T10/99-185r0

To: T10 Technical Committee
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Subject: Change CRC timing values

The extra 10 ns setup time accorded P_CRCA can cause problems for some expander designs. We would like it reduced so expanders have more flexibility to adjust timing.

Is extra setup time really needed for this signal? Two justifications have been made:

- Intersymbol interference (ISI). This signal is expected to remain false for a long period (during the data field), and only change to true for two or three clock edges during the pad and data fields. The DB signals, on the other hand, will usually toggle during the data field. This will create edge rate differences in the DB and P_CRCA signals. *Response*: Any DB line could experience the same pattern as P_CRCA - deasserted for a long time during the data field then asserted just for the CRC field. So, any ISI problems already need to be handled for the data lines.
- ASIC timing. Relax this path so there are only 16 tight paths (for the DB signals) instead of 17. *Response*: 10 ns is more than modern ASICs need and could be reduced. DBP(0) has traditionally been treated like a DB anyway.

Option 1 (preferred)
Change the P_CRCA transmit and receive setup times to match the DATA setup times. Basically, don't treat P_CRCA any different from a DB signal.

From Table 32	Fast-10DT	Fast-20DT	Fast-40DT	Fast-80DT
Transmit Setup Time	37	18,5	9,25	4,8
Receive Setup Time	25	11,5	4,75	1,45
~~CRC Receive Hold Time~~	~~25~~	~~11,5~~	~~4,75~~	~~1,45~~
~~CRC Receive Setup Time~~	~~35~~	~~21,5~~	~~14,75~~	~~11,45~~
~~CRC Transmit Hold Time~~	~~47~~	~~18,5~~	~~9,25~~	~~4,8~~
~~CRC Transmit Setup Time~~	~~47~~	~~28,5~~	~~19,25~~	~~14,8~~

Then, remove these timing definitions and references in chapters 8 and 11.

Option 2 (alternative)
Reduce the P_CRCA setup times so the receive value is around half the nominal 12.5 ns data width. Proposed values from Gene Milligan's 99-183r0 are listed along with this proposal's requests. We want the smallest numbers possible; for Fast-10DT and Fast-20DT, Gene's numbers are more aggressive and are preferred.

From Table 32	Fast-10DT	Fast-20DT	Fast-40DT	Fast-80DT
Transmit Setup Time	37	18,5	9,25	4,8
Receive Setup Time	25	11,5	4,75	1,45
CRC Receive Hold Time	25	11.5	4,75	1,45
CRC Receive Setup Time	35 original 35 CPQ **20,2 GM**	21,5 original 19 CPQ **15,1 GM**	14,75 original 12,55 GM **10 CPQ**	11,45 original 11,45 GM **6,9 CPQ**
CRC Transmit Hold Time	47	18.5	9,25	4,8
CRC Transmit Setup Time	47	28,5	19,25	14,8