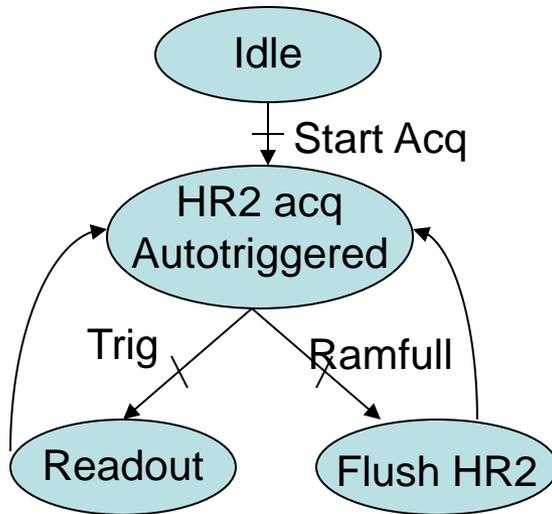


Boards and asics configurations
 Acquisition data

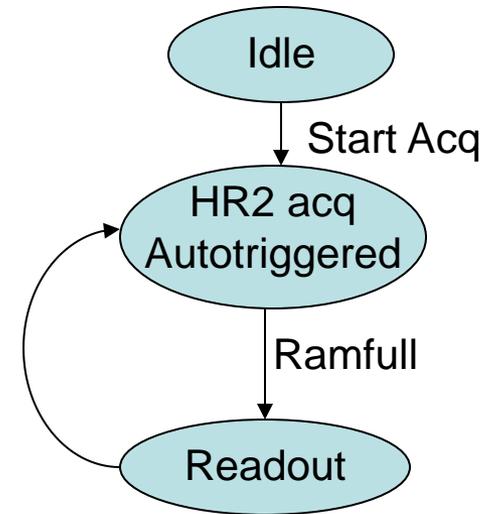
1 hub+Rpi for 4 cassettes

6x 24 HR2

« Beamtest Mode »



« ILC Mode »



Requirements :

- SDCC Clock is internally generated (50MHz)
=> With minor (to be confirmed) FW update, a common clock can be sent to SDCC using the free HDMI connector (important : send the slowest clock of all detectors)
- Trigger To SDCC (if beamtest mode) is TTL (pulse of around 200ns needed)
- Beam start/stop (if power pulsing used) is TTL and is active high (1 = beam, 0=no beam)
- Some busy/ready signals need to be sent to the common board to ensure synchronous behaviour of all detectors (at least Busy/acquiring).
- A common reset to be sure everyone is synchronously started
=> Minor (to be confirmed) but necessary modifications to the SDCC firmware

Register Name	Address	R/W	Default Value	Usage
ID_register	x0001	R/W	x"00000001"	SDCC Id (not used, FTDI serial number used instead)
test_register	x0002	R/W	x"1234ABCD"	Test SDCC access
control_register	x0003	R/W	x"00000000"	Historical, no more used
status_register	x0004	R	x"00000000"	Historical, no more used
delay_trigger_register	x05	R/W	x"00000000"	2,7us due to command decoding + value*20ns
version	x0100	R	☒"00000012"	VHDL code version

In the current configuration of the SDCC, those registers are independants of other detectors

If needed, other (and common) registers can be added (but this would require to define a communication protocol between the « top level board » and all detectors (through the SDCC in the case of the SDHCAL))

SDCC commands

Command Name	Addr.	Source	Dest.	Usage
DIF_reset_cmd	x0000	USB	DIF	Reset The DIFs connected to the SDCC
BCID_reset_cmd	x0001	USB	DIF	Reset the DIFs bunch Crossing counters
Start_Acquisition_cmd_all	x0002	USB	DIF	Enable Acquisition on the connected DIFs and loop
Start_Acquisition_cmd_one	x0009	USB	DIF	Enable Acquisition on the connected DIFs once
Ramfull_ext_cmd	x0003	USB	DIF	Send a Ramfull signal to he DIFs
Trigger_ext_cmd	x0004	USB	DIF	Send a trigger to the DIFs
stop_Acquisition_cmd	x0005	USB	DIF	Stop acquisition on the connected DIFs
Digital_Readout_cmd	x0006	USB	DIF	Start digital Readout on the DIFs
Pulse_lemo_cmd	x000A	USB	DIF	Send a pulse on the SDCC Lemo (disabled in current fw)
RAZ_CHN_cmd	x000B	USB	DIF	Send a Raz channel signal to the connected DIFs
CCC_reset_cmd	x000F	USB	SDCC	Reset the SDCC
Pause_trigger_cmd	x0010	USB	SDCC	Disable external trigger on the SDCC
Resume_trigger_cmd	x0011	USB	SDCC	Resume external trigger on the SDCC
Pause_ILC_cmd	x0012	USB	SDCC	Pause ILC mode acquisition statemachine
resume_ILC_cmd	x0013	USB	SDCC	Resume ILC mode acquisition statemachine

SDCC commands (2)

Command Name	Addr.	Source	Dest.	Usage
DIF_reset_cmd	x0000	USB	DIF	Reset The DIFs connected to the SDCC
BCID_reset_cmd	x0001	USB	DIF	Reset the DIFs bunch Crossing counters
Start_Acquisition_cmd_all	x0002	USB	DIF	Enable Acquisition on the connected DIFs and loop
Start_Acquisition_cmd_one	x0009	USB	DIF	Enable Acquisition on the connected DIFs once
Ramfull_ext_cmd	x0003	USB	DIF	Send a Ramfull signal to he DIFs
Trigger_ext_cmd	x0004			
stop_Acquisition_cmd	x0005			
Digital_Readout_cmd	x0006			
Pulse_lemo_cmd	x000A	USB	DIF	Send a pulse on the SDCC Lemo (disabled in current fw)
RAZ_CHN_cmd	x000B	USB	DIF	Send a Raz channel signal to the connected DIFs
CCC_reset_cmd	x000F	USB	SDCC	Reset the SDCC
Pause_trigger_cmd	x0010	USB	SDCC	Disable external trigger on the SDCC
Resume_trigger_cmd	x0011	USB	SDCC	Resume external trigger on the SDCC
Pause_ILC_cmd	x0012	USB	SDCC	Pause ILC mode acquisition statemachine
resume_ILC_cmd	x0013	USB	SDCC	Resume ILC mode acquisition statemachine

Need to be sent (also) by a top level common board to all detectors

The free HDMI connector (originally LDA link) of the SDCC can be used to communicate with the top level common board

Currently defined and routed (but not used in the SDCC):

```
cnt1_lda_dcc_p      : in std_logic;

cnt1_lda_dcc_n      : in std_logic;
data_dcc_lda_p      : out std_logic;

data_dcc_lda_n      : out std_logic;

sp2_dcc_lda_p       : out std_logic;

sp2_dcc_lda_n       : out std_logic;

trigger_from_lda_p  : in std_logic;

trigger_from_lda_n  : in std_logic;
```

At least a common state machine (minimalist : Idle, configured, running, error)

At least a status of each detector (Powered, configured, running)

At least some basic statistics of data taking (last taken event time tag, last event written on disk...)