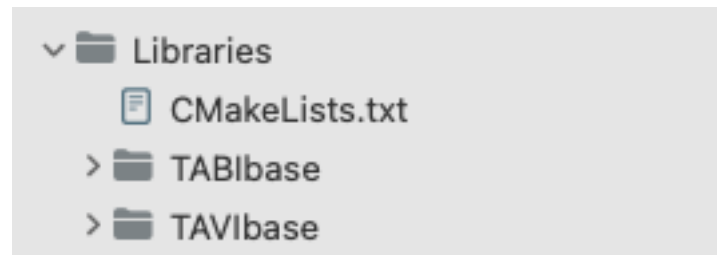


Frascati

VTI/BI Software Status

Shoe

❏ New Folder:

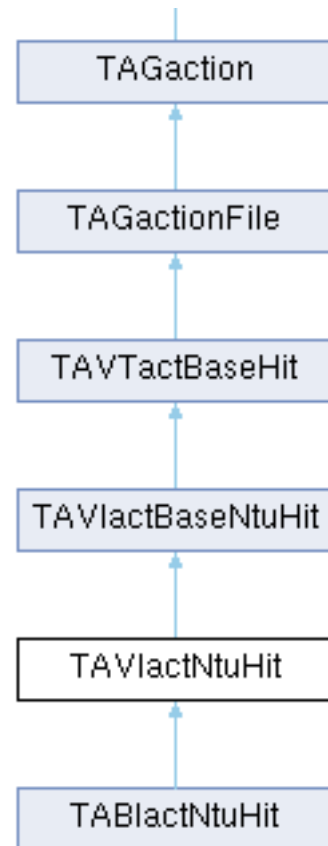


- TABl for the 2 Mimosi in front of target
- TAVl for the vertex detector with Mimosi
 - ➔ Propagating in the whole reconstruction chain (Reco/Name manager)
- New campaign FRAS2026 is in shoe with TG, BI, VTI and VTX parameter files (geom & config)
- New branch (vtxmimosi)

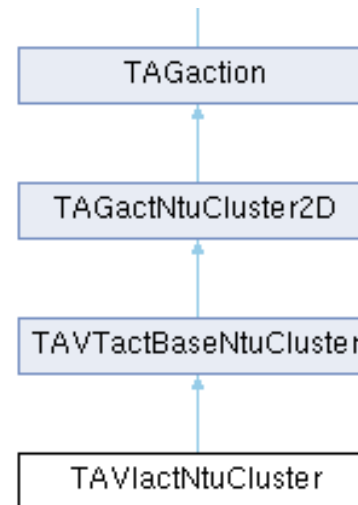
Actions

Shoe

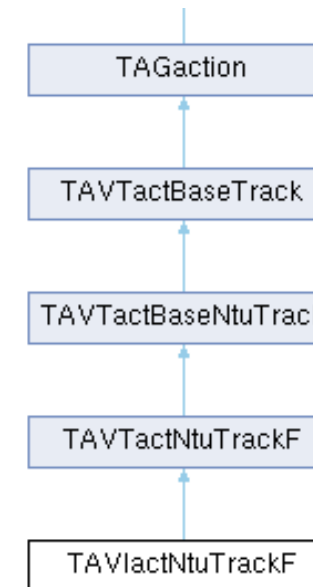
- Structure



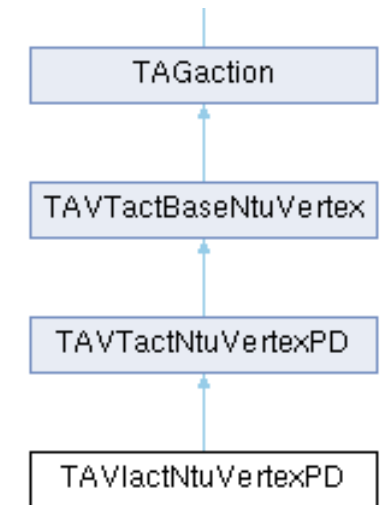
Hit Action



Cluster Action



Track Action



Vertex Action

➔ BI inherits from VI which inherits from VT base class

➔ Same for containers and parameters

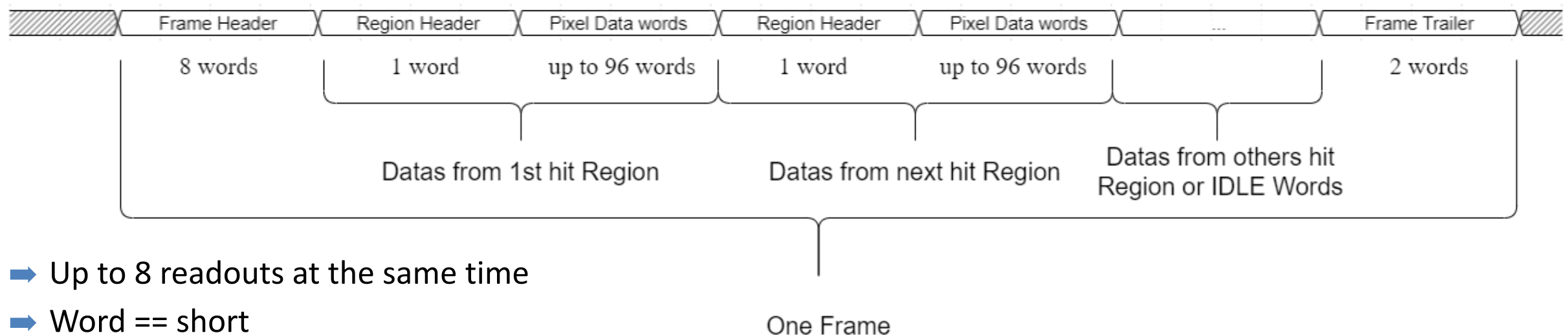
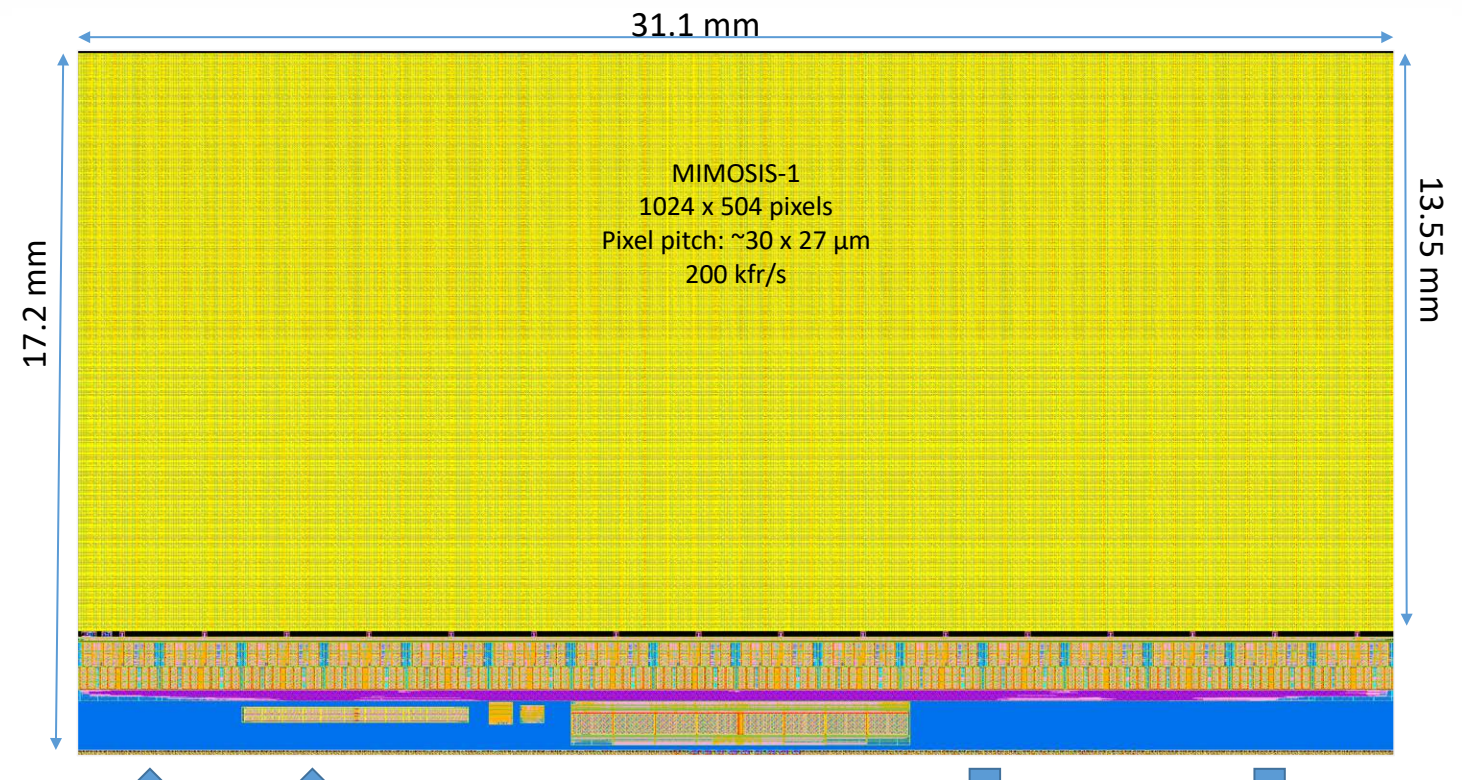
Hit Action

□ Mimosis 2

- Pixels: 1024 x 504 pixels
- Pixel pitch: 30.24 x 26.88 μm^2
- Active area: 30.97 x 13.55 mm^2
- Chip dimension: 31.1 x 17.2 mm^2
- Integration time: 5 μs

□ Rawdata

- Frame Header Word (0xFEXX)
- Region Header Word (0xFDXX)
- Pixel Data Word (0x00 to 0xFBFF)
- Frame Trailer Word (0xFFXX)
- IDLE Word (0xFCAA)



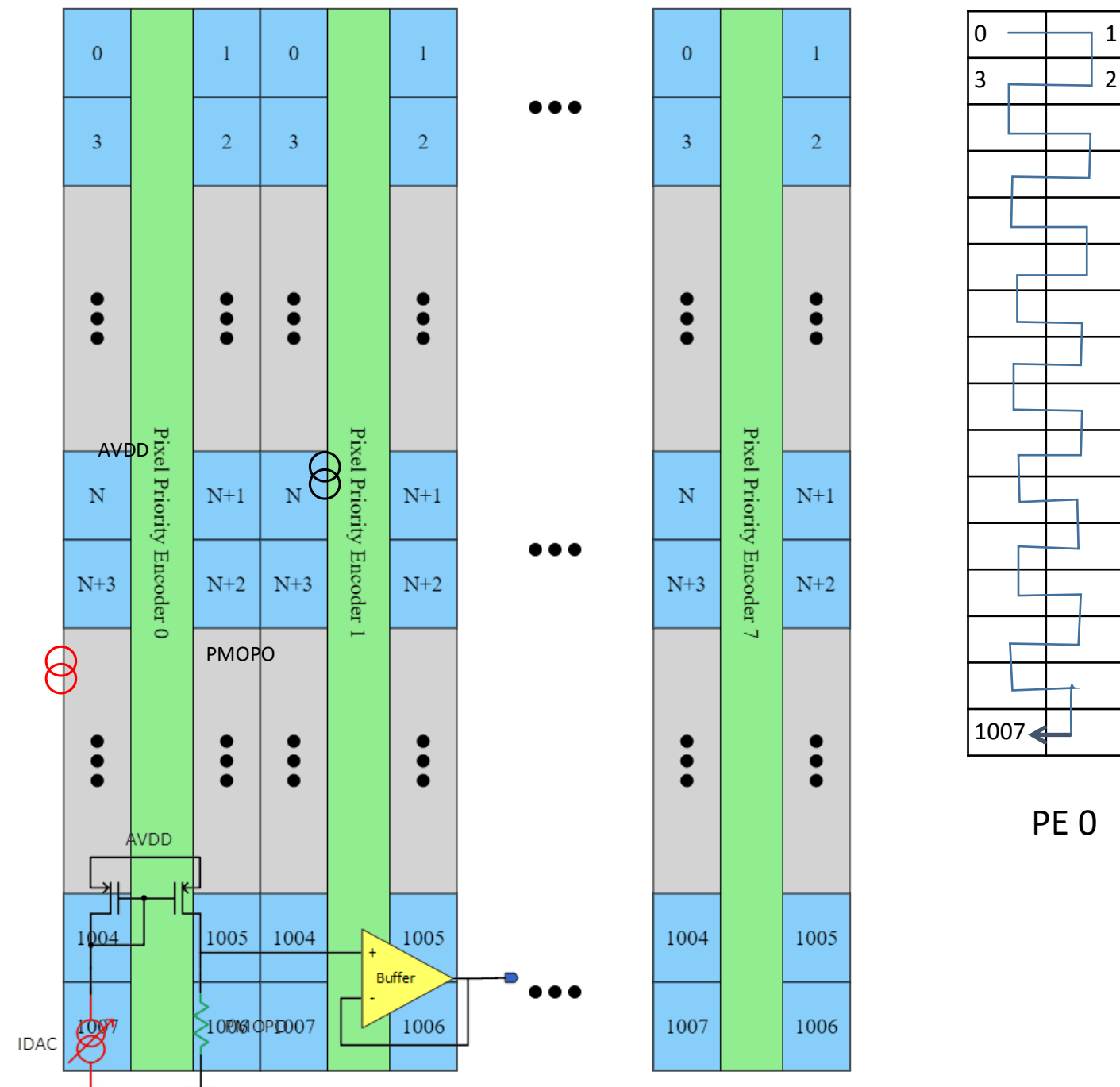
➡ Up to 8 readouts at the same time

➡ Word == short

Mapping parameter

Mapping: TAVIparMap

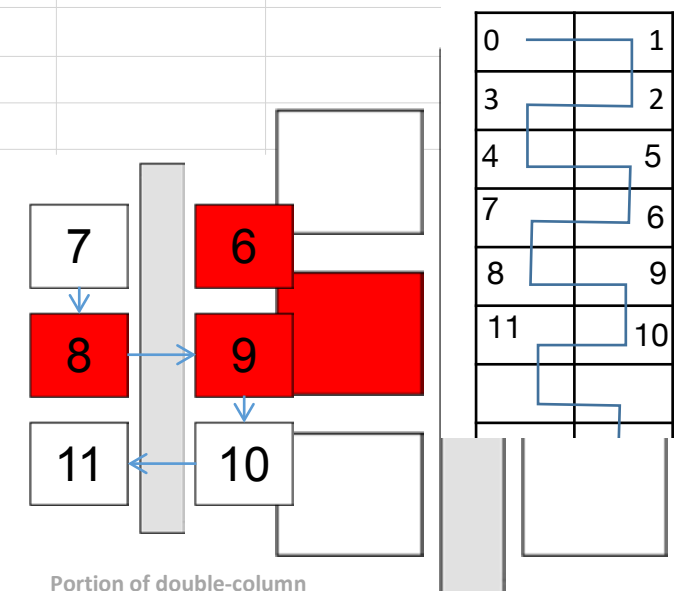
- The 1024 columns divided in 64 regions
- Each region have 8 PPE's (Pixel Priority Encoder)
- Each PPE has 2 columns



Pixel encoding

	15	8	7		Pixel N+3 touched?	0	first word	last word	Pixel N+1 touched?	Compression code	
☐ Pixel word:					No	No	No	No	No	000	
Data					No	No	No	No	No	001	
					No	No	No	No	No	010	
					No	No	No	No	No	011	
					No	No	No	No	No	100	
					No	No	No	No	No	101	
					No	No	No	No	No	110	
					No	No	No	No	No	111	
					No	No	No	No	No		
					No	No	No	No	No		
					No	No	No	No	No		
					No	No	No	No	No		
					No	No	No	No	No		
					No	No	No	No	No		
					No	No	No	No	No		
					No	No	No	No	No		
					No	No	No	No	No		
					No	No	No	No	No		
					No	No	No	No	No		
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					No	No	No	No	No		
					No	No	No	No	No		
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					No	No	No	No	No		
					No	No	No	No	No		
					No	No	No	No	No		
					No	No	No	No			

Pixel N+3 touched?	Pixel N+2 touched?	Pixel N+1 touched?	Compression code
No	No	No	000
No	No	Yes	001
No	Yes	No	010
No	Yes	Yes	011
Yes	No	No	100
Yes	No	Yes	101
Yes	Yes	No	110
Yes	Yes	Yes	111
Bits 0 – 31	Frame Number		
Bits 32 – 63	Unused (status flags?)	AVDD	



		Portion of double-column									
me Trailer	Flags										
	Bit 0	Frame Overflow									
	Bit 1	Region Overflow									
	Bit 2	Superregion Overflow									
	Bit 3	Frame Size Limit Active / Buffer 'rather full'									
	Bit 4										
	Bit 5										
	Bit 6										
Bit 7											

Ch. Finck - IPHC

PMOPO 15

7

6

0 0 1 1 0

0 0 1 1 0

8

9

11

10

Buffer

AVDD

25/11/25

PMOPO

15	6	5	3	2	0
First Pixel Address			PPE number		compression code

- Pixel word:

Data

•

pty Word

Header

me Trailer

on Header

Core Words

100

Pixel Structure

me Trailer



Pixel encoding

15	8	7	Pixel N+3 touched?	Pixel N+2 touched?	Pixel N+1 touched?	Compression code
0	0	0	No	No	No	000
0	0	0	No	No	Yes	001
0	0	0	No	Yes	No	010
0	0	0	No	Yes	Yes	011
0	0	0	Yes	No	No	100
0	0	0	Yes	No	Yes	101
0	0	0	Yes	Yes	No	110
0	0	0	Yes	Yes	Yes	111

Pixel word: 0x0000 0xFBFF 0xFCAA 0xFCAA 0xFE00 0xFEFF 0xFF00 0xFFFF 0xFD00 0xFD3F 0xFC00 0xFC7F 0xFD80 0xFDFF

Pixel Address: 0x0000 0xFBFF 0xFCAA 0xFCAA 0xFE00 0xFEFF 0xFF00 0xFFFF 0xFD00 0xFD3F 0xFC00 0xFC7F 0xFD80 0xFDFF

Col Addr: 0x0000 0xFBFF 0xFCAA 0xFCAA 0xFE00 0xFEFF 0xFF00 0xFFFF 0xFD00 0xFD3F 0xFC00 0xFC7F 0xFD80 0xFDFF

Pixel N+3 touched? No No No No No No No No No No No No No No

Pixel N+2 touched? No No No No No No No No No No No No No No

Pixel N+1 touched? No No No No No No No No No No No No No No

Compression code 000 001 010 011 100 101 110 111

Pixel addresses 0 – 504 used, all words above 0xFC00 reserved

Repeat 8 times, present on all outputs. 128 Bits of information

Followed by 1 CRC word

Pixel N+3 touched?	Pixel N+2 touched?	Pixel N+1 touched?	Compression code
No	No	No	000
No	No	Yes	001
No	Yes	No	010
No	Yes	Yes	011
Yes	No	No	100
Yes	No	Yes	101
Yes	Yes	No	110
Yes	Yes	Yes	111

Frame Header 8 words

Region Header 1 word

Pixel Data N words

Frame Trailer 2 words

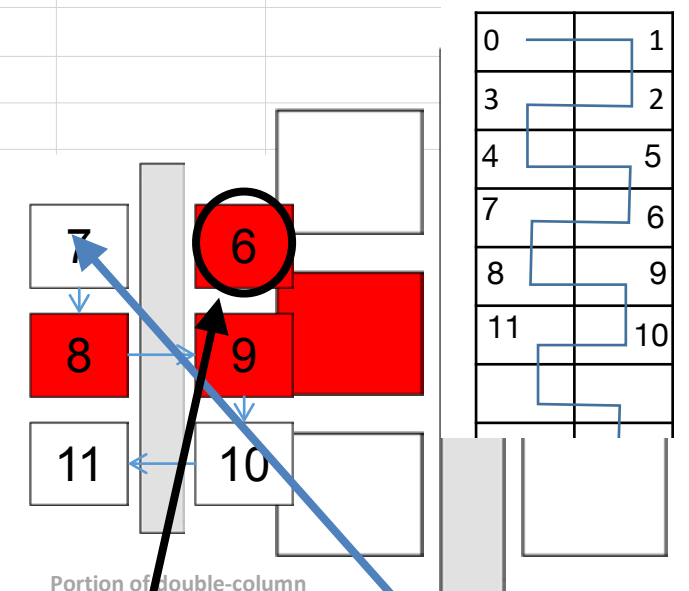
Repeated up to 64 times

Bits 0 – 31 Frame Number

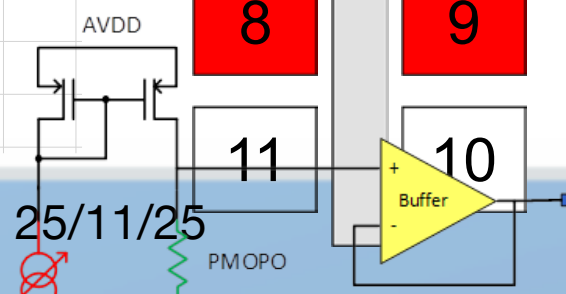
Bits 32 – 63 Unused (status flags?)

AVDD

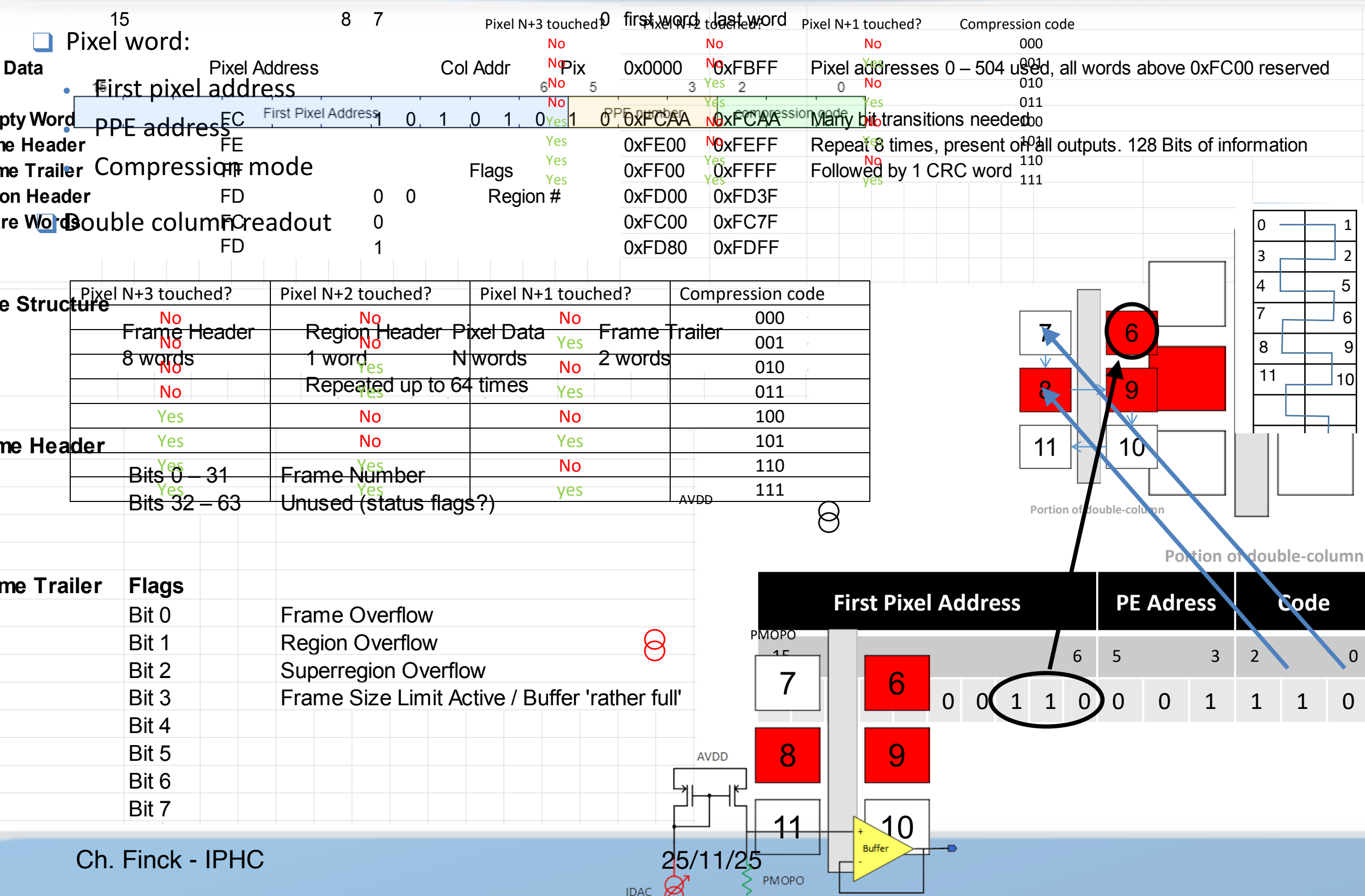
Flags	
Bit 0	Frame Overflow
Bit 1	Region Overflow
Bit 2	Superregion Overflow
Bit 3	Frame Size Limit Active / Buffer 'rather full'
Bit 4	
Bit 5	
Bit 6	
Bit 7	



First Pixel Address	PE Adress	Code
15	6	5
7	0	0
8	1	1
11	0	0
	0	0
	1	1
	1	1
	0	0

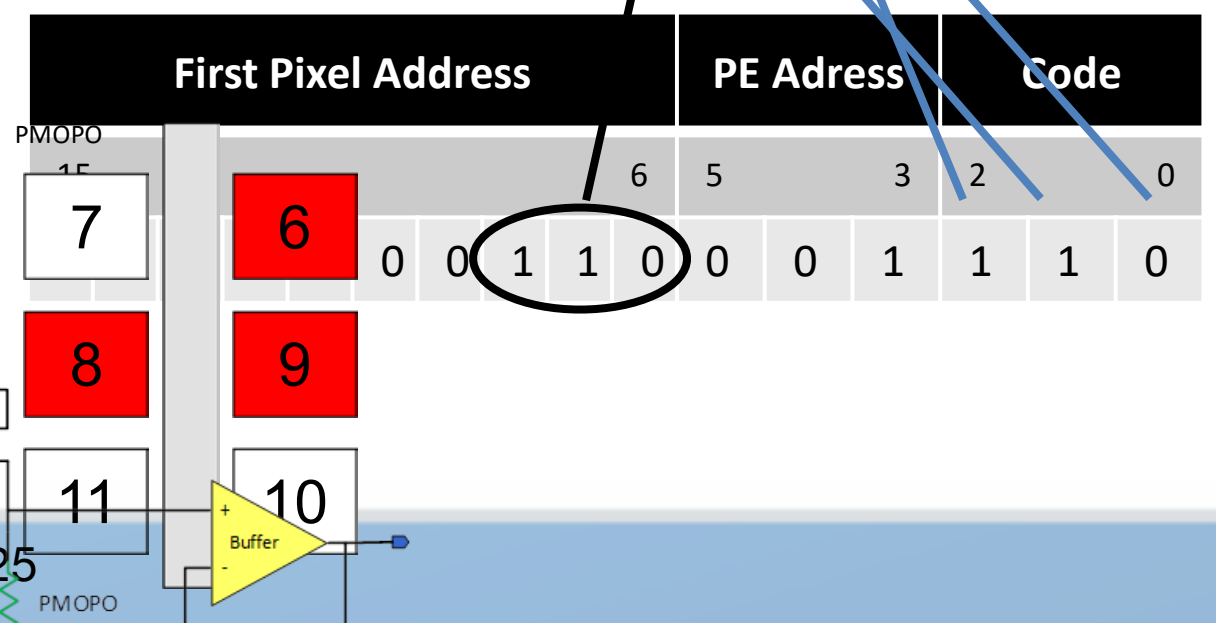
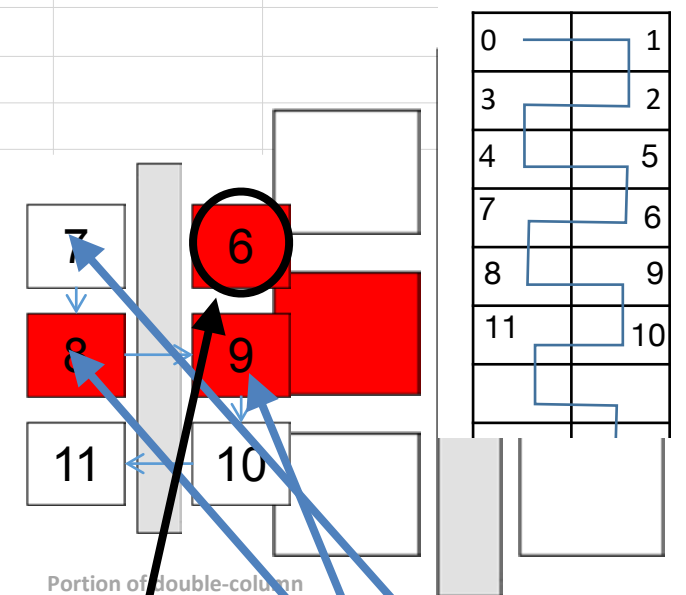


Pixel encoding



15	6	5	3	2	0
First Pixel Address		PPE number		compression code	

Pixel word:	Pixel Address	Col Addr	Pix	Pixel N+3 touched?	Pixel N+2 touched?	Pixel N+1 touched?	Compression code
0	0x0000	0	0	No	No	No	000
1	0x0001	1	0	No	No	No	001
2	0x0002	2	0	No	No	No	010
3	0x0003	3	0	No	No	No	011
4	0x0004	4	0	No	No	No	100
5	0x0005	5	0	No	No	No	101
6	0x0006	6	0	No	No	No	110
7	0x0007	7	0	No	No	No	111
8	0x0008	8	0	No	No	No	000
9	0x0009	9	0	No	No	No	001
10	0x000A	10	0	No	No	No	010
11	0x000B	11	0	No	No	No	011
12	0x000C	12	0	No	No	No	100
13	0x000D	13	0	No	No	No	101
14	0x000E	14	0	No	No	No	110
15	0x000F	15	0	No	No	No	111



15	6	5	3	2	0
First Pixel Address		PPE number		compression code	

Data

- First pixel address

Empty Word PPE address

Header

Trailer Compression mode

on Header

re Words Double column Freadout

10

Pixel Structure

me Header

Game Trailer	Flags
	

- Neighbour fired pixels followed the same mapping

Bit 1

Region Overflow

Bit 2

Superregion Over

Bit 3

Frame Size Limit Active / Buffer 'rather full'

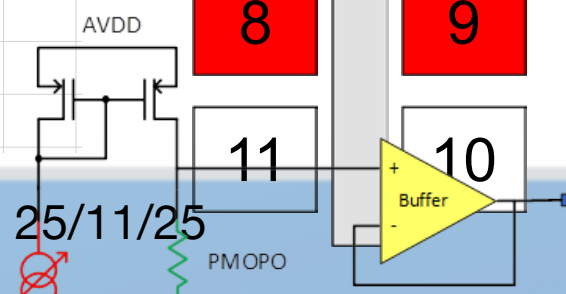
Bit 4

DL 4

Bit 5

Bit 6

Bit 7



Pixel encoding

Pixel word:

15 8 7 0 first word last word

Pixel N+3 touched? Pixel N+2 touched? Pixel N+1 touched? Compression code

0x0000 0xFBFF Pixel addresses 0 – 504 used, all words above 0xFC00 reserved

0xFCAA 0xFCAA Many bit transitions needed

0xFE00 0xFEFF Repeat 8 times, present on all outputs. 128 Bits of information

0xFF00 0xFFFF Followed by 1 CRC word

0xFD00 0xFD3F

0xFC00 0xFC7F

0xFD80 0xFDFF

Frame Structure

Pixel N+3 touched?	Pixel N+2 touched?	Pixel N+1 touched?	Compression code
No	No	No	000
No	No	Yes	001
No	Yes	No	010
No	Yes	Yes	011
Yes	No	No	100
Yes	No	Yes	101
Yes	Yes	No	110
Yes	Yes	Yes	111

Frame Header: 8 words

Region Header: 1 word

Pixel Data: N words

Frame Trailer: 2 words

Repeated up to 64 times

Bits 0 – 31: Frame Number

Bits 32 – 63: Unused (status flags?)

AVDD

Flags

- Bit 0: Neighbour fired pixels followed the same mapping
- Bit 1: Region Overflow
- Bit 2: Superregion Overflow
- Bit 3: Frame Size Limit Active / Buffer 'rather full'
- Bit 4:
- Bit 5:
- Bit 6:
- Bit 7:

Portion of double-column

Portion of double-column

First Pixel Address

PE Address

Code

Buffer

25/11/25

IDAC

PMOPO

AVDD

Conclusions

❑ VTI & BI

- Decoding of frame structure implemented
- All other actions inherit from VTX

❑ Events formatting:

- Need dedicated header/trailer for VTI and BI
- Need dedicated sensor header/trailer for VTI and BI

➡ Need data file for debugging

Backup

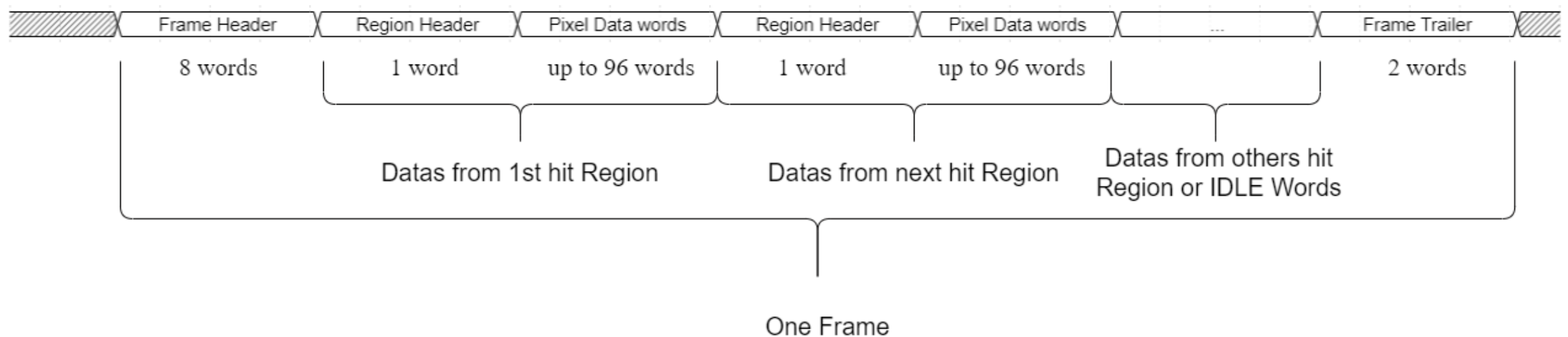
Data Format

DAQ headers

- header/trailer for VTI detector
- header/trailer for plane in VTI detector
- header/trailer for sensor in VTI plane

Pixel Rawdata

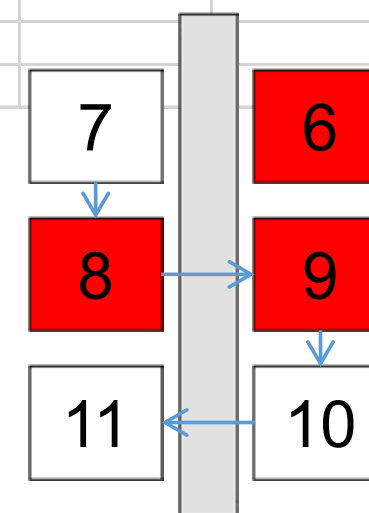
- Frame Header Word (0xFEXX)
- Region Header Word (0xFDXX)
- Pixel Data Word (0x00 to 0xFBFF)
- Frame Trailer Word (0xFFXX)
- IDLE Word (0xFCAA)



Frame Data format

[illegible]

Frame Structure									
Frame Header			Region Header		Pixel Data		Frame Trailer		
8 words			1 word		N words		2 words		
			Repeated up to 64 times						

[illegible]

First Pixel Address										PE Adress			Code		
15 6										5 3			2 0		
0	0	0	0	0	0	0	1	1	0	0	0	1	1	1	0

Portion of double-column

9 8 7
Following pixels