

Versatile Link Plus Status Report

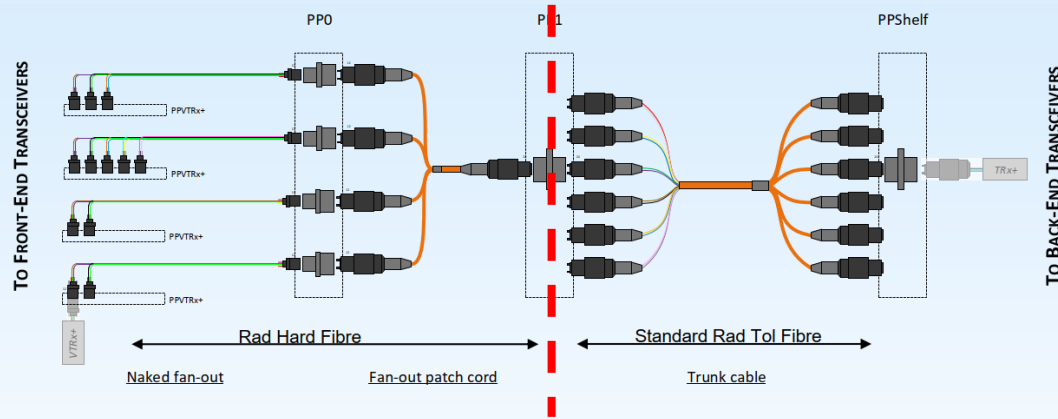
WP5 – Passive Components

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CERN EN-EL-FO

- **Introducing WP5**
- **Contract readiness.**
- **Update from the subdetectors.**
- **Subdetector planning update.**
- **QC.**
- **Modification Requests.**

Introducing WP5

- Defining a cabling plant optimized to meet the specific requirements of the CMS and ATLAS subdetectors



- Harsh environment
 - Temperature down to -35C
 - Magnetic field up to 4T
 - Radiation dose up to 1 MGy
- Standard industrial environment

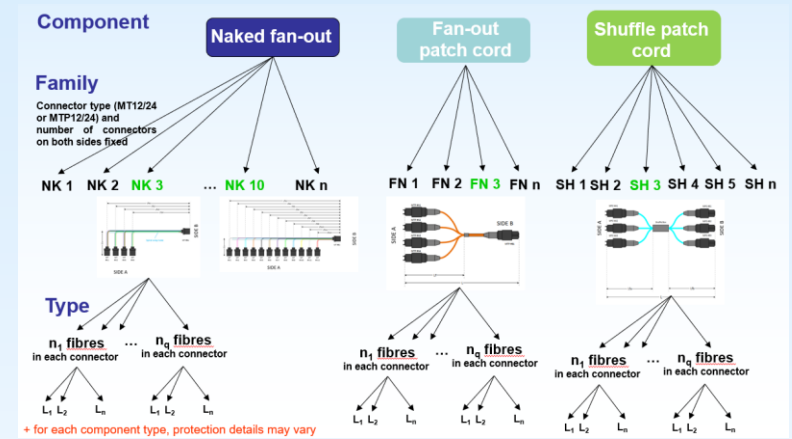
- Versatile Link Plus project requires the development of a radiation resistant data link:

- Up to 10 Gb/s data rate upstream and 2.5 Gb/s downstream over ~100m
- Based on Multi-Mode Fibres (MMF) operating with a centre wavelength of 850 nm
- Concatenation of different types of fibres suited for different radiation levels

Procurement Strategy

- **Patch Cords supplied through Dedicated contract awarded in Sept 2022**
 - Flexible catalogue to take into account the diverse and specific needs of each subdetectors... still trying to be as standard as possible.
 - Competitive prices
 - US Conec connectors, convention & radiation resistant fibres

- **Trunk cables supplied through the CERN frame contracts**
 - US Conec connectors, convention fibres



Dec 23

Mar 24

Oct 24

● Q4 deliverables:

- ✓ Pre-series validation completed
- ✓ Start series production

● Q1 deliverables:

- ✓ Series production follow up
- Request subdetector planning

● Q3 deliverables:

- ✓ Series production follow up
- ✓ Analyse subdetector replies

● First CERN **final series orders have been placed** to OPTEC:

- 10 orders for final series placed.

● Final series production **request arriving slowly**, request for information sent to the subdetectors:

- Date of readiness for ordering series production.
- Latest delivery dates of material to be delivered.

Update from the subdetectors

- Almost every subdetector completed pre-series:

Subdetector	OVERVIEW			PATCH CORDS		TRUNK		PRE-SERIES	Contact person	Email Planning
	Cable plant	Quantity	Rad Hard Fiber	Quantity	Flavours	Quantity	Follow up	Follow up		
ATLAS HGTD	-	-	ok	60	7	45	ok	Completed	Sergei Malyukov	Planning provided
ATLAS ITK Pixel	ok	ok	ok	374	6	56	ok	Completed	Aaron Paul O'Neill	Acknowledged
ATLAS ITK Strip (Barrel)	ok	ok	ok	148	4	20	ok	Completed	Tony Weidberg	Planning provided
ATLAS ITK Strip (End Caps)	ok	ok	ok	70	1	10	No feedback	Completed	Pepe Bernabeu	Planning provided
ATLAS Lar	ok	ok	ok	638	1	200	ok	Completed	Luis Hervas	Not Responded
ATLAS Muon*	-	-	-	-	0	-	-	-	-	-
ATLAS TDAQ*	-	-	-	-	0	-	-	-	-	-
CMS ETL	ok	ok	ok	320	1	25	No feedback	Completed	Natalia Koss	Planning provided
CMS BTL	ok	ok	ok	171	1	20	No feedback	Completed	Joao Varela	Not Responded
CMS ECAL	ok	ok	ok	258	1	129	ok	Completed	Alexander Singovski	Planning provided
CMS HGCAL	ok	ok	no	2340	4	300	ok	Completed	Jan Troska	Acknowledged
CMS IT Pixel	ok	ok	ok	408	1	25	No feedback	Completed	Stella Orfanelli	Planning provided
CMS Muons*	-	-	-	-	0	-	-	-	Domenico Dattola	-
CMS OT Barrel (TB2S)	ok	ok	ok	739	1	50	No feedback	Completed	Antti Onnela	Acknowledged
CMS OT Barrel (TBPS flat)	ok	ok	ok	196	3	15	No feedback	Completed	Nicola Bacchetta	Not Responded
CMS OT Barrel (TBPS tilted)	ok	ok	ok	338	1	30	No feedback	Completed	Antti Onnela	Acknowledged
CMS OT TEDD	ok	ok	ok	3046	6	100	No feedback	Completed	Christophe Delaere	Planning provided
TOTAL				9136		1025				

*Subdetectors out of the VL+ project procurement.

- CMS GEM requested procurement of new fibre optical components for detector upgrade:
 - Requested radiation resistant OM3 and OM4 trunk cables and pcord.

Analysis in progress to see if this request can be added to the VL+ project

Courtesy of
R. Carnesecchi

● QC performed on 27 orders:

Description	Order sent	Order Status	Reception Date	Production time days	Quantity Received	Visual Tests	Optical Tested	Estimated Test time [h]	Actual Test Time [h]	Quantity Non-conform	Non-conformity
VL+: ATLAS HGTD pre-series I	4/24/2023	Collected	6/27/2023	64	13	13	2	8	8		
VL+: ATLAS ITk Strip Barrel pre-series I	4/24/2023	Collected	8/3/2023	101	15	15	2	8	8		
VL+: CMS ETL pre-series I	4/24/2023	Collected	6/19/2023	56	7	7	2	8	8		
VL+: ATLAS ITk Strip End Cap pre-series I	4/24/2023	Collected	6/19/2023	56	4	4	2	8	8		
VL+: CMS TEDD pre-series I	4/24/2023	Collected	7/4/2023	71	24	24	2	8	8		
VL+: CMS BTL pre-series I	4/24/2023	Collected	6/27/2023	64	11	11	2	8	8		
VL+: ATLAS ITk Pixel pre-series I	4/24/2023	Collected	8/3/2023	101	10	10	2	4	4		
OF trunk VL+ / AT B – pre-series I	4/24/2023	Collected	6/13/2023	50	1	1					
OF trunk VL+ / AT HGTD – pre-series I	4/24/2023	Collected	6/13/2023	50	1	1	1	4	4		
OF trunk VL+ / CMS ETL – pre-series I	4/24/2023	Collected	6/13/2023	50	1	1				1	wrong DL
VL+: CMS TBPS-FLAT pre-series I	4/27/2023	Collected	7/4/2023	68	24	24	1	4	4		
OF trunk VL+ / CMS TF – pre-series I	4/27/2023	Collected	6/13/2023	47	2	2					
VL+: CMS IT Pixel pre-series I	4/27/2023	Collected	7/4/2023	68	12	12	2	4	4		
OF trunk VL+/CMS IT Pixel – pre-series I	4/27/2023	Collected	6/13/2023	47	2	2					
OF trunk VL+/CMS TBPS – pre-series I	4/28/2023	Collected	6/13/2023	46	1	1					
VL+: CMS TB2S pre-series I	4/28/2023	Collected	7/4/2023	67	8	8	2	4	4		
VL+: CMS TBPS tilted pre-series I	4/28/2023	Collected	7/4/2023	67	6	6	2	4	4		
OF trunk VL+ / CMS EC – pre-series I	4/24/2023	Collected	6/13/2023	50	4	4	1	4	4		
VL+: CMS ECAL pre-series I	5/2/2023	Collected	8/3/2023	93	6	6	2	8	6		
VL+: accessory stock	6/16/2023	Collected	7/4/2023	18	0	0	n.a	0	0		
VL+: CMS BRIL PRE-SERIES I	11/14/2023	Collected	19/01/24	66	2	1	1	2	2		
VL+: ATLAS ITk STRIP END CAP SERIES I	11/14/2023	Collected	15/04/24	153	36	3	2	8	10		
VL+: ATLAS ITk STRIP BARREL SERIES I	11/14/2023	Collected	19/01/24	66	10	5	2	10	12		
VL+: ATLAS ITk Strip Barrel series I	11/21/2023	Collected	16/01/24	56	5	1	1	4	4		
VL+: ATLAS ITk Strip End Cap series I	11/21/2023	Collected	16/01/24	56	30	4	4	8	8		
VL+: CMS TEDD small hardware	11/24/2023	Collected									
VL+: ATLAS ITk PIXEL SERIES I	2/20/2024	Collected	28/05/24	98	36	3	3	16	16		
OF trunk VL+ / AT px – pre-series I	4/24/2023	Collected	6/13/2023	50	1	1					
CMS BTL series 1	27/06/2024		24/09/24								
ATLAS ITk Pixel	1/7/2024										
VL+: CMS TEDD	8/28/2024										
VL+: CMS OT STRIP BARREL	8/28/2024										
CMS OT Barrel adaptors	8/27/2024										
CMS ECAL fanout & adaptors	9/26/2024										

10% min. sample rate optically tested.

● 118 hours of QC testing for 170 samples:

- Important to understand when the order will be place to **guarantee QC can be performed within provided deadline.**

QC results meeting our expectations and requirements.

- Received modifications requests:
 - Supply of different coloured fibre cables → **REJECTED.**
 - Supply of ribbonized cables → **REJECTED.**
 - Length modification → **APPROVED UNDER CONDITIONS.**
 - Connector modification → **APPROVED UNDER CONDITIONS.**

Small modifications are allowed (length, connector type,...) but only as long as it is included in the frame of the contract.

- Every modification requires **update of the component datasheet**
 - Bigger number of components:
 - Increases chances of productions mistakes.
 - Longer delivery time.
 - Longer QC time.

- Prototype phase is complete, **ready for series production**.
 - Orders are slowly arriving and are under analysis.
- Still **missing vision on the series production** of some subdetectors:
 - ATLAS ITK PIXEL
 - ATLAS LAR
 - CMS BTL
 - CMS HGCALE
 - CMS OT BAREL

Required to prepare a well-organised plan and allocate resources appropriately.
Necessary to understand what are the showstoppers in order to find possible solutions.

- **Good quality of the components** highlighted by the QC performed at CERN.
- Too many length and connector modifications received, **subdetector should start to freeze the designs**.