

GLOBAL TRIGGER

**Trigger Meeting,
CERN 20. May 99
A. Taurok**

Part1: Status of Design

See sheets of Trigger Review 19.May 99

Part2: INTERFACES to TTC, TTS, EVM

Proposal presented. Update after talk included.

Part3: PARTITIONING during CALIBRATION and TESTS

Proposal presented. Update after talk included.

Part4: GAP SHARING

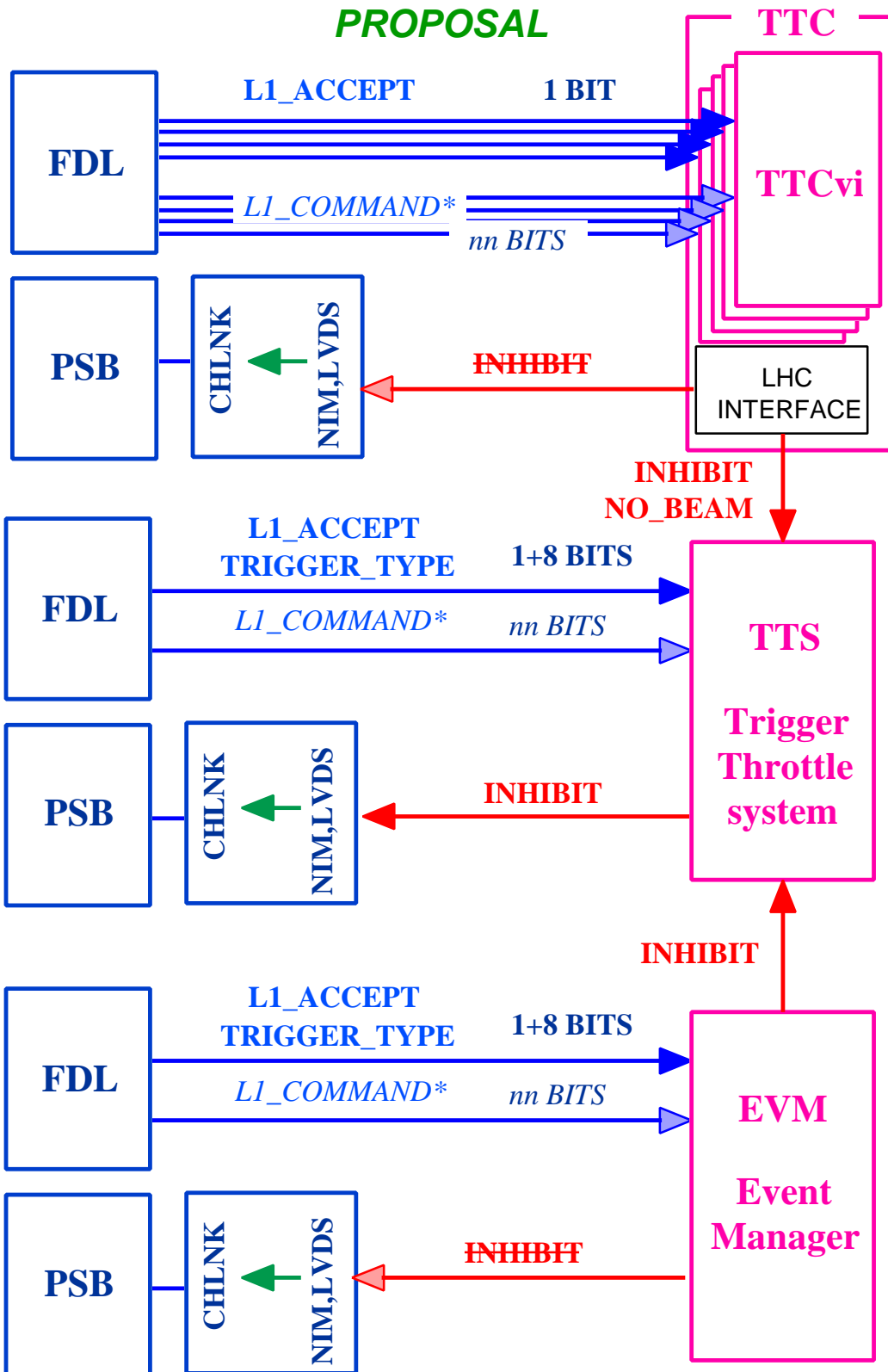
Proposal presented.

Part2: INTERFACES to TTC, TTS, EVM
Proposal

All system are allowed to send special trigger requests directly to the Global Trigger (PSB for 'technical' inputs).

**But all INHIBIT signals go to the TTS.
The TTS only is allowed to inhibit L1Acc on the FDL board.**

INTERFACES to TTC, TTS, EVM PROPOSAL



*L1_COMMAND for modified TTCvi only

12.5.99 HEPHY VIENNA

**PART 3:
PROPOSAL for
PARTITIONING during CALIBRATION and TESTS
and for GAP SHARING**

20.5.99 A. Taurok

1 SUBSYSTEM <====> 1 TTCvi <====> 1 GTCal_logic

Independent calibration and tests

For tests and start-up periods everybody prefers to work independently. Therefore the most natural partitioning is that each subsystem has got its own TTCvi module to run private calibration and test procedures. According to that arrangement the GT_Calibration logic consists of a set of identical parts each for one subsystem. If subsystems want to use the calibration logic of the Global Trigger privately they can run their part of GT_Cal logic independently from each other. Four Algorithm bits are provided for each subdetector to run private physics triggers too.

Calibration/Test cycle for a subsystem

Pretrigger/Test =====> delay =====> L1Acc

Calibration/Test measurement of a group of subsystems

More subsystems can be combined easily as a 'calibration group' by loading the same values into their GT_Cal part. A PRETRIGGER command is sent to start a calibration cycle. Each member of the group decodes and accepts this command and starts its calibration procedure. The next L1Acc is sent at the same bx to all subsystems of the group and stores the data for readout. Pretrigger commands are sent at different times to allow for different procedure length. If a subsystem can do more kinds of calibration/test procedures we use pretrigger commands (pretrig_nn_pp) to select them.

Format of pretrigger command: pretrig_nn_pp

nn = group or subdetector number; pp = procedure type

Calibration/test of a group and DAQ readout with consistent event number

Sometimes it might be preferred that the common event number should be valid in the whole system even for calibration events. Subdetectors not included in the calibration/test group recognise but do not accept the pretrigger command. For that purpose we use several different pretrigger commands (pretrig_ss_pp). If a subsystem receives a pretrig_ss_pp command and does not accept it, then it delivers a dummy event with the next L1Acc to keep its event number consistent.

Calibration with TTCvi as it is

One or more pretrigger commands are loaded into the FIFO of one or more TTCvi and are sent every orbit. The GTCal logic sends the L1Acc some bunch crossings after every pretrigger command to read the data.

Remark: If the calibration/test procedure needs more than one orbit to produce data then the next pretrigger command has to be ignored.

Modified TTCvi

*The TTCvi could be changed to accept **external synchronous commands**. The commands are sent now from the GTCal logic, one at an arbitrary time. With this option we can do all calibration and test measurements of single and groups of subsystems as describe above but in a much more flexible manner.*

Modified TTCvi: Insert Calibration request during physics run

This modification allows us to insert a single calibration/test request without time consuming software interaction. During normal data taking the GTCal stops physics trigger and sends then a pretrigger command to switch the subsystem(s) into the calibration/test mode and to start the procedure. Some time later it sends a LIAcc to read the calibration/test data with consistent event number as mentioned above. Finally it sends a 'physics' command to restore the normal run mode in the subsystems. Such a single calibration can be started by software, by an external signal or regularly.

Preliminary summary of command codes:

Command = 8 bits ==> 256 codes.

command = 00.....63 PRETRIGGER

command = 64.....95 TEST

command = 96.....127 GAP_GRANTED

Definition of a 'subsystem' that has got one TTCvi:

For simple synchronisation we should keep the number of subsystem as small as possible. We propose the following subsystems (*incomplete list, random order*):

ECAL, HCAL, Global Calo Trig, Global Trig (with Global Muon Trig), RPC, DTBX, CSC,

TRACKER: PIXEL, INNER TRACKER, PRESHOWER,

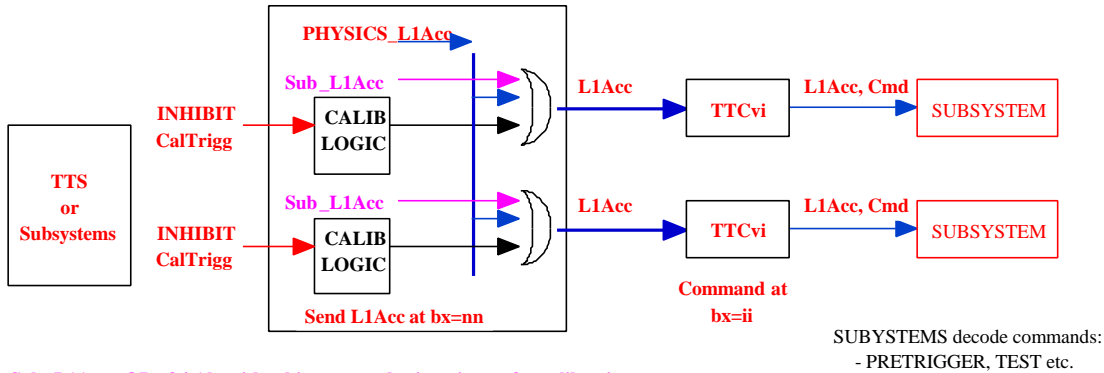
Do we need more TTCvi boards ?

Calibration / Test procedure:

TTCvi sends synchronous PRETRIGGER commands at selected BXs (programmed).
 GTCal in FDL sends LIAcc at selected BXs (programmed).
 The subsystem generates calibration/test data between the PRETRIGGER and the following LIAcc.
 Calibration runs until stopped by software.

PARTITIONING:

There is one TTCvi for each subsystem. Independent calibration in parallel is possible.
 Subsystems can be combined by setting the same bx-value for the LIAcc signal.



Sub_LIAcc= OR of 4 Algorithm bits to run physics triggers for calibration.

CONSTRAINTS:

COMMAND is sent at least 1x per LHC orbit.
 No single Test/Calibration Requests during physics run.

REMARK: No TRIGGER TYPE is sent to TTC and Subsystems. Type would insert 9 bx dead time after every LIAcc and arrives 9bx after LIAcc.

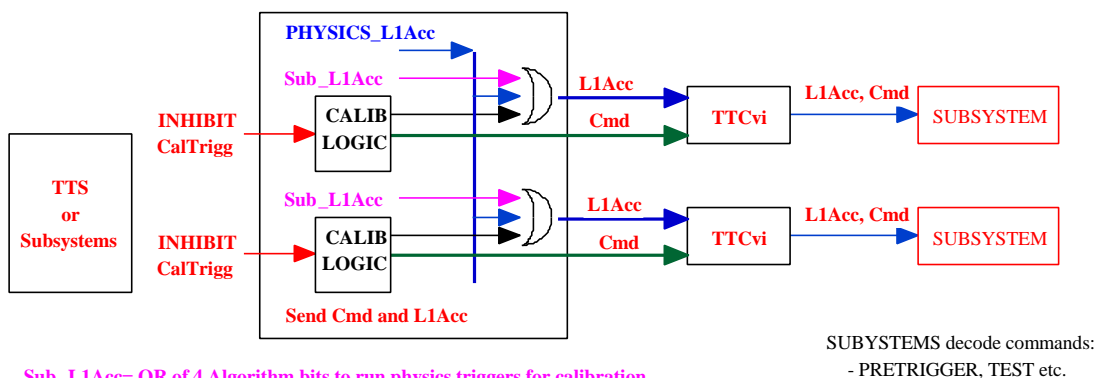
A.Taurok 17-5-99
 FDL_CAL9905.cdd

Calibration / Test procedure with modified TTCvi boards:

The modified TTCvi accepts synchronous PRETRIGGER commands (8 bits).
 GTCal in FDL sends a Pretrigger command and after a selected time a LIAcc.
 The 'Pretrigger' command starts a calibration/test procedure in the subsystem and the following LIAcc reads the data. Afterwards a 'Physics' command returns the subsystem to normal mode.
 Calibration/Test requests can be inserted between physics triggers.

PARTITIONING:

There is one GTCal logic and one TTCvi for each subsystem to enable independent calibration in parallel.
 Subsystems of a calibration/test group accept the same command (flexible arrangements*).



Sub_LIAcc= OR of 4 Algorithm bits to run physics triggers for calibration.

*)Commands: Pretrig_0...31, Test_0...31,
 Physics_0...31, Split_systems,
 Subsystems accept one or more codes.

REMARK: No TRIGGER TYPE is sent to TTC and Subsystems. Type would insert 9 bx dead time after every LIAcc and arrives 9bx after LIAcc.

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 FDL_CAL_modTTC.cdd

Part4: GAP SHARING

Sharing of the orbit GAP

Sharing of the gap is controlled by software. A synchronous command 'gap_granted' sent via/by the TTCvi allows one of the subsystems to use the gap. A set of 'gap_granted_0...31' commands maybe combined with L1Acc's enables different tasks during the gap.

Another option would be to use asynchronous commands to allocate the gap to subsystems. But then - because of synchronisation problems - L1Acc signals cannot be used anymore for synchronisation or other tasks.