

To avoid this situation, restrict the video format on one out of eight channels within the same processor to 1.5G, disable one video Rx/Tx, or limit the audio IP streams to 64 or less per processor.

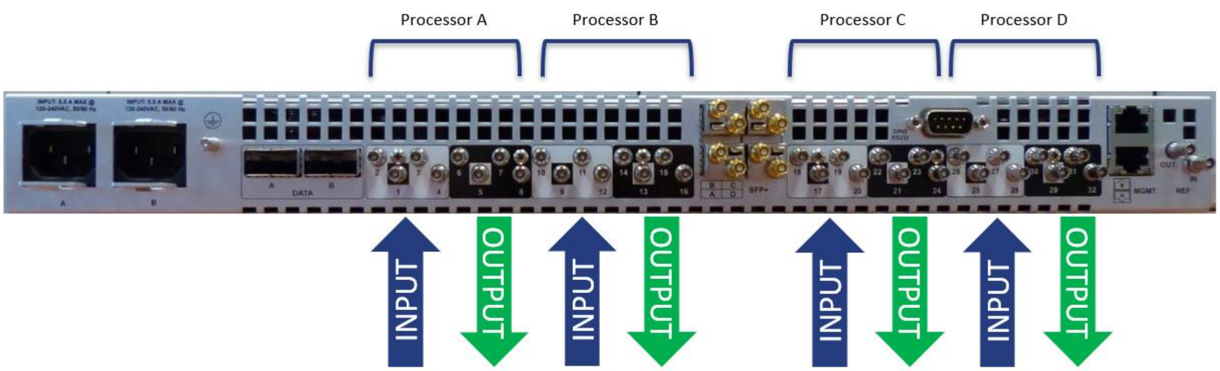
If exceeding these limitations has caused "no audio", after reducing your bandwidth usage you may have to reboot to bring audio back.

Make-Before-Break (MBB) Video Switching

When configuring your SNP, if bandwidth is exceeded, switches will become Make After Break. In order to maintain Make-Before-Break switching, observe the following configuration limits:

Signal	Limit for Make-Before-Break Switching
1.5G	No restriction for 32 channels
3G	7 of 8 channels per processor
3G (2022-6)	6 of 8 channels per processor
UHD	You must have one free UHD section on the SNP, which can be one of the following: • IP input, disconnected • UHD Tx
UHD and 3G on the same processor	Up to 3 channels of 3G + UHD Rx, No limit on UHD Tx

For best results, use a balanced configuration where each processor has one section configured for input and the other section configured for output.



When configured in this way, it is possible to have a 16 x 16 matrix of 3G with MBB (4 x 4 channels of UHD with Make-Before-Break, or 4 IP Rx and 4 IP Tx per processor).

In addition, for each processor you can set **Force MAB Mode** (**Processor** > **Edit** > **General**).

Processor Channel Capacity

Bandwidth is limited to 90% of a processor's capacity (25Gbps).

Audio IP Stream Channel Support

Each program can transmit (or receive) up to 16 ST 2110-30 streams, with each stream supporting encapsulation of 1-8 mono channels.

Each program can have a mixture of # channels/streams. For example, you could configure streams 1-10 as one mono channel per stream, then streams 11-14 as stereo (2 channels) per stream, and then streams 15-16 as 8 mono channels per stream with no negative repercussions.

Audio routing options include the following:

- Encapsulation into an ST 2110-30 stream
- De-encapsulation from ST 2110-30 and embedding onto SDI
- Customized ST 2110-30 to ST 2110-30 with Network address translation

Each PCM audio can be routed to any and all ST 2110-30 transmitters (similarly, for IP to SDI, or IP to IP). Each (mono) audio can go through audio sync and proc for gain and delay adjustments.

Getting to the SDP Object

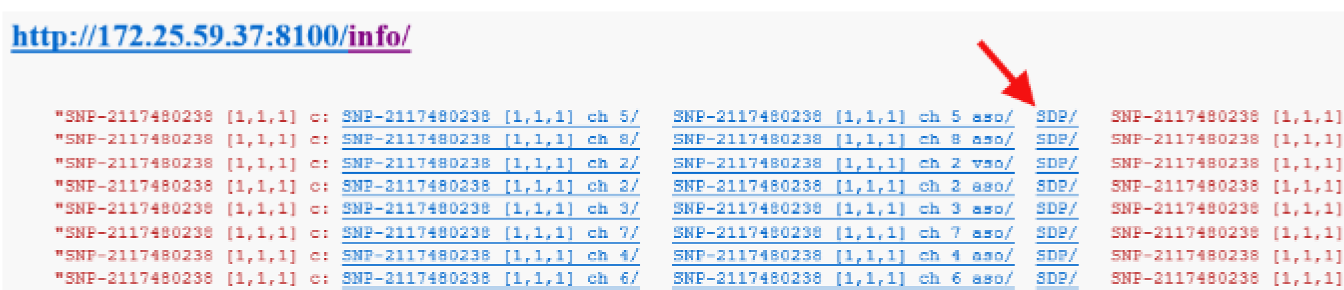
NMOS must be turned on for the SNP to get to the SDP object. See NMOS (on page 369) for more information. SNP uses RDP.

You can get the SDP object by going to

http://<snp_ip>:8100/info/

where <snp_ip> is the IP address of your SNP device.

Each transmitter will have a line similar to the following:



Click the SDP/ link for the stream of interest.

Network Recovery

If your IP network should become unstable due to excessive traffic, SNP may become unavailable.

If you need to bring up the network controls on the panel to help investigate, and the panel application is still running (shows ‘Device Select’ at the top), hold the **Exit** and **Status** keys for 5 seconds to bring up the Control IP configuration panel support.

Once you have made your BIOS changes, you will be unable to go back to the Root menu. To exit the branch, reboot the SNP.

Multi-Unit Cascading

The SNP supports cascading two or more SNP units (to a maximum of 4) in order to increase the total number of UHD PiPs displayed on the SNP Multiviewer output.

Notes:

- You can cascade a maximum of 4 SNP units
- SNPs set to Multiviewer Landscape and Portrait modes can be cascaded

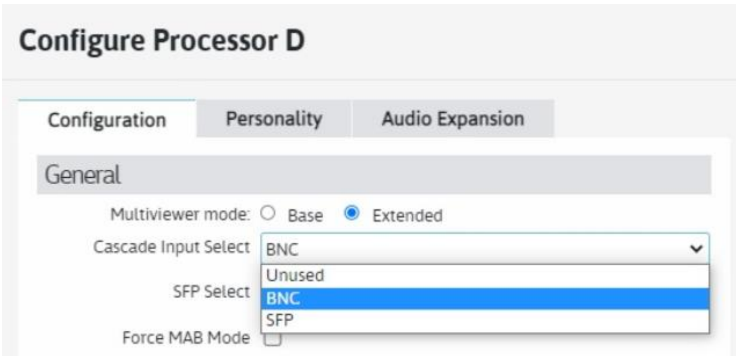
The following table illustrates the maximum output PiPs depending on your display (HD or UHD) and the number of cascaded units:

# of Cascade Units	Mode	Orientation	Max # of PiPs
2 cascaded units	HD	Portrait/Landscape	72
	UHD	Portrait/Landscape	16
3 cascaded units	HD	Portrait/Landscape	96
	UHD	Portrait/Landscape	24
4 cascaded units	HD	Portrait/Landscape	144
	UHD	Portrait/Landscape	32

In This Section

Enabling Cascading Input

- Only **Processor D** of an SNP unit in Multiviewer mode can be set up for **Cascade Input**
- In the **Configuration** tab, **General** section, set the **Cascade Input Select** parameter to **BNC** or **SFP**. Setting it to **Unused** means the cascade input will not be used.

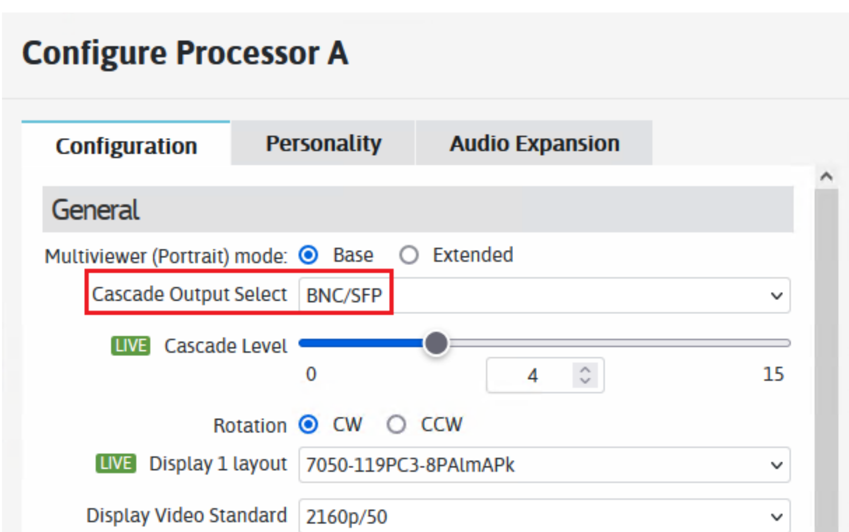


- When **Cascade Input** is enabled, the BNC direction is set/forced to **Input**. Once enabled, the downstream SNP gets its Canvas input from an upstream SNP.
- When **Cascade Input** is enabled, the selected I/O is set to 12G single link

Enabling Cascade Output

Cascade Output

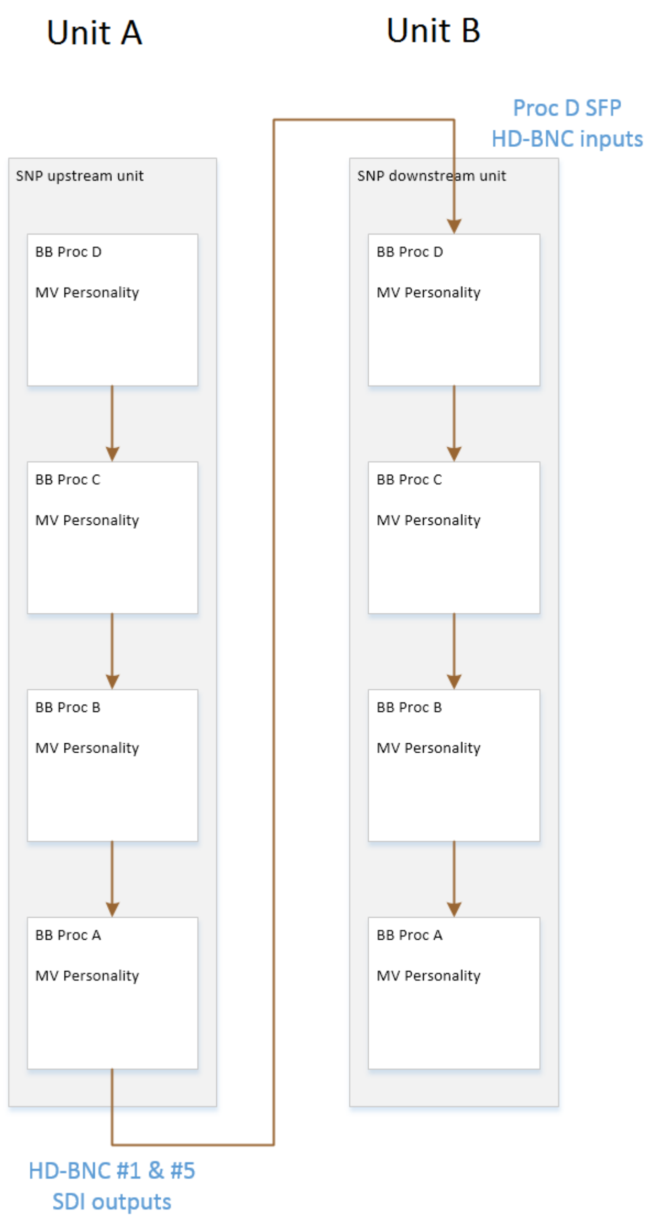
- Only **Processor A** of an SNP unit in Multiviewer mode can be set up for cascade output
- In the **Configuration** tab, **General** section, set the **Cascade Output Select** parameter to **BNC/SFP**. Setting it **Unused** (the default setting) means there is no expected cascade output.
- **Cascade Level**: When Cascade Output is enabled on the UPSTREAM Processor, the *Cascade Level* setting is displayed. Ensure you set this as follows:
  - For the first UPSTREAM unit, set level to 4
  - For the second UPSTREAM unit, set level to 8
  - For the third UPSTREAM unit, set level to 12



Cascading Example

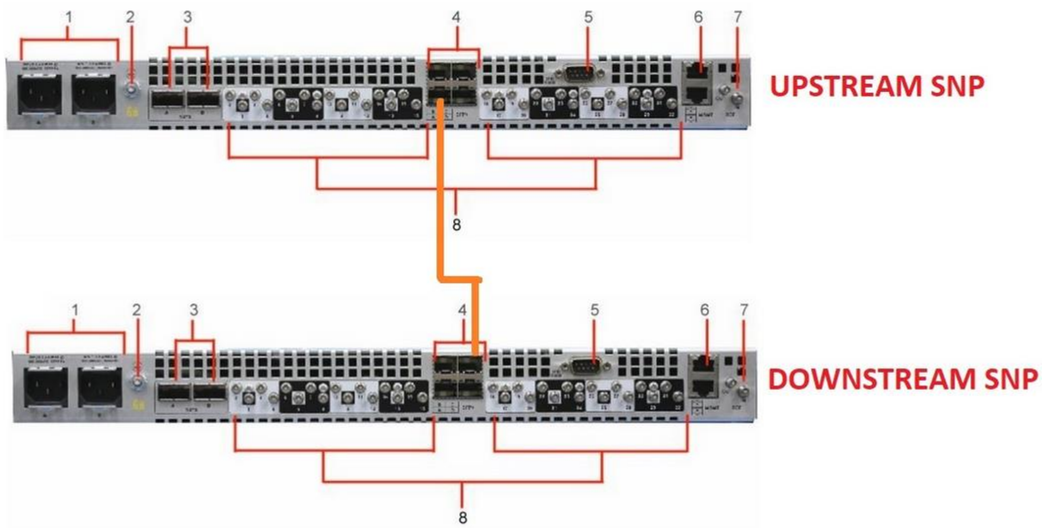
The following diagram illustrates a two unit cascading setup.

- Both SNP units are set to the **Multiviewer** personality (normal or Portrait)
- **Unit A** - the upstream unit - sends **cascade output** (Processor A) via BNC
- **Unit B** - the downstream input - receives unit A's output as **cascade input** (Processor D) via SFP
- This represents a **2 unit cascade**, providing either **72** (HD) or **16** (UHD) output PiPs
- A 3 unit cascade can be created by feeding Unit B's outputs (Processor A) to a third unit (Processor D). And similarly, to a fourth unit.

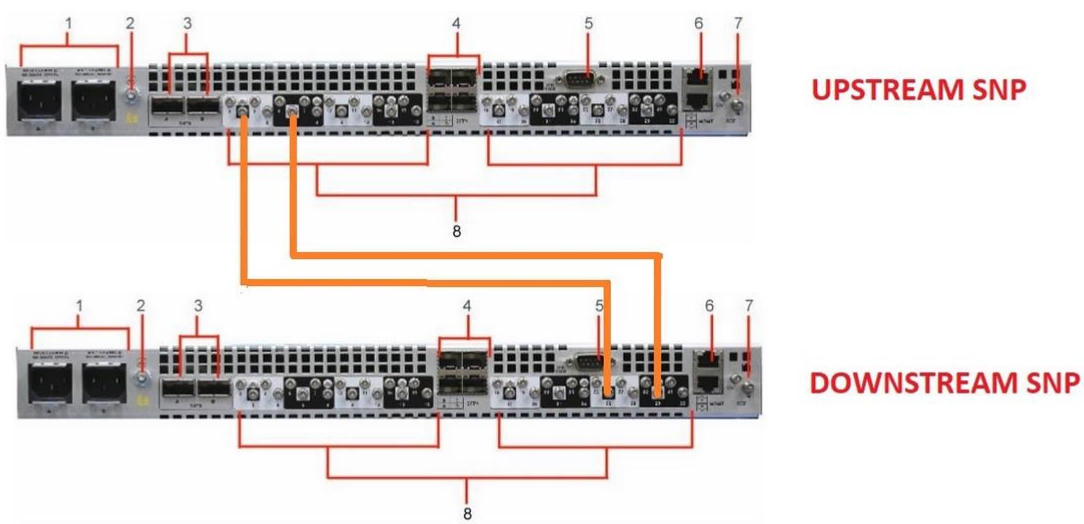


The following diagram shows the physical connections for a 2 unit cascade, connected via SFP and BNC:

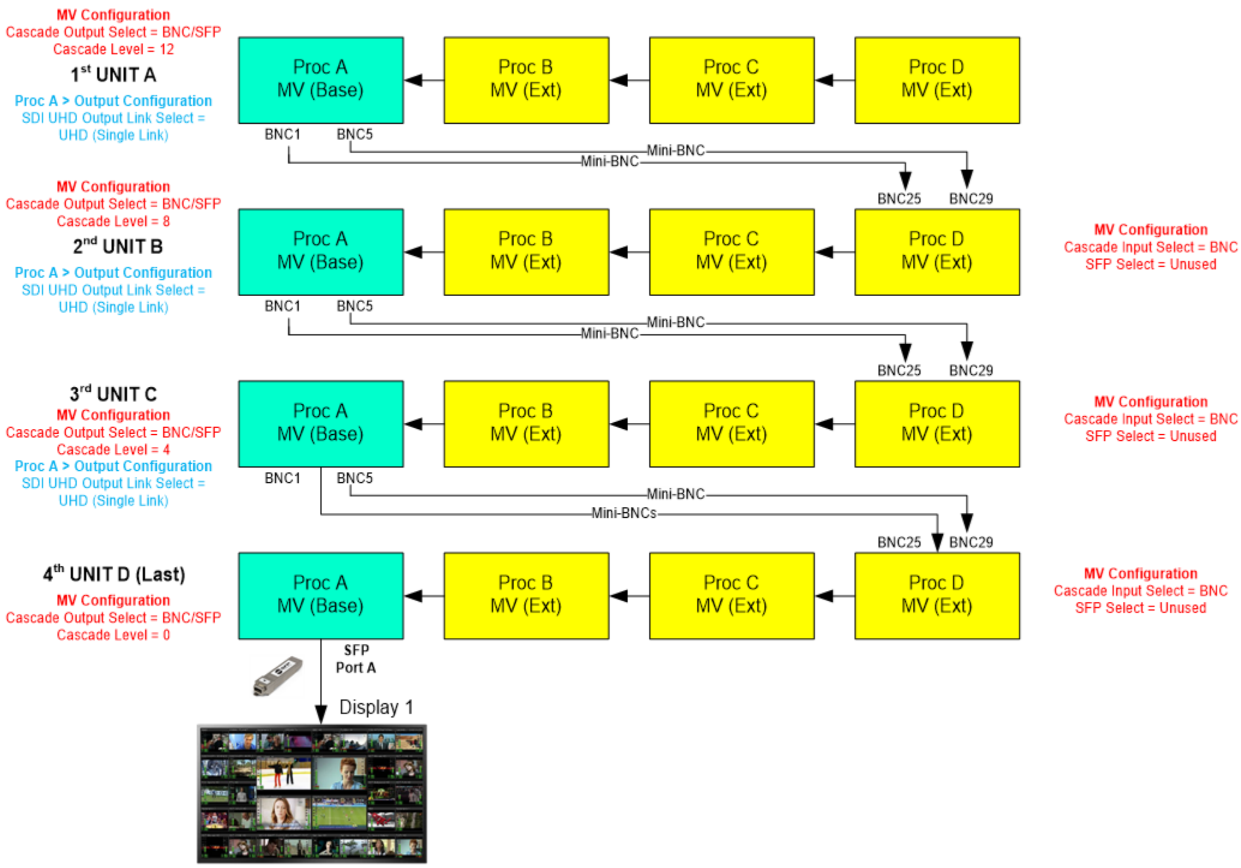
Connected through SFP



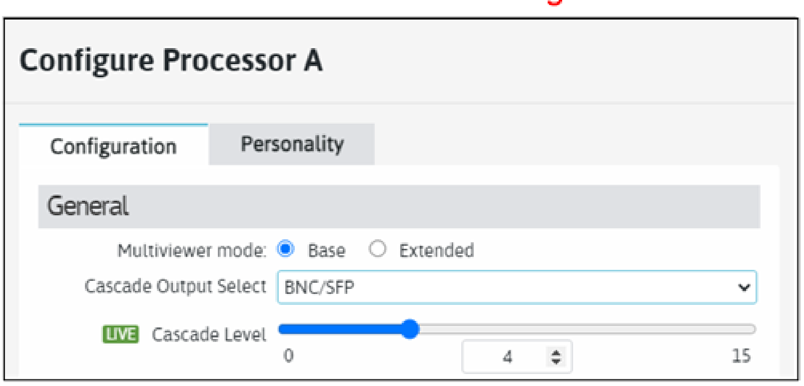
Connected through BNC

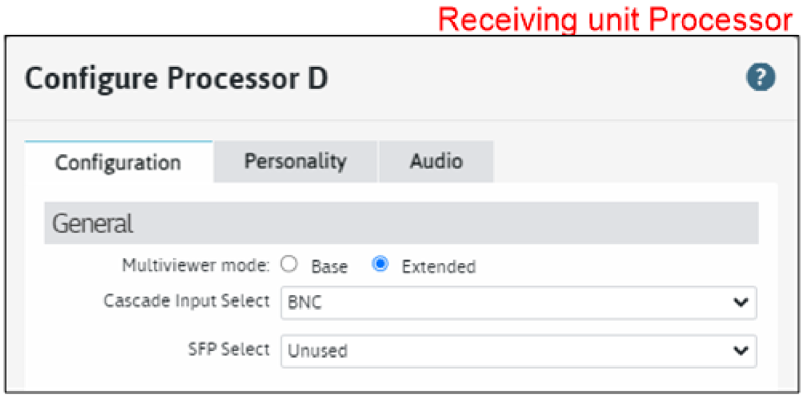


Cascade Concept/Example Using BNC Connections

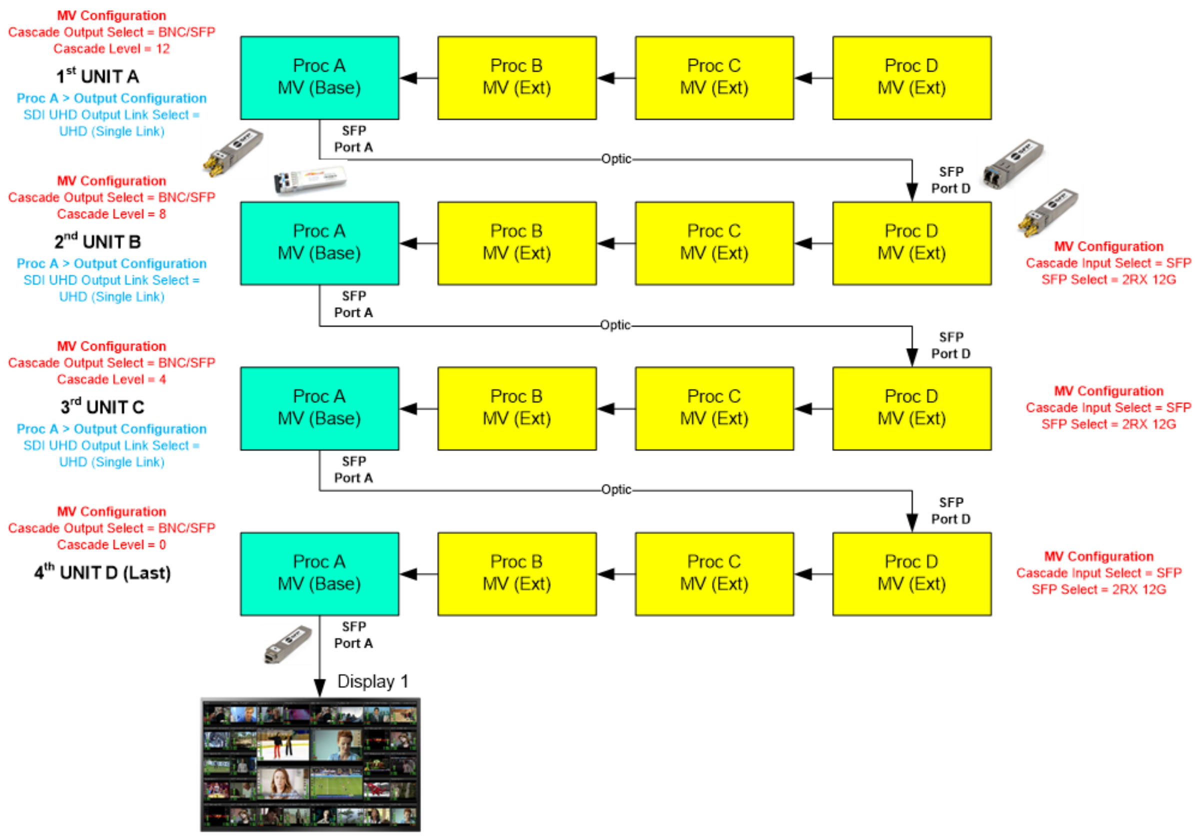


Transmitting unit Processor

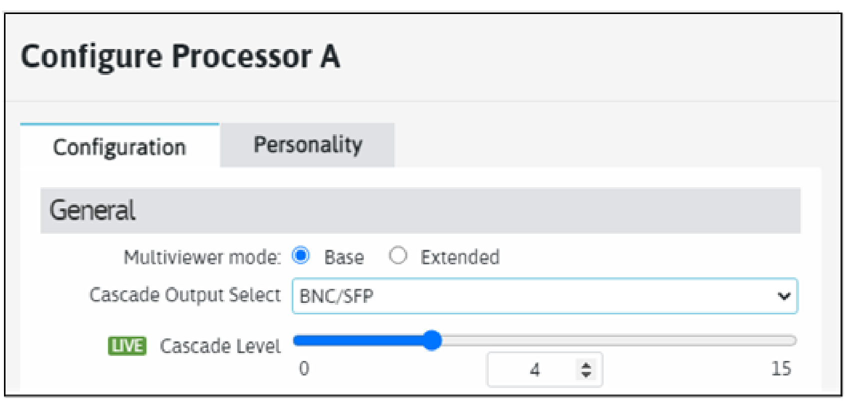



Receiving unit Processor
Configure Processor D
Configuration
Personality
Audio
General
Multiviewer mode:
Base
Extended
Cascade Input Select
BNC
SFP Select
Unused

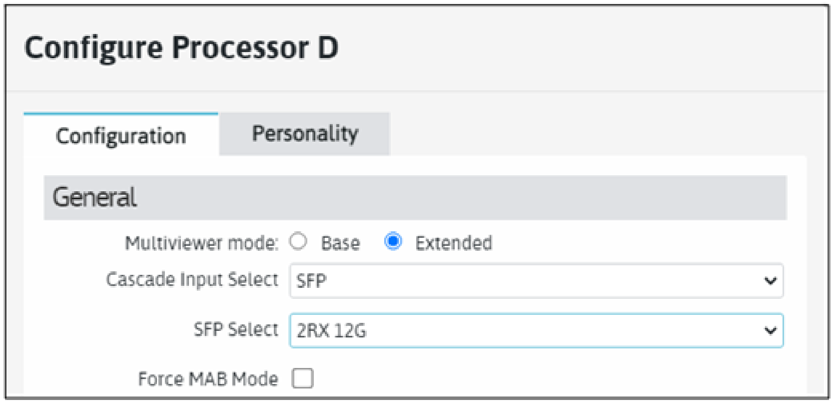
Cascade Concept/Example Using SFP Connections



Transmitting unit Processor

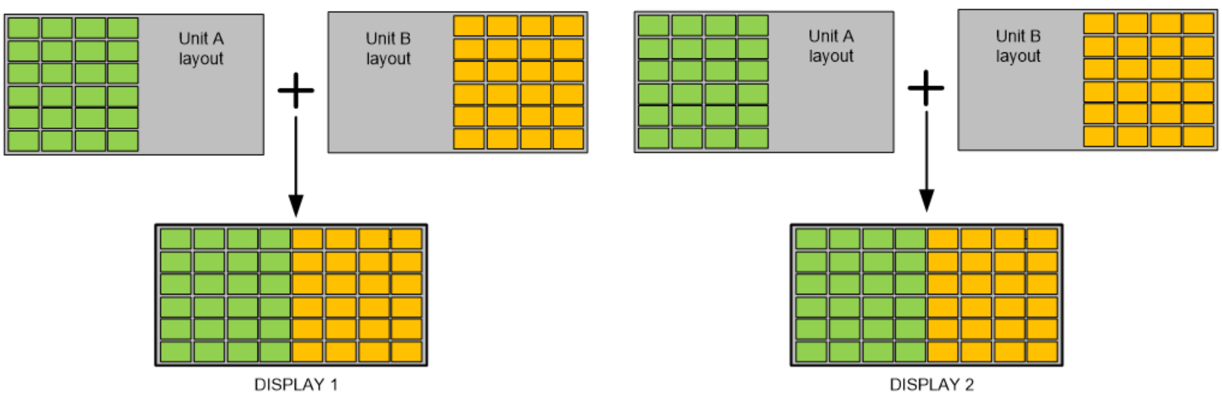


Receiving unit Processor



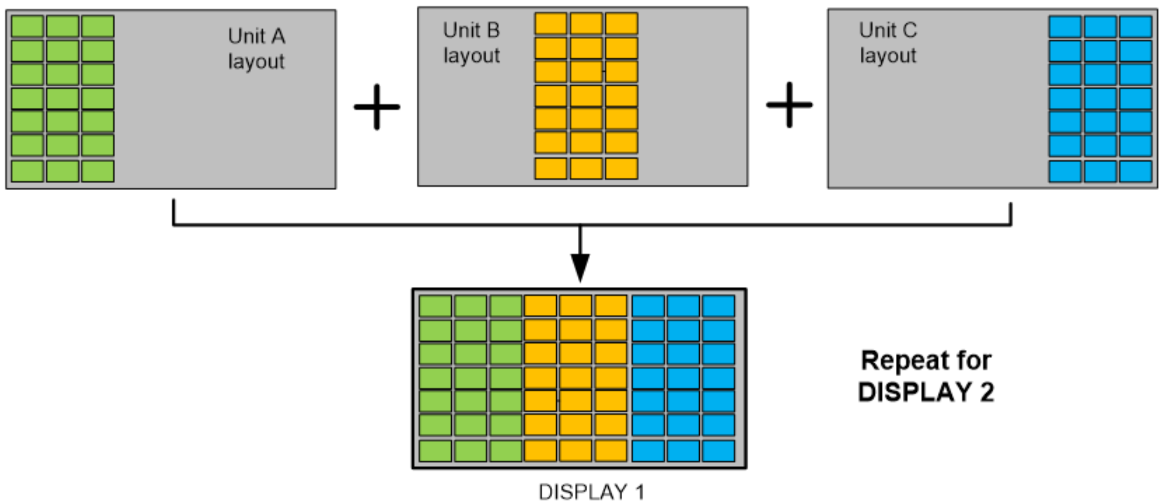
2 Unit Cascade Layout Configuration

- Divide the layout into two.
- Put the 1st unit (UPSTREAM – Unit A) layout contents on the left-half of the canvas.
- Put the 2nd unit (DOWNSTREAM – Unit B) layout contents on the right-half area of the canvas.



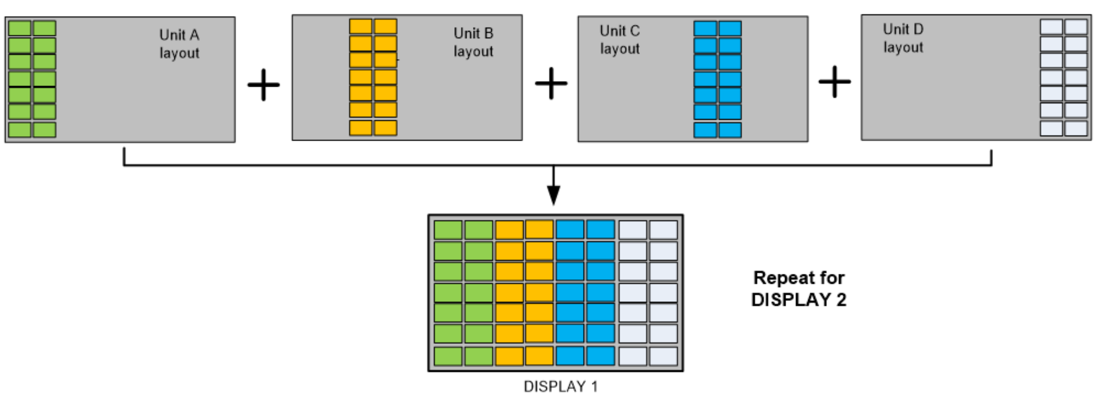
3 Unit Cascade Layout Configuration

- Divide the layout into three.
- Put the 1st unit A layout contents on the left-third of the canvas.
- The 2nd unit B layout contents in the middle third.
- The 3rd unit C contents should go into the right- third of the screen.



4 Unit Cascade Layout Configuration

- Divide the layout into 4 quarters.
- The 1st unit A layout contents should go into the leftmost quarter of the canvas.
- The 2nd unit B should use the adjacent quarter as shown below.
- The 3rd unit C should use the adjacent quarter as shown below.
- The 4th unit D should use the rightmost quarter.



Cascading Issues

In case of missing inputs from a unit, for example, if a unit in the cascade chain is being rebooted or upgraded, the Cascade Input from that unit is automatically turned off so as to not have any interference from that input.

In case of configuration mismatches or missing video presence, alarms are asserted. See Cascade Alarms (on page 482).

Cascade Alarms

Cascade alarms are asserted in case of configuration mismatches between the upstream and downstream SNPs, so users/operators can make changes to fix the configuration issue. An alarm is also asserted in case of video presence missing.

Note: Ensure that the *Output Video Standard*, *Display Colorimetry and TCS*, and *Decimation Filter Sharpness* parameters of an upstream (feeder) unit match those of the downstream (receiver) SNP.

Configuration Mismatch Alarms

Configuration mismatches include the following:

- The Downstream SNP output resolution does not match the Cascade Input video resolution (The MV Output Video Standard does not match the Cascade Input Video Standard)
- No video presence is detected on the Cascade Input (based on type selected: BNC or SFP)
- Cascade Input Video Standard is not 12G

Video Presence Alarms

On Processor D of an SNP enabled for cascading, when the **Cascade Input Selection** is *BNC* or *SFP* and the video input presence detector indicates that a signal is not present or an SFP+ module is not present, an Alarm is raised for each Cascade input.

The alarms are applicable for:

- Processor D, Section 1, Program 1 for MV/MVP
- Processor D, Section 2, Program 1 for MV

Creating Cascade Layouts

The following are some guidelines/tips when creating layouts for cascaded units:

2 Unit Cascade

- Divide the layout into two
- Put the 1st unit (DOWNSTREAM) layout contents on the left half of the canvas
- Put the 2nd unit (UPSTREAM) layout contents on the right half area of the canvas

3 Unit Cascade

- Divide the layout into three
- Put the 1st unit layout contents on the left third of the canvas
- The 2nd unit layout contents in the middle third
- The 3rd unit's contents should go into the right third of the screen

4 Unit Cascade

- Divide the layout into 4 quarters
- The 1st unit layout contents should go into the leftmost quarter of the canvas
- The 2nd unit should use the adjacent quarter (to the right of the first)
- The 3rd unit should use the adjacent quarter (to the right of the second)
- The 4th unit should use the rightmost quarter

Time Sources

The SNP offers the following options for using a time source:

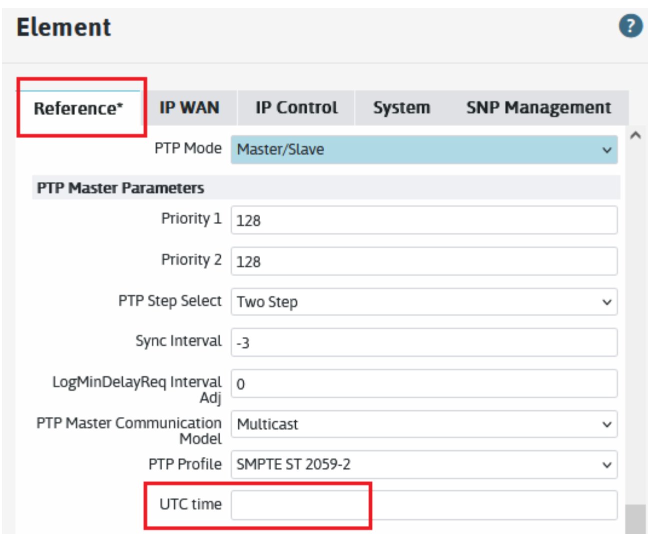
- PTP - See Configuring a PTP Network (on page 485)
- NTP - See Configuring an NTP Server (on page 484)
- UTC time - See Configuring UTC Time (on page 484)

Also see Interaction and Precedence across Configured Time Sources (PTP, NTP, and UTC) (on page 486).

Configuring UTC Time

The SNP allows you to set the system time to Coordinated Universal time.To do this:

- Go to **Configure** > **Element** > **Reference** > **UTC time** (this option shows when PTP Mode is set to Master/Slave).

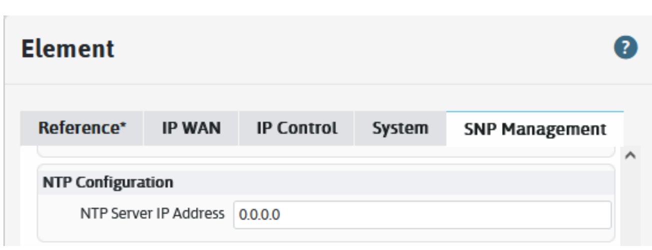


- Enter the time in the following format: YYYY-MM-DD HH:MM:SS

Configuring an NTP Server

The SNP allows you to set the system time to an NTP server. To configure an NTP Server:

- Go to **Configure** > **Element** > **SNP Management**
- In the **NTP Configuration** section, enter IP address of the **NTP server**



Configuring a PTP Network

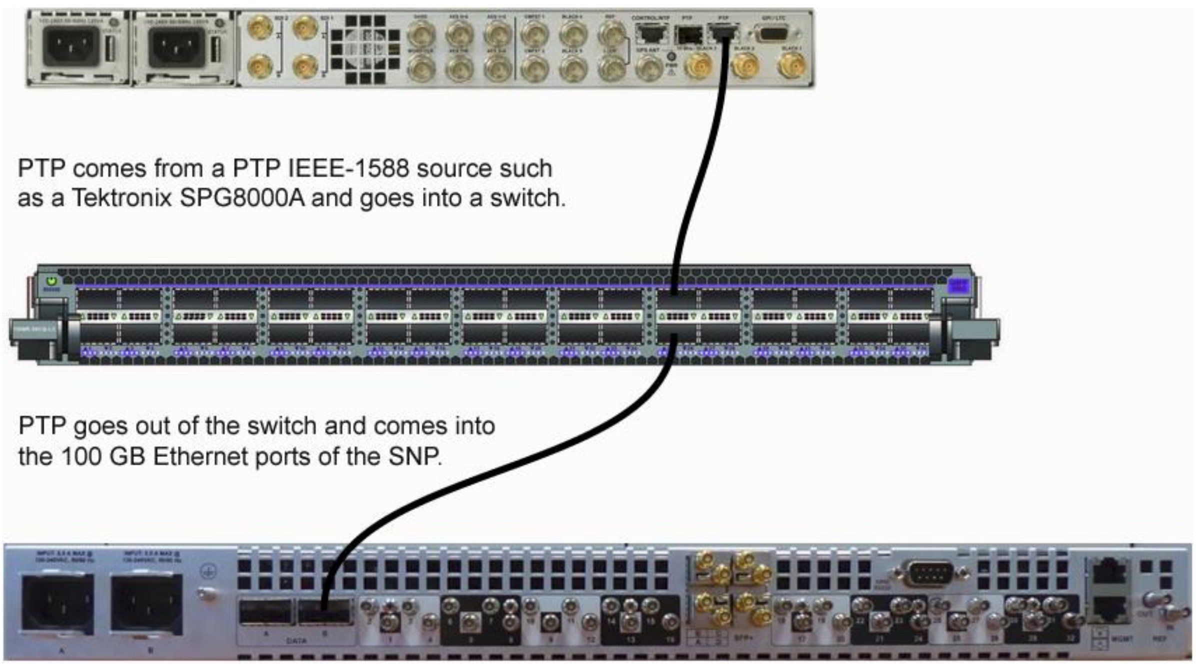
The SNP can function as a Master or a Slave. See Configuring Reference for SNP - PTP (on page 351) for configuration parameters that need to be set as well as status parameters.

A PTP network normally includes a PTP source such as a Tektronix PTP generator. This, and the SNP and switch (such as an Arista switch) need to be correctly configured.

Note: PTP is required for clock.

Connecting to a PTP Source

To connect to a Precision Time Protocol (PTP) IEEE-1588 source, note the following:



The 1588 standard assumes symmetrical path delay. If you have different rate paths (E.g. VSG-4MTG at 100Mbps and SNP at 10G), the One Way Delay (OWD) calculation is incorrect. Two parameters allow SNP to compensate for this error: **Network from master/boundary clock** and **OWD Offset**, listed in Configuring Reference for SNP - PTP (on page 351).

To configure these parameters, follow these steps in SNP Manager:

1. From the main menu, choose **Tools** > **Configure Element.**
2. Select the **Reference** tab, and under **PTP** > **Configuration**, select the **Network from Master/Boundary Clock** option that best describes your network configuration.

   This parameter makes an OWD calculation based on an assumption of how the switch behaves internally. Not all switches will always behave this way.
3. Using a PTP master with a 2059-1 aligned black output, measure the relative timing (in microseconds) of the SNP SDI output to the PTP master's black output. E.g. WFM8300.

4. Enter this value in the **OWD Offset** control, which is also found under **Configure Element** > **Reference** > **PTP** > **Configuration**.

Interaction and Precedence across Configured Time Sources (PTP, NTP, and UTC)

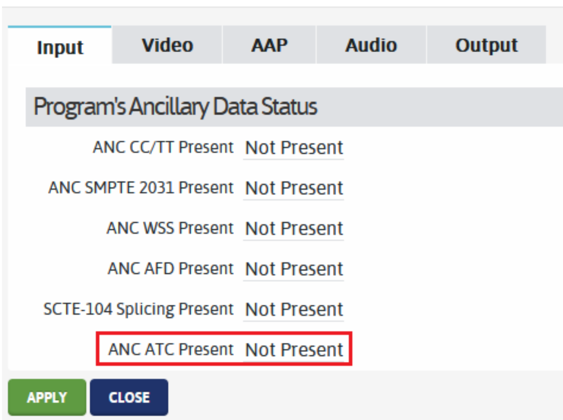
- **PTP** when configured, takes priority over everything else
  - If PTP master is present, the Linux clock is aligned to PTP
  - If PTP master is not preset, and the SNP is configured as a PTP master, the PTP time can be jammed with a specified UTC time, or jammed with the NTP time if an NTP server is specified
- **UTC** time changes the Linux clock to the user-specified time
  - It applies the Linux clock to the PTP time
- **NTP** when configured syncs the Linux clock to the configured NTP server time.
  - Selecting *Jam PTP Time from NTP Now* pushes the Linux clock to the PTP clock.
  - Since the *Jam PTP Time from NTP Now* parameter jams NTP time on request, when not locked to a master, PTP time can still drift from NTP time, as the NTP clock frequency may differ from the SNP's PTP clock.
  - If UTC time is jammed, NTP will take a while to resync.
  - If NTP time is jammed soon after UTC time is set, the UTC time will likely still be present in the Linux clock, jamming UTC time (instead of NTP) to PTP.
  - If NTP is configured during bootup, the SNP jams NTP to PTP shortly after startup if PTP is not present.

Support for Generation and Processing of ATC Timecode in Conversion

The **Dual** and **Quad Conversion** personalities support processing and handling of Ancillary Timecode (ATC) from input to output.

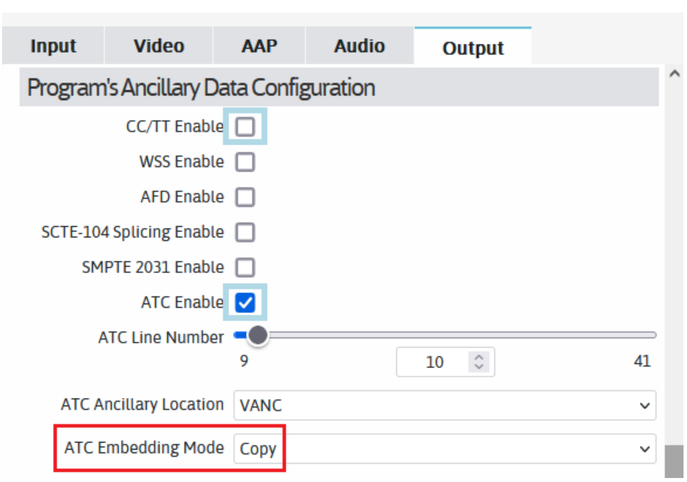
Input Side

- Ancillary timecode packets are auto-detected on the input and reported accordingly **(Input Tab > Program's Ancillary Data Status > ANC ATC Present)**



Output Side

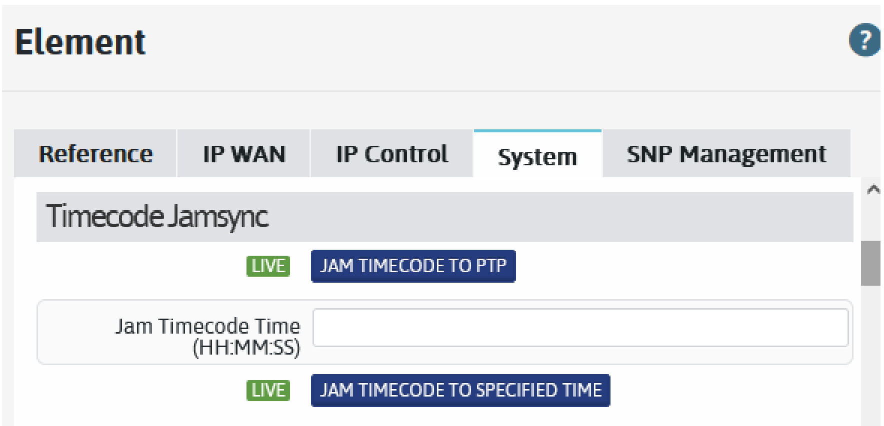
- On the output, the ATC Embedding mode controls the mode for embedding the ancillary timecode.
- **Copy Mode** enables copying the ancillary timecode packets from input to the output without alteration. This is particular useful for a post-production environment where the timecode may not always increment on a per-frame basis. This mode allows the incoming timecode to be on the specified line number of the matching "field" of the output. **(Output Tab > Program's Ancillary Data Configuration > ATC Enable > ATC Embedding Mode)**



Note: If the incoming and outgoing frame rates are different, the Copy mode will skip/repeat timecode values. In this case, the Generate mode is preferable.

Also, for interlaced output, the timecode could technically be on the wrong field of the interlaced output - but in most applications this is correct since the timecode is labeling the content and can still be used to align other content (such as audio) to the video.

- **Generate Mode** lets you insert timecode into the output seeded to a specific time when the Jam Timecode to Specified Time is selected and set. A new generated timecode is inserted into the output, regardless of what was present on the input, and all processors on the same SNP will generate the same timecode in their output.
  (Configure > Element > System)



If the Generate Mode is selected, one additional parameter becomes available to allow the selection of ancillary timecode packets style (LTC or VITC).

For more input and output parameters related to ATC timecode, see:

Output Tab: Program Ancillary Data Configuration (on page 459)

Input Tab: Ancillary Data Status (on page 397)

MCL Hardware Panel

The MCL Hardware Panel provides a physical control surface for the SNP Master Control Switcher (SNP-MCL). The panel can be configured via the SNP UI, and it attaches as a client to the panel control service application running on the SNP.

The following sections walk you through configuring the panel itself, as well as adding it to the SNP.

Note: The MCL Hardware Panel is intended for use with the MCL mode (see Setting the MCL Mode (on page 195)).

In This Section

Connecting Power to the MCL Hardware Panel

Connect the +12V DC adapter to the panel. A second DC adapter can be connected to the panel to provide power redundancy.

DC power connectors and Ethernet RJ-45 connector on bottom of panel

Connecting the Ethernet RJ-45

The panel supports 10/100 Base-T Network connection. Connect the panel's Network port to the same Network as the SNPs.

Panel Display

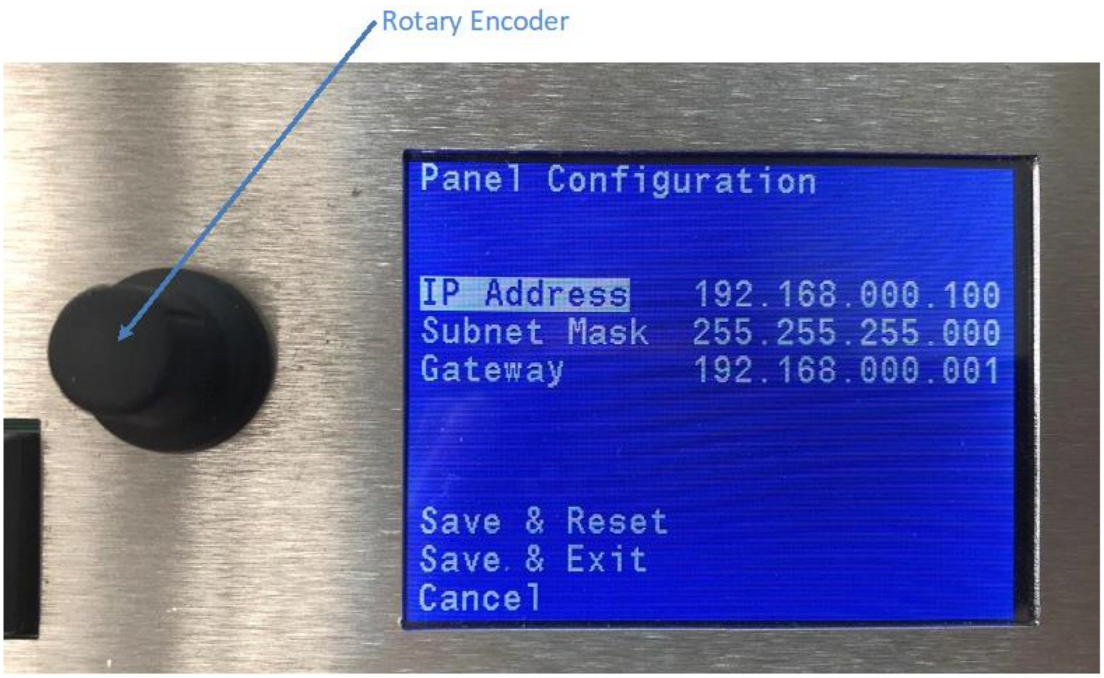
When the MCL Hardware panel is not connected to an SNP, the Touch Display on the panel will show the panel's: Network settings and firmware version.

Setting up the Panel IP Address

In This section

Entering Local Configuration Mode

To enter local configuration mode, press and hold the rotary encoder switch for 5 seconds. After 5 seconds the LCD updates to display the **Panel Configuration** screen.



Selecting Configuration Item

- When the **Panel Configuration** menu is shown, turn the rotary encoder to highlight the required configuration item (for example, IP Address)
- With the required item selected, press the rotary encoder to select the entry mode for that item.
- On pressing the rotary encoder, the current setting for the item will clear and a cursor will highlight the first digit to be entered.
- Use the numeric key pad displayed to enter the 12-digit IP address.

  Note: To enter an IP Address of 192.10.2.1, enter 192.010.002.001 on the panel. All fields of the IP Address require 3 characters each.

- To correct any errors, press the rotary encoder to restart the entry.
- To cancel entry mode, press the rotary encoder twice, if part way through an entry, or once, if at the start of an entry.

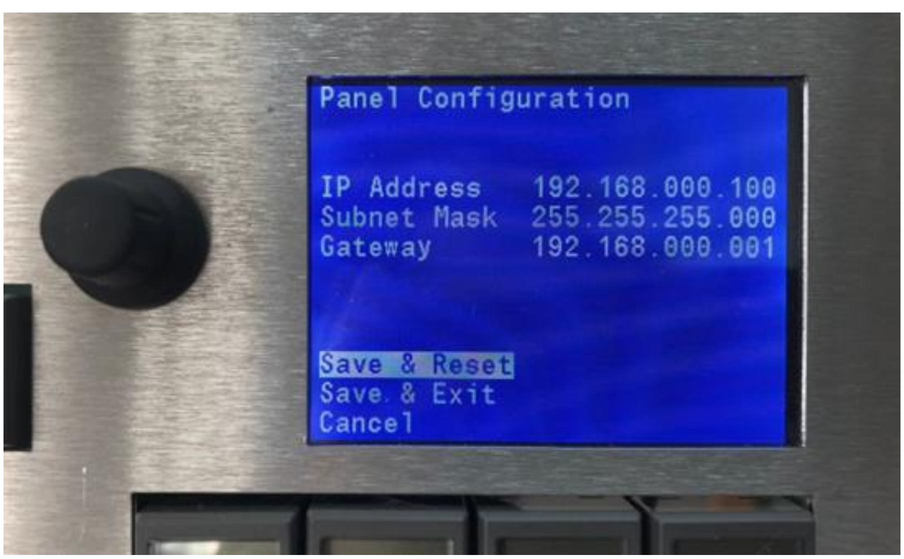
Once the 12-digits of the IP address have been entered, entry mode is completed and the new setting is held in a temporary storage area. The next configuration item can now be selected and modified if required. Repeat this for all network settings.

NOTE: The new network settings do not take effect until one of the Save items have been selected.

Exiting Panel Configuration

Once all network items have been modified use one of the following options to exit panel configuration:

Save & Reset	Stores network settings before resetting panel. Once the panel has reset, the new network settings take effect. *(Recommended option to select)*.
Save & Exit	Stores network settings and returns to normal panel operation NOTE: Changes to network settings are not effective until the next panel reboot.
Cancel	Discards any changes to network settings and returns to normal panel operation.



Upgrading Firmware on the MCL Hardware Panel

Note: These instructions are to upgrade the MCL Hardware Panel's firmware to Revision 08.

It is highly recommended that before loading different SNP software versions, to save the 'Configure MCL Panel' setup by exporting the configuration. See MCL Hardware Panel - Importing and Exporting Configurations (on page 506).

Revision 07 allows the panel's IP address to be changed directly from the panel, without an external application to change the IP address. Revision 08 prevents multiple SNP units from trying to control the hardware panel at the same time.

1. Before commencing the upgrade, ensure Mozilla Firefox is installed on the PC.
2. Create a point to point connection from your PC to the panel. Ensure the PC is on the same network IP address range as the panel.
3. Set the panel's IP address to 192.168.0.100 using the rotary button on the panel.
4. Run the bootloader batch file to put the panel in bootloader mode.
5. When the panel is in Bootloader mode, the Touch Display will look as follows:

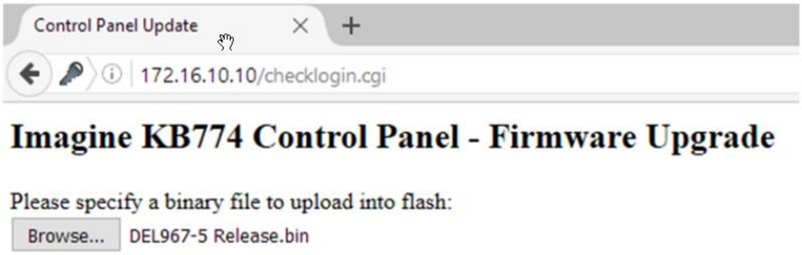
6. Manually open a Firefox browser tab and enter http://192.168.0.100 (ensure you are not using https).
7. Enter the following credentials:

   User ID = **imagine**

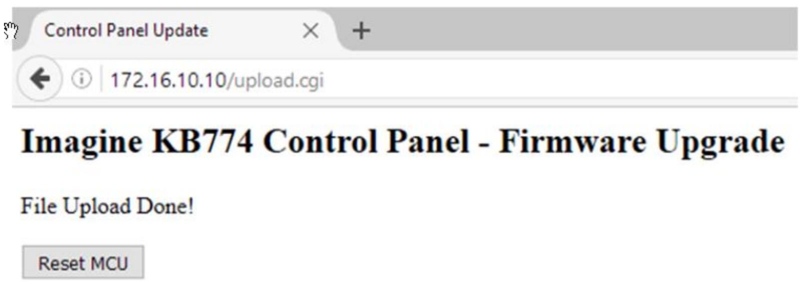
   Password = **kb7744**

8. Once successfully logged in, click the **Browse** button and navigate to the appropriate binary file `DELxxx-x Release.bin`.

Note: Download the `DELxxx-x Release.bin`. file from the Customer Portal.

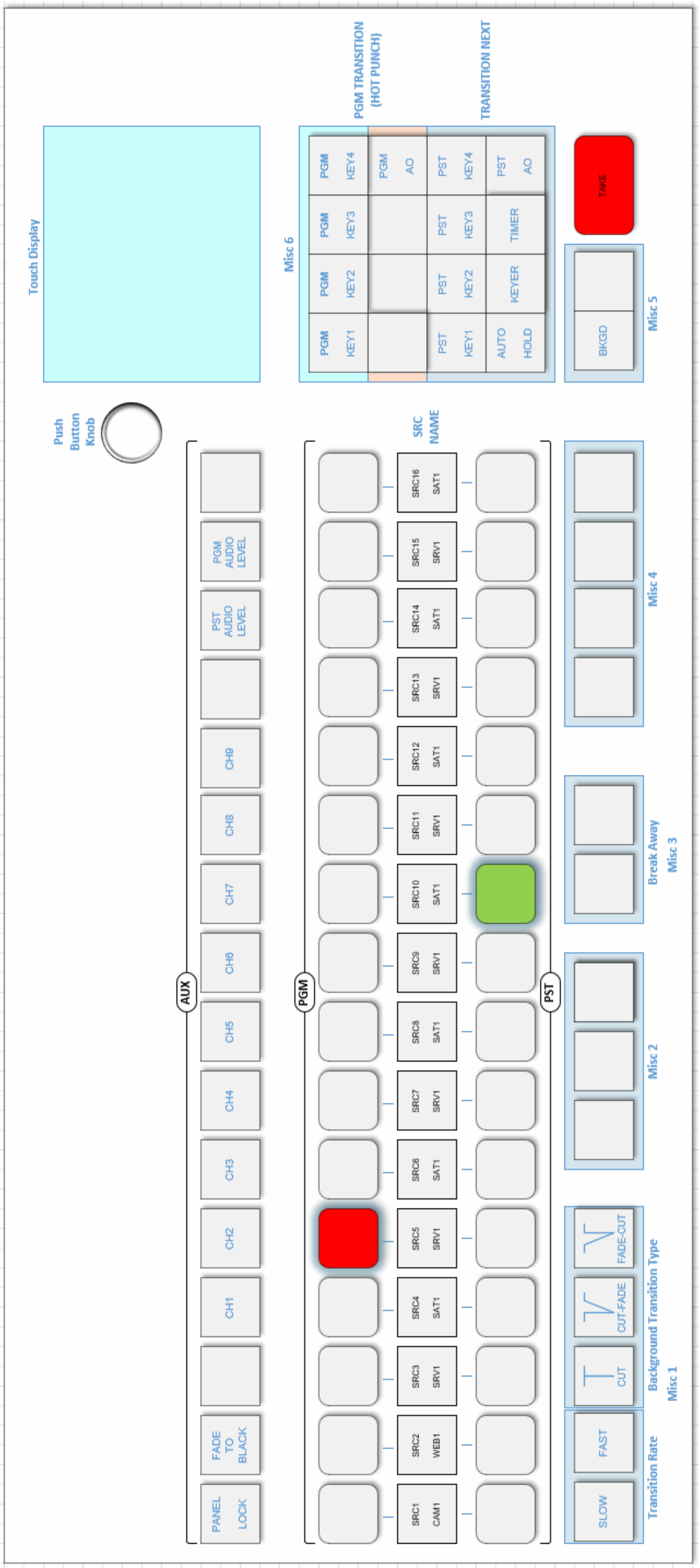


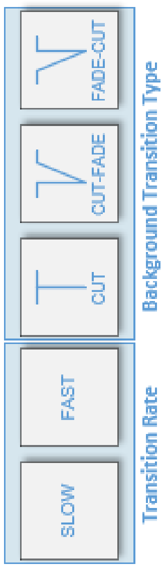
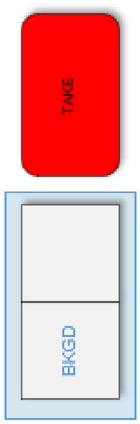
9. Click the **Upload** button. Wait until the firmware upload completes (approximately 10 to 30 seconds). Once complete, you will receive confirmation that the upload was successful.



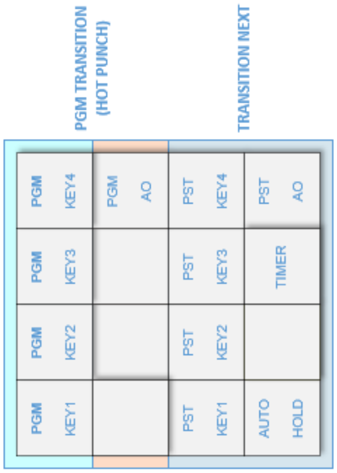
10. Click the **Reset MCU** button. After the panel reboots, the LCD screen on the physical panel will display the updated firmware version.

MCL Hardware Panel Buttons

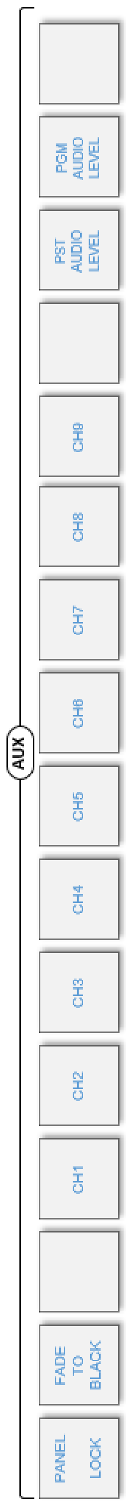


Buttons	Label on Diagram	Details
Program & Preset Bus	Program and Preset	• On the *Program* bus, the 'active' Source button is illuminated in **Red**. • On the *Preset* bus, the 'active' Source button is illuminated in **Green**. • Unselected source buttons are not illuminated
	Misc 1	**Transition Rat**e buttons - Used to select one of the pre-configured transition rates • SLOW • FAST *Note: Only one of these buttons is enabled and selected {illuminated} at a time. If the Medium or Automation transition rates are selected in the GUI, neither of these Transition Rate buttons will be illuminated.* **Background Transition Type** buttons - Used to select one of the fixed Background Transition Types • CUT • CUT-FADE • FADE-CUT *Note: Only one of these buttons is enabled and selected {illuminated} at a time. If the X-Fade or V-Fade Transition Types are selected in the GUI, none of these Transition Type buttons will be illuminated.*
	Misc 5	When the **BKGD** or **PST KEY[1:4]** or **PST AO** buttons are selected, the TAKE button will be illuminated in Green, to indicate that a layer will be transitioned when the TAKE button is pressed.

Buttons	Label on Diagram	Details

	Misc 6	**PGM KEY [1:4] buttons**
		• Used to hot-punch (cut) a key layer directly ON or OFF the program output.
		• Illuminated when the related key is "active" on the program output.
		• Pressing the button triggers state change:
		  ◦ if key is on, turn it off from the program bus.
		  ◦ if key is off, turn it on the program bus.
		• Illuminated ON at the beginning of the "on" transition (when the key starts to appear on the program bus).
		• Illuminated OFF at the end of the "off" transition (when the key stops appearing on the program bus).
		PST KEY [1:4] buttons
		• Used to select key layer(s) to transition on pressing TAKE.
		• Illuminated to indicate which key layer will be transitioned when the TAKE button is pressed.
		PGM AO button
		• Used to fast-fade Voice/Audio Over on or off air.
		• Illuminated to reflect current state of AO on program bus.
		PST AO button
		• Used to select the Voice/Audio Over, which will be transitioned on or off air when TAKE is pressed.
		AUTO HOLD button
		• Automation Hold - When enabled, the Automation command will not be processed by the MCL, however MCL will still reply to Automation commands.
		• QUERY/STATUS and SUBSCRIPTION available.
		• Illuminated to indicate that Automation commands are being ignored by the MCL.
		KEYER button
		• When the KEYER button is pressed, the Touch Display is will show four soft-touch KEY buttons.
		  ◦ Select a KEY button to change the Source for that Keyer Layer. Options include No Key, External, or previously uploaded .mg3 Logo file(s).
		  ◦ Note that the Source Select parameter for Keyer #4 can only have No Key or internal logos assigned to it. An SNP unit, in HD and UHD modes, supports a maximum of 3 External Keyers.
		  ◦ Use the Push-button Knob to select a different Logo file.
		  ◦ Press the soft-touch APPLY button to load the Logo file.

Buttons	Label on Diagram	Details
		• Pressing the KEYER button, moves the menu up one layer. **TIMER button** • When pressed, the TIMER value will increment up from 00:00:00. • When pressed again, the TIMER value will reset to 00:00:00 and not increment. • Illuminated when the TIMER value is incrementing. • The TIMER value is displayed in the Touch LCD.

Buttons	Label on Diagram	Details
	Aux Bus	**PANEL LOCK button** • When enabled, users on the panel will not have Control of the buttons, except the Panel Lock button. • Illuminated when Panel Lock is enabled **FADE TO BLACK button** • When enabled, the LCD Button displays a Red background color • When disabled, the LCD Button displays a Green background color. **CHANNEL GROUP SELECT buttons [1:9]** • Used to select the Playout Channel Group to monitor and control • Illuminated to indicate the selected Playout Channel Group • The LCD button displays the name of the Playout Channel Group • Multiple Channel Group Select buttons can be enabled to allow for larger groups of channels to be controlled (dynamic group creation). **PST OVER LEVEL button** • Used to set the Audio Level for the Source selected on the Preset Bus. • Illuminated to indicate that Preset Source's Audio Level is selected and the Touch Display will display the value of the Preset Source's Audio Level. • The Push-button Knob allows the Preset Source's Audio Level to be changed. • The RESET GAIN button, displayed in the Touch LCD, can be used to set the Preset Gain to 0 dB. **PGM OVER LEVEL button** • Used to set the Audio Level for the Source selected on the Program Bus. • Illuminated to indicate that Program Source's Audio Level is selected and the Touch Display will display the value of the Program Source's Audio Level. • The Push-button Knob allows the Program Source's Audio Level to be changed. *NOTE: SNP will store 16 Audio Source levels* • The RESET GAIN button, displayed in the Touch LCD, can be used to set the Program Gain to 0 dB.

Buttons	Label on Diagram	Details
		

Configuring MCL Panels

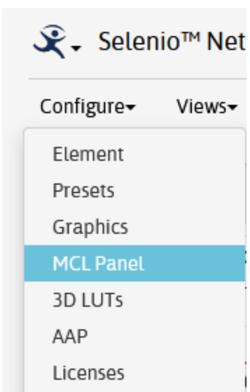
This section allows you to configure hardware panels on the SNP for Master Control. Currently, only the **MCL Hardware Panel** is supported.

Prerequisite:

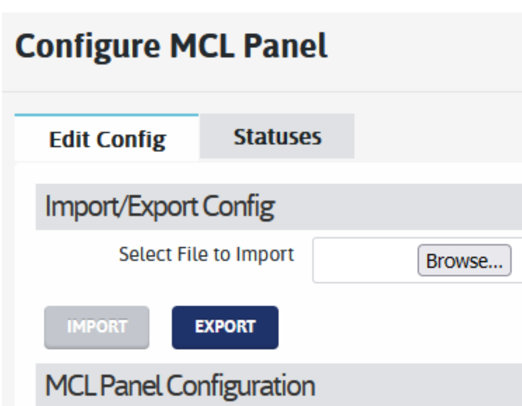
- Ensure that at least one of the SNP's Processors is configured with the Master Control Lite (MCL) personality.
- To use the MCL as a Master Control Switcher, set the 'MCL mode' to MCL.
- Ensure the panels and SNPs are in the same network so they can communicate.

Follow these steps to configure a MCL Hardware Panel:

1. Select **Configure** > **MCL Panel**



2. The **Configure MCL Panel** dialog is displayed with two tabs: **Edit Config** and **Statuses**.
   See Configure MCL Panel Tab - Edit Config (on page 503)
   See Configure MCL Panel Tab - Statuses (on page 505)



Also see MCL Hardware Panel - Importing and Exporting Configurations (on page 506).

Note: `*.PanelControlService.json` files are stored on the SNP file system's sub-directory: `/mnt/localfs/config/`

Configure MCL Panel Tab - Edit Config

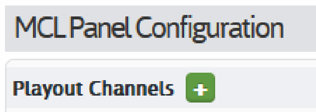
The **Edit Config** tab contains the following sections:

<table>
<tr><th colspan="2">MCL PANEL CONFIGURATION</th></tr>
<tr><td>Playout Channels</td><td>

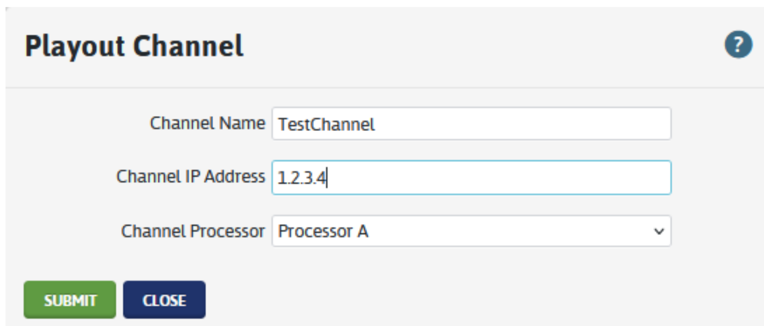
This section lets you define playout channels and lists any existing channels.

To create a new Channel:

1. Click the **+ button** next to **Playout Channels**.



2. In the **Playout Channel** dialog, enter the following:



- **Channel Name**: Enter a Name for the Channel.
  Note: It is recommended to use short names here, so it fits in the LCD display on the panel. The name must be a unique and not in use by another Playout Channel Device.
- **Channel IP Address**: Enter an IP Address for the SNP (current or a different one) being used to create the playout channel.
- **Channel Processor**: Select the Processor (A/B/C/D of a Processor set to MCL personality and in MCL mode) in question on the SNP.
  Note: Each Playout Channel Device must be assigned to a unique Processor which is not already in use.

3. Click **Submit**.

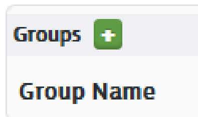
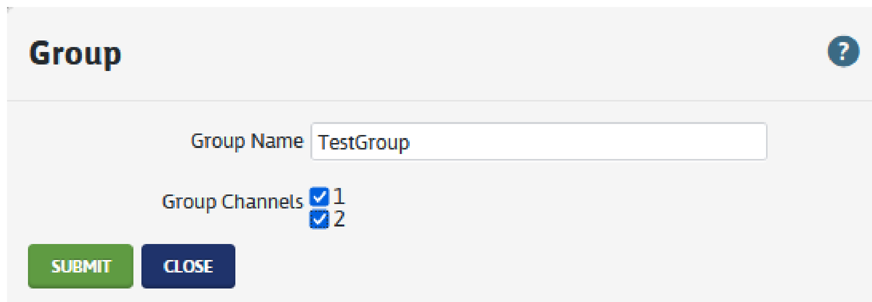
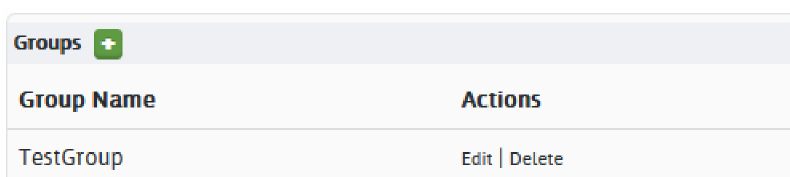
4. Repeat to create as many Playout Channels as desired.

Once defined, playout channels are listed in this section along with the **Channel Name**, **Channel IP**, and **Channel Processor**. The **Actions** column lets you **Edit** or **Delete** a defined channel.

Playout Channels

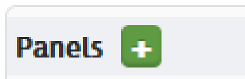
Channel Name	Channel IP Address	Channel Processor	Actions
1	0.0.0.0	Processor A	Edit | Delete
2	0.0.0.0	Processor A	Edit | Delete

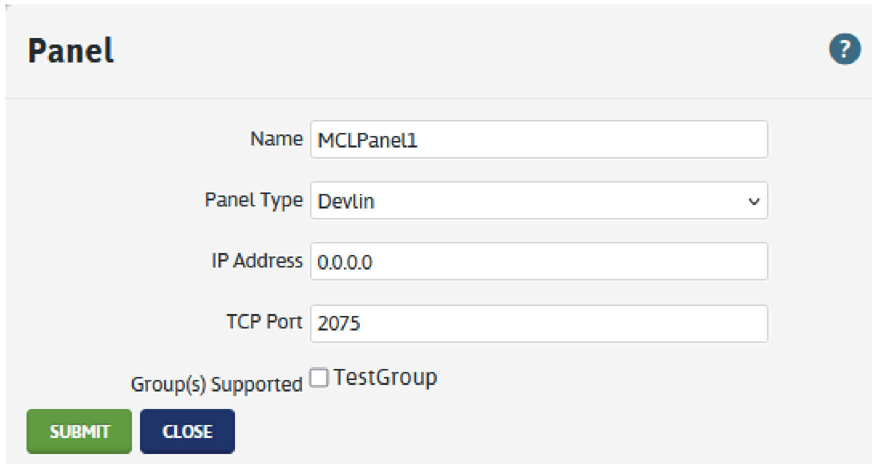
</td></tr>
</table>

Playout Groups	Groups let you link Playout Channels together so they can share configurations and be controlled in a ganged fashion. To create a new Group: 1. Click the **+ button** next to **Groups**  2. In the **Group** dialog displayed, enter:  • **Group Name:** Provide a name for the group *Note: It is recommended to use short names that fit in the LCD display on the panel. The Group Name must be a unique and not already in use by another Playout Group.* • **Group Channels**: Select which of the (previously) defined playout channels should be part of this group. *Note that you can create empty groups without channels.* 3. Click **Submit**. 4. Repeat to create as many Groups as desired. Once defined, groups are listed in this section along with the **Group Name**. The **Actions** column lets you **Edit** or **Delete** a defined group. 

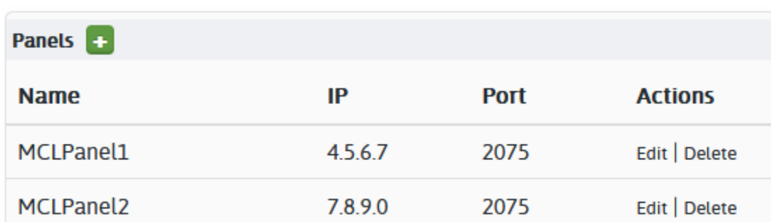
<table>
<tr>
<td>Panels</td>
<td>
This section lets you add hardware (currently, MCL Hardware Panel) panels to the SNP:

To create a new Panel:

1. Click the + button next to Panels


2. In the Panel dialog, enter the following:


Name: Provide a unique name for the panel
Panel Type: Select Devlin
IP Address: Enter the IP address of the panel
TCP Port: Enter the Port or leave the default of 2075 (this is the port that communicates with the Devlin panel).
Groups Supported: Select groups to include (if any).

3. Click Submit.
Once defined, panels are listed in this section along with the Name, IP, and Port. The Actions column lets you Edit or Delete a defined group.


</td>
</tr>
<tr>
<td>Apply Settings</td>
<td>Click the Apply button at the bottom of the dialog to save settings to the SNP.</td>
</tr>
</table>

Configure MCL Panel Tab - Statuses

This section displays status for:

- Playout Channels
- Playout Groups
- Panels

MCL Hardware Panel - Importing and Exporting Configurations

The Panel Control Service is redundant across SNP devices. The configuration can be exported from one SNP and imported onto as many other SNPs as desired, to support the desired redundant setup.

Exporting Configurations

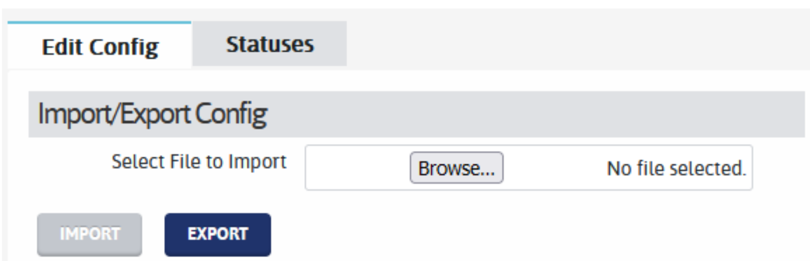
To export a configuration:

1. Click **Configure** > **MCL Panel** and go to the **Edit Config** tab
2. Under the **Import/Export Config** section, click the **Export** button
3. The Configuration is then exported as **PanelControlService.json** and can be found in the **Downloads** folder. This configuration can then be imported onto another SNP, following the instructions below.

Importing Configurations

To import a configuration:

1. Click **Configure** > **MCL Panel** and go to the **Edit Config** tab
2. Under the **Import/Export Config** section, browse to the location of the **PanelControlService.json** file and select it.
3. Click the **Import** button
4. The Configuration is then imported to the current SNP.

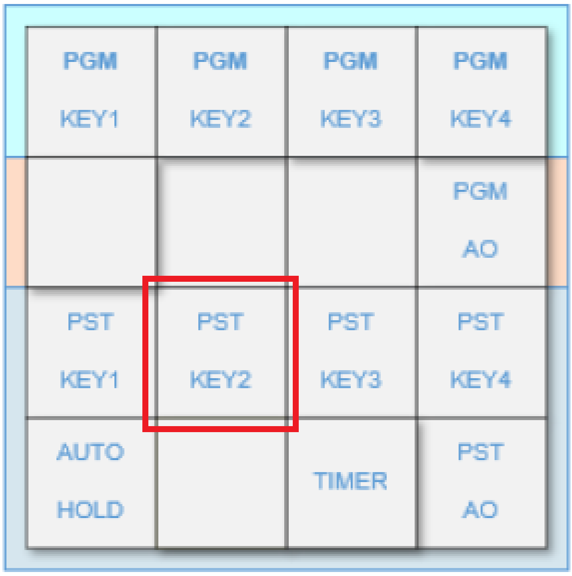


Selecting a Logo Source from the Panel

Logo source selection on the MCL Hardware panel functions differently that it does on the SNP UI. To do this from the Panel:

- Ensure the Panel is connected to the SNP (MCL mode).

- Press or toggle the PST KEY2 button to bring up the logo source selection list on the OLED.



- The current selected logo is highlighted in yellow. Use the knob to select a new logo.
- Press APPLY button on the OLED, the new logo will be selected.

Selecting Playout Groups and Channels

1. Select a **Playout Group** on the panel (assuming one or more Groups containing Playout Channels have been defined)
2. The Touch Display shows the Playout Channels within the selected Group. Enabled Playout Channels display a checkmark.
3. Channels can be added or removed from the group by checking or unchecking using the push-button knob on the panel.
4. On the Touch display, press the **TAKE** button to save changes.

Notes:

- Channels can only be removed from groups that contain more than one channel.
- If the same Channel is included in more than one Group, but is checked in one and unchecked in the other, panel commands will still be sent to the channel in both groups
- When a Playout Group contains more than one Playout Channel, an individual Playout Channel can be taken out of the Playout Group permanently, from the panel, by unchecking it. If the Master Control Operator switches to another Playout Group and then switches back to the modified Playout Group, the overridden Playout Channel is remembered for that Playout Group.

Troubleshooting

If the MCL Hardware Panel loses network connection to SNP(s), the panel's controls: Push-button Encoder, Touch LCD, LCD Buttons, LCDs, and RGB Buttons, will still be illuminated. However, the panel's controls will not respond to button presses or when the Encoder is turned. **Workaround**: If such behavior is seen, check the CLOCK value, in the Touch LCD, to see if it is still incrementing. If it not incrementing, this indicates that the panel is not connected to any SNPs. Verify that the SNPs are powered-up, and the panel and SNPs are connected to the network.
Pressing the PANEL LOCK button to lock the MCL Hardware panel results in inactive Buttons/functions (as expected) however the Push-button Knob is still active - on holding down this Knob, the "Panel Configuration" (IP Address) menu is seen in the Touch Display. On selecting Cancel, the panel correctly exits the "Panel Configuration" state however the panel's buttons and LCD buttons are now all blank/empty and do not return to their previous state. **Workaround**: When exiting the MCL Hardware panel's IP Address menu, select the 'Save & Reset' option, even when no parameters have been changed. This returns the panel to its default start-up mode, where no Playout Channel(s) has been selected.
When a MCL Hardware panel is connected to an SNP, the Playout Group select buttons will be displayed on the panel. Select one of the Playout Group select buttons, 1 to 9, to change the settings of that Playout Group. NOTE: a Playout Group may consist on only one Playout Channel.

Specifications

Certifications and Supported Standards

SNP supports the following SMPTE standards:

- **ST 2022-6** "Transport of SDI over IP"
- **ST 2022-7** "Seamless protection switching of IP streams"
- **ST 2022-8** "Timing of ST 2022-6 Streams in ST 2110 Systems"
- **ST 2110-10** "System Overview" System timing model & Session Description
- **ST 2110-20** "Uncompressed Active Video" Based on RFC 4175
- **ST 2110-21** "Traffic Shaping and Delivery Timing for Video"
- **ST 2110-22** "Constant Bit-Rate Compressed Video over IP networks (e.g. JPEG-XS)
- **ST 2110-30** "PCM Audio" AES67
- **ST 2110-31** "AES3 Compressed Audio Formats"
- **ST 2110-40** "Ancillary Data"

SNP claims the following certifications: UL (including CUL), FCC, CE.

12G/6G/3G/HD/SD-SDI Input Specifications

Item	Specification
Number of Inputs	32 (bi-directional port shared with output)
Connector Type	HD-BNC
Standard	• 12G: SMPTE ST 2082-1 and Amendment 1 to SMPTE ST 2082-1 (11.88, 11.88/1.001 Gb/s) • 6G: SMPTE ST 2081-1 and Amendment 1 to SMPTE ST 2081-1(5.94 5.94/1.001 Gb/s) • 3G: SMPTE 424M (2.97, 2.97/1.001 Gb/s) • HD: SMPTE 292M (1.485, 1.485/1.001 Gb/s) • SD: SMPTE 259M-C, (270Mb/s)
Formats Supported	• 625i/50, 525i/59.94 • 720p/50, 720p/59.94 • 1080i/50, 1080i/59.94 • 1080p/23.98, 1080psf/23.98 • 1080p/24, 1080psf/24 • 1080p/25, 1080p/29.97 • 1080p/50, 1080p/59.94 • 2160p/23.98, 2160p/24 • 2160p/25, 2160p/29.97 • 2160p/50, 2160p/59.94 See Note 1 (below table)
Connector	(High-Density) HD-BNC
Impedance	75Ω
Signal Level	800 mV ± 10%
Return Loss	• >15 dB, from 5 MHz to 1.485 GHz • >10 dB to 3 GHz>, • 7 dB to 6 GHz, • >4 dB to 12 GHz, all typical
Equalization	• 12G: Adaptive cable equalization for >164ft (50m) typical, of Belden 1694A coaxial cable • 6G: Adaptive cable equalization for >262ft (80m) typical, of Belden 1694A coaxial cable • 3G: Adaptive cable equalization for >426ft (130m) typical, of Belden 1694A coaxial cable

Item	Specification
	• HD: Adaptive cable equalization for >590ft (180m) typical, of Belden 1694A coaxial cable • SD: Adaptive cable equalization for >900ft (275m) typical, of Belden 1694A coaxial cable

Note: All the unused output ports should have 75Ω terminators.

Note 1: Remap personality supports the following SQD standards for SDI Quad links:
- 2160psf/23.98, 2160psf/24
- 2160psf/25, 2160psf/29.97

12G/6G/3G/HD/SD-SDI Output Specifications

Item	Specification
Number of Outputs	Up to 32 (bi-directional port shared with input)
Connector Type	(High-Density) HD-BNC
Standard	• 12G: SMPTE ST 2082-1 and Amendment 1 to SMPTE ST 2082-1 (11.88, 11.88/1.001 Gb/s) • 6G: SMPTE ST 2081-1 and Amendment 1 to SMPTE ST 2081-1(5.94 5.94/1.001 Gb/s) • 3G: SMPTE 424M (2.97, 2.97/1.001 Gb/s) • HD: SMPTE 292M (1.485, 1.485/1.001 Gb/s) • SD: SMPTE 259M-C, (270Mb/s)
Formats Supported	• 625i/50, 525i/59.94 • 720p/50, 720p/59.94 • 1080i/50, 1080i/59.94 • 1080p/23.98, 1080psf/23.98 • 1080p/24, 1080psf/24 • 1080p/25, 1080p/29.97 • 1080p/50, 1080p/59.94 • 2160p/23.98, 2160p/24 • 2160p/25, 2160p/29.97 • 2160p/50, 2160p/59.94 See Note 1 (below table)
Impedance	75Ω
Return Loss	• >15 dB, from 5 MHz to 1.485 GHz • >10 dB to 3 GHz, • >7 dB to 6 GHz, • >4 dB to 12 GHz, all typical
Signal Level	800 mV ± 10%
DC Offset	0.0V ± 0.5 V
Rise and Fall Time	• 12G: <45 ps (20% to 80%) • 6G: <80 ps (20% to 80%) • 3G: <135 ps (20% to 80%) • HD: <270 ps (20% to 80%) • SD: <400 to 1500 ps (20% to 80%)
Overshoot	< 10% of amplitude (all outputs terminated)

Item	Specification

Jitter	• Timing jitter:
	  • 12G: <8 UI peak to peak
	  • 6G: <4 UI peak to peak
	  • 3G: <2 UI peak to peak
	  • HD: <1 UI peak to peak
	  • SD: <0.2 UI peak to peak
	• Alignment jitter:
	  • 12G: <0.3 UI peak to peak
	  • 6G: <0.3 UI peak to peak
	  • 3G: <0.3 UI peak to peak
	  • HD: <0.2 UI peak to peak
	  • SD: <0.2 UI peak to peak

Note 1: Remap personality supports the following SQD standards for SDI Quad links:
- 2160psf/23.98, 2160psf/24
- 2160psf/25, 2160psf/29.97

QSFP28 Specifications

Item	Specification
Standard	SFF-8665 and SFF-8636. Electrically compliant with IEEE802.3bm chip-to-module 100 Gb/s four-lane Attachment Unit Interface (CAUI-4) standard. ***Note:*** *IEEE std 802.3-2015 Clause 91 RS-FEC is always enabled.*
Connector	2x Hot pluggable QSFP28 MSA form factor
Voltage	3.3V
Power consumption	<4.5W typical. Individual per type used.
Case operating temperature range	0°C to 70°C
Compliance	RoHS-6 compliant (lead-free)

General Purpose Interface (for future use)

Item	Specification
Connector	DB-9
Number of inputs/outputs	4 bi-directional, user configurable
Logic Level	+5 V TTL

Genlock

Item	Specification
Connector Type	2xHD-BNC, user configurable as loop-through or input and output.
Impedance	75 Ohms
Return Loss	• >40 dB from 25 Hz to 10 MHz (SMPTE 318M-1999)
Input Level	• NTSC/PAL-B/PAL-M: 1V pk-to-pk, -4.0dB to +6.0dB • Tri-Level Sync: 600mV pk-to-pk, -4.0dB to +6.0dB
Standards	• NTSC; PAL-B; PAL-M • 1080i: 60/59.94/50 • 1080p: 30/29.97/25/24/23.98 • 1080psf: 24/23.98 • 720p: 60/59.94/50

LAN

Item	Specification
Number of Connectors	2
Connector Type	RJ-45
Type	10/100/1000 Base-T Ethernet as defined by IEEE 802.3-2008

Note: Shielded (screened) Ethernet cable should be used with this product.

RS-232 (for future use)

Item	Specification
Number of Rx Ports	1

Item	Specification
Number of Tx Ports	1
Standard	Electrical specification EIA-232-C
Connector	DB-9

Propagation Delay

The minimum system latency for the SNP is 1 frame, based on the following:

SNP #1 SDI input > SNP #1 SFP+ Tx > SNP #2 SFP+ Rx > SNP #2 SDI output.

Tx Available Bandwidth

The software currently limits enabling any new streams if the Tx Configured bandwidth is more than 95Gbps. The maximum Tx is 94.75Gbps (this is the TX Configured bandwidth).

Example:

Video Format	Video Channels	Proxy Format	Proxy Channels	Audio Format	Audio Channels	Audio Packet Time[ms]	Anc Format	Anc Channels	TX Configured [GUI-Gbps]	Measured Bandwidth [Gbps]
1080p59	32	1080i29	8	x	0	x	x	0	93.816	95.08417216
1080p59	32	1080i29	8	2110-30	512	1	x	0	94.5471	95.83377165
1080p59	32	1080i29	8	2110-31	512	1	x	0	94.7437	96.03041384
1080p59	32	1080i29	8	2110-30	256	0.125	x	0	94.6829	95.95513344
1080p59	32	1080i29	8	2110-31	128	0.125	x	0	94.2977	95.60373722
1080p59	32	1080i29	8	2110-31	192	0.125	x	0	94.5285	95.91544371

Notes:

Measured BW contains FCS, preamble and interframe gap.

The measurements in the table assumed the audio is evenly distributed among processors and we should recommend that in high bandwidth scenarios.

The last populated column (Measured bandwidth) can be exposed by reading (every second) one register per Primary and one register per Secondary and display that information as Current Throughput. This value is calculated as per Annex A in the SMPTE 2110-10 standard.

Measured bandwidth field contains interframe gap, preamble and FCS bytes in the calculation and that is similar to the rate% reported by the switch.

Environmental

Temperature

The operating temperature of the SNP is 32°F to 86°F (0°C to 30°C) with relative humidity of 10% to 90% non-condensing.

The non-operating temperature is -20 to 70 degrees C.

Mechanical

Item	Specification
Dimensions	
Height	1RU or 1.75 in.
Width	17.5 in. (44.45 cm) without ears, 19 in. (48.3 cm) with ears for rack mounting
Depth	23 $^{3}/_{8}$ in. (59.4 cm) from front rail to back of box (including connectors but not cables) No more than 1.5 inches from front rail to absolute front of installed unit (including screws and pushbuttons) ***Note:*** *SNP requires at least 2.5 in. (6.3 cm) of space behind the unit for cooling and cabling.*
Weight	16.5 lbs (7.5 kg)

Power Consumption

Item	Specification
Number	Two independent, load-sharing power supplies Two IEC C14 power inlets, one for each power supply
Input voltage	100 to 240 VAC Operating range
Frequency	50 to 60 Hz Operating 47 to 63 Hz
Inrush current	At 264 VAC, at 25°C cold start, 15 Apk typical
Efficiency	Typical 93% @230VAC
Power factor	At 240 VAC, full load, typical 0.98
Harmonic distortion	Complies with the requirements of EN61000-3-2
Power consumption	Less than 350 watts total, as measured across both of the AC mains cords
Maximum input current	4.5 A per input
Heat dissipation	367 W

Appendix A

MCL and Magellan Control System

In This Appendix

When the SNP operates in Master Control Switcher (MCL) mode, Magellan Control System can be used to route signals to the MCL program inputs, and route MCL outputs to destinations. The following steps take you through configuring SNP and Magellan Control System.

Notes:

From a Magellan Control System perspective:

- SNP-MCL program inputs are defined as Destinations in Magellan Control System
- SNP-MCL program outputs are defined as Sources in Magellan Control System
- Ensure you're running at least Magellan Control System 3.8.1 (or higher) and Navigator 5.8.2 (or higher) and follow these instructions.

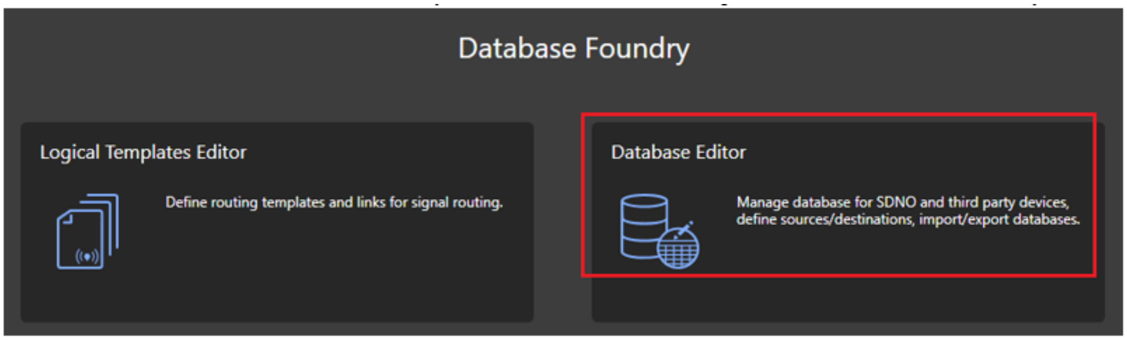
Magellan Control System Configuration

Create a Routing Device and Endpoint Device (for the SNP)

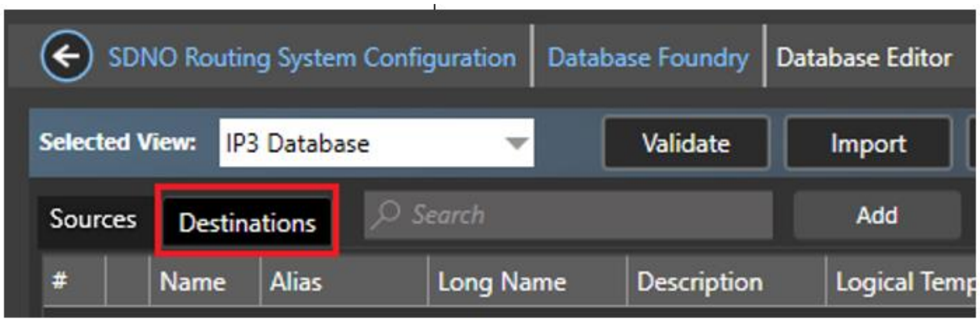
1. In Navigator, create a routing system and poll the IP address of the desired Magellan Control System.
2. Run the **Magellan Control System Client**
3. Ensure you have a **Routing Device** and an **Endpoint device** for the SNP (defined via the Device Foundry)
4. Ensure you have a logical template defined (for example, HD Video) for use in creating destinations

Define Destinations

1. Go to the **Database Editor** (Database Foundry > Database Editor)



2. Go to the **Destinations** tab

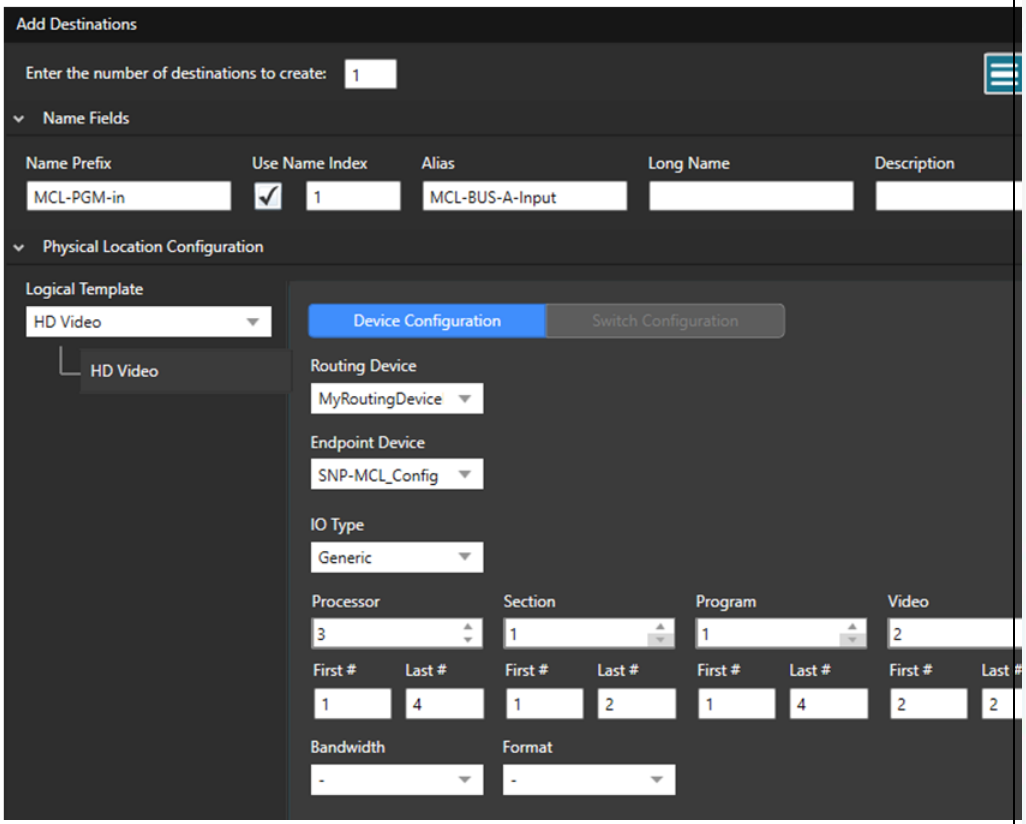
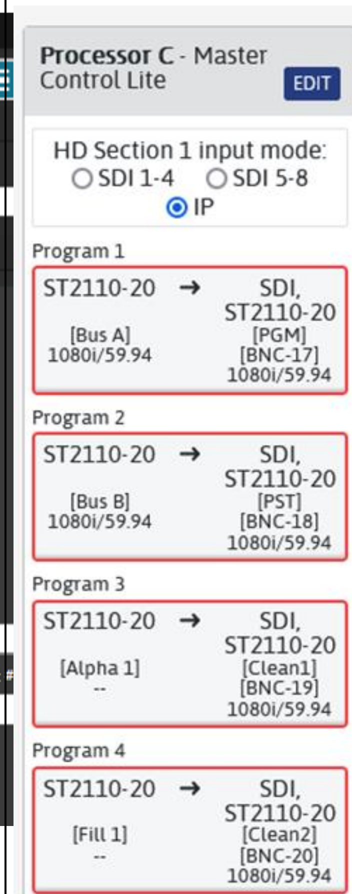


3. Add the MCL's inputs as **destinations** (for example, Bus A, Bus B, Key 1, Fill 1, etc.)
   In this example, we consider an SNP with Processors configured as follows:
   - Proc A – MCL UHD
   - Proc B – Proc A MCL extension
   - Proc C- MCL HD (MCL Mode)
   - Proc D – MCL HD (Dual DSK Mode)

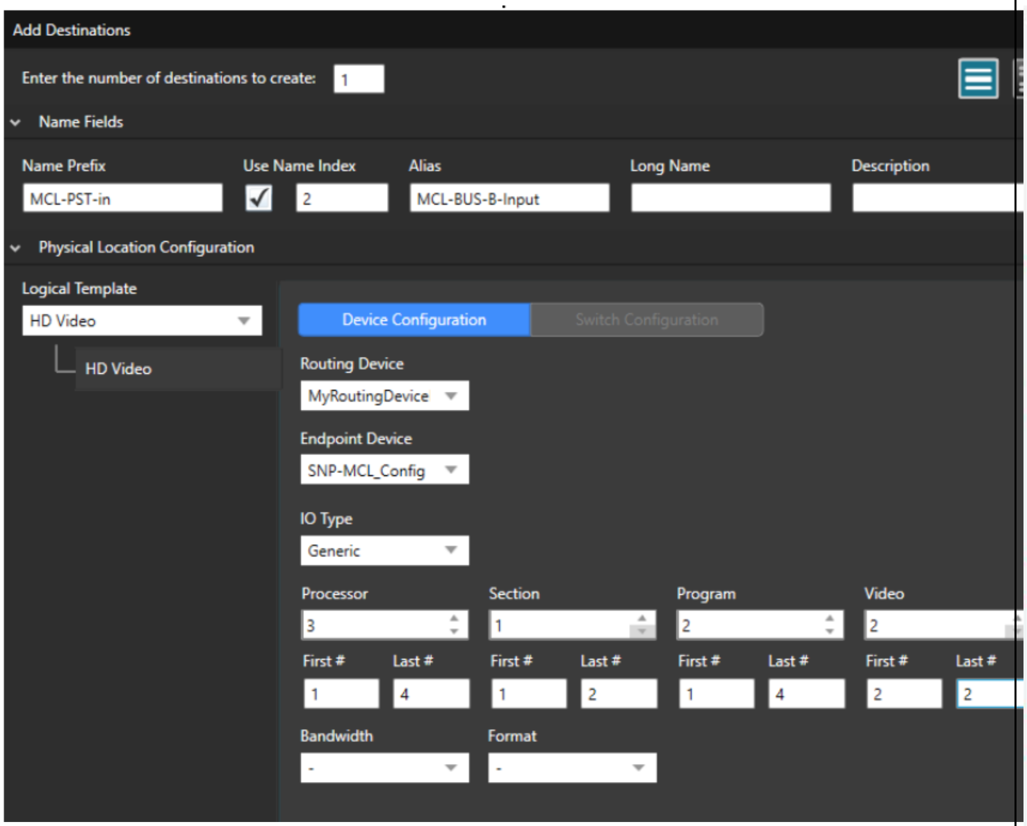
   See section below on SNP to SNP Mapping.
4. Save the database. Publish the database.

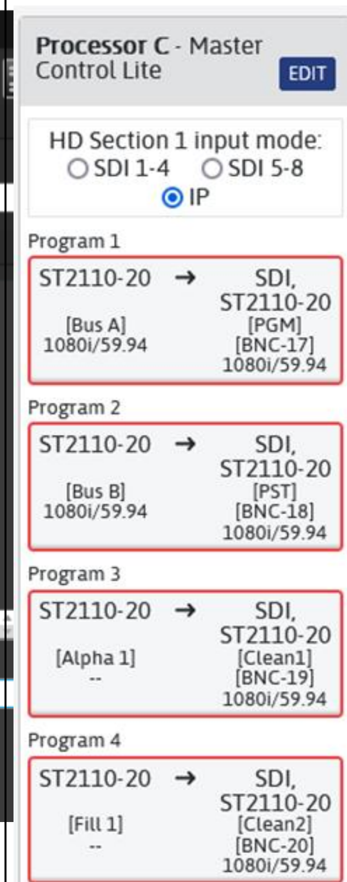
SNP Processor Mapping to the Magellan Control System Destinations

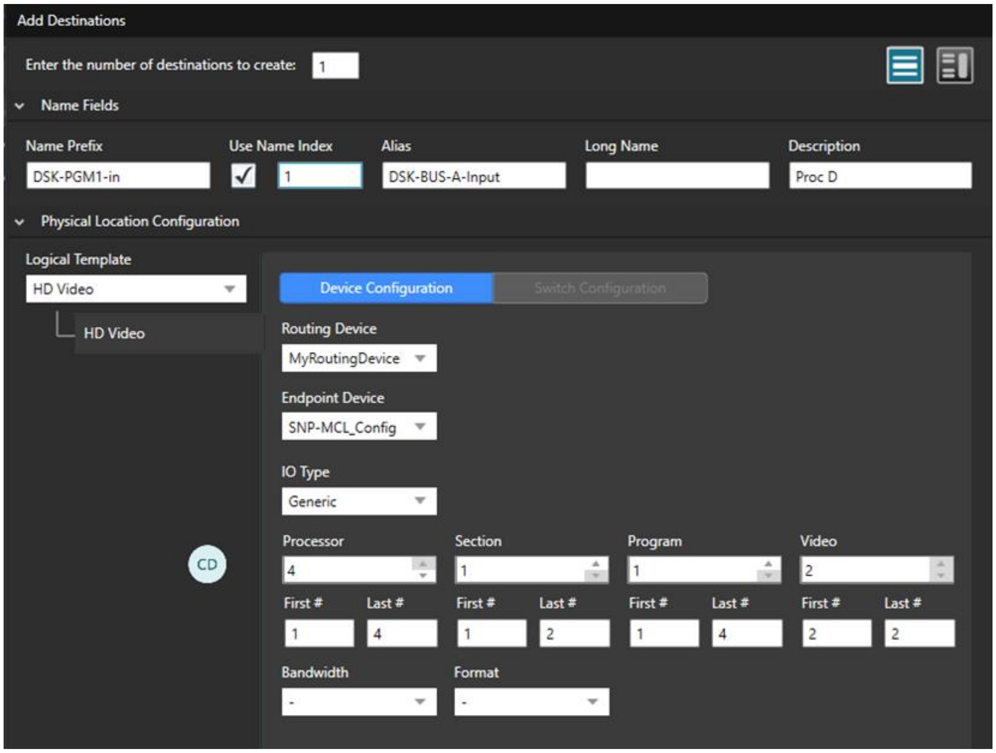
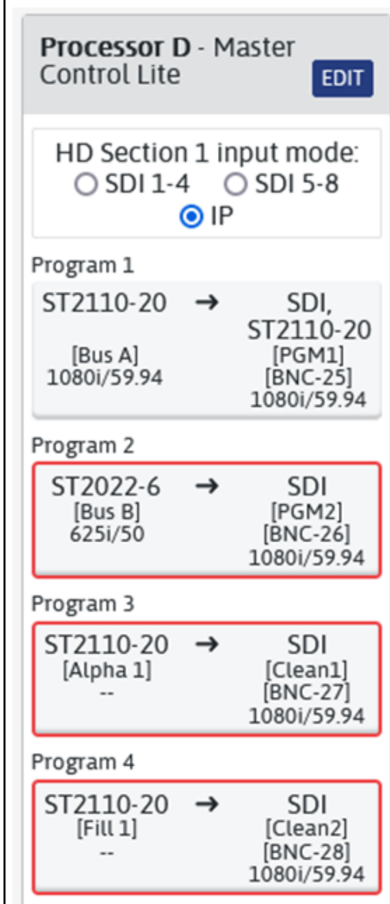
The following screenshots illustrate the SNP Processor Mapping to the Magellan Control System Destinations to create:

Destination created for MCL Bus A input	
	

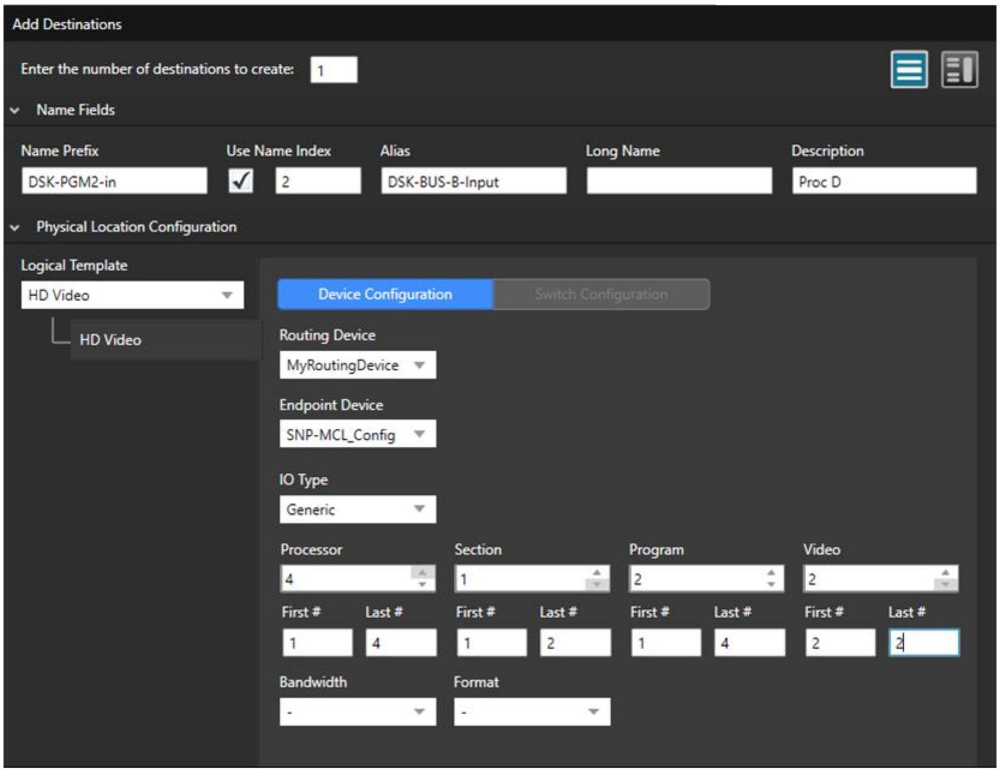
Destination created for MCL Bus B input



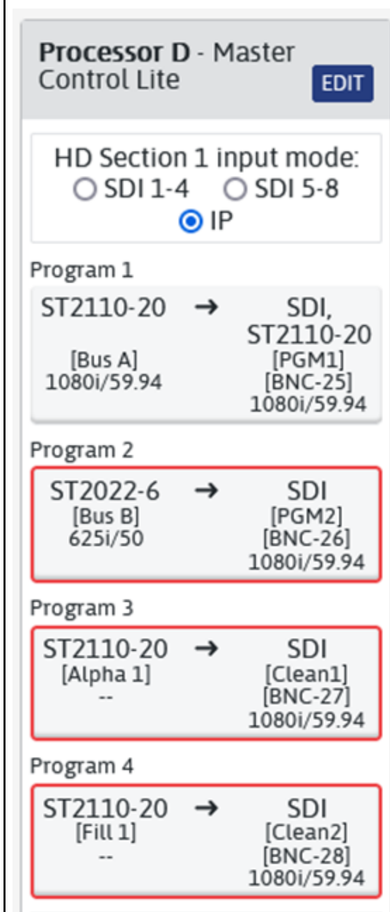


Destination created for MCL Bus A input (DSK Mode)	
	

<table>
<tr><th colspan="2">Destination created for MCL Bus B input (DSK Mode)</th></tr>
<tr><td>

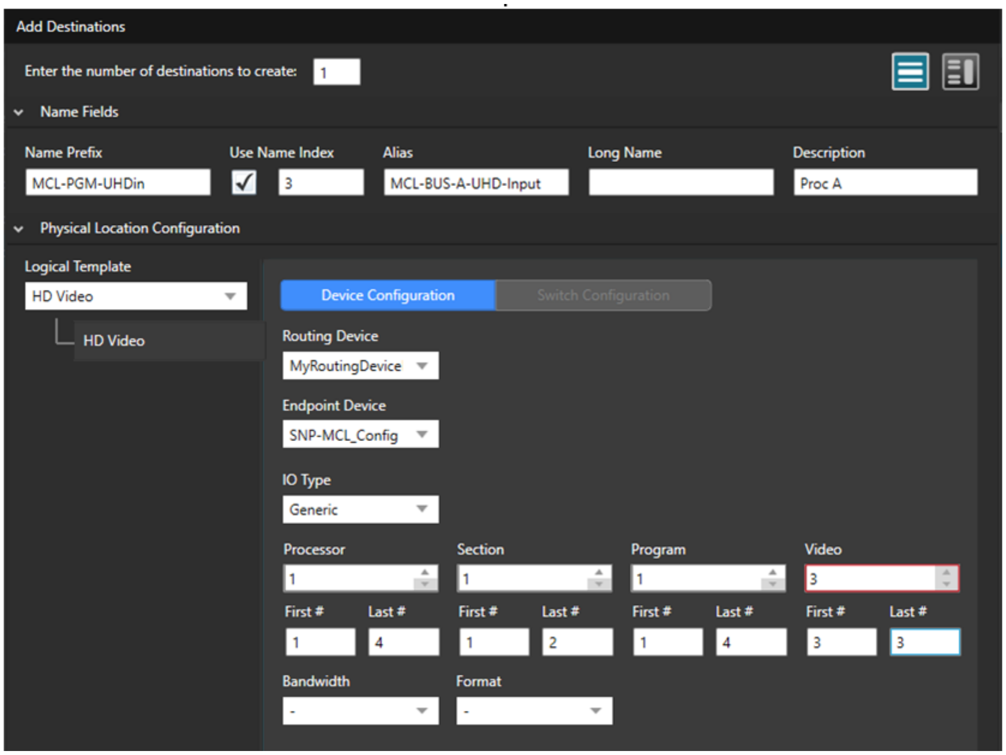


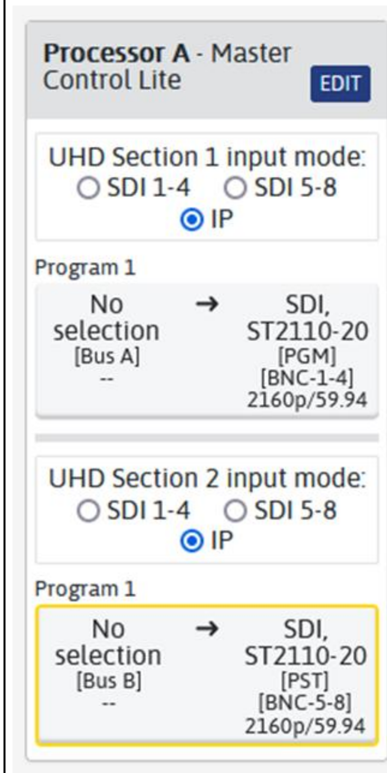
</td><td>



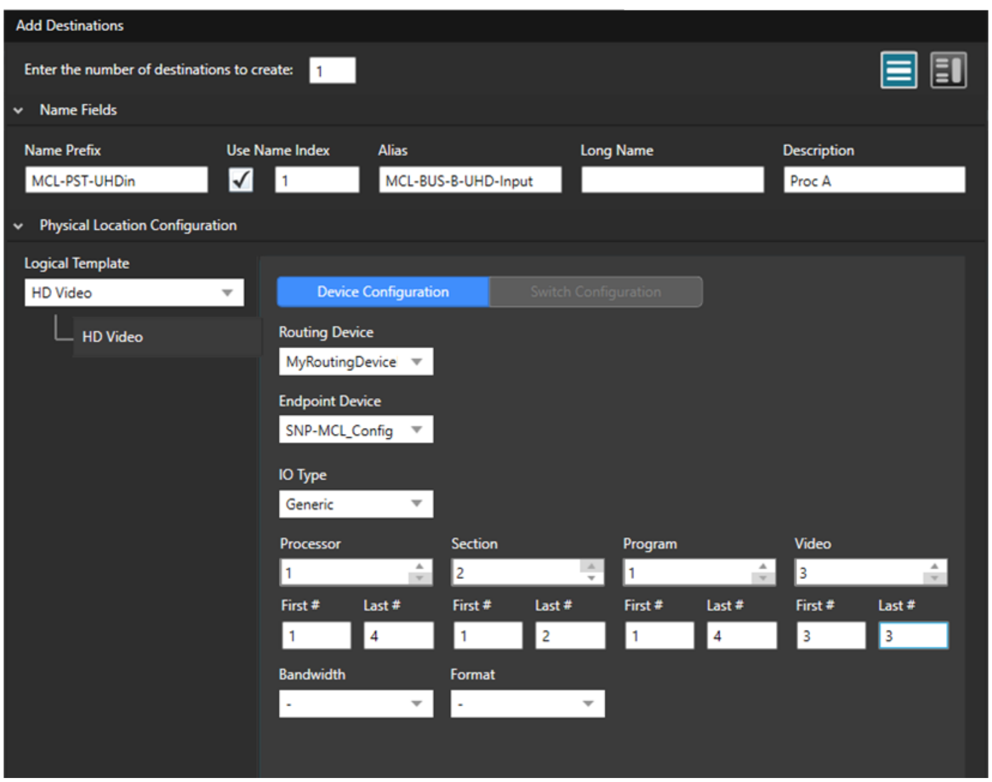
</td></tr>
</table>

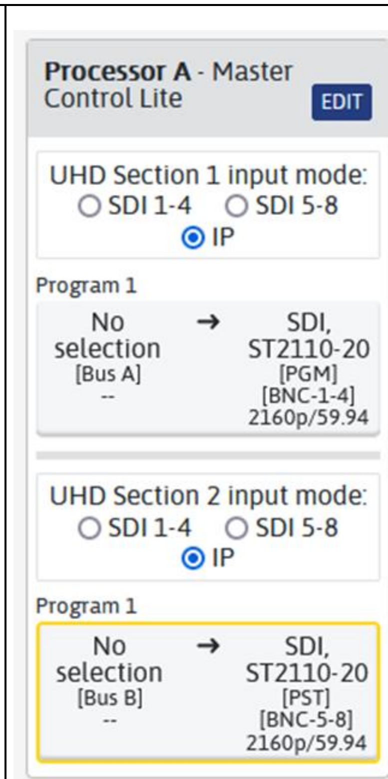
Destination created for MCL Bus A input UHD.



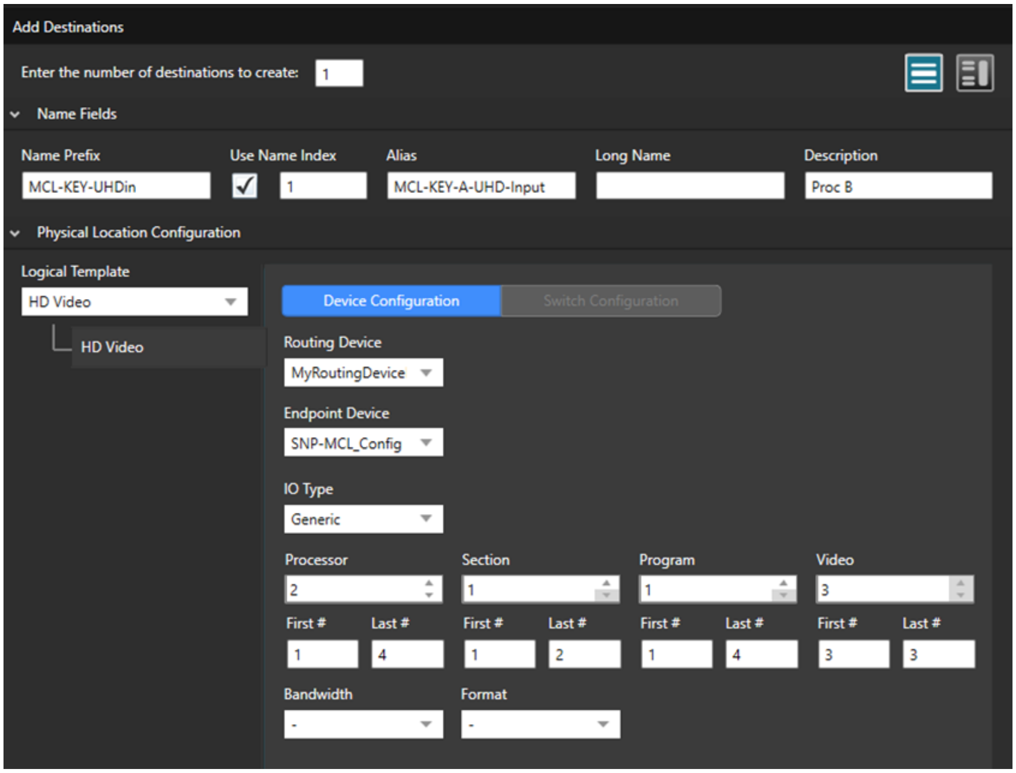


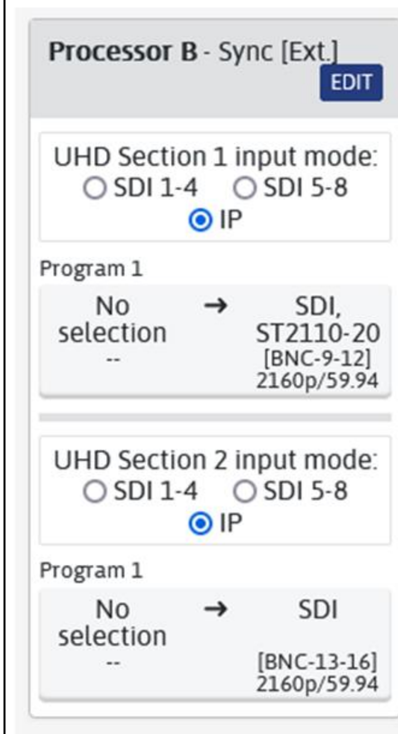
Destination created for MCL Bus B input UHD.



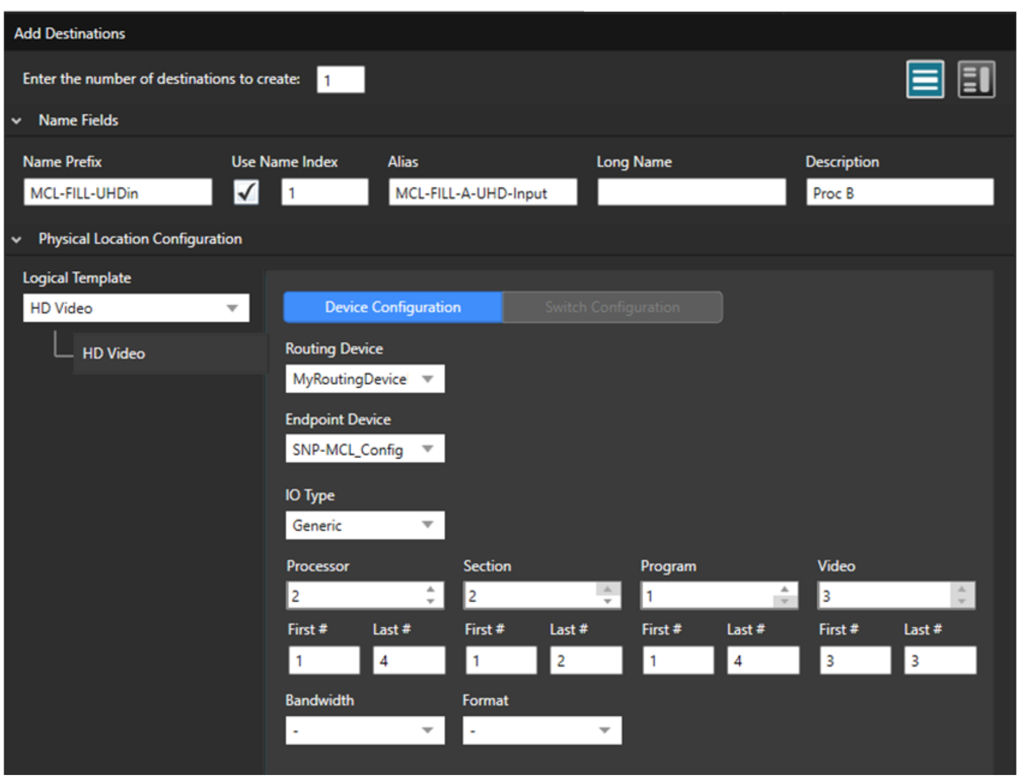


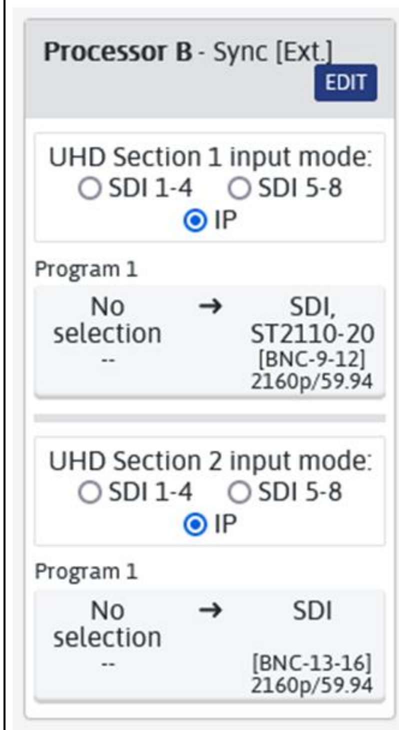
Destination created for MCL Key 1 input UHD.





Destination created for MCL Fill 1 input UHD.





SNP Configuration

Define the Magellan Control System Server in SNP

Follow these steps to set up communication between your Magellan Control System and SNP:

1. Click **Configure** > **Element** and go to the **SNP Management** tab
2. Under **External Devices > LRC Configuration > LRC Server IP Address**, enter the IP Address of your SDNO server

   Note: This specifies to the SNP unit which Magellan Control System to communicate with.

Define Routing Settings in SNP

1. Set the desired SNP Processor to **Master Control Lite**
2. Click the Processor's **Edit** button and then go to **MCL Tab > MCL Configuration > Router Configuration**

   Note: This section contains settings to bind the router database with SDNO and SNP.

3. In the **Source Table Name** section:
   a. Select the **Source Number** (1-16 sources)
   b. Enter the **Logical Source Name**

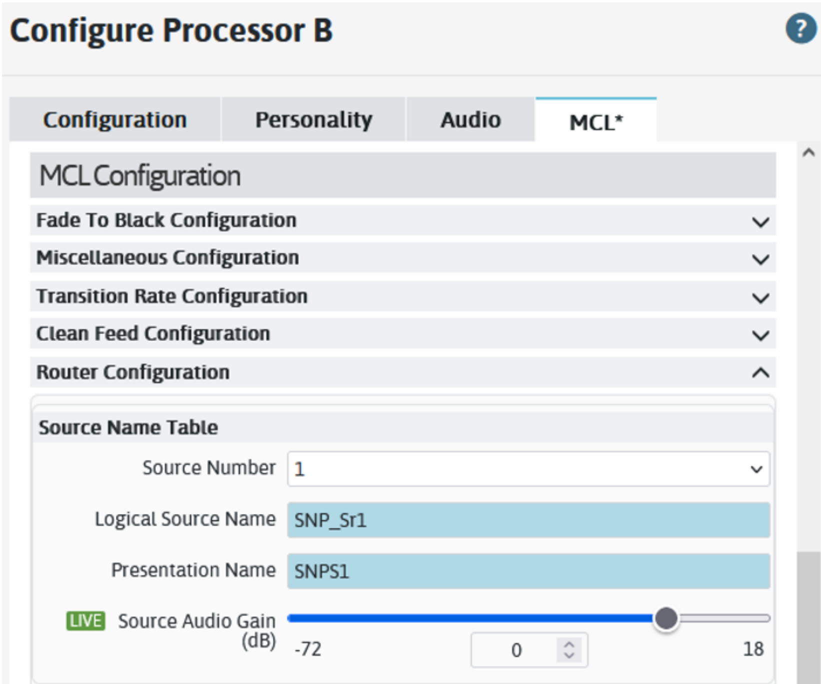
      Note: Name must match what's defined on the Magellan Control System, as it is validated against the configured Magellan Control System Server. In case of a source name mismatch with the Magellan Control System database, an alarm will be asserted:

07/31/2023 10:15:25 AM	ProcessorC Section1 Program3	IP Receiver Ancillary Out Of Range Packets	Out of range ancillary IP packets detected on stream 1.
07/31/2023 10:15:17 AM	ProcessorC Section1 Program3	IP Receiver Ancillary Missing Packets	Missing ancillary IP packets detected on stream 1.
07/31/2023 10:09:33 AM	System MCL	Master Control Lite Proc C Invalid Destination/Source Name Error	SS2_Rx_C_H 1
07/31/2023 10:08:54 AM	ProcessorA Section2 Program1	IP Receiver Ancillary Missing Packets	Missing ancillary IP packets detected on stream 2.

   c. Enter the **Presentation** or **Display Name**

      Note: This name will be displayed on the hardware panels and is a maximum of 16 characters. If left blank, the Router Database's Logical Source Name will be displayed on the hardware panel used.

   d. Optionally the **Source Audio Gain** can be set



4. In the **Routing Control** section
   a. Enter the **Bus A** and **Bus B Destination Names** (see SNP Program Mapping section below)
   b. Enter the **Program** and **Preset Follow Names** - You can configure optional Magellan Control System destinations that follow the routing status of MCL PGM/PST output destinations, for example, you can configure 2 MV PIP destinations so that you can monitor MCL PGM/PST output signals on a Multiviewer.

Note: The name must match what's defined on the Magellan Control System. In case of a destination name mismatch with the Magellan Control System database, an alarm will be asserted.

   c. Enter the **AUX Destination Name**
   d. Select the **Program Source** – this is the LRC source to be routed to the Program.

   Note that this is a live parameter and will perform a route. Route Status can be seen in the Routing Status section below.

   e. Select the **Preset Source** - this is the LRC source to be routed to the Preset

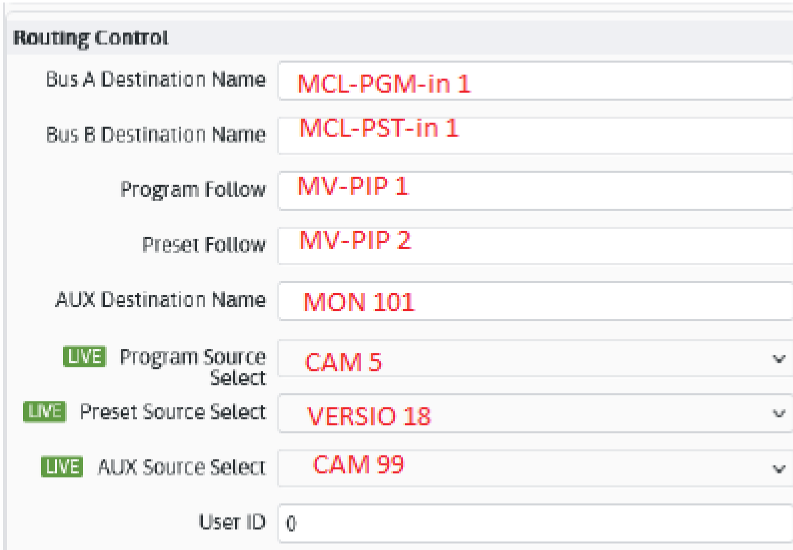
   Note that this is a live parameter and will perform a route. Route Status can be seen in the Routing Status section below.

   f. Select the **AUX Source** - this is the LRC source to be routed to the AUX Bus

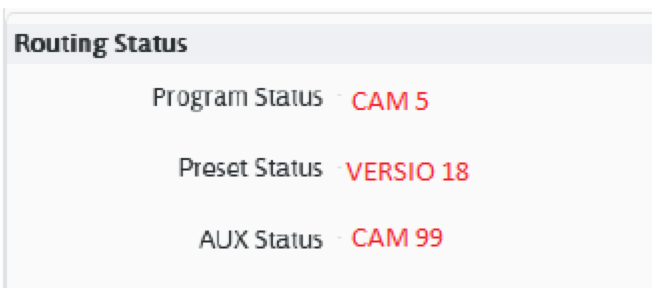
   Note that this is a live parameter and will perform a route. Route Status can be seen in the Routing Status section below.

   g. Enter the **User ID** – this is the LRC User ID.

Note: When configured as a non-zero value, SNP-MCL will PROTECT the MCL output routing destinations, so other panels cannot route to these destinations by accident.



5. In the **Routing Status** section
   a. **Program Status**: Displays the current source routed to the Program (if any)
   b. **Preset Status**: Displays the current source routed to the Preset (if any)
   c. **AUX Status**: Displays the current source routed to the Aux (if any)



SNP Program Mapping

When a Processor is configured as MCL:

The MCL inputs are as follows for HD 1.5G and 3G (from a router perspective these are Destinations):

Section 1 - Program 1	Bus A
Section 1 - Program 2	Bus B
Section 1 - Program 3	Key 1
Section 1 - Program 4	Fill 1
Section 2 - Program 1	Key 2
Section 2 - Program 2	Fill 2
Section 2 - Program 3	Key 3
Section 2 - Program 4	Fill 3

The MCL outputs are as follows for HD 1.5G and 3G (from a router perspective these are Sources):

Section 1 - Program 1	Program Output
Section 1 - Program 2	Preset Output
Section 1 - Program 3	Clean 1
Section 1 - Program 4	Clean 2
Section 2 - Program 1	Clean 3
Section 2 - Program 2	Clean 4
Section 2 - Program 3	Clean 5
Section 2 - Program 4	Clean 6

The MCL inputs are as follows for UHD (when 'UHD Input Routing Configuration' is set to: AB, ABKF, ABKFKF, and ABKFKFKF):

Processor A, Section 1 - Program 1	Bus A
Processor A, Section 2 - Program 1	Bus B
Processor B, Section 1 - Program 1	Key 1
Processor B, Section 2 - Program 1	Fill 1
Processor C, Section 1 - Program 1	Key 2
Processor C, Section 2 - Program 1	Fill 2

Processor D, Section 1 - Program 1	Key 3
Processor D, Section 2 - Program 1	Fill 3

The MCL inputs are as follows for UHD (when ‘UHD Input Routing Configuration’ is set to: KFAB, KFABKF, and KFABKFKF):

Processor A, Section 1 - Program 1	Key 1
Processor A, Section 2 - Program 1	Fill 1
Processor B, Section 1 - Program 1	Bus A
Processor B, Section 2 - Program 1	Bus B
Processor C, Section 1 - Program 1	Key 2
Processor C, Section 2 - Program 1	Fill 2
Processor D, Section 1 - Program 1	Key 3
Processor D, Section 2 - Program 1	Fill 3

The MCL outputs are as follows for UHD (for all ‘UHD Input Routing Configurations’):

Processor A, Section 1 - Program 1	Program Output
Processor A, Section 2 - Program 1	Preset Output
Processor B, Section 1 - Program 1	Clean 1
Processor B, Section 2 - Program 1	Clean 2
Processor C, Section 1 - Program 1	Clean 3
Processor C, Section 2 - Program 1	Clean 4
Processor D, Section 1 - Program 1	Clean 5
Processor D, Section 2 - Program 1	Clean 6

Appendix B

MCL and ADC

Note: This appendix is draft content.

SNP-MCL can be controlled using ADC Automation.

SNP-MCL communicates with the ADC Automation System over a TCP socket. TCP port numbers are as follows for a processor set to the Master Control Lite personality:

Processor	Port
Processor A	31000
Processor A	31001 (second path when in DSK Mode)
Processor B	31002
Processor B	31003 (second path when in DSK Mode)
Processor C	31004
Processor C	31005 (second path when in DSK Mode)
Processor D	31006
Processor D	31007 (second path when in DSK Mode)

ADC Automation communicates with each MCL Playout Channel separately. The MCL Hardware panel (see MCL Hardware Panel (on page 489)) can control a single or multiple Playout Channels at the same time, as a Playout Group.

In This Appendix

Connecting ADC Automation to SNP-MCL

The Moxa #NP6650-32 **TCP/IP-to-RS-422** Converter is recommended to connect ADC Automation to SNP-MCL. If you currently have an ADC Automation System with internal serial connections, you do not necessarily need the Moxa device. A device that supports RS-422 to TCP Client would suffice.

To configure the Moxa device (to make the RS-422 serial ports available to the ADC Device Server), see the *MOXA ADC Virtualization User Note* (part of the SNP 2.2 doc set). On the Moxa device, it is recommended using higher port numbers, 25 to 32, for IP client ports to convert between TCP and RS-422.

Keyer Control

The MCL Personality can only up to 4 keyers. For Automation, the Keyers are enumerated as 3, 4, 5, 6.

Depending upon configuration, they can be used as an *external key* or an *internal key* with graphic. ADC sends specific commands based on the keyer selected.

Keyer commands are issued by using a bit map. The table below illustrates the relationship in the protocol bit map to the key # in the MCL Personality.

<Keyer>	Keyer Select (unsigned byte)	MCL Key
Bit 0	Keyer 1	not used
Bit 1	Keyer 2	not used
Bit 2	Keyer 3	Key 1
Bit 3	Keyer 4	Key 2
Bit 4	Sqeezeback	not used
Bit 5	Keyer 5	Key 3
Bit 6	Keyer 6	Key 4
Bit 7	Reserved	not used

Logo IDs

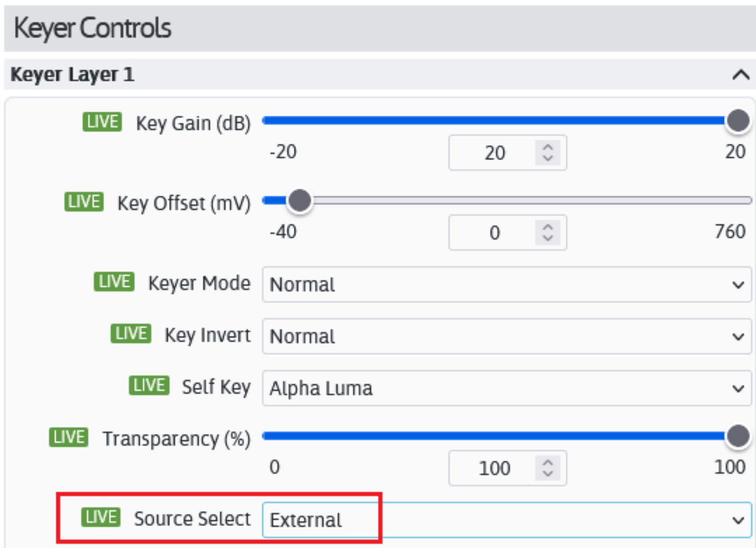
If an invalid Logo ID is used, ADC automation sends "LOGO_SELECT 255" as pat of the message string. Ensure you do not:

- Define a logo with ID 255
- Leave the logo ID undefined
- Use ID 0 or below

Using External Keys

Keyers 1 and 2 normally control external keyers. However, the KEY MOD command, returns a NAK, therefore no further settings are available.

To us an external key in an ADC playlist, manually set the Keyer settings in the MCL GUI, ensuring the keyer is set to type **External**.



In the ADC Playlist, set the keyer number (3,4,6,7), but do not set the logo number. The keyer will turn on/off only with the last settings used. See the example below.

Line # in Event Field	Event Description
2	Key 1, if set as the above example, will put the external key 1 "On Air" 10 seconds (as per the "Time" field) after Event 1 starts, It will stay on for 10 seconds as per the "Dur" field.
4	Key 2, if set similar to the above example, will put the external key 2 "On Air" 10 seconds (as per the "Time" field) after Event 3 starts, It will stay on for 10 seconds as per the "Dur" field.
6	Key 3, if set similar to the above example, will put the external key 3 "On Air" 10 seconds (as per the "Time" field) after Event 5 starts, It will stay on for 10 seconds as per the "Dur" field.

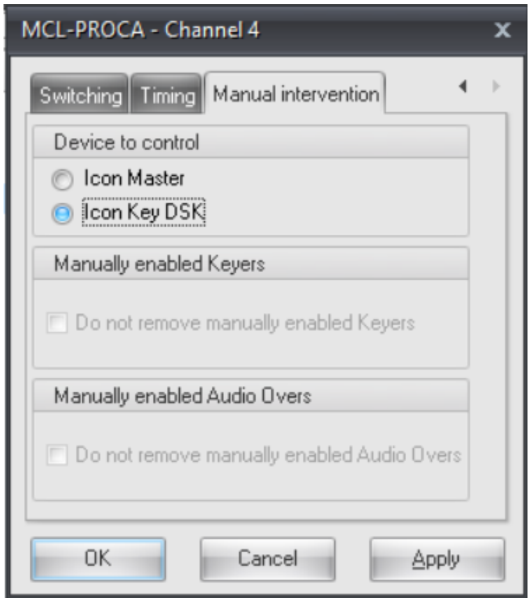
Line # in Event Field	Event Description
8	Key 4, if set similar to the above example, will put the external key 4 "On Air" 10 seconds (as per the "Time" field) after Event 7 starts, It will stay on for 10 seconds as per the "Dur" field.
10	Key 1, if set as the above example, will put the external key 1 "On Air" 10 seconds (as per the "Time" field) after Event 9 starts, It will stay on for 10 seconds as per the "Dur" field.
12	Key 1, will be loaded with Logo ID "7". and will be put "On Air" 10 seconds (as per the "Time" field) after Event 11 starts, It will stay on for 10 seconds as per the "Dur" field.
14	Key 1, will retain the last information. In this case it is still loaded with Logo ID "7". and will be put "On Air" 10 seconds (as per the "Time" field) after Event 13 starts, It will stay on for 10 seconds as per the "Dur" field.

- The keyer retains the last settings. Only the logo number can be changed. To play an external key after this, manually set the keyer back to External.
- While Keyers support external audio via the fill channel in manual mode, the keyer on/off command via automation only supports video fill/key video. Audio from the fill source will not be put on air.

  Note, this is different than "Audio Over" which takes it's sources the Key via the keyer Alpha's audio.
- The SNP Automation Protocol returns a <NAK> for invalid logo IDs. ADC turns on the keyer but with previously loaded logo.
- Non-standard Logo IDs will not be displayed in the Logo dropdown in the GUI, and will return <NAK>.

DSK-Mode - Subscription support

ADC automation does not support the subscribe function. The last tab in the ADC configuration tool for IconMaster MCS has a setting for IconMaster or IconKey DSK. The latter disables a function that tells automation to ignore manually controlled keyers. This functionality requires the subscription command such that automaton is aware of the manual keyer changes.



DSK-Mode - Upstream Router Control

The original DSL-3901 is a standalone device that does not have upstream router control. The ADC user notes indicate this along with alternate suggestions. For backward compatibility with the DSK-3901, the upstream router control via automation has been disabled, Manual control of the upstream inputs can be performed via the MCL (DSK Mode) GUI.

DSK-Mode - Dual Channel Support

The DSK-3901 supports two channels but via CCS Control. While using the IconMaster protocol, the B Channel is utilized still as a PST for setting up the keyers. The DSK-3901 has only one serial port for external automation. The MCL/DSK combination through the multiple TCP/IP Port assignment, can have automation control of Channel A and/or B independently.

Appendix C

Servicing

Note: The original SNP-GW-3GX32 chassis has been retired from sale. The metal shell and front panel assembly and power supplies have been superseded entirely by the SNP-GW-3Gx32-HS-QF chassis, now sold under the SNP-PLATFORM-4A part number (see Orderable Part Numbers (on page 35)). The revised chassis features hot-swappable power supplies and higher-performance fans. In addition, all SNP main boards (regardless of chassis) shipped after November 2019 have been fitted with additional airflow-guides on the main circuit board in order to improve the operating temperature environment on-board.

While the unit is mounted in the rack and fully cabled, you can swap out the power supplies, front panel, or the primary electronics assembly (main board). Procedures for switching main PCB assembly and front panel and fan bracket assemblies are the same for both frames.

Note: Except for replacing the power supply in an SNP-GW-3GX32-HS-QF frame with hot swappable power supplies, all these tasks must be completed with the unit off and power cords disconnected from the frame.

Customer-Replaceable Parts

Front Panel Assemblies	
SNP-FNPL-ASSY	**SNP-GW-3GX32 frames** Front Panel Assembly (on page 538)
SNP-FNPL-HS-QF	**SNP-GW-3GX32-HS-QF** Front Panel Assembly (on page 538)
SNP-FPNL-HS-HQF	Spare Front Panel with Variable Speed Fans (Field Replaceable)
PCB Assemblies	
SNP-MAIN-PCB-ASSY	**SNP-GW-3GX32** and **SNP-GW-3GX32-HS-QF** frames Main PCB Assembly (SNP-MAIN-PCB-ASSY) (on page 543)
SNP-MAIN-PCB-ASSY	Spare Main PCB Assembly (Field Replaceable)
Power Supplies	
SNP-350W-ACPS-ASSY	**SNP-GW-3GX32 frames** Redundant PSU Assembly (Field-Replaceable) (SNP-350W-ACPS-ASSY) (on page 539)

SNP-400W-ACPS-HS	**SNP-GW-3GX32-HS-QF frames** Hot-Swappable Power Supply (SNP-GW-3GX32-HS-QF) (on page 540) *(OmniPower. For use with SNP Classic and SNP-XL)*
SNP-400W-ACPS-HS	**SNP-GW-3GX32-HS-QF frames** Hot-Swappable Power Supply (SNP-GW-3GX32-HS-QF) (on page 540) *(Zippy Inc. For use with SNP-XL only)*
Fans	
SNP-SPARE-BBFAN	SPARE FAN FOR SNP BB FPGA FIELD REPLACEMENT See Replacing the BB Fans on SNP-GW-3GX32-HS-QF (on page 557)
SNP-SPARE-IPFAN	SPARE FAN FOR SNP IP FPGA FIELD REPLACEMENT See Replacing the IP Fan on SNP-GW-3GX32-HS-QF (on page 544)
SNP-SPARE-FPFAN	SPARE FAN FOR SNP FRONTPANEL QF/HQF FIELD REPLACEMENT
Air Guides	
SNP-AIR-GUIDE-KIT	**SNP-GW-3GX32 & SNP-GW-3GX32-HS-QF** Man PCB Air Guides to improve airflow (Field Upgrade Kit)
SNP-HW-UPGRADE-KIT	SNP-AIR-GUIDE-KIT and Spare Front Panel with Variable Speed Fans (SNP-FPNL-HS-HQF)

To remove and replace any of these hardware components, you will need a Phillips screwdriver with #2 bit.

Determining what Hardware you have

- Front Panels (on page 537)
- Redundant PSU Assembly (Field-Replaceable) (SNP-350W-ACPS-ASSY) (on page 539)
- Hot-Swappable Power Supply (SNP-GW-3GX32-HS-QF) (on page 540)
- Main PCB Assembly (SNP-MAIN-PCB-ASSY) (on page 543)

Hardware Feature Compatibility Notes

All units which will run the “Production Multiviewer” personality, Quad-1080p-Conversion personality, or JPEG-XS personalities MUST be fitted with the airflow guides and the HS-QF fans in order to meet the thermal performance specifications quoted in the manual. Prolonged operation of the new SNP features at elevated ambient temperatures, without the upgraded fans and airflow guides, can cause the FPGAs to run at elevated temperatures, cause FPGA over-temperature alarm assertions, and likely shorten the service life of the unit.

In order to facilitate customers with older units to purchase and run the more recent Features (in addition to purchasing a license for the feature) we offer the following upgrade materials which can be installed on existing chassis.

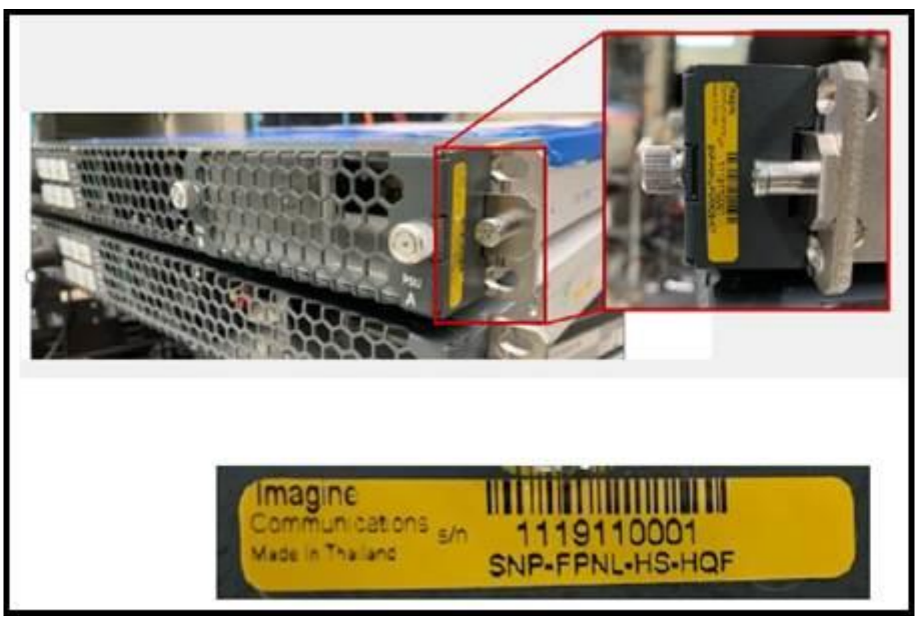
Orderable Item	Description	
SNP-FPNL-HS-HQF	SNP Front Panel assembly with Variable Speed Fans (Field Replaceable)	See Front Panel Assemblies section in Servicing (on page 535)
SNP-AIR-GUIDE-KIT	Main PCB Air Guides for SNP-GW-3GX32 & SNP-GW-3GX32-HS-QF to improve airflow (Field Upgrade Kit)	See Air Guides section in Servicing (on page 535)
SNP-HW-UPGRADE-KIT	Includes SNP-AIR-GUIDE-KIT and an SNP-FPNL-HS-HQF Front Panel assembly with HS-QF Variable Speed Fans	See Air Guides section in Servicing (on page 535)

Front Panels

There are three kinds of front panels:

Frame	Front Panel	Notes
SNP-GW-3GX32	SNP-FPNL-ASSY	Original
SNP-GW-3GX32 SNP-GW-3GX32-HS-QF	SNP-FPNL-HS-HQF	Front panel assembly with access door and quiet fans. Replaces the SNP-FPNL-HS-QF and adds air guides with higher maximum speed fans for improved cooling.
SNP-GW-3GX32-HS-QF	SNP-FPNL-HS-QF	

Front Panels SNP-FPNL-HS-QF and SNP-FPNL-HS-HQF look very similar. To determine which front panel you have and whether an upgrade is required, look on the right side of the front panel:



A label indicates what panel your SNP has.

Front Panel Assembly

The front panel unit is specific to the frame type, and includes the display, metalwork, and all four cooling fans. Individual parts of the front panel are not field-serviceable, but you can remove and replace the entire front panel.

In **SNP-GW-3GX32** frames, to replace either the Main PCB Assembly (SNP-MAIN-PCB-ASSY) (on page 543)or the Redundant PSU Assembly (Field-Replaceable) (SNP-350W-ACPS-ASSY) (on page 539), you must first power down the unit before removing the front panel assembly.

In **SNP-GW-3GX32-HS-QF** frames, you only need to remove the front panel when replacing the Main PCB Assembly (SNP-MAIN-PCB-ASSY) (on page 543). The hot swappable power supplies can be accessed separately. See Hot-Swappable Power Supply (SNP-GW-3GX32-HS-QF) (on page 540) for more information.

Removing the Front Panel

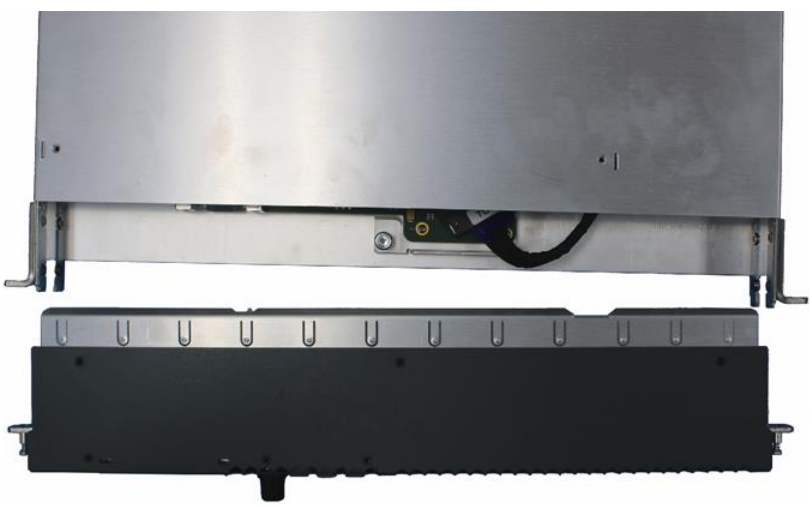
The front panel can be removed and replaced, for example if fans or lights fail on the panel.

The instructions for removing both SNP-FPNL-ASSY for SNP-GW-3GX32 frames or SNP-FPNL-HS-QF for SNP-GW-3GX32-HS-QF frames are the same. The pictures below display the process using an SNP-FPNL-ASSY and a SNP-GW-3GX32 frame.

1. Turn OFF SNP power using the power switch on the left.

   Use a screwdriver to release the thumb screws at the left and right ends of the front panel.

2. Gently slide the entire front panel away from the chassis.



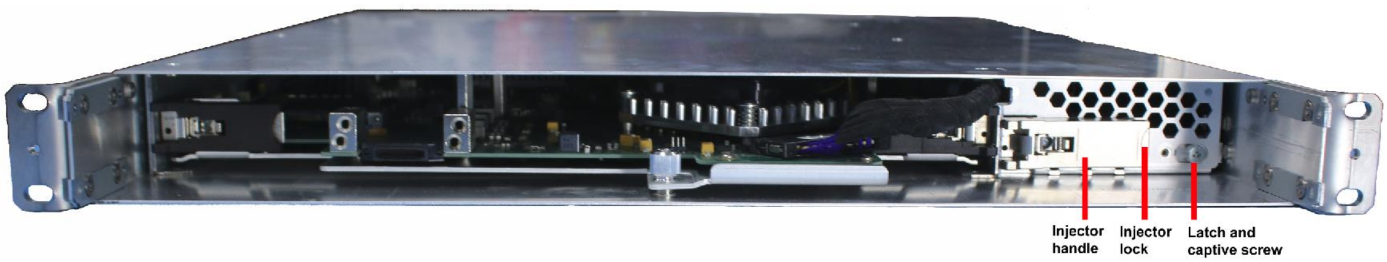
Installing the Front Panel

1. Gently slide the entire front panel onto the chassis.
2. Use a screwdriver to replace the thumb screws at the left and right ends of the front panel.
3. Power ON the SNP.

Your SNP is ready to use.

Redundant PSU Assembly (Field-Replaceable) (SNP-350W-ACPS-ASSY)

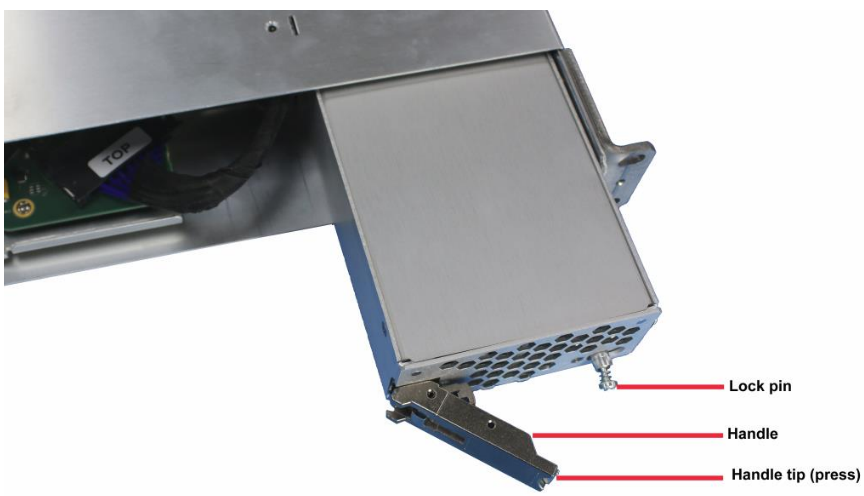
The Power supply assembly (SNP-350W-ACPS-ASSY) is located at the right end of the SNP.



Removing the Power Supply Assembly

Before removing the power supply assembly, you must remove the front panel of the SNP. See Removing the Front Panel (on page 538) for more information. It is not necessary to remove the top of the chassis to remove the power supply, meaning that you can replace the power supply while the entire unit remains in the rack.

1. Unscrew the lock pin until it springs free (it is a captive screw so will not escape completely).
2. Slide the safety lever to the left.
3. Push the tip of the ejector lever and then pull first to release the handle, and then to remove the power supply from the chassis.



Installing the Power Supply

1. Line the power supply up with the space provided and slide it gently in until it will not go any further.
2. Push the ejector lever until it is flush with the power supply.
3. Slide the safety lever to the right.
4. Screw the safety lever with a screwdriver until it is "finger tight".

Before returning your SNP to full operation, you must reattach the front panel. See Installing the Front Panel (on page 539) for more information.

Hot-Swappable Power Supply (SNP-GW-3GX32-HS-QF)

To remove and install the hot-swappable power supply (SNP-GW-3GX32-HS-QF), see the following topics:

- Removing the Individual Hot-Swappable Power Supply (on page 540)
- Installing the Hot-Swappable Power Supply (on page 542)

Devices that contain hot-swappable power supplies have a front panel with release screws for the hot-swappable power supplies.

If your front panel does not have these screws, then you must remove your device from service before swapping out power supplies. See Redundant PSU Assembly (Field-Replaceable) (SNP-350W-ACPS-ASSY) (on page 539).

Removing the Individual Hot-Swappable Power Supply

Without turning the device off, follow these steps:

1. Determine which power supply needs replacement.

   This information is available in the SNP Manager. see Power Supply Status (on page 366).

   Or you can look inside the front right of the SNP; the power supply that is running and functioning correctly will have two green lights in its upper right corner.
2. Unscrew the two screws that hold the hot swappable power supply cover in place on unit front.

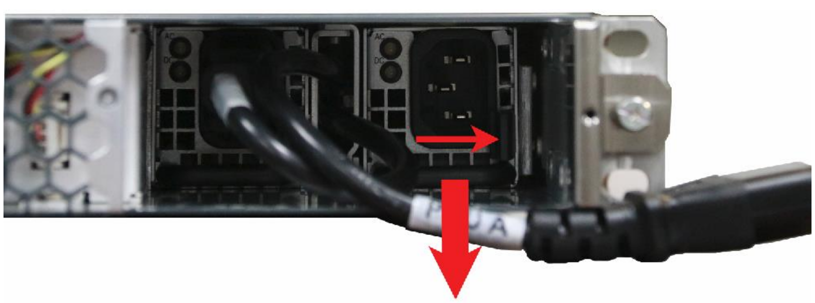
3. Slide the power supply cover away from the front of the SNP.

4. Unplug only the power supply to be replaced.

   Power Supply A/B indicators are etched into the metal on the bottom of the frame on the front, and on the back; and both power supply cables are labeled.

   Ensure you are removing power from the malfunctioning power supply.

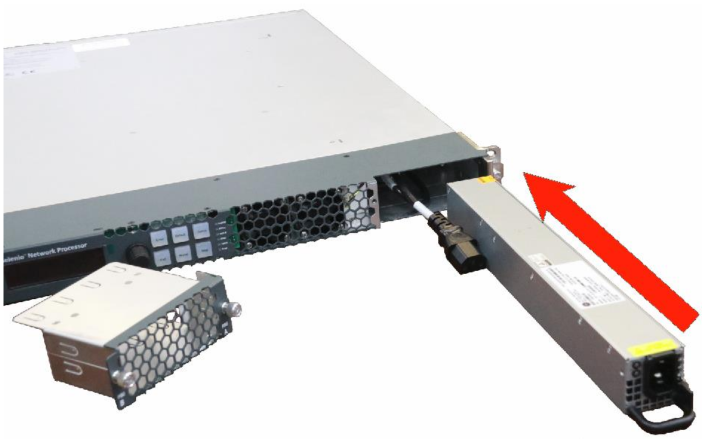
5. Slide the power supply release latch to the left and while holding it in the released position use the handle at the bottom of the power supply to slide it from the SNP frame.



Installing the Hot-Swappable Power Supply

With the SNP frame power supply access panel open, follow these steps:

1. Slide the power supply into the empty space.



2. Connect the power cord to the power supply.

   You can do this step before completely locking the power supply into place, or after. It might be easier to do it before.

   Note: When installing power supplies (especially if you have disconnected both power supplies) that the cables are labeled. It is very important that the correct cable be attached to each power supply. Power supply slot identification is etched into the metal of the frame on the front, and screened onto the back of the frame. If you do not connect the correct cable to the correct power supply, indicators in the SNP Manager will not provide correct power supply health information.

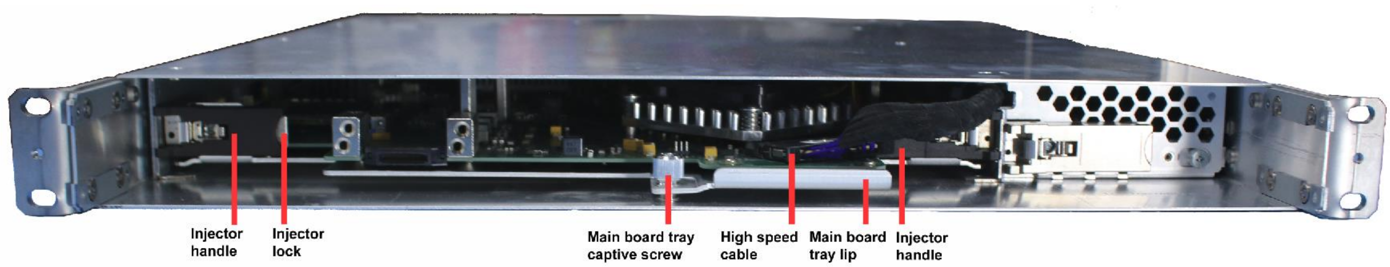
   ---

3. Push the power supply the rest of the way into the device until the release latch snaps into place.
4. Replace the power supply access panel cover.

Ensure that the access panel cover is completely engaged, so the angled lips at the top and bottom hold the power cords in place.

Main PCB Assembly (SNP-MAIN-PCB-ASSY)

The SNP main board assembly (SNP-MAIN-PCB-ASSY) fits snugly to the left of the power supply.



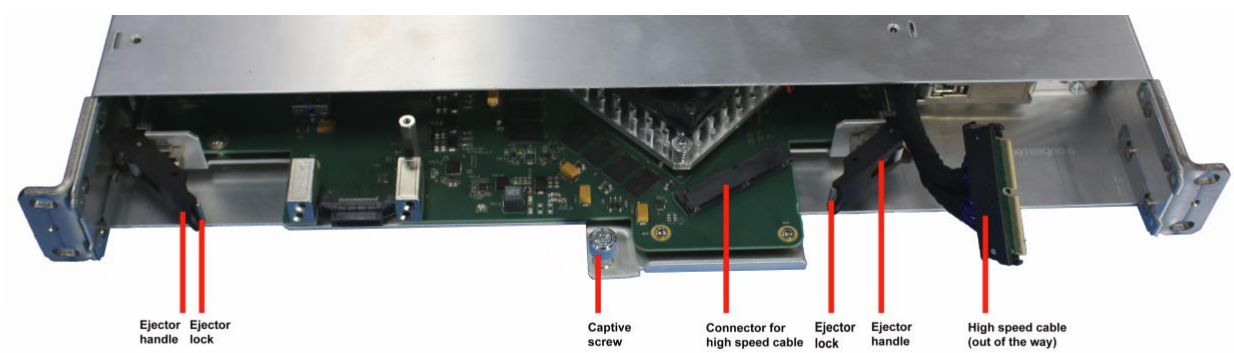
Removing the Main PCB Assembly

Before removing the main board, you must remove the front panel of the SNP. See Removing the Front Panel (on page 538) for more information. It is not necessary to remove the top of the chassis to remove the main board, meaning that you can service SNP while the entire unit is rack-mounted.

1. Pressing both sides of the fly-over cable, evenly slide it away from the connector.

   Do not pull the fly-over cable cord.
2. Park it straightened and out of the way.

3. Turn the captive thumb screw to release the board from the chassis base. It will spring when released.
4. Holding the ejectors at the left and right ends of the board, press the ends and then slide them first open 15-20 degrees and then slide the board out of the frame.



Installing the Main PCB Assembly

1. Line the main board up with the space provided and slide it gently in until it will not go any further.
2. Push the plate below and to the right of the thumbscrew.
3. Push the ejectors at the left and right of the board firmly and evenly until the board will go no further.
4. Press the ejectors in so they are at a right angle to the frame and the clips at the ends are engaged.
5. Tighten the thumb screw.
6. Carefully replace the fly-over, lining it up to slide evenly into the connector. The fly-over cable housing has a label "TOP" to indicate the top of the connector.

Before returning your SNP to full operation, you must reattach the front panel. See Installing the Front Panel (on page 539) for more information.

Replacing the IP Fan on SNP-GW-3GX32-HS-QF

SNP-SPARE-IPFAN Kit Contents

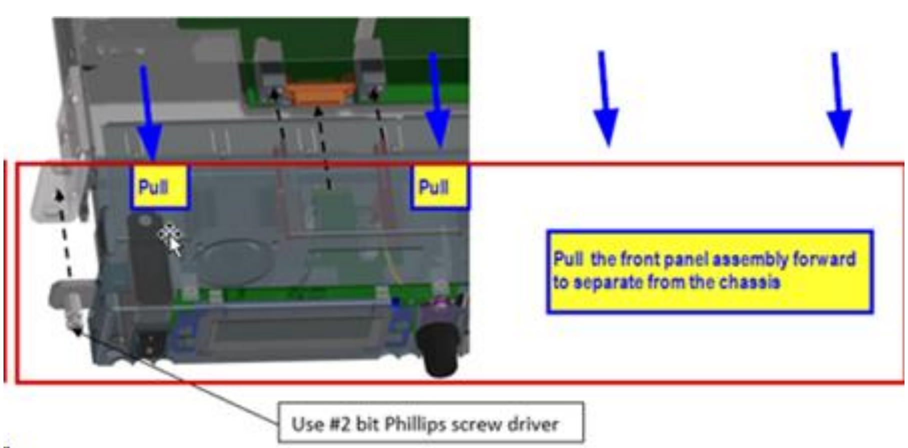
Verify the contents of your kit:

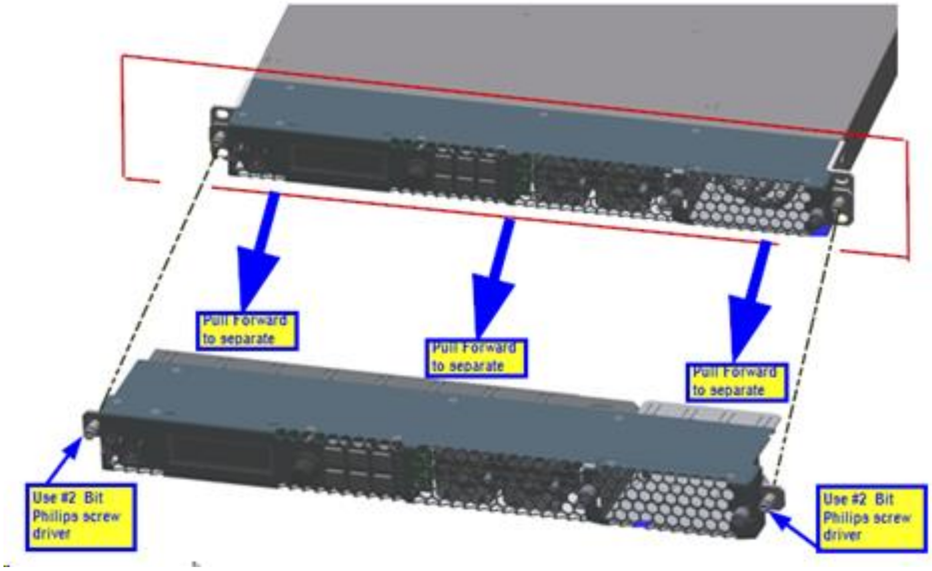
Item	Part Number	Description	Packing	Qty
1		Replacement IP Fan	Bag-A	1
2		TIE WRAP W/MTG HOLE*NYLON*4.3"LONG*0.10" WIDE*NYONL*UL94V-0*WHITE*FOR #4/M2.5 SCREW MTG	Bag-A	1

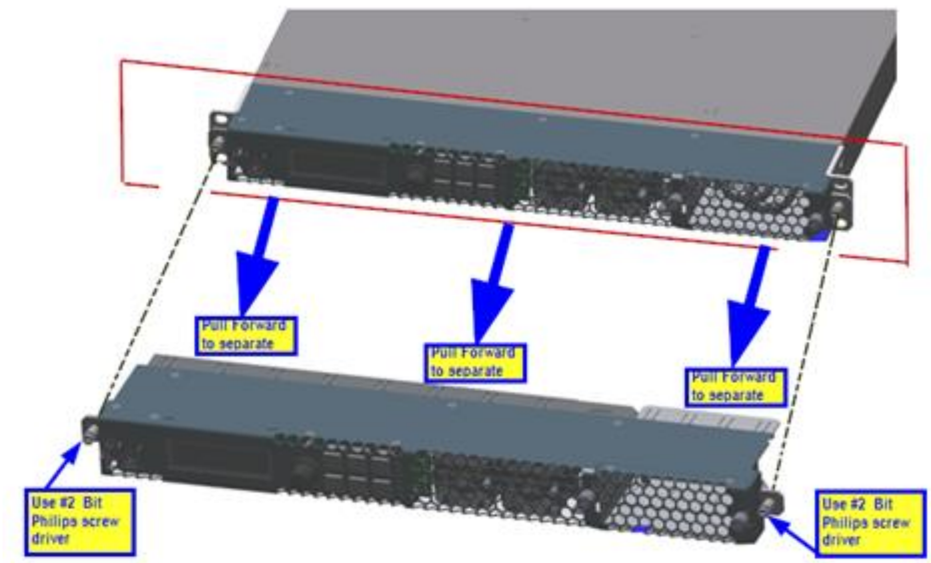
Removing the Front Panel

Disassemble the Front Panel from the SNP Chassis by doing the following:

1. Using a #2bit Phillips screwdriver, loosen the 2 captive screws shown below.
2. Pull the front panel assembly forward and away from the Chassis as shown below
3. Store in a safe location

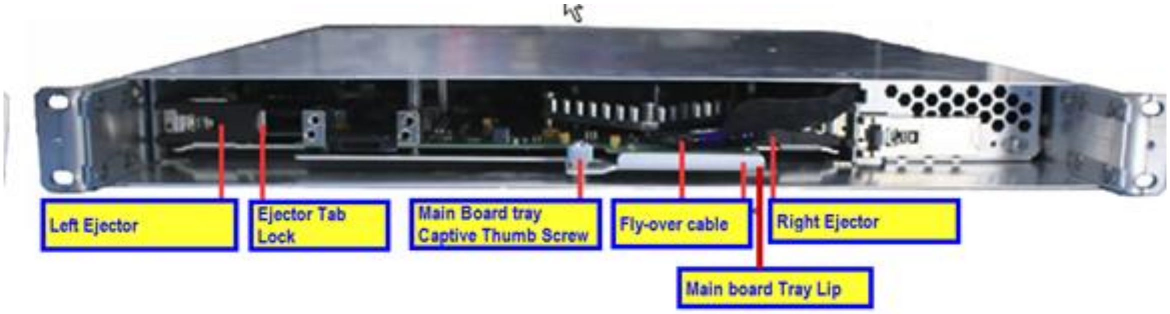



Pull Forward to separate
Pull Forward to separate
Pull Forward to separate
Use #2 Bit Philips screw driver
Use #2 Bit Philips screw driver


Pull Forward to separate
Pull Forward to separate
Pull Forward to separate
Use #2 Bit Philips screw driver
Use #2 Bit Philips screw driver

Removing the Main Board

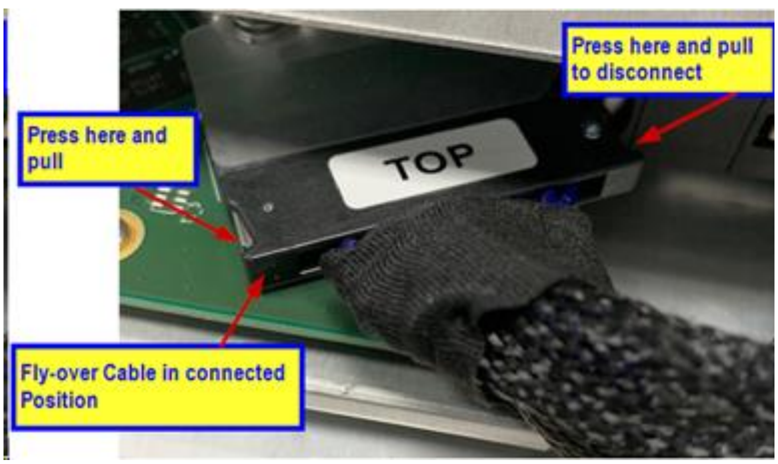
1. Access and Remove the Main PCB.



Ensure you complete the previous step (Removing the Front Panel (on page 544)) before this one.

Note that you can service the SNP while the entire unit is rack mounted so you don't have to remove the top of the chassis to remove the Main PCB.

2. Pressing both sides of the fly-over cable, evenly slide it away from the connector. Do not pull the fly-over cable cord.



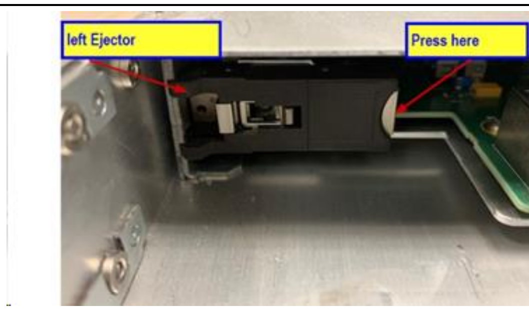
3. Park the disconnected fly-over cable straightened and out of the way as shown below.

4. Turn the thumb screw to release the PCB board PCB and tray from the chassis.
5. The screw will spring when released.

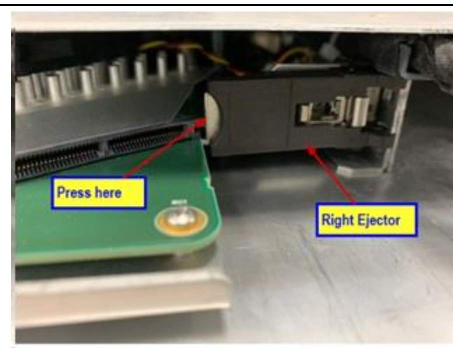
Thumb Screw Locked Position

Thumb Screw Unlocked Position

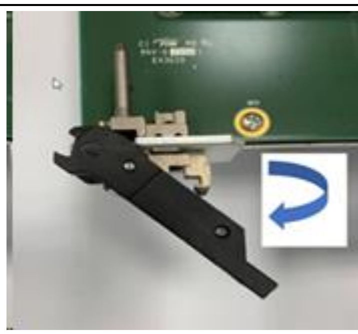
6. Press the tabs at the end of Left Ejector handle and Right Ejector handle and rotate until the board is released and starts to slide



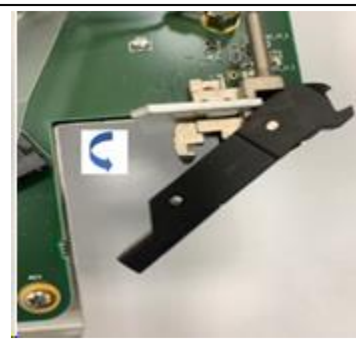
Releasing Left Ejector



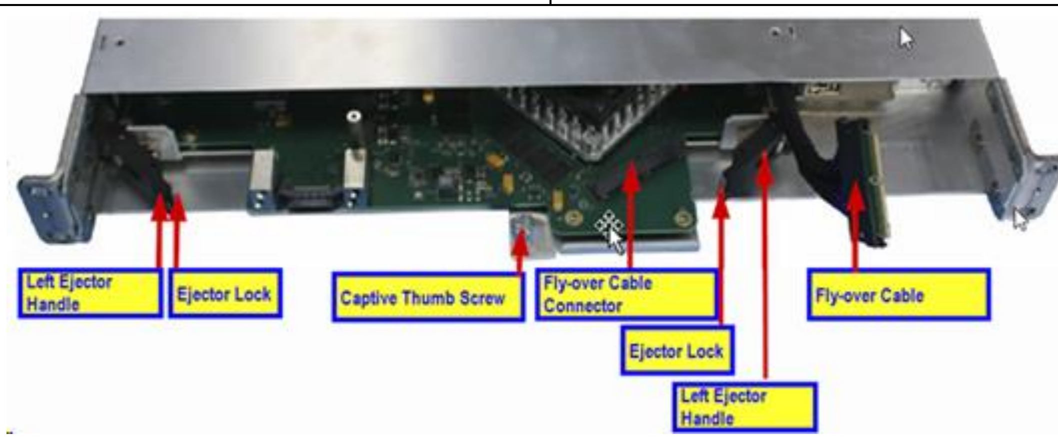
Releasing Right Ejector



Opening Left Ejector



Opening Right Ejector



Ejector Handles, Screws, and Flyover Cable in Chassis

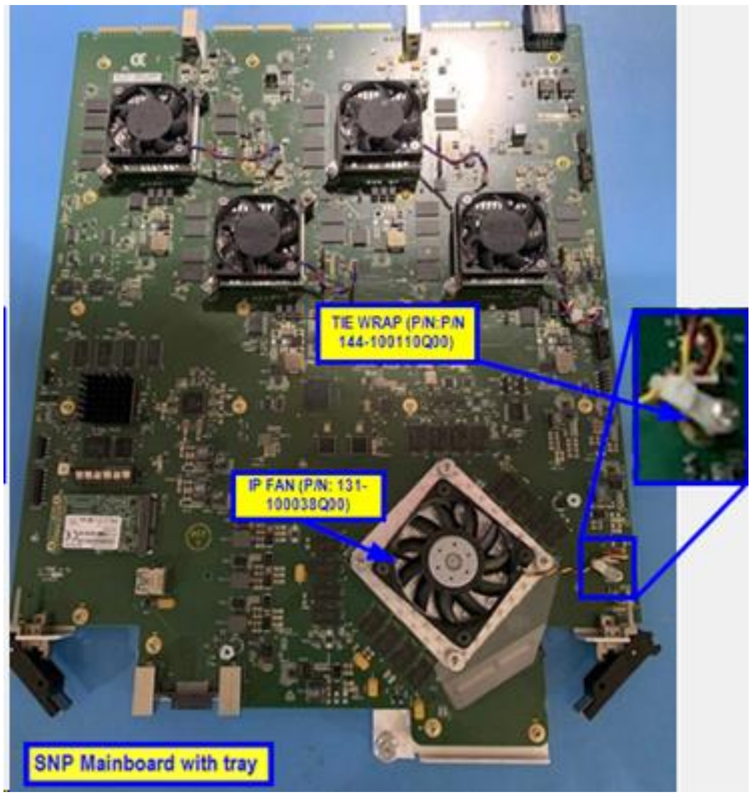
7. Slide the Main board completely out of the chassis and place it on a work surface.

8. Identify the defective IP Fan

Removing the Defective IP Fan

1. After identifying the defective fan trace the cable from the fan and remove the connector socket from the main board.

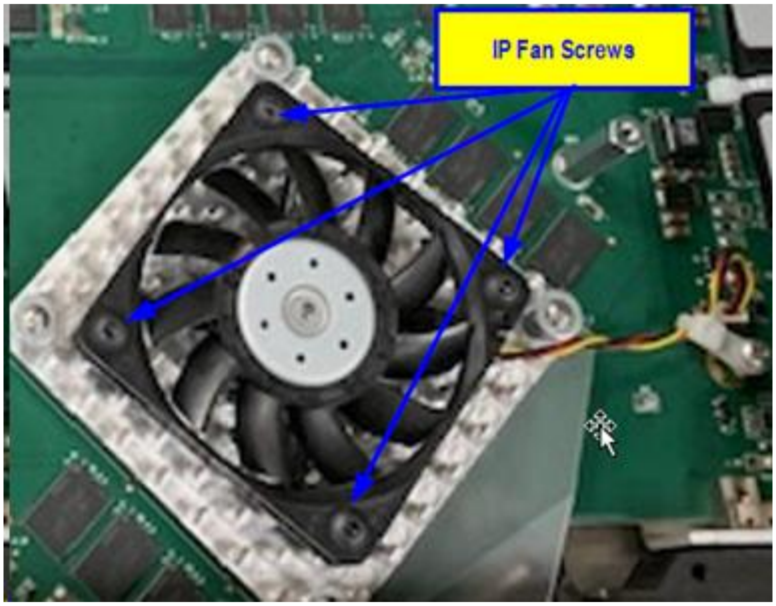
   Note IP Fan cables have a strain relief attached to a standoff as shown.



When replacing the IP Fan, following this method:

- Hold the standoff with a Needle nose plier to prevent it from rotating and remove the screw that's holding the TIE WRAP.
- After installing the replacement fan, a new TIE WRAP supplied must be used and the screw reattached to the standoff.
- Observe the orientation of the fan as you will need to reinstall with the same orientation.

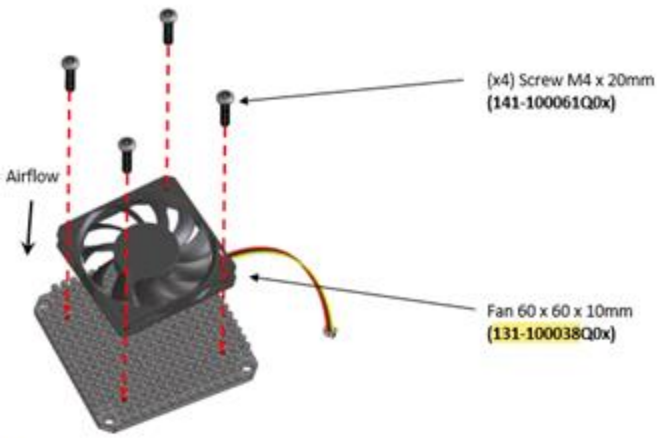
2. Remove the four IP Fan Screws using M4 hex driver and save them for reusing



Replacing the New Fan

1. Align the replacement Fan in place of the removed Fan while observing the following:
   - With wires exiting in Bottom right corner
   - Label facing down
   - Fan Mounting holes align to the Heatsink holes

2. Tighten the Fan with the heatsink using the four screws that were removed (in Removing the Main Board (on page 546))



3. Reconnect the Fan Cable connector
4. Install the new Tie Wrap

After installing the replacement fan, a new TIE WRAP supplied must be used and the screw reattached to the standoff.

Reinstalling the Main Board

1. Make sure Main board is in lined up and parallel with the sliding track of chassis shown below and slide it in gently

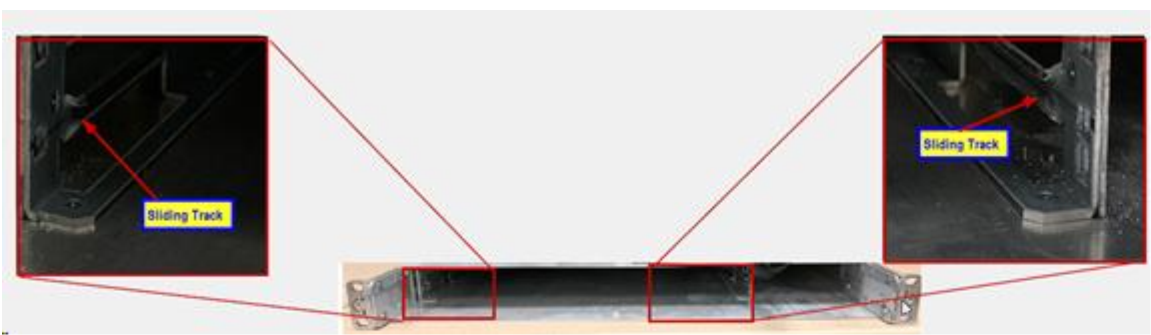


Figure 25: Sliding Track Positions

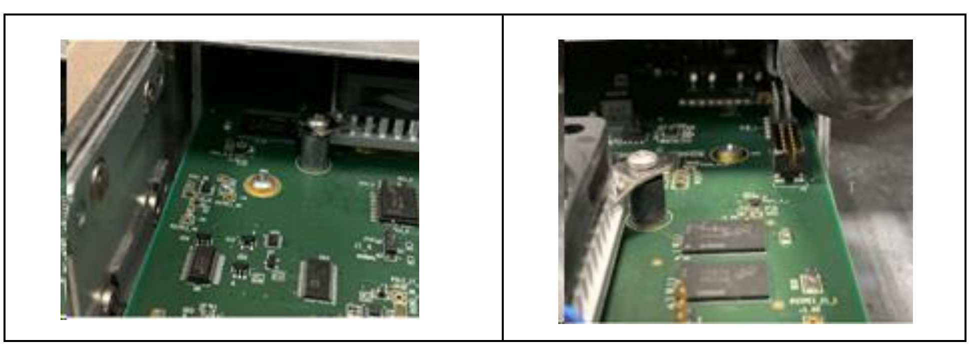


Figure 26: Sliding the Main Board into the Chassis

2. Push on the tray lip (shown below) to slide the board all the way in, to the point where it starts to engage with the mating connectors at the back. You will feel some resistance when this starts to happen, and the ejector handles will move slightly forward

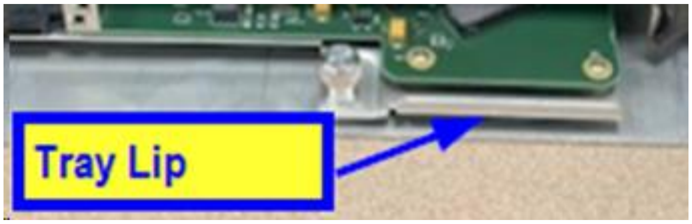


Figure 27: Tray Lip

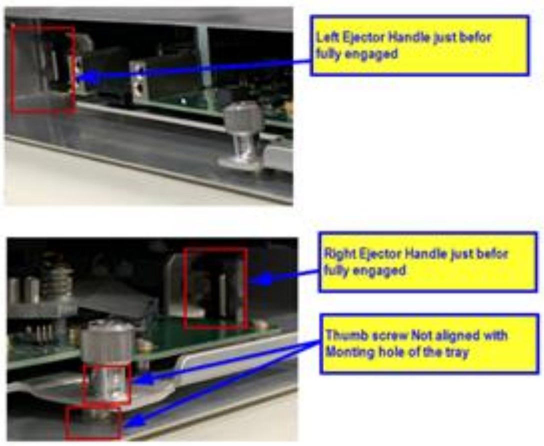


Figure 28: Ejector Handle Positions

3. Push the ejector handles at the left and right of the board firmly and evenly until the board will go no further

	
Figure 29: Ejector Handle Closure Directions	

- At this point the ejector should be locked into place. You will hear a "click" when the ejector is fully locked.

- In the fully locked position, the Captive Thumb screw should align to the mounting hole on the chassis.

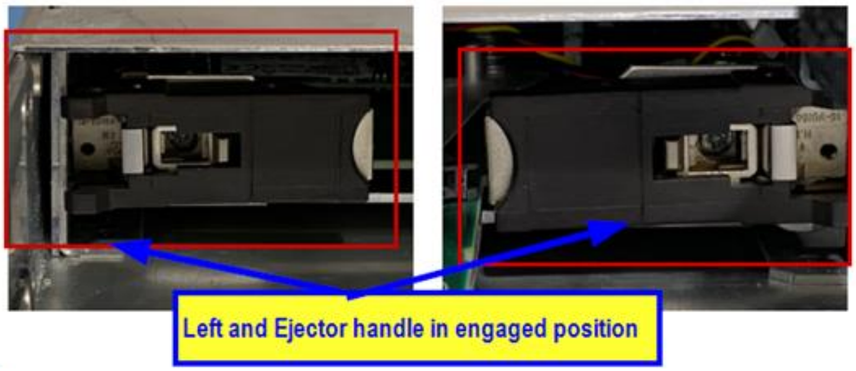
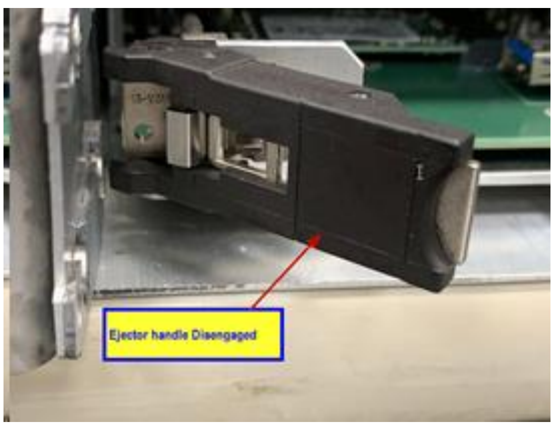


Figure 30: Ejector Handles in an Engaged Position



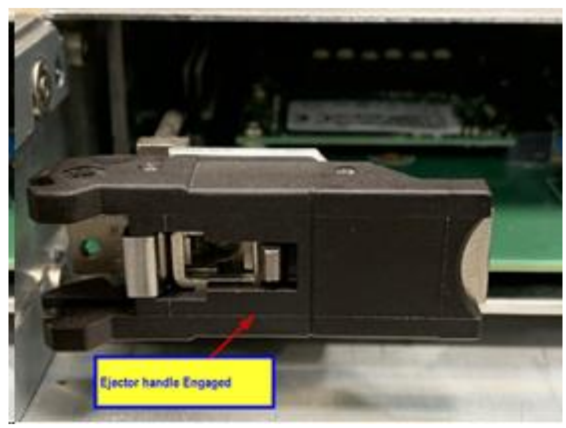


Figure 31: Ejector Handles in Disengaged and Engaged Positions

4. Tighten the thumbscrew by turning clockwise.

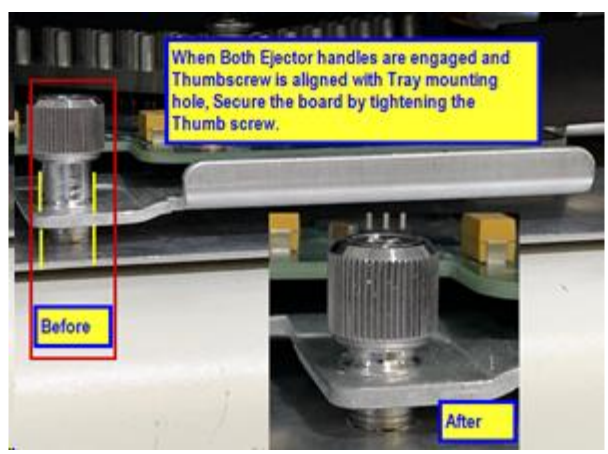


Figure 32: Tightening Thumb Screws

5. Carefully reconnect the Fly-over, lining it up to slide evenly into the connector.

Note the Orientation of the Cable ("TOP" Label facing up)

Figure 33: Reconnecting the Fly-over Cable

Reinstalling the Front Panel

1. Assemble the Front Panel to the SNP Chassis

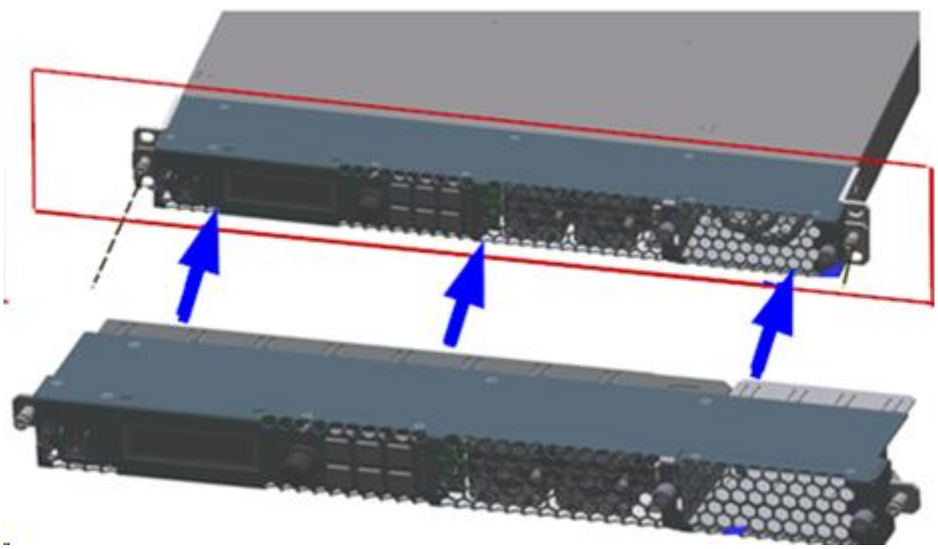


Figure 34: Sliding the front panel into the chassis

2. Orient and slide the Front Panel Assembly as shown. Ensure the High-Speed Cable (Fly-over cable) does not interfere with other Front Panel components.
3. Push the Front Panel Assembly until the blind mating pin engages as shown below. You should feel some resistance.

4. Give a firm push to mate the card edge connector

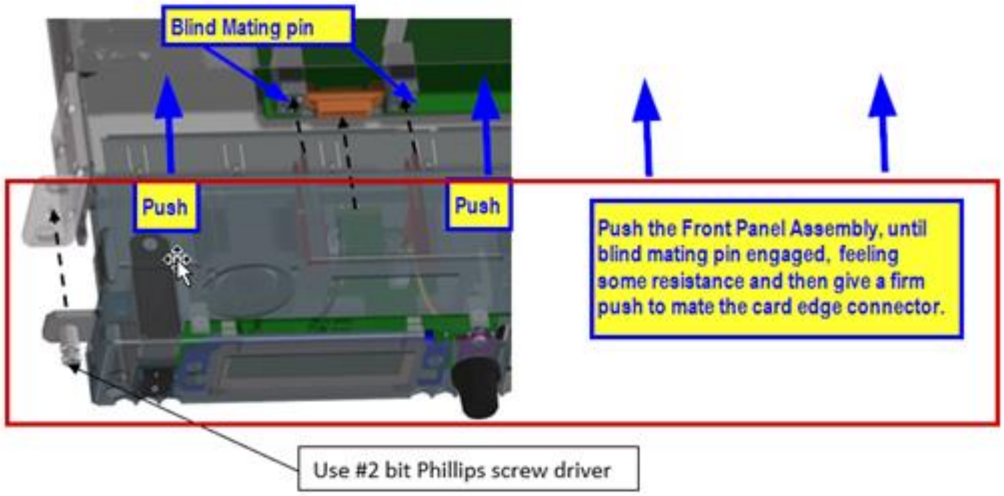


Figure 35: Push the Front Panel back into the SNP Chassis

5. Secure the Front Panel Assembly to the Main Chassis with a #2-bit Phillips screwdriver

Figure 36: Secure the Front Panel with Screws

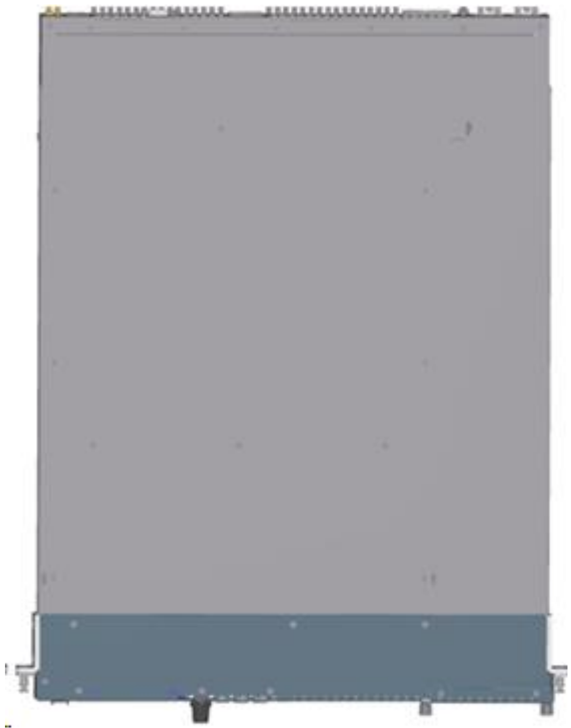


Figure 37: Completed Assembly

6. This completes your IP Fan replacement is complete. Your SNP is ready to return to service.

Replacing the BB Fans on SNP-GW-3GX32-HS-QF

SNP-SPARE-BBFAN Kit Contents

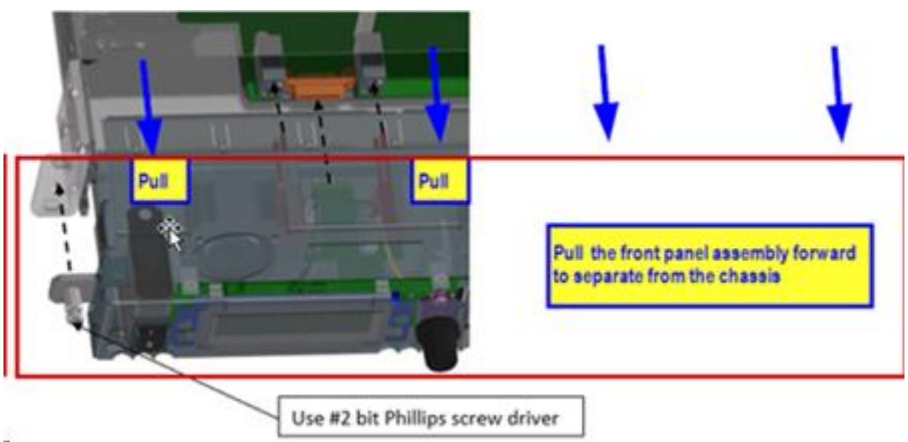
Verify the contents of your kit:

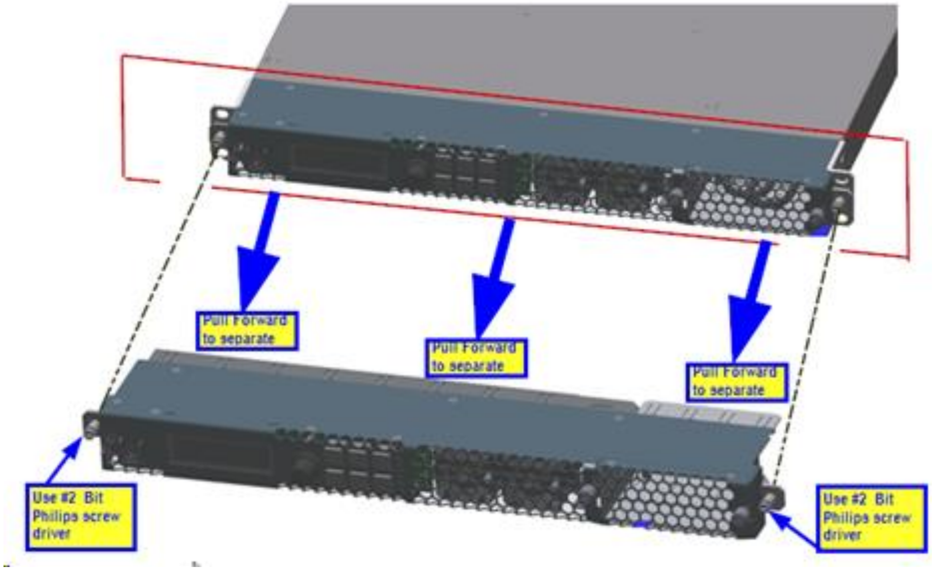
Item	Part Number	Description	Packing	Qty
1		Replacement BB Fan	Bag-A	1
2		TIE WRAP W/MTG HOLE*NYLON*4.3"LONG*0.10" WIDE*NYONL*UL94V-0*WHITE*FOR #4/M2.5 SCREW MTG	Bag-A	1

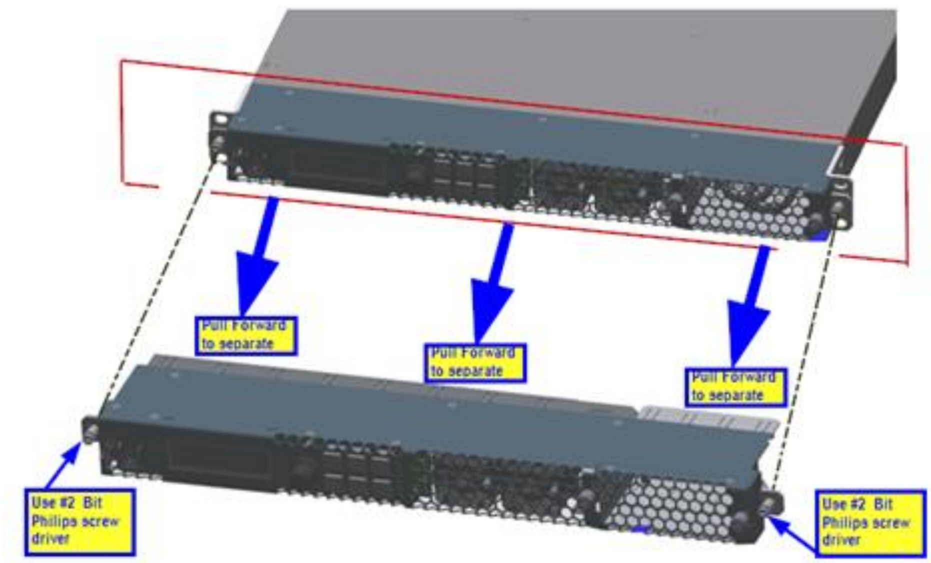
Removing the Front Panel

Disassemble the Front Panel from the SNP Chassis by doing the following:

1. Using a #2bit Phillips screwdriver, loosen the 2 captive screws shown below.
2. Pull the front panel assembly forward and away from the Chassis as shown below
3. Store in a safe location

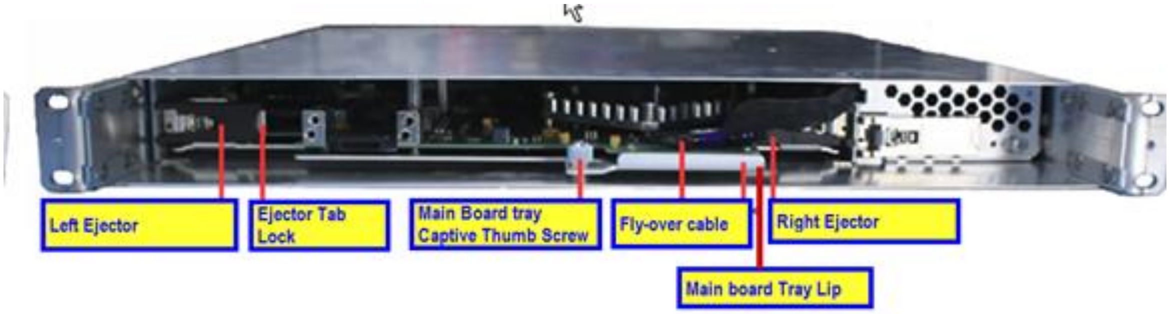



Pull Forward to separate
Pull Forward to separate
Pull Forward to separate
Use #2 Bit Philips screw driver
Use #2 Bit Philips screw driver


Pull Forward to separate
Pull Forward to separate
Pull Forward to separate
Use #2 Bit Philips screw driver
Use #2 Bit Philips screw driver

Removing the Main Board

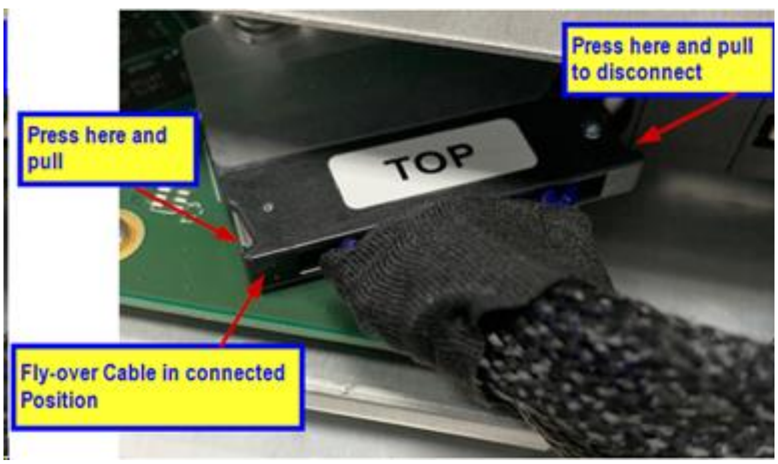
1. Access and Remove the Main PCB.



Ensure you complete the previous step (Removing the Front Panel (on page 557)) before this one.

Note that you can service the SNP while the entire unit is rack mounted so you don't have to remove the top of the chassis to remove the Main PCB.

2. Pressing both sides of the fly-over cable, evenly slide it away from the connector. Do not pull the fly-over cable cord.

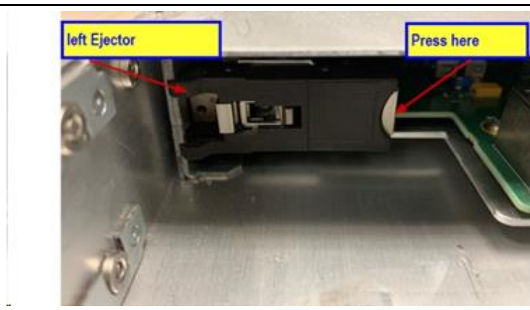


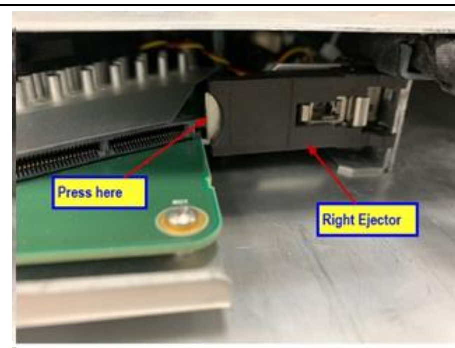
3. Park the disconnected fly-over cable straightened and out of the way as shown below.

4. Turn the thumb screw to release the PCB board PCB and tray from the chassis.
5. The screw will spring when released.

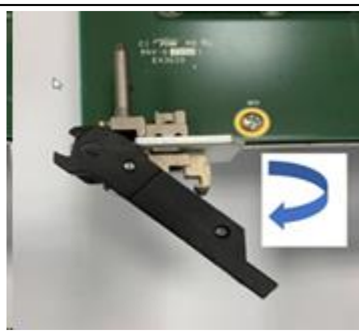
Thumb Screw Locked Position	Thumb Screw Unlocked Position

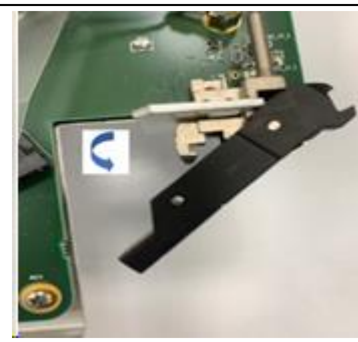
6. Press the tabs at the end of Left Ejector handle and Right Ejector handle and rotate until the board is released and starts to slide



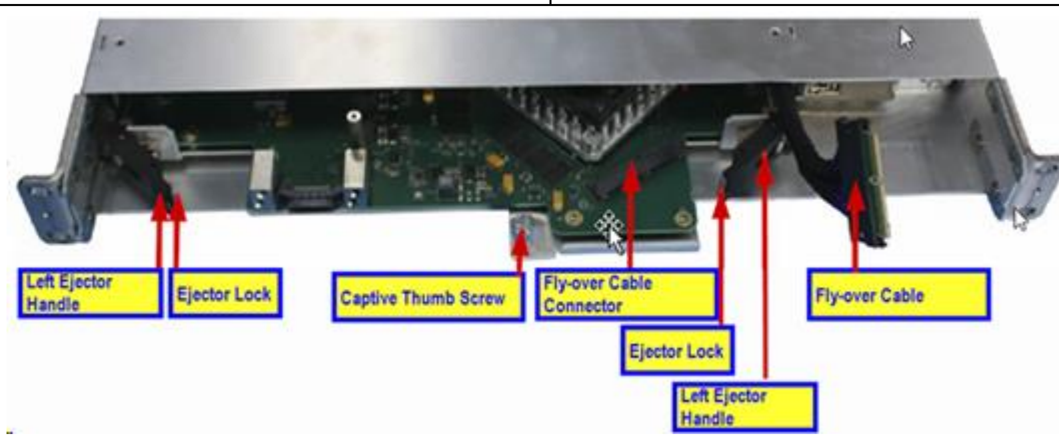


Releasing Left Ejector	Releasing Right Ejector





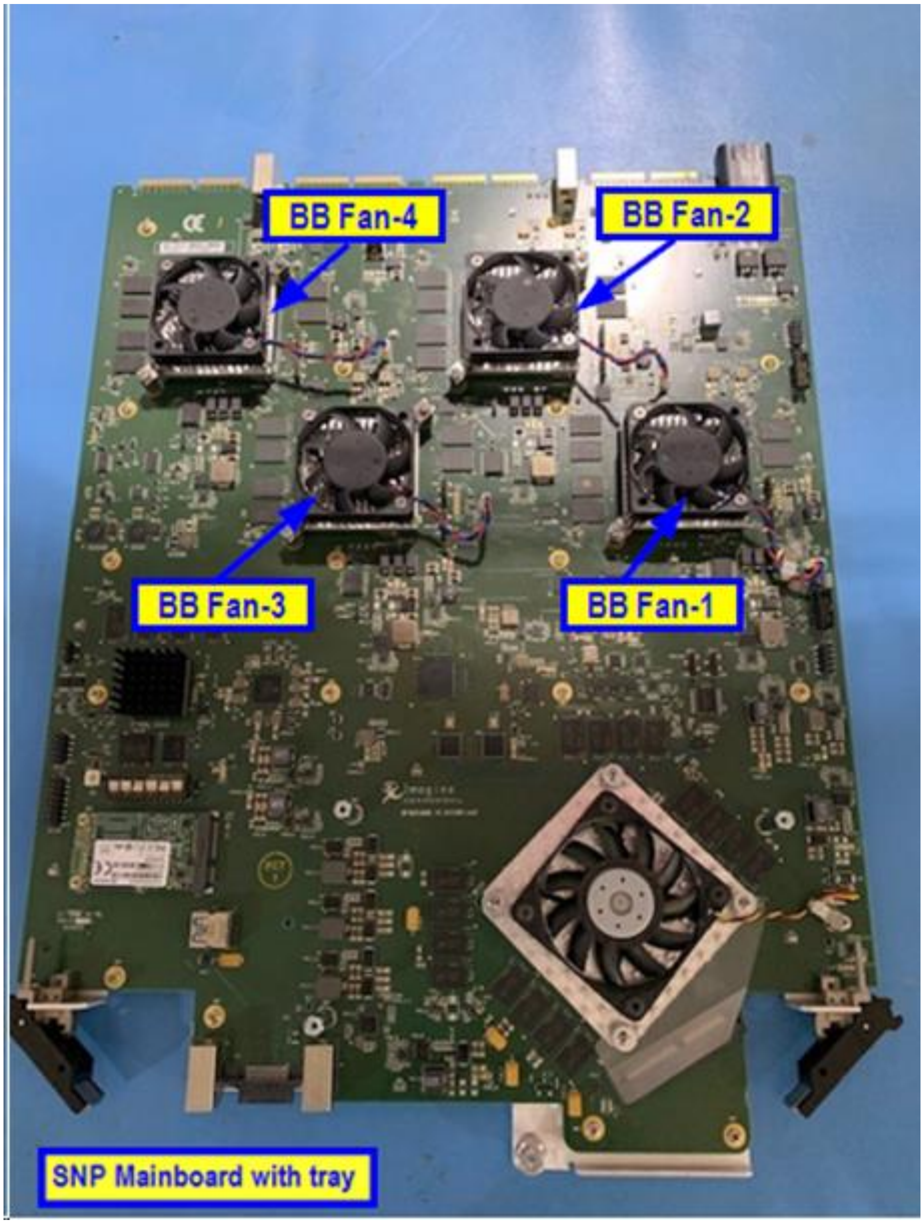
Opening Left Ejector	Opening Right Ejector



Ejector Handles, Screws, and Flyover Cable in Chassis

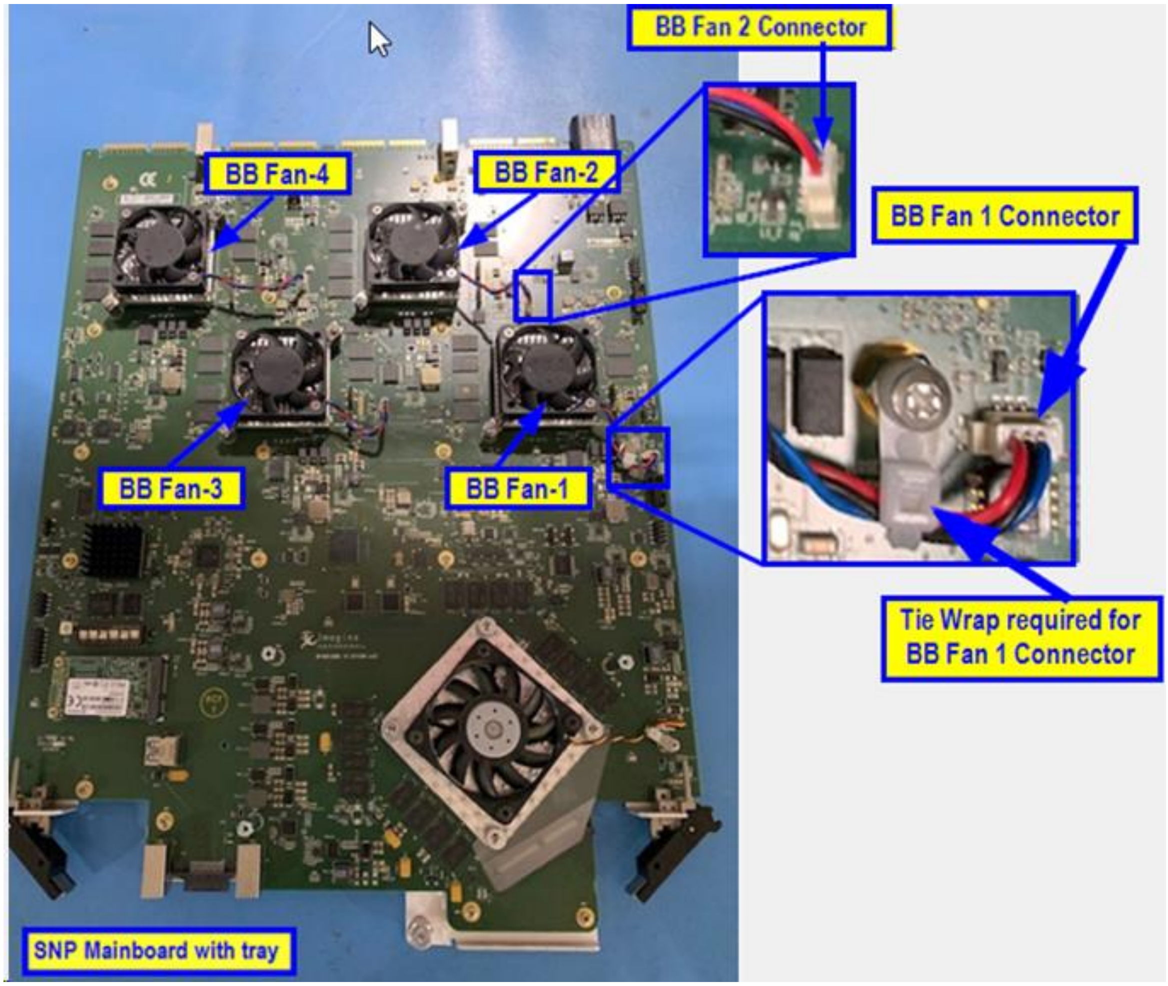
7. Slide the Main board completely out of the chassis and place it on a work surface.

8. Identify the defective Fan

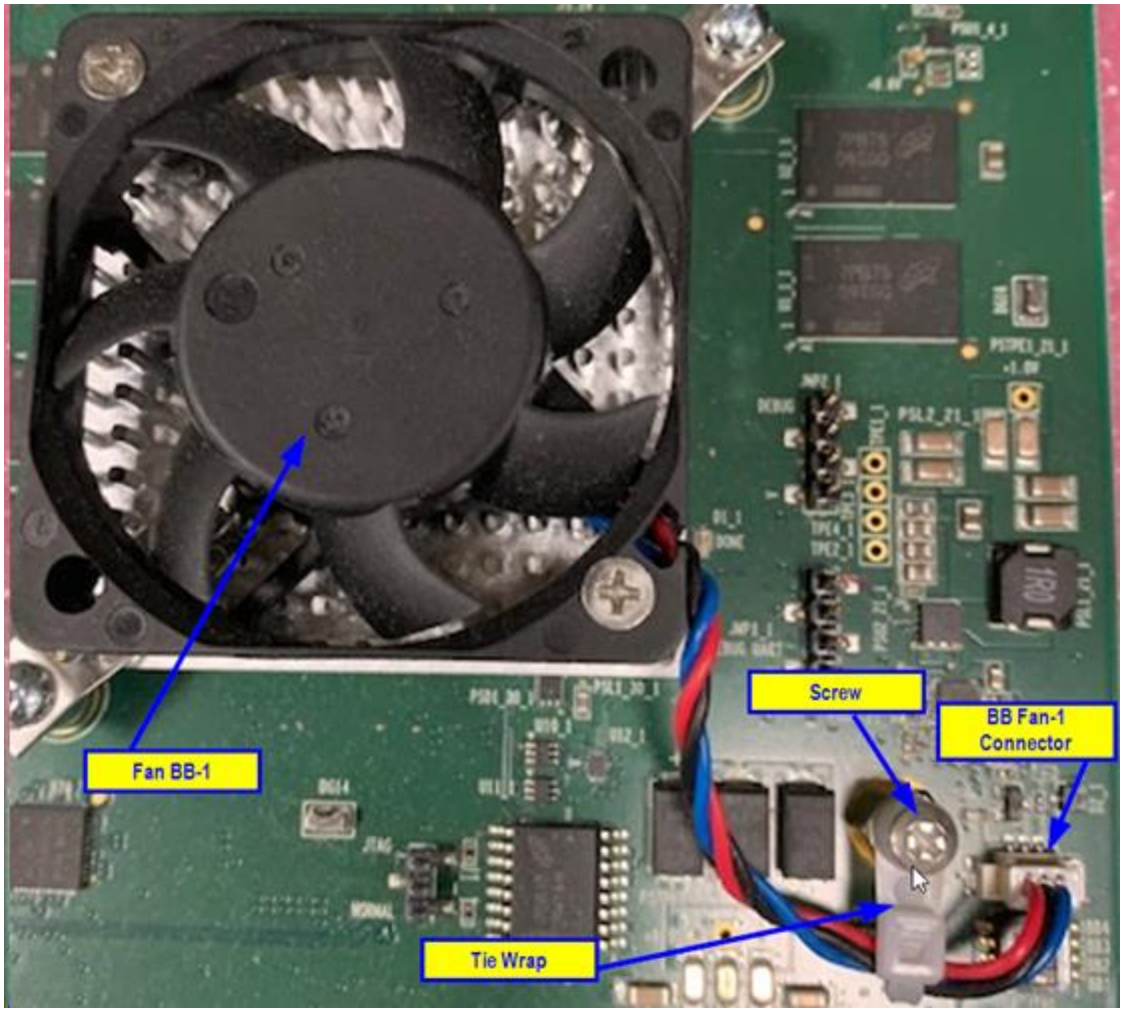


Removing the Defective Fan

1. Identify the defective fan

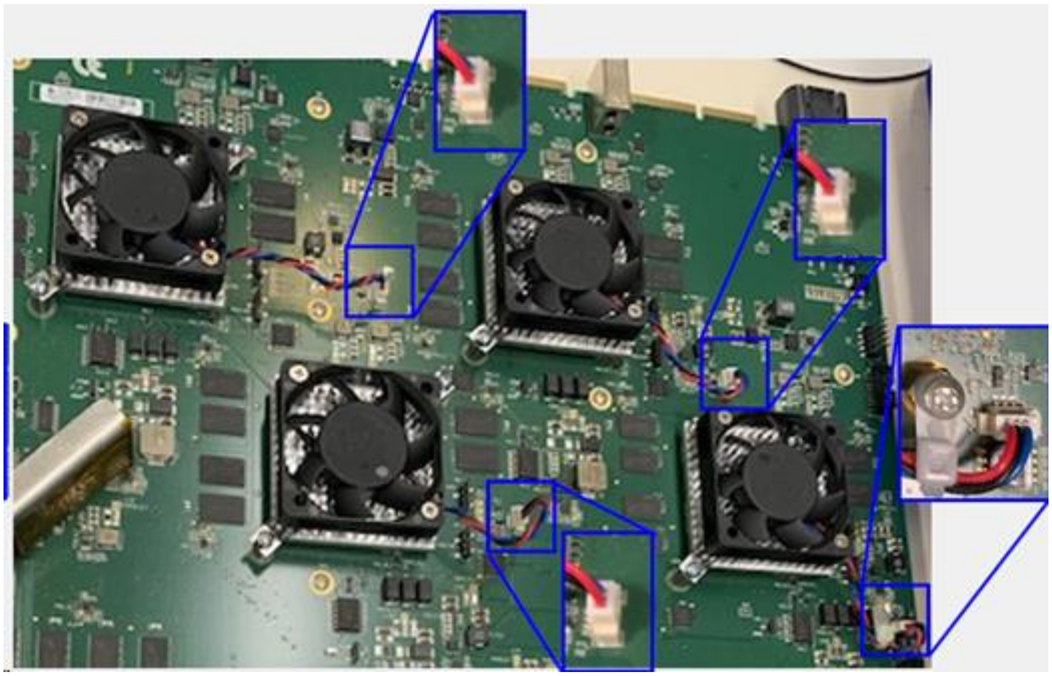


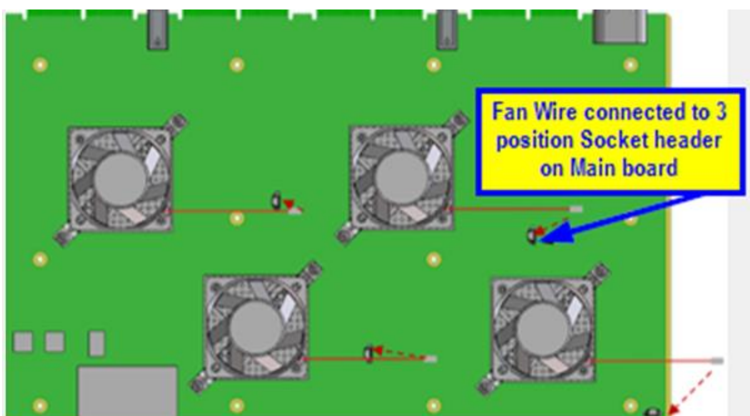
Note: Cable on BB fan 1 is secured with Tie wrap as shown below.

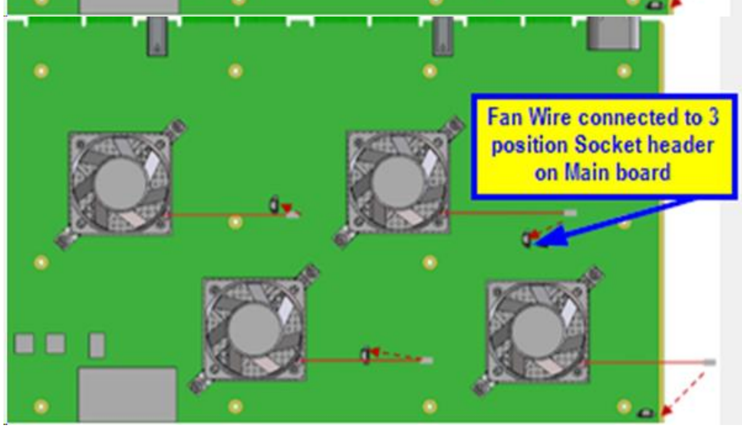


2. If BB1 is to be replaced, then Remove the tie wrap.
   - Hold the standoff with a Needle nose plier to prevent it from rotating and remove the screw that's holding the TIE WRAP.
   - Keep the screw for reinstallation later

3. After identifying the defective fan trace the cable from the fan and unplug the fan cable from the main board.







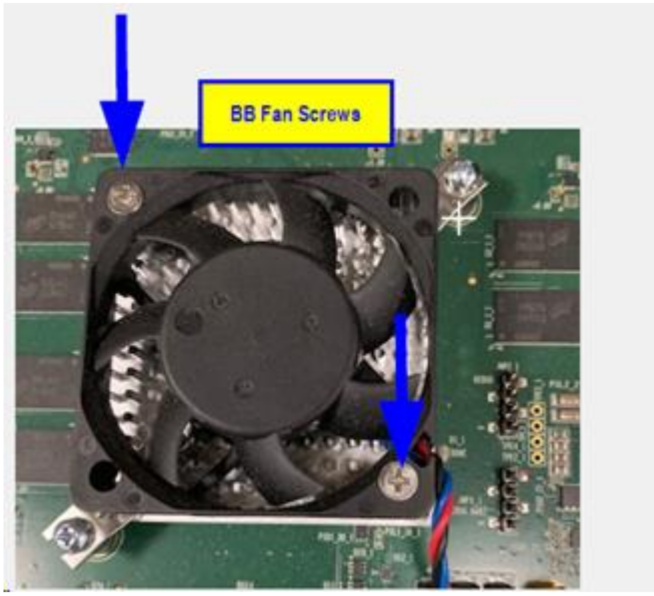
4. Remove the 2 BB Fan Screws using # 2 Philips Screwdriver and save for reusing.

5. Remove the defective fan and discard.

Replacing the New Fan

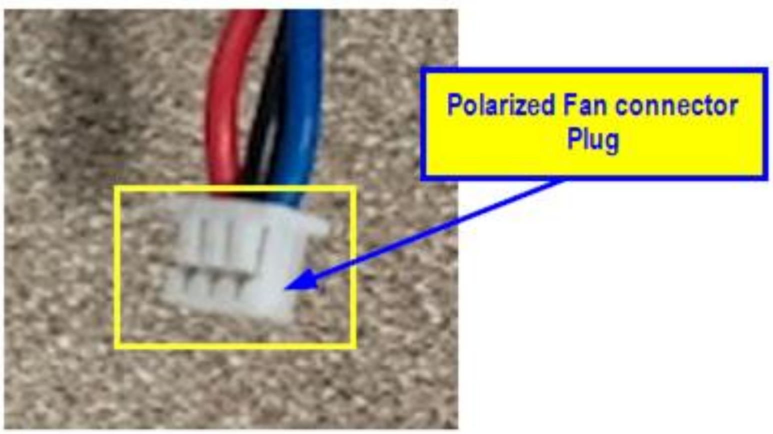
1. Align the replacement Fan in place of the removed Fan while observing the following:
   - With wires exiting in Bottom right corner
   - Label facing down
   - Fan Mounting holes align to the Heatsink holes

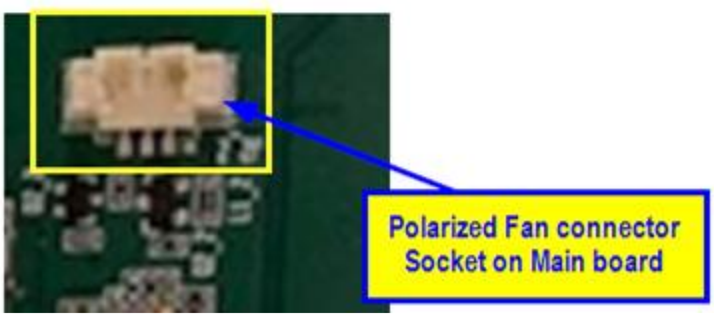
2. Tighten the Fan with the heatsink using the four screws that were removed (in Removing the Defective Fan (on page 563))



3. Reconnect the Fan Cable connector

Fan Connectors are polarized (will mate only in the correct orientation)





4. Install the new Tie Wrap

After installing the replacement fan, a new TIE WRAP supplied must be used and the screw reattached to the standoff using a Needle Nose plier.

Reinstalling the Main Board

1. Make sure Main board is in lined up and parallel with the sliding track of chassis shown below and slide it in gently

Figure 38: Sliding Track Positions

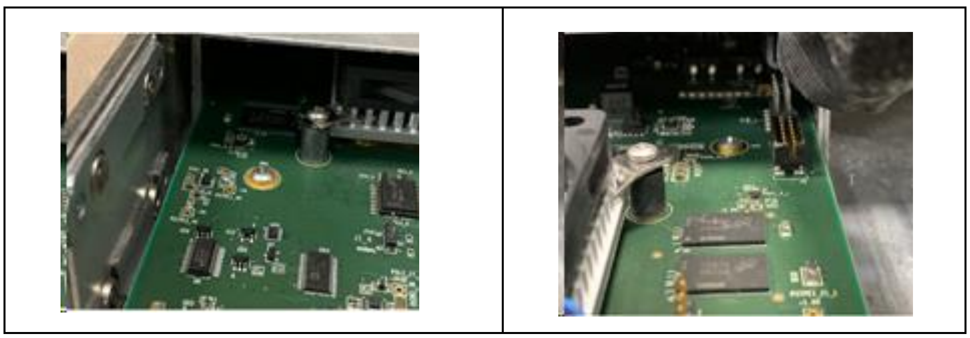


Figure 39: Sliding the Main Board into the Chassis

2. Push on the tray lip (shown below) to slide the board all the way in, to the point where it starts to engage with the mating connectors at the back. You will feel some resistance when this starts to happen, and the ejector handles will move slightly forward

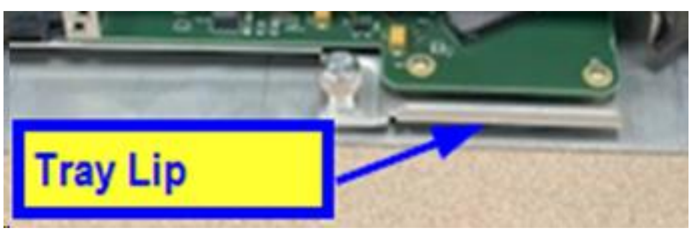


Figure 40: Tray Lip

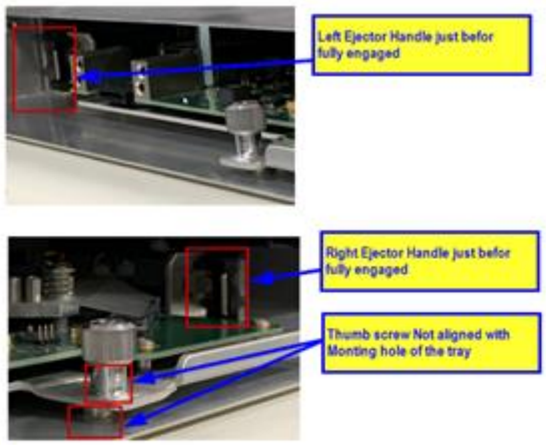


Figure 41: Ejector Handle Positions

3. Push the ejector handles at the left and right of the board firmly and evenly until the board will go no further

Figure 42: Ejector Handle Closure Directions

- At this point the ejector should be locked into place. You will hear a "click" when the ejector is fully locked.
- In the fully locked position, the Captive Thumb screw should align to the mounting hole on the chassis.

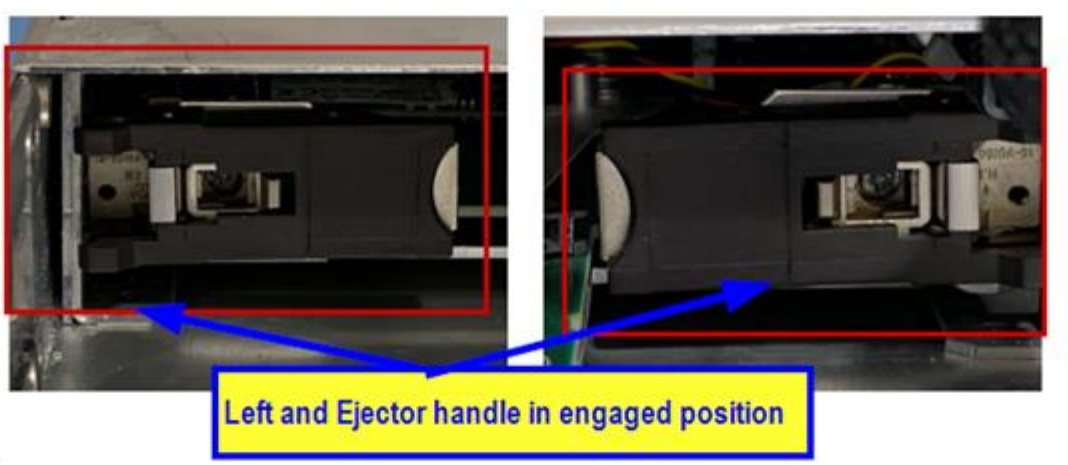


Figure 43: Ejector Handles in an Engaged Position

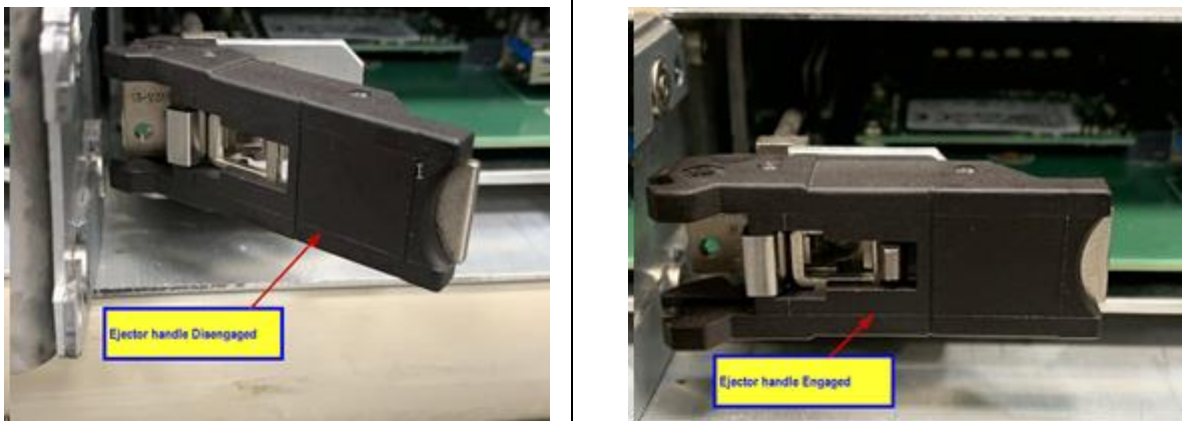


Figure 44: Ejector Handles in Disengaged and Engaged Positions

4. Tighten the thumbscrew by turning clockwise.

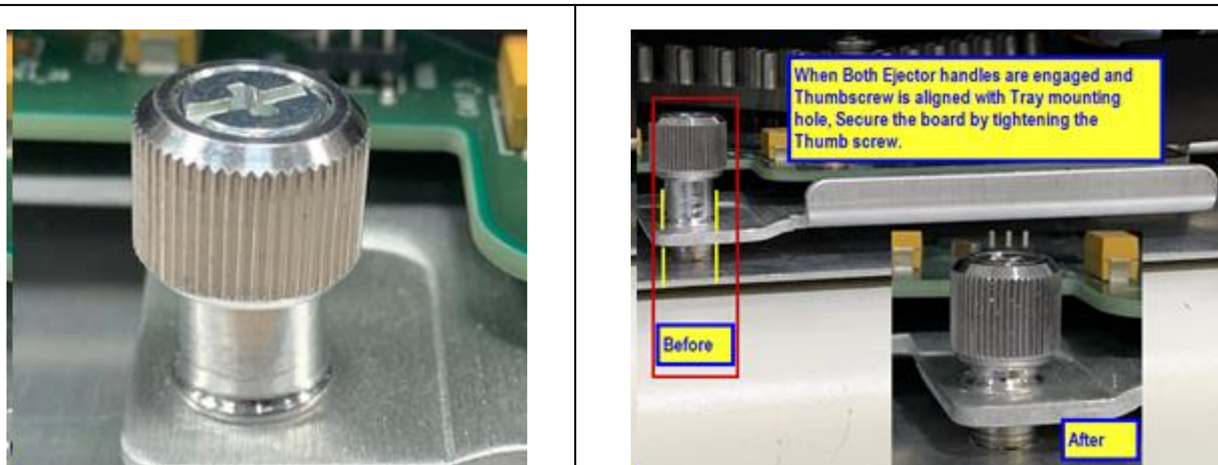


Figure 45: Tightening Thumb Screws

5. Carefully reconnect the Fly-over, lining it up to slide evenly into the connector.

Note the Orientation of the Cable ("TOP" Label facing up)

Figure 46: Reconnecting the Fly-over Cable

Re-installing the Front Panel

1. Assemble the Front Panel to the SNP Chassis

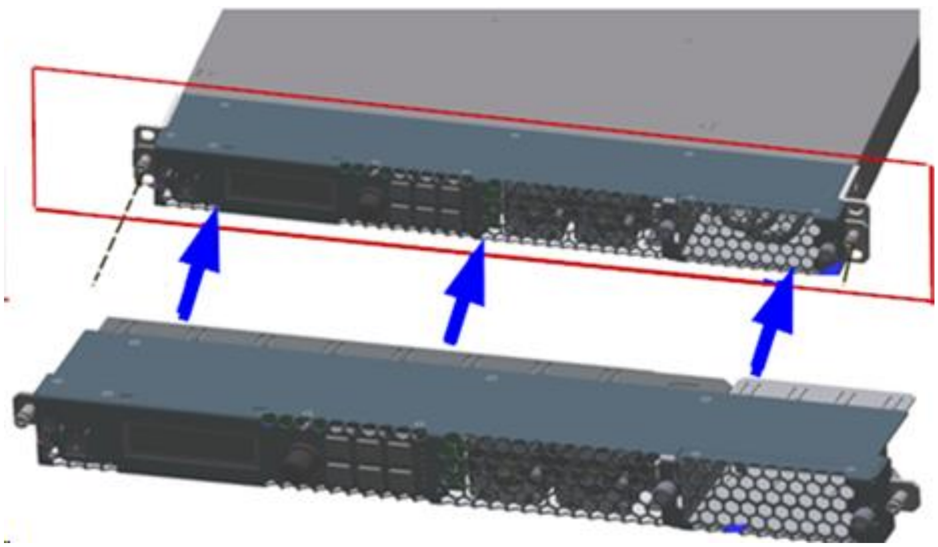


Figure 47: Sliding the front panel into the chassis

2. Orient and slide the Front Panel Assembly as shown. Ensure the High-Speed Cable (Fly-over cable) does not interfere with other Front Panel components.
3. Push the Front Panel Assembly until the blind mating pin engages as shown below. You should feel some resistance.

4. Give a firm push to mate the card edge connector

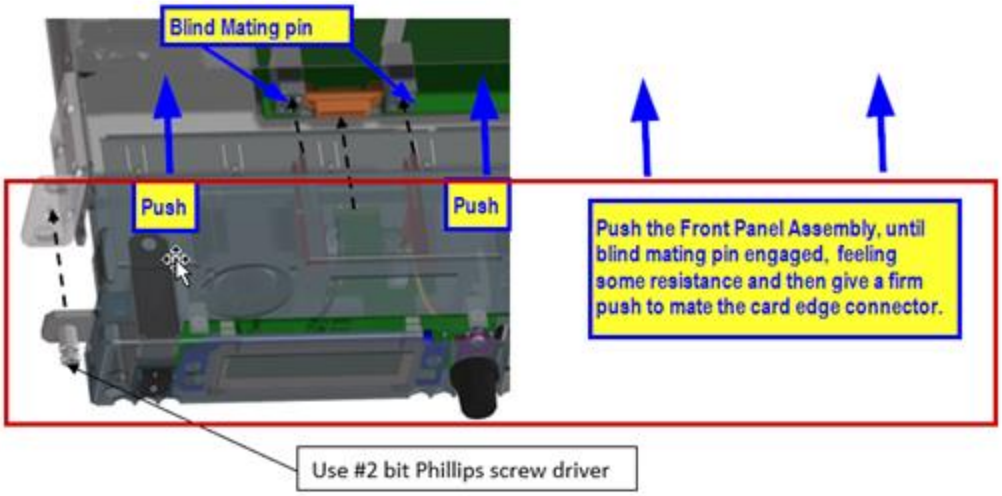


Figure 48: Push the Front Panel back into the SNP Chassis

5. Secure the Front Panel Assembly to the Main Chassis with a #2-bit Phillips screwdriver

Figure 49: Secure the Front Panel with Screws

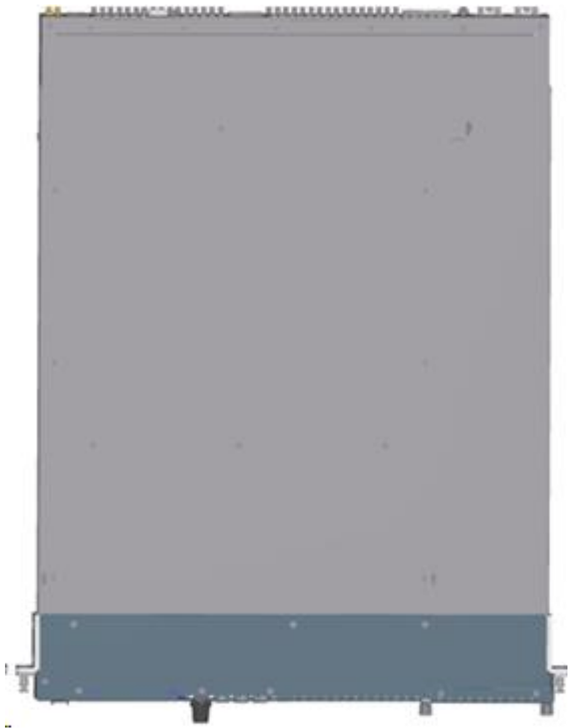


Figure 50: Completed Assembly

6. This completes your BB Fan replacement is complete. Your SNP is ready to return to service.

Replacing the FP Fan on SNP-GW-3GX32-HS-QF

SNP-SPARE-FP FAN Kit Contents

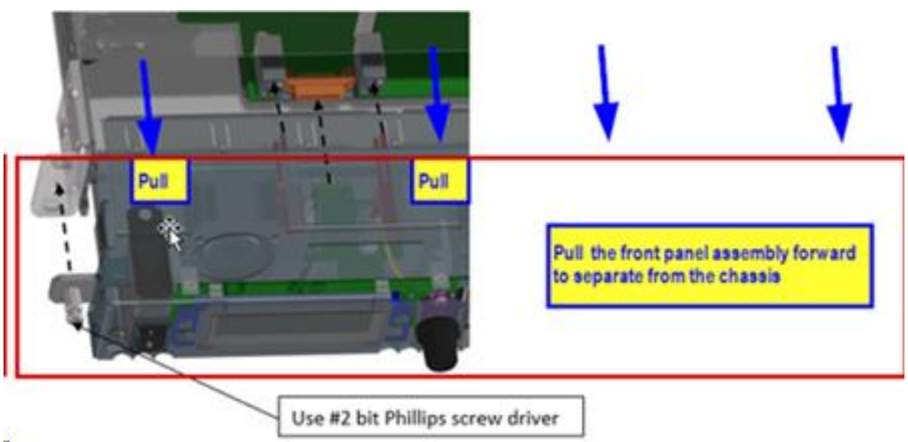
Verify the contents of your kit:

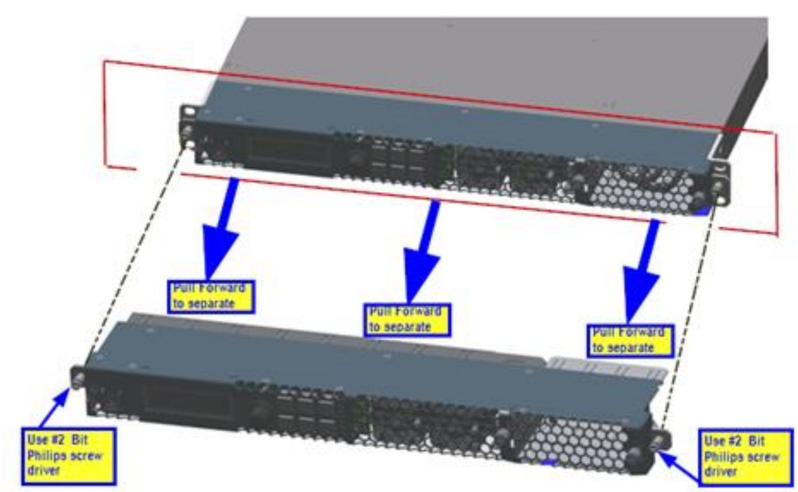
Item	Part Number	Description	Packing	Qty
1	131-100051Q00	Replacement FP Fan	Bag-A	1

Removing the Front Panel

Disassemble the Front Panel from the SNP Chassis by doing the following:

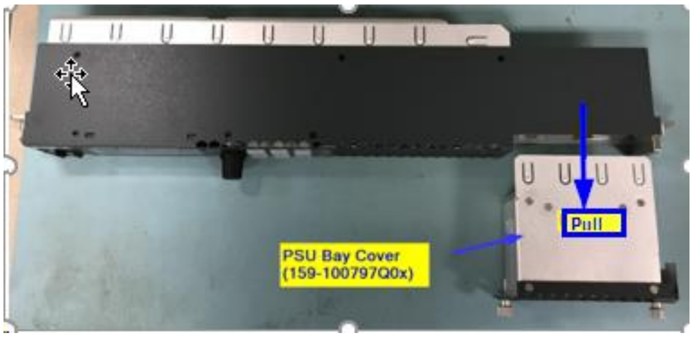
1. Using a #2bit Phillips screwdriver, loosen the 2 captive screws shown below.
2. Pull the front panel assembly forward and away from the Chassis as shown below
3. Store in a safe location

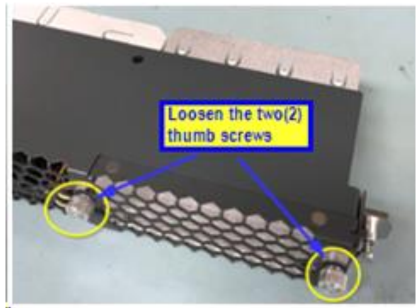




Dissassemble the PSU Bay Cover

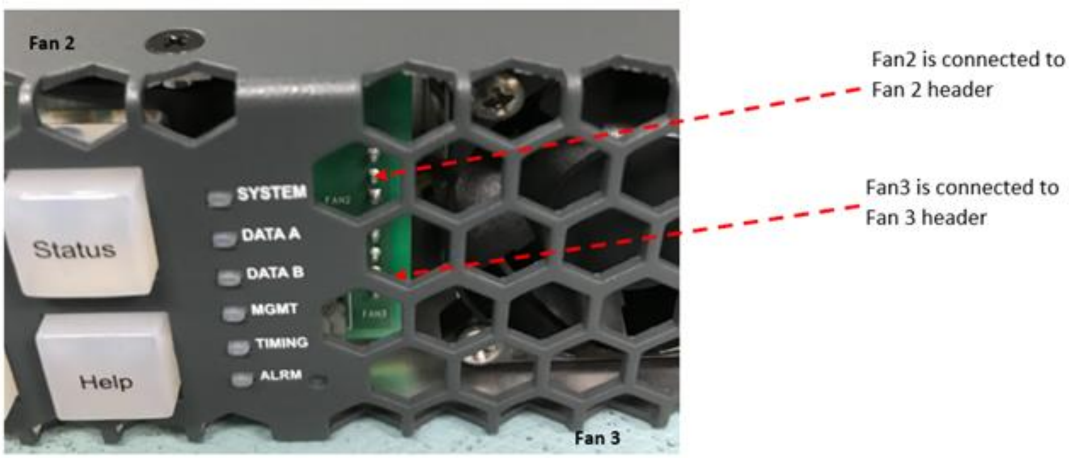
Remove the PSU Bay Cover (159-100797Q00) from the Assembled Front Panel (159-100796Q00) and Fan Bracket (164-100741Q00), by loosening the two (2) thumb screws

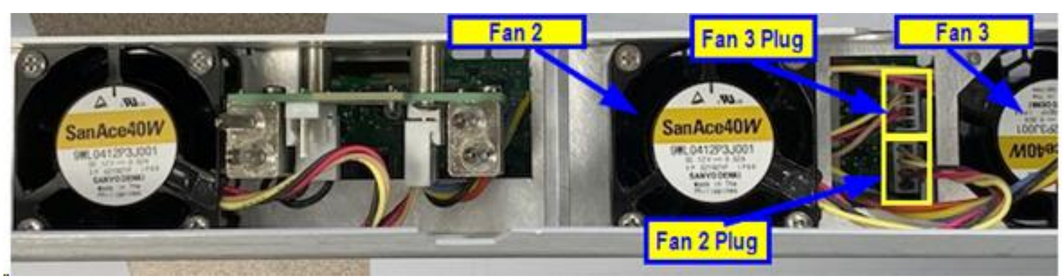




Dissassemble the Fan Bracket from the Front Panel

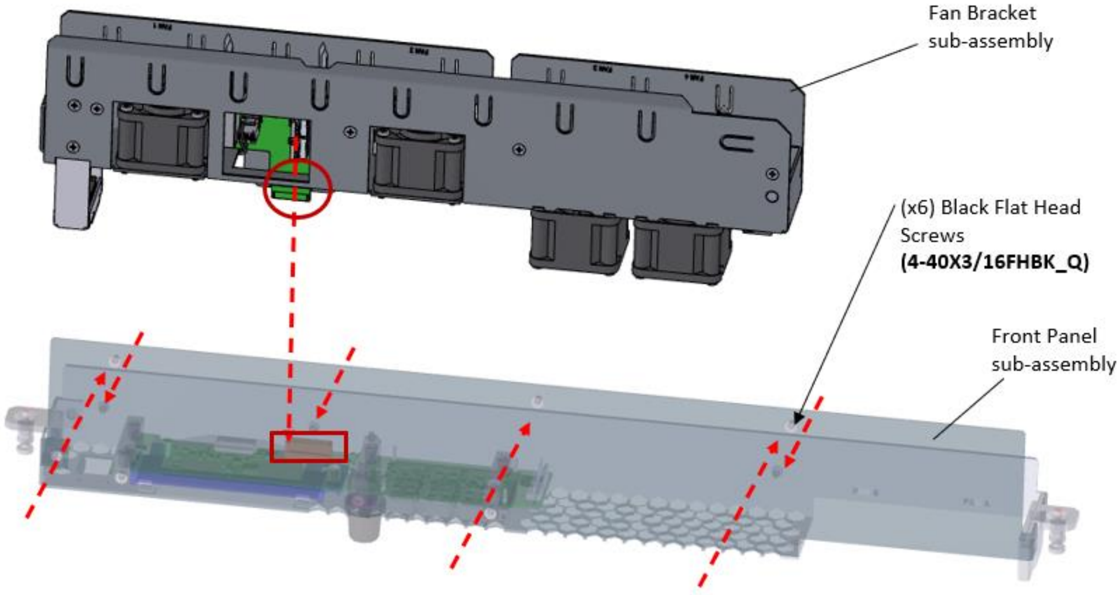
1. Unplug Fan 2 header and Fan 3 header
    a. Disconnect Fan 2 wire plug to the top "Fan 2" header, and Fan 3 wire plug to the bottom "Fan 3" header on Front Panel board

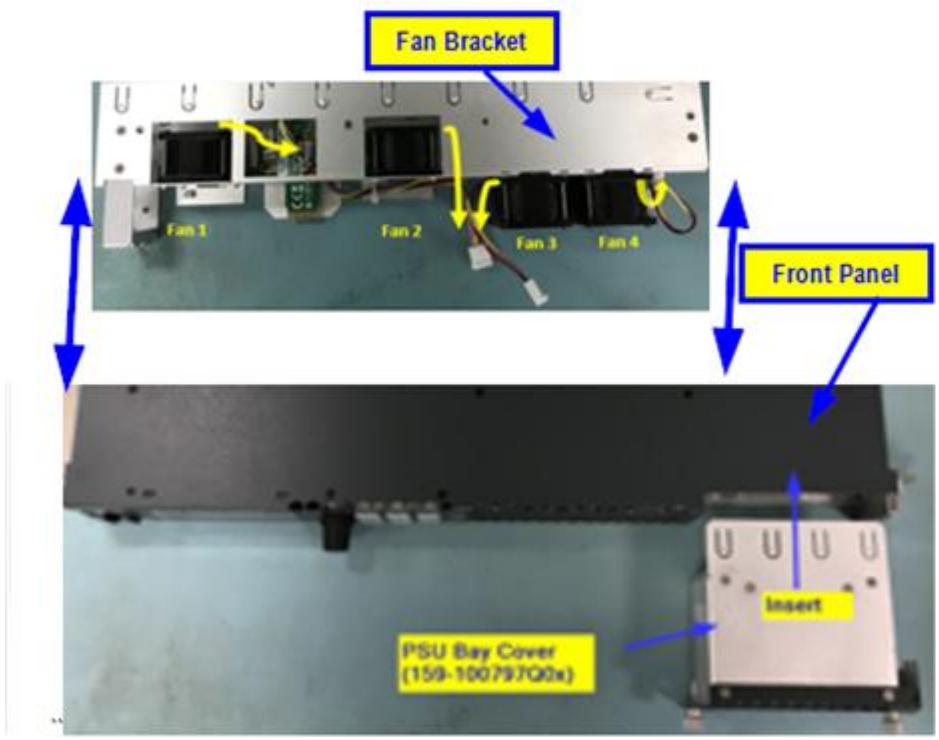




1. Dismantle the Front Panel and Fan Bracket assembly
    a. Remove the six (6) Black Flat Head Screws (4-40X3/16FHBK_Q) and separate Front Panel and Fan Bracket sub-assembly

a. Please keep this screw for later as it will be needed for reassembling the Front Panel
b. The following figure shows the Metal Front Panel in transparent and the Fan Bracket in solid

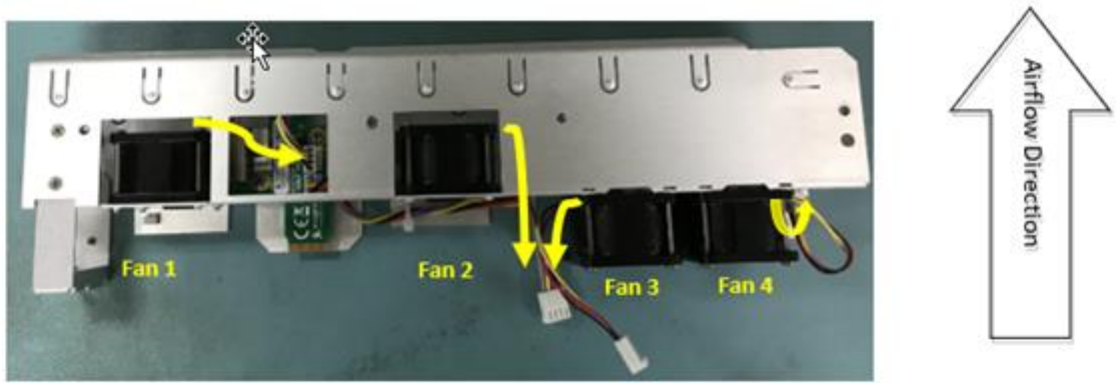




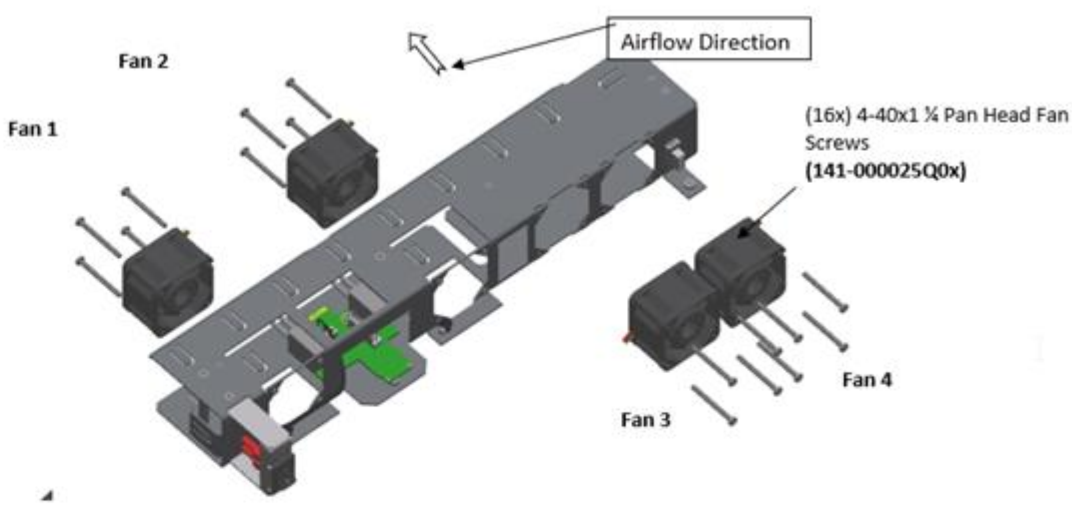
Identify the Defective Fan and Replace

Note: This instruction covers how to replace all 4 fans. However, after separating the front panel and fan bracket, you need to remove only the respective defective Fan as shown.

1. Unplug Fan 1 header and Fan 4 header
    a. Disconnect Fan 1 wire plug from the header on Front Panel Extender Board. Location shown in figure.
    a. Disconnect Fan 4 wire plug from the panel-mount connector. Location shown in figure.

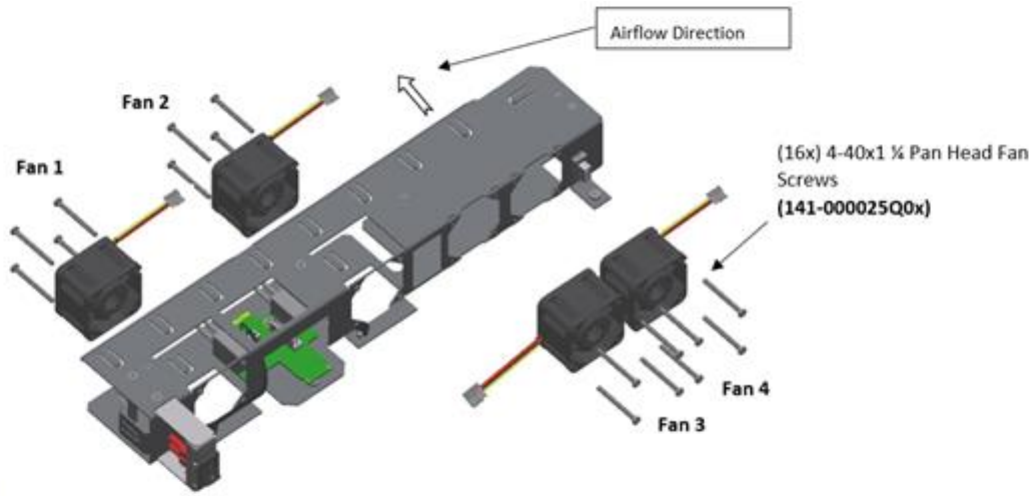


2. Disassemble Original Fans
    a. Unscrew the 4-40x1 ¼ pan head Fan screws (141-000025Q00, 4 per Fan) on the defective Fan(s) as needed.
    b. Save the removed screws for reattachment and Discard the removed Fans.

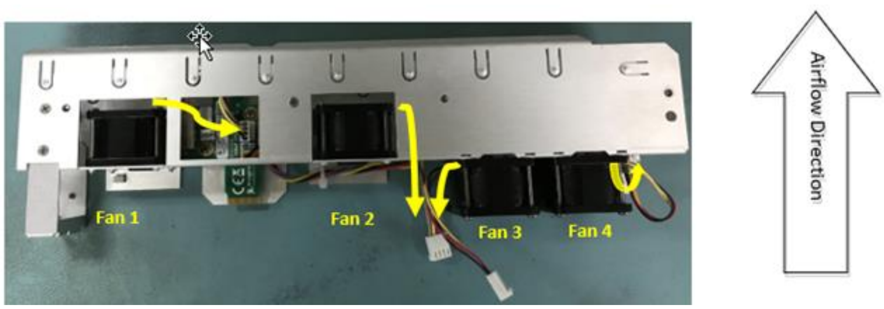


3. Assemble replacement Fans
    a. In place of the removed Fan install the replacement Fan (131-100051Q00) as needed.

b. Orient the Fans (131-100051Q00) with the airflow towards the rear of the chassis (use molded arrow on fan body as guide). For Fan 1, 2, and 4, the wires exiting the right side, and for Fan 3, the wires need to exit the left side. Insert Fan 1 and Fan 2 into the opening of Fan Bracket. Mount each fan to the Fan Bracket with four (4) 4-40x1 ¼ Pan Head Fan Screws at all of the four (4) mounting holes.



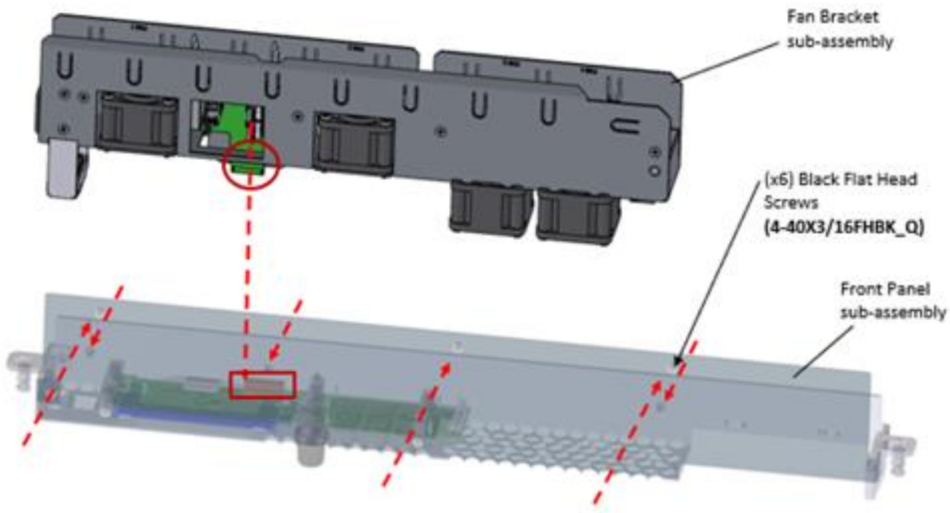
4. Plug Fan 1 header and Fan 4 header.
   a. Plug the Fan 1 wire to the header on Front Panel Extender Board
   b. Plug the Fan 4 wire to the panel-mount connector



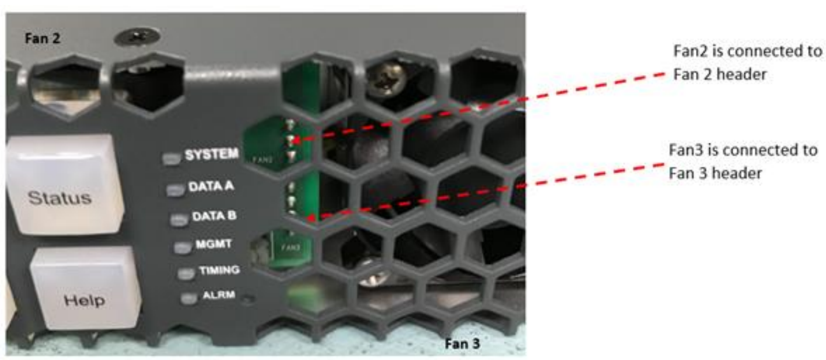
Reattach the Fan Bracket to the Front Panel

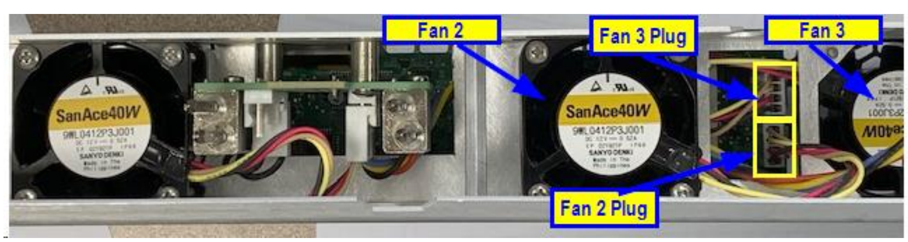
1. Assemble Front panel and Fan Bracket sub assembly
   a. Orient Front Panel and Fan Bracket sub-assembly. Align the card edge connector on the back of the Front Panel Display (170-101720Q0x) with the card edge on the Front Panel Extender Board (770-101721Q0x), and push the two sub-assemblies together, ensure they are firmly mated. Secure the Fan Bracket (164-100741Q0x) to the Front Panel (159-100796Q0x) with six (6) Black Flat Head Screws (4-40X3/16FHBK_Q).

a. Metal Front Panel shown in transparent and Fan Bracket shown in solid



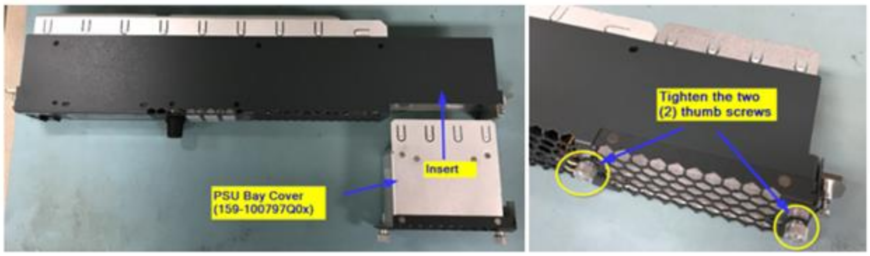
2. Plug Fan 2 header and Fan 3 header
   a. Connect Fan 2 wire plug to the top "Fan 2" header, and Fan 3 wire plug to the bottom "Fan 3" header on Front Panel board



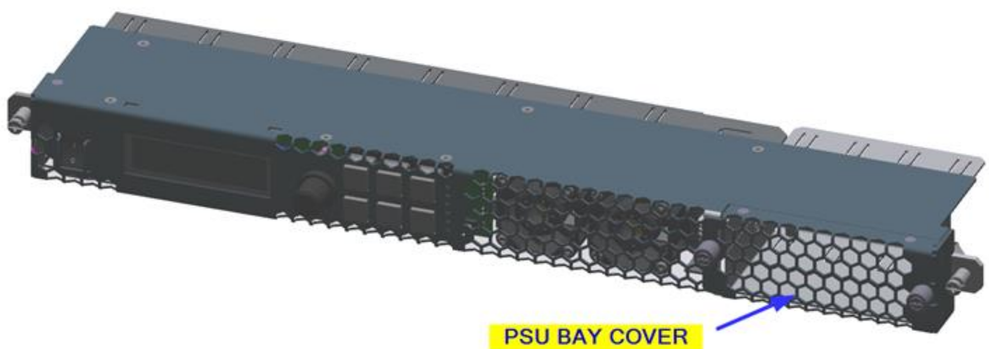


Assemble PSU Bay Cover

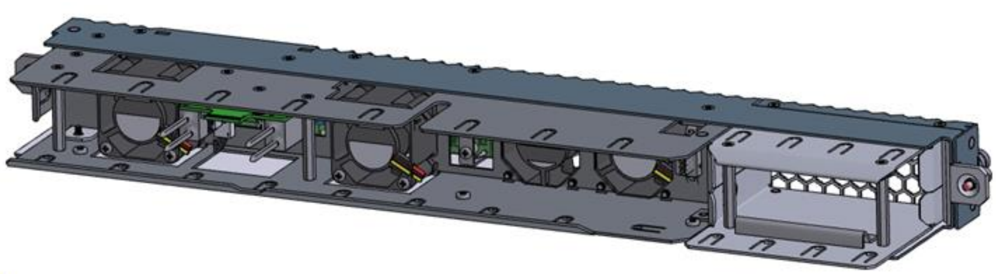
Orient/Insert the PSU Bay Cover (159-100797Q00) to the Assembled Front Panel (159-100796Q00) and Fan Bracket (164-100741Q00), tighten the two (2) thumb screws



Completed Front Panel Assembly Front View



Completed Front Panel Assembly Rear View



Reinstall the Front Panel

1. Assemble the Front Panel to the SNP Chassis

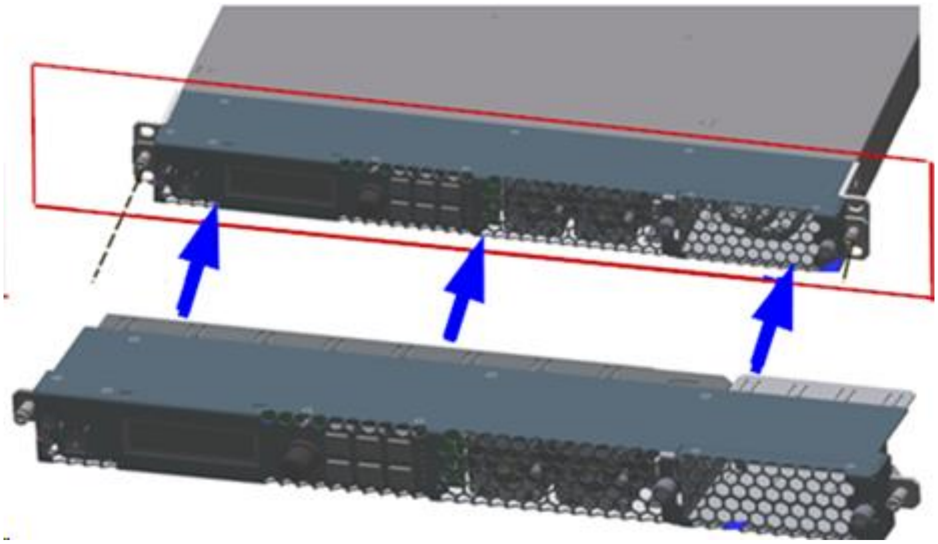


Figure 51: Sliding the front panel into the chassis

2. Orient and slide the Front Panel Assembly as shown. Ensure the High-Speed Cable (Fly-over cable) does not interfere with other Front Panel components.
3. Push the Front Panel Assembly until the blind mating pin engages as shown below. You should feel some resistance.
4. Give a firm push to mate the card edge connector

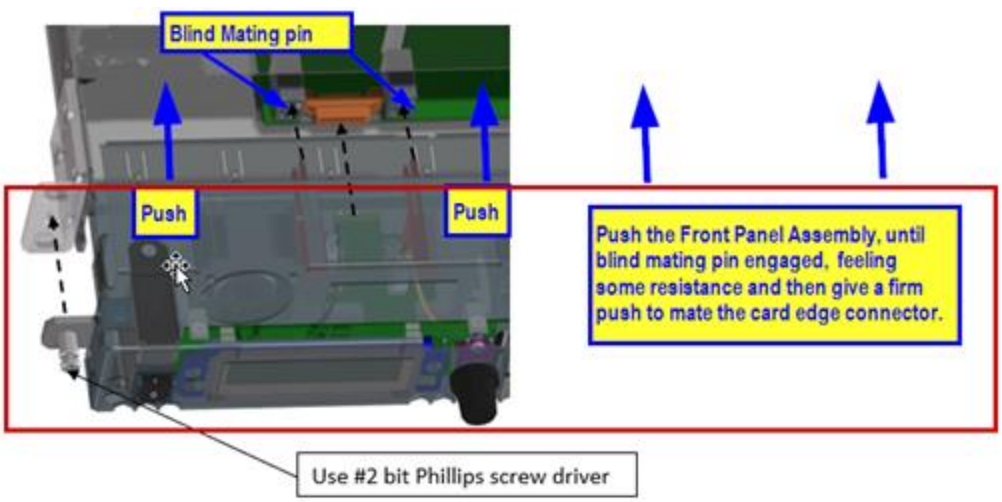


Figure 52: Push the Front Panel back into the SNP Chassis

5. Secure the Front Panel Assembly to the Main Chassis with a #2-bit Phillips screwdriver

Figure 53: Secure the Front Panel with Screws

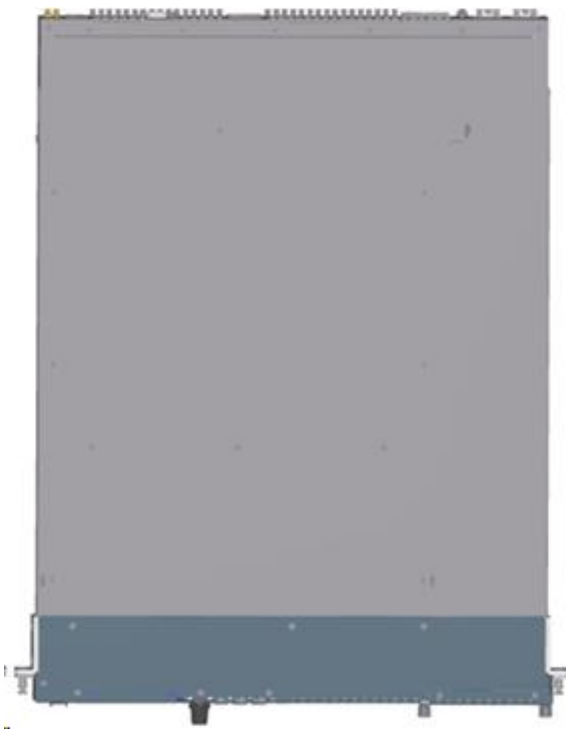


Figure 54: Completed Assembly

6. This completes your FP Fan replacement. Your SNP is ready to return to service.

Laser Safety for Fiber Optic Back Modules

WARNING!
Use of controls, adjustments, and procedures other than those specified in this document may result in hazardous laser radiation exposure.

Optical fiber telecommunication systems use semiconductor laser transmitters that emit infrared light that is normally not visible to the human eye. Although a conventional laser produces a small beam of light, the power density is very high, and it can damage your eyes.

If a beam of laser light enters the eye, the eye magnifies and focuses the energy on the retina. The energy that reaches the retina can be as much as 100,000 times more than at the cornea and, as a result, it can burn the retina.

Laser transmission products are classified in four major groups (Class 1, 2, 3, and 4), according to their emissions and potential for causing injury. Fiber optic transmitter modules in this series are designated Class 1.

Precautions for Enclosed Systems

In its normal operating mode, an optical fiber communication system is totally enclosed and presents no risk of eye injury. However, if the fiber optic cables that interconnect various components of an optical fiber disconnect or break, you may be exposed to laser emissions. Also, technicians may be exposed to laser emissions during installation and servicing.

Unlike some other laser designs, semiconductor lasers have a highly divergent beam that decreases rapidly with distance. The greater the distance, the less energy will enter the eye, and the less potential risk for eye injury.

WARNING!
Eye damage may occur if an optical instrument such as a microscope, magnifying glass, or eye loupe is used to stare at the energized fiber end.

Under normal operating conditions, optical fiber telecommunication systems are completely enclosed; nonetheless, observe the following precautions:

- Do not stare into optical connectors or broken fibers.
- Ensure technicians have satisfactorily completed an approved training course before performing installation or maintenance.
- Ensure there are appropriate warning labels near the optical ports of the modules.

Precautions for Unenclosed Systems

During service, maintenance, or restoration, an optical fiber telecommunication system is considered unenclosed. Under these conditions, follow the practices described below.

CAUTION!
Only authorized, trained personnel shall be permitted to do service, maintenance, and restoration.

1. Avoid exposing the eye to emissions from unterminated, energized optical connectors at close distances.
2. Ensure that only authorized, trained personnel use optical test equipment during installation or servicing.
3. Turn off all laser sources before scanning a fiber with an optical test set.
4. Keep all unauthorized personnel away from the immediate area of the optical fiber systems during installation and service.

For guidance on the safe use of optical fiber communication systems in the workplace, consult *ANSI Z136.2, American National Standard for Safe Use of Lasers* in the U.S. or outside the U.S., *IEC-60825, Part 2*.

Label

The SNP is a Class 1 laser product when used with a fiber optic back module.

Figure 55: Label for Class 1 Laser Products

Inspecting and Cleaning Fiber Optic Connections

When connecting fibers to a back module, ensure that you do not touch the end of the fiber, or allow it to become dirty. Small amounts of microscopic dust or other contaminants can seriously impair or disable a fiber optic network. If you touch the end of a fiber prior to connecting it to the back module, or otherwise allow it to become dirty, you must carefully inspect and clean the connection.

This table lists some typical contaminants of a fiber optic connection.

Table 1: Typical Contaminants

Contaminant	Comments
Dust particle, 1 micron	Can block up to 1% of the light transmission, creating a loss of 0.05 dB
Dust particle, 9 microns	Although microscopic, the particle can completely block the fiber core
Human hair	Typically 50 to 75 microns in diameter
Oil	Frequently caused by touching
Film residues	Can accumulate from vapors or smoke
Powdery coatings	Can be left behind after water or other solvents evaporate

Important Points

- Before you begin cleaning, always inspect the fiber connections.
- Inspect and clean both fiber ends every time you make a connection.
- Keep a protective cap on unplugged fiber connectors.
- Do not touch the end of a fiber.
- Store unused protective caps in a clean resealable container, located nearby for easy access.
- Do not reuse cleaning tissues or swabs.
- Do not allow alcohol or another wet cleaning agent to dry on a fiber end.
- Never touch the dispenser tip of an alcohol bottle or any clean portion of a tissue or swab.
- Use care when handling the fiber; do not twist or pull.
- Keep your cleaning fluids away from open flame or spark.

The illustration shows the acceptable limits of defects in a fiber connection.

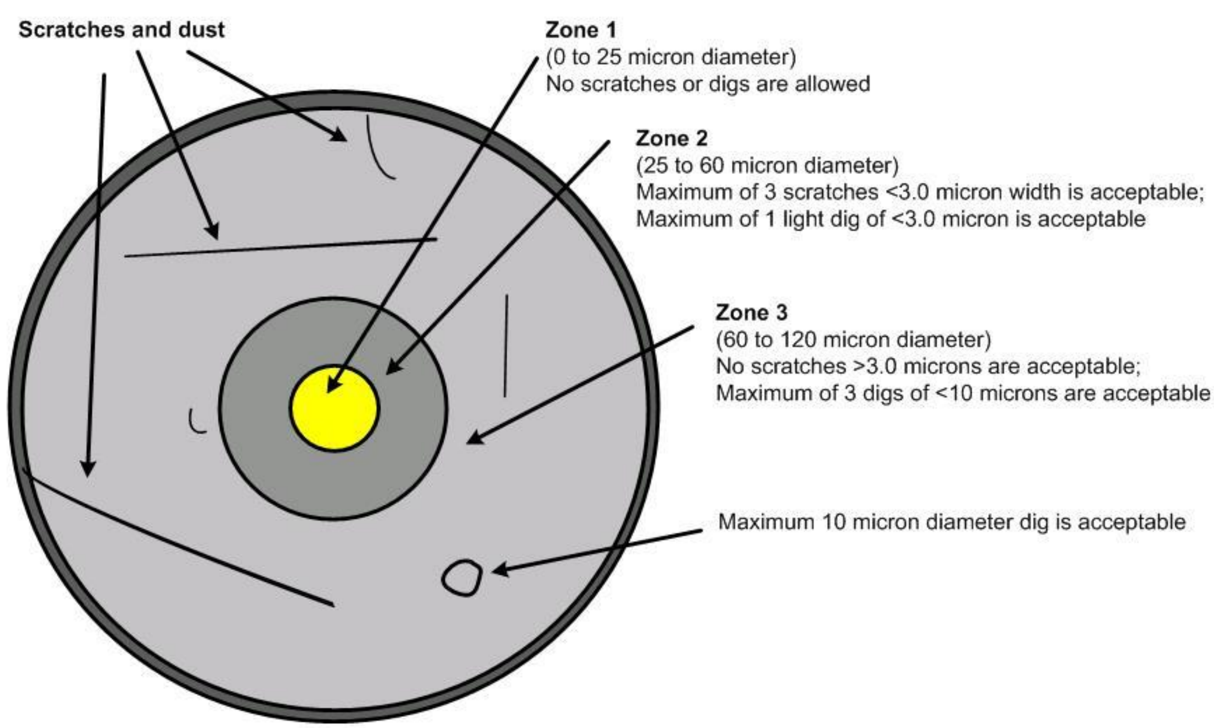


Figure 56: Fiber Optic Cross-Section

Inspection Procedure

To inspect and clean the fibers, follow these steps:

1. Ensure the fiber is <u>not "live."</u>

WARNING!
Eye damage may occur if an optical instrument such as a microscope, magnifying glass, or eye loupe is used to stare at an energized fiber end.

2. Inspect the fiber endface with a fiberscope.
3. If the fiber endface is clean, return to the installation instructions; if the connector is dirty, proceed to the dry cleaning instructions below.

Dry Cleaning Procedure

If you are using cartridge- or pocket-style dry cleaning tools, follow the manufacturer's directions. If you are using lint-free wipes, follow these steps:

1. Fold the lint-free wipe four to eight times into a square, taking care to avoid touching the cleaning surface of the wipe.
2. Lightly wipe the fiber tip in the central portion of the lint-free wipe.

CAUTION: Do not scrub the fiber. Excessive rubbing will leave scratches.

3. Repeat the wiping action on another clean section of the wipe or a new wipe.
4. Inspect the connector again with the fiberscope.
5. If the connection is clean, return to the installation steps; if the connector is still dirty, proceed to the wet cleaning instructions.

Wet Cleaning Procedure

Using 99.8% isopropyl alcohol and lint-free wipes, follow these steps to wet clean the fiber:

1. Fold the wipe into a square, about 4 to 8 layers thick.
2. Moisten one section of the lint-free wipe with one drop of 99.8% alcohol, ensuring that a portion of the wipe remains dry.
3. Lightly wipe the fiber end in the alcohol-moistened portion of the lint-free wipe.
4. Immediately repeat the wiping action on the dry section of the wipe, removing any residual alcohol.
5. Inspect the fiber endface again, and if necessary, repeat the wet cleaning with another clean section of the lint-free wipe.

CAUTION!
Do not scrub the fiber. Excessive rubbing will leave scratches.

6. Dry clean any remaining residue, and then inspect the connector again.
7. If the contamination persists, repeat the dry and wet cleaning procedure until the endface is clean.

If the fiber end still remains dirty after repeated cleaning attempts, call Customer Service for further instructions; if the fiber end is clean, return to the installation instructions.

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