

Status of cables and connectors between MU barrel detectors and towers

MU Barrel Technical board

7 December 2004


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Status of cables

I'm going to cover the following points

- . **Definition of materials**
- . **Status of PRR**
- . **Procurement of cables**
- . **Cutting Lengths' status**
- . **Time estimation**

Definition of materials

- Concerning **MB** and **RB**, there are still some problems
 - **DT Fibers.**
This is the real worry thing. At present we don't know which kind is to be used
 - The final connectors specification for the DT's TR and RO cables (**MB.CA.tr / MB.CA.ro**).
Is the interference with FE cables still unsolved ? 
 - A CMS statement which accepts the **connectors** proposed by **CAEN** for *EASY LV* sys.
 - The last version is that proposed by S. Lusin.
 - Matteo is still waiting the EASY LV prototype with these new connectors, so he hasn't released a evaluation about.
 - **What about their procurement ?** How long is it ?
- **Alignment** cables (about **3%** of the Barrel total, list maintained by *E. Calvo Alamillo IFCA*)
Status will be reported by Enrique tomorrow during MU integration.
- **HO** cables
Status will be reported by Pawel next THURSDAY during the cabling whorkshop

Status of PRR procedure – RB and MB cables

- **HV cables** (about 12% of the total BARREL cables)

Both HV cables for MB and RB **was approved and checked with fire test.**

- **LV cables (9%)**

MB.LV.fe	(2.5%, DT's FE):	Approved, Fire test passed.
RB.LV.fe-#	(4%, RPC's FE):	Approved, Fire test passed.
MB.LV.mc	(2.5%, DT's minicrate):	Document done. Fire test to be done.

- **Optical Fibers (5%)**

MB.OF.ttc-mc	(2.5%, DT's ttc):	<i>NOT DONE because <u>cable</u> is not fully defined.</i> Fire test to be done.
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MB.OF.sc	(2.5%, DT's slow ctrl):	Approved, Fire test passed. but it could be changed (ARMORED FIBERS ?)
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- **Signal cables (72%)**

RB.CA.sgn	(50%, RPC's trigger):	Document done. Fire test to be done
MB.CA.tr & ro	(10%, DT's TR & RO):	<i>NOT DONE because <u>connectors</u> aren't fully defined.</i> Cables passed the Fire test passed. 📄

RB.CA.dcs-# & t-sens	(7%):	They changed few weeks ago, now from NOVACAVI. Documents almost done. Fire test to be done
MB.CA.sc	(2%):	Under working now, comes from CERN STORE.
MB.CA.veto	(3%):	CERN STORE DOESN'T SUPPLY ANYMORE THIS. I'M WAITING FOR A DECISION FROM PADOVA

Procurement of cables – RB and MB cables

- **HV cables (12%)** for both MB and RB was procured and delivered at CERN.
- **LV cables (9%).**
 - MB.LV.fe (2.5%): Already procured and delivered at CERN.
 - RB.LV.fe-# (4%): Already procured and delivered at CERN.
 - MB.LV.mc (2.5%): *Aachen should be ready to place order to **NOVACAVI**.*
Delivery time is about **6 weeks** for the **FULL PRODUCTION**.
- **Optical Fibers (5%)**
 - MB.OF.ttc-mc (2.5%) } **THESE ARE NOT FULLY DEFINED.**
 - MB.OF.sc (2.5%) } Furthermore *They will need cutting lengths* in order to place the order to **UNIFIBRE**.
Delivery time is *4 weeks* for the SECTOR TEST Q.TY.
- **Signal cables (72%)**
 - RB.CA.sgn (50%): Ordered from KABELWERK and NOVACAVI for the sector test.
 - MB.CA.tr & ro (10%): Bologna is ordering from DAETWYLER.
Soon they will need space to store a big amount of cable.
 - RB.CA.dcs-# & t-sens (7%): INFN is ordering in these days.
They will be delivered at beginning of **Feb. '05**
 - MB.CA.sc (2%): Already procured the q.ty from CERN STORE for the SECTOR TEST.
 - MB.CA.veto (3%): **NOT FULLY DEFINED**

STATUS OF CABLES

Cable name	Supplier	Respons. person	% length	PRR status	Order status (full prod.)	Delivering time		Manufacture time (working weeks)		
						sect test	full prod.	sect test	1 wheel	5 wheels
MB.LV.mc	NOVACAVI	Willmott	2.3	not tested	ordering ¹⁾	6 w (full prod.)		2 w	not specified	not specified
MB.LV.fe	INTERCOND	Pegoraro	2.3	done	delivered	delivered	delivered	2 w @ ISR	3 w @ ISR	12w @ ISR
MB.HV	KERPEN	Borsato	6	done	delivered	delivered	delivered	done	done	done
MB.OF.ttc-mc	UNIFIBRE	Bellato	4	not def.	not ordered ²⁾	4 w (with con.)	6 w (with con.)	delivered with connectors		
MB.OF.sc	UNIFIBRE	Bellato	4	done but ..		4 w (with con.)	6 w (with con.)	delivered with connectors		
MB.CA.sc	CERN STORE	Bellato	1.5	CERN store	not ordered ³⁾	delivered	6 w (worst)	2 w @ PD		
MB.CA.veto-5	NOVACAVI	Bellato	4	not tested	not ordered ⁴⁾	6 w (full prod.)		2 w @ PD		
MB.CA.tr	DAETWYLER	Odorici	7.8	tested	ordered	begin. of Feb. '05 (full prod.)		2 w @ ?		6 w @ DAETWYLER
MB.CA.ro			7.8	tested						

RB.LV.fe-8	NOVACAVI	Ranieri	2.8	done	delivered	delivered	delivered	3 w	3 w	5 w
RB.LV.fe-12	NOVACAVI	Ranieri	0.5							
RB.HV	NOVACAVI	Ranieri	6	done	delivered	delivered	delivered	3 w	3 w	5 w
RB.CA.sgn	NOVACAVI	Ranieri	43	not tested	CERN tender	20.12.04	20 [Km/m]	3 w	3 w	6 w
RB.CA.dcs-6	NOVACAVI	Piccolo	3.2	not tested	ordering ⁵⁾	begin. of Feb. '05 (full prod.)		3 w	4w @ ? (tbv)	6 w @ CPE
RB.CA.dcs-9			0.6							
RB.MCA.t-sens			3.2							

WORST CASE	4 w (DT fibers)	> 6 w (DT fibers)	> 12 w (MB.LV.fe)
CUTTING LENGHTS TIME LIMIT (respect schedule 4.10.04 AB)	end Jan. '05	end Feb. '05

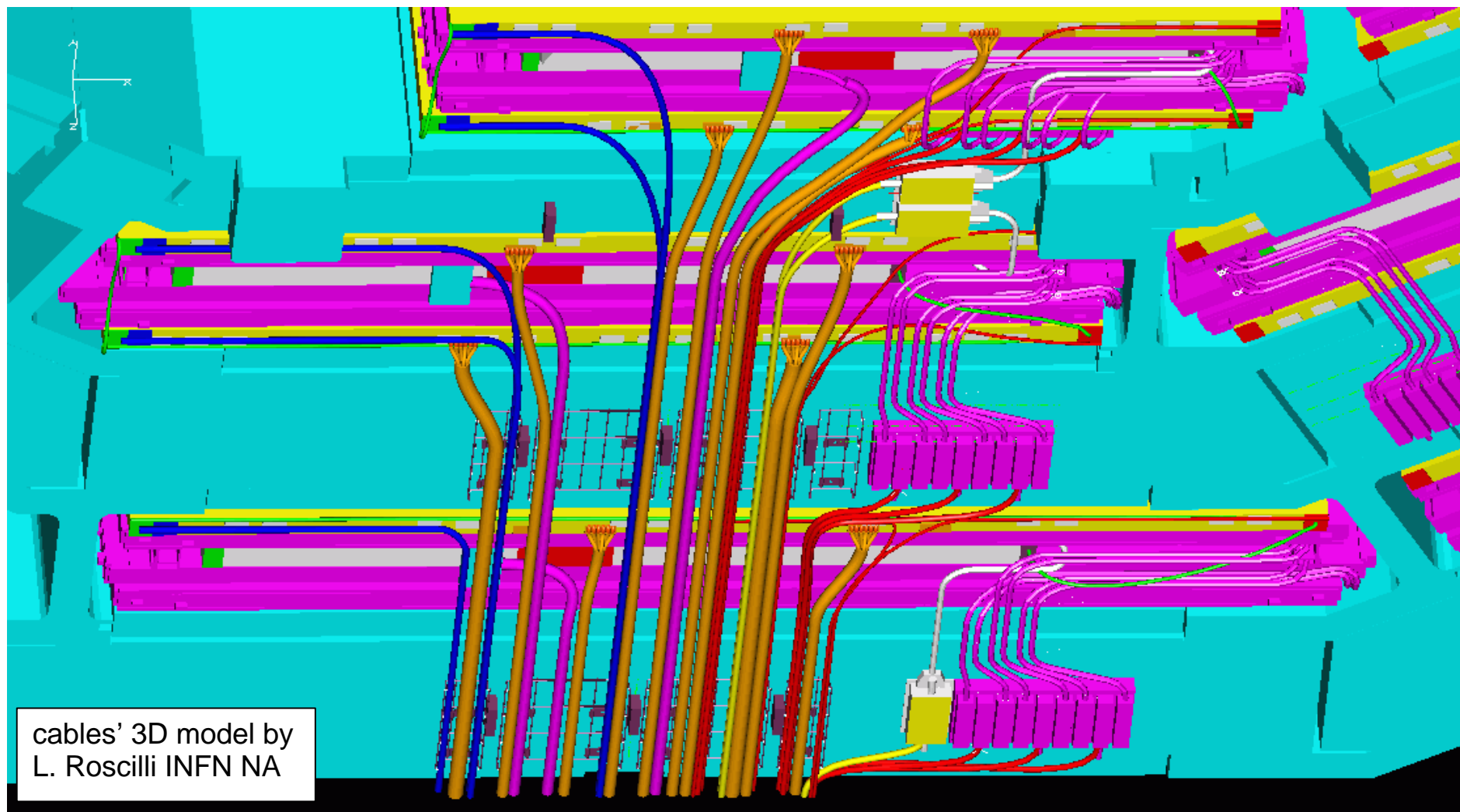
REMARKS

- 1) Aachen is waiting the new NOVACAVI's offert (old was expired) from MADRID. The offert should be ready in few days.
- 2) THU. 9, DEC. there will be a workshop in which should be chosed the kind of fiber (ARMORED or with PLASTIC TUBE) and its routing (RADIAL or UNDER MAB)
- 3) It's confirmed to be a CERN STORE cable. Next days I will ask for the PRR procedure.
- 4) Not yest fully defined. Goods news during this CMS weeks.
- 5) Just the time to complete the INFN internal administative procedure, few days.

Cutting Lengths for ext. wheels — RADIAL LENGTHS 1/4

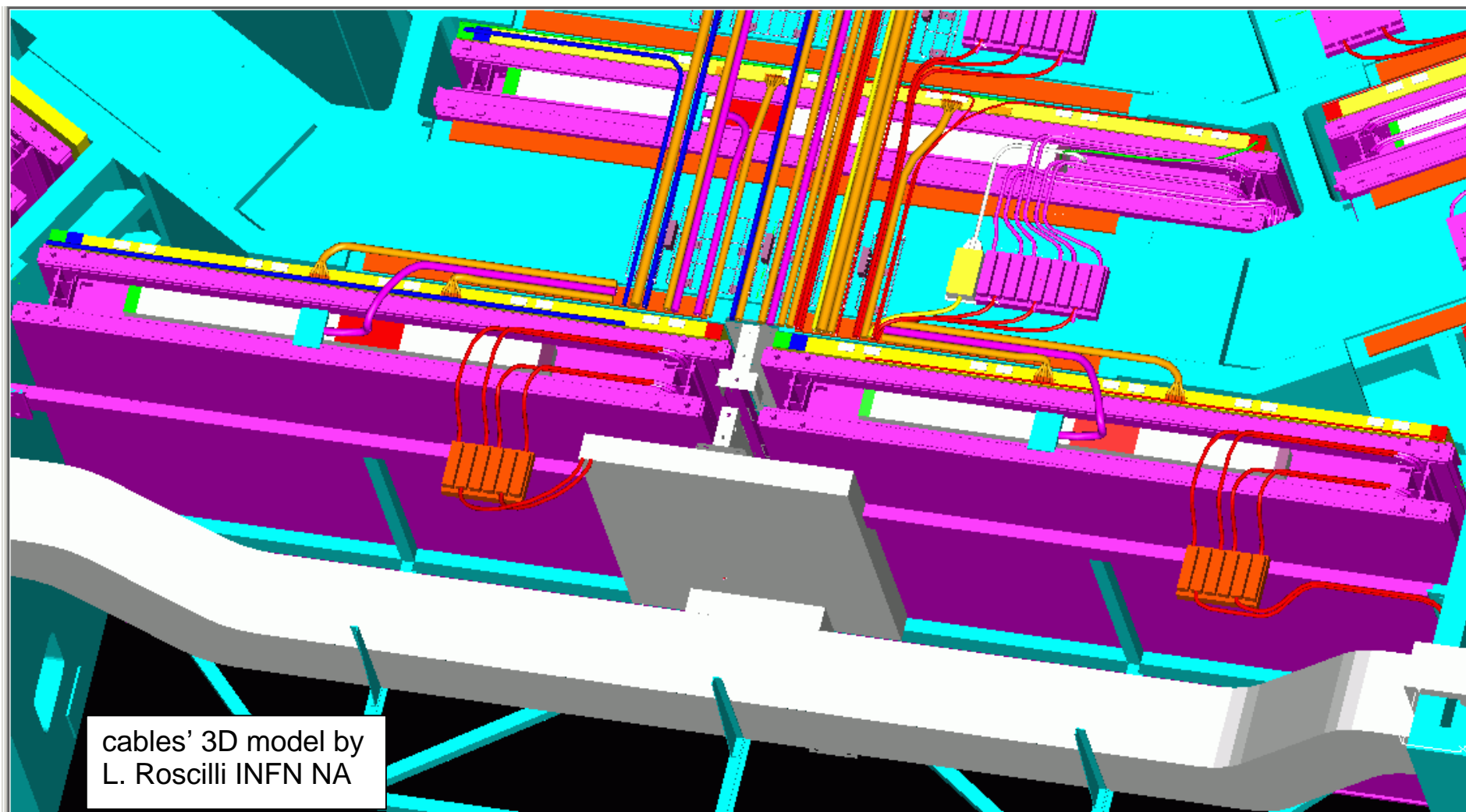
- **Lorenzo almost done the ZpL and ZpR layouts** (which define cables for layers 1,2 and 3)
He is now particularizing these layout to the MB4 of YB2 S10 and S11.
In the next days he should be able to produce the table with the radial lengths and the offsets respect the conventional point on the iron external corner.
- Although is not possible to make a real separation between cables of different groups **should be possible to use some marker** (colored panduits, AI separator with label...)
Does Someone know something useful about this subject ?
- **HO cables accomodated in the radial layouts** (very close to the layer 1 ch., 2+2 cm wide)
- **Putting DT fibers below the mabs, is it possible ?** (Discussed in details next **THURSDAY**)
- **Still to be done**
 - cross check for all position of minicrate and its connectors, holes on carter, split board....
The source of all these info is PD, so the check should be done there.
I asked Lorenzo to export a dwg with these infos for what done up today.
 - ZmL and ZmR layouts and their particularizations with layear 4
 - table with lengths and offsets

Cutting Lengths for ext. wheels – RADIAL LENGTHS 2/4



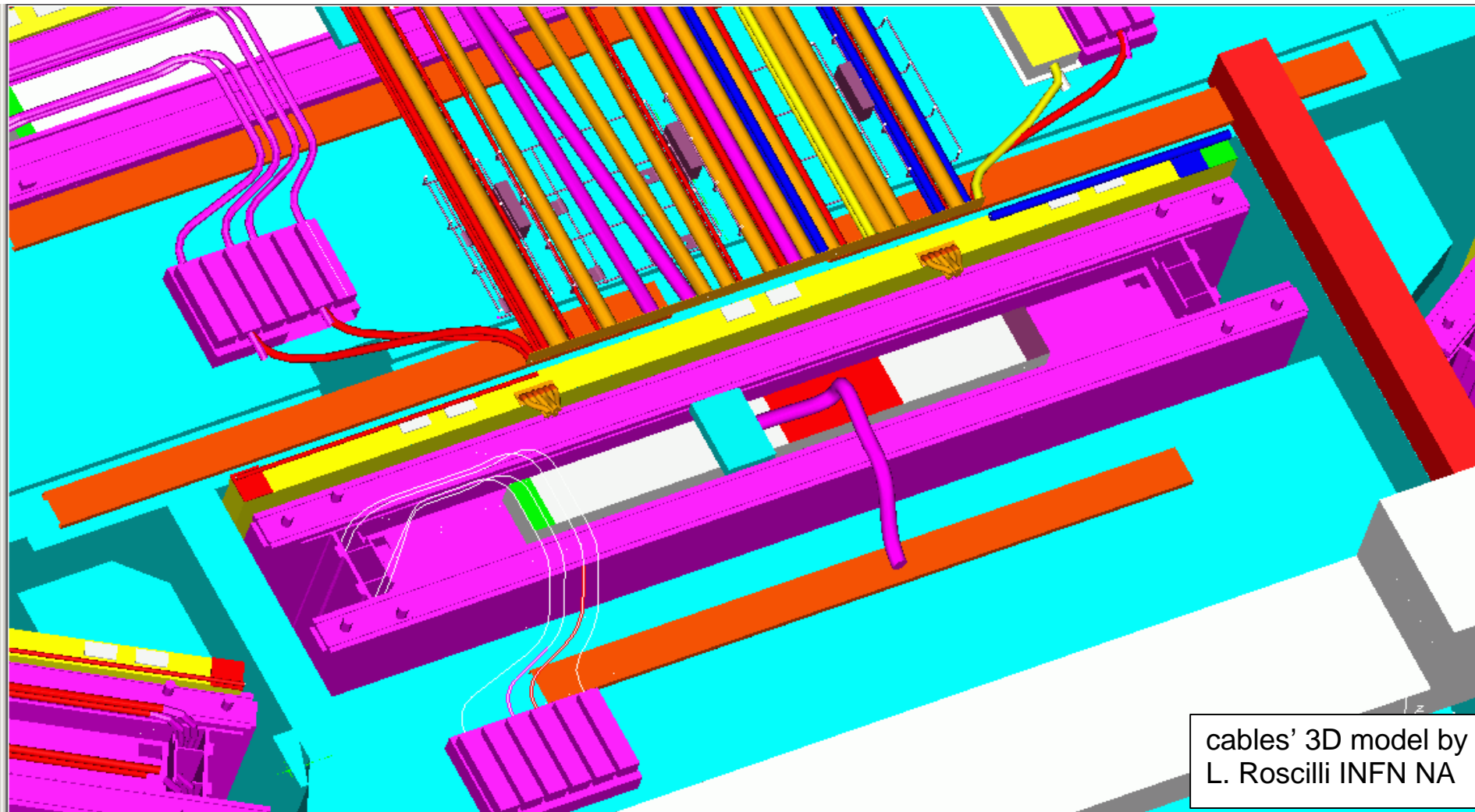
YB+2 Sector 10 (ZpL layout)

Cutting Lengths for ext. wheels – RADIAL LENGTHS 3/4



YB+2 Sector 10, layer 4 details (ZpL layout)

Cutting Lengths for ext. wheels — RADIAL LENGTHS 4/4



YB+2 Sector 11, chamber inside foot (ZpR layout)

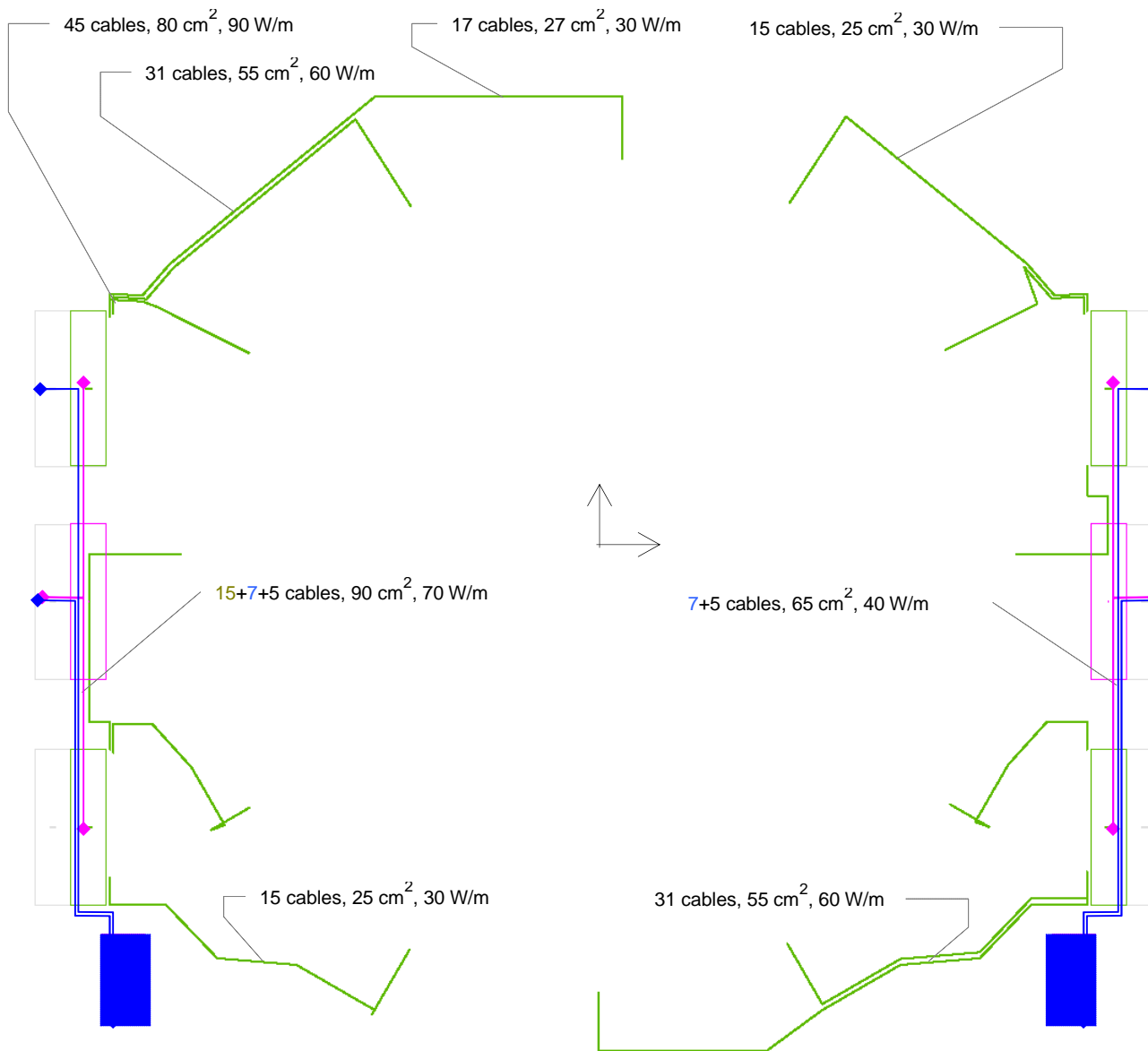
Cutting Lengths for ext. wheels — TOWERS' BALCONIES AND FEET PATCH PANEL

- **Lowest diving boards cannot be drilled as needed. We propose to lift up racks putting a base of about 25 cm. Anyway front access to the rack has to be by holes.**
- **To cut cables means to freeze the crate layout. No major modification will be possible after. Present assumptions:**
 - **AC/DC converters for LV power supplies** in the central balconies (ext. wheels) (but last week RPC asked for 3 extra U/quadrant in order to accommodate the CAEN's AC/DC boxes inside the LV racks..Matteo is against..Carlos ?. the question is still open!)
 - **Inner racks will have only front access** (EASY LV crates, DT Slow ctrl patch panel, AC/DC boxes ...)
 - DT's **SECTOR COLLECTOR CRATES** all inside the lowest nearest ($X>0$) balcony
 - RPC's **Link board crates** always in the top and bottom of the external racks (6 per wheel)
- **Some crates have already a well defined position inside racks, others not.**
 - About lengths inside rack, 2 possibilities:
 - exact length (we need a CAD study, who can make this ?)
 - roughly worst approximation
 - Extra lengths about 1.5 m. To be stored
 - on 'mesh' below highest and middle diving boards
 - inside feet and below the racks' new base in the lowest diving boards
 - Same for the feet patch panels

Cutting Lengths for ext. wheels — PERIPHERAL LENGTHS

- **Mechanical studies are now in progress for the feet area of external wheels (see Domenico presentation)**
- **Highest sectors don't need particular studies. There it needed some CAD study in order to extract lengths between well defined points.**

Routing and cutting lengths – LV full system



LV cables

PER 1 SECTOR

MB.LV.mc	4-5 cables,	15 cm ² ,	25 W/m
MB.LV.fe	4-5 cables,	7 cm ² ,	3 W/m
RB.LV.fe-8	5-6 cables,	4 cm ² ,	1.5 W/m
RB.LV.fe-12	1 cable,	1 cm ² ,	0.5 W/m
Worst total	17 cables,	27 cm²,	30 W/m

BETWEEN 2 BALCONIES

MB.LV.48v_ux	3 cables,	27 cm ² ,	22 W/m
RB.LV.48v_ux 1-2	2 cables,	18 cm ² ,	15 W/m
Worst total	5 cables,	45 cm²,	37 W/m

BETWEEN FOOT PPanels & BALCONY

MB.LV.hv_ux	4-7 cables,	22 cm ² ,	0.7 [W/m]
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PACK FACTOR IS TO BE ADDED !

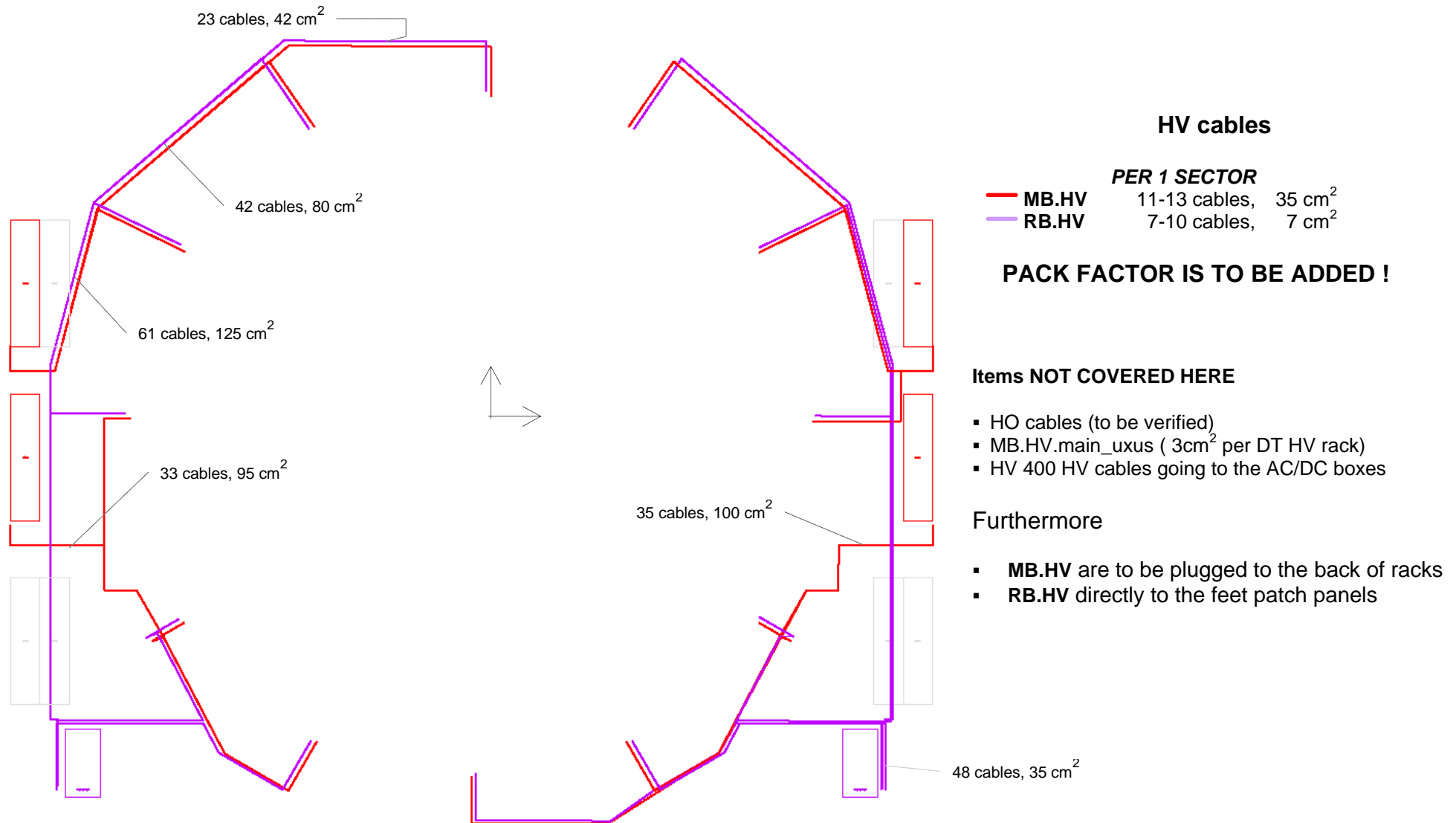
Items NOT COVERED HERE because their dissipation should be negligible respect the others above

- HO cables (to be verified)
- Alignment cables (Enrique confirmed this)
- The power 400Hz cables (Sergei confirmed this)

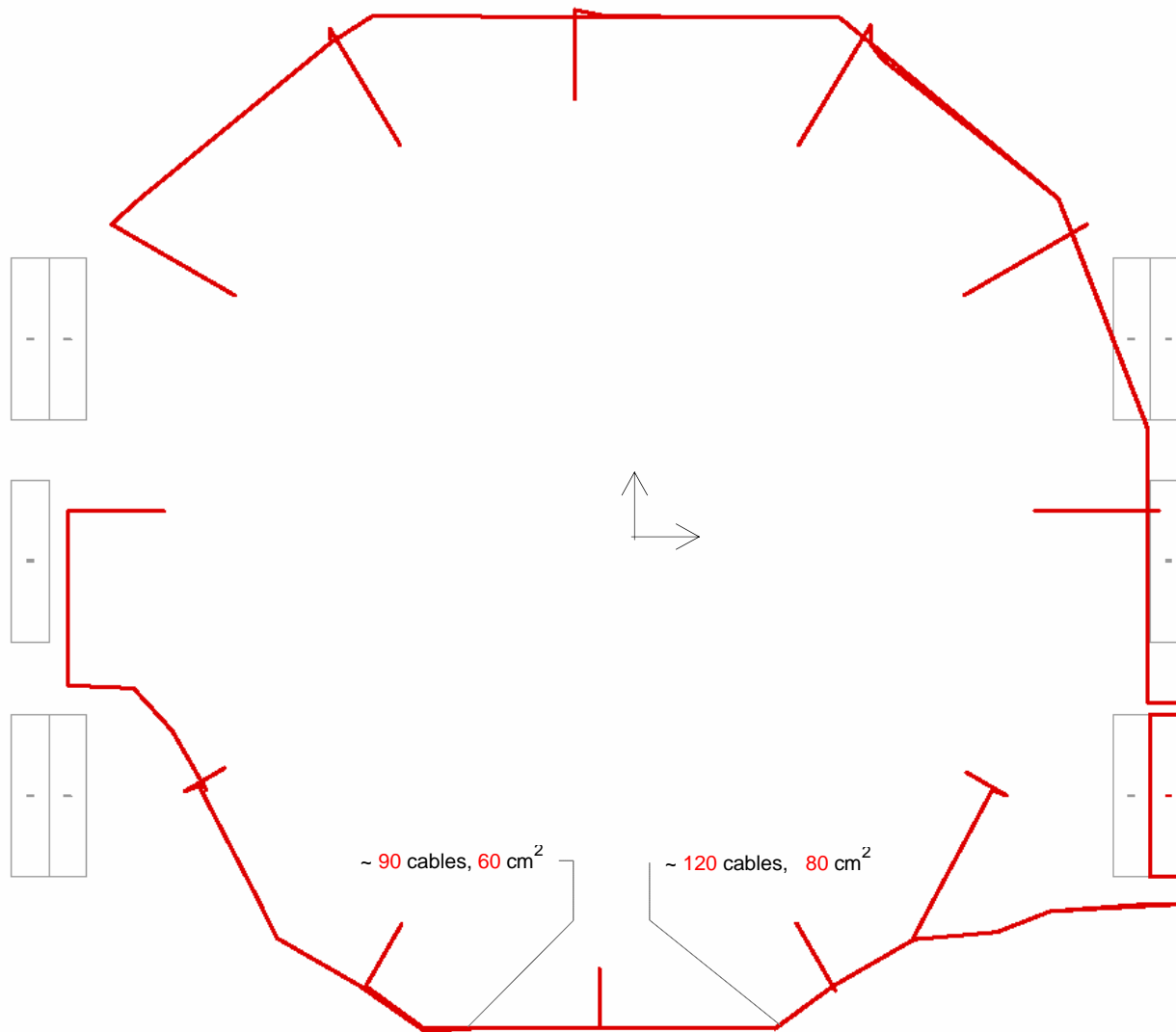
Furthermore, it's supposed that

- All cables are to be plugged to the front of racks
- Feet will be not cooled
- AC/DC boxes in the central balconies - inner side

Routing and cutting lengths – HV full system



Routing and cutting lengths – DT's TR, RO & sc



DT's TR, RO & sc cables

	<i>PER 1 SECTOR</i>
MB.CA.tr	8-10 cables, 5 cm ²
MB.CA.ro	8-10 cables, 5 cm ²
MB.OF.ttc-mc	4-5 cables, 5 cm ²
MB.OF.sc	4-5 cables, 5 cm ²
MB.OF.veto	1-2 cables, 3 cm ²
Worst total	25-32 cables, 23 cm²

Items NOT COVERED HERE

- MB.HV.sc copper daisy-chain

Furthermore

- All cables with front access only (to be verified)
- MB.CA.veto is a multi-cable
- Optical fiber aren't finalized !
- The MB4/9 and MB4/11 have to wait
 - DT's TR, RO & sc cables
 - HO cables
 - Alignment cables
 before to be installed.

About releasing cutting Lengths for ext. wheels

- **Sector test** (all cables of 2 sectors - scheduled in March '05 – about 1 month)

Assuming

- the worst manufacturing time as **4 weeks** (DT fibers)
- RPC group will help in preparing theirs lengths (Davide 2 weeks at cern ?)
- To transform all the mechanical studies (radial, peripheral, racks ..) in real cutting lengths we (me and the RPC person) will need **2 weeks** of work
- Integration office (Faber, Bally, Jan Bos ...) will be available to perform a cross-check in short time using the EDMS procedure


then **ALL THE MECHANICAL STUDIES IN THE FEET AREA** and the **RADIAL LENGTHS**

HAVE TO BE COMPLETED BEFORE 15 JAN '05

This means that all the involved person (Domenico, Lorenzo, me) have to work really FULL TIME on these items. Support from **Integration office** and **home institutes** is needed

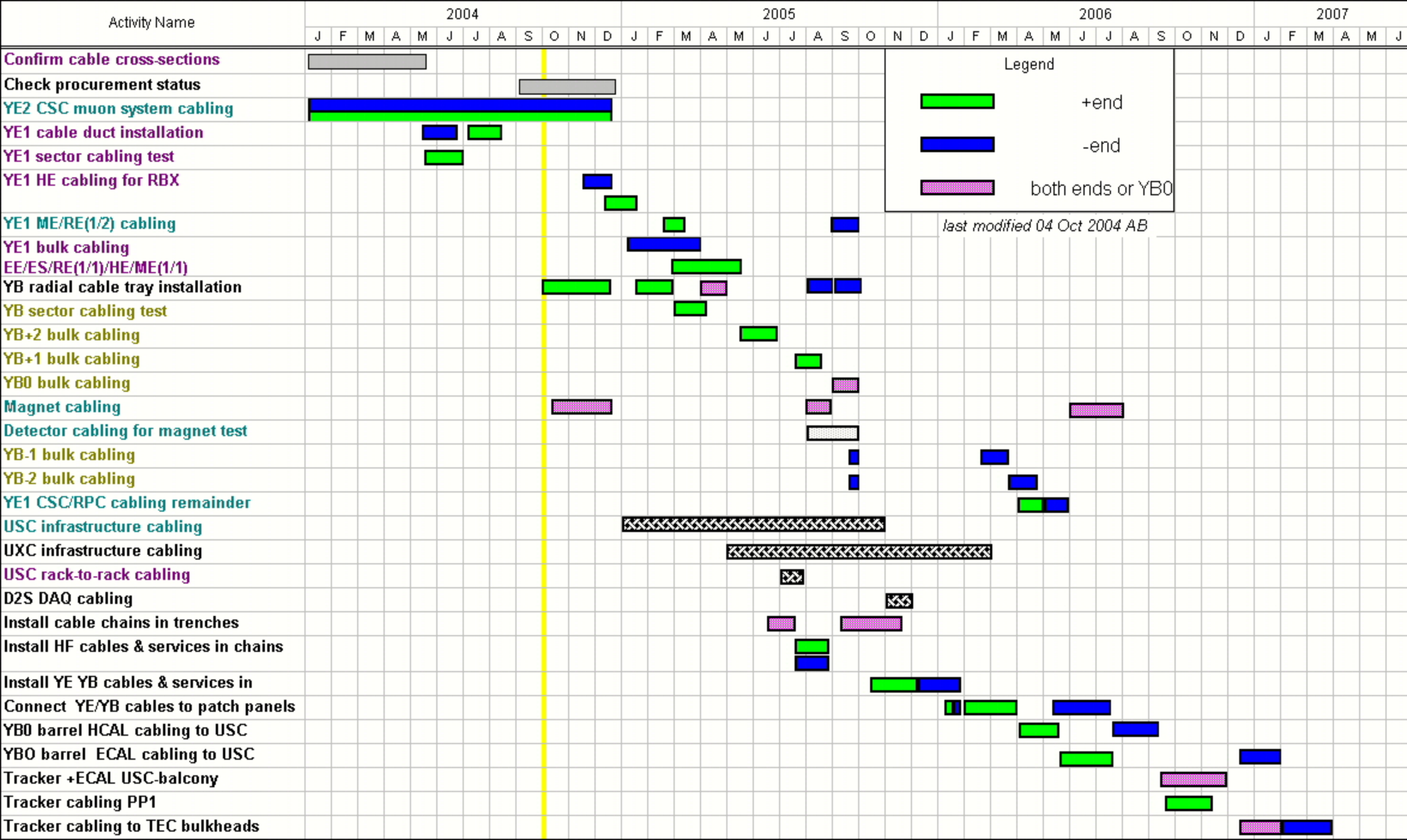
- **YB+2 installation** (scheduled in half May '05 – about 1 month) (**TO BE DISCUSSED NOW!**)

Assuming that (tbv)

- all cables will be delivered before end of FEB '05 (fibers excluded, need lengths) 
- March '05 spent in the test installation – no others works
- the worst manufacturing time 6 weeks per 1 wheel (**but not all time are well defined**)
- 3 weeks to produce the cutting list (FABIO + DAVIDE) from mech. studies.

ALL THE MECHANICAL STUDIES SHOULD BE COMPLETED BEFORE HALF OF FEBRUARY '05 (?)

- extension of this work to all external wheels.



SPARE GENERAL POLICY

- The minimal set....
- 1 cable/quadrant, the longest.
- to be installed with others
- all leads and screens shall be earthed on both ends

THIS IS TO BE APPROVED !!!

Responsible person

Status of the cable only

Cable's diameter	[mm]
min. static bend Radius	[mm]
min. repeat. bend R (esteem.)	[mm]
Weight	[g/m]
Supplier	
Type	
Cable description	
Dis. power (worst)	[W/m]
Installation's kind	
From (Detectors or yoke's boxes)	
To (Towers' crates or PPanels)	
<i>name in 'RACKS LAYOUT'</i>	
COMMENT	

SUMMARY of Muon Barrel - Cables between DETECTOR and UXC55's towers

Major news : DT group is thinking about a new T sensor. This could mean new cables!

Major news : NEW RPC cable RB.CA.sgn is 40% smaller (as x-sect) then the previous !

MB								
MB.LV.mc	MB.LV.fe	MB.HV	MB.OF.ttc-mc	MB.OF.sc	MB.CA.sc	MB.CA.veto	MB.CA.tr	MB.CA.ro
Willmott	Pegoraro	Borsato	Bellato	Bellato	Bellato	Bellato	Odorici	Willmott
defined	defined	defined	not def.	not def.	defined	not def.	defined	defined
17.35	11.5	16	10	10	5	10	7.4	
145	92	160	40	25	40		29	
209	138	192	60	50	60		58	
658	245	310	10	16			64	
Novacavi Intercond KERPEN UNIFIBRE UNIFIBRE					CERN		Dätwyler	
P0228_04 #RCF1562/SSL-V2YCH					04.21.51.055.4		UNINET 6702 4p	
RS-4w+2w+2t			RS-4w+4w+6w		RS-56w		1 fib/cable 2 fib/cable	
RS-4w+2w+2t			RS-4w+4w+6w		RS-56w		RS-1t MC-4x 1t	
PS			PS		HV		Fiber Fiber CU-sgn CU-sgn	
yk.PC			MB.SB		yk.JB		MB.MC MB.MC MB.MC MB.MC MB.MC MB.MC	
rk's crate:			rk's crate:		rk's crate:		rk's crate: rk's crate: rk's crate: rk's crate: rk's crate:	
DT LV mc - PP			DT LV fe - PP		DT HV		DT T/R TTC. oc DT Slow Ct. PP DT T/R Sec Col DT T/R Sec Col DT T/R Sec Col DT T/R Sec Col DT T/R Sec Col	
					Lengths all eq. ?		RS 485 Has to follow same cable & connectors	
			1Km extra in rack		daisy 2 sect.		T/R routing.	

MB Total

RB							
RB.LV.fe-8	RB.LV.fe-12	RB.HV	RB.CA.sgn	RB.CA.dcs-6	RB.CA.dcs-9	RB.MCA.t-sens	
Ranieri	Ranieri	Ranieri	Ranieri	Piccolo	Piccolo	Piccolo	
defined	defined	defined	defined	defined	defined	defined	defined
8.4	10.5	8.05	10	6	6.6	9.6	
55	65	50	65	33	38	55	
101	126	97	120	129	129	120	
134	198	76	142	52	67	129	
Novacavi Novacavi		Novacavi Novacavi		Novacavi Novacavi		Novacavi Novacavi	
8R3141		12R3117		4R3142		40R3178	
P0869_04-1		P0869_04-2		P0869_04-3			
RS-8w		RS-12w		RS-4w		RST-20p RST-6p RST-9p RST- 6x 1t	
0.2		0.3					
PS		PS		HV		CU-sgn CU-sgn CU-sgn CU-sgn	
RB		RB		RB		RB RB RB RB RB RB	
rk's crate:		rk's crate:		It's PP:		rk's crate: rk's crate: rk's crate: rk's crate: rk's crate:	
RPC LV		RPC LV		RPC HV		RPC LBC RPC LBC RPC LBC lw RPC LV	
						T probe	

RB Total

Names Legend

- The UPPER CASE initial part follows the CMS' Dbase guidelines.
- LV: power supply
 - HV: power supply
 - CA: copper signal
 - OF: Optical Fiber
- The lower case ending part comes from the MU local name.

FROM/TO Legend

- JB: Junction Box
- MB: Muon DT Barrel detector
- MC: MiniCrate
- PC: Patch Connector
- PP: patch panel
- RB: RPC Barrel detector
- SB: Split Board
- ft: foot (or X2 level in W0)
- rk: rack
- yk: yoke

	estim. x-sect/sector-w/o connec [cm ²]	13.5	6	30.5	4.5	4.5	0.2	4.4	5	5	= 73.6	4	1.25	5.5	82.5	2	0.5	5	= 100.8	175 [cm ²]
W0	N. cables on W0	50	50	136	50	50	56	50	100	100	= 642	62	12	96	944	62	12	62	= 1250	1892 cables
	spares to be installed	4	4	4	4	4	4	4	0	0	= 28	4	4	4	12	4	4	4	= 32	60 spares
	Medium length (estim.) [m]	20	20	15.5	49	30	44x5m+12*30m	30	30	30		20	20	30	20	20	20	24		
	TOT. LENGTH with spares [m]	1080	1080	2170	2460	1620	580	1620	3120	3000	= 16430	1320	320	3000	19120	1320	320	1488	= 26888	43.3 [Km]
W±1	N. cables on W±1	50	50	136	50	50	56	50	100	100	= 642	62	12	96	944	62	12	62	= 1250	1892 cables
	spares to be installed	4	4	4	4	4	4	4	0	0	= 28	4	4	4	12	4	4	4	= 32	60 spares
	Medium length (estim.) [m]	15	15	15.5	49	27	44x5m+12*30m	27	27	27		15	15	20	15	15	15	22		
	TOT. LENGTH with spares [m]	810	810	2170	2460	1458	580	1458	2808	2700	= 14954	990	240	2000	14340	990	240	1364	= 20164	35.1 [Km]
W±2	N. cables on W±2	50	50	136	50	50	56	50	100	100	= 642	62	12	96	944	62	12	62	= 1250	1892 cables
	spares to be installed	4	4	4	4	4	4	4	0	0	= 28	4	4	4	12	4	4	4	= 32	60 spares
	Medium length (estim.) [m]	15	15	15.5	49	27	44x5m+12*30m	27	27	27		15	15	20	15	15	15	22		
	TOT. LENGTH with spares [m]	810	810	2170	2460	1458	580	1458	2808	2700	= 14954	990	240	2000	14340	990	240	1364	= 20164	35.1 [Km]
ALL 5	N. cables on all WHEELS	250	250	680	250	250	280	250	500	500	= 3210	310	60	480	4720	310	60	310	= 6250	9460 cables
	% vs. the total MB+RB+Align %	2.6%	2.6%	7.0%	2.6%	2.6%	2.9%	2.6%	5.1%	5.1%	= 32.9%	3.2%	0.6%	4.9%	48.4%	3.2%	0.6%	3.2%	= 64.1%	97.1%
	MIN. LENGTH to be installed [m]	4000	4000	10540	6900	6900	2900	6900	13800	13800	= 69740	4960	960	10560	75520	4960	960	6944	= 104864	174.6 [Km]
	% vs. the total MB+RB+Align %	2.3%	2.3%	6.0%	3.9%	3.9%	1.6%	3.9%	7.8%	7.8%	= 39.4%	2.8%	0.5%	6.0%	42.7%	2.8%	0.5%	3.9%	= 59.2%	98.6%
	spares to be installed	20	20	20	20	20	20	20	20	20	= 140	20	20	20	60	20	20	20	= 160	300 spares
	TOT. LENGTH to buy [m]	4320	4320	10850	40800	7452	2900	7452	14352	13800	= 76246	5280	1280	11000	76480	5280	1280	1400	= 102000	178 [Km]

MB+RB+Align. cables

GRAN TOTAL	9746 cables
+	300 spares
=	181 [Km]

- NOTES**
- * GREEN numbers are released. We assume that they will not change!
 - * ORANGE numbers are good estimation
 - * RED numbers are pure estimation
 - * NOT GREEN CELLS are DANGEROUS !! => SEND ME INFORMATION !
- See http://cern.ch/Fabio.Montecassiano/pub_doc/CABLES/cables_detector-towers.pdf for updates.

* CMS GLIMOS says that the cables' color it's VERY IMPORTANT for safety issues. We have to buy BLUE cables or to demonstrate why we can't. Anyway, HV cables have to be red

* Spares could be installed during the main installation or after, when needed. THE RESPONSABLE OF EACH CABLE HAS TO PROPOSE THESE Q.TY ASAP !

Each responsible person have to check his cables and signal any changes early!

SPARE GENERAL POLICY

- The minimal set....
- 1 cable/quadrant, the longest.
- to be installed with others
- all leads and screens shall be earthed on both ends

THIS IS TO BE APPROVED !!!

SUMMARY of Muon Barrel - Cables between DETECTOR and UXC55's towers

(maintained by Enrique Calvo Alamillo e-mail:calvo@ifca.unican.es)

	LB (Alignment Link Barrel)				LT (Alignment Link Tracker)			AE (Alignment Endcap)					AB (Alignment Barrel)			
	LB.LV.sgn-4	LB.LV.sgn-6	LB.LV.sgn-8	LB.OF	LT.LV.sign	LT.CA.sign	LT.OF	AE.LV.yk-1	AE.LV.yk-2	AE.LV.rk	AE.CA.tag	AE.CA.ser	AB.CA.zb	AB.LV	AB.LV	AB.CA.eth
Responsible person	E.Calvo	E.Calvo	E.Calvo	E.Calvo	E.Calvo	E.Calvo	E.Calvo	D. Eartly	D. Eartly	D. Eartly	D. Eartly	D. Eartly				
Status of the cable only	defined	defined	defined	defined	defined	defined	defined	defined	defined	defined	defined	defined				
Cable's diameter [mm]	7.2	7.6	9.7	5	9.7	7.2	5	6	10	6	6	6	8	6	20	8
min. static bend Radius [mm]	30	38	48.5	25	48.5	36	25									
min. repeat. bend R (esteem.) [mm]	75	76	97	50	97	72	50									
Weight [g/m]	74.8	68	115	5.5	115	77	5.5									
Supplier	NOVACAVI	BELDEN	SABIX	NUFERN	SABIX	SABIX	NUFERN	HUBER-S SPECTRA	HUBER-S	BELDEN	BELDEN					
Type		9506NH	63451214	S630	63451214	63450614	S630	MultiA12	68-2829-02	MultiA12	9503NH	9503NH				
Cable description	1x(3AWG24), 1XCOAX AWG26, 4X(AWG28/7)	AWG 24, 6 twisted pairs, shielded	0.14 mm2, 12 twisted pairs, shielded	1 OF wire	0.14 mm2, 12 twisted pairs, shielded	0.14 mm2, 6 twisted pairs, shielded	1 OF wire	2c,14AWG str ,PES ins, scr, sheath	28AWG str ,10 twisted pairs, shielded	2c,14AWG str ,PES ins, scr, twisted pairs, shielded	24AWG str, 3 twisted pairs, shielded	24AWG str, 3 twisted pairs, shielded				
Dis. power (worst) [W/m]	0.003	0.002	0.0001		0.0001	3E-06										
Installation's kind	PS, sgn	PS, sgn	PS, sgn	Fiber	PS, sgn	PS, sgn	Fiber	PS	PS, sgn	PS	CU-sgn	CU-sgn	PS	PS	PS	CU-sgn
From (Detectors or boxes on yoke)	LB PP	LB PP	LB PP	LB PP	LT PP	LT PP	LT PP	AE PP	AE PP	AE PP	AE PP	AE PP				
To (Towers' crates or PPanels)	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
name in 'RACKS LAYOUT'	Alignment	Alignment	Alignment	Alignment	Alignment	Alignment	Alignment	Alignment	Alignment	Alignment	Alignment	Alignment	Alignment	Alignment	Alignment	Alignment
COMMENT																
estim. x-sect/sector~w/o connec [cm ²]	0.75	1.25	1	0.25	4	0.75	1.5	0.5	1	0.5	0.5	0.5	1.5	0.5	4	2
N. cables on W±0	0	0	0	0	4	1	6	1	5	1	1	1	12	12	6	6
spares																
Estimated medium length [m]					50	50	50									
TOT. LENGTH with spares [m]					200	50	300									
N. cables on W±1	0	0	0	0	0	0	0	0	0	0	0	0	0	12	6	6
spares																
Estimated medium length [m]																
TOT. LENGTH with spares [m]																
N. cables on W±2	6	12	6	6	0	0	0	1	5	1	1	1	0	12	6	6
spares																
Estimated medium length [m]	22	22	22	22												
TOT. LENGTH with spares [m]	132	264	132	132												
N. cables on all WHEELS	12	24	12	12	8	2	12	4	20	4	4	4	24	72	36	36
spares	0.1%	0.2%	0.1%	0.1%	0.1%	0.0%	0.1%	0.0%	0.2%	0.0%	0.0%	0.0%	0.2%	0.7%	0.4%	0.4%
TOT. LENGTH with spares [m]	264	528	264	264	400	100	600									

Names Legend
 The UPPER CASE initial part follows the CMS' Dbase guidelines:
 - LV: power supply
 - HV: power supply
 - CA: copper signal
 - OF: Optical Fiber

The lower case ending part comes from the MU local name.

FROM/TO Legend
 - AB: Alignment Barrel
 - LB: Alignment Link on the Barrel.
 -LT:Alignment Link on the Tracker.
 - AE: Alignment Endcap
 -ZB:Z-Bar
 - JB: Junction Box
 - PC: Patch Connector
 - PP: patch panel
 - SB: Split Board

- ft: foot
 - rk: rack
 - yk: yoke

W±0
W±1
W±2
ALL 5

== 21 [cm²]
 == 56 cables
 == 0 spares
 == 0.6 [Km]
 == 24 cables
 == 0 spares
 == 0.0 [Km]
 == 63 cables
 == 0 spares
 == 0.7 [Km]
 == 286 cables
 == 2.9%
 == 0 spares
 == 2.4 [Km]

NOTES

- * GREEN numbers are released. We assume that they will not change!
 - * ORANGE numbers are good estimation
 - * RED numbers are pure estimation
 - * BLANK CELLS are DANGEROUS !! ==> SEND ME INFORMATION !
- See http://cern.ch/Fabio.Montecassiano/pub_doc/CABLES/cables_detector-towers.pdf for updates.

* CMS GLIMOS says that the cables' color it's VERY IMPORTANT for safety issues.
 We have to buy BLUE cables or to demonstrate why we can't.
 Anyway, HV cables have to be red
 * Spares could be installed during the main installation or after, when needed.
 THE RESPONSABLE OF EACH CABLE HAS TO PROPOSE THESE Q.TY ASAP !
Each responsible person have to check his cables and signal any changes early!

MB, RB, Alig. cables
GRAN TOTAL
9746 cables
+
300 spares
== 181 [Km]



FRAGILE

