DAQ Data Format(s)

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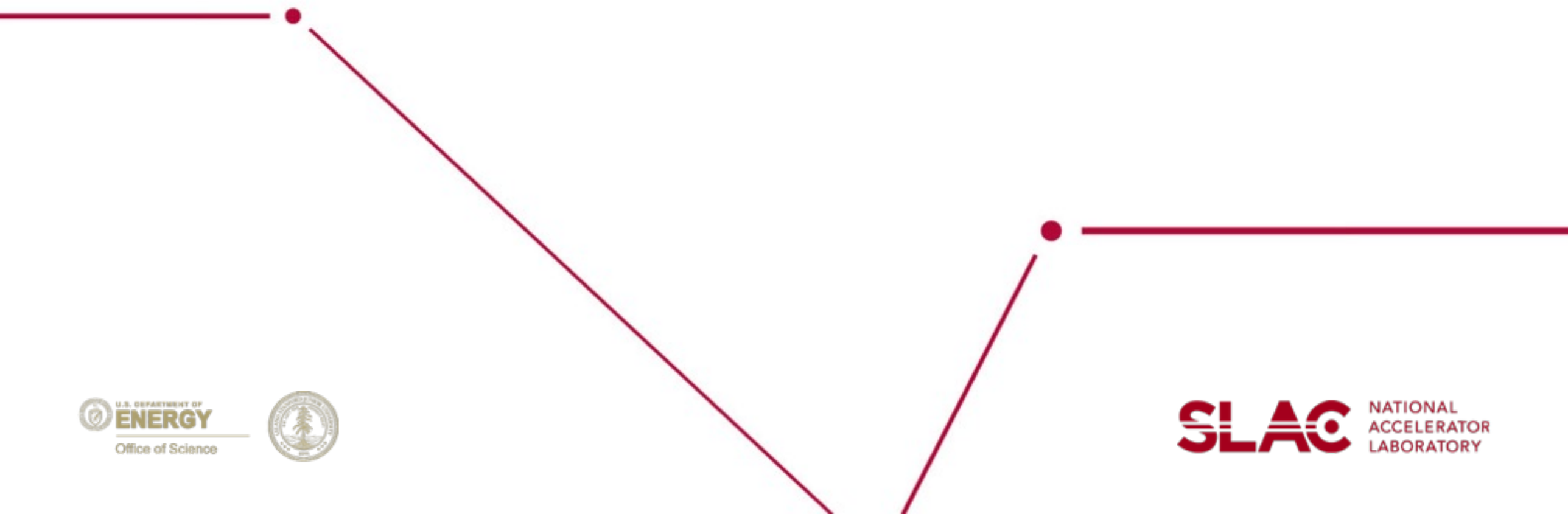
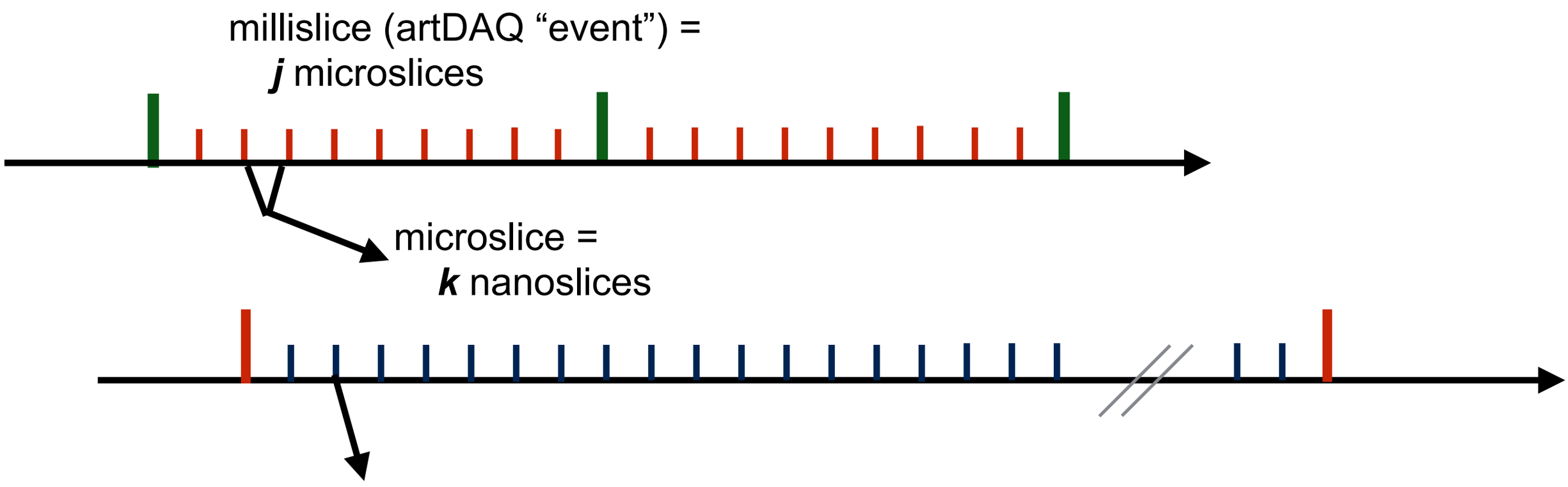
35t online-offline interface meeting

October 16, 2015



TPC data time structure model



each nanoslice is 1 ADC tick (0.5 μs)

This basic structure is maintained regardless of run mode…what changes is whether an ADC payload is sent to the backend.

Every millislice contains 10 microslice headers!!! Whether any of the microslices contain ADC data or not.

The current DAQ is configured such that:
j=10 = 5ms
k=1000 = 0.5ms

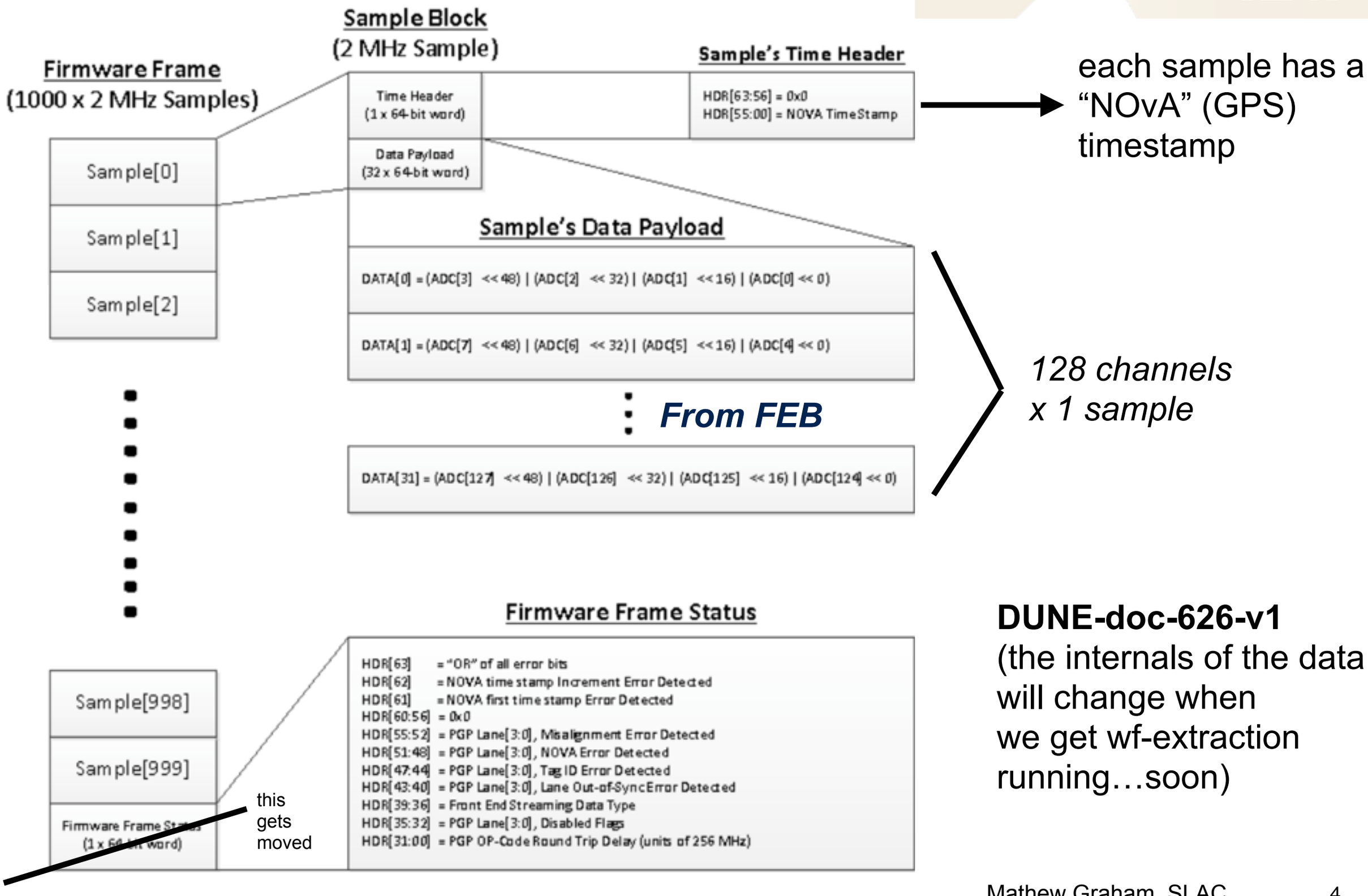
these can be changed!

35ton data modes (from TPC/RCE standpoint)

- **Triggered**: send X microslices of ADC payload when an external trigger is received (more details later)
- Burst: fill up buffers on RCEs for a (settable) time and then stream them out to backend
  - this mode hasn't really been tested in the wild yet.
- Scope: continuously stream out 1 (or more) channels forever
- *Continuous*: continuously stream out all channels forever; zero-suppressed/data-compressed/waveform-extracted/ dev-nulled…something to cut down the bandwidth

➡even if there is no ADC sent with a microslice, a header will be sent!!!

TPC data channel structure: nano→microslice



each sample has a "NOvA" (GPS) timestamp

128 channels x 1 sample

this gets moved

DUNE-doc-626-v1
(the internals of the data will change when we get wf-extraction running…soon)

TPC data channel structure: micro→millislice→event

SLAC

see DUNE-doc-626-v1
for details on these ids

Software Frame

uint32_t	frame_size
uint32_t	sequence_id
uint32_t	type_id
uint64_t	Software Frame Status
uint64_t	Firmware Frame Status

Header

microslice

Version 0.14

RCE/FEB XXX

artDAQ
boardReader
builds
millislices

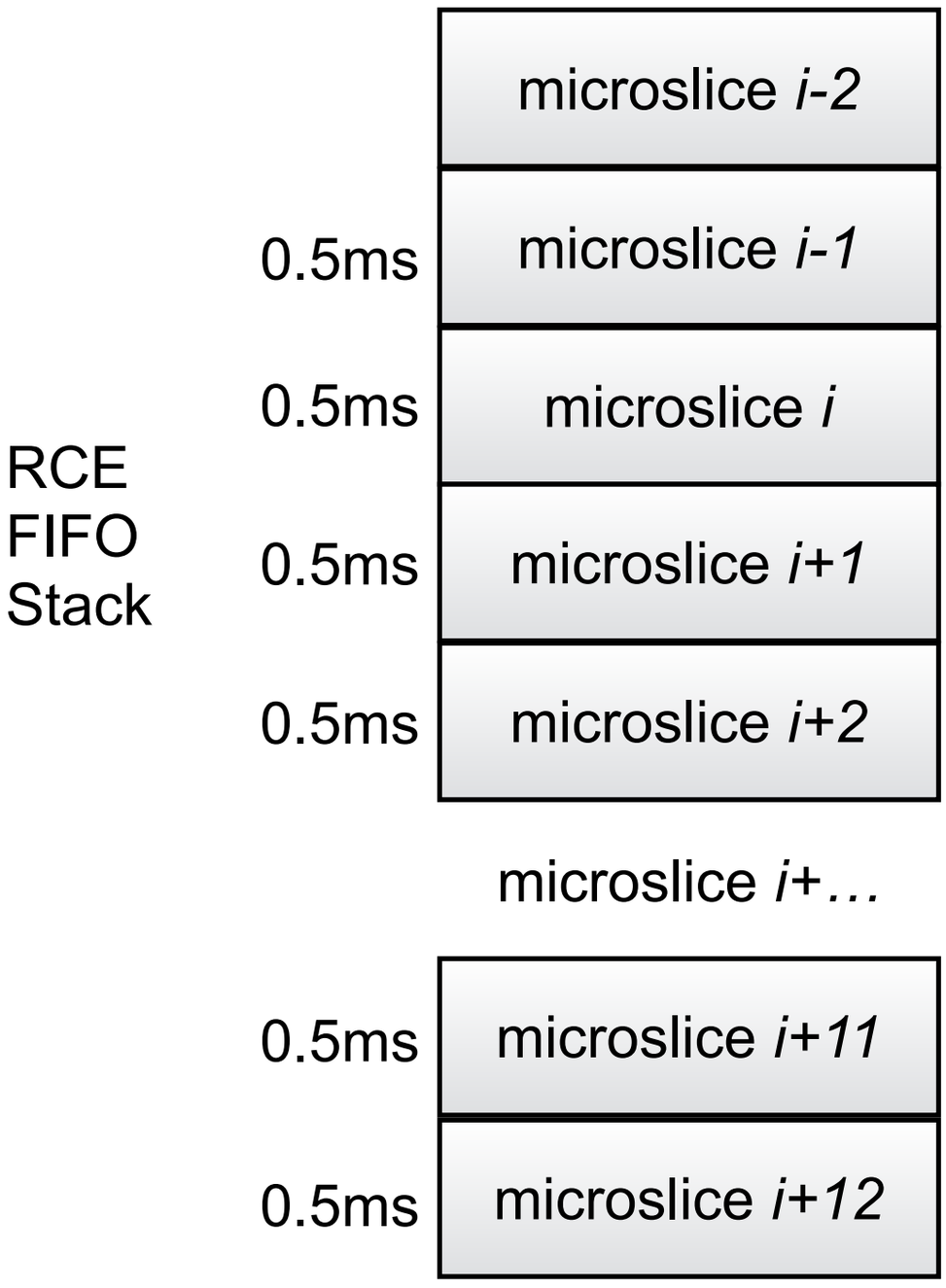
millislice header
microslice #1
microslice …
millislice #j (=10)

plus other
boardReaders
(1 BR/RCE
=/FEB)

artDAQ
eventBuilder

millislice from FEB #1
millislice from FEB …
millislice from FEB #16

TPC data time structure: Triggered Mode



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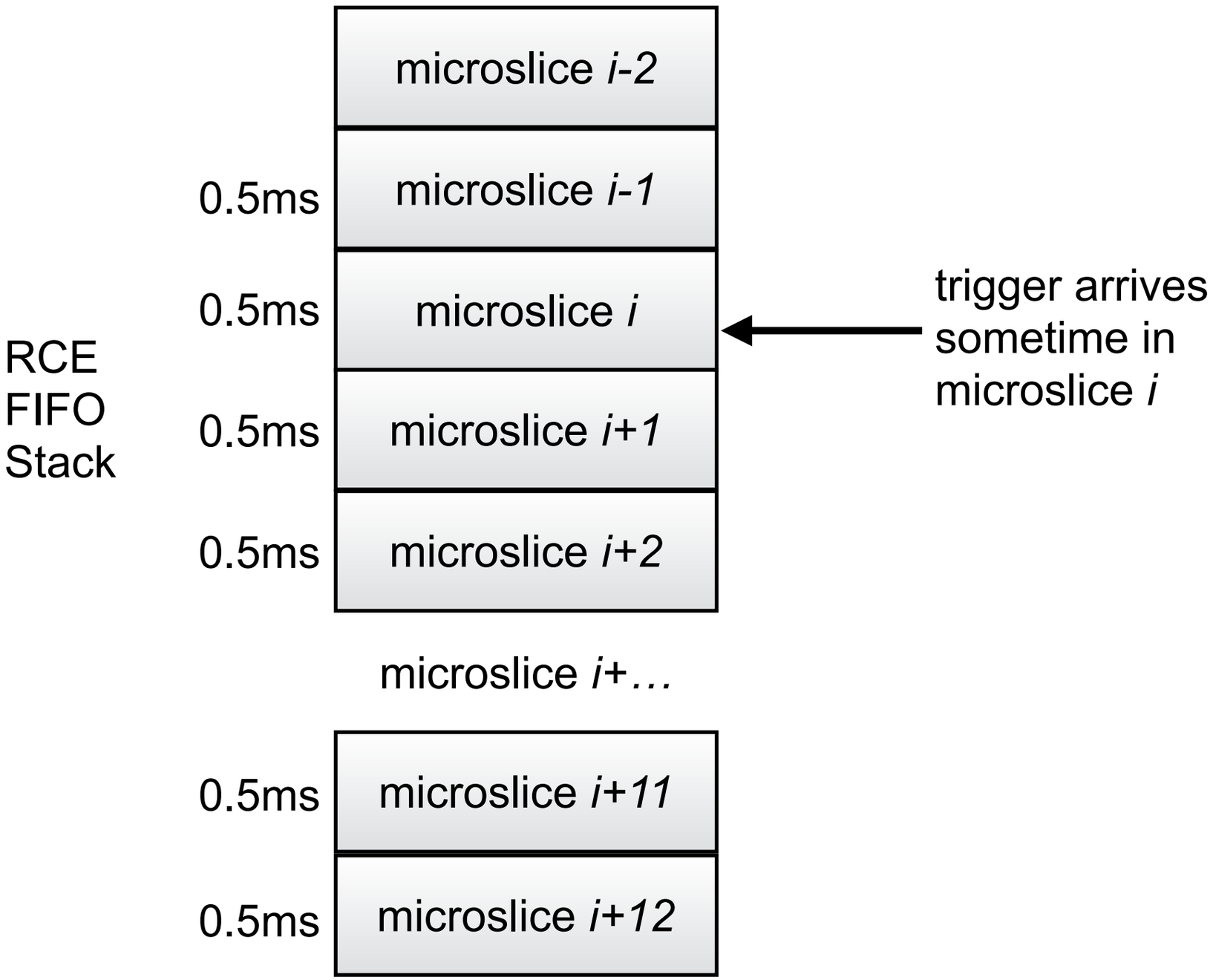

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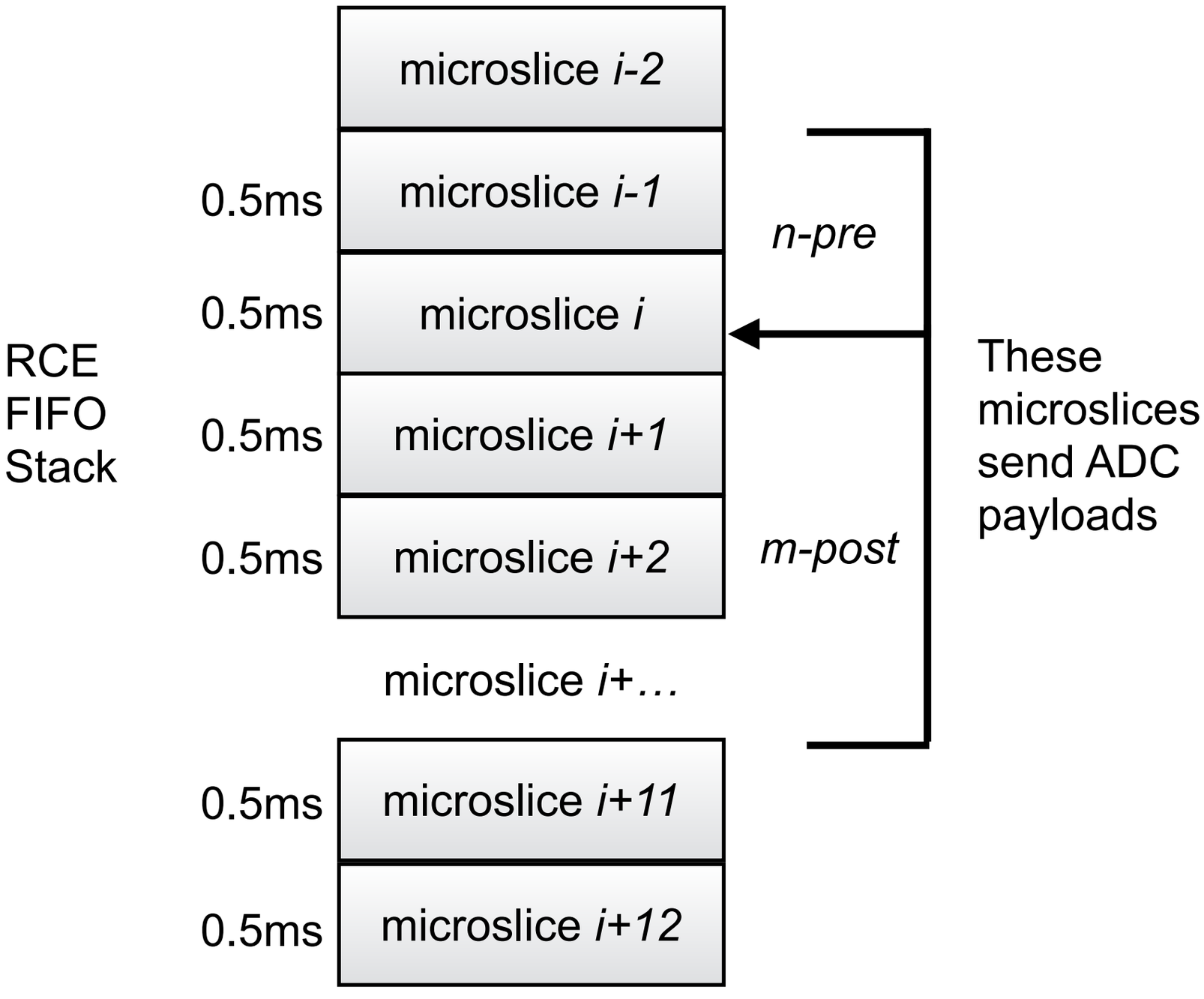

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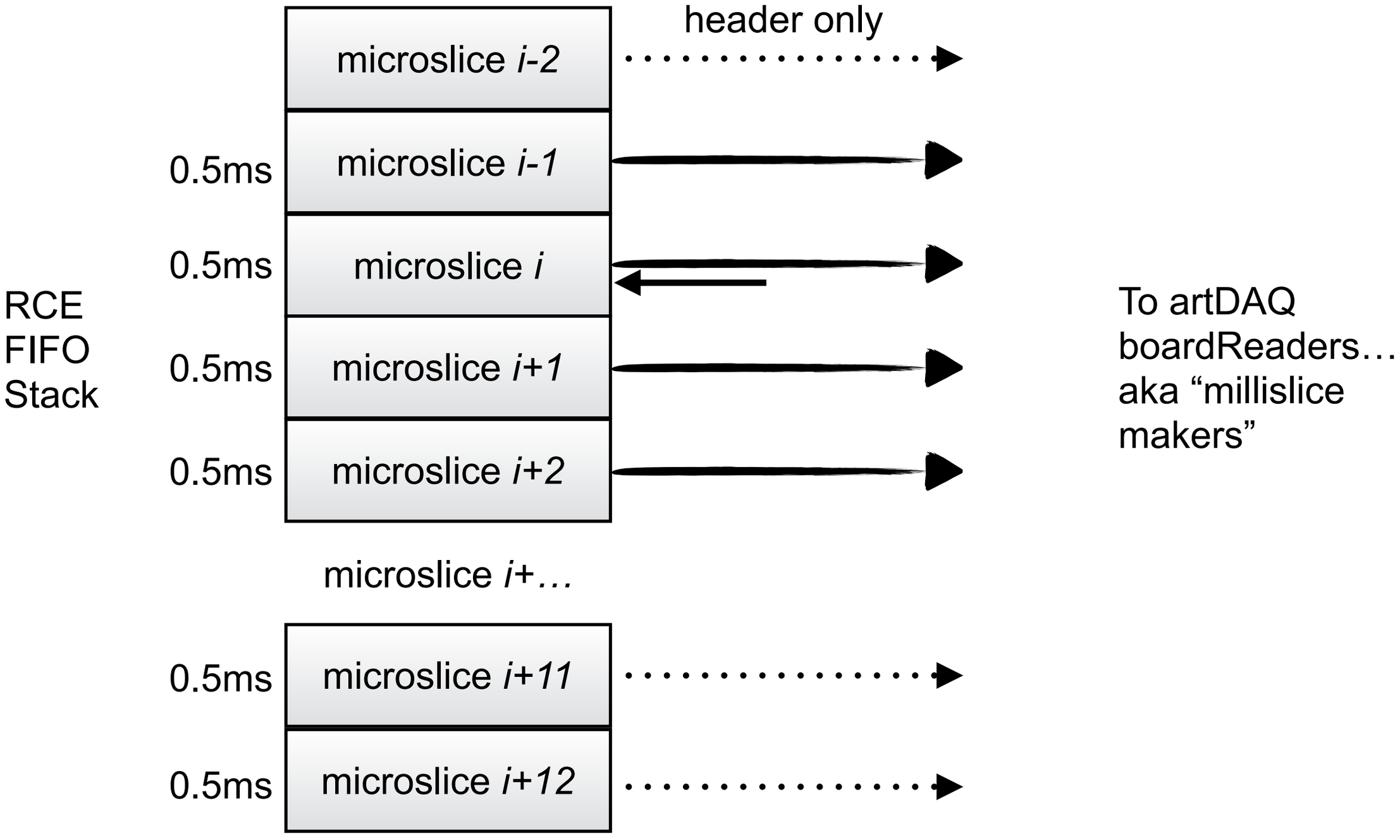

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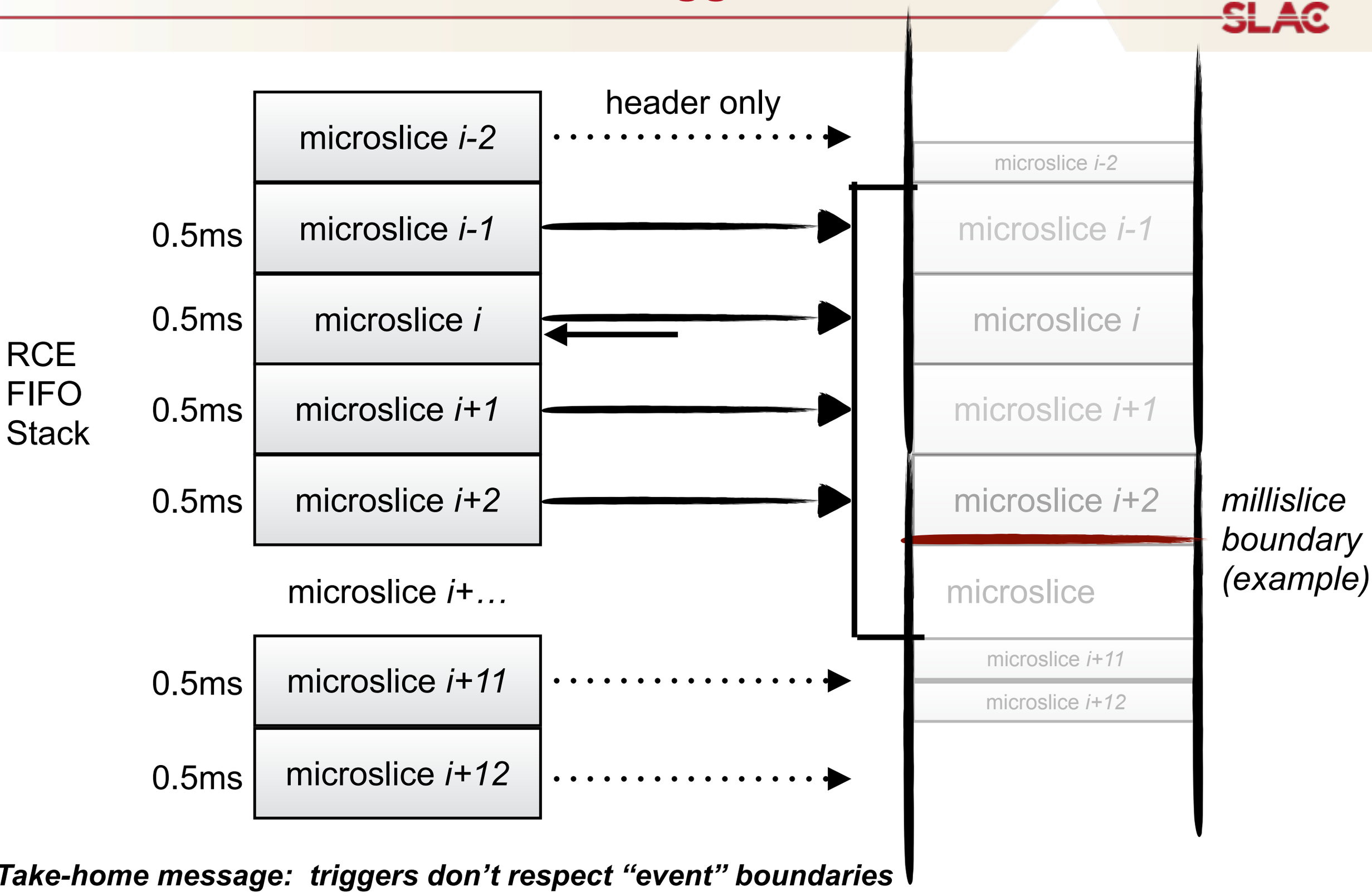
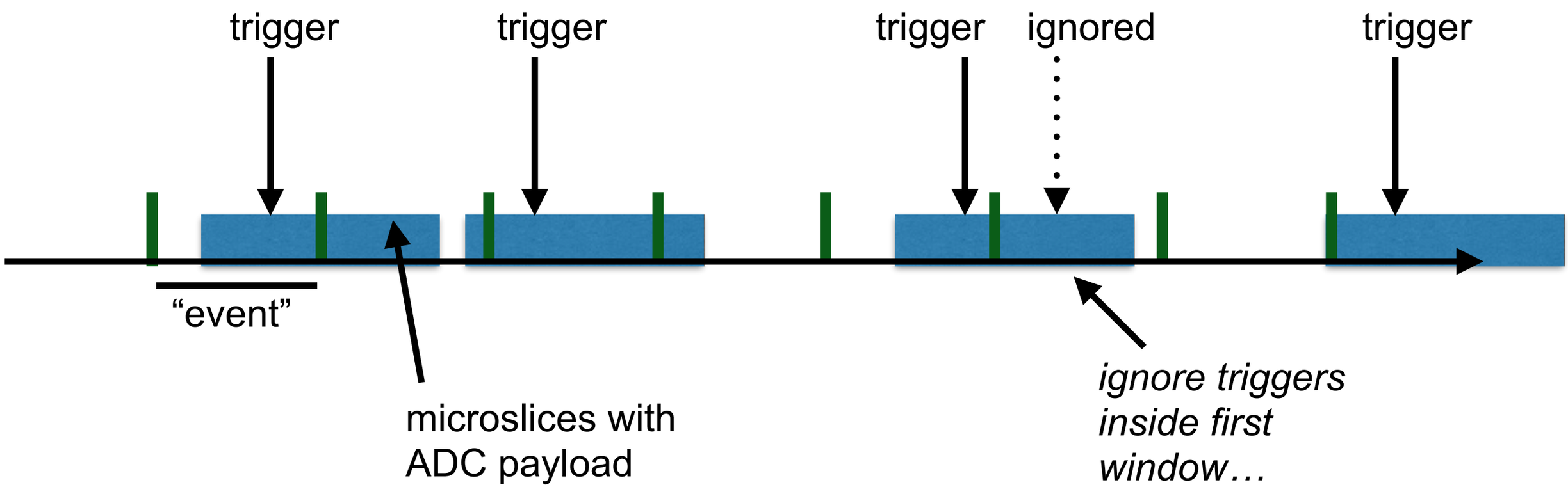


Take-home message: triggers don't respect "event" boundaries

A different way to look at it…



Someone may ask…why do we do it this way??? This is crazy! You want me to stitch events together?

> ***answer:*** we don't want to run triggered…we want to take most of the data waveform extracted. Yes, you will have to stitch events together (or duplicate data).

Summary++

- These are early days…
  - all of the data we're taking now is "triggered" by a pulser…works fine for noise measurements
  - the DAQ/cold electronics folks thanks the online/offline monitoring folks from the heart…the work they've done has been invaluable
- We started this effort with a focus on replicating how we will take data with the full detector
  - it's not really event-based…more like a film-strip than a polaroid