Prototype of new data acquisition system for COMPASS experiment

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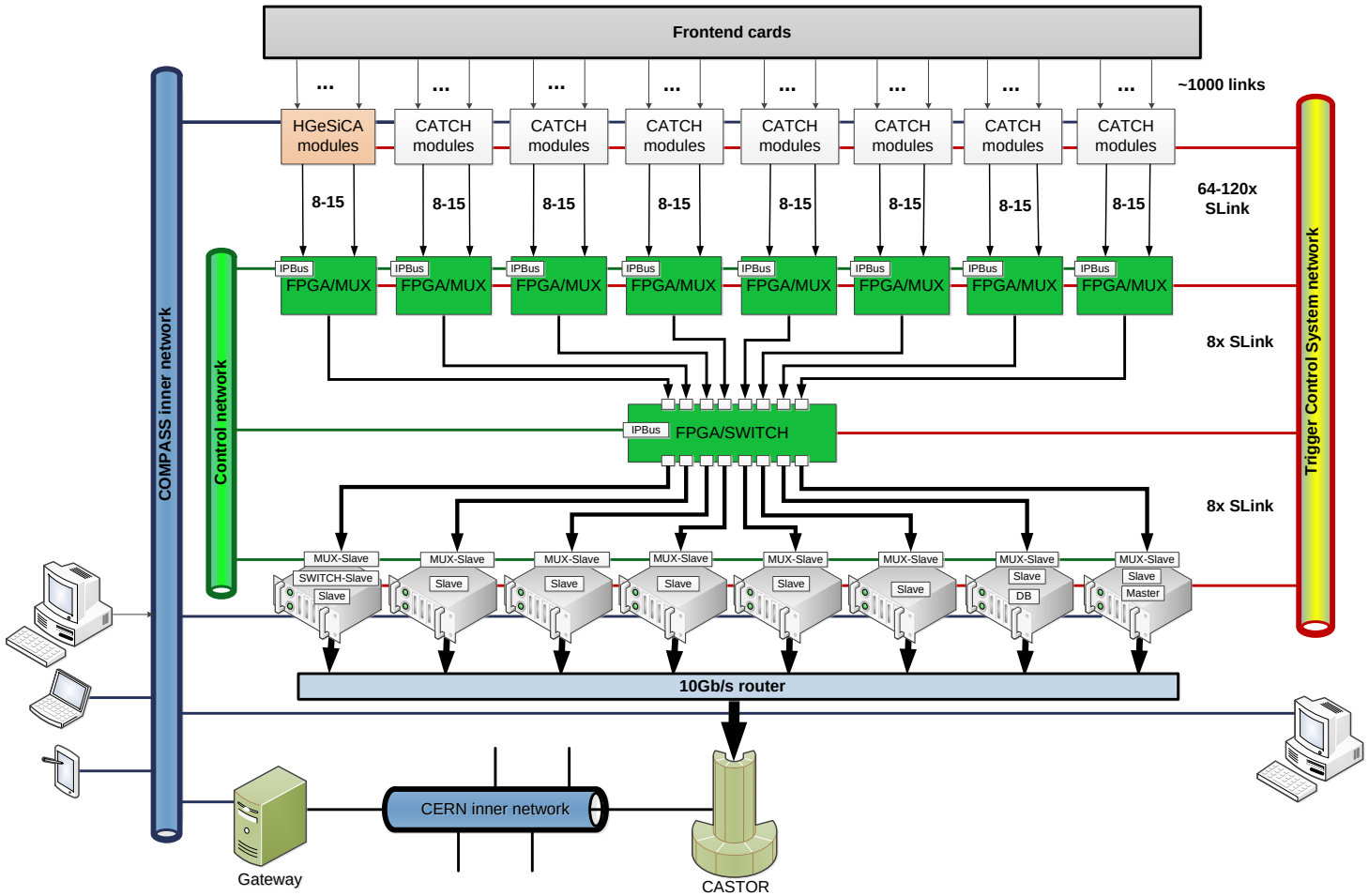
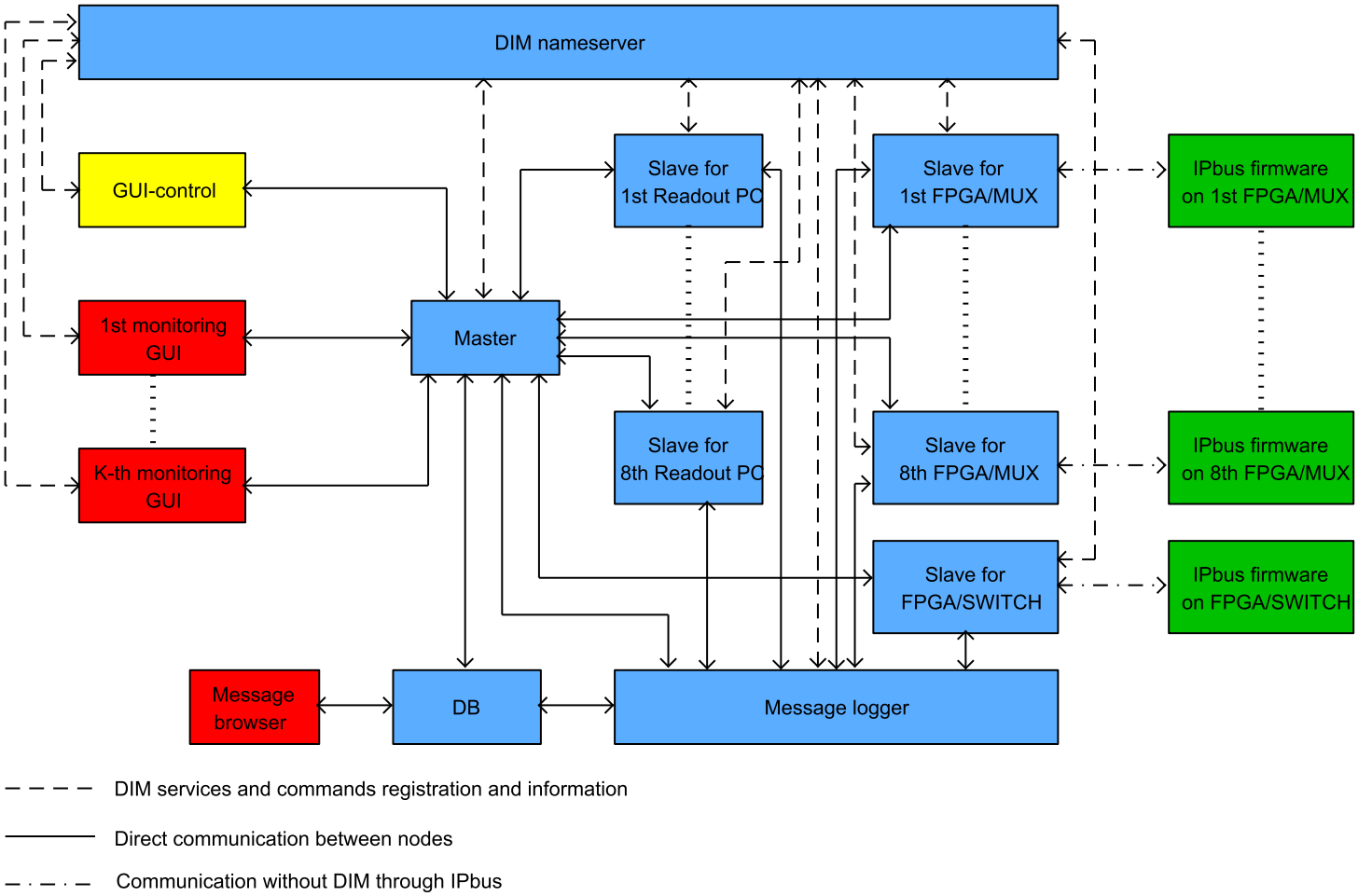
Hardware/Software structure of the new DAQ

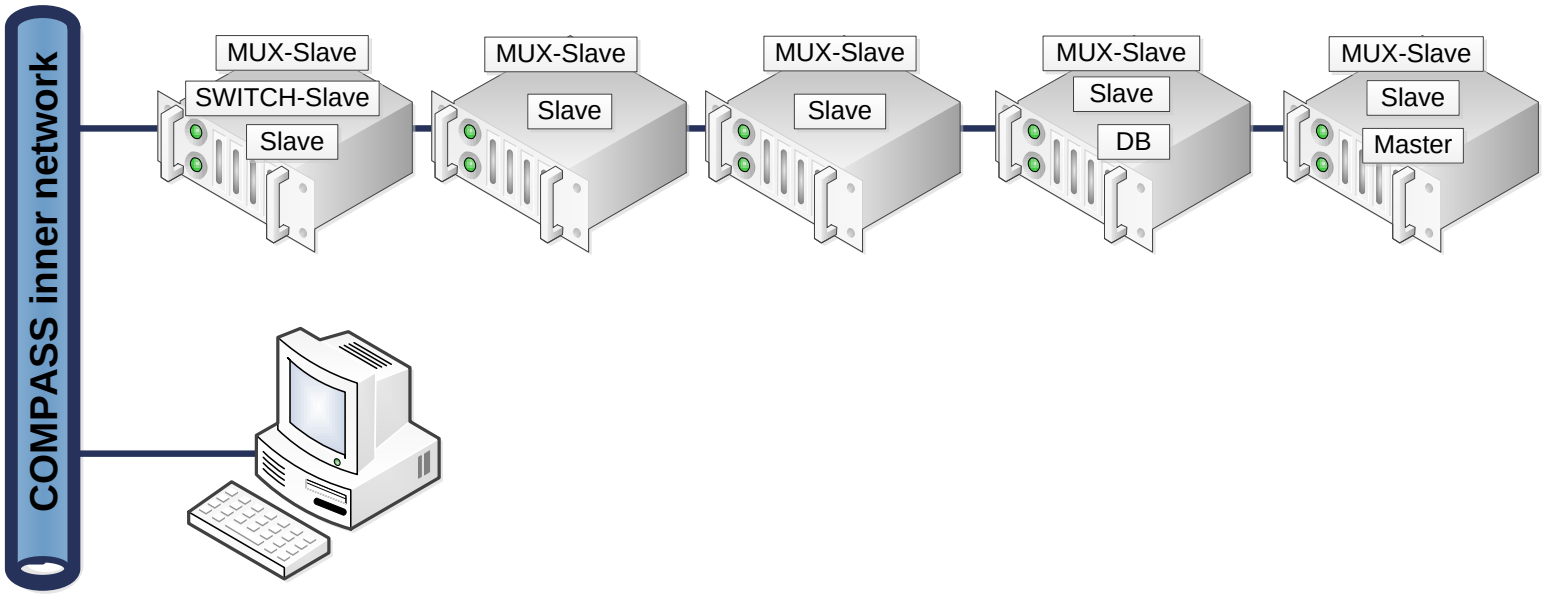


Software structure of the new DAQ

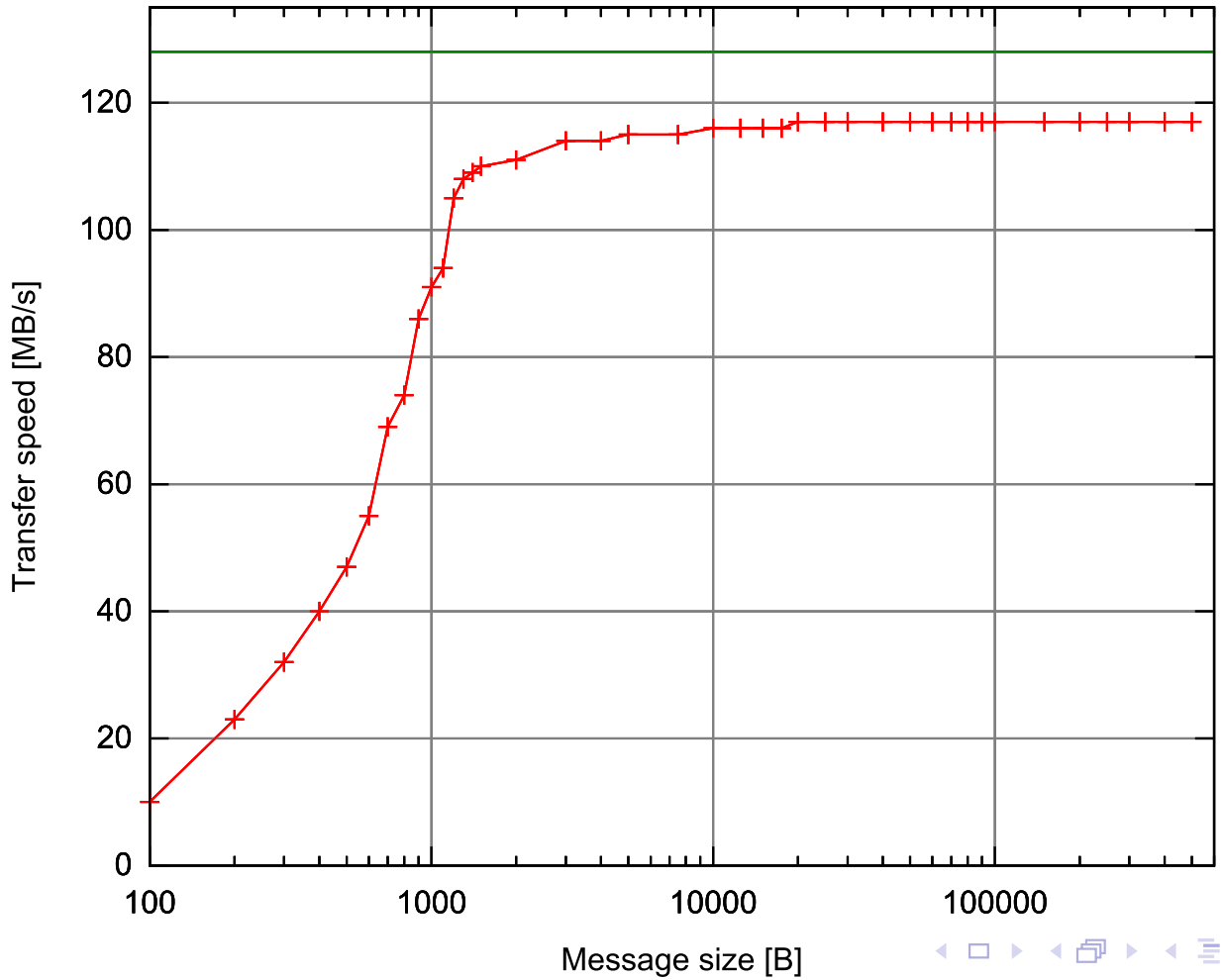


Prototype phase 1 - communication tests

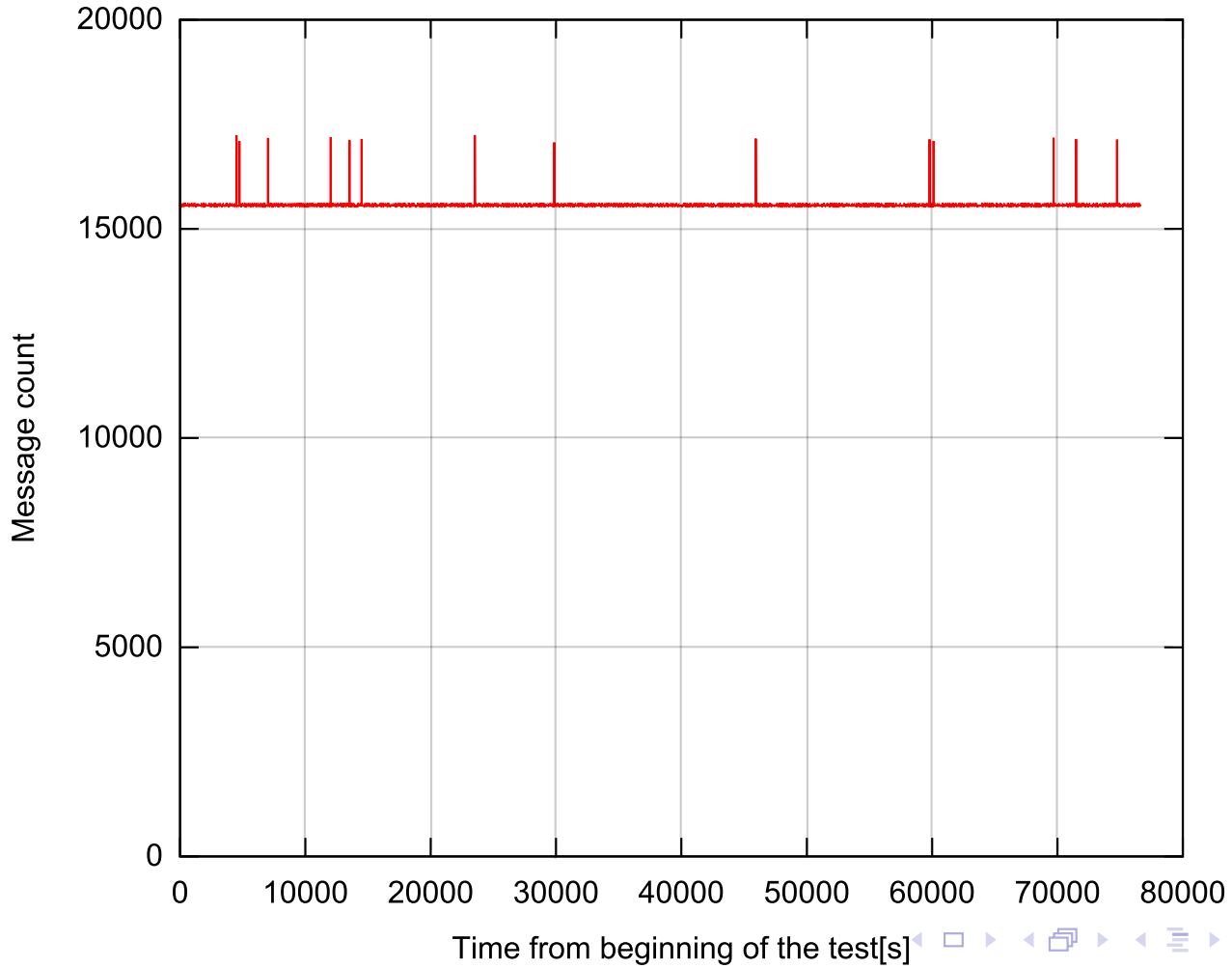
- DIM tests
- basic GUI design
- state machine design



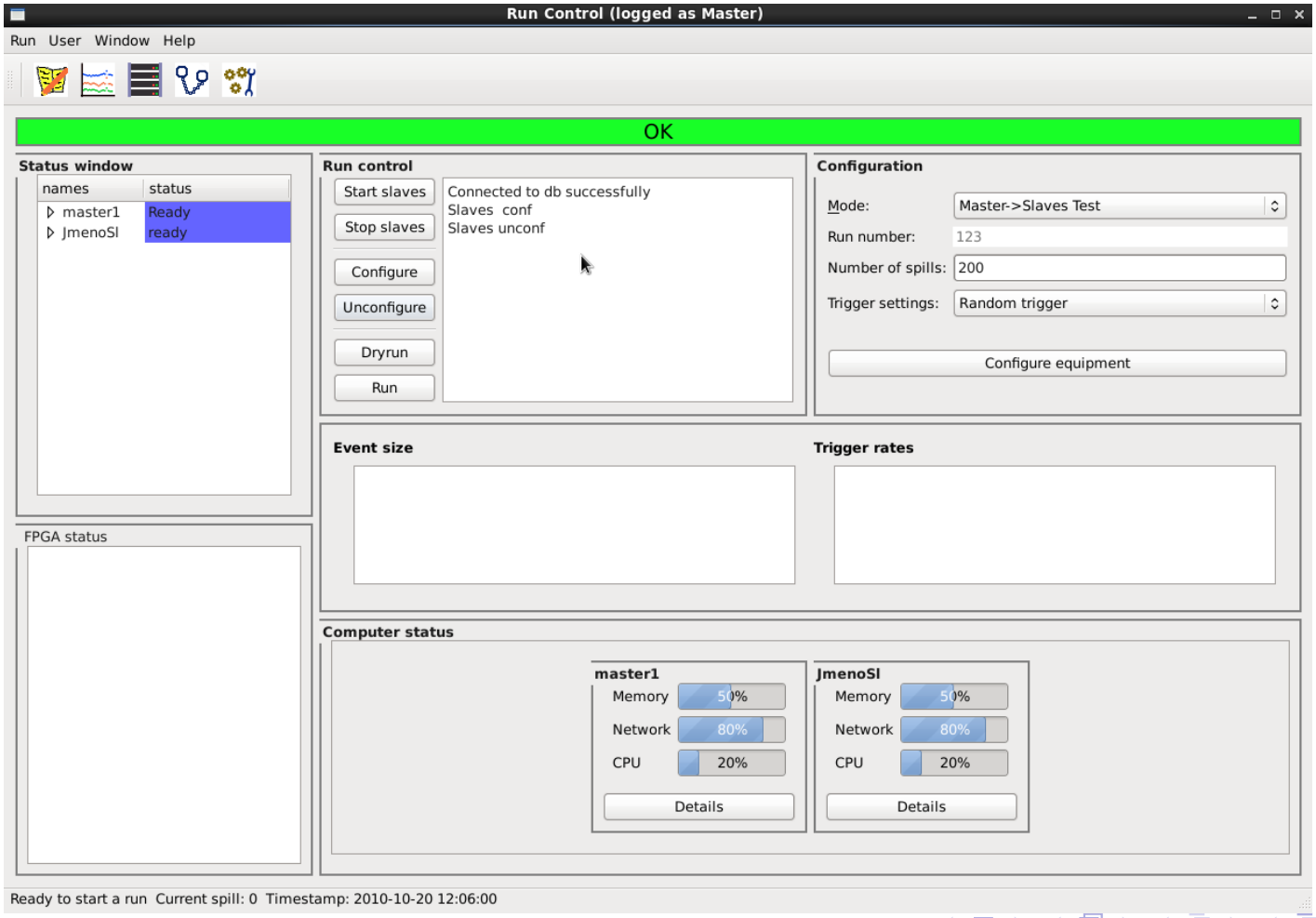
Speed


Transfer speed [MB/s]
0
20
40
60
80
100
120
100
1000
10000
100000
Message size [B]

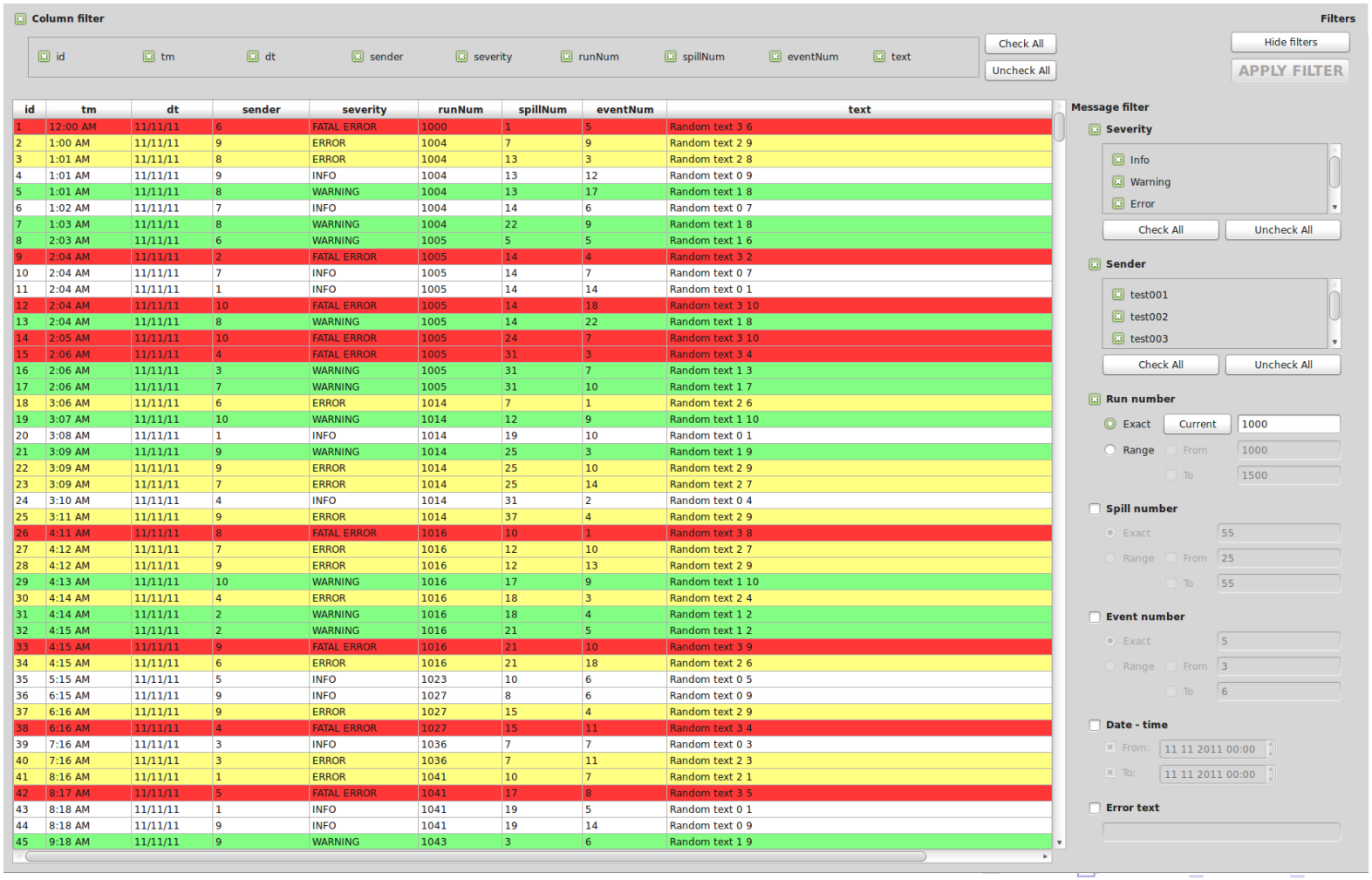
Stability


20000
15000
10000
5000
0
Message count
0
10000
20000
30000
40000
50000
60000
70000
80000
Time from beginning of the test[s]

GUI prototype



MessageBrowser prototype



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2	1:00 AM	11/11/11	9	ERROR	1004	7	9	Random text 2 9
3	1:01 AM	11/11/11	8	ERROR	1004	13	3	Random text 2 8
4	1:01 AM	11/11/11	9	INFO	1004	13	12	Random text 0 9
5	1:01 AM	11/11/11	8	WARNING	1004	13	17	Random text 1 8
6	1:02 AM	11/11/11	7	INFO	1004	14	6	Random text 0 7
7	1:03 AM	11/11/11	8	WARNING	1004	22	9	Random text 1 8
8	2:03 AM	11/11/11	6	WARNING	1005	5	5	Random text 1 6
9	2:04 AM	11/11/11	2	FATAL ERROR	1005	14	4	Random text 3 2
10	2:04 AM	11/11/11	7	INFO	1005	14	7	Random text 0 7
11	2:04 AM	11/11/11	1	INFO	1005	14	14	Random text 0 1
12	2:04 AM	11/11/11	10	FATAL ERROR	1005	14	18	Random text 3 10
13	2:04 AM	11/11/11	8	WARNING	1005	14	22	Random text 1 8
14	2:05 AM	11/11/11	10	FATAL ERROR	1005	24	7	Random text 3 10
15	2:06 AM	11/11/11	4	FATAL ERROR	1005	31	3	Random text 3 4
16	2:06 AM	11/11/11	3	WARNING	1005	31	7	Random text 1 3
17	2:06 AM	11/11/11	7	WARNING	1005	31	10	Random text 1 7
18	3:06 AM	11/11/11	6	ERROR	1014	7	1	Random text 2 6
19	3:07 AM	11/11/11	10	WARNING	1014	12	9	Random text 1 10
20	3:08 AM	11/11/11	1	INFO	1014	19	10	Random text 0 1
21	3:09 AM	11/11/11	9	WARNING	1014	25	3	Random text 1 9
22	3:09 AM	11/11/11	9	ERROR	1014	25	10	Random text 2 9
23	3:09 AM	11/11/11	7	ERROR	1014	25	14	Random text 2 7
24	3:10 AM	11/11/11	4	INFO	1014	31	2	Random text 0 4
25	3:11 AM	11/11/11	9	ERROR	1014	37	4	Random text 2 9
26	4:11 AM	11/11/11	8	FATAL ERROR	1016	10	1	Random text 3 8
27	4:12 AM	11/11/11	7	ERROR	1016	12	10	Random text 2 7
28	4:12 AM	11/11/11	9	ERROR	1016	12	13	Random text 2 9
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34	4:15 AM	11/11/11	6	ERROR	1016	21	18	Random text 2 6
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36	6:15 AM	11/11/11	9	INFO	1027	8	6	Random text 0 9
37	6:16 AM	11/11/11	9	ERROR	1027	15	4	Random text 2 9
38	6:16 AM	11/11/11	4	FATAL ERROR	1027	15	11	Random text 3 4
39	7:16 AM	11/11/11	3	INFO	1036	7	7	Random text 0 3
40	7:16 AM	11/11/11	3	ERROR	1036	7	11	Random text 2 3
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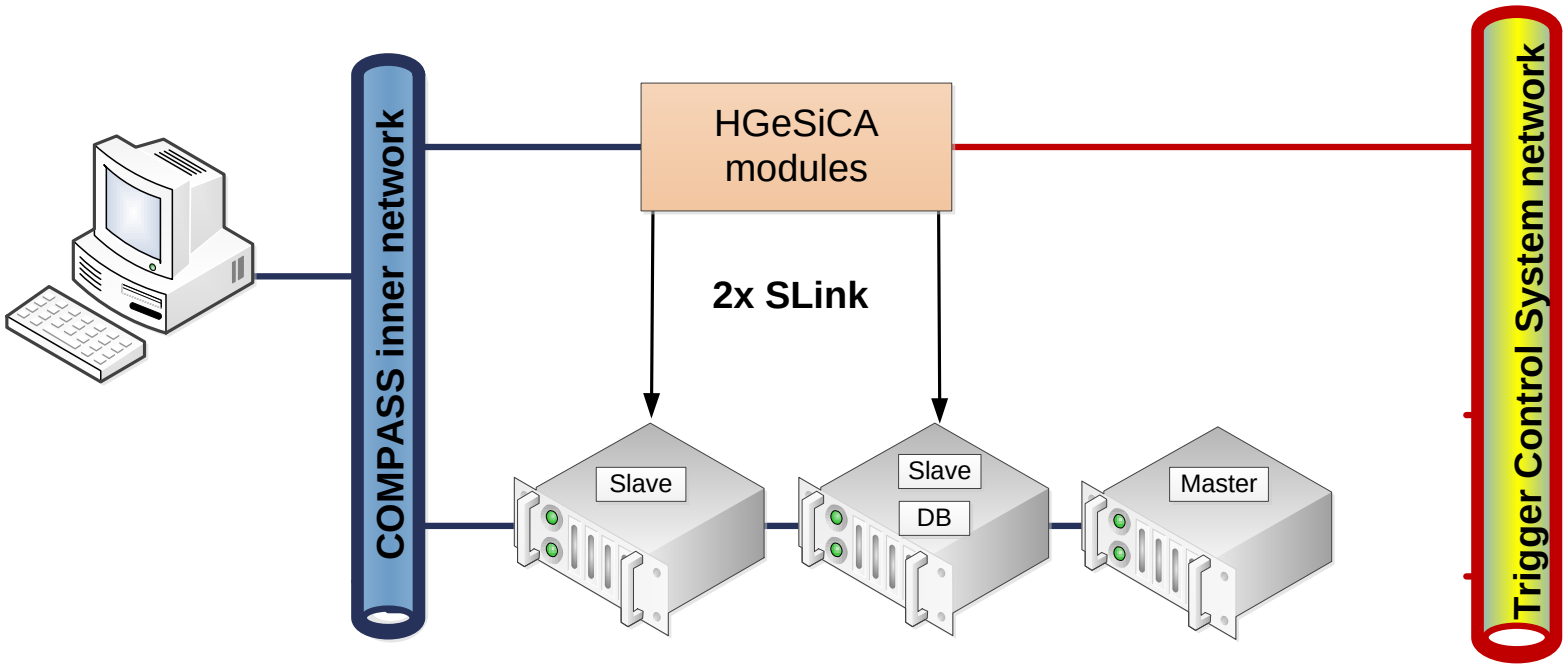
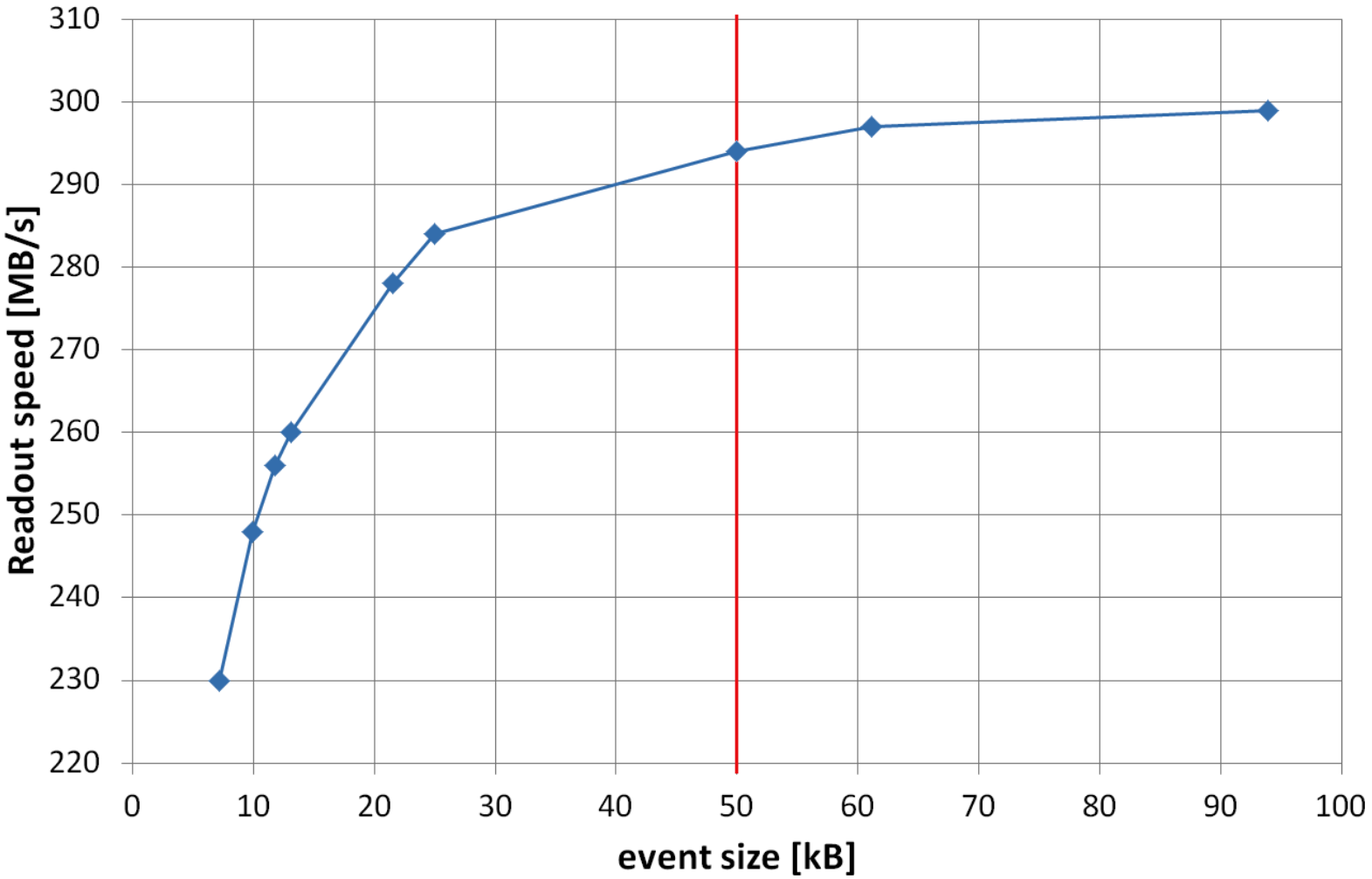
42	8:17 AM	11/11/11	5	FATAL ERROR	1041	17	8	Random text 3 5
43	8:18 AM	11/11/11	1	INFO	1041	19	5	Random text 0 1
44	8:18 AM	11/11/11	9	INFO	1041	19	14	Random text 0 9
45	9:18 AM	11/11/11	9	WARNING	1043	3	6	Random text 1 9

Prototype phase 2 - readout tests

- 2xPCI-express spillbuffers
- fixed size events generated by HGeSiCa



Readout speed test

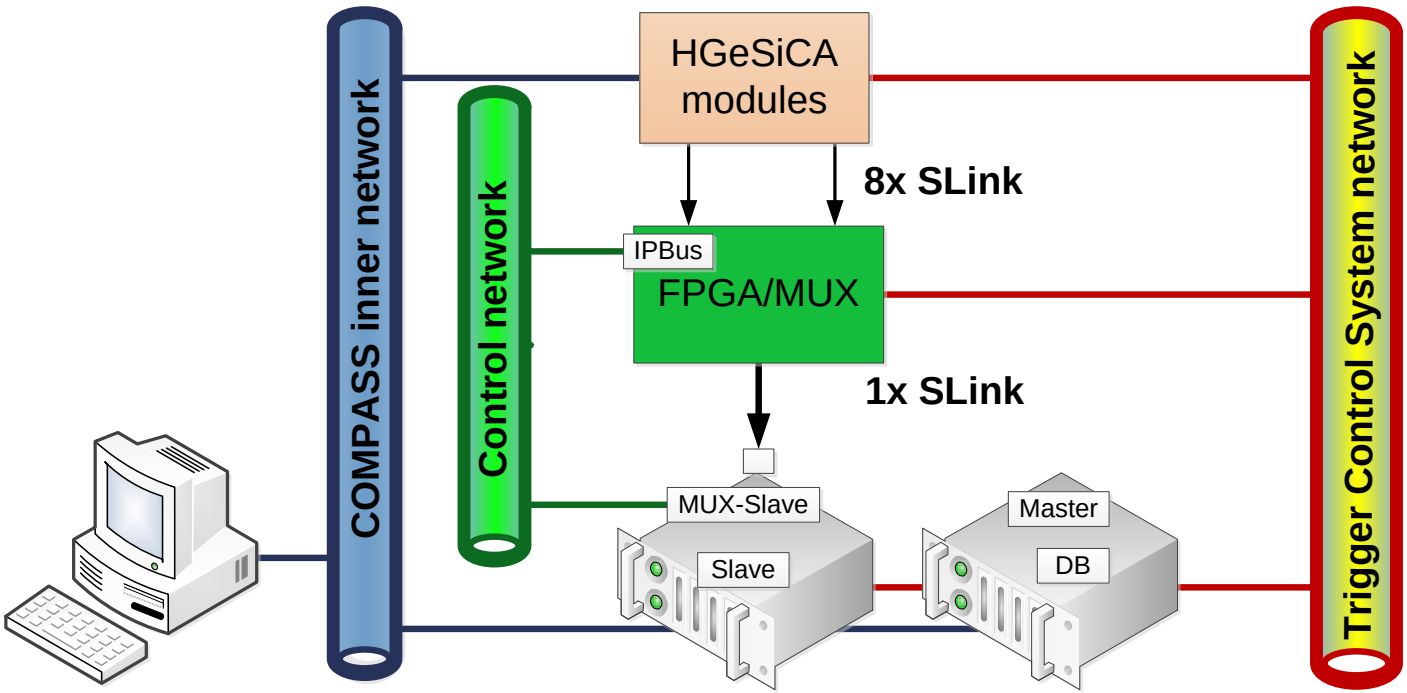


Readout speed test - result

- readout speed limited by SLink transfer speed
- big events better for readout
- final DAQ with 8 spillbuffer cards up to 1200 MB/s
- maximum CPU usage around 40%
- all data read during on-spill

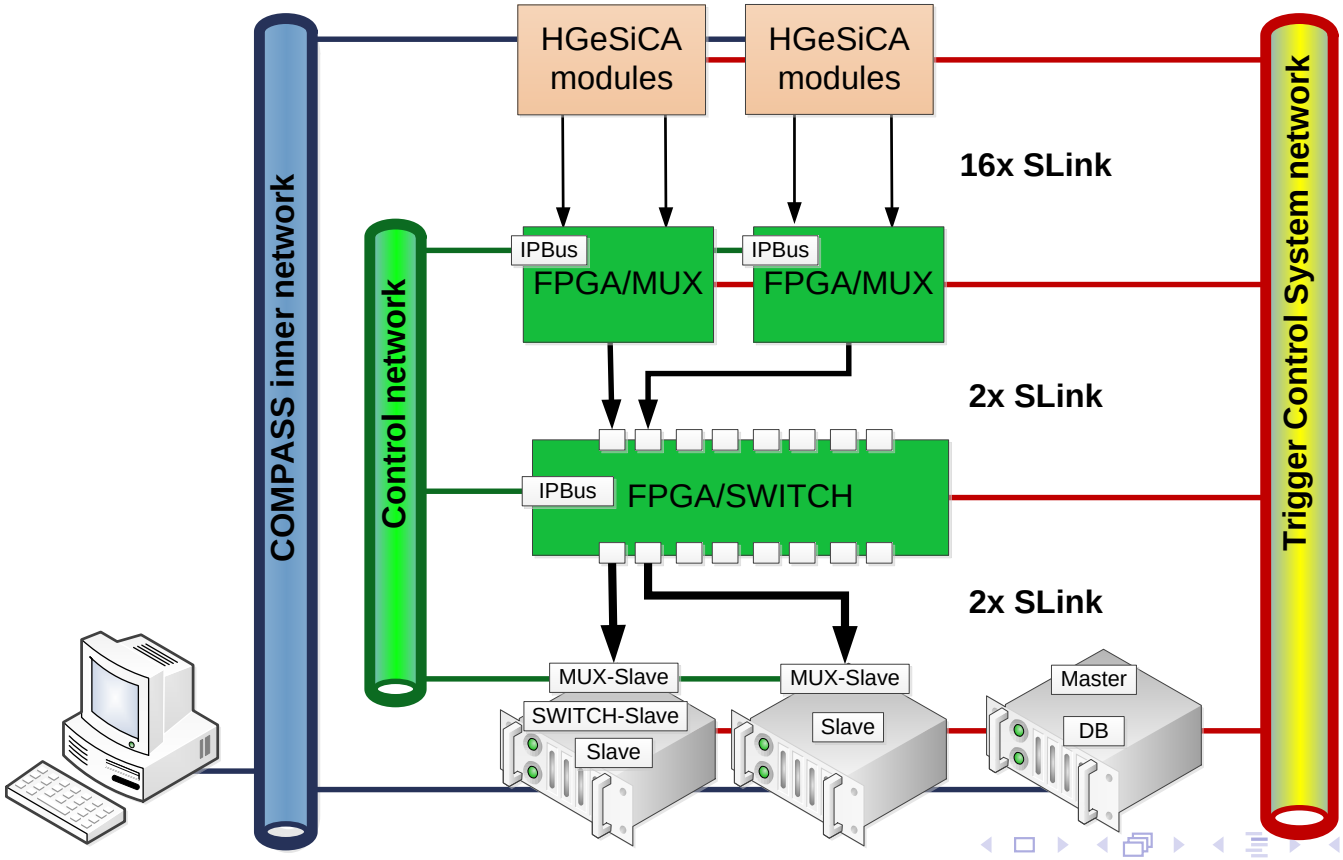
Prototype phase 3

- new hardware module
- new input data format



Prototype phase 4

- hardware event building



- Prototype phase 1 - communication tests → DONE
- Prototype phase 2 - readout tests → DONE
- Prototype phase 3 - FPGA/MUX test → summer 2013
- Prototype phase 4 - FPGA/SWITCH test → autumn 2013
- Full scale prototype → winter 2013