DIF-LDA read-out packets format (some ideas)

CALICE technical meeting on EVO
Thursday, March 5
14:00 CEST
Duration : 1h

Questions (1)

- Lower the number of packets send by all DIFs to the DAQ (ILD: >1E6 packet/spill if 1 pkt/chip -ECAL-)

- Ease data aggregation at SW level

- Allow crosschecks to be performed by the SW
  - Amount of data, answers from all DIFs/ROCs, …

- "Send while receive"
  - In DIF: buffer of packet size (1 kB = 512 16b words, allow encapsulation by other boards as max size is ~1.5 kB)

Ideas (1)

- ROC data seen as a continuous flow
  - Concatenate or cut data into ~512 words
  - Encapsulate this into a packet structure (header)
  - Send when packet is completed or an "end read-out" is received
- Add TAGs to separate data from different ROCs
- Add IDs to allow the SW to check that everything has been received

Questions (2)

- Keep same packet header as defined for commands or not ?
- Send a summary word/data block at the end
  - Number of chip read (in case of bypass)
  - Trigger counters,…

Ideas (2a)

Option 1 (encapsulated):

Field	SubField	Comments
PACKETTYE (16b)		DIFBT_PKT_DATA = 0x"0001"
PACKETID (16b)		Arbitrary ID (automatic increment)
TYPEMODIFIER (16b)		0x0001
DATALENGTH (16b)		Number of 16b words in the DATA field
DATA	localDIFID (6b)+ ROpacketID (10b)	16b
	"0" + CHAINID (3b) + ROSequenceID (12b)	16b
	ROCData 1 to 505 x 16b words	Data block from ROC, w or w/o empty chips (a slice of DIF_MaxROPacket_Size – 7 words max)
CRC	16b	Inserted by 8b/10b itf

Option 2 (specific):

Field	Width	Comments
PACKETTYE	16 bits	DIFBT_PKT_DATA = 0x"0001"
localDIFID (6b)+ ROpacketID (10b)	16 bits	
"0" + CHAINID (3b)+ ROSequenceID (12b)	16 bits	
DATALENGTH	16 bits	Number of 16b words in the ROCData section
ROCData	1 to 507 x 16 bit words	Data block from ROC, w or w/o empty chips (a slice of DIF_MaxROPacket_Size - 5 words max)
CRC	16 bits	

Ideas (2b)

Append to the data a "Read-out summary word"

- Always sent (equivalent to an acknowledge)
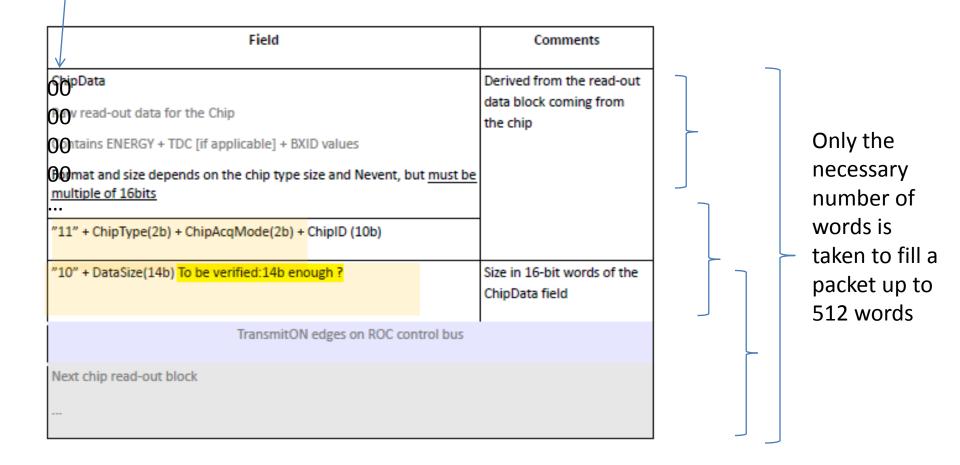- Identified with a clear signature (specific packettype ?)

Content:
- number of chip read
- trailer: other summary words, to be defined

Questions (3)

- When data are aggregated (DIF or SW), how to separate data from various chips ?
  - Easy for SPI/SKI ROC
    - All 16b not used : filled with zeros
    - Some Zeros can be replaced by Ones to tag the CHIPID and provide a separator
  - HardROC ?

Ideas (3)

SPI/SKI ROC

Field	Comments
ChipData 00 Raw read-out data for the Chip 00 Contains ENERGY + TDC [if applicable] + BXID values 00 Format and size depends on the chip type size and Nevent, but must be multiple of 16bits ...	Derived from the read-out data block coming from the chip
"11" + ChipType(2b) + ChipAcqMode(2b) + ChipID (10b)	
"10" + DataSize(14b) To be verified:14b enough ?	Size in 16-bit words of the ChipData field
TransmitON edges on ROC control bus	
Next chip read-out block ...	

Only the necessary number of words is taken to fill a packet up to 512 words

discussion

- Comments / more Ideas ?

- A document is in preparation