SNS Accelerator and Thoughts on Integration of Diagnostics Information

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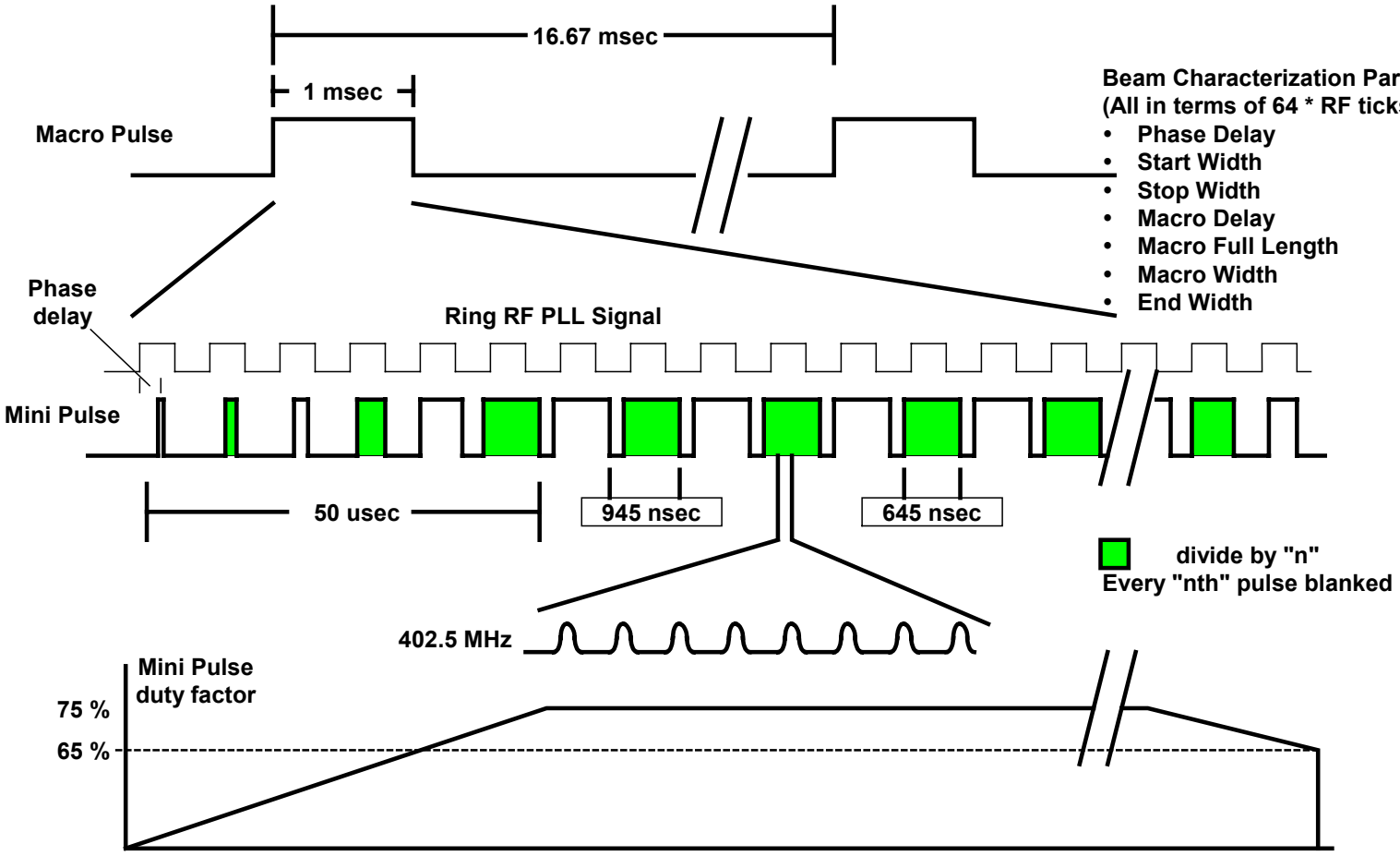
ICFA Mini Workshop of High Intensity Hadron Machine Diagnostics

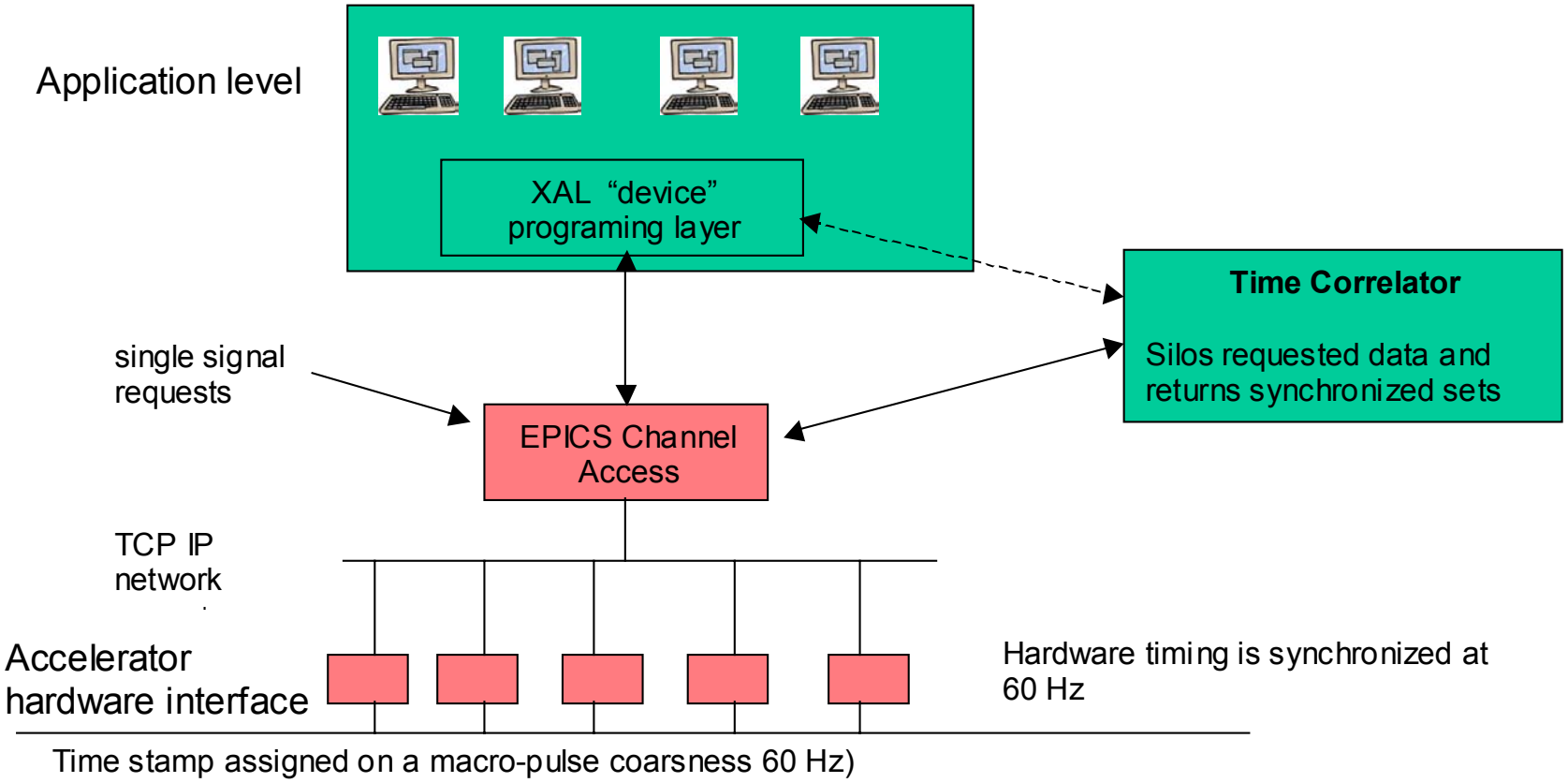
Diagnostic Integration Issues

- Correlation of multiple diagnostics from the same pulse
  - Accurate time stamps – good timing system
- Pulse stealing
  - Allow “physics” pulses with different setup up to be periodically interspersed within a train of “operational” pulses.
  - The “physics” pulse information is stored in separate buffers
- Glitch detection
  - Machine protection faults trigger circular buffers to dump data across the machine
  - Pre and post fault information across the machine can be gathered and examined

SNS Macro Pulse Shape



Time Correlator Provides Synchronized Data



- All data is time-stamped
- Correlator is a callable routine to return sets of EPICS Process Variables from the same macropulse

Pulse Flavor Assignments

0 = Beam Off

1 = Target 1 Normal Beam

2 = Reserved

3 = 10 μSecond Diagnostic Pulse

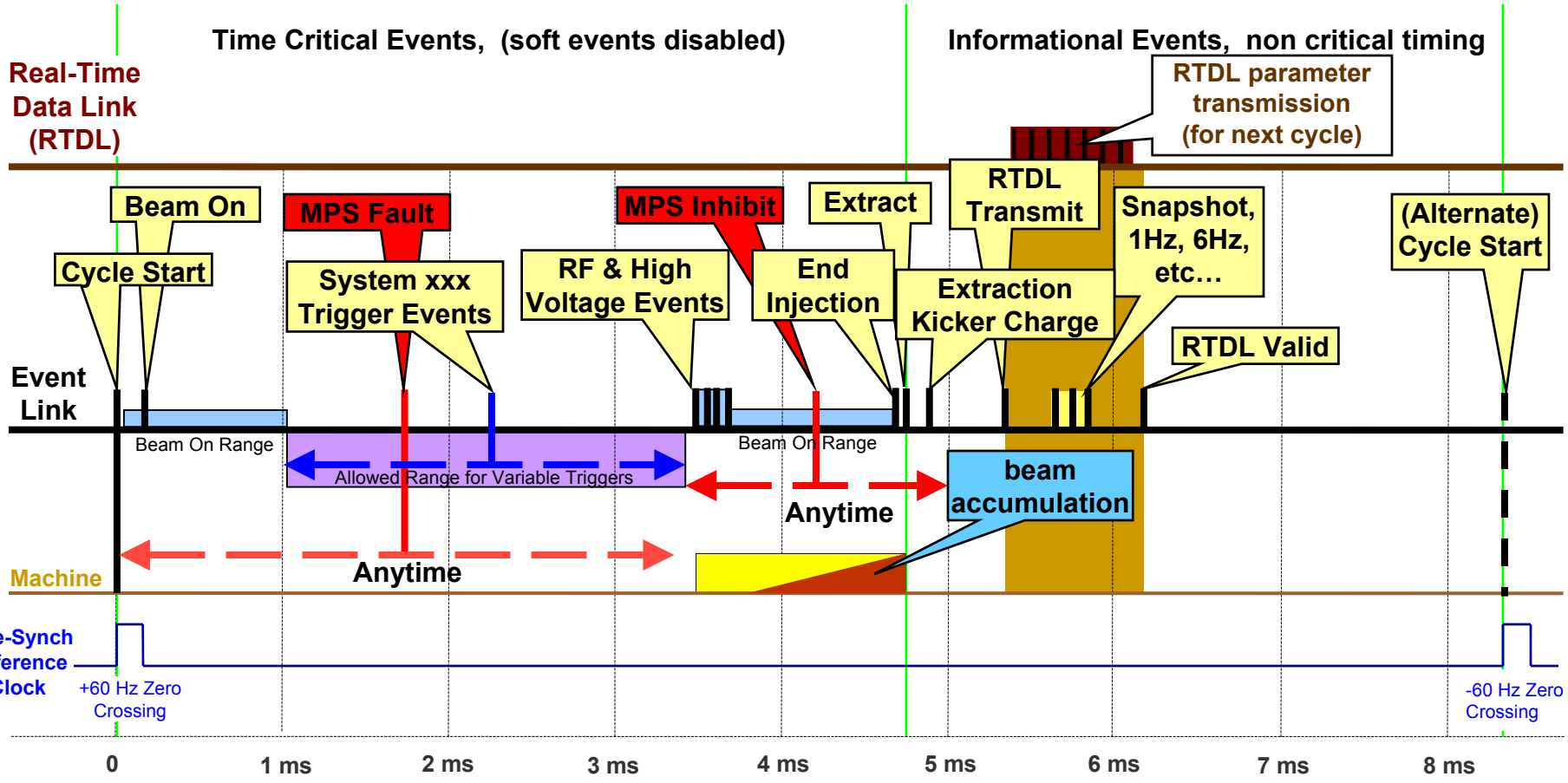
4 = 50 μSecond Diagnostic Pulse

5 = 100 μSecond Diagnostic Pulse

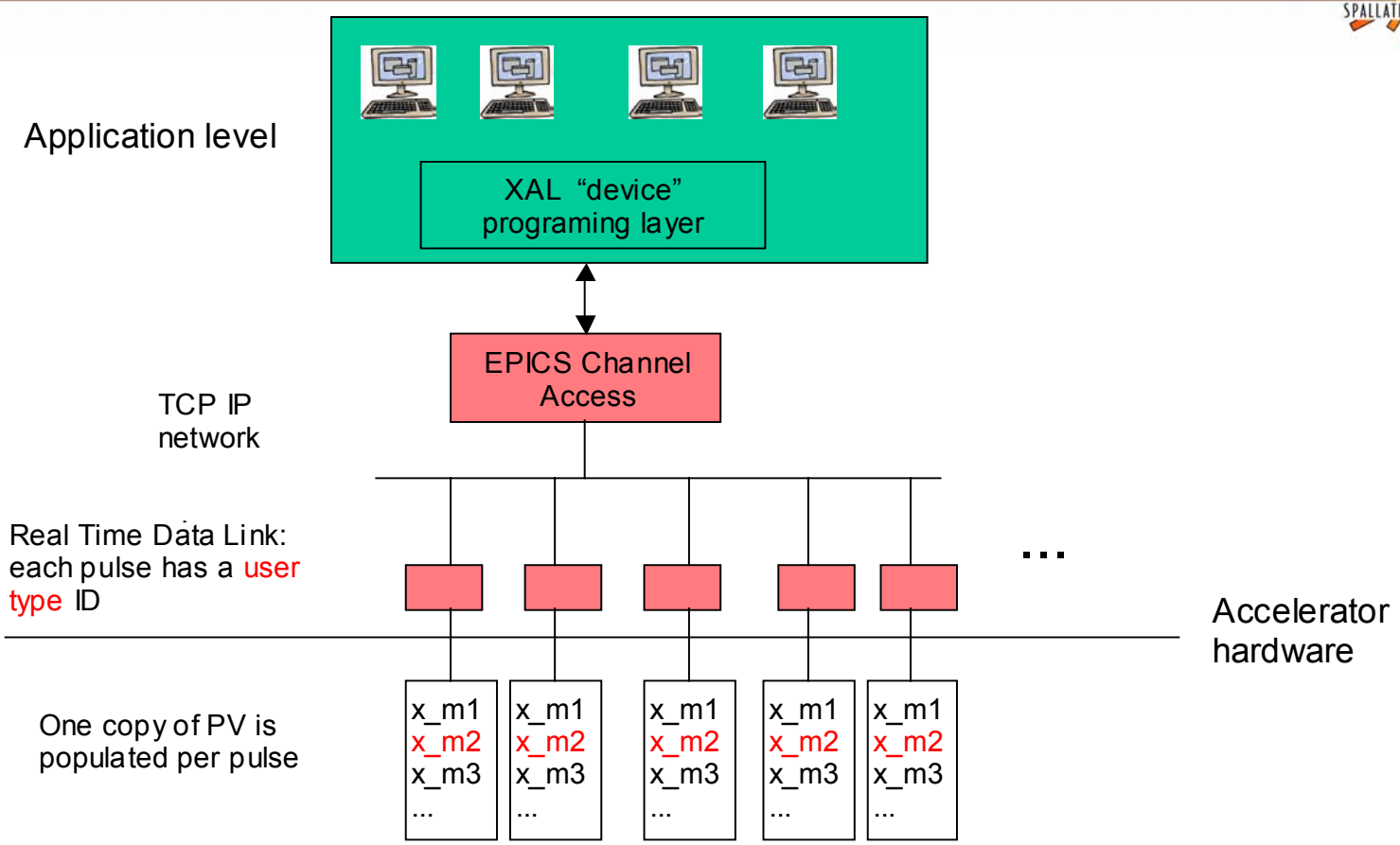
6 = Physics Pulse

7 = Arbitrary

Timeline (from the timing system point of view)



Multi-mode Signals



- Diagnostic and RF information have multiple copies of process variables (PV)
- User type value triggers a single PV each macro-pulse
- Allows interspersing occasional "physics-mode" pulses in a stream of "production mode" pulses, and reliably getting this information