

RCE GBT Readout for Demonstrator Status

II. Physikalisches Institut

2017-11-30

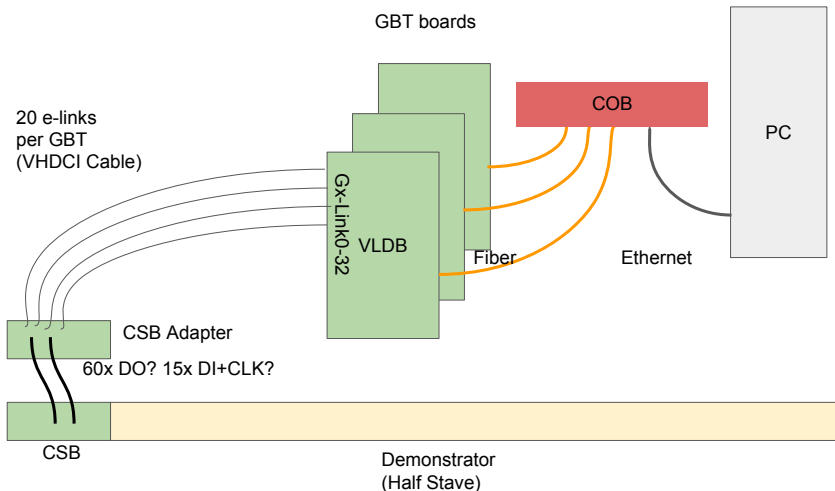


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und Forschung

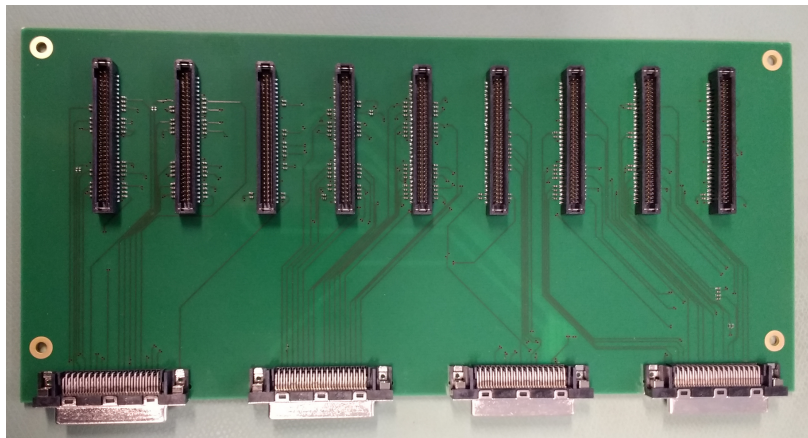


GBT RCE for Demonstrator Readout

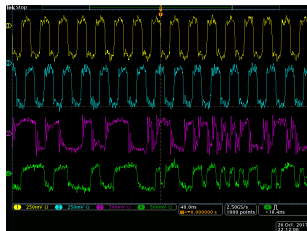
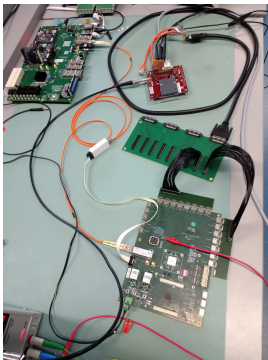
Topology reminder



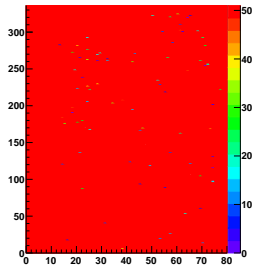
- Adapter board between VLDB and Demonstrator
- 3x20 channels from VLDBs mapped to 3x16 + 1x12 channels on VHDCI
- Capacitors for AC coupling of all signals (100nF)

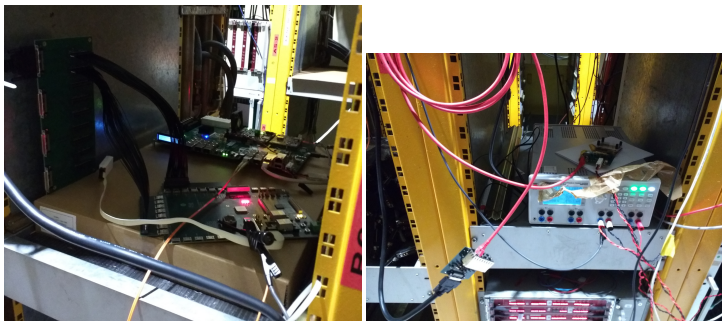


- VHDCI connector soldered to ethernet cables
- Module connected to adapters and readout
- Two channels tested and working
- Signals probed on module and adapter

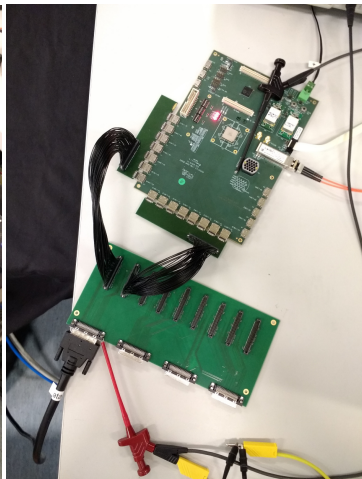
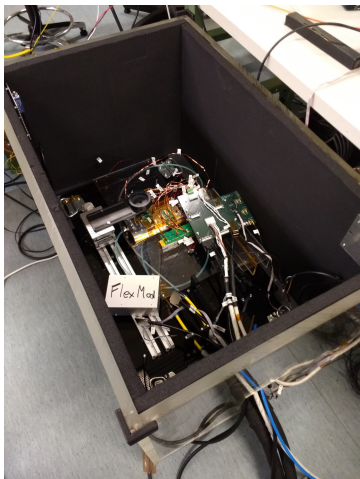


OCCUPANCY Mod 94220425 at A1-1





- Tests with VHDCI to ethernet adapter
- 8 ports with Clk, Cmd, 2xData (only 1st connected on 'normal' modules)
- tested channels on VHDCI 1&2
- most channels work
- Channel 1_3 on VHDCI1 not responding (but works when connected to demonstrator CSB)
- Channel 1_6 on VHDCI1 & VHDCI2 not responding (problem on ethernet adapter?)



- Two quad modules wired to demonstrator CSB (6 FEs working)
- VLDB + adapters connected to VHDCI cable from CSB
- Setup in SR1 radiation lab, long fiber to HSIO

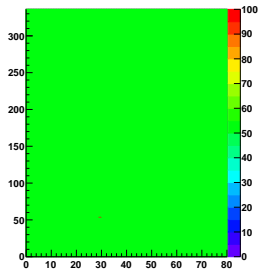
- Still requires connection to module ground
 - Works for now, not possible for full demonstrator
 - No common-mode biasing on VLDB/GBTx?
- Problems establishing stable connection to FEs
 - Remains \sim stable once link is established
 - Could be caused by phase-locking of GBTx
- Limited equipment for debugging

Tests

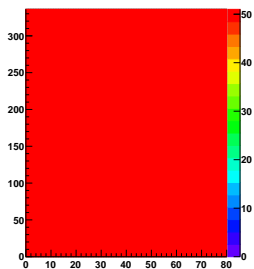
- Digital & analog scan
- Full tuning
- Source scan (Sr90)
 - Unable to see hits from source
 - Similar problem with USBpix system
 - Source was probably not opened properly

Digital

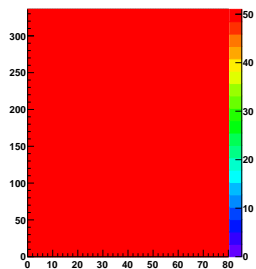
OCCUPANCY Mod 94220525 at A1-1



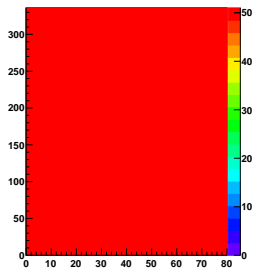
OCCUPANCY Mod 94220625 at A1-2



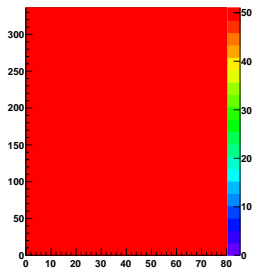
OCCUPANCY Mod 94220725 at A2-1



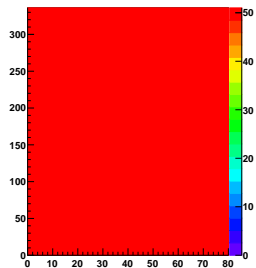
OCCUPANCY Mod 94220825 at A2-2



OCCUPANCY Mod 94210525 at A3-1

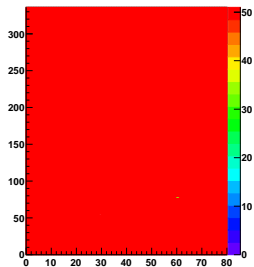


OCCUPANCY Mod 94210425 at A3-2

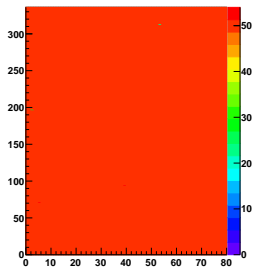


Analog

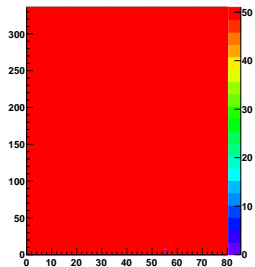
OCCUPANCY Mod 94220525 at A1-1



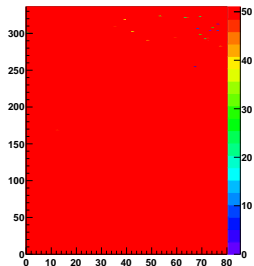
OCCUPANCY Mod 94220625 at A1-2



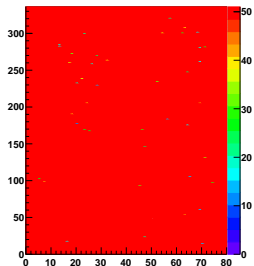
OCCUPANCY Mod 94220725 at A2-1



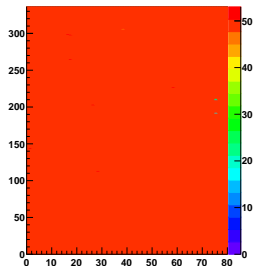
OCCUPANCY Mod 94220825 at A2-2



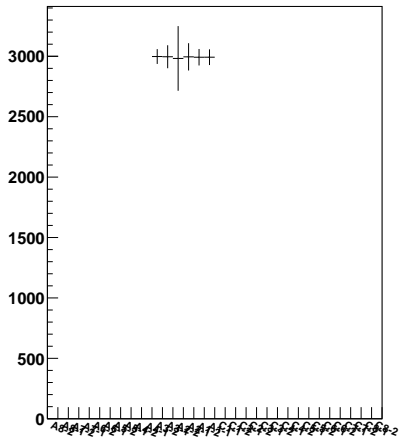
OCCUPANCY Mod 94210525 at A3-1



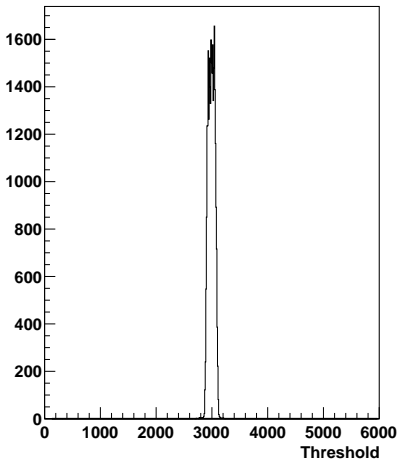
OCCUPANCY Mod 94210425 at A3-2



Thresholds 1st stave

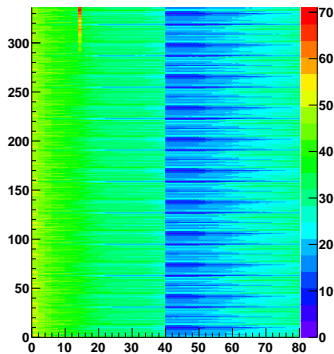


Threshold distribution Module 94220525 at A1-1

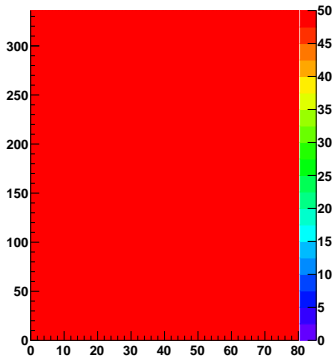


- Added resistors to bias GBT Rx to 1.2V
- AC coupling now works properly

OCCUPANCY Mod 94220425 at A1-1

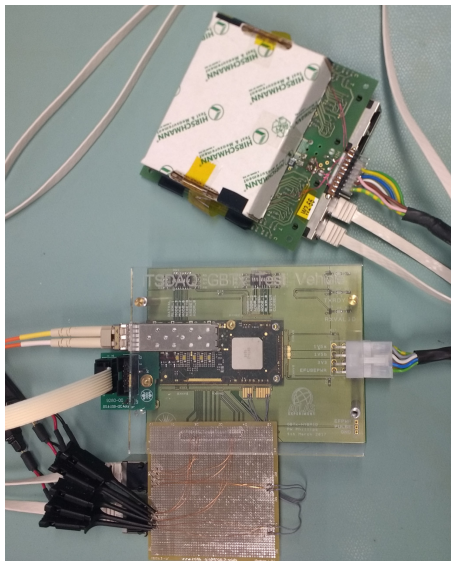


OCCUPANCY Mod 94220425 at A1-1



- GBTx supports automatic phase tracking, static phase selection, and training mode
- So far: always used automatic tracking
- Works fine most of the time
- Need to test if other modes bring an improvement

- Compact alternative to VLDB
- Problems establishing stable link to GBTx
- Presentation during AUW (<https://indico.cern.ch/event/676641/>)
- Resistor on TX_DISABLE identified as problematic
- Replaced 10k resistor by 1k resistor
- Now measure 0.4V (enabled) instead of 1.8V (undefined)
- Link now stable, receive Clk & Cmd from RCE





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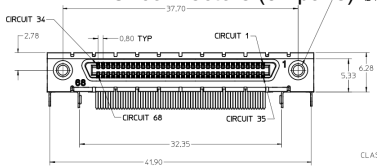
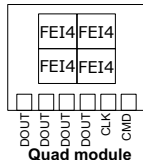
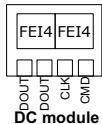
Thank you for your attention.



Backup



- Read-out from tilted section requires 32 pairs for data (16 modules, 2 pairs per module) and 32 pairs for CLK+CMD
 - 2 VHDCI connectors (34 pairs) 8 modules each
- Read-out from flat section requires 28 pairs for data (7 modules, 4 pairs per module) and 14 pairs for CLK+CMD
 - 2 VHDCI connectors (34 pairs) 3 modules on one, 4 on the other



Section	Mod s	DO (pairs)	CLK+CM D (pairs)
Tilted	16	32	16+16
Flat	7	28	7+7

Connector	#Mods	DO (pairs)	CLK+CM D (pairs)
Tilted 1	8 (DC)	16	16
Tilted 2	8 (DC)	16	16
Flat 1	4	16	8
Flat 2	3	12	6



VHDCI pinout



Section 1 Left (from top) Data Pinout			Section 1 Right (from top) Data Pinout			Section 2 Data Pinout			Section 3 Data Pinout		
VHDCI	Data Flex (FX11)		VHDCI	Data Flex (FX11)		VHDCI	Data Flex (FX11)		VHDCI	Data Flex (FX11)	
1	DAQ_CLKp_1	35DAQ_CLKn_1	1	DAQ_CLKp_4	35DAQ_CLKn_4	1	DAQ_CLKp_1	35DAQ_CLKn_1	1	DAQ_CLKp_9	35DAQ_CLKn_9
2	DAQ_DINp_1	36DAQ_DINn_1	2	DAQ_DINp_4	36DAQ_DINn_4	2	DAQ_DINp_1	36DAQ_DINn_1	2	DAQ_DINp_9	36DAQ_DINn_9
3	DAQ_DOUT1n_1	37DAQ_DOUT1p_1	3	DAQ_DOUT1n_4	37DAQ_DOUT1p_4	3	DAQ_DOUT1n_1	37DAQ_DOUT1p_1	3	DAQ_DOUT1n_9	37DAQ_DOUT1p_9
4	DAQ_DOUT2n_1	38DAQ_DOUT2p_1	4	DAQ_DOUT2n_4	38DAQ_DOUT2p_4	4	DAQ_DOUT2n_1	38DAQ_DOUT2p_1	4	DAQ_DOUT2n_9	38DAQ_DOUT2p_9
5	empty	39empty	5	empty	39empty	5	DAQ_CLKp_2	39DAQ_CLKn_2	5	DAQ_CLKp_10	39DAQ_CLKn_10
6	empty	40empty	6	empty	40empty	6	DAQ_DINp_2	40DAQ_DINn_2	6	DAQ_DINp_10	40DAQ_DINn_10
7	DAQ_DOUT3n_1	41DAQ_DOUT3p_1	7	DAQ_DOUT3n_4	41DAQ_DOUT3p_4	7	DAQ_DOUT1n_2	41DAQ_DOUT1p_2	7	DAQ_DOUT1n_10	41DAQ_DOUT1p_10
8	DAQ_DOUT4n_1	42DAQ_DOUT4p_1	8	DAQ_DOUT4n_4	42DAQ_DOUT4p_4	8	DAQ_DOUT2n_2	42DAQ_DOUT2p_2	8	DAQ_DOUT2n_10	42DAQ_DOUT2p_10
9	DAQ_CLKp_2	43DAQ_CLKn_2	9	DAQ_CLKp_5	43DAQ_CLKn_5	9	DAQ_CLKp_3	43DAQ_CLKn_3	9	DAQ_CLKp_11	43DAQ_CLKn_11
10	DAQ_DINp_2	44DAQ_DINn_2	10	DAQ_DINp_5	44DAQ_DINn_5	10	DAQ_DINp_3	44DAQ_DINn_3	10	DAQ_DINp_11	44DAQ_DINn_11
11	DAQ_DOUT1n_2	45DAQ_DOUT1p_2	11	DAQ_DOUT1n_5	45DAQ_DOUT1p_5	11	DAQ_DOUT1n_3	45DAQ_DOUT1p_3	11	DAQ_DOUT1n_11	45DAQ_DOUT1p_11
12	DAQ_DOUT2n_2	46DAQ_DOUT2p_2	12	DAQ_DOUT2n_5	46DAQ_DOUT2p_5	12	DAQ_DOUT2n_3	46DAQ_DOUT2p_3	12	DAQ_DOUT2n_11	46DAQ_DOUT2p_11
13	empty	47empty	13	empty	47empty	13	DAQ_CLKp_4	47DAQ_CLKn_4	13	DAQ_CLKp_12	47DAQ_CLKn_12
14	empty	48empty	14	empty	48empty	14	DAQ_DINp_4	48DAQ_DINn_4	14	DAQ_DINp_12	48DAQ_DINn_12
15	DAQ_DOUT3n_2	49DAQ_DOUT3p_2	15	DAQ_DOUT3n_5	49DAQ_DOUT3p_5	15	DAQ_DOUT1n_4	49DAQ_DOUT1p_4	15	DAQ_DOUT1n_12	49DAQ_DOUT1p_12
16	DAQ_DOUT4n_2	50DAQ_DOUT4p_2	16	DAQ_DOUT4n_5	50DAQ_DOUT4p_5	16	DAQ_DOUT2n_4	50DAQ_DOUT2p_4	16	DAQ_DOUT2n_12	50DAQ_DOUT2p_12
17	Reserved	51Reserved	17	Reserved	51Reserved	17	Reserved	51Reserved	17	Reserved	51Reserved
18	Reserved	52Reserved	18	Reserved	52Reserved	18	Reserved	52Reserved	18	Reserved	52Reserved
19	DAQ_CLKp_3	53DAQ_CLKn_3	19	DAQ_CLKp_6	53DAQ_CLKn_6	19	DAQ_CLKp_5	53DAQ_CLKn_5	19	DAQ_CLKp_13	53DAQ_CLKn_13
20	DAQ_DINp_3	54DAQ_DINn_3	20	DAQ_DINp_6	54DAQ_DINn_6	20	DAQ_DINp_5	54DAQ_DINn_5	20	DAQ_DINp_13	54DAQ_DINn_13
21	DAQ_DOUT1n_3	55DAQ_DOUT1p_3	21	DAQ_DOUT1n_6	55DAQ_DOUT1p_6	21	DAQ_DOUT1n_5	55DAQ_DOUT1p_5	21	DAQ_DOUT1n_13	55DAQ_DOUT1p_13
22	DAQ_DOUT2n_3	56DAQ_DOUT2p_3	22	DAQ_DOUT2n_6	56DAQ_DOUT2p_6	22	DAQ_DOUT2n_5	56DAQ_DOUT2p_5	22	DAQ_DOUT2n_13	56DAQ_DOUT2p_13
23	empty	57empty	23	empty	57empty	23	DAQ_CLKp_6	57DAQ_CLKn_6	23	DAQ_CLKp_14	57DAQ_CLKn_14
24	empty	58empty	24	empty	58empty	24	DAQ_DINp_6	58DAQ_DINn_6	24	DAQ_DINp_14	58DAQ_DINn_14
25	DAQ_DOUT3n_3	59DAQ_DOUT3p_3	25	DAQ_DOUT3n_6	59DAQ_DOUT3p_6	25	DAQ_DOUT1n_6	59DAQ_DOUT1p_6	25	DAQ_DOUT1n_14	59DAQ_DOUT1p_14
26	DAQ_DOUT4n_3	60DAQ_DOUT4p_3	26	DAQ_DOUT4n_6	60DAQ_DOUT4p_6	26	DAQ_DOUT2n_6	60DAQ_DOUT2p_6	26	DAQ_DOUT2n_14	60DAQ_DOUT2p_14
27	empty	61empty	27	DAQ_CLKp_7	61DAQ_CLKn_7	27	DAQ_CLKp_7	61DAQ_CLKn_7	27	DAQ_CLKp_15	61DAQ_CLKn_15
28	empty	62empty	28	DAQ_DINp_7	62DAQ_DINn_7	28	DAQ_DINp_7	62DAQ_DINn_7	28	DAQ_DINp_15	62DAQ_DINn_15
29	empty	63empty	29	DAQ_DOUT1n_7	63DAQ_DOUT1p_7	29	DAQ_DOUT1n_7	63DAQ_DOUT1p_7	29	DAQ_DOUT1n_15	63DAQ_DOUT1p_15
30	empty	64empty	30	DAQ_DOUT2n_7	64DAQ_DOUT2p_7	30	DAQ_DOUT2n_7	64DAQ_DOUT2p_7	30	DAQ_DOUT2n_15	64DAQ_DOUT2p_15
31	empty	65empty	31	empty	65empty	31	DAQ_CLKp_8	65DAQ_CLKn_8	31	DAQ_CLKp_16	65DAQ_CLKn_16
32	empty	66empty	32	empty	66empty	32	DAQ_DINp_8	66DAQ_DINn_8	32	DAQ_DINp_16	66DAQ_DINn_16
33	empty	67empty	33	DAQ_DOUT3n_7	67DAQ_DOUT3p_7	33	DAQ_DOUT1n_8	67DAQ_DOUT1p_8	33	DAQ_DOUT1n_16	67DAQ_DOUT1p_16
34	empty	68empty	34	DAQ_DOUT4n_7	68DAQ_DOUT4p_7	34	DAQ_DOUT2n_8	68DAQ_DOUT2p_8	34	DAQ_DOUT2n_16	68DAQ_DOUT2p_16