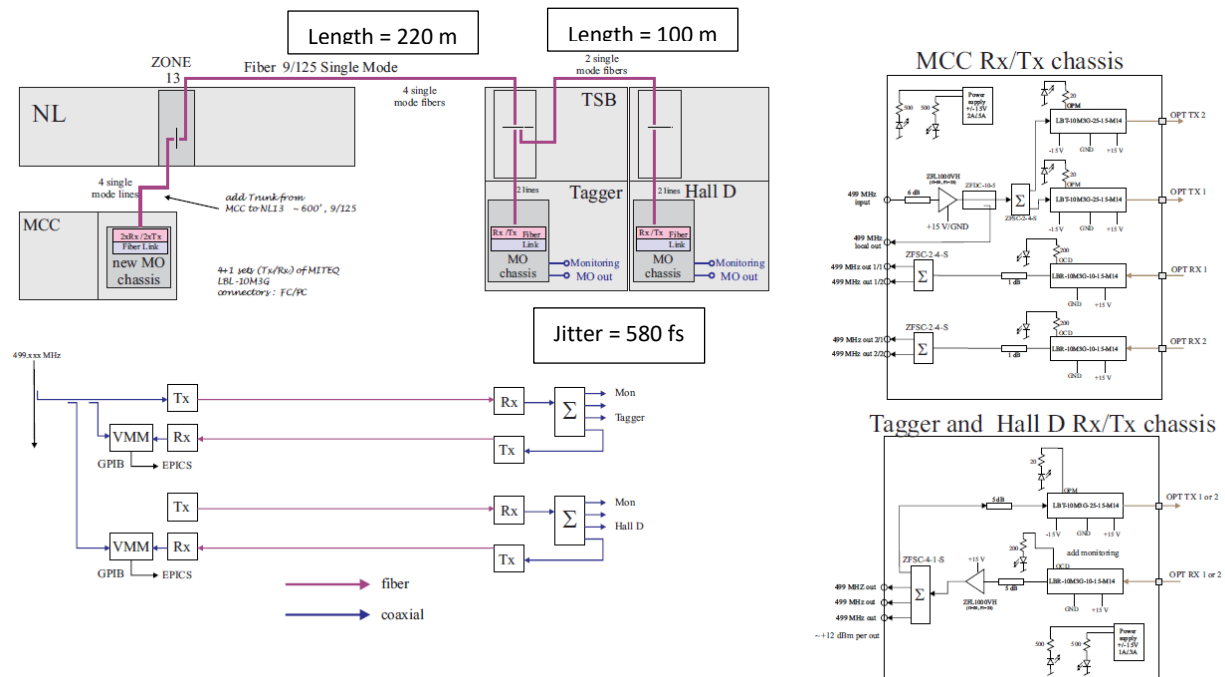**Timing at EIC 2**
JLab Hall D/GlueX Reference

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Timing in Hall D is implemented with a high stability local system clock and referenced to the high stability RF accelerator clock. Timing between bunches is 4 ns.

Accelerator RF Clock

The accelerator clock is distributed as follows:

The accelerator RF (NL26) clock is temperature stabilized, 250 MHz:
   a) Fiber: 9/125 Single Mode.
   b) Length: 220 m to Tagger Hall and 100 m from Tagger Hall to Hall D.
   c) Line is not temperature stabilized: read-back line is used for phase drift compensation.
   d) Jitter: 580 fs at output of RF MO Chassis.

Local System Clock

The RF clock is asynchronous to the high stability System clock, which is provided by the Trigger Supervisor (TS) module and distributed by the Trigger Distribution (TD) module. All readout modules are VXS, which is an extension of VME with a serial fabric backplane.

The System clock is distributed to all VXS crates via optical fibers and then distributed within a crate via a Trigger Interface (TI) module and Signal Distribution (SD) through the backplane to all readout modules (ADCs, TDCs and other trigger-related modules). The System clock signals are de-skewed by programming delays appropriately in the TI and SD modules (PECL signals). All channels are, therefore, properly timed and synchronized. Jitter at the crate level was measured to be nominally less than 4 ps.

MO Signals

Two MO (Master Oscillator) modules (one in the Tagger Hall and one in Hall D) pre-scale and signal condition the 250 MHz RF clock appropriately within the acceptable range of various TDCs. Pre-scaling factors are programmed (per channel) in the MO modules, which provide four outputs each. These PECL outputs are distributed via low-loss twin-ax cables; signals are then fed to high precision 25 ps TDCs (62 ps TDCs for wire chambers) via high precision, single-channel PLL units.

Timing

The TDCs provide timing information characteristics between the RF clock and the System clock. This time differences vary between runs and calibration is, therefore, implemented before each run. The actual bunch times are determined from scintillating detectors with good timing resolution of 100 ps to 200 ps. For every valid trigger occurrence, the TS generates a time stamp which is distributed to each crate and to be associated with the event digitized data.