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~~09~~10/~~09~~13/1999

To: T10 Technical Committee
From: William Petty, LSI Logic Corp.
Subj: **SPI-4 REQ/ACK ISI removal via qualified clocking method**

Change Control

Rev.	Date	Description of Change
0	9/9/99	Initial Document
1	10/11/1999	Disallowed gating of ST following ST or DT following DT. Paired ST and DT qualification into single event. Revised waveforms to match text.

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)~~
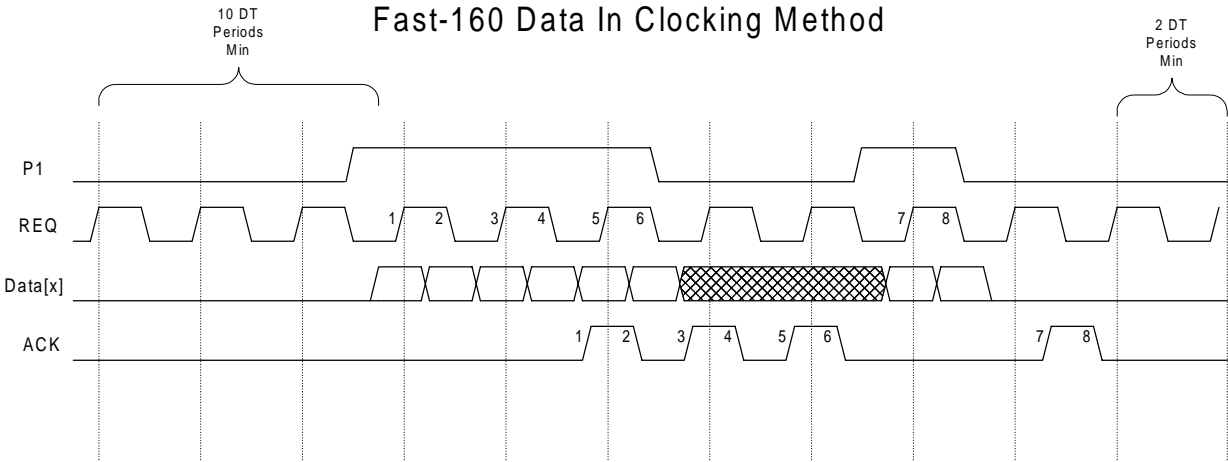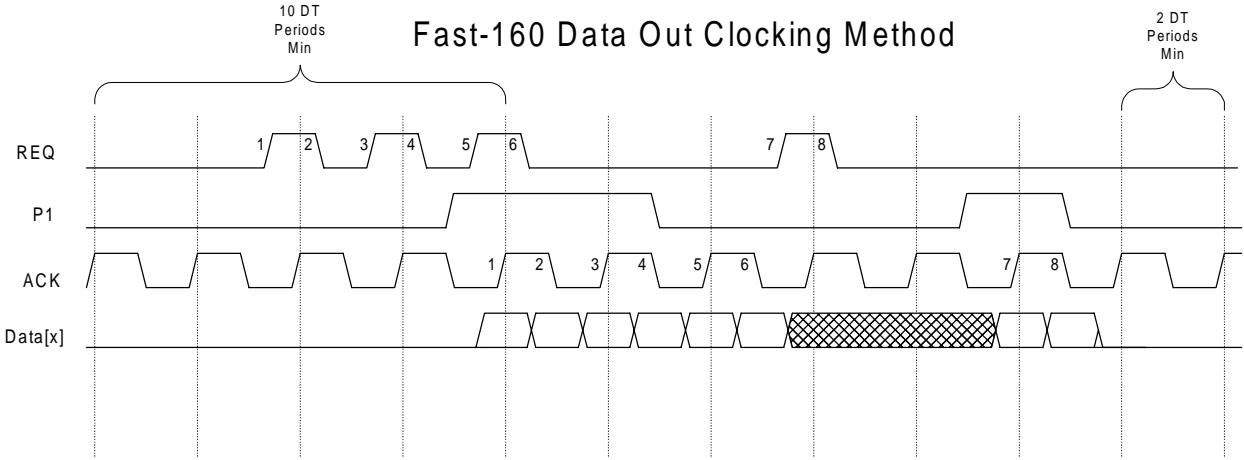

Figure 1

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~~DT edge of the REQ/ACK ~~and used~~ as a qualifier to gate the already free running REQ/ACK from the data source. P1 is only sampled on the ST edge of REQ/ACK, and if sampled active, qualifies both the ST and the immediately following DT edge. This allows ~~all data and strobe information to be sampled on the same ISI free clock~~the P1 qualifier to have an entire DT period of setup and hold at the transmitter.

2

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.

4. This method requires the following restrictions:

    1. Only even offset counts are allowed when negotiating Fast-320 rates.

    2. All data is transmitted in pairs and may contain pad data if CRC data is to follow.