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To: T10 Technical Committee  
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Subj: **SPI-4 REQ/ACK ISI removal via qualified clocking method**

### Change Control

<u>Rev.</u>	<u>Date</u>	<u>Description of Change</u>
0	9/9/99	Initial Document

## **1. PROPOSAL SUMMARY**

The effects of pattern dependant ISI created when REQ or ACK pause can be removed by utilizing the unused P1 signal line as a qualifier for REQ or ACK from the device that sources data.

### **1.1 Primary Goals**

- To remove one of the two sources of compounding ISI timing errors.
- Establish an ISI free reference clock at the receiver.

### **1.2 Assumptions**

- Clock start up burst can begin during phase settling time.
- Must only be used in DT phase after fast-160 negotiations are complete.

## 2. Waveforms

The following graph shows the preferred use of the qualified clocking method. Note: the P1 gated REQ rising edge may not always be phase aligned with a similar rising edge of ACK. (See transition #6 in Fig 1 below)

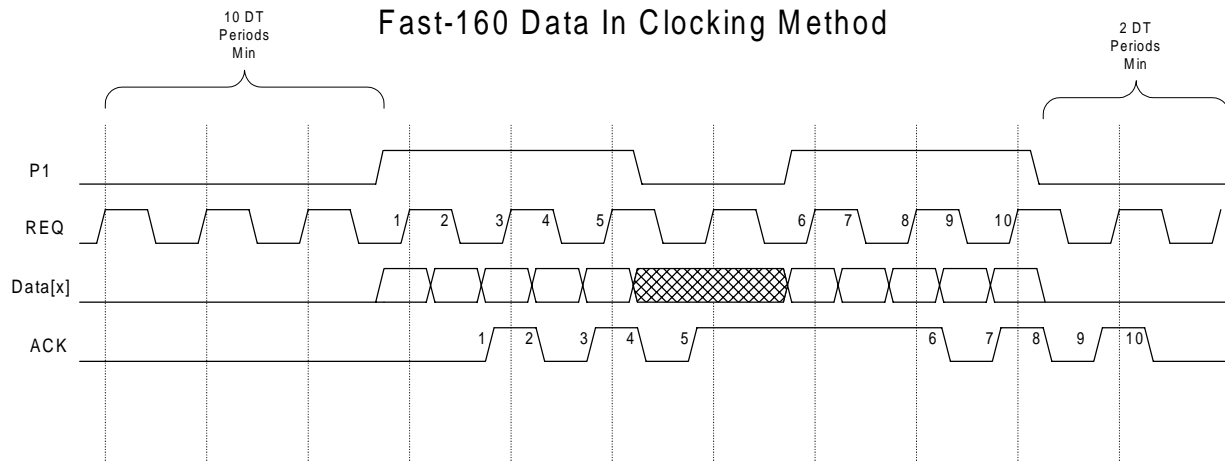


Figure 1

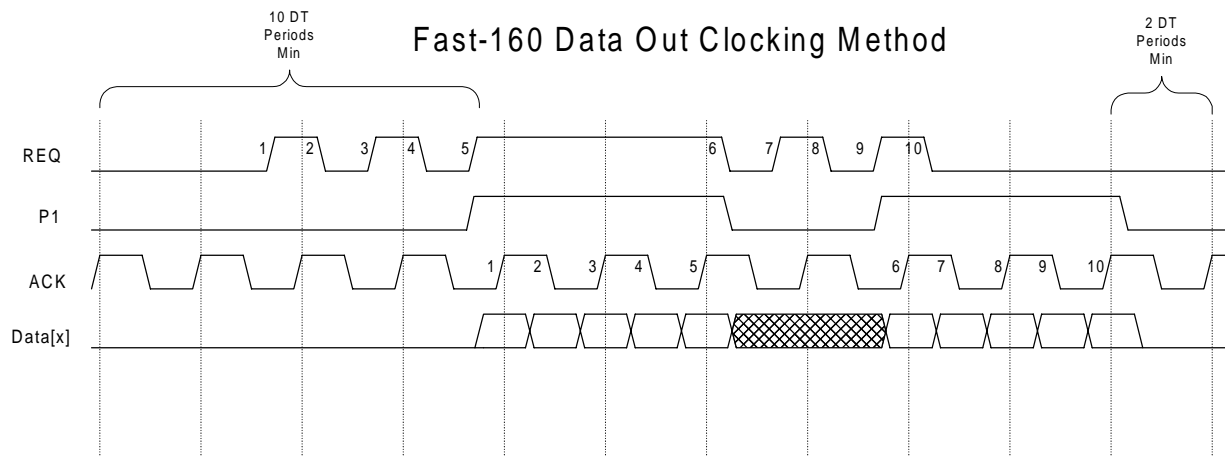


Figure 2

### 2.1 Implementation Description

1. The currently unused P1 signal is held negated while the REQ/ACK clock begins transitioning at the maximum agreed period for a minimum of 10 periods to ensure that all ISI components die out.
2. The P1 signal line is transmitted in unison with the 16-bit data stream and used as a qualifier to gate the already free running REQ/ACK from the data source. This allows all data and strobe information to be sampled on the same ISI free clock.
3. The corresponding ACK/REQ signal is not time correlated with any other signal lines and thus needs no qualifier. It is counted to maintain proper offset management.