Precision Timing : Capability Reference

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The scope of the systems described here fall along the lines of the precision timing program. Precision timing represents the integrated monitoring and control of systems that are required to interact beneficially with the core accelerator driver for LCLS but which have independent control relative to the accelerator and FEL photons. Separately, precision timing represents those systems which function at timescales shorter than the framework event system for accelerator facilities.

Note, this is an internal definition and the terminology used external to the groups at SLAC, and beyond the laboratory, vary.

This document concerns itself primarily with the systems beginning with the Phase Cavities in the Undulator hall through to the experiment hutches, including the fiber timing lab, the reconfigured NEH laser lab and the server instructure installations in the NEH and FEH.

The disposition of timing and related systems in the experimental and support areas in the reconfigured NEH and FEH is designed to support the following: - Reference LLRF signals for use in existing or planned systems (one run of low loss, larger diameter coax for 476 MHz that can be switched if needed to run an LCLS2 rf reference at various frequencies) - Provide modest provision for possible future capability - Includes installing sufficient fiber for dedicated precision timing systems including: - RF-Over-Fiber installations for basic drift-stabilized rf references - This implies running additional fiber length such that RFOF fibers can be directly fusion-spliced if performance requirements dictate - Timing control signals - Sufficient fiber installations for high rate fiber-based systems (alternately referred to as the L2SI Experiment Timing Systems) - Reference timing signals - Provision is made for supplying user/diagnostic timing signals (events from EVRs/TPRs based on system) - Provision for one reference cable between key areas that is sufficient for impromptu debugging - Data processing of timing related data acquisition systems (though not managed through the precision timing program) - Wave8 data links (Two fibers)

The determination of what type of signal provision is needed for the scientific output of a facility is determined by the hutch scientists in discussion with the precision timing group.

#TODO Matt has a comment in Stefan's diagram about the relocation of the XPP DAQ farm to the FEH Mezzanine, and whether that still supports our needs for the fiber based systems

Wave8 Signals go from laser hall to 208

The installation of the systems described here in part dovetail with existing/planned DAQ and controls systems, and count of fibers in particular needs to be considered within the context of fiber trunk runs and total used/used+spares counts.

Describe the laser systems if possible, pull from other documents where able.

The system includes the tiered operation of laser systems as described in previous reviews and documentation.