System test

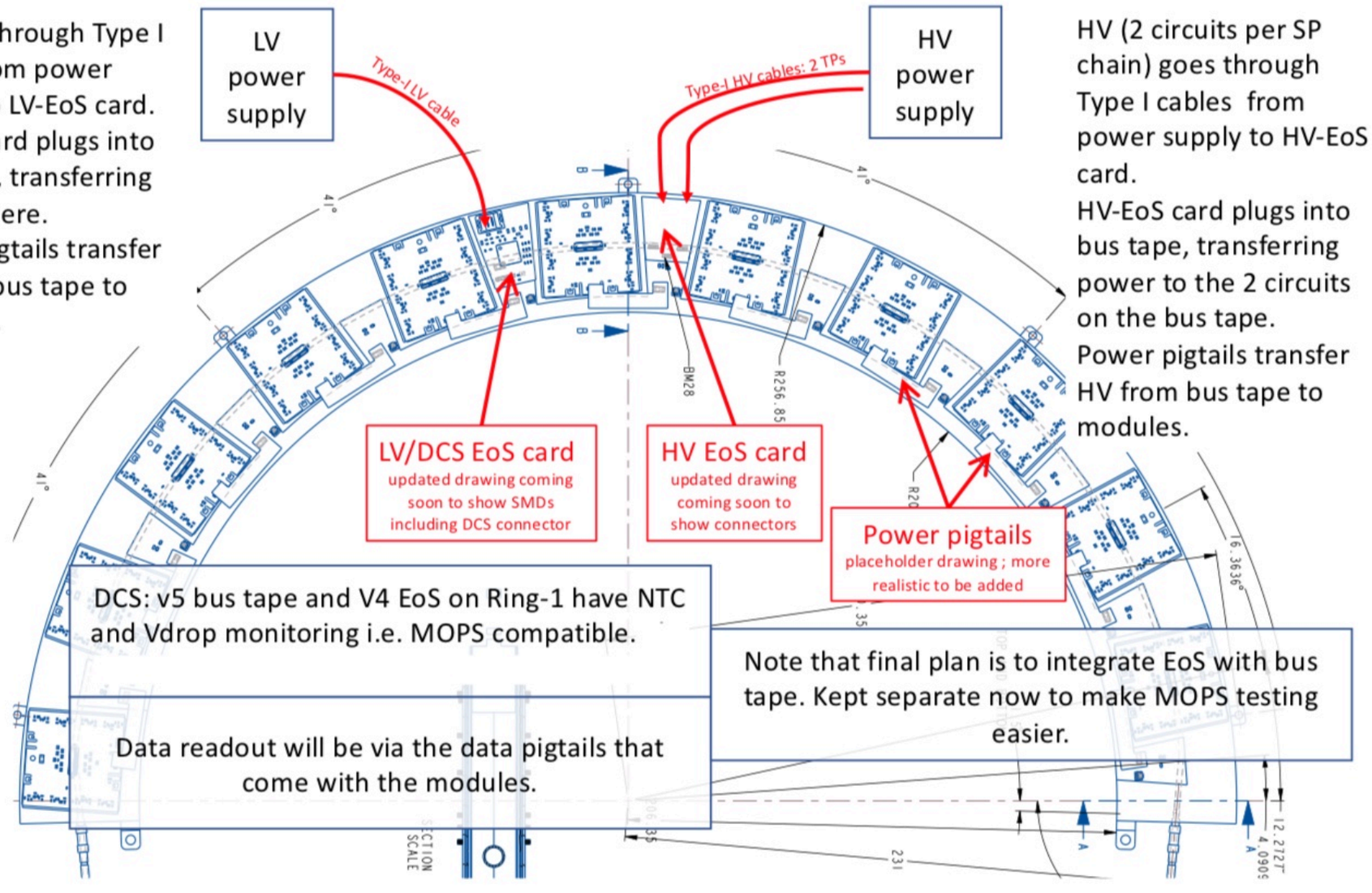
Slide per discussione

draft

Half Ring 1

Ring 1

LV goes through Type I cable from power supply to LV-EoS card.
LV-EoS card plugs into bus tape, transferring power there.
Power pigtails transfer LV from bus tape to modules.



HV (2 circuits per SP chain) goes through Type I cables from power supply to HV-EoS card.
HV-EoS card plugs into bus tape, transferring power to the 2 circuits on the bus tape.
Power pigtails transfer HV from bus tape to modules.

Layer 3 prototype.
11 modules per SP chain (side)

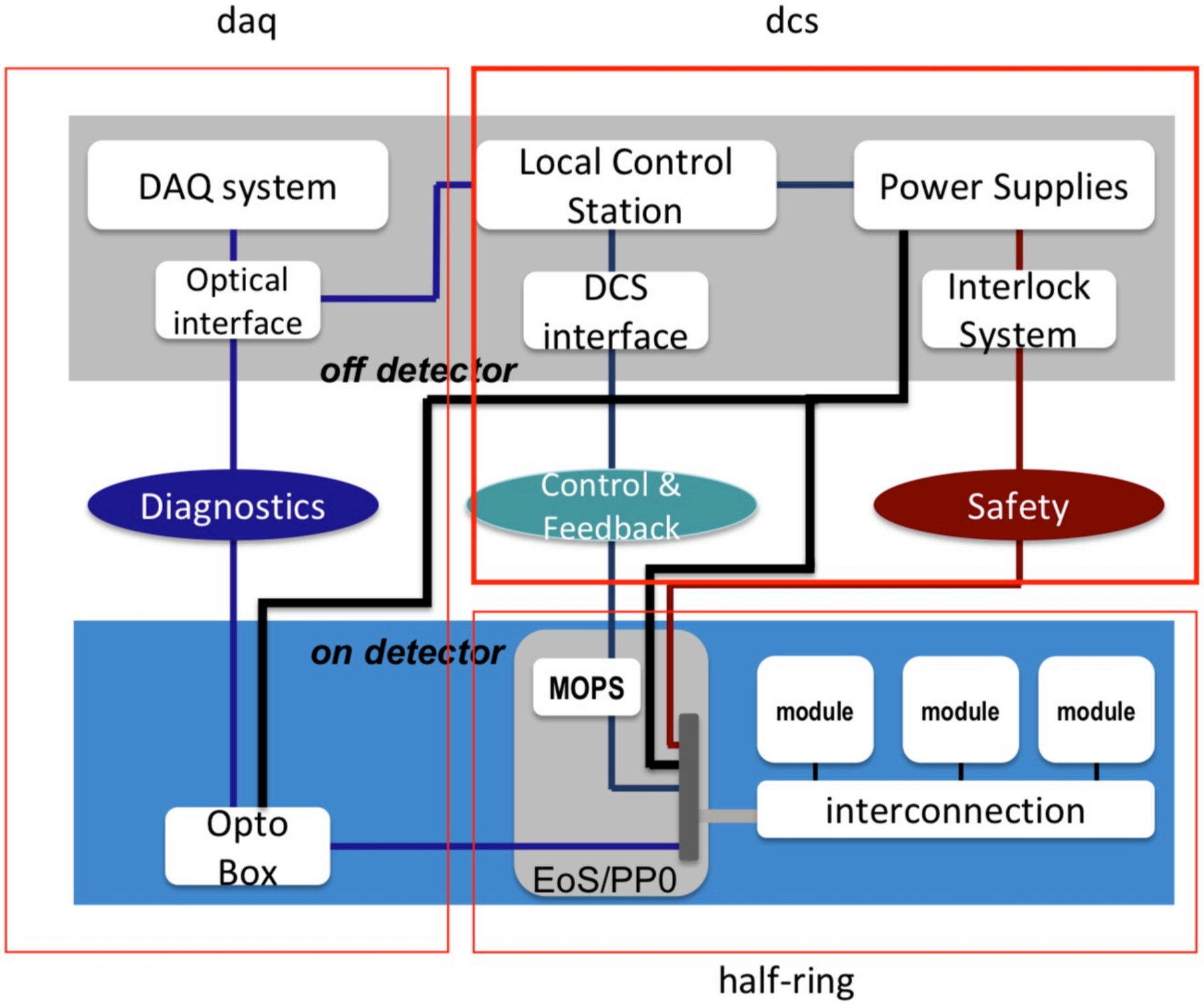
DCS: v5 bus tape and V4 EoS on Ring-1 have NTC and Vdrop monitoring i.e. MOPS compatible.

Data readout will be via the data pigtails that come with the modules.

Note that final plan is to integrate EoS with bus tape. Kept separate now to make MOPS testing easier.

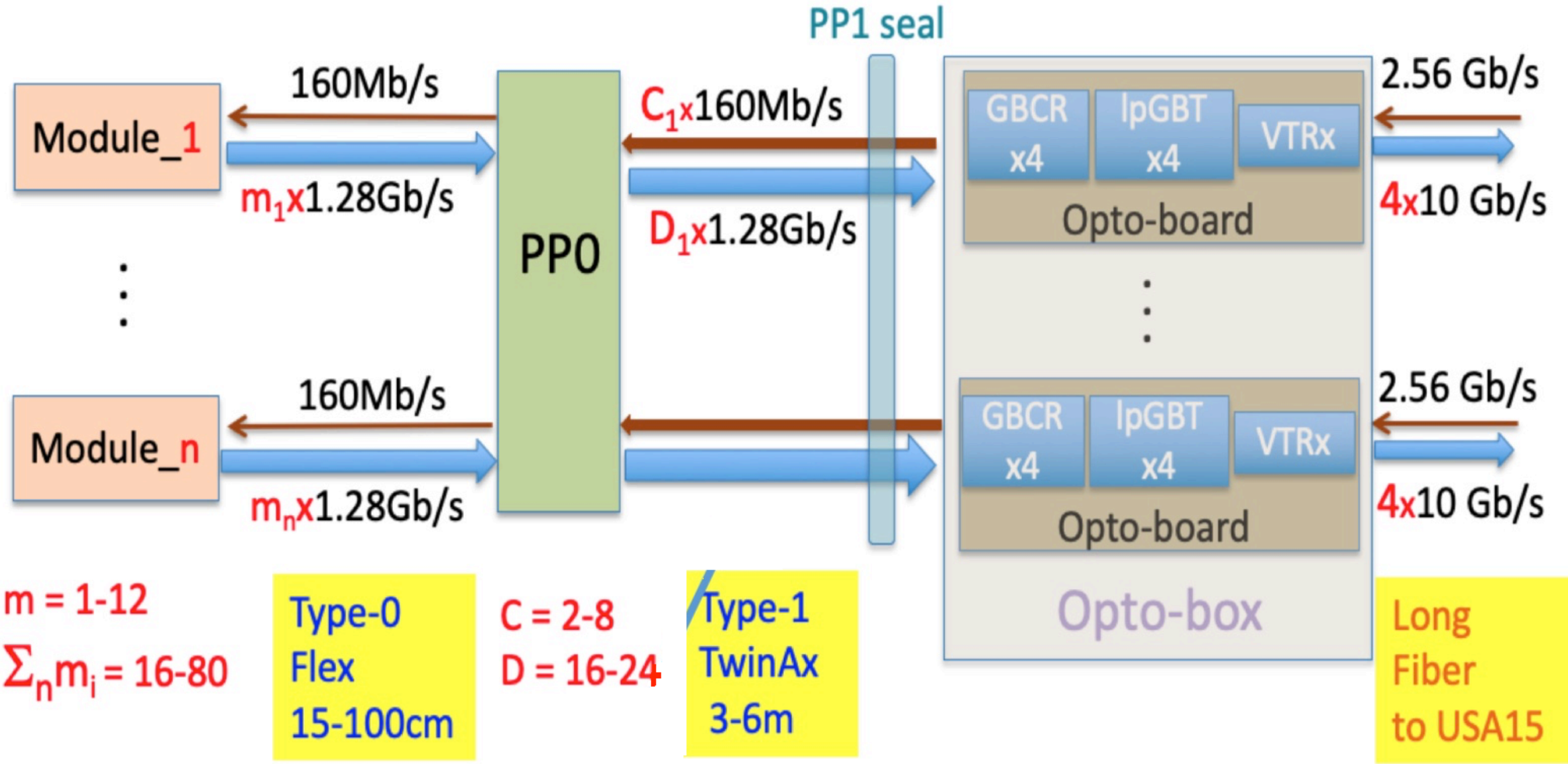
P. Sutcliffe, M. Langstaff, J. Pater

System test



+ cooling
+ storage box
+ dry air

Block Diagram of Data Transmission



ITK Type 1 service

Sub-system	PP0 end		Optoboard end		Total E-links
	Termination	#E-links	Termination	#E-links	
Inner System	Direct solder to PP0 board	70-100	Samtec ERF8 connector	32 (24 data + 8 cmd)	9208
Outer Barrel	Samtec FireFly ECU5	4-12			9904
Outer Endcap	Direct solder to module flex	2-5			7072

Layer	Ring	Data+Cmd /module	Bundle 1 #module	Bundle 1 ERF8 Data+Cmd	Optoboard capacity bundle 1	Bundle 2 #module	Bundle 2 ERF8 Data+Cmd	bundle 2 Optoboard capacity
2	1-5	2+1	8	16+8	66%			
2	6-11	4+1	4	16+4	66%	4	16+4	66%
3	1-8	2+1	6	12+6	50%	5	10+5	42%
4	1-7	1+1	8	8+8	33%	5	5+5	21%
4	8-9	2+1	8	16+8	66%	5	10+5	42%

- 6 Flavors of Optoboard configuration.

Common order twinax

Contact	Subsystem	Length (m)	Length (ft)	Length (ft)	cost ($)
Su Dong	IS	7000			
Su Dong	IS	1500			
Su Dong	IS	2000	34449	35000	21000
Jeremy Love	IS	4000	13123	14000	8400
Susanne Kuehn	OB	3400	11155	12000	7200
Stephan Eisenhardt	EC	650			
Stephan Eisenhardt	EC	100			
Stephan Eisenhardt	EC	1950	8858	9000	5400
Sandro Tomassini	PP1	4500	14764	15000	9000
Petr Sicho	ID end region	0	0	0	
Sum		25100		85000	51000

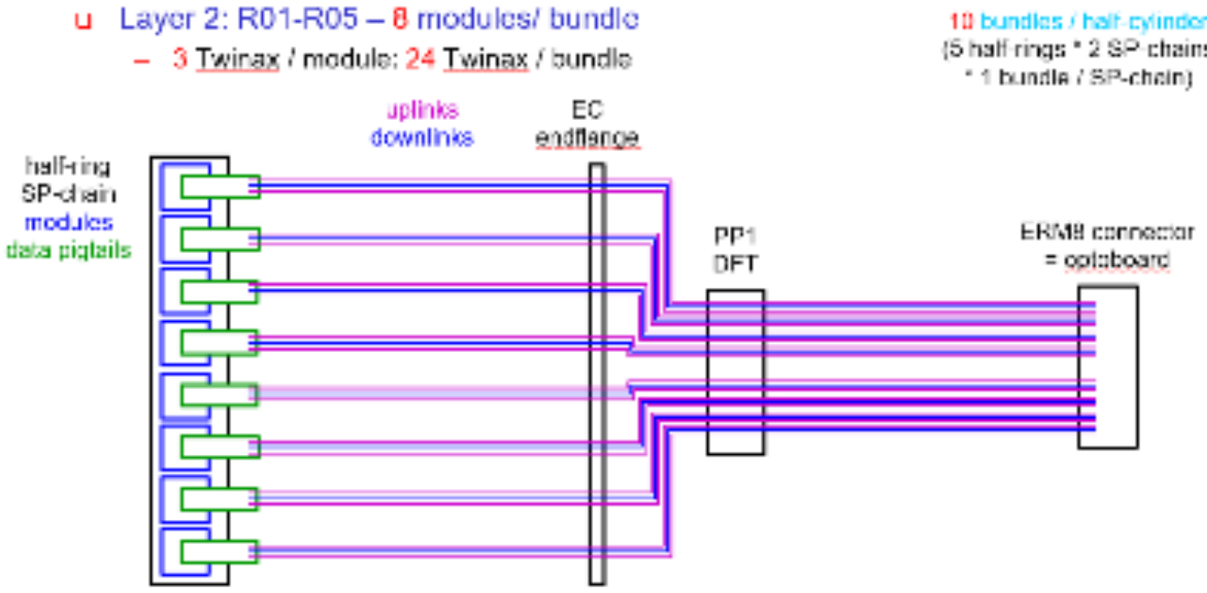
- Fabrication of ERF (Quantity 25) $300ea
- Fabrication of Firefly (Quantity 25) $100ea
- Cable weaving $100 per bundle (2 bundles)
- Assembly cost (2 firefly PCBs-1 ERF board) $500-$600 per assembly
  - This is L2i configuration
  - Waiting on European Company quote
- Total ~$1200 for a set.

Inner half rings

Cable Bundles – Layer 2, R01-R05

- Layer 2: R01-R05 – 8 modules/ bundle
  - 3 Twinax / module: 24 Twinax / bundle

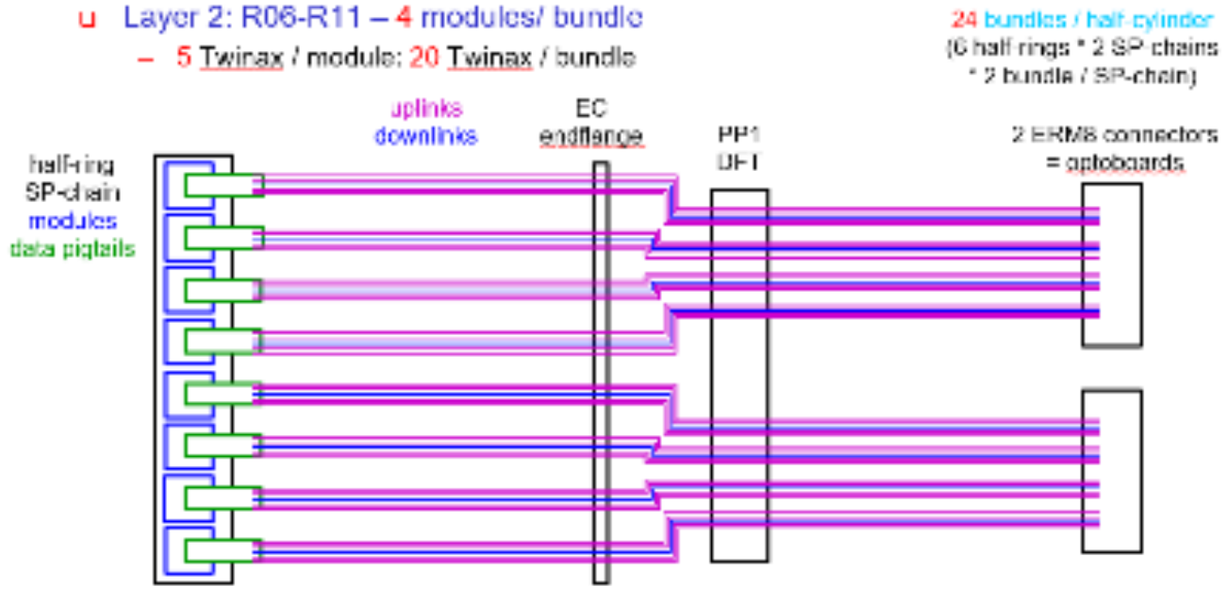
10 bundles / half cylinder
(5 half rings * 2 SP chains
* 1 bundle / SP-chain)



Cable Bundles – Layer 2, R06-R11

- Layer 2: R06-R11 – 4 modules/ bundle
  - 5 Twinax / module: 20 Twinax / bundle

24 bundles / half cylinder
(6 half rings * 2 SP chains
* 2 bundle / SP-chain)

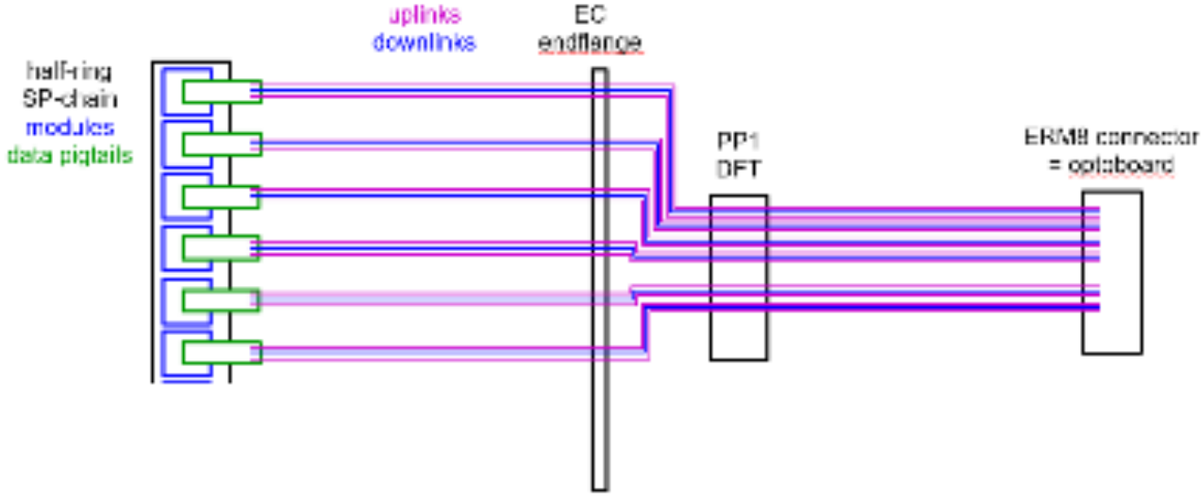


Middle half rings

Cable Bundles – Layer 3, R01-R08 a

- Layer 3: R01-R06 – 6 modules/ bundle
  - 3 Twinax / module: 18 Twinax / bundle

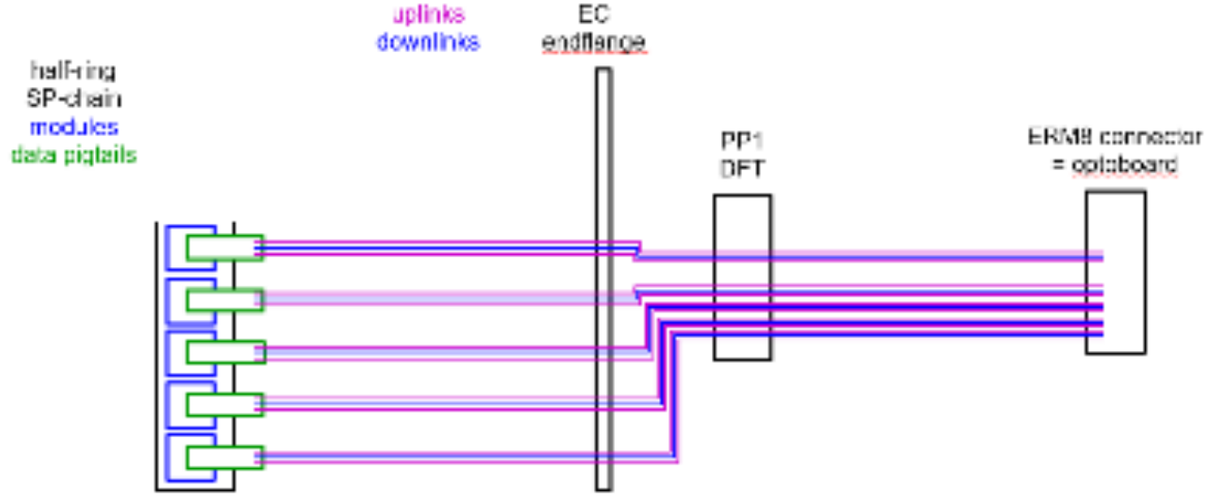
22 bundles / half cylinder
(11 half rings * 2 SP chains
* 1 bundle / SP-chain)



Cable Bundles – Layer 3, R01-R08 b

- Layer 3: R01-R06 – 5 modules/ bundle
  - 3 Twinax / module: 15 Twinax / bundle

22 bundles / half cylinder
(11 half rings * 2 SP chains
* 1 bundle / SP-chain)

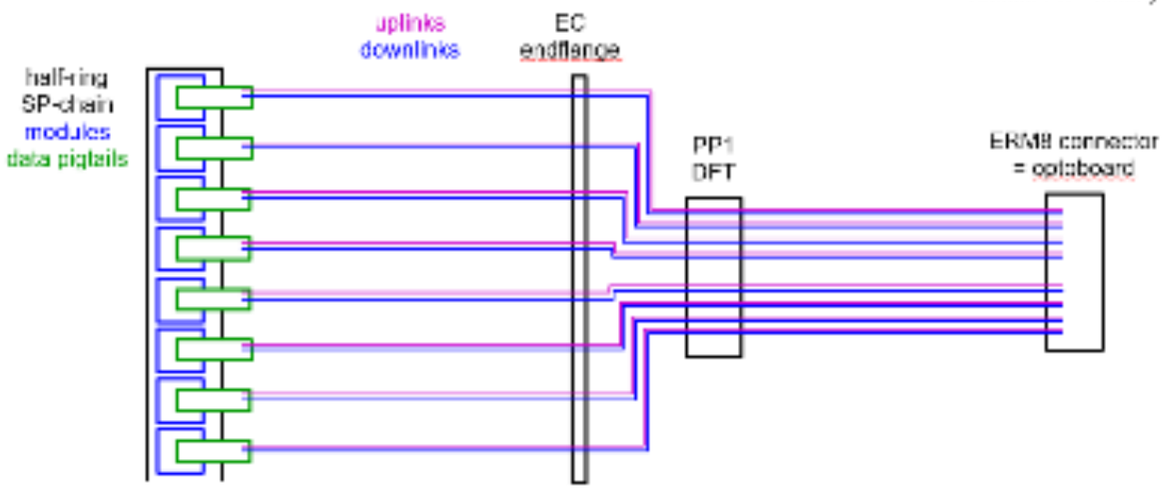


Outer half ring

Cable Bundles – Layer 4, R01-R07 a

- Layer 4: R01-R07 – 8 modules/ bundle
  - 2 Twinax / module: 16 Twinax / bundle

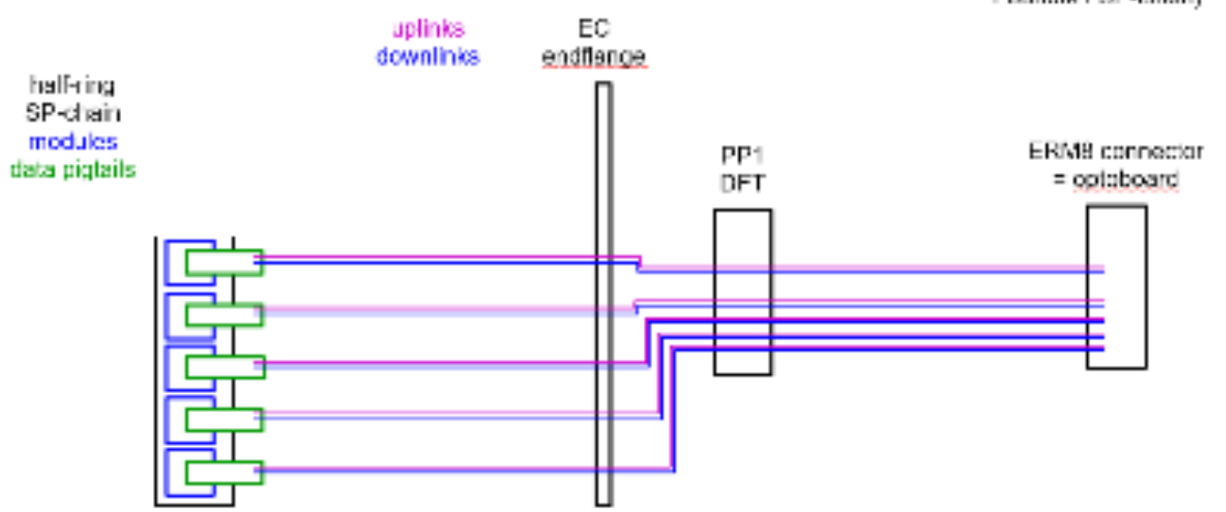
14 bundles / half cylinder
(7 half rings * 2 SP chains
* 1 bundle / SP-chain)



Cable Bundles – Layer 4, R01-R07 b

- Layer 4: R01-R07 – 5 modules/ bundle
  - 2 Twinax / module: 10 Twinax / bundle

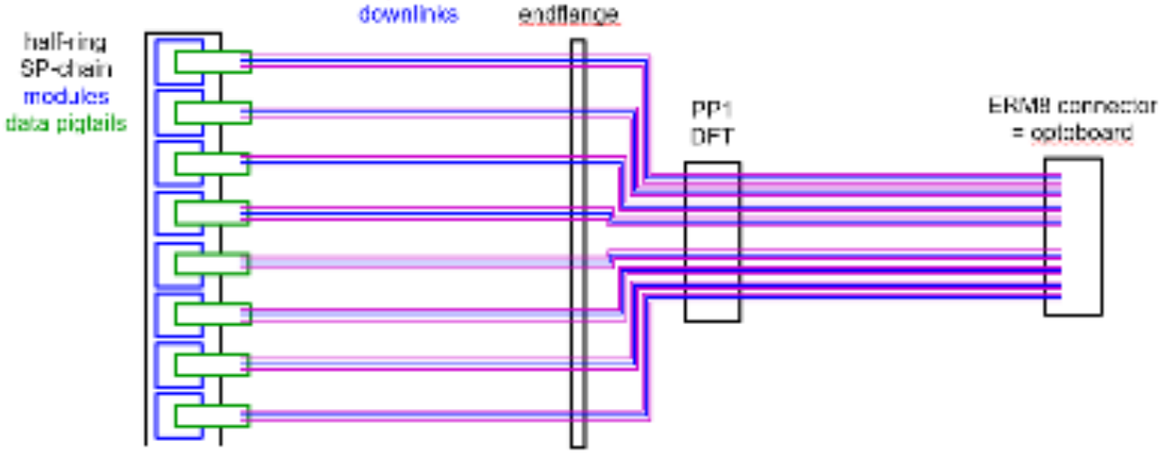
14 bundles / half cylinder
(7 half rings * 2 SP chains
* 1 bundle / SP-chain)



Cable Bundles – Layer 4, R08-R09 a

- Layer 4: R08-R09 – 8 modules/ bundle
  - 3 Twinax / module: 24 Twinax / bundle

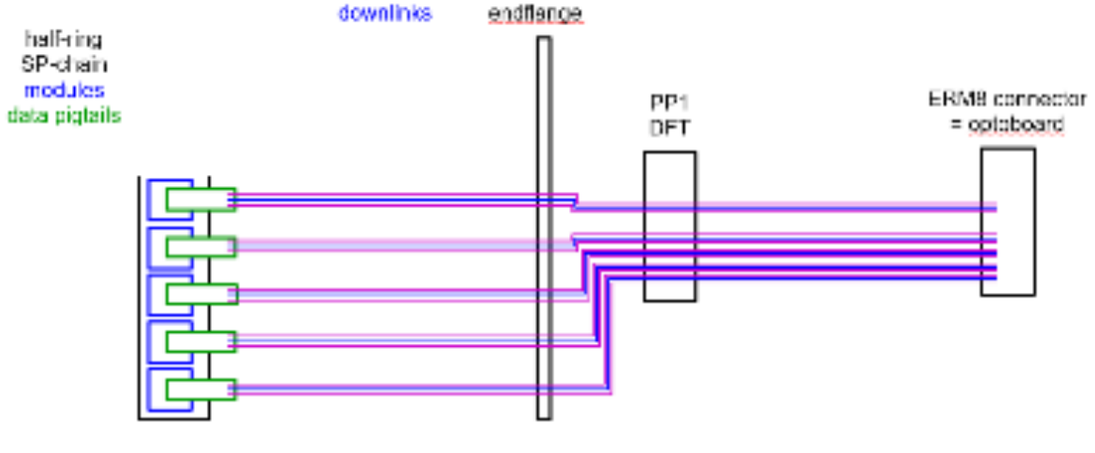
4 bundles / half cylinder
(2 half rings * 2 SP chains
* 1 bundle / SP-chain)



Cable Bundles – Layer 4, R08-R09 b

- Layer 4: R08-R09 – 5 modules/ bundle
  - 3 Twinax / module: 15 Twinax / bundle

4 bundles / half cylinder
(2 half rings * 2 SP chains
* 1 bundle / SP-chain)

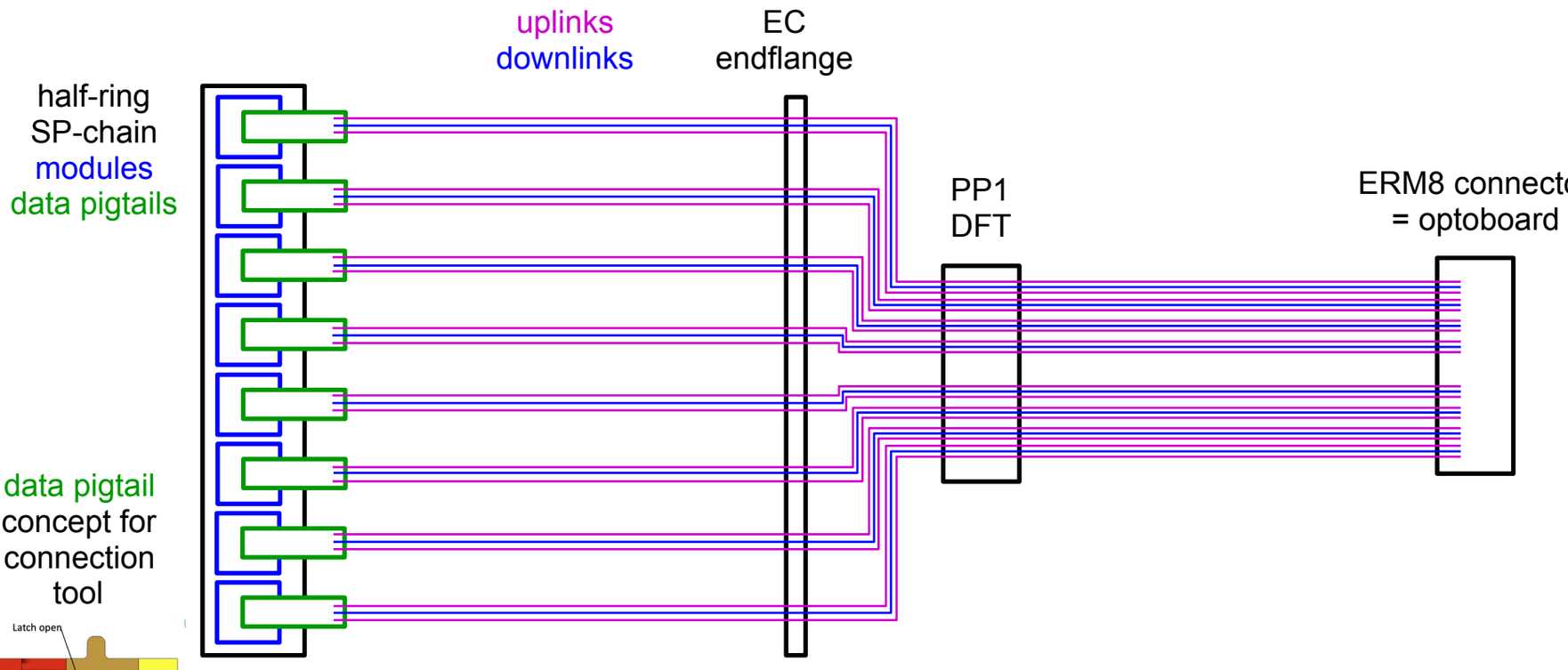


Type 1 service: option 1

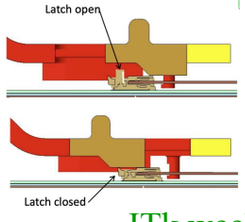
Option 1: cable looming outside endcap

- Layer 2: R01-R05 – 8 modules/ bundle
  - 3 Twinax / module: 24 Twinax / bundle

10 bundles / half-cylinder
(5 half-rings * 2 SP-chains
* 1 bundle / SP-chain)



data pigtail
concept for
connection
tool



data pigtail
flex connector
to module

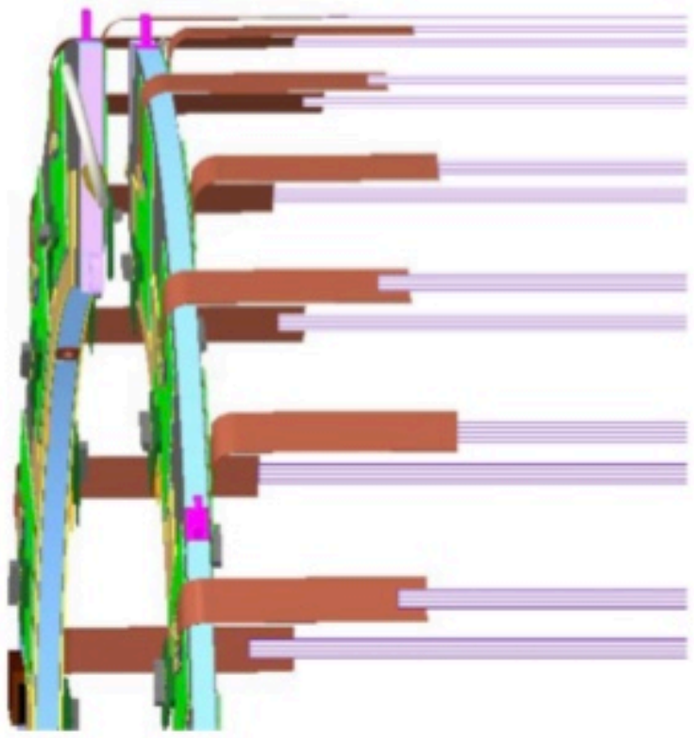
data pigtail
solder connection
to Twinax

ITk week, Pixel Services, 24.09.2020 Stephan Eisenhardt

Data pig tail

Molex ZIF Mating connector

Samtec Firefly Connector oppure twinax saldato direttamente su pig tail



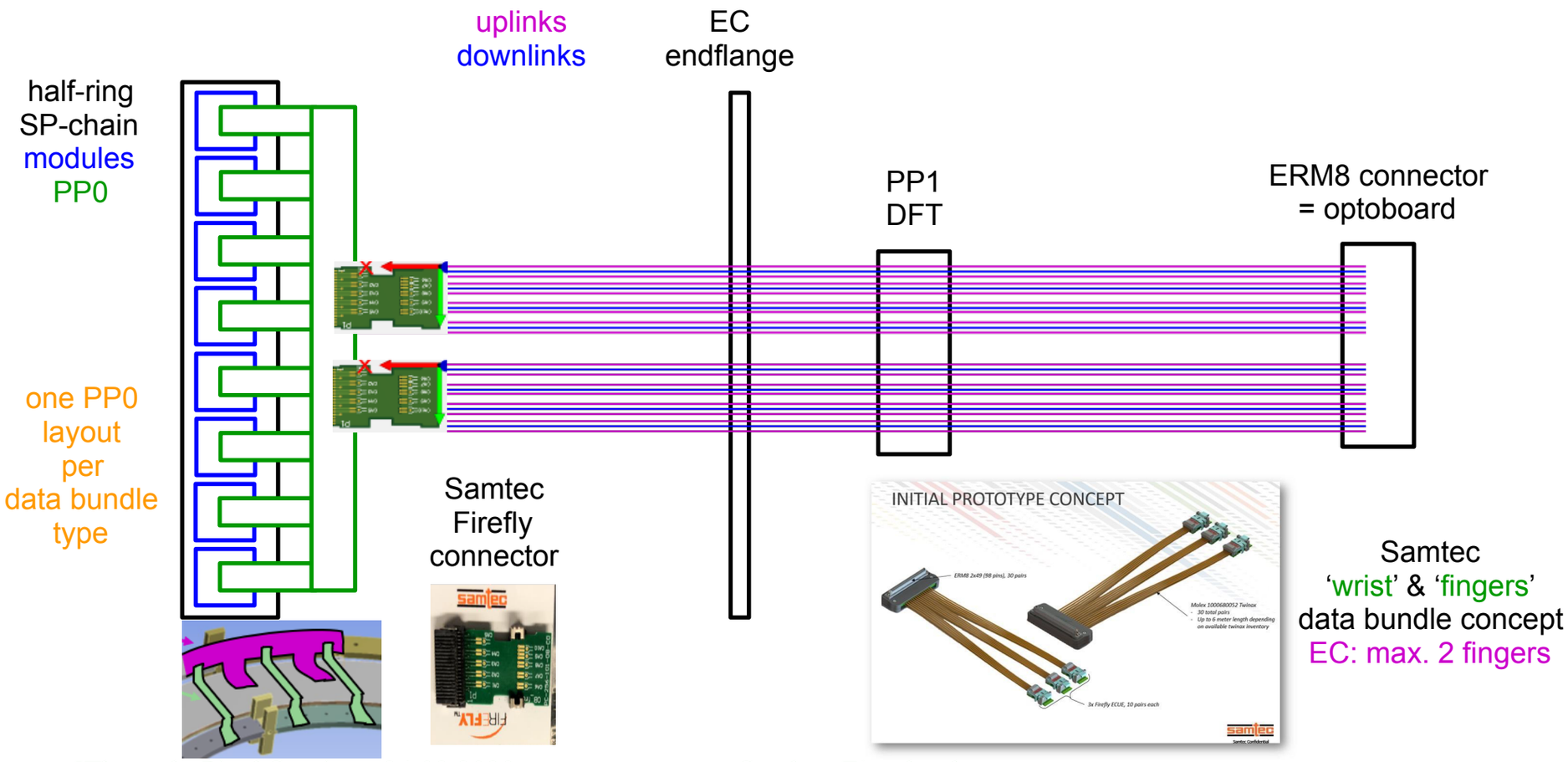
Current design here

Type 1 service: option 3

Option 3: PP0 flex(s) for looming

- Layer 2: R01-R05 – 8 modules/ bundle
  - 3 Twinax / module: 24 Twinax / bundle

10 bundles / half-cylinder
(5 half-rings * 2 SP-chains
* 1 bundle / SP-chain)

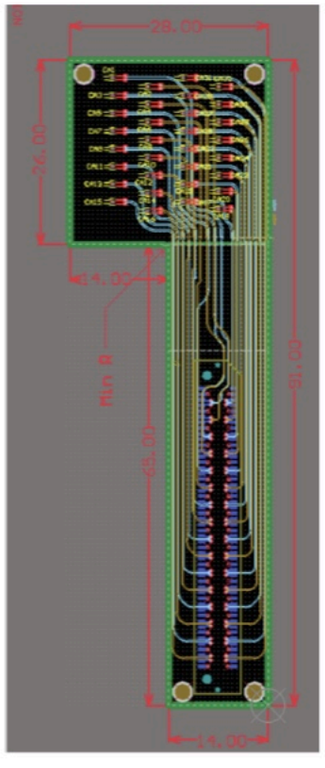


Samtec
'wrist' & 'fingers'
data bundle concept
EC: max. 2 fingers

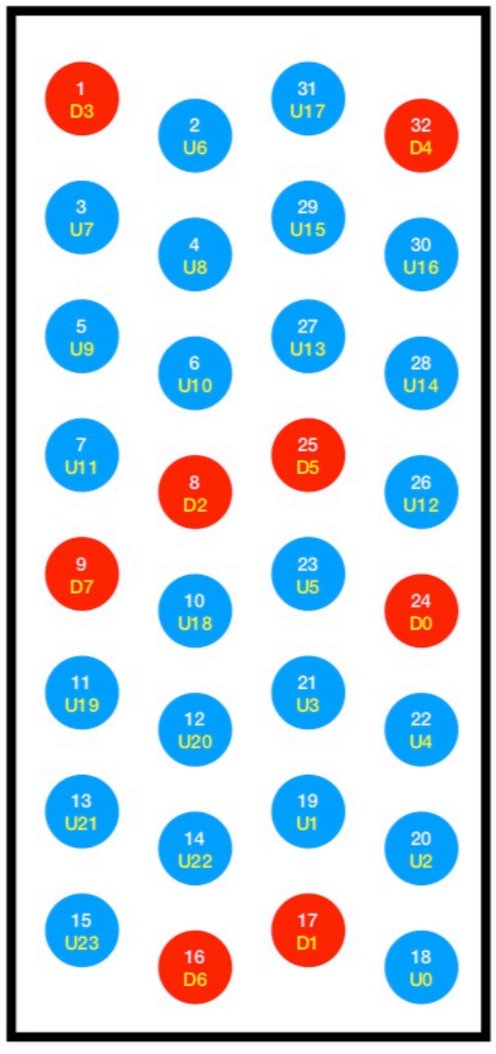
Terminazione optoboard

Termination board — Pinout

* Pinout of the ERF8 connector defined by the pinout of the mating connector on the Optoboard
* Correspondence between the soldering pads on the rigid PCB and the signal paths defined by routing on the board



Pinout Twinax cables at rigid PCB



Pinout ERF8 connector