Production Tests:
Pulsar 2b integrated with PRM (KU040 or KU060)

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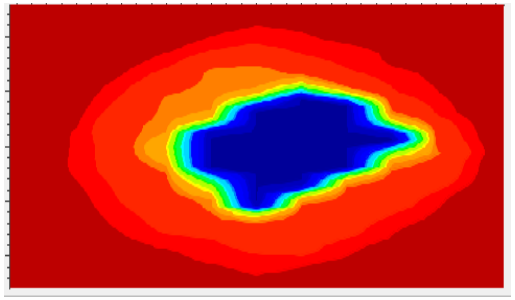
Board List and setup

- Board List
  - 5 Pulsar2b: 6-1, 6-2, …, 6-5
  - 3 protoPRM with KU040
  - 5 protoPRM with KU060
- Setup
  - Pulsar2b-6-1 with 2 PRM-ku040
  - Pulsar2b-6-2 with 2 PRM-ku060
  - Pulsar2b-6-3 with 1 PRM-ku040
  - Pulsar2b-6-4 with 1 PRM-ku060
  - Pulsar2b-6-5 with 2 PRM-ku060

Test List

- GTH Test with IBERT
  - Pulsar2b fabric interface with mini-backplane in the 1U crate at 10.0 Gbps
  - Pulsar2b FMC interface with protoPRM at 10.0 Gbps
  - protoPRM local channel between master and slave FPGA at 16.375 Gbps for KU060
  - RTMs at 8.0 Gbps
- LVDS Test
  - Pulsar2b FMC interface with protoPRM at 100MHz
  - protoPRM local channel between master and slave at 200MHz

Issue List



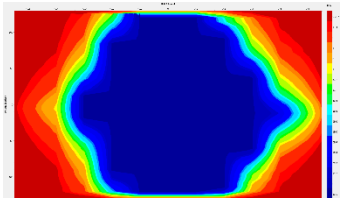
- Pulsar2b-6-5 fabric interface with mini-backplane
  - GT-X1Y32(Quad118-0) eye is narrow comparing with others
- Pulsar2b-6-2 FMC interface with two PRM-ku060
  - 1 GTH line dead in bi-direction in FMC-2
  - LVDS from PRM to PL2b in FMC-2 has some issue
    - Maybe just 1 LVDS-pair is broke, not sure
  - 1 GTH line not good from PL2b to PRM in FMC-1
  - 1 GTH line not good from PL2b to PRM in FMC-3

Details

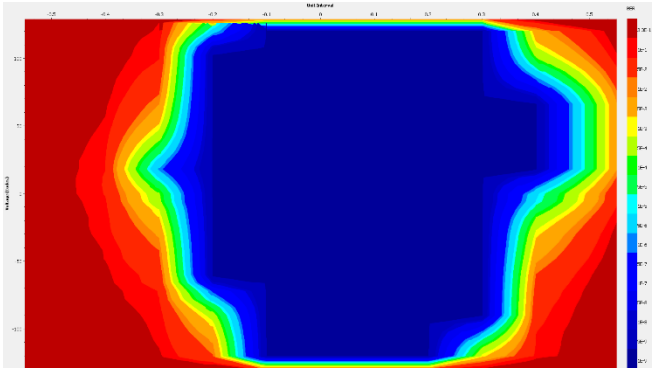
Pulsar2b 6-1 + (2)PRM 4

1U crate

- Tested at 10.0 Gb/s: BER<1e-14
- Tested the Pulsar FMC with PRM (GTH channels). All channels are error free. Pulsar2b assigns 3 GTH to each FMC, while protoPRM has 4 available.



- Tested the fabric interface



- Tested the LVDS for each FMC connector between Pulsar2b FPGA and protoPRM Master FPGA

Fabric with minibackplane

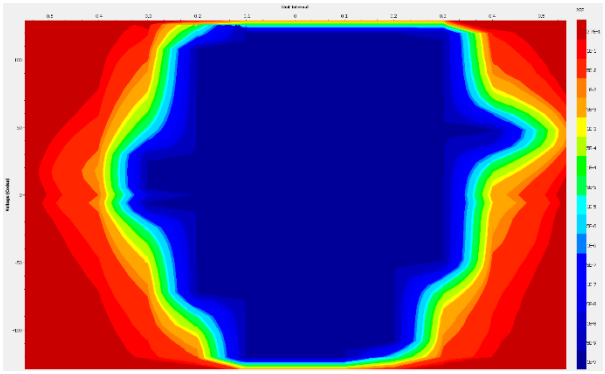
GT_X1Y6	8784
GT_X1Y7	9288
GT_X1Y8	9108
GT_X1Y9	8352
GT_X1Y10	8388
GT_X1Y11	8424
GT_X1Y12	9324
GT_X1Y13	8100
GT_X1Y14	8856
GT_X1Y15	8568
GT_X1Y16	7560
GT_X1Y17	8460
GT_X1Y18	8784
GT_X1Y19	7884
GT_X1Y20	9288
GT_X1Y21	8784
GT_X1Y22	8388
GT_X1Y23	8136
GT_X1Y24	9072
GT_X1Y25	8316
GT_X1Y26	7812
GT_X1Y27	9036
GT_X1Y28	8748
GT_X1Y29	8424
GT_X1Y30	7812
GT_X1Y31	7272
GT_X1Y32	7272
GT_X1Y33	7380

Pulsar2b 6-2 + (2)PRM 6

1U crate

- Tested at 10.0 Gb/s: BER<1e-14
- Tested the Pulsar FMC with PRM (GTH channels). All channels are error free. Pulsar2b assigns 3 GTH to each FMC, while protoPRM has 4 available.

- Tested the fabric interface



Fabric with minibackplane

GT_X1Y6	8388
GT_X1Y7	9396
GT_X1Y8	10224
GT_X1Y9	9828
GT_X1Y10	9216
GT_X1Y11	8388
GT_X1Y12	9108
GT_X1Y13	9180
GT_X1Y14	8892
GT_X1Y15	9180
GT_X1Y16	8748
GT_X1Y17	8820
GT_X1Y18	9324
GT_X1Y19	8280
GT_X1Y20	8208
GT_X1Y21	8964
GT_X1Y22	8568
GT_X1Y23	9000
GT_X1Y24	9036
GT_X1Y25	7416
GT_X1Y26	7740
GT_X1Y27	8892
GT_X1Y28	8064
GT_X1Y29	9144
GT_X1Y30	7452
GT_X1Y31	7452
GT_X1Y32	8172
GT_X1Y33	8856

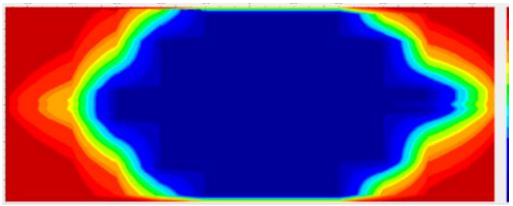
- Tested the LVDS for each FMC connector between Pulsar2b FPGA and protoPRM Master FPGA

Pulsar2b 6-3 + (1)PRM 4-1

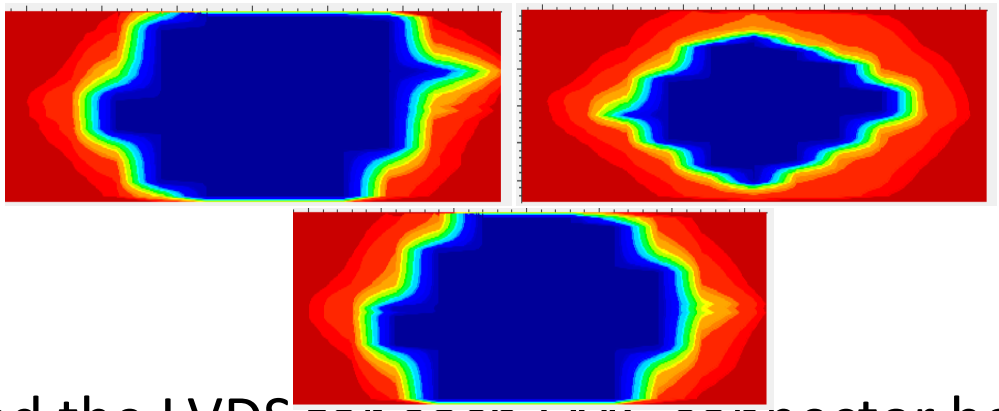
1U crate

- Tested at 10.0 Gb/s: BER<1e-14
- Tested the Pulsar FMC with PRM (GTH channels). All channels are error free. Pulsar2b assigns 3 GTH to each FMC, while protoPRM has 4 available.

Link	Open Area
Pulsar link1 (MGT_X0Y39)	8460
Pulsar link2 (MGT_X0Y38)	9108
Pulsar link3 (MGT_X0Y37)	10512
Pulsar link4 (MGT_X0Y36)	8712
Pulsar link5 (MGT_X0Y35)	10008
Pulsar link6 (MGT_X0Y34)	8424
PRM1 link1 (MGT_X0Y1)	8280
PRM1 link2 (MGT_X0Y2)	8028
PRM1 link3 (MGT_X0Y3)	7164
PRM2 link1 (MGT_X0Y1)	7812
PRM2 link2 (MGT_X0Y2)	7992
PRM2 link3 (MGT_X0Y3)	8388



- Tested the fabric interface



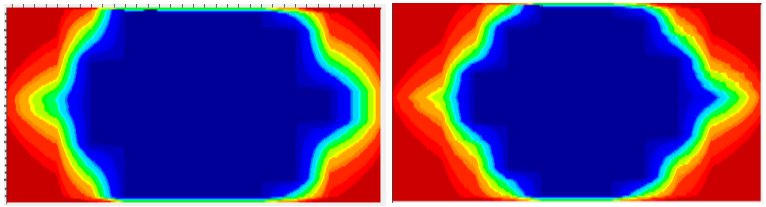
Link	Open Area	Link	Open Area
GT_X1Y6	8640	GT_X1Y20	9000
GT_X1Y7	9576	GT_X1Y21	8640
GT_X1Y8	8676	GT_X1Y22	8712
GT_X1Y9	9144	GT_X1Y23	7848
GT_X1Y10	8604	GT_X1Y24	8748
GT_X1Y11	7128	GT_X1Y25	7380
GT_X1Y12	7956	GT_X1Y26	7128
GT_X1Y13	8532	GT_X1Y27	7416
GT_X1Y14	8424	GT_X1Y28	7848
GT_X1Y15	7344	GT_X1Y29	8316
GT_X1Y16	8172	GT_X1Y30	5724
GT_X1Y17	7848	GT_X1Y31	7020
GT_X1Y18	5832	GT_X1Y32	4212
GT_X1Y19	7884	GT_X1Y33	8064

- Tested the LVDS for each FMC connector between Pulsar2b FPGA and protoPRM Master FPGA

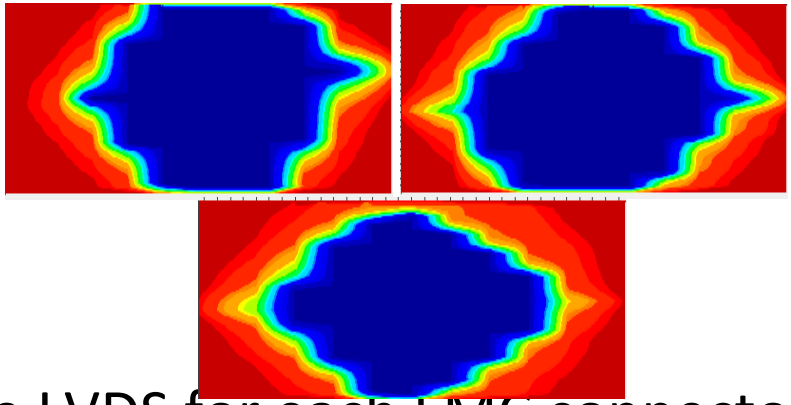
Pulsar2b 6-4 + (1)PRM 6-4

1U crate

- Tested at 10.0 Gb/s: BER<1e-14
- Tested the Pulsar FMC with PRM (GTH channels). All channels are error free. Pulsar2b assigns 3 GTH to each FMC, while protoPRM has 4 available.



- Tested the fabric interface



- Tested the LVDS for each FMC connector between Pulsar2b FPGA and protoPRM Master FPGA

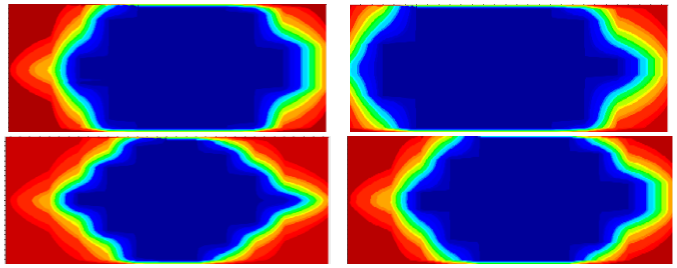
Link	Open Area
Pulsar link1 (MGT_X0Y38)	9648
Pulsar link2 (MGT_X0Y39)	8640
Pulsar link3 (MGT_X0Y37)	9792
Pulsar link4 (MGT_X0Y36)	8568
Pulsar link5 (MGT_X0Y34)	9216
Pulsar link6 (MGT_X0Y35)	9936
PRM1 link1 (MGT_X1Y5)	7416
PRM1 link2 (MGT_X1Y6)	7200
PRM1 link3 (MGT_X1Y7)	6588
PRM2 link1 (MGT_X1Y1)	7236
PRM2 link2 (MGT_X1Y2)	7380
PRM2 link3 (MGT_X1Y3)	7812

Link	Open Area	Link	Open Area
GT_X1Y6	7776	GT_X1Y20	7236
GT_X1Y7	9540	GT_X1Y21	8820
GT_X1Y8	10224	GT_X1Y22	8316
GT_X1Y9	9540	GT_X1Y23	7200
GT_X1Y10	9468	GT_X1Y24	8892
GT_X1Y11	8568	GT_X1Y25	7236
GT_X1Y12	7992	GT_X1Y26	9612
GT_X1Y13	8640	GT_X1Y27	8568
GT_X1Y14	9216	GT_X1Y28	8064
GT_X1Y15	8532	GT_X1Y29	9504
GT_X1Y16	8352	GT_X1Y30	7812
GT_X1Y17	8136	GT_X1Y31	6084
GT_X1Y18	9360	GT_X1Y32	6228
GT_X1Y19	9180	GT_X1Y33	9144

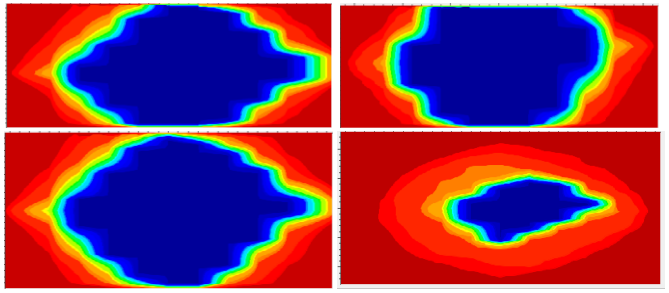
Pulsar2b 6-5 + (2)PRM 60

1U crate

- Tested at 10.0 Gb/s: BER<1e-14
- Tested the Pulsar FMC with PRM (GTH channels). All channels are error free. Pulsar2b assigns 3 GTH to each FMC, while protoPRM has 4 available.



- Tested the fabric interface



Open area too low

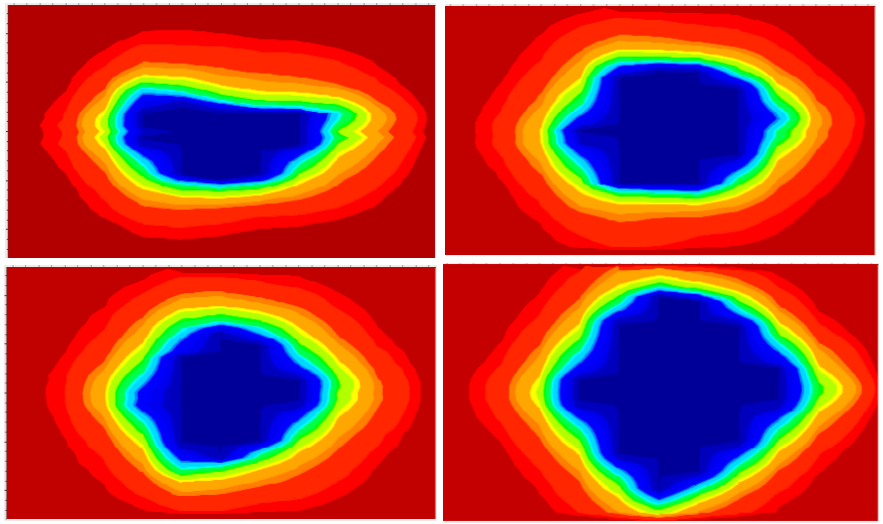
- Tested the LVDS for each FMC connector between Pulsar2b FPGA and protoPRM Master FPGA

Link	Open Area	Link	Open Area
Pulsar link1 (MGT_X0Y38)	8784	PRM1 link1 (MGT_X0Y38)	6948
Pulsar link2 (MGT_X0Y39)	9072	PRM1 link2 (MGT_X0Y39)	7524
Pulsar link3 (MGT_X0Y37)	9684	PRM1 link3 (MGT_X0Y37)	6876
Pulsar link4 (MGT_X0Y36)	9216	PRM1 link4 (MGT_X0Y36)	6876
Pulsar link5 (MGT_X0Y34)	8640	PRM1 link5 (MGT_X0Y34)	6624
Pulsar link6 (MGT_X0Y35)	7920	PRM1 link6 (MGT_X0Y35)	7776
Pulsar link7 (MGT_X1Y34)	8244	PRM2 link1 (MGT_X1Y5)	6876
Pulsar link8 (MGT_X1Y35)	8028	PRM2 link2 (MGT_X1Y6)	6912
Pulsar link10 (MGT_X1Y37)	9504	PRM2 link3 (MGT_X1Y7)	5940
Pulsar link11 (MGT_X1Y38)	8928	PRM2 link1 (MGT_X1Y2)	6408
Pulsar link12 (MGT_X1Y39)	9396	PRM2 link2 (MGT_X1Y3)	7452

Link	Open Area	Link	Open Area
GT_X1Y6	8172	GT_X1Y20	7992
GT_X1Y7	8424	GT_X1Y21	7596
GT_X1Y8	8928	GT_X1Y22	7740
GT_X1Y9	8856	GT_X1Y23	8208
GT_X1Y10	8892	GT_X1Y24	7920
GT_X1Y11	8064	GT_X1Y25	7092
GT_X1Y12	8244	GT_X1Y26	9216
GT_X1Y13	8172	GT_X1Y27	7020
GT_X1Y14	9324	GT_X1Y28	6804
GT_X1Y15	7740	GT_X1Y29	7236
GT_X1Y16	7344	GT_X1Y30	5544
GT_X1Y17	7668	GT_X1Y31	6012
GT_X1Y18	7956	GT_X1Y32	1548
GT_X1Y19	8388	GT_X1Y33	9000

RTM results: Slot 9->12

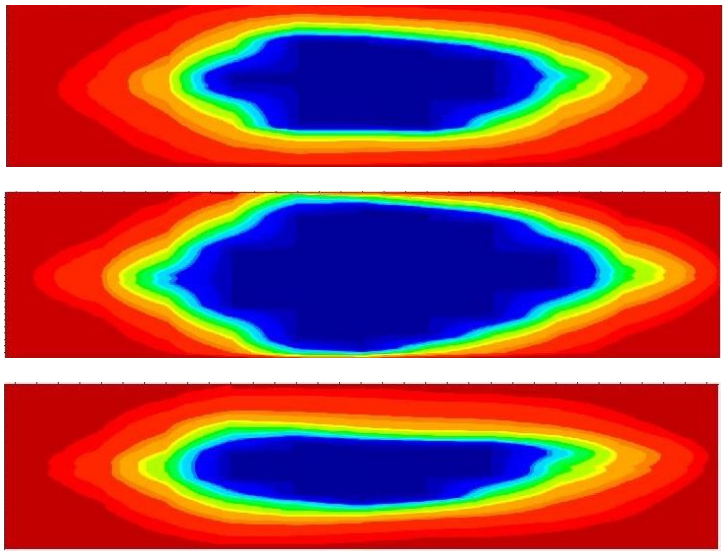
- Tested at 8Gbps
- Results look fine
- All channels error free



Link	Open Area	Link	Open Area
Q0-0	2520	Q5-0	2952
Q0-1	1512	Q5-1	1728
Q0-2	3348	Q5-2	2664
Q0-3	1368	Q5-3	2448
Q1-0	1836	Q6-0	2556
Q1-1	2016	Q6-1	1584
Q1-2	2196	Q6-2	2808
Q1-3	2664	Q6-3	1908
Q2-0	3060	Q7-0	2412
Q2-1	3600	Q7-1	1908
Q2-2	3960	Q7-2	2304
Q2-3	3780	Q7-3	1836
Q3-0	1764	Q8-0	2160
Q3-1	3960	Q8-1	1944
Q3-2	3528	Q8-2	3348
Q3-3	2988	Q8-3	2628
Q4-0	2772	Q9-0	2304
Q4-1	3780	Q9-1	2736
Q4-2	1908	Q9-2	1404
Q4-3	3888	Q9-3	1944

RTM results: Slot 12->9

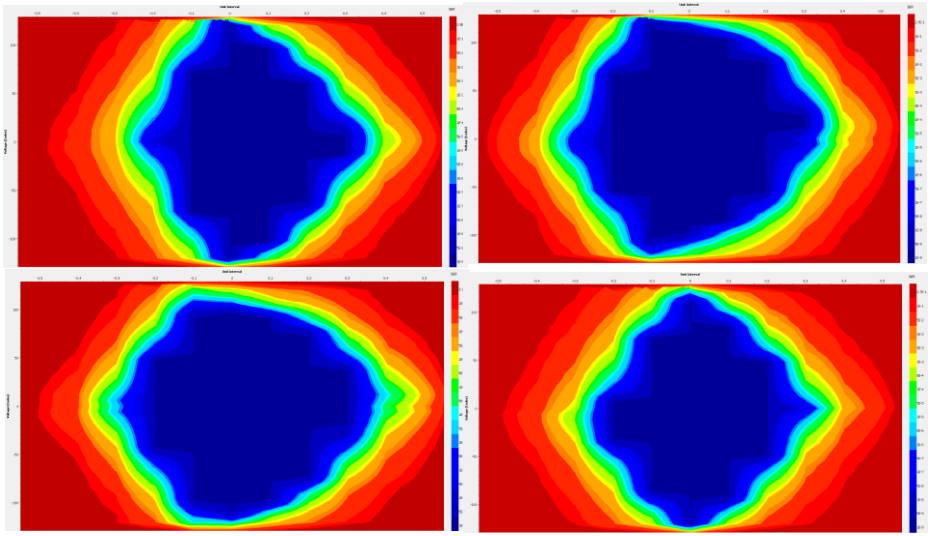
- Tested at 8Gbps
- Results look fine
- All channels error free



Link	Open Area	Link	Open Area
Q0-0	2772	Q5-0	2232
Q0-1	1980	Q5-1	2628
Q0-2	3708	Q5-2	2484
Q0-3	1800	Q5-3	2700
Q1-0	1872	Q6-0	2700
Q1-1	2664	Q6-1	2448
Q1-2	2232	Q6-2	2700
Q1-3	1332	Q6-3	2196
Q2-0	4068	Q7-0	3132
Q2-1	5256	Q7-1	2700
Q2-2	3636	Q7-2	3204
Q2-3	3744	Q7-3	1584
Q3-0	2484	Q8-0	2521
Q3-1	3672	Q8-1	1944
Q3-2	3096	Q8-2	2592
Q3-3	3132	Q8-3	2196
Q4-0	2844	Q9-0	2304
Q4-1	4572	Q9-1	3492
Q4-2	1944	Q9-2	1836
Q4-3	3924	Q9-3	2088

RTM results: Slot 10->11

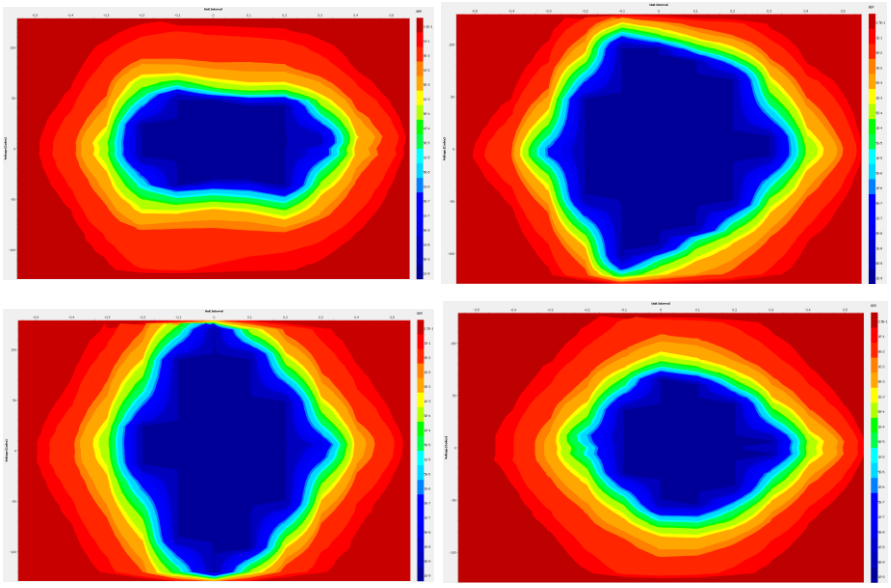
- Tested at 8Gbps
- Results look fine
- All channels error free



Link	Open Area	Link	Open Area
Q0-0	2484	Q5-0	2448
Q0-1	1116	Q5-1	2412
Q0-2	3204	Q5-2	3384
Q0-3	1656	Q5-3	2664
Q1-0	2700	Q6-0	2520
Q1-1	2232	Q6-1	3348
Q1-2	2304	Q6-2	3096
Q1-3	2520	Q6-3	2412
Q2-0	4392	Q7-0	2952
Q2-1	5292	Q7-1	2664
Q2-2	4212	Q7-2	3816
Q2-3	5400	Q7-3	2088
Q3-0	3276	Q8-0	1908
Q3-1	4176	Q8-1	2124
Q3-2	3708	Q8-2	3060
Q3-3	4824	Q8-3	2700
Q4-0	2772	Q9-0	1836
Q4-1	4572	Q9-1	3492
Q4-2	2088	Q9-2	1908
Q4-3	4536	Q9-3	2880

RTM results: Slot 11->10

- Tested at 8Gbps
- Results look fine
- All channels error free



Link	Open Area	Link	Open Area
Q0-0	2376	Q5-0	2664
Q0-1	1224	Q5-1	2556
Q0-2	3816	Q5-2	2952
Q0-3	1080	Q5-3	2700
Q1-0	2232	Q6-0	2520
Q1-1	2484	Q6-1	3240
Q1-2	1836	Q6-2	3852
Q1-3	2016	Q6-3	2772
Q2-0	4464	Q7-0	2988
Q2-1	5796	Q7-1	2232
Q2-2	3924	Q7-2	2376
Q2-3	4716	Q7-3	2304
Q3-0	2376	Q8-0	3168
Q3-1	3456	Q8-1	2448
Q3-2	2376	Q8-2	3168
Q3-3	3420	Q8-3	2484
Q4-0	2880	Q9-0	1944
Q4-1	3060	Q9-1	3384
Q4-2	2232	Q9-2	2196
Q4-3	3348	Q9-3	2340

RTM results: Slot 9->13

- Tested at 8Gbps
- Results look fine
- All channels error free

Link	Open Area	Link	Open Area
Q0-0	2232	Q5-0	2700
Q0-1	1764	Q5-1	1980
Q0-2	3276	Q5-2	2736
Q0-3	1800	Q5-3	1656
Q1-0	2160	Q6-0	2052
Q1-1	2052	Q6-1	1620
Q1-2	2412	Q6-2	2988
Q1-3	2736	Q6-3	1908
Q2-0	2700	Q7-0	2304
Q2-1	3852	Q7-1	1944
Q2-2	4032	Q7-2	2520
Q2-3	3636	Q7-3	1620
Q3-0	2304	Q8-0	828
Q3-1	4032	Q8-1	1872
Q3-2	3348	Q8-2	2916
Q3-3	3096	Q8-3	2340
Q4-0	2304	Q9-0	2088
Q4-1	4032	Q9-1	3024
Q4-2	1620	Q9-2	1656
Q4-3	3708	Q9-3	2484

RTM results: Slot 13->9

- Tested at 8Gbps
- Results look fine
- All channels error free

Link	Open Area	Link	Open Area
Q0-0	2700	Q5-0	2232
Q0-1	1512	Q5-1	2016
Q0-2	2592	Q5-2	2700
Q0-3	1836	Q5-3	2592
Q1-0	1836	Q6-0	2124
Q1-1	2160	Q6-1	1908
Q1-2	2232	Q6-2	3456
Q1-3	1872	Q6-3	1908
Q2-0	3132	Q7-0	3312
Q2-1	5508	Q7-1	1764
Q2-2	4464	Q7-2	3420
Q2-3	3564	Q7-3	1764
Q3-0	1944	Q8-0	2304
Q3-1	3528	Q8-1	1908
Q3-2	2736	Q8-2	2988
Q3-3	3708	Q8-3	2520
Q4-0	3672	Q9-0	2412
Q4-1	2736	Q9-1	2448
Q4-2	2124	Q9-2	1764
Q4-3	2880	Q9-3	2016

Other issue

- Network issue (no clear now)
  - Some timing delay issues were observed while testing the boards remotely (from different PC's using wireless connections)