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Subj: SAS-2: Remove restrictions for SSC
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Overview

It has been noted that there are some conflicting statements in SAS-2 about when Spread Spectrum Clocking (SSC) is allowed or prohibited.

There have been multiple questions directed to the phy working group concerning specification clarification regarding implementations that may use the same PLO/ SSC circuits to supply clocking for multiple SAS ports. (For example, if one port is running with SSC enabled and another port requests SSC disabled, then SSC would be disabled for all ports supplied with the same PLO/ SSC circuit.) During the development of adding SSC to SAS-2, these implementations were discussed but no text was added to clarify the expected behaviour although the intention was to allow them. Since the questions have happened from different people at different times, it is evident that the SAS-2 specification should contain text that explains this behavior.

Suggested changes

5.3.8.2 Transmitter SSC modulation

A SAS phy transmits with the SSC modulation types defined in table 68.

Table 68 — SAS phy transmitter SSC modulation

SSC modulation type [a]	Requirement	Condition
None	Mandatory	When attached to a phy that does not support SSC
None or down-spreading [b]	Optional	When attached to a phy that supports SSC

[a] SAS phys compliant with previous versions of this standard were only allowed to transmit with an SSC modulation type of none.
[b] A SAS device (e.g., disk drive) that attaches to a SAS domain in a location (e.g., a drive bay) that also supports a SATA device may always transmit with down-spreading (i.e., +0 / -2 300 ppm) on all its phys, since phys that support being attached to SATA devices have always been required to tolerate SATA down-spreading (i.e., +0 / -5 000 ppm) (see table 70 in 5.3.8.3).

Editor's Note 22: Table footnote b) disagrees with the rule in 6.7.4.2.3.2 that says a phy "shall disable SSC during SNW-1, SNW-2, and Final-SNW." The intent was that this footnote overrides that section. This footnote should be reconsidered; it may be better to eliminate this exception and just require all SAS phys to properly negotiate SSC.

Delete note b and editors note above.
Add the following text after Table 69:

A SAS device should provide independent control of SSC on each transmitter device, however, it may implement a common SSC transmit clock in which multiple transmitter devices do not have independent control to enable or disable SSC. In such implementations, SSC may be disabled on a transmitter device that is already transmitting with SSC enabled if another transmitter device sharing the same common SSC transmit clock is required to perform the operations described in 6.7.4.2.3.2 or 6.7.4.2.4.

If any transmitter device sharing a common SSC transmit clock negotiates a non-SSC transmission state, any transmitter device sharing that common SSC transmit clock may disable SSC. These transmitter devices shall be compliant with the SSC requirements even if the transmitter device has negotiated SSC enabled but its transmit clock has SSC disabled as long as the transmitted signal does not exceed the maximum SSC frequency deviation limits specified in Table 67.

The disabling and enabling of SSC may occur at any time except as noted in 6.7.4.2.3.2 or 6.7.4.2.4. For implementations with a common SSC transmit clock, the disabling and enabling of SSC shall be done at a point in the SSC profile such that the transition does not cause the transmitter device jitter to exceed specification when filtered through the JTF, as applicable.

Add definition:

common SSC transmit clock: An implementation that employs a single transmit clock for multiple transmitter devices and enables or disables SSC (see 5.3.8) on the transmit clock signal to all transmitter devices in common rather than allowing each transmitter device to independently control SSC.