



CMB-S4 DAQ Overview

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Plan & Timeline

- Planning a front-loaded schedule
 - Need to have a working DAQ system when real lab testing starts -- soon!
 - Otherwise we have second-system effect
- Things for which we are responsible:
 - Timing system
 - Slow control
 - Readout for random small things (thermometers etc.)
 - Readout from bolometer readout boards
- First draft of all of these needs to happen in ~ next year

Questions to resolve this meeting

- How do we provide services (timing, notably) to other subsystems?
- Are slow-control/DAQ solutions developed for other experiments suitable for S4? What needs to be done to adapt them?
- Do we have the ability to read out **both** the current generation of the downselected readout **and** the real one?
- What should we tell the readout group about the design of the digital part of their system to interface to us?

Timing options

Two pieces: clock and time-of-day, both easily provided by off-the-shelf GPS clocks

Basic options on the table:

- 10 MHz + IRIG-B
 - Simple signals, complex distribution
 - Used in lots of CMB experiments
- SyncE + PTP
 - Complex signals, runs over the Ethernet we have already
 - New to us

IRIG-B + 10 MHz

- Deployed on a number of stage-3 projects, straightforward
- Complicated fiber network with dedicated hardware, makes connecting to timing network burdensome
- Jitter/drift easy to characterize, well-known
- Dedicated network means other site systems don't couple to timing quality

SyncE + PTP

- Runs over Ethernet, delivers clock (SyncE) and nanosecond time-of-day (PTP)
- Super complex, but basically everything with Ethernet supports it out of the box
- Need to worry about timing quality of network switches now
- Jitter small (CERN uses this, for instance), but **not yet characterized** and we have no spec for $\frac{2}{3}$ readout systems