NLC Damping Ring Timing System

The reference RF for the damping ring is produced by I/Q phase shifting (through many cycles) the linac RF. The phase shifter is driven by a pair of DACS. Control of the phase to meet the following requirements is through software.

All Damping Ring triggers are drive from the Damping Ring reference RF.

Modes:

**Locked:** The DR oscillator can be phase shifted relative to the main RF, but the 1MHz phase must return to zero phase during the fiducial window (enforced by software). The fiducial regeneration circuit looks for RF divider phase hops.

**Store:** This mode is used for long term storing in the damping ring. The Damping Ring reference RF is not required to return to any set phase relative to the linac RF. Fiducials are triggered at the nearest 1MHz cycle.

Note that the standard trigger generator design provides enough flexibility for the damping ring operation.

**New components:**

Fiber transmitter / receiver: The standard NLC design will work with the internal VCXOs replaced with wide band units. This will increase the phase noise from the system, but probably not beyond 10psec for a 100Khz out of 357MHz bandwidth.

The DAC sequencer contains a ring buffer for the DACs, synchronized to the 357Mhz timing reference. The data for the DACs will be generated offline in software.

The fiducial regeneration circuit will set the fiducial for the damping ring to match the next cycle of 1MHz (ring turn). This circuit will also report the timing difference between the main linac fiducial and the damping ring fiducial.