Proposed Draft **Serial ATA International Organization**

Version 5
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Serial ATA Technical Proposal # <033>
Title : Relaxation of Minimum Transmit Rise/Fall Times for Gen 1 and Gen 2

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Document History

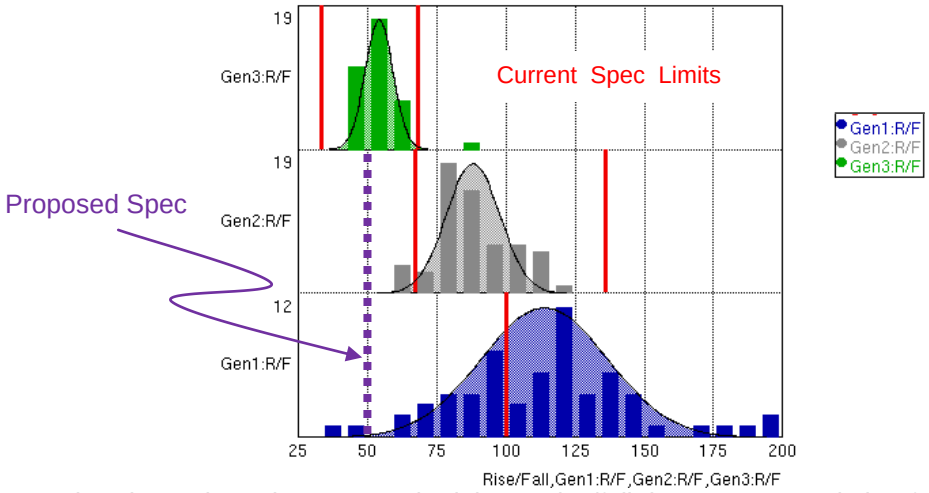
Version	Date	Comments
1	10/25/2010	Initial release.
2	11/23/2010	Clarified the backwards compatibility nature & changed min rise/fall to 50ps instead of 33ps from 6G
3	1/20/2010	Added IW8 & IW9 Measured rise/fall data
4	1/25/2011	Simplified the proposal by relying soley on IW data
5	2/24/2011	Changed proposed spec limit from 41.6pS to 55pS due to concerns raised by intel & HP for old legacy Gen 1 systems that cannot handle extremely fast rise/fall times
6	5/11/2011	Ammended rise time from 55ps to 50ps

Introduction

The current Serial ATA Revision 3.0 specification contains minimum rise and fall times of the transmitter that vary from 33pS to 100pS as a function of link data rate. To be compliant, high speed devices must change their rise/fall times as they negotiate at lower speeds of operation. This programmability adds complexity, risk, and additional development cost to the PHY without any obvious signal integrity improvement. We propose to reduce the minimum rise and fall times for SATA Gen 1 and Gen 2 speeds and to allow a Gen 2 or 3 device with a single rise/fall time to work across all SATA data rates. This proposed relaxation of the specification will not have any impact on hosts or devices that are in the field.

Technical Proposal

Using a single rise/fall time for all data rates should be allowed. Allowing devices with rise/fall times considerably faster than the current Gen 1 specification is consistent with current devices in the field. The current UTD Revision 1.0 specification only considers maximum rise/fall times for SATA compliance. Minimum rise/fall times are measured and recorded but not used for pass/fail criteria for certification. As shown below in the data collected at IW#8 and IW#9, over 30% of the Gen 1 devices fail the current Gen 1 specification minimum rise/fall time without any interoperability issues.



Based upon the above data, the proposed minimum rise/fall time recommendation for Gen 1 & Gen 2 is 50pS. This is consistent with measured minimums from IW#8 & IW#9 while not being extreme for older legacy Gen 1 systems.

In summary, decreasing the minimum Gen 1 and Gen 2 rise/fall times from the 100ps & 67ps in the current spec down to 50ps accomplishes the following improvements to the SATA specification:

1. It makes the specification consistent with SATA Gen2/3 devices in the field when running at legacy data rates
2. It simplifies PHY designs by allowing a TX driver with a single rise/fall time to work across all three SATA speeds reducing design complexity and cost.
3. It has no impact of any SATA certified devices in the field.

1 Technical Specification Changes

Change Section 7.2.1 – Physical Layer Requirements Tables : Table 31 – Transmitted Signal Requirements

[**Editor's Note:** The changes marked in **blue** (and underlined/strikethrough) will be incorporated in section 7.2.1]

The following edits are proposed to eliminate the rate dependent rise/fall times in Table 31.

Parameter	Units	Limit	Electrical Specification							Detail Cross-Ref Section	Measurement Cross-Ref Section
			Gen1i	Gen1m	Gen1x	Gen2i	Gen2m	Gen2x	Gen3i		
$t_{20\text{-}80TX}$, TX Rise/Fall Time	ps (UI)	Min 20-80%	**50 (0.075)** ~~**100 (.15)**~~		**50 (0.075)** ~~**67 (.10)**~~	**50 (0.15)** ~~**67 (.10)**~~			33 (0.20)	7.2.2.2.9	7.4.4
		Max 20-80%	273 (.41)		273 (.41)	136 (.41)			68 (0.41)		

Note : no changes are proposed to the RX rise and fall times as these prevent extremely fast pieces of test equipment from using rise/fall times that do not reflect those edge rates seen in practical implementations and legacy devices with much slower edge rates do exist in volume in the field.