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PULSE

Timing Distribution System

Lowest noise optical timing distribution & synchronization

APPLICATIONS

Synchronization of distributed microwave and laser sources in large-scale facilities such as:

- Free-electron lasers and particle accelerators
- High power laser facilities
- Ultrafast electron diffraction instruments
- Radio telescope arrays

BENEFITS

- Less than 5 fs RMS timing jitter and timing drift
- Modular and expandable system (standard up to 8 fiber links and 10-km length)
- Remote or local control via EPICS
- Automated search and lock mechanism via GUI
- Advanced monitoring and control features

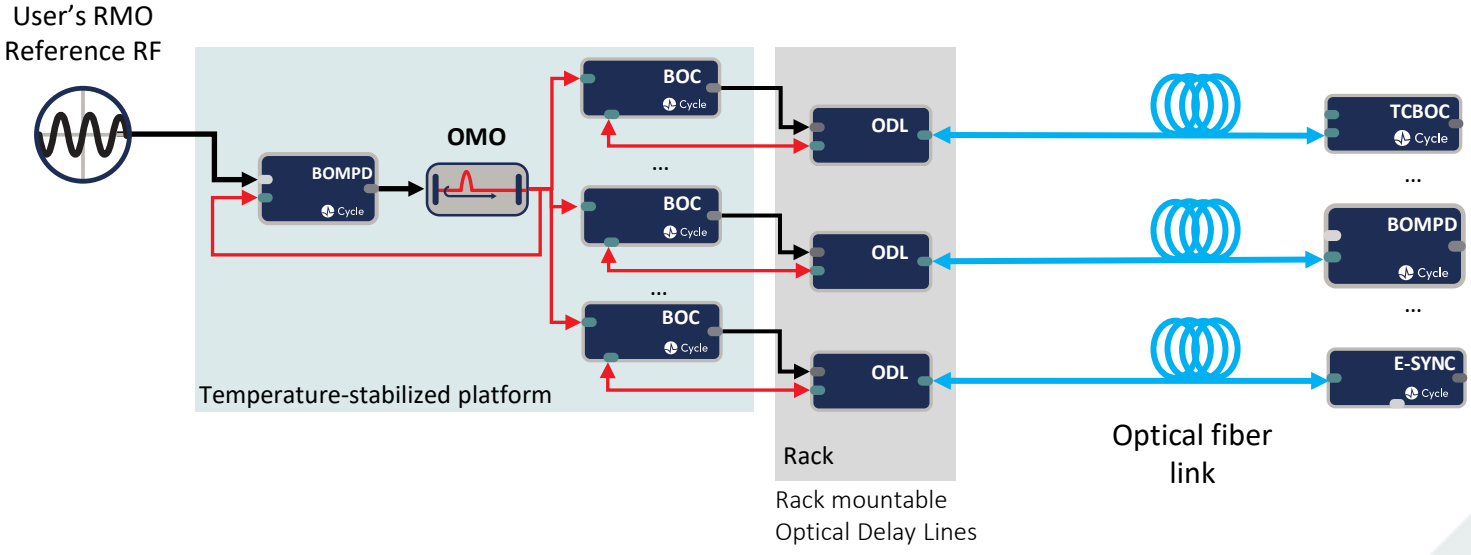
DESCRIPTION

PULSE Timing Distribution System delivers optical signals to remote locations with the lowest added timing jitter and drift available on the market.

It employs ultralow noise optical pulse trains from an optical master oscillator (OMO) as the timing signal, transferring them to remote sites via fiber optic links. Fiber delay variations are measured with attosecond precision using Cycle's patented BOC technology and actively compensated.

At fiber link outputs, ultrafast lasers or micro-wave sources can be synchronized to the OMO remotely with unparalleled precision.

SETUP EXAMPLE



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Contact us to discuss your timing and synchronization requirements

SPECIFICATIONS

Parameter	Specification	Comment
Timing jitter	< 5 fs RMS	integrated residual noise [35 µHz - 1 MHz], i.e., for 8 hours[1]
Fiber link type	PM or SM fiber	polarization maintaining or standard single mode fibers
Fiber link length	< 10 km	contact Cycle for longer lengths.
Number of fiber links	Up to 8	per platform, expendable by combining multiple platforms
Optical wavelength	1555 ± 10 nm	operating at pulsed mode
Pulse repetition rate	100 MHz – 1 GHz	please consult Cycle GmbH for higher repetition rates.
Control system interface	EPICS	via TCP/IP
Integrated feedback	Included	applied to OMO, fiber link actuators, etc.
Auto lock	Included	via graphical user interface on a computer
Dimensions	1.6 × 1.4 × 0.6 m^3 19” rack	isolated & stabilized master platform for optical modules temperature-controlled rack for opto-electronic modules
Fiber link output options		
Optical PULSE receiver	PM or SM fiber	> 10 mW output, stabilized OMO pulse train
RF PULSE receiver	SMA	ultra-low noise RF signals at any harmonic of pulse rep. rate
BOC / TCBOC	PM fiber	input to a BOC/TCBOC for remote laser synch.
BOMPD	PM fiber	input to a BOMPD for remote RF synch.
E-SYNC	PM or SM fiber	input to a ESYNC for remote laser/RF synch.
EDFA	PM fiber	ultra-low noise in-loop EDFA with > 100 mW total output power to support 8 additional fiber links

[1] system shall be in a thermally controlled environment (temperature +18 to +24°C, with slope < 0.4°C/h and variation < 1°C pk-pk; humidity < 60 %RH with variation < 10 %RH pk-pk).

MEASUREMENT DATA

Out-of-loop timing jitter, drift and residual ADEV between two stabilized 150-m fiber links.