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Progress Report

&

SOME IDEAS

CFT Sectors mapping into SVT Sectors

Tagging:

CPS
Electron
Isolation
?? Other ??

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Manuel I. Martin

SF Triggers

Progress Report

Technical Design Report (TDR)

Hardware

MC Simulation

Software Emulation of Hardware

(Nothing to report on this)

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Technical Design Report (TDR)

Very Preliminary Draft !!!!

Mayor Areas

Brief description

CFT/CPS Trigger

- (FB, SG, MJ, MM, MV, KY)

Central Fiber Tracker Axial fibers and Central Preshower Axial strips. L1 (CFTTM) and L2 (CFTpp and SVTpp) and support for L1 m-Trigger. PS Clusters are sent to the FPS

• FPS Trigger

- (FB, MJ, MM)

Forward Preshower detector. Forms L1 FPST, and L2 PSTpp CPS axial are included here!!
(As today the FPS beyond the FE is not approved)

• FPD Trigger

- (FB, MM, MV)

Forward Proton Detector. Forms the L1 FPT and supports the FPDpp

FB~F. Borcharding, SG~S. Gruenendahl, MJ~ M. Johnson
MM~M. Martín, MV~M. Vaz, KY~Kin Yip

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Hardware

FE Stereo

First Prototypes back for testing and debugging with “real” cassettes and SVX

FE Axial

90% design completed. Working on real state allocation and specifics.

SIFT

Order placed with new specifications.

SCM

New specifications. New paper design completed. New layout to start.

FEA Test Board

Mother Board in house and tested.

Tracking Daughter Board is being manufactured.

Data Distribution Daughter Board design completed. Preparing circuit layout for outside PCB layout.

Broadcaster

**Paper design completed. 2 Physical crates
6 Logical crates.**

Receiver

Paper design completed. Final design to be done in Brazil

L1 Concentrator

Preliminary paper design .

L2 Concentrator

Preliminary paper design .

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MC Simulation

- **Done Simulation of response with:**

- 2 Pt tracks per H fiber
- 6 tracks per Pt bin
- 24 tracks per FE
- 50 tracks per 45° Sector
- 400 tracks total per CFT Axial

- **Next:**

- **Simulation of response with:**

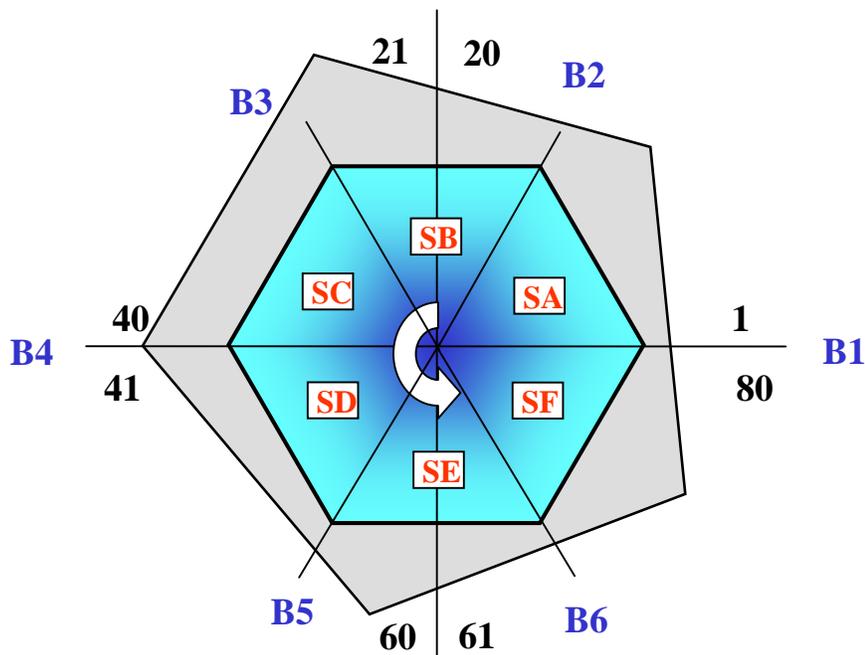
- 2 Pt tracks per H fiber
- 6 tracks per Pt bin
- 24 tracks per FE
- 60 tracks per 60° Sector
- 360 tracks total per CFT Axial

- **Simulation of response with:**

- 2 Pt tracks per H fiber
- 6 tracks per Pt bin
- 24 tracks per FE
- 30 tracks per 60° Sector
- 180 tracks total per CFT Axial

–

CFT Trigger L1 and L2 Data Mapped into 60° Sectors



Sector's definitions

Sector SA	{ 0° , 60° }	{ B1 , B2 }	{ 1 , 14* }
Sector SB	{ 60° , 120° }	{ B2 , B3 }	{ 14** , 27** }
Sector SC	{ 120° , 180° }	{ B3 , B4 }	{ 27* , 40 }
Sector SD	{ 180° , 240° }	{ B4 , B5 }	{ 41 , 54* }
Sector SE	{ 240° , 300° }	{ B5 , B6 }	{ 54** , 67** }
Sector SF	{ 300° , 360° }	{ B6 , B1 }	{ 67* , 80 }

Only boundaries B2 and B5 between sectors are well defined

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CFT Trigger L1 and L2 Data Mapped into 60° Sectors

Segmentation of each CFT FE Sector into 44 subsectors is possible !!

Each subsector is defined by the $\Phi = 6.136^\circ$ (0.10227°) corresponding to one fiber on layer H.

Using this fine division, sectors of 60.034° and 59.932° can be obtained.

This is achieved by starting and ending the sector as shown

60 Degrees Sectors	Starts at		Ends at		Total
	4.5° sector	H fiber	4.5° sector	H fiber	Angle
SA	1	1	14	15	60.034
SB	14	16	27	29	59.932
SC	27	30	40	44	60.034
SD	41	1	54	15	60.034
SE	54	16	67	28	59.932
SF	67	30	80	44	60.034

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CFT Trigger L1 and L2 Data Mapped into 60^o Sectors

The mapping shown is valid for L2:

the errors in mapping a
CFT Sector into a SVT Sector is less than .07^o

This mapping is creates a problem at L1:

segmentation in H fiber is cumbersome for track counting
as result

tracks could be counted twice.

Need a different mapping for L1

Sector's definitions for L1

Sectors	4.5 ^o sector	H fiber	4.5 ^o sector	H fiber	Angle
SA	1	1	13	44	58.5
SB	14	1	27	44	63
SC	28	1	40	44	58.5
SD	41	1	53	44	58.5
SE	54	1	67	44	63
SF	68	1	80	44	58.5

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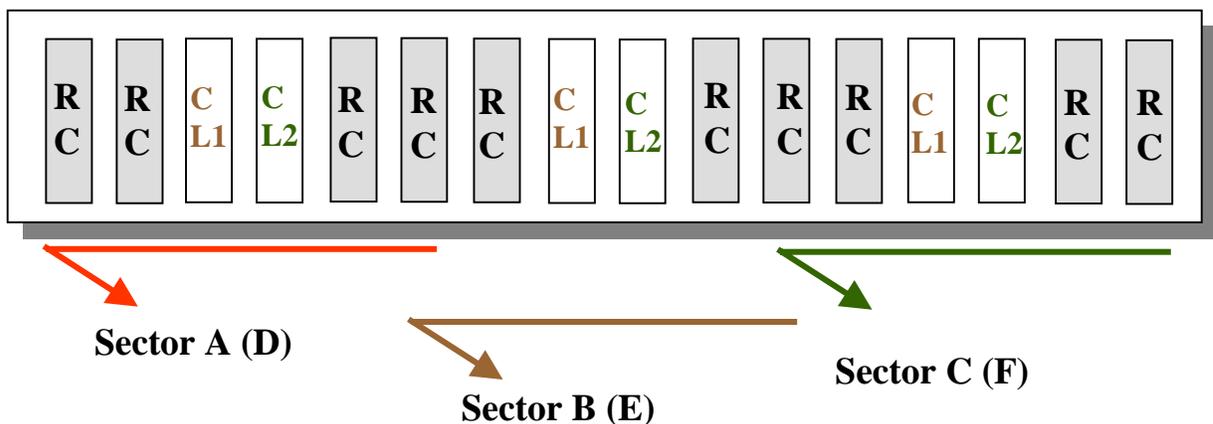
Broadcaster Crates for L1 and L2 Mapped into 60° Sectors

Two Physical Broadcast Crates (PCB)

There is no communication between PCBs

Each PCB contains 3 Logical Broadcast Crates (LBC)

Each LBC has one Concentrator for L1 and one for L2



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Track's Tagging for L1 Trigger

Valid Combinations of Tags

Code	Tag				Max # Trakcs
	CPS	Electron	Other	Isolated	
# Tracks per Pt bin	No	No	No	No	??
Particle Tagg and Pt bin	No	No	No	Yes	1
# Tracks per Pt bin	Yes	No	No	No	??
Particle Tagg and Pt bin	Yes	No	No	Yes	1
# Tracks per Pt bin	Yes	Yes	No	No	??
Particle Tagg and Pt bin	Yes	Yes	No	Yes	1
# Tracks per Pt bin	Yes	No	Yes	No	??
Particle Tagg and Pt bin	Yes	No	Yes	Yes	1

Four cases when the track(s) is(are) not Isolated
 Four cases when the track **is** Isolated

Make an early decision !!

Is the track(s)

ISOLATED

Not Isolated

????????

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CFT Trigger L1 Data from FE to RB Encoding e and XX

Code bits

Interaction Number

I	PS1	PS2	XX	e	P _t bin or zeros		
---	-----	-----	----	---	-----------------------------	--	--

Turn Number

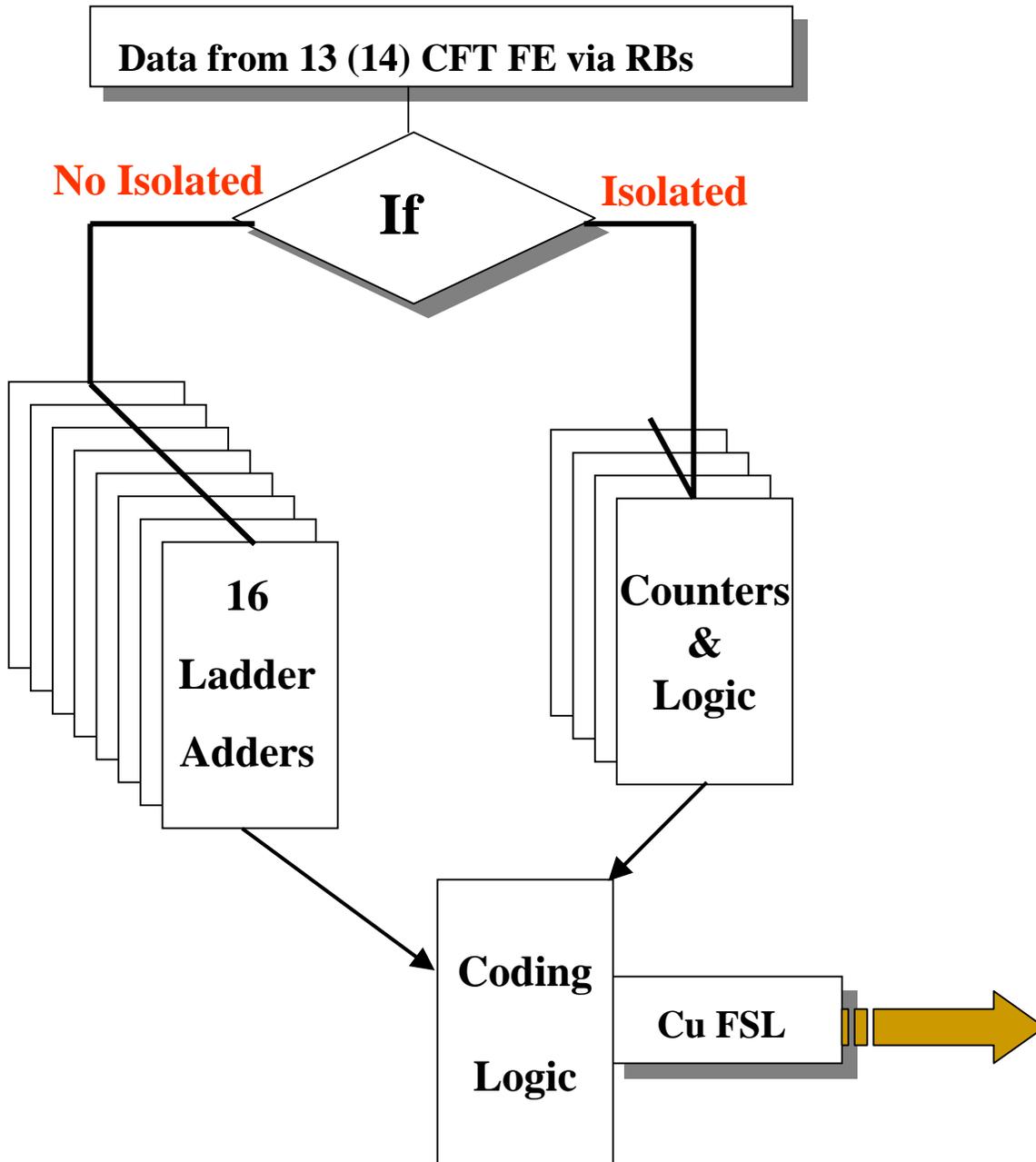
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If I=0

	Total # Tracks	\overline{PS}	e	XX
P ₁ ^t				
P ₂ ^t				
P ₃ ^t				
P ₄ ^t				

Equivalent to 4 bits

L1 Concentrator Board



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Encoding CFT Trigger L1 Data from CB to CFTTM

Encoding of:

Header.... **Error**(1bit), **LSB of Event #** (up to 11bits)

Total Tracks (6 bits per Pt bin)

Tracks wit **PS** tag (6 bits per Pt bin)

Electron candidates (6 bits per Pt bin)

Isolated Tracks (3 bits per Pt bin)

Header with Event # information			
Total # of Tracks (Pt 1)		Total # of Tracks (Pt 2)	
Total # of Tracks (Pt 3)		Total # of Tracks (Pt 4)	
Tracks with PS (Pt 1)		Tracks with PS (Pt 2)	
Tracks with PS (Pt 3)		Tracks with PS (Pt 4)	
e candidates (Pt 1)		e candidates (Pt 2)	
e candidates (Pt 3)		e candidates (Pt 4)	
Isolated (Pt 1)	Isolated (Pt 1)	Isolated (Pt 1)	Isolated (Pt 1)

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Encoding CFT Trigger L1 Data from CB to CFTTM

Encoding of:

- Header.... Error(1bit), LSB of Event # (up to 3 bits)**
- Tracks with Tag X (2 bits per Pt bin)**
- Total Tracks (6 bits per Pt bin)**
- Tracks with PS tag (6 bits per Pt bin)**
- Electron candidates (6 bits per Pt bin)**
- Isolated Tracks (3 bits per Pt bin)**

Header			
Tag X (Pt 1)	Tag X (Pt 2)	Tag X (Pt 3)	Tag X (Pt 4)
Total # of Tracks (Pt 1)	Total # of Tracks (Pt 2)		
Total # of Tracks (Pt 3)	Total # of Tracks (Pt 4)		
Tracks with PS (Pt 1)	Tracks with PS (Pt 2)		
Tracks with PS (Pt 3)	Tracks with PS (Pt 4)		
e candidates (Pt 1)	e candidates (Pt 2)		
e candidates (Pt 3)	e candidates (Pt 4)		
Isolated (Pt 1)	Isolated (Pt 1)	Isolated (Pt 1)	Isolated (Pt 1)

L1 Concentrator Interfaces

➤ To Receiver Boards

- Via Back Plane (16 lines per associated FE)

➤ To CFTTM

- Via Cu Fast Serial Link

➤ To L3

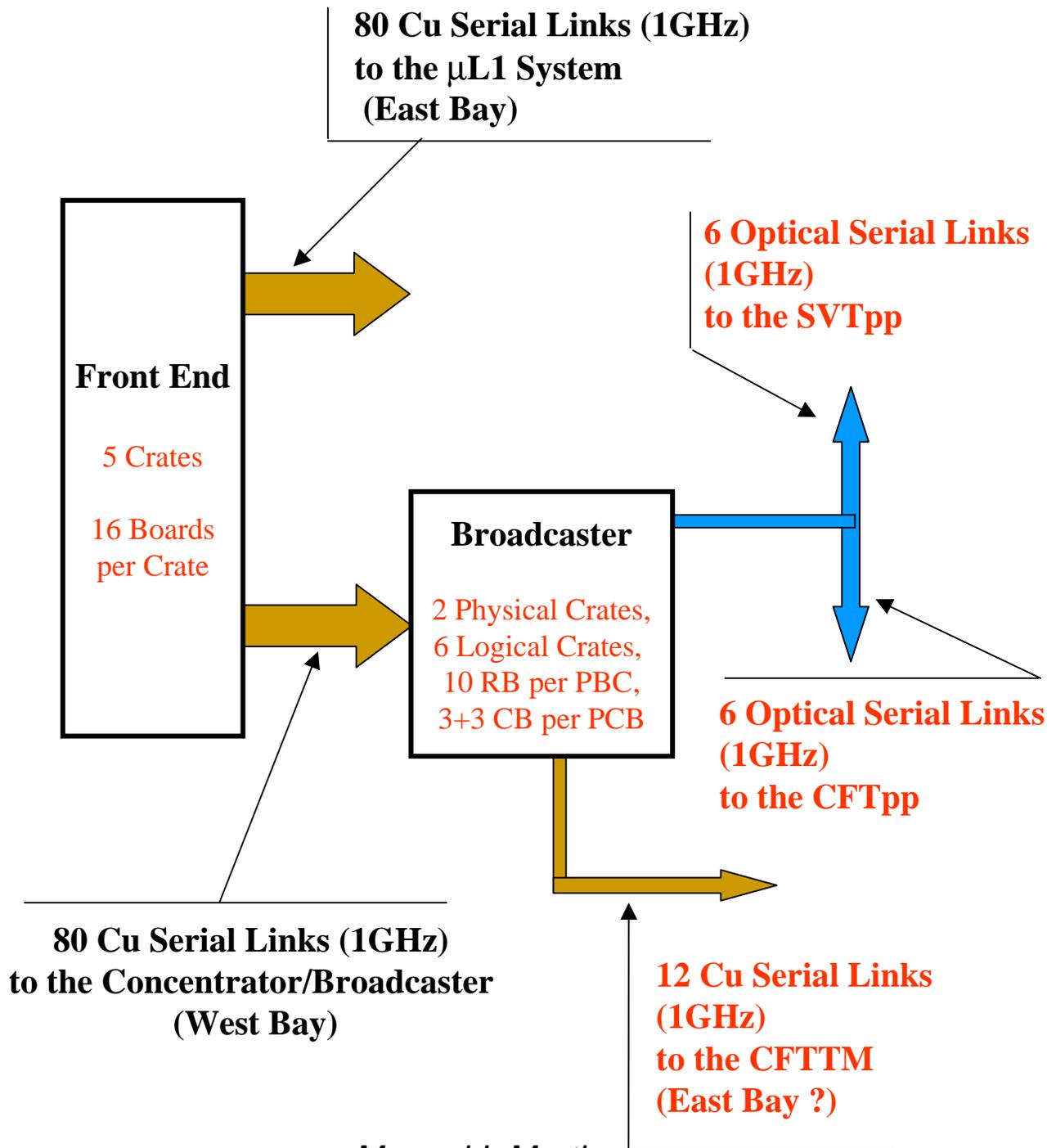
- Via Optical Link
 - Same as to CFTTM for Not Isolated Tracks
 - Add Pt bin, Tags and Φ for Isolated Tracks

➤ To “Geographical Sector”

- Error line indicating that the Event Number is inconsistent within the CFT FE served.
- The common Event Number (Via the Cu FSL?)

CFT Architecture

Data Flow to L1 and L2



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