

SAS OOB challenges: scale or not scale in SAS-2 ?

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OOB signaling in SAS 1.1

In SAS-1.1, for OOB detection to work the following conditions must be met:

1. The eye at the RX is open and meets the mask
2. The OOB signal detector has a bandwidth at least 1.5x of data rate, i.e. 4.5GHz for 3Gb/s link
 - this is more than is required in the Rx data path

(See also doc T10/04-128r1)

6Gbit/s Data Transmission In SAS 2.0

6Gbit/s data transmission in SAS 2.0 will result in:

- 1. The 6Gb/s RX data eye will be closed by the channel**
 - A simple OOB signal detector (as is used in SAS 1.1) may falsely trigger during data transmission
 - Even if it had a bandwidth of 9GHz (1.5x 6Gbit/s)
 - This implies more required interaction between OOB detection and DWORD sync detection is necessary
- 2. RX equalization (likely DFE) will be required to open the data eye**

6Gbit/s OOB Burst Signaling in SAS 2.0

A 6Gbit/s OOB burst in SAS 2.0 will result in:

- 1. RX OOB envelope will be degraded**
 - Similar to how the RX data eye becomes closed
- 2. OOB equalization could be used to correct the envelope**
 - Conventional DFE (as is used for the data path) requires synchronization to operate
 - OOB most likely requires different EQ (FFE or FIR) than data

Suggestion for SAS-2

- **Limit OOB burst rate to 1.5Gb/s**
 - Or, at a minimum, don't scale it to 6Gb/s
- **Strengthen OOB detection & DWORD sync detection interaction for 6Gbit/s**
 - We can no longer depend upon OOB signal detection being reliable during data transmission
 - Possible race condition after OOB signaling but before DWORD sync will need to be examined carefully

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