

K-Frame XP Application Note

Advanced IP Boards - AIP

By: Liam Dixon Date: May 2025

1) Introduction:

This document provides a comprehensive overview of the AIP1 and AIP2 Rear 16x8 and 8x4 boards, highlighting their key differences, configuration procedures, and essential details related to SFP and QSFP components. It is intended to support technical teams in understanding, setting up, and troubleshooting these Rear IO Modules effectively.



Features:

- 25GbE SFP and 100GbE QSFP ports supported where one is active at one time.
- 100Gb Ports support; 720p, 1080i, 1080p & 2160p.
- 25Gb Ports supports; 720p, 1080i, 1080p.
- In-band NMOS IS-04 & IS-05 (See NMOS K Frame NMOS Setup and Debug Guide for more details)
- GearBox
- UltraMatch Note Phase 2 extends UltraMatch conversion to 720p and 1080i
- MatchSync
- 1 Full Frame of Buffer in all standards.
- ST 2110-22 JPEG XS Encoding/Decoding (IntoPix Codec).
- Tally / GPI



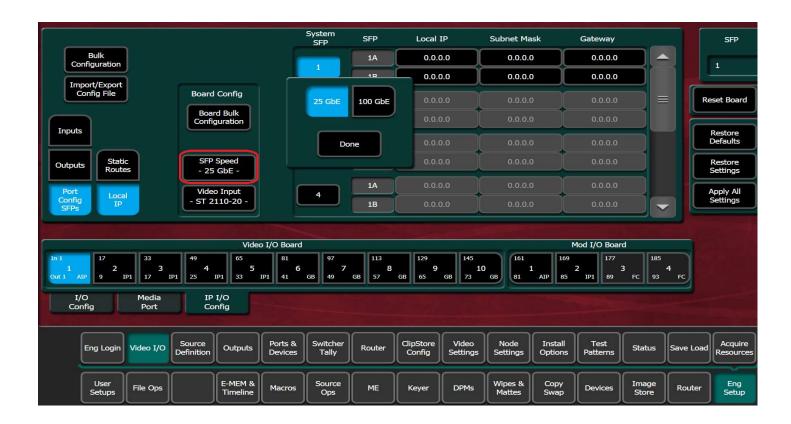
2)<u>16x8 AIP1</u>

To configure the AIP1s ports, you need to be in the Eng Setup – Video I/O –IP I/O Config - Port Configs SFPs menu:

The AIP consists of 100Gb QSFP Ports and 25Gb SFP Ports where only one is active at once (100Gb or 25Gb)

2a) AIP 1 25Gb Mode:

- To Activate 25Gb Mode simply press the "SFP Speed" button and select 25 GbE and press "Done"



You can now configure the Local IP address of the 25Gb Ports:



- 25gb SFP 1A & 1B:



- 25Gb SFP 2A & 2B



		System SFP	SFP	Local IP	Subnet Mask	Gateway	SFP
Bulk Configuration			2A	0.0.0.0	0.0.0.0	0.0.0	1
Import/Export	- Beerloufe	5	2B	0.0.0	0.0.0.0	0.0.0.0	
Config File	Board Config		2A	0.0.0.0	0.0.0.0	0.0.0	Reset Board
Inputs	Configuration	6	2В	0.0.0.0	0.0.0.0	0.0.0.0	Restore
			2A	0.0.0.0	0.0.0.0	0.0.0	Defaults
Outputs Static Routes	SFP Speed - 25 GbE -	7	2B	0.0.0.0	0.0.0.0	0.0.0.0	Restore Settings
Port Local	Video Input		2A	0.0.0.0	0.0.0.0	0.0.0.0	Apply All
Config SFPs IP	- ST 2110-20 -	8	2B	0.0.0.0	0.0.0.0	0.0.0.0	Settings
	Video I/O Bo	bard				Mod I/O Board	
In 1 17 33 0 ut 1 AIP 9 IP1 17 IP	49 65 81 4 5 1 25 IP1 33 IP1 41	6 7	GB 113 8 57	129 145 9 145 65 GB 73	10 1	169 177 185 2 3 4 85 IP1 89 FC 93 FF	c
I/O Media Config Port	IP I/O Config						States and states



SFP Port Config Lo	ocal IP Bul	k Configuration								
	stem	Loca	I IP		Subnet	Mask		Gate	way	
Start E	ind	Starting Address	Octet	Inc	Starting Address	Octet	Inc	Starting Address	Octet	Inc
	1	0.0.0	4th	1	0.0.0.0	4th	0	0.0.0.0	4th	0
		Ending Address	0.0.0	0.7	Ending Address	0.0.0	0.0	Ending Address	0.0.0	0.0
SFP B		Loca	I IP		Subnet	Mask		Gate	way	
		Starting Address	Octet	Inc	Starting Address	Octet	Inc	Starting Address	Octet	Inc
		0.0.0	4th	_ 1 _	0.0.0.0	4th	0	0.0.0.0	4th	0
		Ending Address	0.0.0	0.7	Ending Address	0.0.0	0.0	Ending Address	0.0.0	0.0
										Cancel
										Enter
I/O Config	Media Port	IP I/O Config						The second s		

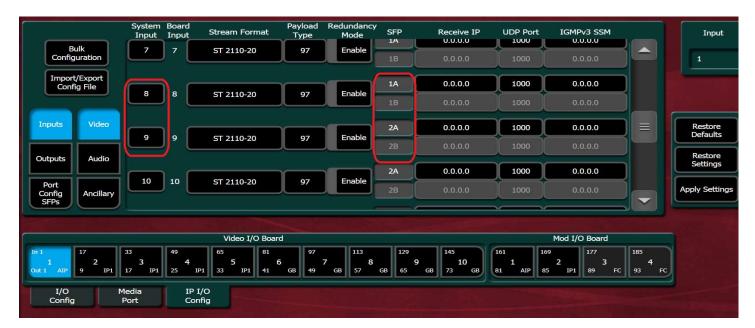
- You can make use of the Bulk Configurator to configure all SFP IPs in one handy take:

For Bulk Configuration please refer to the User Manual.

2b) AIP1 25Gb Inputs:

To configure the AIPs Input Multicast, you need to be in the Eng Setup – Video I/O –IP I/O Config – Inputs Menu.

- 25Gb SFP 1 processes Inputs 1 thru 8 of that Rear.
- 25Gb SFP 2 processes Inputs 9 thru 16 of that Rear.





2c) AIP1 25Gb Outputs:

To configure the AIPs Output Multicast, you need to be in the Eng Setup – Video I/O –IP I/O Config – Outputs Menu.

- 25Gb SFP 1 processes Outputs 1 thru 4 of that Rear:
- 25Gb SFP 2 processes Outputs 5 thru 8 of that Rear:

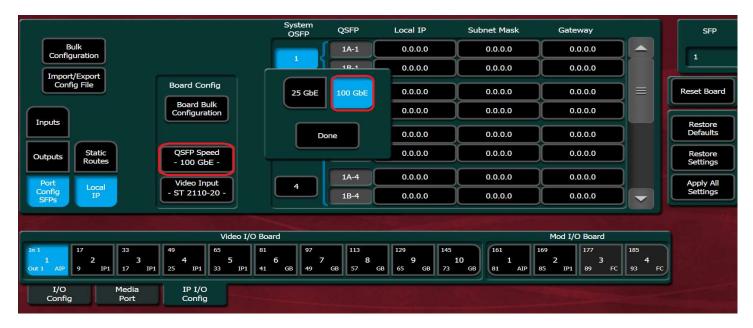


Note: When ST 2110-22 JPEG XS Encoding/Decoding is available the board will offer an extra Monitor Output per Output Spigot.



2d) AIP1 Quad 100Gb Mode:

- To Activate 100Gb Mode simply press the "QSFP Speed" button and select 100 GbE and press "Done"



The AIP1 board **only** supports Quad 100Gb Mode which means each 100Gb QSFP Port is split into 4 x 25Gb Lanes and therefore requires 4 x 25Gb IP addresses. See AIP2 for Single 100Gb Mode.

You can now configure the Local IP address of all the 25Gb Lanes for each 100Gb Port:

Note: For details on Static Routes please see "K Frame NMOS Setup and Debug Guide.



- 100Gb QSFP 1A & 1B:



- 25Gb Lanes - 1A-1, 1A-2, 1A-3, 1A-4 & 25Gb 1B-1, 1B-2, 1B-3, 1B-4:

	System QSFP	QSFP	Local IP	Subnet Mask	Gateway		SFP
Bulk Configuration	1	1A-1	0.0.0.0	0.0.0.0	0.0.0.0		1
Import/Export		1B-1	0.0.00	0.0.0.0	0.0.0.0		
Config File Board Config		1A-2	0.0.0.0	0.0.0.0	0.0.0.0		Reset Board
Board Bulk Configuration	2	1B-2	0.0.0.0	0.0.0.0	0.0.0.0		
Inputs		1A-3	0.0.0.0	0.0.0.0	0.0.0.0		Restore Defaults
Outputs Static QSFP Speed Routes - 100 GbE -	3	1B-3	0.0.0	0.0.0.0	0.0.0.0		Restore Settings
		1A-4	0.0.0.0	0.0.0.0	0.0.0.0		Apply All
Config IP - ST 2110-20 -	4	1B-4	0.0.0.0	0.0.0.0	0.0.0.0		Settings
Video I/O Boa	rd				Mod I/O Board		
In 1 17 33 49 65 81 1 2 3 4 5 4 5 41 0ut 1 AIP 9 IPI 17 IPI 25 IPI 33 IPI 41	6 97 GB 49		129 145 9 73	10 1	69 177 2 3 85 IP1 89 FC	185 4 93 FC	
I/O Media IP I/O Config Port Config							

- 100Gb QSFP 2A & 2B:

-			PORTS	
0	25Gb 28 2A	100Gb 28 24	25Gb 100Gb 1A	1Gb ETHERNET TALLY / GPI
0	U			

- 25Gb Lanes - 2A-1, 2A-2, 2A-3, 2A-4 & 25Gb 2B-1, 2B-2, 2B-3, 2B-4:

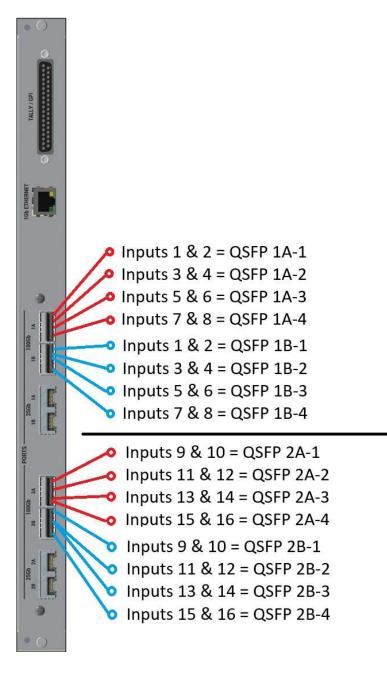
	System OSFP	QSFP	Local IP	Subnet Mask	Gateway		SFP
Bulk Configuration	5	2A-1	0.0.0.0	0.0.0.0	0.0.0.0		1
Import/Export		2B-1	0.0.0.0	0.0.0.0	0.0.0		
Config File Board Config	6	2A-2	0.0.0.0	0.0.0.0	0.0.0.0		Reset Board
Board Bulk Configuration	L.	2B-2	0.0.0.0	0.0.0.0	0.0.0		
Inputs	7	2A-3	0.0.0.0	0.0.0.0	0.0.0.0		Restore Defaults
Outputs Static Routes - 100 GbE -		2B-3	0.0.0.0	0.0.0.0	0.0.0.0		Restore Settings
Port Local Video Input	8	2A-4	0.0.0.0	0.0.0.0	0.0.0.0		Apply All
Config IP - ST 2110-20 -		2B-4	0.0.0.0	0.0.0.0	0.0.0.0		Settings
				Contrast Contrast			
Video I/O B	oard				Mod I/O Board		
In 1 17 33 49 65 81 1 2 3 49 5 Out 1 AIP 9 IP1 17 IP1 25 IP1 33 IP1 43	6 7	GB 113 8 57	129 145 9 1 GB 65 GB 73	10 1	169 177 2 3 85 IP1 89 FC	185 4 93 FC	
I/O Media IP I/O Config Port Config							Tribest



2e) AIP1 100Gb Quad Mode Inputs:

To configure the AIPs Input Multicast, you need to be in the Eng Setup – Video I/O –IP I/O Config – Inputs Menu.

- 100Gb QSFP 1A & 1B processes Inputs 1 thru 8 of that Rear in a configuration of 2 Inputs per 25Gb lane.
- 100Gb QSFP 2A & 2B processes Inputs 9 thru 16 of that Rear in a configuration of 2 Inputs per 25Gb lane.





	Syster Inpu	n Board t Input		Payload Type	Redundancy Mode	QSFP	Receive IP	UDP Port	IGMPv3 SSM	
Bulk Configuration		1	ST 2110-20	97	Enable	1A-1	0.0.0.0	1000	0.0.0.0	
Import/Expor			51 2110-20	97	Enable	1B-1	0.0.0.0	1000	0.0.0.0	
Config File		.				1A-1	0.0.0.0	1000	0.0.0.0	
Inputs Vid	2 leo	2	ST 2110-20	97	Enable	1B-1	0.0.0.0	1000	0.0.0.0	
inputs via		.				1A-2	0.0.0.0	1000	0.0.0.0	
Outputs Au	dio	3	ST 2110-20	97	Enable	1B-2	0.0.0.0	1000	0.0.0.0	
Port	\equiv $_$					1A-2	0.0.0.0	1000	0.0.0.0	
Config SFPs Anci	llary 4	4	ST 2110-20	97	Enable	1B-2	0.0.0.0	1000	0.0.0.0	

	System Input	Board Input	Stream Format	Payload Type	Redundancy Mode	QSFP	Receive IP	UDP Port	IGMPv3 SSM	
Bulk	5	5	ST 2110-20	97	Enable	1A-3	0.0.0.0	1000	0.0.0.0	
Configuration			51 2110 20			1B-3	0.0.0.0	1000	0.0.0	
Import/Export Config File						1A-3	0.0.0.0	1000	0.0.0.0	
	6	6	ST 2110-20	97	Enable	1B-3		1000		
Inputs Video						1A-4	0.0.0.0	1000	0.0.0.0	
Outputs Audio	7	7	ST 2110-20	97	Enable	1B-4	0.0.0.0	1000	0.0.0	
						1A-4	0.0.0.0	1000	0.0.0.0)
Port Config Ancillary SFPs	8	8	ST 2110-20	-20 97	Enable	1B-4	0.0.0.0	1000	0.0.0	-

	System Input	Board Input	Stream Format	Payload Type	Redundancy Mode	QSFP	Receive IP	UDP Port	IGMPv3 SSM	
Bulk Configuration	9	9	ST 2110-20	97	Enable	2A-1	0.0.0.0	1000	0.0.0.0	
Import/Export	Ľ		51 2110-20	97		2B-1	0.0.0.0	1000	0.0.0.0	
Config File						2A-1	0.0.0.0	1000	0.0.0.0	
	10	10	ST 2110-20	97	Enable	2B-1	0.0.0.0	1000		
Inputs Video						2A-2	0.0.0.0	1000	0.0.0.0	
Outputs Audio		11	ST 2110-20	97	Enable	2B-2	0.0.0.0	1000	0.0.0.0	
Port						2A-2	0.0.0.0	1000	0.0.0.0	
Config SFPs Ancillary	12	12	ST 2110-20	97	Enable	2B-2	0.0.0.0	1000		

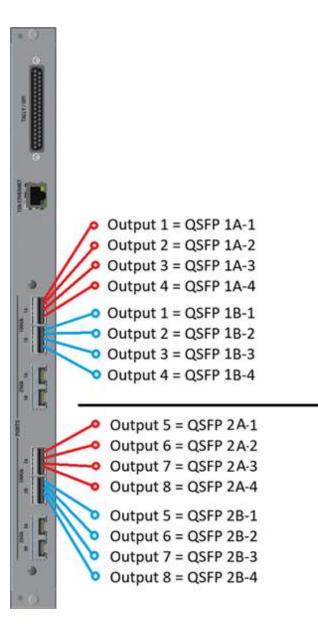
	System Input	Board Input	Stream Format	Payload Type	Redundancy Mode	QSFP	Receive IP	UDP Port	IGMPv3 SSM	
Bulk Configuration	13	13	ST 2110-20	97	Enable	2A-3	0.0.0.0	1000	0.0.0	
		13	51 2110-20	, , , , , , , , , , , , , , , , , , ,		2B-3	0.0.0	1000		
Import/Export Config File						2A-3	0.0.0.0	1000	0.0.0.0	
	14	14		97	Enable			$ \rightarrow $		
		· •				2B-3	0.0.0.0	1000	0.0.0.0	
Inputs Video						2A-4	0.0.0.0	1000	0.0.0.0	
	15	15		97	Enable			$ \rightarrow $		
Outputs Audio	_	-				2B-4	0.0.0.0	1000	0.0.0.0	
						2A-4	0.0.0.0	1000	0.0.0.0	
Port Config Ancillary	16	16	ST 2110-20	97	Enable	2B-4	0.0.0.0	1000	0.0.0.0	
SFPs										



2f) AIP1 100Gb Quad Mode Outputs:

To configure the AIPs Output Multicast, you need to be in the Eng Setup – Video I/O –IP I/O Config – Inputs Menu.

- 100Gb QSFP 1A & 1B processes Outputs 1 thru 4 of that Rear in a configuration of 1 Inputs per 25Gb lane.
- 100Gb QSFP 2A & 2B processes Outputs 5 thru 8 of that Rear in a configuration of 1 Inputs per 25Gb lane.





	System Output		Stream Format	Payload Type	Redundancy Mode	QSFP	Transmit IP	UDP Port	
Bulk Configuration		ſ		97	Enable	1A-1	0.0.0.0	1000	
Import/Export			ST 2110-20	97	Enable		0.0.0	1000	
Config File	1		ST 2110-20			1A-1	0.0.0.0	1000	
		l	Monitor Output	99	Enable		0.0.0.0	1000	
Inputs Video		ſ				1A-2	0.0.0.0	1000	
Outputs Audio			ST 2110-20	97	Enable	1B-2	0.0.0.0	1000	
	2	2	ST 2110-20			1A-2	0.0.0.0	1000	
Port Config Ancillary SFPs		l	Monitor Output	99	Enable	1B-2	0.0.0.0	1000	
SFPs Ancillary		ļ	Monitor Output			1B-2	0.0.0.0	1000	

		Stream Format	Payload Type	Redundancy Mode	QSFP	Transmit IP	UDP Port	
	ſ		07	Enable	1A-3	0.0.0.0	1000	
		51 2110-20	97	Lhable	1B-3	0.0.0	1000	
3	3	ST 2110-20		E	1A-3		1000	
	l	Monitor Output	99	Enable	1B-3		1000	
	(_				1A-4	0.0.0.0	1000	
	, L	ST 2110-20	97	Enable	1B-4	0.0.0	1000	
4	↓ 1	ST 2110-20			1A-4	0.0.0	1000	
		Monitor Output	99	Enable	1B-4	0.0.0.0	1000	
			Output Output Stream Format 3 3 ST 2110-20 3 3 ST 2110-20 Monitor Output ST 2110-20 4 ST 2110-20	Output Output Stream Format Type 3 3 ST 2110-20 97 3 3 ST 2110-20 99 Monitor Output 99 99 4 4 ST 2110-20 97	Output Output Stream Format Type Mode 3 3 ST 2110-20 97 Enable 3 3 ST 2110-20 99 Enable 4 4 ST 2110-20 97 Enable	Output Output Stream Format Type Mode QSFP 3 3 ST 2110-20 97 Enable 1A-3 3 3 ST 2110-20 99 Enable 1B-3 4 4 ST 2110-20 97 Enable 1A-4 4 4 ST 2110-20 97 Enable 1A-4 4 4 ST 2110-20 99 Enable 1A-4	Output Output Stream Format Type Mode QSFP Transmit IP 3 3 ST 2110-20 97 Enable 1A-3 0.0.0.0 3 3 ST 2110-20 97 Enable 1B-3 0.0.0.0 3 3 ST 2110-20 99 Enable 1B-3 0.0.0.0 4 4 ST 2110-20 97 Enable 1B-4 0.0.0.0 4 4 ST 2110-20 97 Enable 1B-4 0.0.0.0	Output Stream Format Type Mode QSFP Transmit IP UDP Port 3 3 ST 2110-20 97 Enable 1B-3 0.0.0.0 1000 3 3 ST 2110-20 97 Enable 1B-3 0.0.0.0 1000 3 3 ST 2110-20 99 Enable 1B-3 0.0.0.0 1000 4 4 ST 2110-20 97 Enable 1A-4 0.0.0.0 1000 4 4 ST 2110-20 97 Enable 1A-4 0.0.0.0 1000

	System Output		Stream Format	Payload Type	Redundancy Mode	QSFP	Transmit IP	UDP Port	
Bulk Configuration		ſ		07	Enable	2A-1	0.0.0.0	1000	
Import/Export			ST 2110-20	97	Linable	2B-1		1000	
Config File	5	51	ST 2110-20			2A-1		1000	
		l	Monitor Output	99	Enable	2B-1		1000	
Inputs Video		6				2A-2	0.0.0.0	1000	
				97	Enable	2B-2	0.0.0.0	1000	Ξ
Outputs Audio	6	6				20-2	0.0.0.0	1000	
Port		' r		99	Enable	2A-2		1000	
Config Ancillary SFPs		l	Monitor Output	, <u> </u>		2B-2	0.0.0.0	1000	





3) 16x8 AIP2 – With Single 100Gb support:

To configure the AIP2's ports, you need to be in the Eng Setup – Video I/O –IP I/O Config - Port Configs SFPs menu:

The AIP2 consist of 100Gb QSFP Ports and 25Gb SFP Ports where only one is active at once (100Gb or 25Gb)

- Note1 For 25Gb Mode, refer to AIP1 25gb Mode.
- Note2 For Quad 100Gb (4 x 25Gb) Mode, refer to AIP1 100Gb Quad Mode.

3a) Single Stream 100Gb Mode:

The QSFP-DR-100Gb that is used for the single-lambda operation includes a chip to convert from NRZ to PAM4 optically. Electrically it still is 25Gb NRZ.

Provides compatibility with 400Gb Network Switches allowing one MAC address to handle all of the traffic instead of requiring four.

100G Single Stream Benefits:

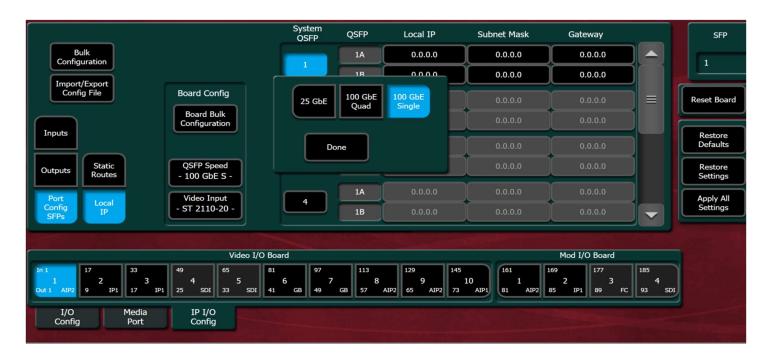
Simpler optical design with fewer components and less complexity in network management. Lower costs for optical components and reduced overall system cost.

Facilitates easier migration to 400G and 800G Ethernet by using a single-channel 100G PAM4 technology. 100G single-lambda can enhance the stability of network connections in applications like live streaming, eliminating latency and buffering.

Single-Lambda (100G)	
[]	← λ1 (100 Gbps)
Multi-Lambda (4x25G)	
← λ1 (25 Gbps)	
← λ2 (25 Gbps)	
← λ3 (25 Gbps)	
← λ4 (25 Gbps)	



- To Activate 100Gb Mode simply press the "QSFP Speed" button and select "100 GbE Single" and press "Done"



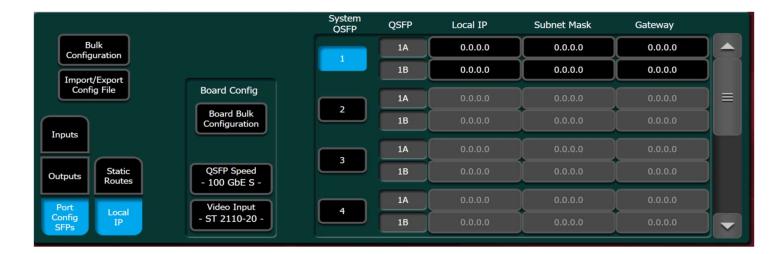
You can now configure the Local IP address for the 100Gb Port:

Note: For details on Static Routes please see "K Frame NMOS Setup and Debug Guide".



- 100Gb QSFP 1A & 1B:





- 100Gb QSFP 2A & 2B



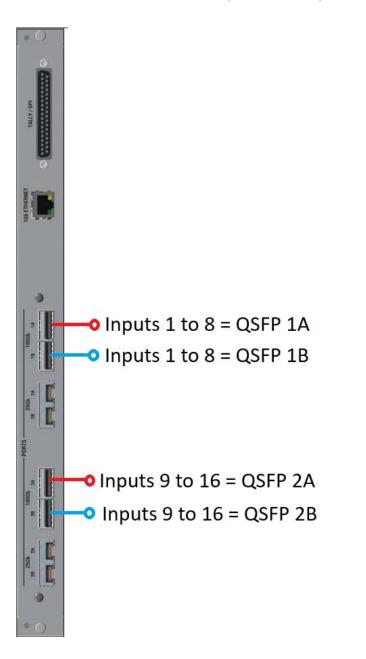
		System QSFP	QSFP	Local IP	Subnet Mask	Gateway	
Bulk Configuration		5	2A	0.0.0.0	0.0.0.0	0.0.0.0	
Import/Export			2B	0.0.0.0	0.0.0.0	0.0.00	
Config File	Board Config	6	2A	0.0.0	0.0.0.0	0.0.0.0	
Inputs	Board Bulk Configuration		2В	0.0.0.0	0.0.0.0	0.0.0.0	
			2A	0.0.0.0	0.0.0.0	0.0.0.0	
Outputs Static Routes	QSFP Speed - 100 GbE S -		2B	0.0.0.0	0.0.0.0	0.0.0.0	
Port Local	Video Input	8	2A	0.0.0.0	0.0.0.0	0.0.0.0	
Config SFPs IP	- ST 2110-20 -		2B	0.0.0	0.0.0	0.0.0	



3b) AIP2 Single Stream Inputs:

To configure the AIPs Input Multicast, you need to be in the Eng Setup – Video I/O –IP I/O Config – Inputs Menu.

- 100Gb QSFP 1A & 1B processes Inputs 1 thru 8 of that Rear.
- 100Gb QSFP 2A & 2B processes Inputs 9 thru 16 of that Rear.





	System Input	Board Input	Stream Format	Payload Type	Redundancy Mode	QSFP	Receive IP	UDP Port	IGMPv3 SSM	
Bulk Configuration	1	1	ST 2110-20	97	Enable	1A-1	0.0.0.0	1000	0.0.0.0	
Import/Export			51 2110-20	97		1B-1	0.0.0.0	1000	0.0.0.0	
Config File						1A-1	0.0.0.0	1000	0.0.0	
Inputs Video	2	2	ST 2110-20	97	Enable	1B-1	0.0.0.0	1000	0.0.0.0	
Inputs Video						1A-2	0.0.0.0	1000	0.0.0.0	
Outputs Audio	3	3	ST 2110-20	97	Enable	1B-2	0.0.0.0	1000	0.0.0.0	j
Port	4	. –			Enable	1A-2	0.0.0.0	1000	0.0.0.0	
Config SFPs Ancillary	4	4	ST 2110-20	97	Enable	1B-2		1000		

		System Input	Board Input	Stream Format	Payload Type	Redundancy Mode	QSFP	Receive IP	UDP Port	IGMPv3 SSM	
	ulk uration	5	5	ST 2110-20	97	Enable	1A-3	0.0.0.0	1000	0.0.0	
	/Export			51 2110 20			1B-3	0.0.0.0	1000	0.0.0.0	
	g File						1A-3	0.0.0.0	1000	0.0.0.0	
		6	6	ST 2110-20	97	Enable	1B-3	0.0.0.0	1000] ≡
Inputs	Video						1A-4	0.0.0.0	1000	0.0.0.0	
Outputs	Audio	7	7	ST 2110-20	97	Enable	1B-4	0.0.0.0	1000	0.0.0	j
Port			i . 🗖				1A-4	0.0.0.0	1000	0.0.0.0)
Config SFPs	Ancillary	8	8	ST 2110-20	97	Enable	1B-4	0.0.0.0	1000	0.0.0.0	

	System Input	Board Input	Stream Format	Payload Type	Redundancy Mode	QSFP	Receive IP	UDP Port	IGMPv3 SSM	
Bulk Configuration					Earth	2A-1	0.0.0.0	1000	0.0.0.0	
Import/Export		۶ (ST 2110-20	97	Enable	2B-1	0.0.0.0	1000	0.0.0.0	
Config File	J					2A-1	0.0.0.0	1000	0.0.0.0	1
		10	ST 2110-20	97	Enable	2B-1	0.0.0.0	1000	0.0.0	j
Inputs Vide	<u> </u>					2A-2	0.0.0.0	1000	0.0.0.0	
Outputs Audi		11	ST 2110-20	97	Enable	2B-2	0.0.0.0	1000	0.0.0.0	
Port						2A-2	0.0.0.0	1000	0.0.0.0	
Config SFPs Ancilla	ITY 12	12	ST 2110-20	97	Enable	2B-2	0.0.0.0	1000		

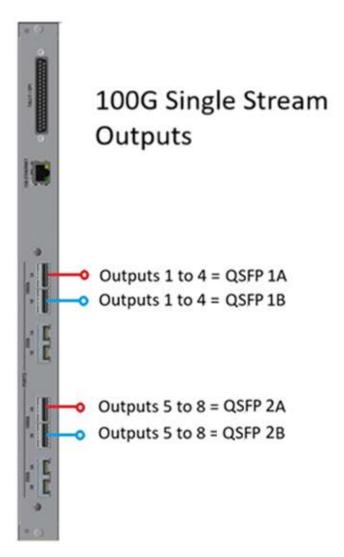
	System Input	Board Input	Stream Format	Payload Type	Redundancy Mode	QSFP	Receive IP	UDP Port	IGMPv3 SSM	
Bulk Configuration	13	13	ST 2110-20	97	Enable	2A-3	0.0.0.0	1000	0.0.0.0	
) ¹³	51 2110-20	, <u> </u>		2B-3		1000	0.0.0	
Import/Export Config File						2A-3	0.0.0.0	1000	0.0.0.0	
	14	14		97	Enable	2B-3	0.0.0.0	1000	0.0.0.0	
Inputs Video										
	15	15	ST 2110-20	97	Enable	2A-4	0.0.0.0	1000	0.0.0.0	Į
Outputs Audio						2B-4	0.0.0.0	1000	0.0.0.0	
Port						2A-4	0.0.0.0	1000	0.0.0.0	
Config SFPs Ancillary	16	16	ST 2110-20	97	Enable	2B-4	0.0.0	1000	0.0.0.0	



3c) AIP2 Single Stream Outputs:

To configure the AIPs Output Multicast, you need to be in the Eng Setup – Video I/O –IP I/O Config – Outputs Menu.

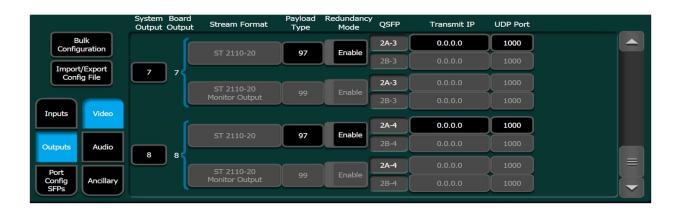
- 100Gb QSFP 1A & 1B processes Outputs 1 thru 4 of that Rear.
- 100Gb QSFP 2A & 2B processes Outputs 5 thru 8 of that Rear.





	System Output		Stream Format	Payload Type	Redundancy Mode	QSFP	Transmit IP	UDP Port	
Bulk Configuration		ſ	ST 2110-20	97	Enable	1A-1	0.0.0.0	1000	
Import/Export	1		51 2110-20	97		1B-1	0.0.0.0	1000	
Config File	1	<u>ר</u> וי	ST 2110-20	99	Enable	1A-1	0.0.0.0	1000	
		l	Monitor Output	99	Enable	1B-1	0.0.0.0	1000	
Inputs Video		ſ				1A-2	0.0.0.0	1000	
Outputs Audio			ST 2110-20	97	Enable	1B-2	0.0.0.0	1000	
Port	2	21	ST 2110-20			1A-2		1000	
Config Ancillary SFPs			Monitor Output	99	Enable	1B-2	0.0.0.0	1000	

	System Output		Stream Format	Payload Type	Redundancy Mode	QSFP	Transmit IP	UDP Port	
Bulk Configuration		ſ	CT 2440 20	07	Enable	1A-3	0.0.0.0	1000	
Import/Export	3	3	ST 2110-20	97		1B-3	0.0.0.0	1000	
Config File	<u> </u>	່ໄ	ST 2110-20	99	Enable	1A-3		1000	
Inputs Video		l	Monitor Output	99	Enable	1B-3	0.0.0.0	1000	
		ſ				1A-4	0.0.0.0	1000	
Outputs Audio		ال	ST 2110-20	97	Enable	1B-4	0.0.0.0	1000	
Port	4	∫ ⁴ໂ	ST 2110-20			1A-4		1000	
Config SFPs Ancillary		l	Monitor Output	99	Enable	1B-4	0.0.0	1000	-



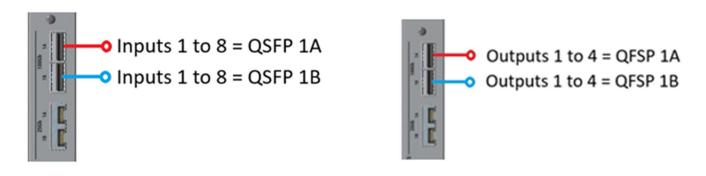


4) 8x4 AIP1&2 Mod I/Os:

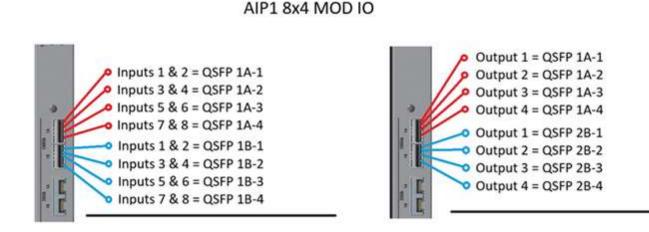
Both 8x4 Mod IO AIP variants are the same as their 16x8 counterparts with just half the IO count. Each have 8 in and 4 out.

For example, a single Stream AIP2 Mod IO:

AIP2 8x4 MOD IO



Quad Stream AIP1 Mod IO:





4a) Mod IO Input Numbers

	System Input		Stream Format	Payload Type	Redundancy Mode	QSFP	Receive IP	UDP Port	IGMPv3 SSM		În
Bulk Configuration	161	1		07	Enable	1A-1	0.0.0.0	1000	0.0.0.0		161
Import/Export	101	-	ST 2110-20	97	Enable	1B-1	0.0.0.0	1000	0.0.0		
Config File						1A-1	0.0.0.0	1000	0.0.0.0		
	162	2	ST 2110-20	97	Enable	1B-1		1000	0.0.0.0	ÍU e	
nputs Video						1A-2	0.0.0.0	1000	0.0.0.0		Resto Defau
itputs Audio	163	3	ST 2110-20	97	Enable	1B-2	0.0.0.0	1000	0.0.0.0		Resto Settir
Port onfig Ancillary	164	4	ST 2110-20	97	Enable	1A-2 1B-2	0.0.0.0	1000	0.0.0.0	Apr	oly Se
SFPs		_				18-2	0.0.0.0	1000	0.0.0.0		
			Video I/O Boa	rd					Mod I/O Board		
17 2 1 AIP2 9 IP1	33 3 17 IP1	49 4 25 5	65 81 5 6DI 33 SDI 41	6 GB 49	7 8 GB 57	129 9 AIP2 65	145 10 AIP2 73 AIP1	161 16 1 81 AIP2 85	2 3	185 4 93 SDI	
	Media Port		I/O nfig								

Regardless of the Mainframe size, the first 8x4 MOD IO Input will start at Input 161.

This is to keep consistent with a fully loaded SXP Frame having 10 x 16x8 IO Rears.

4b) Mod IO Output Numbers

Regardless of the Mainframe size, the first 8x4 MOD IO Output will start at Input 81.



This is to keep consistent with a fully loaded SXP Frame having 10 x 16x8 IO Rears



5)<u>100GB QSFPs</u>

5a) Single MAC / Quad MAC 100Gb Operations vs Single-mode / Multi-mode Fiber and 400G breakout compatibility:

When discussing optical transceivers in the context of 100G and 400G Ethernet, there are several key distinctions to understand across:

- 1. Single MAC vs Quad MAC 100G Operations
- 2. Single-mode vs Multi-mode Fiber
- 3. 400G Breakout Compatibility

Let's break each one down:

1. Single MAC vs Quad MAC 100G Operations:

- Single MAC 100G:
 - Uses a single 100G MAC (Media Access Control) interface.
 - Typically seen in 100GBASE-LR4 or 100GBASE-SR4 transceivers.
 - The MAC handles the full 100G stream, and the transceiver may use 4x25G lanes internally (e.g., via CAUI-4 interface).
 - Common in point-to-point 100G links.
- Quad MAC 100G (4x25G):
 - Uses four independent 25G MACs, each mapped to a lane.
 - Often used in breakout scenarios, such as a 100G port breaking out into 4x25G connections.
 - Common in top-of-rack switches or leaf-spine architectures where port flexibility is needed.

2. Single-mode vs Multi-mode Fiber

- Single-mode Fiber (SMF):
 - Designed for long-distance transmission (up to 10 km or more).
 - Uses laser-based optics (e.g., LR4, ER4).
 - Smaller core diameter (~9 µm).
 - Lower attenuation and dispersion.
- Multi-mode Fiber (MMF):
 - Designed for short-distance transmission (up to 100-400 meters).
 - Uses VCSEL-based optics (e.g., SR4).
 - Larger core diameter (~50 μm).
 - More cost-effective for short links but not suitable for long-haul.



3. 400G Breakout Compatibility

- 400G Transceivers (e.g., QSFP-DD, OSFP) can support:
 - 4x100G breakout: One 400G port split into four 100G ports.
 - Requires optics and switch support for breakout mode.
 - Common standards:
 - 400GBASE-DR4: 4x100G PAM4 lanes over SMF, breakout into 4x100G.
- Breakout Use Cases:
 - High-density interconnects in data centres.
 - Cost-effective scaling by using fewer transceivers and switch ports.

Summary Table

Feature	Single MAC 100G	Quad MAC 100G	Single-mode Fiber	Multi-mode Fiber	400G Breakout
MAC Interfaces	1x100G	4x25G	N/A	N/A	4x100G
Fiber Type	Either	Either	Yes	Yes	Depending on optics
Distance	Up to 10 km+	Short/Medium	Long	Short	Varies
Use Case	Point-to-point	Breakout	Long-haul	Intra-rack	High-density



5b) GV tested QSFPs:

							400G Switch Por	t
				Single Mode (LR) / Multi	100G Single MAC	100G Quad MAC	Breakout	
	10G/25G/100G	Brand	Part #	Mode (SR)	Compatible	Compatible	Compatible	K-Frame Compatible
QSFP	100G	Innolite	TR-FC85S-N00	Multi (SR)	Yes	Yes	No	Yes
QSFP	100G	Fiberstore	QSFP-DR-100G	Single (LR)	Yes	Yes	Yes	Yes
SFP	10/25 Dual	Innolite	TR-PZ85S-N00	Multi (SR)	N/A	N/A	No	Yes
SFP	10/25 Dual	Fiberstore	SFP-25GMLR-31	Single (LR)	N/A	N/A	No	Yes

- InnoLight TR-FC85S-N00:

The InnoLight TR-FC85S-N00 is a 100Gb/s QSFP28 SR4 optical transceiver module designed for high-speed data communication over multimode fibre (MMF).

Features

- 4 independent full-duplex channels
- Up to 28Gb/s data rate per channel
- QSFP28 MSA compliant
- Up to 100m OM4 MMF transmission
- Operating case temperature: 0 to 70°C
- Single 3.3V power supply
- Maximum power consumption 3.5W
- MTP/MPO optical connector
- RoHS-6 compliant



Applications

- Rack to Rack
- Data Center
- Infiniband QDR, DDR and SDR
- 100G Ethernet



- Fiberstore (FS) QSFP-DR-100G:

The Fiberstore (FS) QSFP-DR-100G is a 100GBASE-DR QSFP28 optical transceiver designed for high-speed single-mode fiber (SMF) connections.

Center Wavelength	1310nm
Connector	Duplex LC
Cable Distance (Max.)	500m (with Host FEC)
Cable Type	SMF
Modulation	PAM4
Transmitter Type	EML
Packaging Technology	BOX Packaging
Chip	Broadcom Chip

- InnoLight TR-PZ85S-N00:

The InnoLight TR-PZ85S-N00 is a 10G/25G dual-rate SFP28 optical transceiver, designed for shortrange data transmission over multimode fiber. It supports both 10Gbps and 25Gbps Ethernet applications





- Fiberstore SFP-25GMLR-31:

The FS.com SFP-25GMLR-31 is a 25GBASE-LR SFP28 optical transceiver designed for long-range single-mode fiber applications.

skey Specifications

- Form Factor: SFP28
- Data Rate: 25Gbps
- Wavelength: 1310nm
- Reach: Up to 10 km over OS2 single-mode fiber
- Connector: Duplex LC
- Transmitter: DFB laser
- Receiver: PIN photodiode
- Power Consumption: ≤ 1.2W
- Digital Diagnostics: DOM (Digital Optical Monitoring)
- Compliance: IEEE 802.3by, IEEE 802.3cc, SFF-8472
- · Compatibility: Works with major brands like Cisco, Juniper, Arista, Dell, and more

