BLM Direct Dump Test Results

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thanks to the help from Francesco M. Velotti and Nicolas Magnin from the TE-ABT

General information

o   Run2 BLMDDs:

BLMPI.04L6.B2I10_TCSP.A4L6.B2   BLMPI.04L6.B2I10_TCDQA.A4L6.B2

BLMPI.04R6.B1E10_TCDQA.A4R6.B1   BLMPI.04R6.B1E10_TCSP.A4R6.B1

o   Test procedure (Presented on 31.07 MPP):

- Put TCSP or TCDQA across the beam trajectory to absorb the beam upon injection
- Inject pilot bunch
- Record the beam dump
- Verify the BLMDD beam dump trigger and threshold
  - ➢   BLMDD thresholds are 20000 bits
  - ➢   2e10 protons on the TCSP should give a signal of >30000 bits (trigger direct dump)
  - ➢   Bunch intensity < 1e10 proton should not trigger direct dump
- Repeat for all 4 BLMDDs

- Didn't mask adjacent BLM

  - PM data would be useful for signal comparison and in case BLMDD didn't trigger beam dump as expected
  - BLMDD existing as a separate client in TSU

Verifying the BLMDD trigger and threshold

		Beam Int.	BIS	BLMDD tri.	ADC max.
B1	TCSP	3.90E+09	YES	YES	25935
B2	TCSP	5.00E+09	YES	NO	16619
B2	TCSP	2.00E+10	YES	YES	49002
B1	TCDQ	2.80E+09	YES	NO	7252
B1	TCDQ	1.19E+10	YES	YES	27056
B2	TCDQ	8.50E+09	YES	NO	15719
B2	TCDQ	2.20E+10	YES	YES	29188

Client	CPLD1	CPLD2
All clients	REQ	REQ
BIS Freq.	9.375	9.375
BIS fast	OK	OK
BIS slow	OK	OK
BEC fast	OK	OK
BEC slow	OK	OK
BLMDD	REQ	REQ
Inject&Dump	OK	OK
SCSS	OK	OK
Internal	OK	OK

- All 4 BLMDDs have thresholds set to ~20000bits (seen from the BLMDDExpert GUI)
- We have confirmed all 4 BLMDDs give beam dump trigger when their signals are above the threshold of 20000 bits, considering the input on the TSDS.

Measuring beam dump trigger latency

- The time delay between loss signal over thr. and BLMDD gives beam dump
- Estimating the time of signal exceeds the threshold

MKI signal start + Rise time + TOF

Test	MKI signal start	Rise time [us]	MKI BLM DCUM	BLMDD DCUM
B1 TCSP	16:56:09.086'925'824	61.917874	3181.42	16817.86
B2 TCSP	17:50:05.487'076'096	79.9516184	23461.45	16505.55
B1 TCDQ	18:09:41.487'114'496	61.9182393	3181.42	16804.56
B2 TCDQ	18:22:34.286'578'944	79.951	23461.45	16519.63

- BLMDD beam dump trigger t-stamp

Test	Beam Dump	DD Tri. t-diff.[us]	Latency [us]
B1 TCSP	16:56:09.087'153'125	-43	76.9
B2 TCSP	17:50:05.487'284'975	-31	74.7
B1 TCDQ	18:09:41.487'283'150	+20	81.3
B2 TCDQ	18:22:34.286'787'775	-31	74.7

BLMDD trigger w.r.t. beam dump trigger
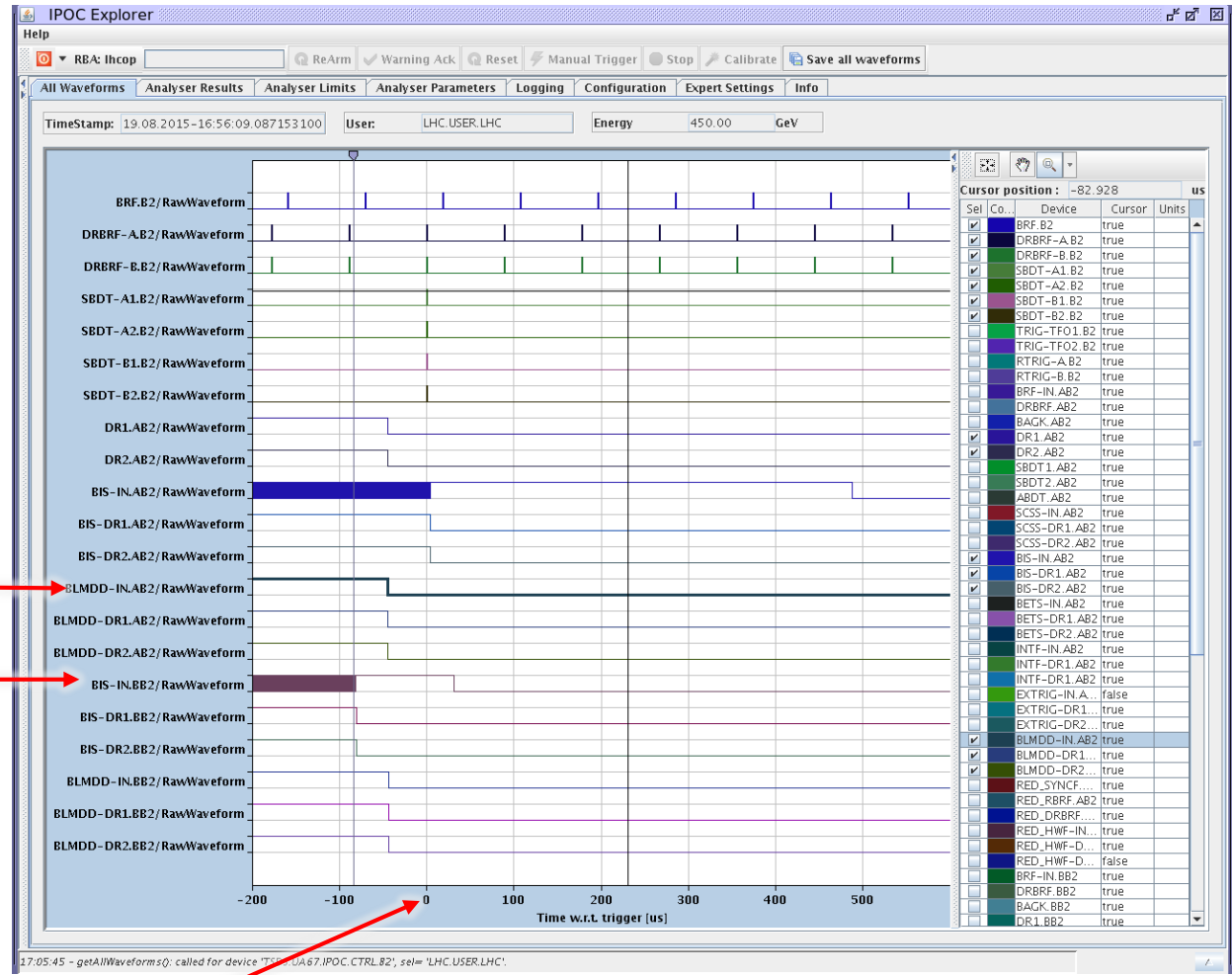
BLMDD trigger

BIS trigger

Beam dump time

Mismatching beam dump triggers
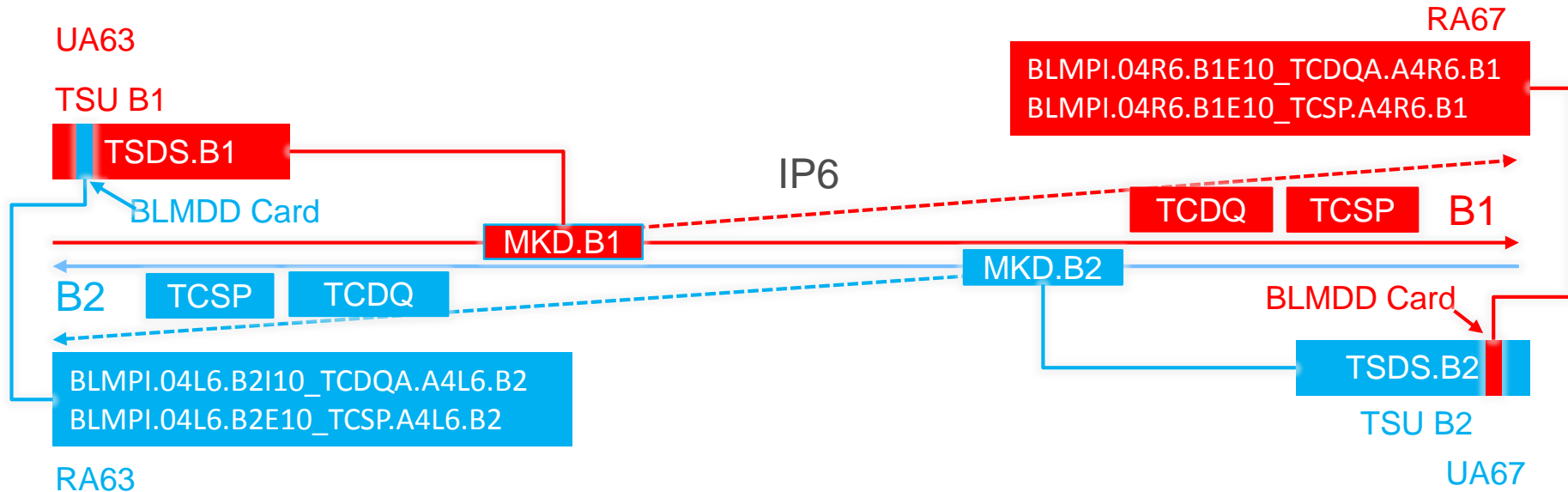
Currently the BLMDD card is situated in the nearby TSDS rack, and triggered wrong beam dump in the TSDS (B1 BLMDD gives a B2 beam dump and vice versa)

Cabling proposal
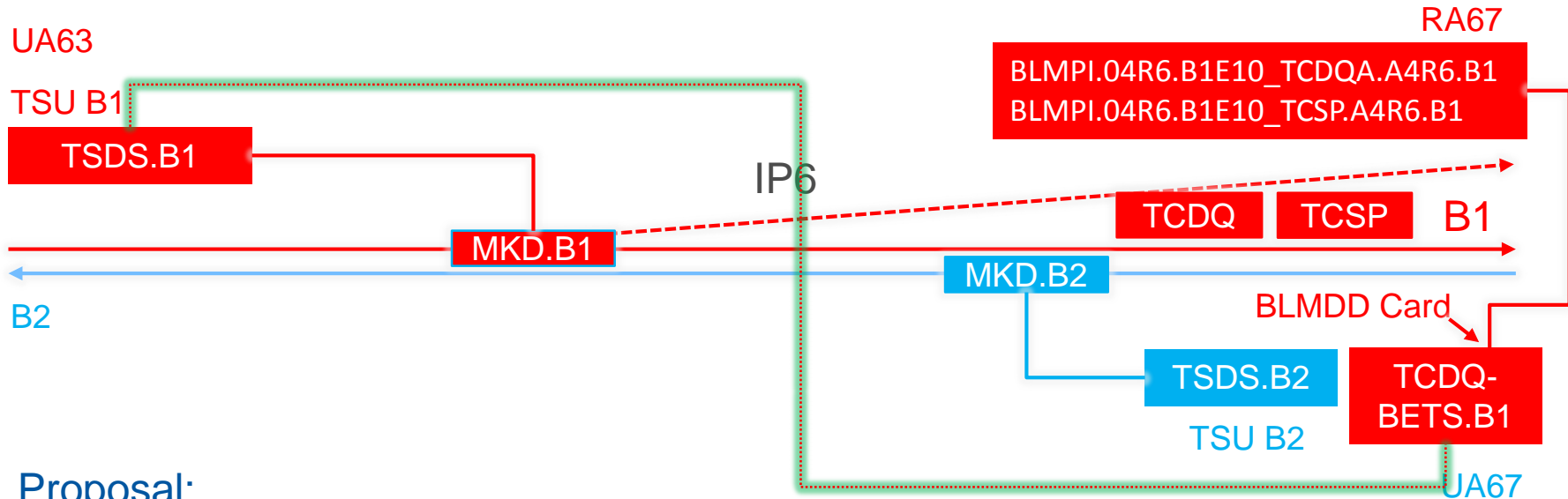
- Proposal:
  - We propose that the BLMDD card is moved to the nearby TCDQ-BETS crate and connected to the correct TSDS by a ~350m cable.
  - The current loop on this long cable guaranteed a beam dump in case of connection failure.
- TO DO:
  - The solution is agreed between BI-BLM and ABT, its feasibility to be investigated during TS2.
  - Develop a module for regular signal checking of the BLMDD and included in the PM data

BACK UP SLIDES

BLMDD signal compared to standard BLM

To do: Develop a module for regular signal checking of the BLMDD and include it in the normal BLM connectivity check or PM data

2015 BLMDD Test

TCSP BLMDD vs. IC signal RS01 (2015 Aug.)
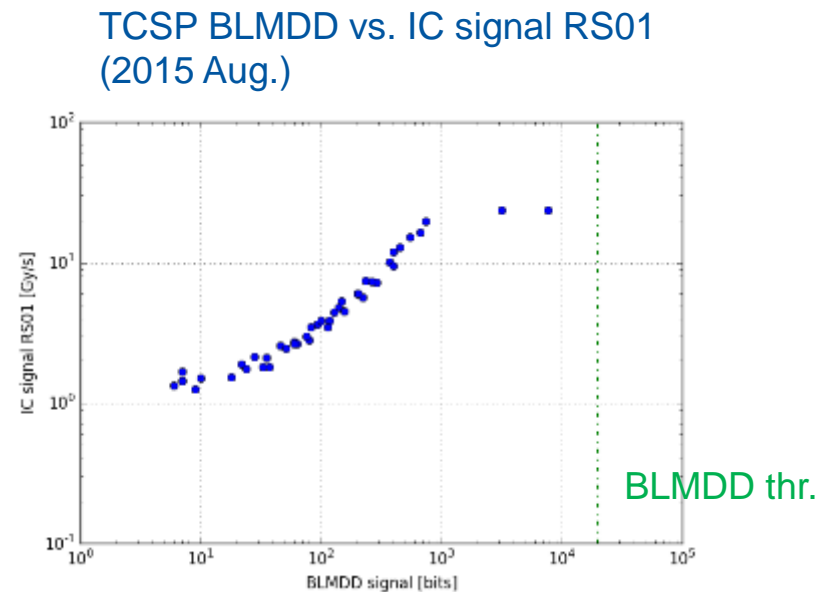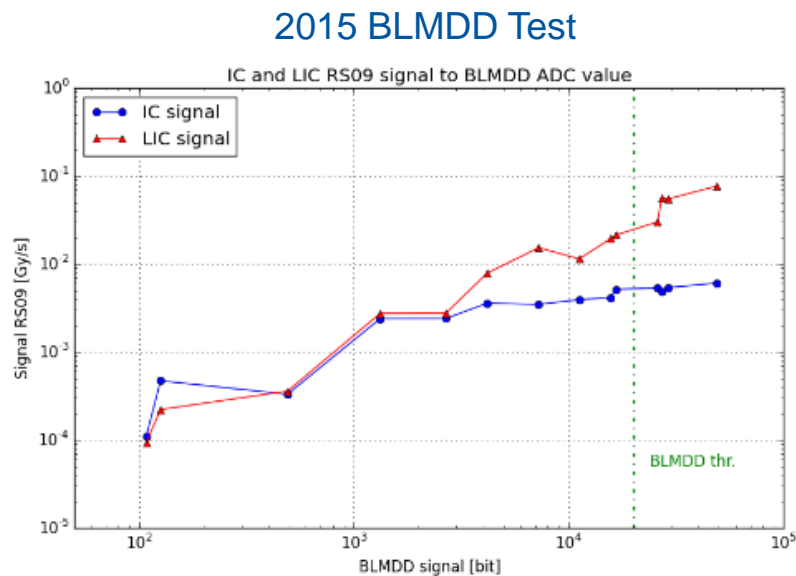
Mismatching BLMDD trigger

TEST of B1 TCSP

http://elogbook.cern.ch/eLogbook/eLogbook.jsp?shiftId=1067894