Timing Pattern Generator of the Swiss Light Source

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-present setup
-new developments
-EPICS support
-applications

Timing System Structure

Timing reference generation

Master Oscillator(s) 500 MHz

Bunch Clock

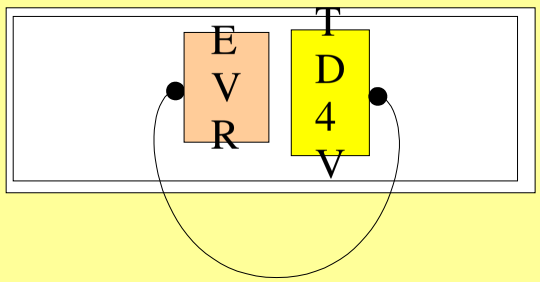
Line Sync

EVG

Fiber optic distribution

High-precision timing:
Presettable delay cards
-resolution to single bunch (2 ns)

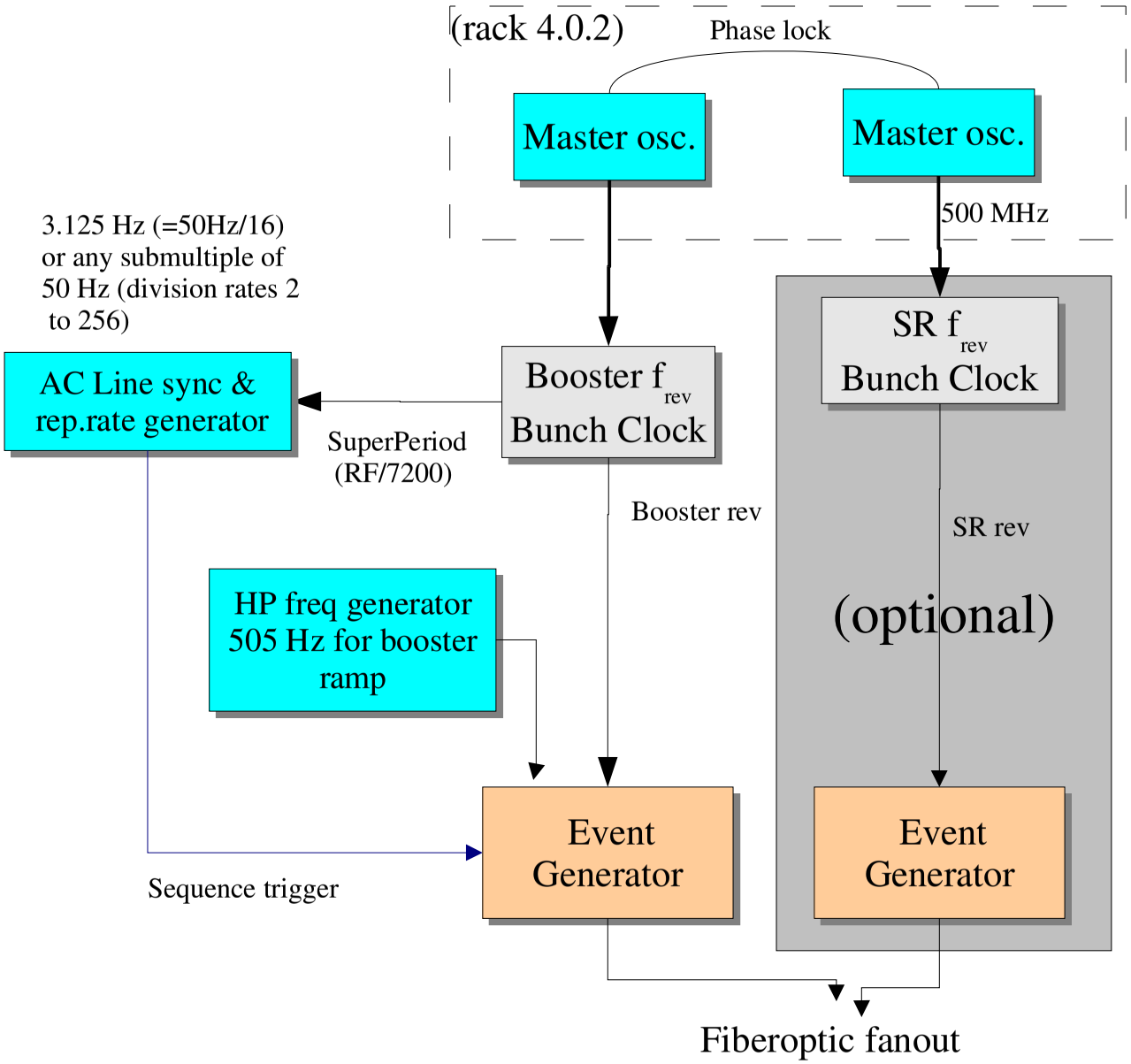
Linac gun trigger



Global synchronization, reference distribution and (a little) lower resolution timing: Event System
-resolution to 20 ns

BPM System
Current transformers (ICT)
Synchronized cameras
Tune measurement
Magnet ramping
Booster RF ramping
Experimental stations synchronization

Current SLS Timing Source

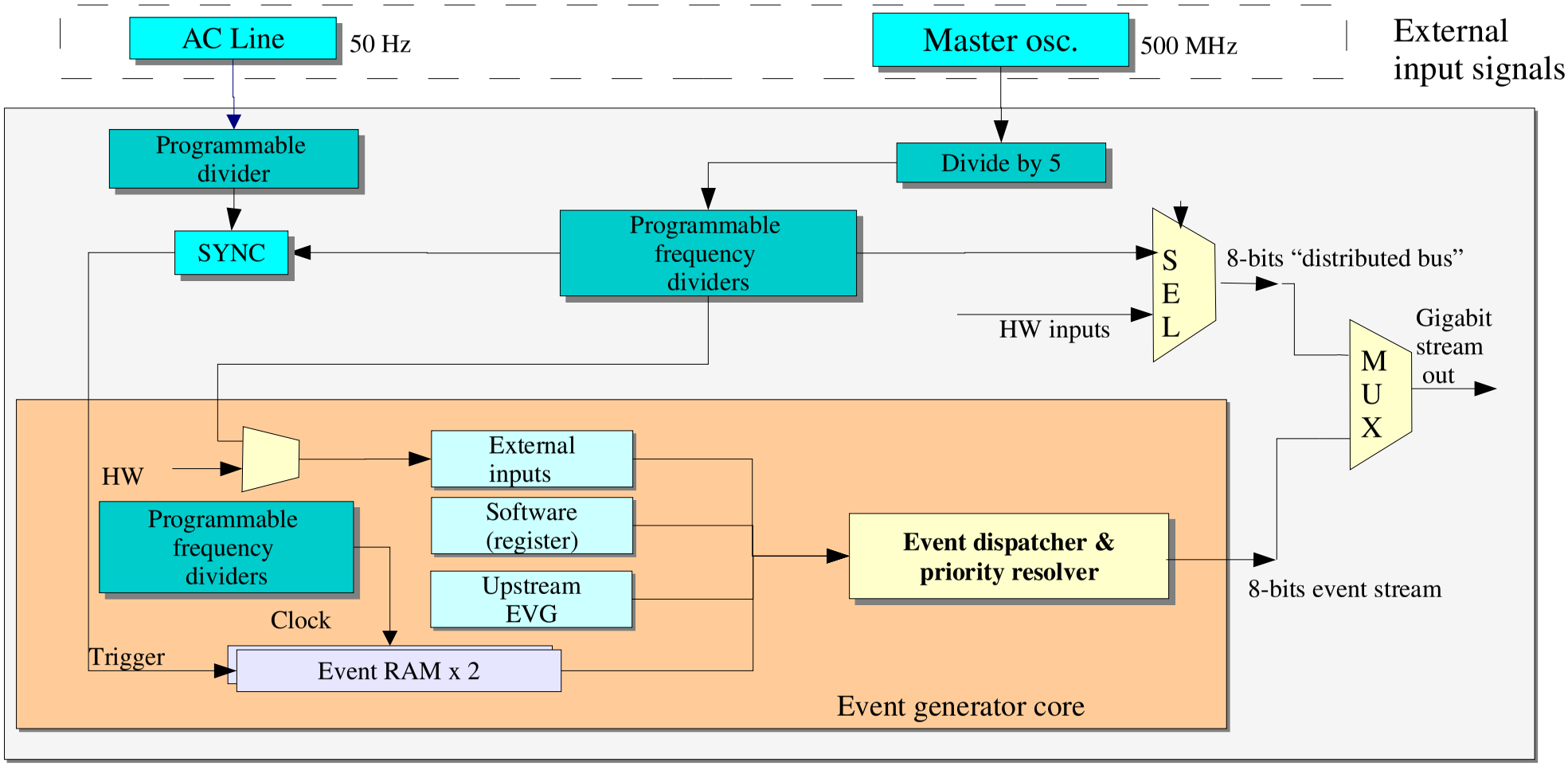


Most operations already built into event system. However, some homegrown or external components remain:
-AC line sync
-Bunch clock
-External clock generator (HP)

User's need for more clocks with settable frequencies led to an idea: **build all these directly into EVG.**

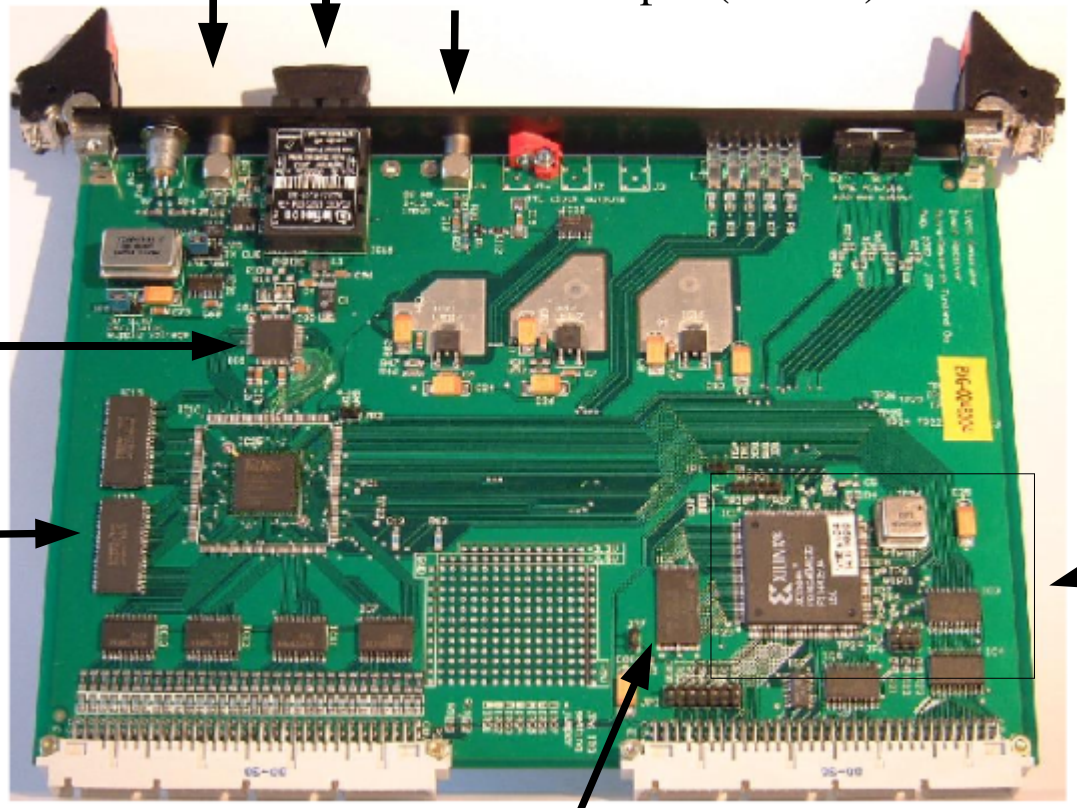
Advantages:
-eliminate external 'boxes'
-simplify software
-better performance
-simplify maintenance

Timing Source with EVG-Plus



"Timing system on one card" : only AC and RF signal inputs needed. Everything else is under software control.

EVG Plus Card



EPICS support for the Event Generator

Record types for supporting EVG (original APS, SLS extensions)

EG record, setup of the generator:
-mapping of hardware signals to events
-enable/disable of HW inputs
-RAM mode
-RAM clock prescaler setting
-RAM software triggers
-Software event generation (VME)

New features (to be done):
-prescaler frequency settings (for 8 new)
-AC line prescaler
-selection of distributed bus input (external in/prescaler)
-prescaler to event trigger selection
-prescaler&AC sync to RAM sequence trigger selection

EGEVENT record, placement of events into the event RAM.
-event number
-delay (desired & actual)
-delay unit
-RAM #
-priority
-max. delay

On the wishlist:
-a better (simpler, more efficient) way to handle alternate RAM updates. Works, but is complicated and unnecessarily slow.

New Applications

Driving requirement:
generation of clock signals for time-resolved experiments:
revolution clock (1 pulse/storage ring turn) and subharmonics
(available now, although with limited EPICS support)

Additional need for high-precision timing at the beamline
development for an event receiver with 500 MHz regeneration in progress

Experiment start planned for summer 2003

Flexible, jitter-free clock signals for beam diagnostic purposes (not always possible with events)