

# CDCTRG status: GCRT and plans

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- GCRT in July and August
- Status and plan of each CDCTRG module
- Schedule

Global Reconstruction Logic (GRL)  
Global Decision Logic (GDL)

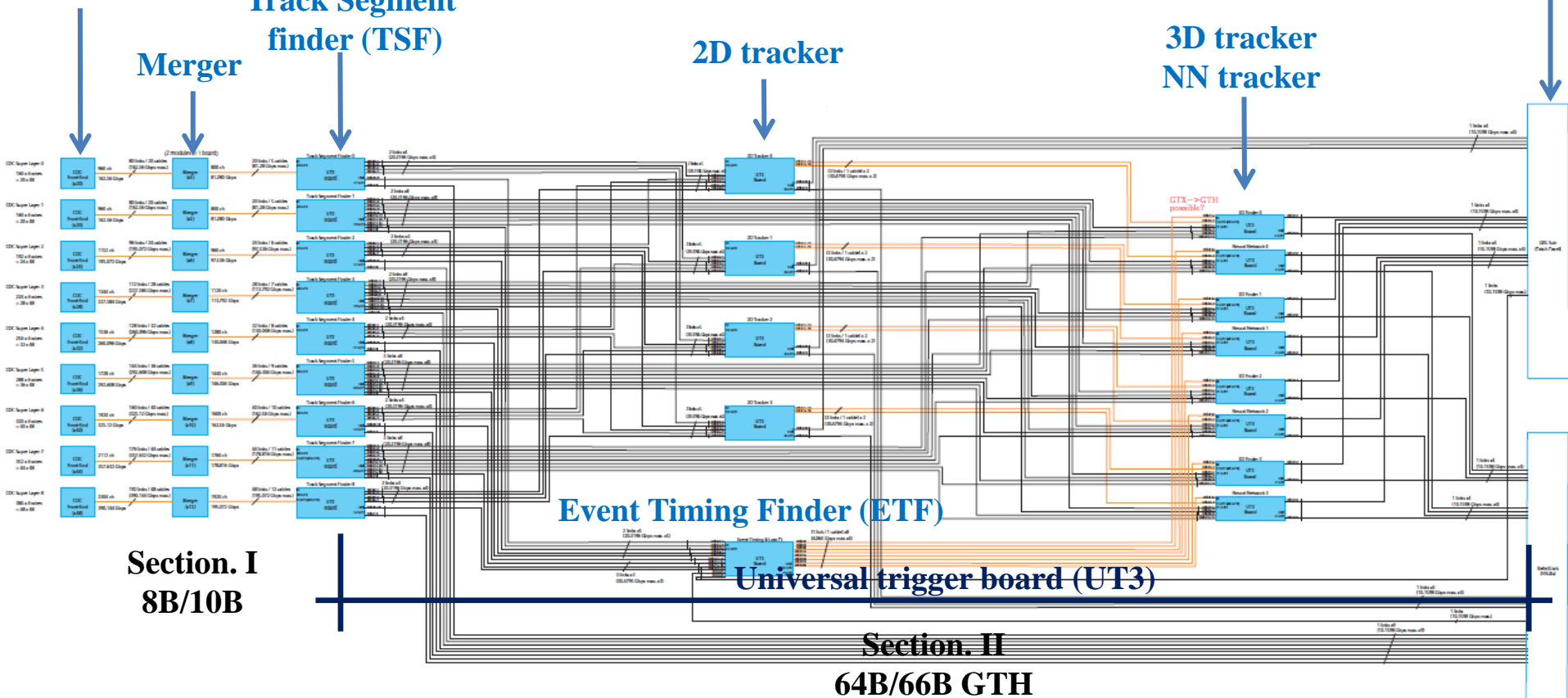
Front-end (FE)

Track Segment  
finder (TSF)

2D tracker

3D tracker  
NN tracker

Merger

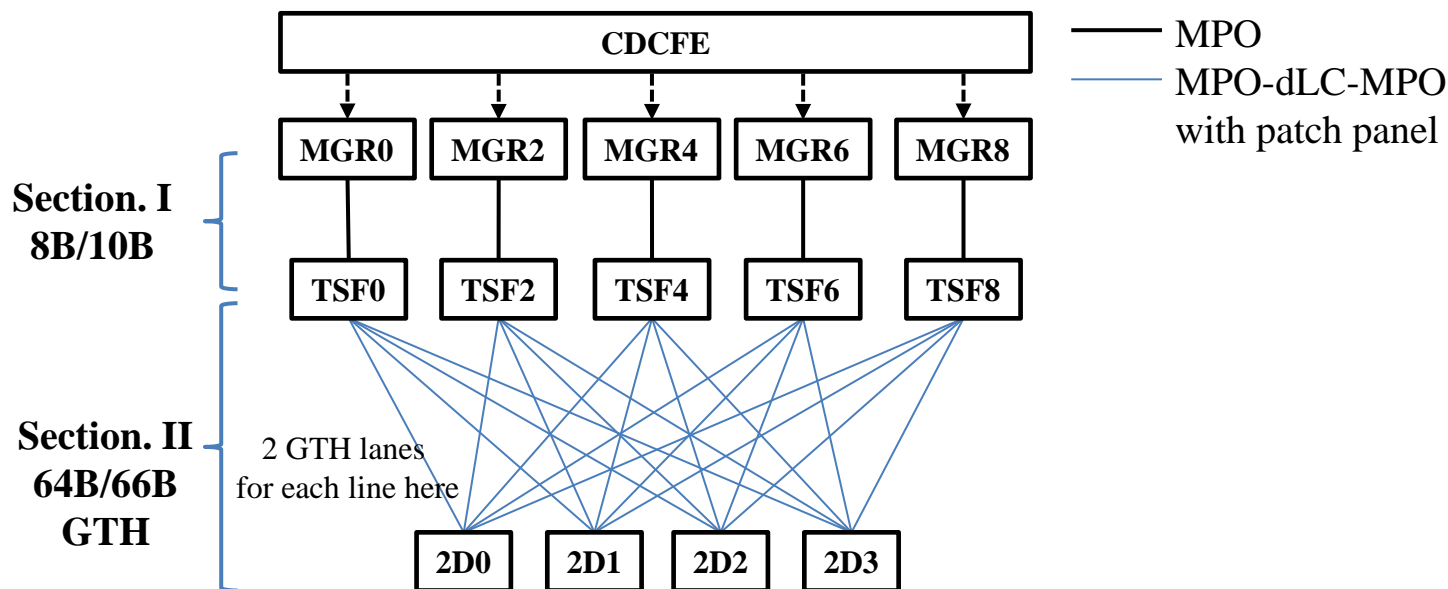


Section. I  
8B/10B

Section. II  
64B/66B GTH

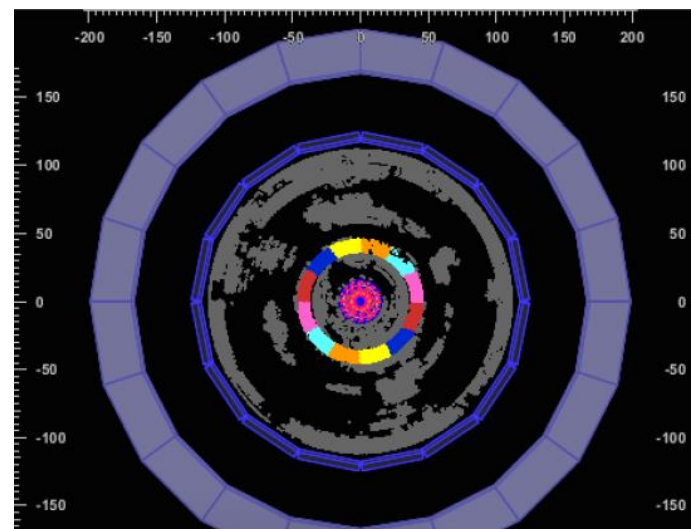
# GTH issue

- GTH issue around this spring
  - Low success rate of building data flow and lane\_up (GTH hardware response).
  - Instability is due to CDX, high userclk speed (169.33 MHz), etc.
- Half speed 64B/66B GTH setup (11.176 Gbps → 5.588 Gbps) since this spring.
  - ~100% success rate of building data flow.
  - Easier for UT3 firmware to meet the timing constraints, resource usage, etc.

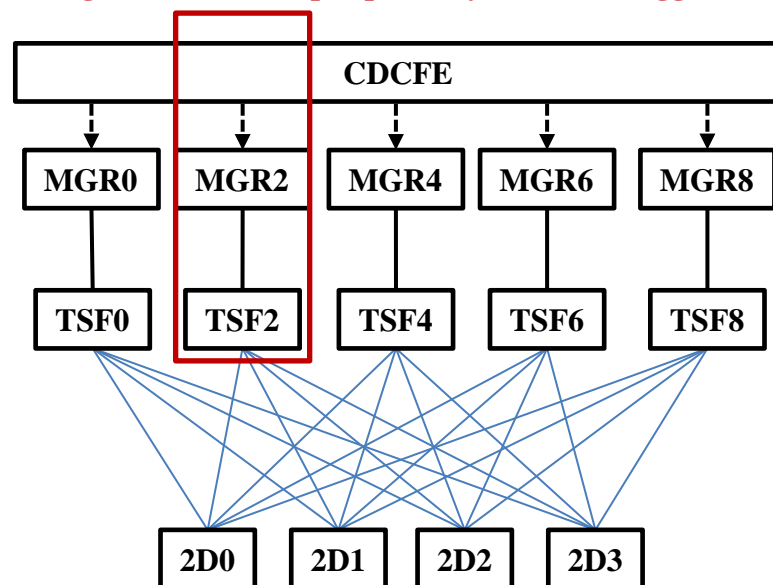


# GCRT in July

- TSF2 provides **back-to-back** trigger:
  - In units of CDCFE.
  - TS belong to same color regions are hit.
- TSF → 2D data:
  - Regular case: TS ID + L/R + timing
  - Current case: TS hitmap (without timing info) due to TS ID bits overflow problem.
  - Under investigation.
- 2D boards were included in July.
  - B2L Data taking on TSF2 and 2D0 to debug TSF and 2D.
  - We have 2D Hough finding output now. Validation on 2D logic is still ongoing.

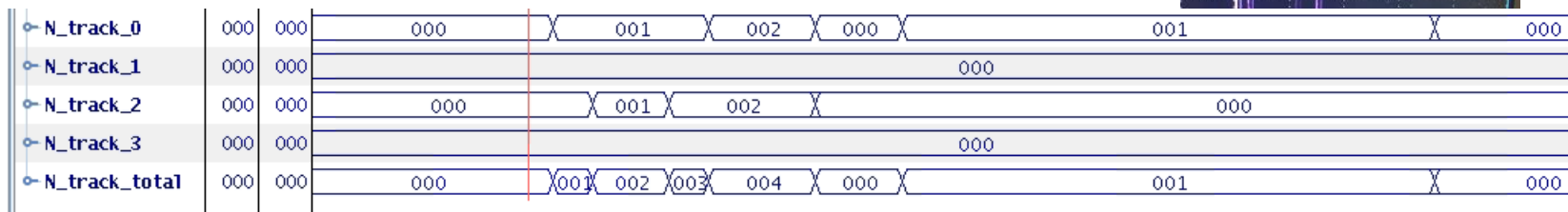
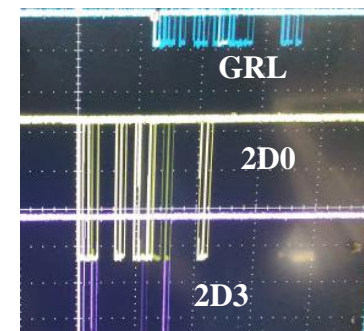
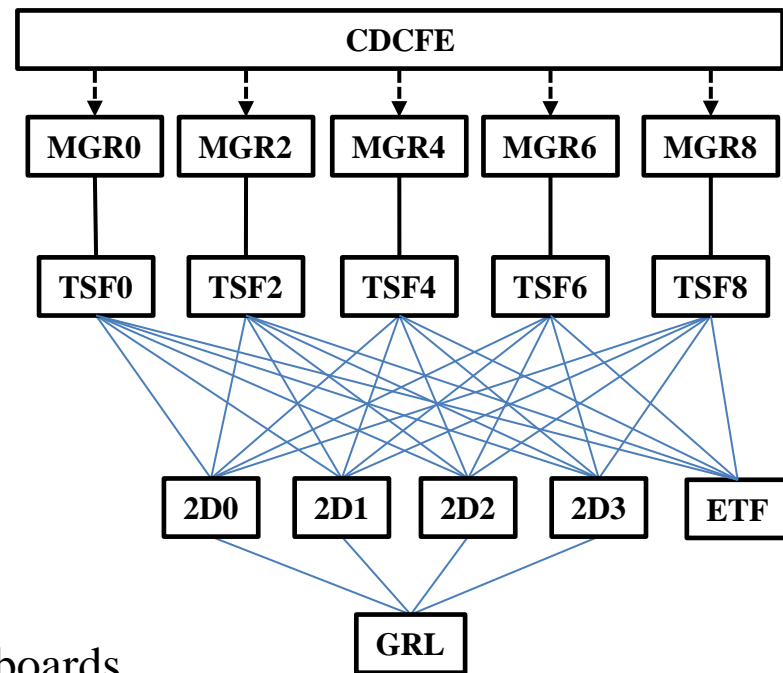


Original GCRT setup: up to only TSF2 for trigger



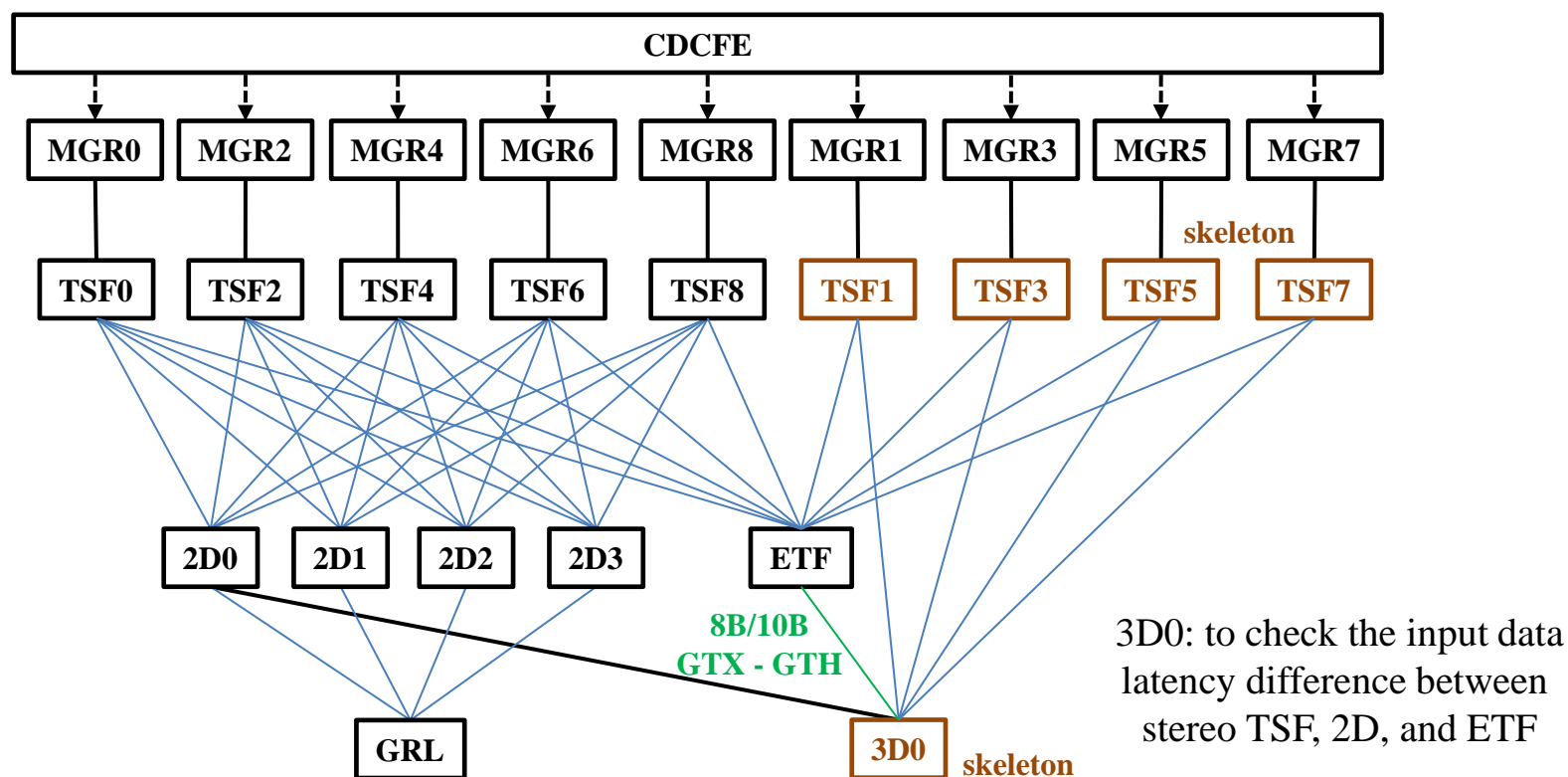
# GCRT in August – E-Hut Setup 1

- Data flow is updated for GCRT in August:
  - ETF and GRL included.
  - Half speed GTH.
- TSF2 provides **single TS** trigger.
- Keep 2D debugging by B2L and chipscope.
- GRL is receiving tracking results from the 4 2D boards.
  - Provide the summary track trigger.
    - Latency between 2D and GRL: ~500 ns
  - Chipscope monitoring on 2D data.
  - Track counting in a 500 ns window:



# Status of CDCTRG data flow – E-Hut Setup 2

- Stereo TSF(skeleton), ETF with all inputs, 3D0(skeleton) are included.
- In the current E-Hut setup, user can choose to build setup 1 or setup 2.
  - We can also use either FE with HV or Merger data player: Merger would be the data generators (instead of FE) to play TSIM data or recorded cosmic data.



# E-Hut installation status

- All the cabling (dLC, MPO, and patch panel) are completed. Patch panel connections were changed based on new TSF-ETF lane ordering scheme. Labels are not changed yet.  
[https://confluence.desy.de/download/attachments/34030296/PatchPanel\\_20170817.pdf?api=v2](https://confluence.desy.de/download/attachments/34030296/PatchPanel_20170817.pdf?api=v2)
- Most of the boards were moved to E-Hut. Rest of the Mergers and UT3 are in B2F as another test setup (6 Mergers → 1 TSF → 1 2D) for TSF debugging.

	#modules	Installed	Cabling to next stg	Data Flow Confirmed	Function Confirmed
CDC FE	292	all	done	yes	yes
Merger	73	all	done	yes	yes
TSF	9	all	done	yes	under test
2D	4	all	done	yes	under test
3D	4	1	done	yes	no
ETF	1	all	done	yes	no
NN	1	no	no	no	no

UT3

UT3 as a test. may use UT4.

Most of the UT3 were moved from B2 to E-Hut. Rest: 3D\*3

Status and plan will be detailed from next page.



# Status and plan of each CDCTRNG module

## ◆ TSF:

- Status: Axial TSF are working for GCRT and outputting TS hitmap to 2D. TS ID issue is under investigation.
- Plan1: Stereo TSF full firmwares.
- Plan2: Regular output (TS ID + timing info).
- Long term plan: Full speed GTH firmware.

## ◆ 2D:

- Status: Checking the Hough finder logic in GCRT now.
- Plan1: With regular TSF input: start to check full tracking logic with L/R.
- Long term plan: Full speed GTH firmware.

## ◆ ETF:

- Status: Full firmware is ready in E-Hut now. Will use the TS input to check the logic soon (by chipscope).
- Plan1: With regular TSF input: start to check the timing output .
- Long term plan: Full speed GTH firmware.

# Status and plan of each CDCTRG module (cont'd)

## ◆ 3D (NN):

- Status: Skeleton firmware in E-Hut setup 2 now (3D0).
- Plan1: After stereo TSFs are made, we will use chipscope to check the input data's coincidence (latency difference) between different inputs.
  - Important for the 3D/NN data unpacker's input buffering.
- Plan2: With regular TSF and ETF input: start to check 3D logic.
- Long term plan: Full speed GTH firmware.

## ◆ GTH:

- Status: Half speed GTH in the current CDCTRG data flow.
- A study on full speed GTH was done in July by using 5 TSF → 4 2D setup. The reset scheme through VME and protocol design are changed.
- Plan: Making all UT3 firmwares with full speed GTH is not the first priority recently. Based on the stability, we will keep using the half speed until all the CDCTRG modules' (TSF, 2D, 3D, ETF, and GRL) core logic and output are confirmed.

Thanks everybody for the contribution!

