

# Upgrade of Abort Trigger System for SuperKEKB

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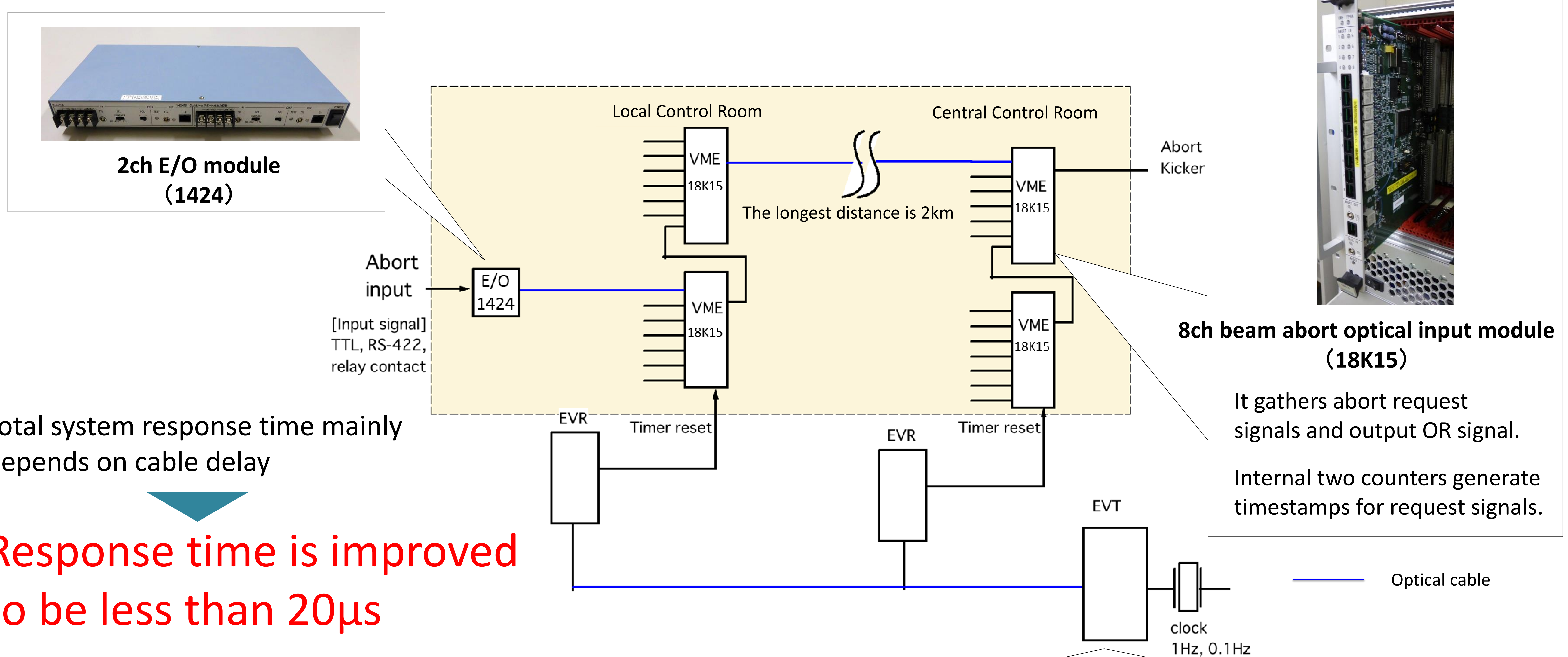
## What is Abort Trigger System

Abort Trigger System collects more than 130 beam abort request signals and issues the beam abort trigger signal to the abort kickers

## Requirements for new system

- Total response time is less than 20 $\mu$ s
  - ➔ **The optical request signals are transmitted**
- The system can reveal the order of sequential abort request signals
  - ➔ **Timestamps for detected request signals**

## System Configuration



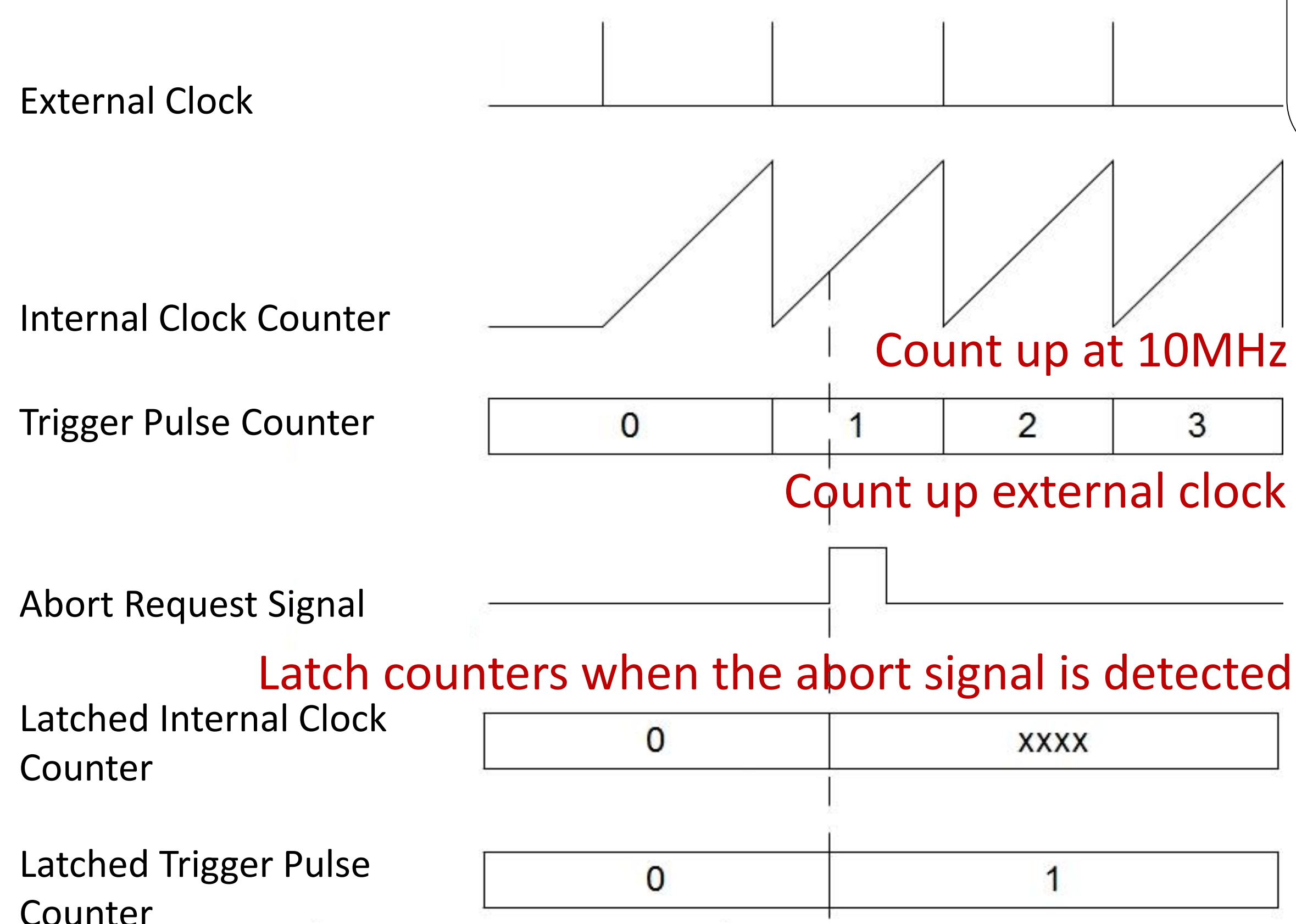
Total system response time mainly depends on cable delay

**Response time is improved to be less than 20 $\mu$ s**

- EVT (Event Transmitter module) and EVRs (Event Receiver modules) are modules of software trigger system
- It provides the synchronization pulse and/or the interrupt signal to IOCs (Input/Output Controllers) or devices
- Counters among 18K15s are synchronized by external clock provided by software trigger system
- The IOC at CCR records the time when the software trigger system send a synchronization trigger

## Timestamps

- Abort request signals are usually occurred sequentially
- The order of the request signals are important to identify the cause of the beam abort
- We can notice relative time differences from the counters
- Absolute time can be calculated with software processing



Timing diagram of two counters in 18K15

## Latched counters show CH1 is the first detected signal

	Trigger Pulse Counter	Internal Clock Counter
CH1	0x20	0x92E8A
CH2	0x23	0xDF10B
CH3	0x2B	0xEF747
CH4	0x2B	0x7DDAA
CH5	0x32	0x5B32C6
CH6	0x2F	0x3207FC

Latched counters of 18K15

convert

CH1	2014/07/16 11:40:51.752964056
CH2	2014/07/16 11:40:54.784157756
CH3	2014/07/16 11:41:02.790870956
CH4	2014/07/16 11:41:02.744340056
CH5	2014/07/16 11:41:10.290467656
CH6	2014/07/16 11:41:07.020674656

Timestamps of time and date format