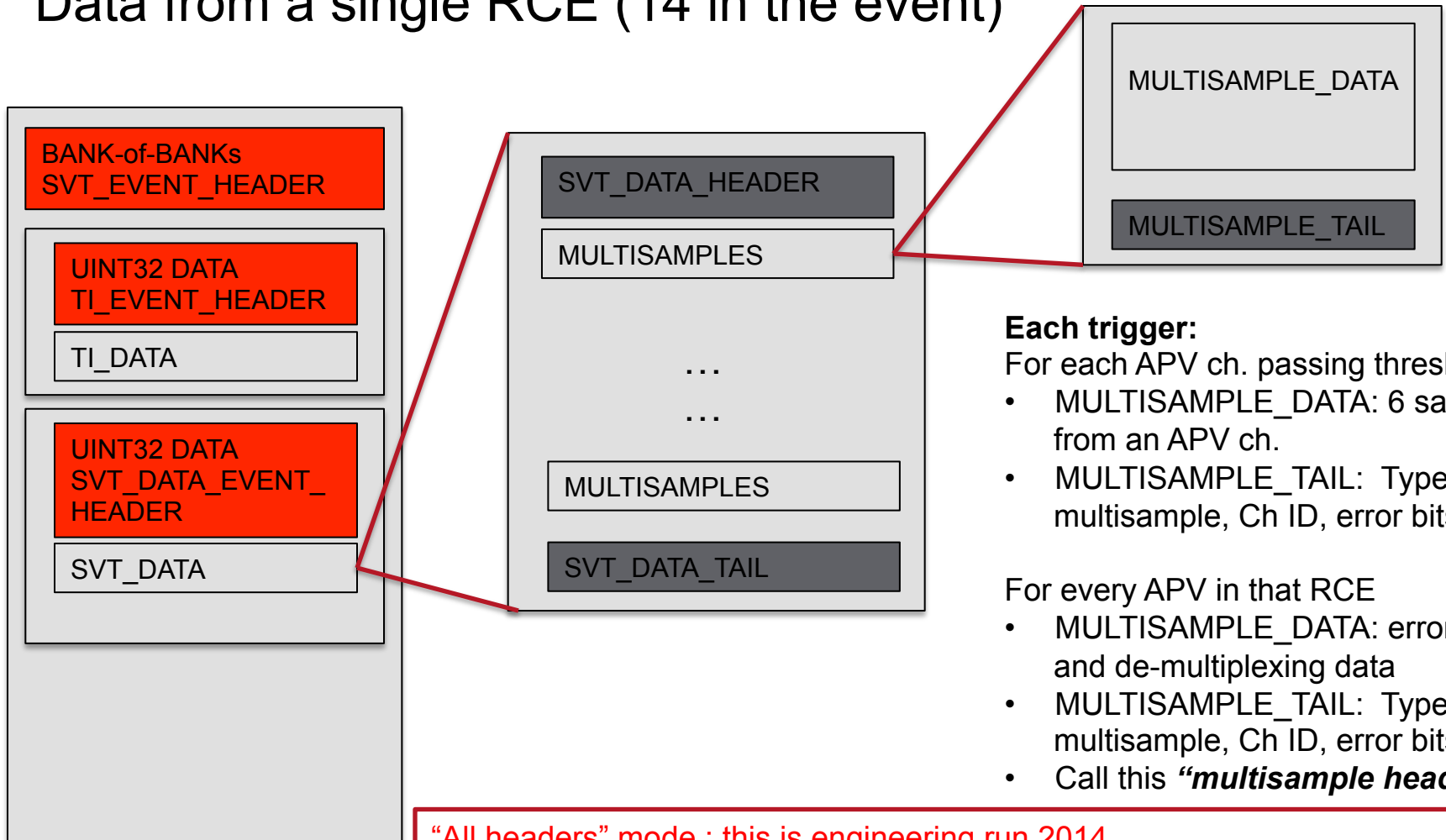


SVT Data Format Update

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Data from a single RCE (14 in the event)



Each trigger:

For each APV ch. passing thresholds:

- MULTISAMPLE_DATA: 6 samples from an APV ch.
- MULTISAMPLE_TAIL: Type of multisample, Ch ID, error bits

For every APV in that RCE

- MULTISAMPLE_DATA: error/sync and de-multiplexing data
- MULTISAMPLE_TAIL: Type of multisample, Ch ID, error bits
- Call this ***“multisample header”***

“All headers” mode : this is engineering run 2014

“First header” mode removes all but one multisample headers per RCE

“No header” mode removes all but one multisample headers

SVT Data Format

```
<!-- header mode "All headers" -->

<bank content="bank" data_type="0xe" tag="51" padding="0" num="64" length="72" ndata="70">
  <uint32 data_type="0x1" tag="57610" padding="0" num="51" length="6" ndata="4">
    0x20010003      0x40      0xcde82c9      0x1
  </uint32>
  <uint32 data_type="0x1" tag="3" padding="0" num="51" length="64" ndata="62">
    0x100003f      0x96f594f7      0x9aff98fd      0x9ef99cfb      0x42000800
    0x36f534f7      0x3aff38fd      0x3ef93cfb      0x48800800      0x76f574f7
    0x7aff78fd      0x7ef97cfb      0x4d800800      0x56f554f7      0x5aff58fd
    0x5ef95cfb      0x49000800      0x96f594f7      0x9aff98fd      0x9ef99cfb
    0x4e000800      0x16f514f7      0x1aff18fd      0x1ef91cfb      0x40000800
    0x16f514f7      0x1aff18fd      0x1ef91cfb      0x4c000800      0x36f534f7
    0x3aff38fd      0x3ef93cfb      0x40800800      0x76f574f7      0x7aff78fd
    0x7ef97cfb      0x49800800      0x56f554f7      0x5aff58fd      0x5ef95cfb
    0x41000800      0x96f594f7      0x9aff98fd      0x9ef99cfb      0x4a000800
    0x36f534f7      0x3aff38fd      0x3ef93cfb      0x4c800800      0x16f514f7
    0x1aff18fd      0x1ef91cfb      0x48000800      0x56f554f7      0x5aff58fd
    0x5ef95cfb      0x4d000800      0x76f574f7      0x7aff78fd      0x7ef97cfb
    0x41800800      0xf
  </uint32>
</bank>
<bank content="bank" data_type="0xe" tag="52" padding="0" num="64" length="92" ndata="90">
  <uint32 data_type="0x1" tag="57610" padding="0" num="52" length="6" ndata="4">
    0x20010003      0x40      0xcde82c9      0x1
  </uint32>
  <uint32 data_type="0x1" tag="3" padding="0" num="52" length="84" ndata="82">
    0x100003f      0x56f554f7      0x5aff58fd      0x5ef95cfb      0x45000801
    0x36f534f7      0x3aff38fd      0x3ef93cfb      0x48800701      0x76f574f7
    0x7aff78fd      0x7ef97cfb      0x4d800701      0x76f574f7      0x7aff78fd
    0x7ef97cfb      0x4d800301      0x56f554f7      0x5aff58fd      0x5ef95cfb
    0x49000701      0x96f594f7      0x9aff98fd      0x9ef99cfb      0x4e000701
    0x96f594f7      0x9aff98fd      0x9ef99cfb      0x4e000301      0x76f574f7
    0x7aff78fd      0x7ef97cfb      0x45800801      0x16f514f7      0x1aff18fd
    0x1ef91cfb      0x4c000701      0x96f594f7      0x9aff98fd      0x9ef99cfb
    0x46000801      0x76f574f7      0x7aff78fd      0x7ef97cfb      0x49800701
    0x16f514f7      0x1aff18fd      0x1ef91cfb      0x4c000301      0x16f514f7
    0x1aff18fd      0x1ef91cfb      0x44000801      0x96f594f7      0x9aff98fd
    0x9ef99cfb      0x4a000701      0x36f534f7      0x3aff38fd      0x3ef93cfb
    0x4c800701      0x36f534f7      0x3aff38fd      0x3ef93cfb      0x4c800301
    0x16f514f7      0x1aff18fd      0x1ef91cfb      0x48000701      0x56f554f7
    0x5aff58fd      0x5ef95cfb      0x4d000701      0x56f554f7      0x5aff58fd
    0x5ef95cfb      0x4d000301      0x36f534f7      0x3aff38fd      0x3ef93cfb
    0x44800801      0x14
  </uint32>
</bank>
```

SVT Data Format

```
<!-- header mode "First header" -->

<bank content="bank" data_type="0xe" tag="51" padding="0" num="15" length="16" ndata="14">
  <uint32 data_type="0x1" tag="57610" padding="0" num="51" length="6" ndata="4">
    0x20010003      0xf      0xdfb04f26      0
  </uint32>
  <uint32 data_type="0x1" tag="3" padding="0" num="51" length="8" ndata="6">
    0x100000e      0x8a938891      0x8e958c97      0x929f909d      0x42000800
    0xf
  </uint32>
</bank>
<bank content="bank" data_type="0xe" tag="52" padding="0" num="15" length="16" ndata="14">
  <uint32 data_type="0x1" tag="57610" padding="0" num="52" length="6" ndata="4">
    0x20010003      0xf      0xdfb04f26      0
  </uint32>
  <uint32 data_type="0x1" tag="3" padding="0" num="52" length="8" ndata="6">
    0x100000e      0x4a934891      0x4e954c97      0x529f509d      0x45000801
    0x14
  </uint32>
</bank>
```

SVT Data Format

```
<!-- header mode "No headers: -->
<bank content="bank" data_type="0xe" tag="51" padding="0" num="3" length="12" ndata="10">
  <uint32 data_type="0x1" tag="57610" padding="0" num="51" length="6" ndata="4">
    0x20010003      0x3      0xe0f85e5e      0
  </uint32>
  <uint32 data_type="0x1" tag="3" padding="0" num="51" length="4" ndata="2">
    0x1000002      0xf
  </uint32>
</bank>
<bank content="bank" data_type="0xe" tag="52" padding="0" num="3" length="12" ndata="10">
  <uint32 data_type="0x1" tag="57610" padding="0" num="52" length="6" ndata="4">
    0x20010003      0x3      0xe0f85e5e      0
  </uint32>
  <uint32 data_type="0x1" tag="3" padding="0" num="52" length="4" ndata="2">
    0x1000002      0x14
  </uint32>
</bank>
```

SVT Data Format Impact

-> Expected overhead <-

All:

1 multisample header (4 32 bit words) for each APV i.e. $4(\text{hybrids/RCE}) * 5 \text{ APV/hybrid} * 4 \text{ words/APV} = 80 \text{ words}$

In addition a header and tail word for the SVT event.

Total: 82 words from the SVT

First header: 1 multisample header (4 32 bit words) for each RCE i.e. 4 words

In addition a header and tail word for the SVT event.

Total: 6 words from the SVT

No header: 0 multisample headers for each RCE i.e. 0 words.

In addition a header and tail word for the SVT event.

Total: 2 words from the SVT

SVT overhead reduction:

All -> first: $6/80=0.075$

All -> no: $2/80=0.025$

-> Typical SVT evio bank w/ threshold and NO BEAM<-

Note that the additional data always present is 8 words:

TI data (always present) 6 words (2 evio headers + 4 data words) and the SVT data bank evio header (2 words)

-> Observed SVT evio bank reduction <-

All -> first: $14/90 = 0.16$

All -> no: $10/90 = 0.11$

-> Observed HPS evio bank reduction w/ special ECal run and NO BEAM <-

All-> first: $309/937=0.3$

All-> No: $257/937=0.27$

Large part of our data is from APV overhead right now

- Useful for checking system status
- Reduce this overhead by checking in firmware (online) as much as possible
- Keep enough to check overall (b/w RCE's) system status

New “header modes”

- “First header”: reduces SVT APV overhead to 7.5% of eng. run.
- “No headers”: reduces to 2.5% of eng. Run

Unless we find other issues we'll run in “First header” mode in the future (“No header” mode doesn't allow us to check sync b/w RCEs)