

SRCF Fiber Cabling

- [Discussion on Jan. 18, 2022](#)
- [SRCF Fiber Order](#)
- [Sept. 2022 Cabling Proposal](#)
- [SRCF cabling](#)
 - [Nodes](#)
 - [Cabling](#)
 - [Top Patch Panel:](#)
 - [Bottom Patch Panel \(MPO\):](#)
 - [Bottom Patch Panel \(LC\):](#)
 - [LC](#)
 - [TMO Hutch Fiber Connections](#)
 - [RIX Hutch Fiber Connections](#)
 - [MFX Hutch Fiber Connections](#)
 - [Room 208 Fiber Connections](#)
 - [Problematic connections SRCF 208](#)

Discussion on Jan. 18, 2022

with claus, weaver, cpo

Matt's proposal:

- timing on LC, but still handled by BOS
- networking might be on LC as well (unless 40Gb or 100Gb, which is natively MPO). NOT handled by BOS (also XTCav point-to-point)
- pgp is on MPO and handled by the BOS
- detectors are all LC going to the BOS
- BOS-to-208-patch-panel is MPO (via breakout cable) and some LC as described above
- don't need breakout cables in SRCF according to Matt's proposal (wasteful of fibers between 208 and SRCF?)
- try to use the SFP-to-QSFP-adapters (LC to MPO) as much as possible in SRCF

this is an argument for "specialized" cabling on the SRCF side:

- if we had enough fibers for all SRCF nodes we would hook up MPO cables for all of them
- but we only have 300 fiber pairs to SRCF where ideally we would like $56 \text{ nodes} \times 8 = 448$ fiber pairs (also need networking fibers)
- also, the bos can only handle 160 fiber pairs going to SRCF
- also, some nodes only need 1 fiber (timing, hsd) so hooking up all fibers is a waste
- it's hard to change what fibers a node needs because we have to change:
 - firmware
 - transceiver (LR4 (hsd), PLR4 (wave8, epixHR), SFP to QSFP converters (timing))order:
- bos has 320 pairs, but only half of these are used for SRCF, the other half goes to detectors (LC). Implies 40 breakout cables with 4 fiber-pairs per MPO for room 208?
- 56 cmp, 11 eb, 19 mon nodes. currently only cmp have kcu's. maximum of 112 transceivers, but some should be sfp-to-qsfp. hsd's use lr4 (currently 12 channels in TMO and 4 channels in RIX). in feb. 2023 tmo needs 14 for hexanodes plus extra channels (spare and miscellaneous signals). so guess 25 LR4. expect 36 in TMO eventually. all others use plr4. $112 - 25 \approx 90$ PLR4 max. Matt guess half will be sfp-to-qsfp. So 45 PLR4, and 45 sfp-to-qsfp
- 56 cmp nodes corresponds to $56 \times 8 = 448$ fiber pairs (more than the half of the bos devoted to srcf (other half is for detectors))
- order our own patch fibers? (1 foot through 3m or 5m?)
- in short-term need to cable test detectors incrementally
- in long-term consider ripping out and having professionals do it (requires planning). we do have a short window (2 or 3 weeks?) setup SRCF in advance using estimates of detector numbers. ideally so we can maintain it.
- need to figure out fiber swaps (tx/rx) and how we do it in a neat way. more complex with MPO. Maybe BOS could do this? We think not: monitoring might not work. proposal: best place is from BOSSRCFpatchpanel. indicate the swap by removing the plastic piece that holds tx/rx in place.

3 sets of limited fiber resources:

- bos: 320 pairs, 160 for detectors, 160 for srcf
- nodes: $56 \times 8 = 448$ pairs
- fibers between 208 and srcf: 300 fiber pairs (48 MPO, 48 LC?). Total of 240?

SRCF Fiber Order

55

[blocked URLFS QSFP-PLR4-40G Compatible 40GBASE-PLR4 QSFP+ 1310nm 10km DOM MTP/MPO-12 SMF Optical Transceiver Module](#)

(singlemode plr4 qsfp)

25

[blocked URL](#)Cisco QSFP-40GE-LR4 Compatible 40GBASE-LR4 QSFP+ 1310nm 10km DOM Duplex LC SMF Optical Transceiver Module (single mode lr4)

45

[blocked URL](#)Cisco CVR-QSFP-SFP10G Compatible 40G QSFP+ to 10G SFP+ Adapter Converter Module (sfp to qsfp adapter) CVR-QSFP-SFP10G

60

[blocked URL](#)Cisco SFP-10G-LR Compatible 10GBASE-LR SFP+ 1310nm 10km DOM Duplex LC SMF Optical Transceiver Module (singlemode sfp

transceiver (for sfp-to-qsfp adapters))

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[blocked URL](#)3m (10ft) MTP® Female to 4 LC UPC Duplex 8 Fibers Type B Plenum (OFNP) OS2 9/125 Single Mode Elite Breakout Cable, Yellow (3m singlemode breakout)

20

[blocked URL](#)1m (3ft) MTP® Female to 4 LC UPC Duplex 8 Fibers Type B Plenum (OFNP) OS2 9/125 Single Mode Elite Breakout Cable, Yellow (1m single mode breakout)

45

[blocked URL](#)Customized 8-144 Fibers Senko MPO-12 OS2 Single Mode Elite Trunk Cable, Yellow (3m mpo12 trunk cable)

20

[blocked URL](#)0.5m (1.6ft) LC UPC to LC UPC Duplex OS2 Single Mode PVC (OFNR) 2.0mm Fiber Optic Patch Cable (0.5m patch fiber)

20

[blocked URL](#)1m (3ft) LC UPC to LC UPC Duplex OS2 Single Mode PVC (OFNR) 2.0mm Fiber Optic Patch Cable (1m patch fiber)

20

[blocked URL](#)1.5m (5ft) LC UPC to LC UPC Duplex OS2 Single Mode PVC (OFNR) 2.0mm Fiber Optic Patch Cable (1.5m patch fiber)

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[blocked URL](#)2m (7ft) LC UPC to LC UPC Duplex OS2 Single Mode PVC (OFNR) 2.0mm Fiber Optic Patch Cable (2m patch fiber)

20

[blocked URL](#)3m (10ft) LC UPC to LC UPC Duplex OS2 Single Mode PVC (OFNR) 2.0mm Fiber Optic Patch Cable (3m patch fiber)

10

[blocked URL](#)4m (13ft) LC UPC to LC UPC Duplex OS2 Single Mode PVC (OFNR) 2.0mm Fiber Optic Patch Cable (4m patch fiber)

Sept. 2022 Cabling Proposal

Executive summary: I think at 100kHz we can keep roughly the same number of nodes that we have in the FEE alcove.

Issues:

- which fibers should be MPO vs LC?
 - only use MPO for fim's.
- should we fanout timing at SRCF or put it through the bos?
 - use the fanouts at SRCF for simplicity
 - should we fanout in 208?
 - maybe put camlink data fibers through the bos?
- routing mono-encoder udp network over to srcf
- sharing xtcav between hutches with bos-switchable timing

100kHz data volumes:

- wave8: $8\text{waveforms} \times 256\text{samples/sample} \times 2\text{bytes/sample} \times 0.1\text{MHz} = 400\text{MB/s}$ (need to add FEX data too)
- piranha: $2048\text{px} \times 2\text{bytes/px} \times 0.1\text{MHz} = 410\text{MB/s}$
- hsd full wf: $60000\text{samples} \times 2\text{bytes/sample} \times 0.1\text{MHz} = 12\text{GB/s}$
 - max waveform length appears to be ~60000 samples looking at xtc2 file?
 - FEX needs to reduce it to 4GB/s (3x)
- bld: $336\text{bytes/event} \times 0.1\text{MHz} = 33\text{MB/s}$ (from xtcreader -f /cds/data/psdm/prj/public01/xtc/tmoc00118-r0222-s008-c000.xtc2)
- timing: $309\text{bytes/event} \times 0.1\text{MHz} = 31\text{MB/s}$

summary:

- hook it up similarly to the way it is done in the FEE alcove, but more neatly
- fanout the timing in 208 and put everything through the BOS

recabling proposal:

- tmo timing (including pvadet, bld) (LC, SFP to QSFP)
- rix timing (LC, SFP to QSFP)
- (4) tmo camlink nodes (LC, needs timing)
- (2) rix camlink nodes (LC, needs timing)
- tmo/rix fim node (5 fims) (MPO, PLR4)
- (2) rix hsd nodes (2 LC per node, LR4)
- (7) tmo hsd nodes (2 LC per node, LR4)
- peppex hsd node (LC LR4)
- (2) tmo/rix ami
- (2) tmo/rix teb
- (2) tmo/rix mebuser
- xtcav (LC, needs timing)
- mono-encoder (LC, needs timing)
- in SRCF:
 - let's try MPO for everything (since we only have 48 LC)

- tdet (12, timing): SFP fiber (from an MPO breakout cable) SFP to QSFP converter
 - 3 MPO breakout, 12 SFP to QSFP converters, 12 SFP transceivers
- ilv (10, hsd): SFP fiber with LR4 transceiver (no MPO)
 - 5 MPO breakout, 20 LR4
- wave8 (1, XilinxKcu1500Pgp4_6Gbps_ddr): MPO fiber with PLR4 transceiver
 - 1 MPO, 1 PLR4
- camlink (4, ClinkKcu1500Pgp2b): data (transceiver 0, up to 4 lanes/cameras) MPO fiber with PLR4, timing (transceiver 1), try MPO fiber with PLR4 (neater, but wastes fibers)
 - 8 MPO, 8 PLR4

current inventory (sept. 13, 2022):

- 27 nodes needed
- shutdown 30
- 3 broken (cmp006, 13, 15)

SRCF cabling

Nodes

drp-srcf-cmpNNN	KCU firmware	Comment	Application (Oct 17, 2022)
001	DrpTDet	TMO low rate, XTCAV nic	slow tmo tdet (+xtcav)
002	DrpTDet	RIX low rate, encoder nic	slow rix tdet (+mono)
003	DrpTDet	TMO high rate	tmo high rate tdet
004	XilinxKcu1500Pgp4_6Gbps_ddr		rix/tmo wave8 Collection host
005	DrpPgpllv		rix hsd's
006	ClinkKcu1500Pgp2b	LCLSECSD-1844	nothing
007	ClinkKcu1500Pgp2b		tmo fzp piranha
008	DrpTDet	didn't show up on xpm	rix user meb
009	DrpPgpllv		rix hsd's
010	DrpTDet	RIX high rate	rix fast tdet
011	ClinkKcu1500Pgp2b		tmo fzp opal
012	ClinkKcu1500Pgp2b		tmo opal rix piranha
013	ClinkKcu1500Pgp2b		tmo atm piranha
014	Lcls2EpixHrXilinxKcu1500Pgp4_6Gbps		epix hr
015		No mlx5; Bad Ethernet LCLSECSD-1305 Unreliable machine: bad for TEB / MEB	nothing
016	DrpTDet	No mlx5. Error messages LCLSECSD-1305 Unreliable machine: bad for TEB / MEB	nothing
017	DrpPgpllv		tmo hsd_3
018	DrpPgpllv		tmo hsd_5,hsd_7
019	DrpPgpllv		tmo hsd_4,hsd_13
020	DrpPgpllv		tmo hsd_2
021	DrpPgpllv		tmo hsd_6
022	DrpPgpllv		tmo hsd_8,hsd_9
023	DrpPgpllv		peppex hsd's
024	DrpPgpllv		tmo hsd_10,hsd_11
025	DrpTDet		rix slow tdet
026	ClinkKcu1500Pgp2b		tmo atm opal
027	ClinkKcu1500Pgp2b		rix atm opal
028	DrpTDet	XPM:6	tmo ami
029	DrpTDet	XPM:5	rix ami
030	DrpTDet	NC	tmo user meb
031	XilinxKcu1500Pgp4_6Gbps_ddr	LCLSECSD-2030 : BIOS not upgradable	tmo user meb
032	DrpTDet	XPM:7 (hacked with fiber from xpm0 that was in cmp037). Web IPMI interface broken. Update bios settings: only one pcie bus.	LCLS1 HXR hatches
033	DrpTDet	XPM:0. update bios settings: only one pcie bus.	

034	DrpTDet		mona slurm tests
035	DrpTDet	XPM:0; LCLSECS-2032 : BIOS not upgradable from v2.0 but is useable as-is	mona slurm tests
036	DrpTDet	XPM:7	epixM
037	DrpTDet	XPM:0 (hacked with fiber from xpm7)	
038	DrpTDet	XPM:0	
039	DrpTDet	LCLSECS-2028 : Broken IPMI	
040	DrpTDet	XPM:0	
041	DrpTDet	XPM:0	
042	DrpTDet	XPM:0	
043	DrpTDet	XPM:0	EpixHrEmu
044	DrpTDet	XPM:0	Laser hall
045	Todo: XilinxKcu1500Pgp4_6Gbps	XPM:0	TXI Wave8
mon001			tmo meb and ami_manager neh-base.cnf, hsd.cnf, rix-hsd.cnf
046	DrpPgpllv		TMO HSD_15 and TMO HSD_16
048	DrpPgpllv		TMO HSD_17 and TMO HSD_18
049	DrpPgpllv	not working, possibly defective KCU	
050	DrpPgpllv		TMO HSD_01 and TMO HSD_19

drp-srcf-gpuNNN	KCU firmware	Comment	Application
001	in progress	Adding kcu1500	
002	n/a		
003	n/a		
004	n/a		

Cabling

Top Patch Panel:

NOTE: the rightmost MPO connections are MPO12 (2 rows, 4 columns). The left ones are MPO8. We should use MPO8 for KCU. The MPO12 are reserved for "future expansion" (can be converted to MPO8, I think).

(6-strand breakout cable) 1: cmp038 (away from usb port) 2: cmp040 (away from usb port) 3: cmp041 (away from usb port) 4: cmp042 (away from usb port) 5: cmp043 (away from usb port) 6: cmp044 (away from usb port)			DON'T USE FOR NOW	DON'T USE FOR NOW		(breakout cable) 1: cmp022(away from USB port) 2: cmp022(close to USB port) 3: cmp023 (away from USB port) 4: cmp023 (close to USB port)	(breakout cable) 1: cmp018(away from USB port) 2: cmp018(close to USB port) 3: cmp019 (away from USB port) 4: cmp019 (close to USB port)	(breakout cable) 1: cmp009(away from USB port) 2: cmp009(close to USB port) 3: cmp017 (away from USB port) 4: cmp017 (close to USB port)	(breakout cable) 1: cmp008 2: cmp010 3: cmp016 4: cmp025
(break cable) 1: cmp033 (away from usb port) 2: cmp035 (away from usb port) 3: cmp036 (away from usb port) 4: cmp037 (away from usb port)					(breakout cable) 2: cmp046 (away from usb) 3: cmp048 (close to usb) 4: cmp048 (away from usb)	(breakout cable) 1: cmp024(away from USB port) 2: cmp024(close to USB port) 3: - 4: -	(breakout cable) 1: cmp020(away from USB port) 2: cmp020(close to USB port) 3: cmp021 (away from USB port) 4: cmp021 (close to USB port)	(breakout cable) 1: cmp029 2: cmp030 3: cmp032 4: -	(breakout cable) 1: cmp028 2: - 3: - 4: -
					(breakout cable) 1: cmp050(close to usb) 2: cmp050(away from the usb) 3: cmp046 (close to usb)				

Bottom Patch Panel (MPO):

cmp006 (timing) (close to the USB port)	cmp011 (timing) (close to the USB port)	cmp012 (timing) (close to the USB port)	cmp004(close to usb port)	cmp013(timing) (close to the USB port)	cmp026(timing) (close to the USB port)	cmp027(timing) (close to the USB port)	cmp004(away from usb port)
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cmp006 (data) (away from USB port)	cmp011 (data) (away from USB port)	cmp012 (data) (away from USB port)	cmp013 (data) (away from USB port)	cmp045 (away from USB port)	cmp026 (data) (away from USB port)	cmp027 (data) (away from USB port)	cmp014(away from usb port)
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Bottom Patch Panel (LC):

IT	IT	cmp007 (close to the USB port)		cmp001 (away from the USB port)
	IT	cmp007 (away from the USB port)		cmp002 (away from the USB port)
	IT			cmp003 (away from the USB port)
	IT			cmp005 (close to the USB port)
	IT			cmp005 (away from the USB port)
	IT			

LC

Fibers 15-16: XTCAV from Room 208 Rack 2 PH2 fibers 61-62 cmp001

Fibers 21-22: MonoEncoder from ACTA Switch in FEE cmp002

TMO Hutch Fiber Connections

Source	Destination	Notes
XPM 2 input on RTM	Rack 4 in TMO hutch, FODU2, Cassette 4, fibers 3-4 (a.k.a TMO2.4.3-4)	Note that cassettes 3 and 4 are swapped between rack 3/4
XPM 2 network connection	Rack 3, Cassette 3, fibers 23-24, goes to Rack 4 FODU 5, Cassette 4, fibers 23-24, goes to Rack 4 FODU 2 cassette 4 fibers 5-6	Note that cassettes 3 and 4 are swapped between rack 3/4

RIX Hutch Fiber Connections

Source	Destination	Notes
XPM 3 network connection	Rack 1 FODU Cassette 1 fibers 15-16	Don't immediately know what the official fodu number is
XPM 3 AMC1 port 5 counting from 0	Room 208 RIX1 fodu, cassette 1 fibers 11-12	Wasn't connected on the room 208 side on Oct. 26, 2022. Maybe not necessary any more?

MFX Hutch Fiber Connections

Source	Destination	Notes
BOS 1.8.1, 1.8.2 and XPM7 output	Building B950 RB02 in room 208: SM S04 To B999 MEZZ FODU 43 R11, Ports 1,2,4	3 fiber pairs for epixHR data (two pairs) and timing (one pair)

Room 208 Fiber Connections

See [FEE Alcove](#) for description of which patch panel in 208 goes to which detector. Note that the fiber numbering on that page is different from here. On the FEE alcove page we number fibers left-to-right, then top-to-bottom. Here we use a better scheme: using the actual fiber numbers marked on the cassettes. We should convert the FEE-alcove page to use the better fiber-numbering scheme.

Source	Destination	Notes
ATCA FEE router port 0	ATCA room 208 router port 1	10Gb network to SRCF node, the connection is done via the octopus fiber #4
room 208 ATCA crate switch optical fiber port 0	SRCF LC cassette 4 (counting from 1, left to right) fibers 11/12	10Gb network to SRCF node (drp-srcf-cmp004?)
TMO XPM 2 network connection (TMO FODU 1, Cassette 4 fibers 5-6)	ATCA switch optical port 7 counting from 0	needed to swap tx/rx fibers to get link-lock
RIX XPM 3 network connection (RIX FODU, cassette 1, fibers 15-16)	ATCA switch optical port 6 counting from 0	
Mono Encoder Network	From FEE Fodu 1 cassette 3 fibers 1,2 to SRCF LC fodu fibers 21,22	

Timing output of XPM2 in 208	TMO FODU 1, Cassette 3, Fibers 17-18: 1.3.17-18	Cassette 1 is missing
Timing output of XPM3 in 208	RIX FODU 1, Cassette 1, Fibers 7-8: 1.1.7-8	
XPM0-AMC0-PORT0	RIX 1.1.3-4	This is XPM0 XPM3 in RIX, FODU 1 for RIX is FODU 5 in 208
XPM0-AMC0-PORT1	TMO 2.4.3-4	This is XPM0 XPM2 in TMO, FODU 2 for TMO is FODU 7 in 208
XPM0-AMC1-PORT2	TMO 2.3.33-34 (tmo cassette 3 fiber 33-34)	Backup connection for XPM0->XPM2
XPM5-AMC0-PORT0	RIX 1.1.3-4	This is XPM3 XPM5
XPM6-AMC0-PORT0	TMO 1.3.17-18	This is XPM2 XPM6
XPM0-AMC1-PORT0	FEE FODU 1, Cassette 4 fiber 11-12 (top right)	LCLS2 timing for FEE Teststand
TMO ATM CAMLINK	TMO FODU 1 cassette 3 fiber 1-2 (a.k.a. TMO1.3.1-2)	cassette 1 is missing, swapped tx/rx at bos
RIX FIM MR4K2	RIX FODU 1 cassette 1 fibers 25-26 (a.k.a RIX1.1.25-26)	
RIX FIM MR3K2	RIX1.1.27-28	
RIX FIM CHEMRIX	RIX1.1.29-30	
TMO FIM1	TMO1.3.5-6	Not sure which FIM this really corresponds to in TMO
TMO FIM2	TMO1.3.7-8	Not sure which FIM this really corresponds to in TMO
RIX HSD2	RIX1.1.19-20	I may be swapping hsd2/3 (this was FEE fodu 1.3.18, old numbering scheme)
RIX HSD3	RIX1.1.23-24	I may be swapping hsd2/3 (this was FEE fodu 1.3.15, old numbering scheme)
TMO CAMLINK OPAL1	TMO1.4.1-2	swapped tx/rx at bos
TMO CAMLINK OPAL2	TMO1.3.3-4	swapped tx/rx at bos
TMO CAMLINK FZP	TMO1.2.11-12	swapped tx/rx at bos
RIX CAMLINK ATM	RIX1.3.13-14	
TMO HSD3 or companion	TMO1.4.13-14	I may be swapping hsd3 with its companion (don't know the name: not in tmo.cnf?). This one was in fee fodu1.1.11 (old numbering scheme). Needed tx/rx swap at bos.
TMO HSD3 or companion	TMO1.4.15-16	I may be swapping hsd3 with its companion (don't know the name: not in tmo.cnf?). This one was in fee fodu1.1.9 (old numbering scheme). Needed tx/rx swap at bos.
TMO HSD5 or HSD7	TMO1.4.31-32	I may be swapping hsd5/hsd7. This one was in fee fodu 1.1.1 (old numbering scheme). Needed tx/rx swap at bos.
TMO HSD5 or HSD7	TMO1.4.29-30	I may be swapping hsd5/hsd7. This one was in fee fodu 1.1.5 (old numbering scheme). Needed tx/rx swap at bos.
TMO HSD4	TMO1.4.27-28	Was in fee fodu 1.1.4 (old numbering scheme). tx/rx swap at bos.
TMO HSD4 companion	TMO1.4.33-34	Was in fee fodu 1.1.6 (old numbering scheme). tx/rx swap at bos.
TMO HSD1	TMO1.4.17-18	Was in fee fodu 1.1.12 (old numbering scheme). tx/rx swap at bos.
TMO HSD2	TMO1.4.19-20	Was in fee fodu 1.1.8 (old numbering scheme). NO tx/rx swap at bos!
TMO HSD6	TMO1.4.35-36	Was in fee fodu 1.1.3 (old numbering scheme). tx/rx swap at bos.
TMO HSD6 companion	TMO1.4.25-26	Was in fee fodu 1.1.2 (old numbering scheme). tx/rx swap at bos.
TMO HSD9	TMO1.4.21-22	Was in fee fodu 1.1.7 (old numbering scheme). tx/rx swap at bos.
TMO HSD8	TMO1.4.23-24	Was in fee fodu 1.1.10 (old numbering scheme). tx/rx swap at bos.
RIX HSD1	RIX1.1.21-22	Was in fee fodu 1.3.8 (old numbering scheme)
RIX HSD0	RIX1.1.17-18	Was in fee fodu 1.3.9 (old numbering scheme)
PEPPEX HSD1	Room 208 Rack 2 PH4 "To B920 R90-S SLOT B" fibers 21-22 (second from bottom). Also labelled "slot 4" on the slot itself.	Was in fee fodu 2.4.3 (old numbering scheme)
PEPPEX HSD0	Room 208 Rack 2 PH4 "To B920 R90-S SLOT B" fibers 19-20 (third from bottom). Also labelled "slot 4" on the slot itself.	Was in fee fodu 2.4.4 (old numbering scheme)
PEPPEX OPAL	Room 208 Rack 2 PH4 "To B920 R90-S SLOT B" fibers 23-24 (bottom pair). Also labelled "slot 4" on the slot itself.	Was in fee fodu 2.4.5 (old numbering scheme)
XTCAV	Room 208 Rack 2 PH2 fibers 61-62 from B005 (each cassette has 12 fibers, so top of sixth cassette from left)	Was in fee fodu 1.2.2 (old numbering scheme)

TXI FIM	Room 208 XPM 5 AMC 1 SFP 2 (20240112) XPM 6 AMC 1 SFP 6 To FODU 8 Cassete 2 Port 9-10 Data To FODU 8 Cassete 2 Port 11-12	
TMO LCLS1 timing	XPM7 AMC1 port1 to TMO FODU 7 Cassette 3 (counting from 1 with 4 cassettes total, one currently unoccupied) fibers 11-12	
XPM0-AMC1-PORT4	FEE FODU 6, Cassette 3 fiber 23-24 (lower right)	LCLS2 timing for FEE Teststand XPM10 RTM
TMO HSD 88 or 89	BOS (2.1)1-2 or 5-6	In TMO Hutch connected to FODU1 Cassette 1 position 8 (most left in the middle row might be broken) and 15 (lowest row int he middle) RACK 4 in 208 FODU 7 RACK 4
TMO HSD 89 or 88	BOS(2.1) 5-6 or 1-2	in TMO Hutch connected to FODU1 Cassette 1 position 9 and 10 RACK 4 in 208 FODU 7 RACK 4 N.B. position 9 (in the middle row third from the left) was already taken in 208 but not in TMO. Connected to FODU4 (208) cassette 2 (second from the left) position 7 (first from the left in the middle), but removed because no fiber in TMO.
TMO HSD 1 (1B:B)	BOS 1.8.3	In TMO hutch connected to FODU1 Cassette 1 position 3 (counting from top left from 1) RACK4
TMO HSD 18 (B1:B)	BOS 1.8.4	In TMO hutch connected to FODU1 Cassette 1 position 4 (counting from top left from 1) RACK4
RIX High-rate encoder in FEE (data and timing, in that order)	From FEE: B940-008-R03-FODU-U1 PAIRS 2 and 3 COUNTING FROM 1 Through FEE alcove: B940-009-R06-FOD3-U1 pairs 2 and 5 counting from 1 To B950-208-r42-FOD3-U2 PAIRS 2 and 5 COUNTING FROM 1	Swapped tx/rx at xpm5 amc1 port 2 (counting from 0). Data also needed to be swapped going into BOS (1.7.8).

XPM Topology

```
lcls2Timing -> xpm0 -> 2 (tmo) -> 4 (tmo)
                                     -> 6 (208) -> BOS
                                     -> 3 (rix) -> 5 (208) -> BOS
                                     -> 10(fee) -> 11(fee)
lcls1Timing -> xpm7
```

Problematic connections SRCF 208

- DRP-SRCF-CMP018-QSFP1 5.3.6 (Shows -7.27, is an HSD)
- DRP-SRCF-CMP008 (reported by ric): [Connecting DRP-SRCF-CMP008.0_TIMING \(5.5.1\) to XPM-6_AMC-0_SFP-1 \(5.8.4\) doesn't bring up 'TDetSim/cmp008' in xpmvpa and shows LinkRxErrs](#)
- move base processes to mon001

Cleanup:

- old neh cmp013 going to xpm3 amc0 port 5
- old neh cmp015 going to xpm3 amc1 port 0
- LC patch panel connections to SRCF
- leftover long fibers in 208