

Slow Raw Header structure

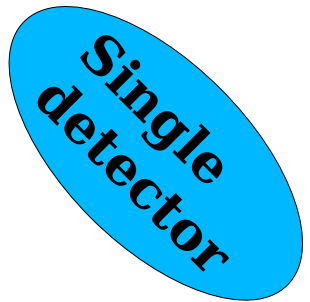
(Single detector)

10 x unsigned_integer_32_bit [40 bytes]

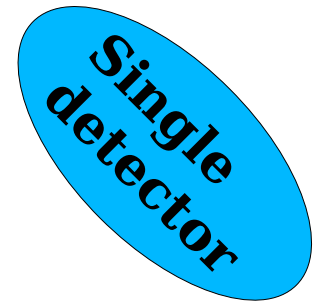
- 1) Event length (bytes).
- 2) Detector Name (TOFI/TOFO/LMD/STB/GAS/SIL/MAG)
- 3) Current System Time (seconds)
- 4) Number of Channels
- 5) Data offset (bytes)
- 6) Messages offset (bytes)
- 7) Miscellaneous offset (bytes)
- 8) Header length (bytes)
- 9) Magic number
- 10) Free space (for future development)

Slow Raw Header structure

- **1: Event length (32 bit):**
Length of the complete raw event [header + data] (bytes)
- **2: Detector NAME (4 characters):**
 - TOFI
 - TOFO
 - LMD
 - STB
 - GAS
 - SIL
 - MAG
- **3: Absolute time from 01/01/1970 (32 bit): [0,4294967295]**
32 bit: seconds
- **4: Number of channels (32 bit):**
 - TOFINO (Italian): 26 (24 Low Voltage + 2 High Voltage)
 - TOFINO (Japanese): 24
 - TOFONE: 144
 - LMD: 32
 - STB: 168
 - SIL (ISIM/OSIM): 54 (36+18)
 - GAS: 0
 - MAG: 1



Slow Raw Header structure

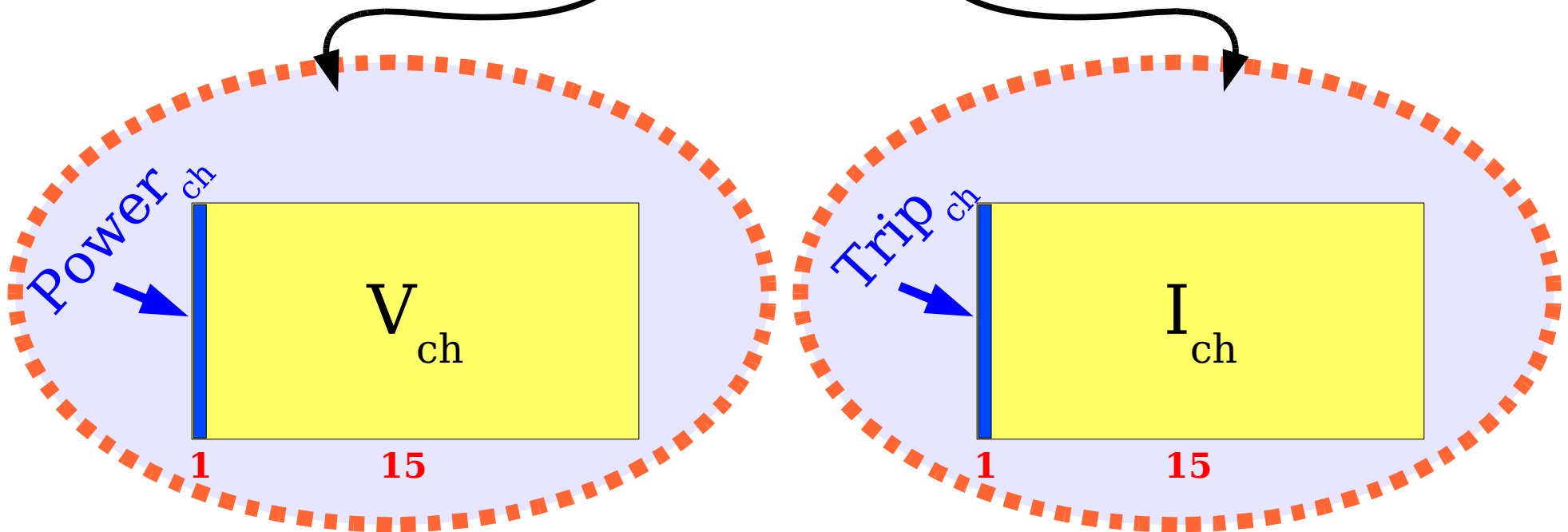
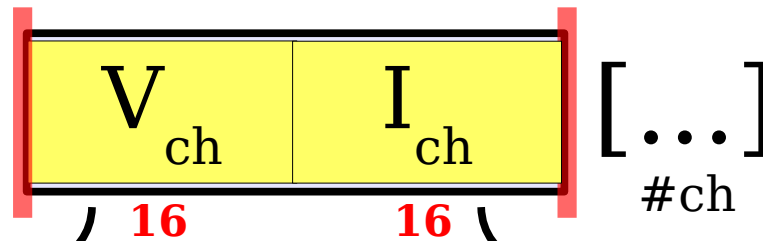


- 5: **Data offset (32 bit): (bytes)**
Offset (bytes) of the data part.
See next slides for the structure of the data part.
- 6: **Messages offset (32 bit): (bytes)**
Offset (bytes) of the messages part.
Automatically set ($\text{Data_Offset} + \text{Data_Part}$)
These messages are the same used during the previous data taking.
A '200 characters' (200 bytes) maximum space is available
- 7: **Misc offset (32 bit): (bytes)**
Automatically set ($\text{Messages_Offset} + 200 \text{ bytes}$)
Offset (bytes) of miscellaneous informations part.
- 8: **Header length (32 bit): (bytes)**
- 9: **Magic number (32 bit): [8 Hexadecimal]**
- 10: **Free space (for future development)**

Slow Raw Data Part

Single detector

Every single channel is encoded into one unsigned integer (32 bit)

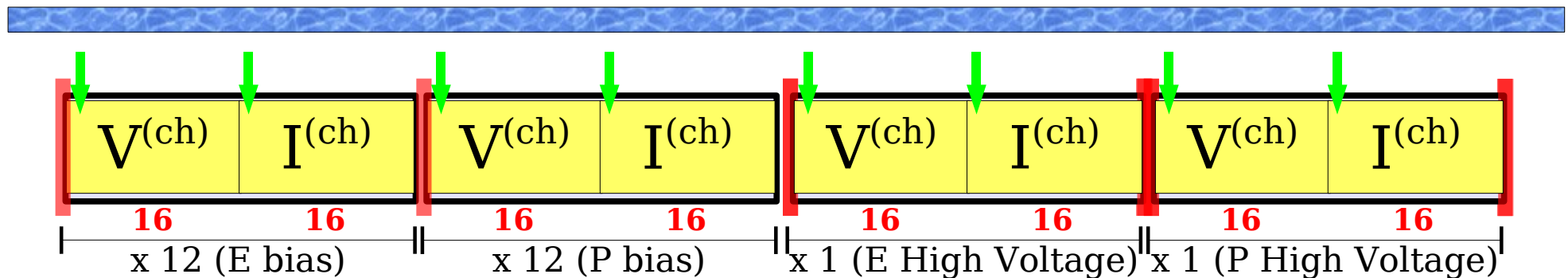


Slow Raw Data Part

Single detector

TOFINO (Italian) [not used]

- › Detector NAME: **TOFI**
- › Num of channels: **26**
- › Magic number: **0xCAFE**
- › Data offset: **41**



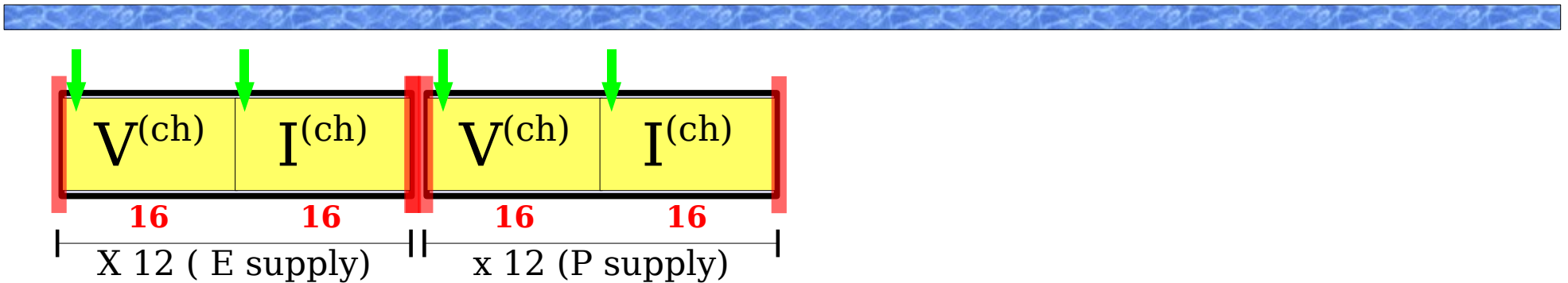
$$(32 \times 24) + (32 \times 2) = 832 \text{ bits} \quad (104 \text{ bytes})$$

Slow Raw Data Part

TOFINO (Japanese)

Single detector

- › Detector name: **TOFI**
- › Num of channels: **24**
- › Magic number: **0xCAFE**
- › Data offset: **41**



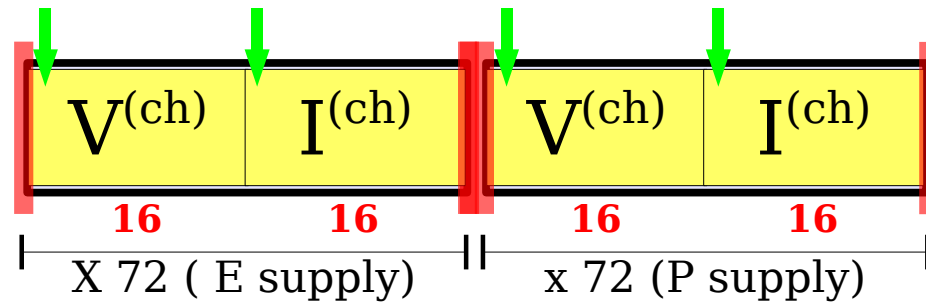
$$[32 \times 12] + [32 \times 12] = 768 \text{ bits} \quad (96 \text{ bytes})$$

Slow Raw Data Part

TOFONE

Single detector

- › Detector name: **TOFO**
- › Num of channels: **144**
- › Magic number: **0xCAFE**
- › Data offset: **41**



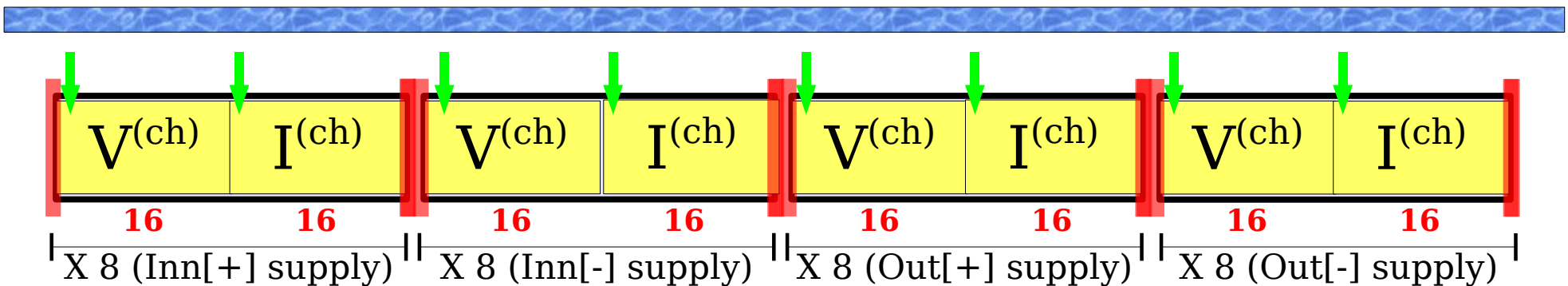
$$[32 \times 72] + [32 \times 72] = 4608 \text{ bits} \quad (576 \text{ bytes})$$

Slow Raw Data Part

Single detector

LMD

- › Detector name: **LMD**
- › Num of channels: **32**
- › Magic number: **0xCAFE**
- › Data offset: **41**



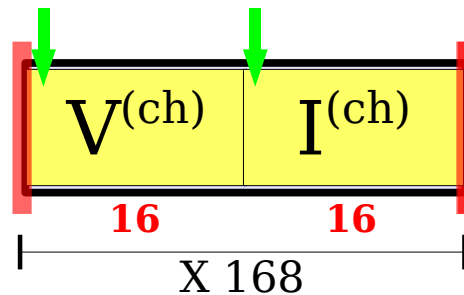
$$[32 \times 16] + [32 \times 16] = 1024 \text{ bits} \quad (128 \text{ bytes})$$

Slow Raw Data Part

Single detector

STB

- › Detector name: **STB**
- › Num of channels: **192** (2 crates; 6 boards; 16 channels)
- › Magic number: **0xCAFE**
- › Data offset: **41**



Sorted by:

- CRATE
- BOARD
- CHANNEL

[32x192] = 6144 bits (768 bytes)

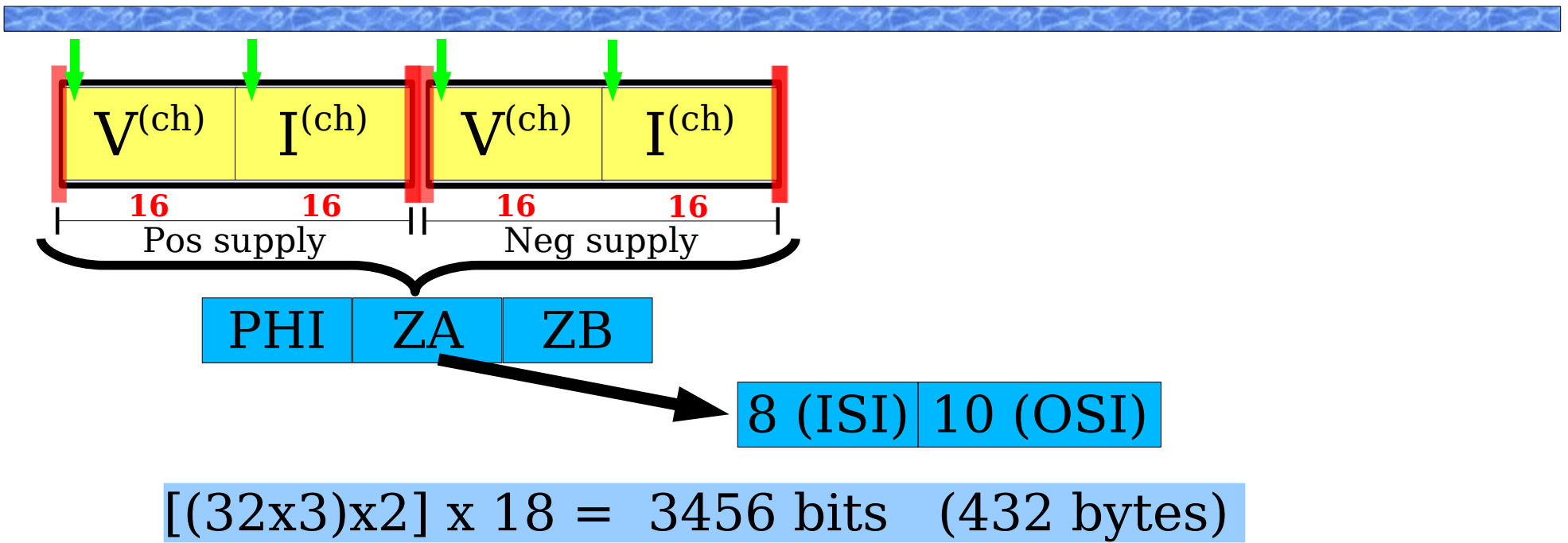
NOTE: power bit logic inverted for the 2006/2007 d-tak

Slow Raw Data Part

SIL

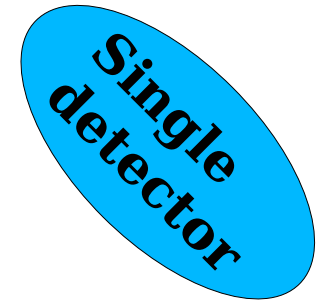
Single detector

- › Detector name: **SIL**
- › Num of channels: **108** --> **(18x3) x 2**
- › Magic number: **0xCAFE**
- › Data offset: **41**



Slow Raw Data Part

GAS



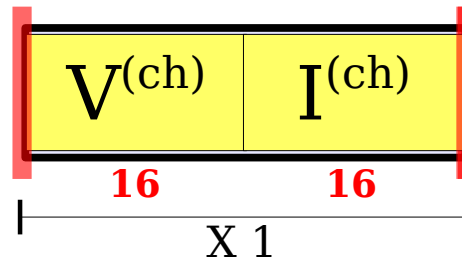
- › Detector name: **GAS**
 - › Num of channels: **0**
 - › Magic number: **0xCAFE**
 - › Data offset: **41**
-

Slow Raw Data Part

Single
detector

MAG

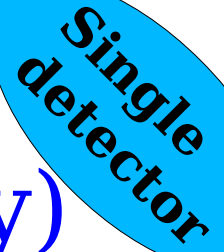
- › Detector name: **MAG**
- › Num of channels: **1**
- › Magic number: **0xCAFE**
- › Data offset: **41**



[32x1] = 32 bits (4 bytes)

Slow Raw Event

Single detector Event (summary)



Single
detector

- Header: 40 bytes
- Data Part:
 - TOFI (Italian)... : 104 bytes
 - TOFI (Japanese).. : 96 bytes
 - TOFO..... : 576 bytes
 - LMD : 128 bytes
 - STB : 768 bytes (672 are used)
 - GAS : 0 bytes
 - SIL : 432 bytes
 - MAG : 4 bytes
- Messages Part: 200 max bytes for every detector
- Misc Part: no limit set (required by LMD(?)/GAS/MAG(?) only)

Complete Slow Raw Event

Global Header (all detectors)

(automatically built by the *SCC*)

10 x unsigned_integer_32_bit [40 bytes]

- 1) Global Slow-RAW-Event length (bytes).
- 2) Current System Time (seconds)
- 3) TOFINO offset (bytes)
- 4) TOFONE offset (bytes)
- 5) LMD offset (bytes)
- 6) STB offset (bytes)
- 7) GAS offset (bytes)
- 8) SIL offset (bytes)
- 9) MAGNET offset (bytes)
- 10) Free

Offsets for single
detector headers

Complete Slow Raw Event

SINGLE SlowRaw EVENT							
HDR (bytes)	40	DET	# Chs	# MISC U32	DATA PART (bytes)	MISC PART (bytes)	TOTAL (bytes)
Max MSG (bytes)	200	TOFINO	24	0	96	0	336
Max event size (bytes)	4096	TOFONE	144	0	576	0	816
		LMD	32	1	128	4	372
		STB	192	0	768	0	1008
		GAS	0	11	0	44	284
		SIL	108	0	432	0	672
		MAG	1	1	4	4	248
					2004	52	3736

GLOBAL SlowRaw EVENT	
HDR (bytes)	40
TOFINO max offset	40
TOFONE max offset	376
LMD max offset	1192
STB max offset	1564
GAS max offset	2572
SIL max offset	2856
MAG max offset	3528
Max mag misc (bytes)	324

Complete Slow Raw Event

Complete Event size (all detectors)

- Global Header: 40 B
- Detector headers: 280 B (40 B for every detector)
- Detector data parts: ~1.65 kB
 - TOFI : 96 bytes (Japanese) ; 104 bytes (Italian)
 - TOFO..... : 576 bytes
 - LMD : 128 bytes
 - STB : 672 bytes
 - GAS : 0 bytes
 - SIL : 216 bytes
 - MAG : 4 bytes
- Detector msg parts: <= 1.36 kB (200 B for every detector)
- Detector misc parts: <~ 50 B

TOTAL : <~ 3.4 kB

The size of every FINUDA raw-event containing the Slow-Control raw event will increase of about **(3-3.4) kB**.