Start-up Training Sequence Proposal

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Infineon

Never stop thinking

Overview

- DFE receivers may require training before speed negotiation takes place.
- Applying a known pattern for training greatly improves time required for training.
- Ensure backwards compatibility.
- Use current protocol.
- Introduce training sequence only where needed.
- Leverage off existing spec based on DFE architecture.

OOB Sequence

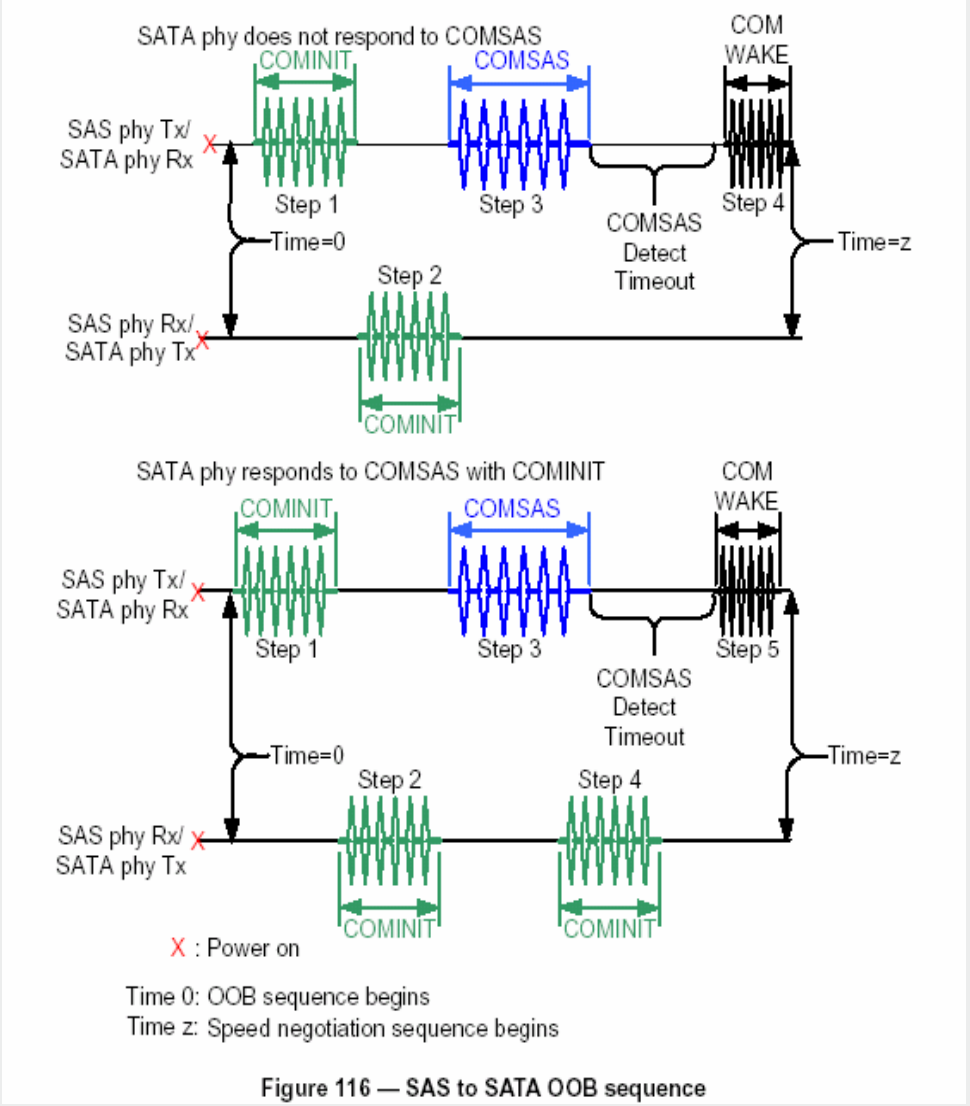

Figure 116 — SAS to SATA OOB sequence

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SATA Speed Negotiation (Training not required)

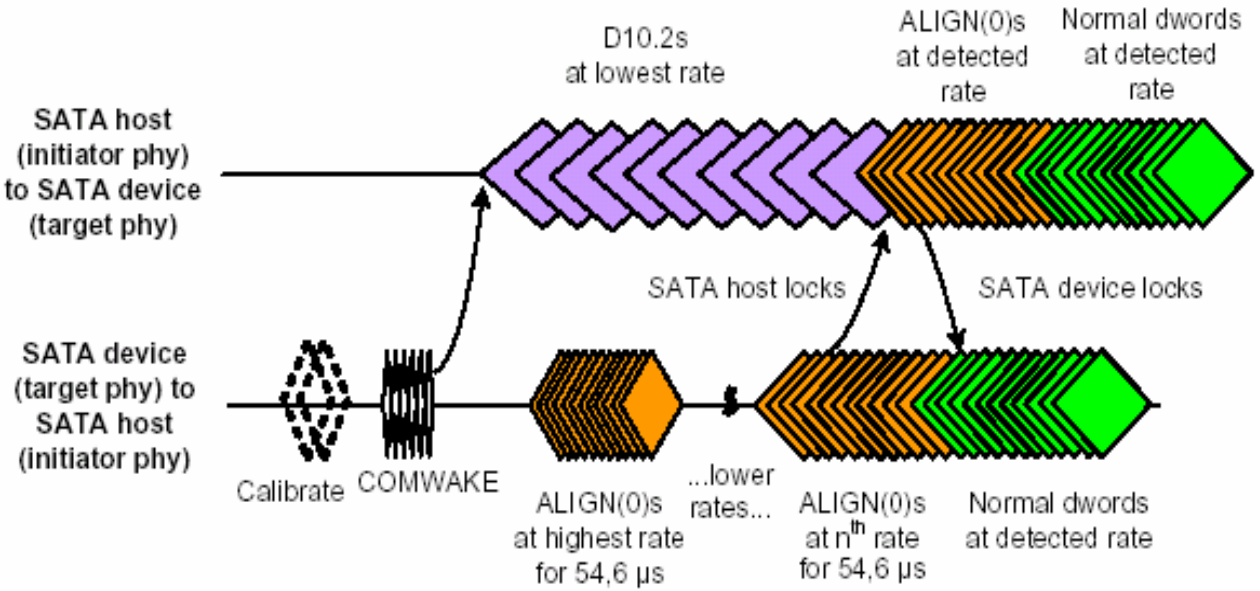

Figure 115 — SATA speed negotiation sequence

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SAS Speed Negotiation Window

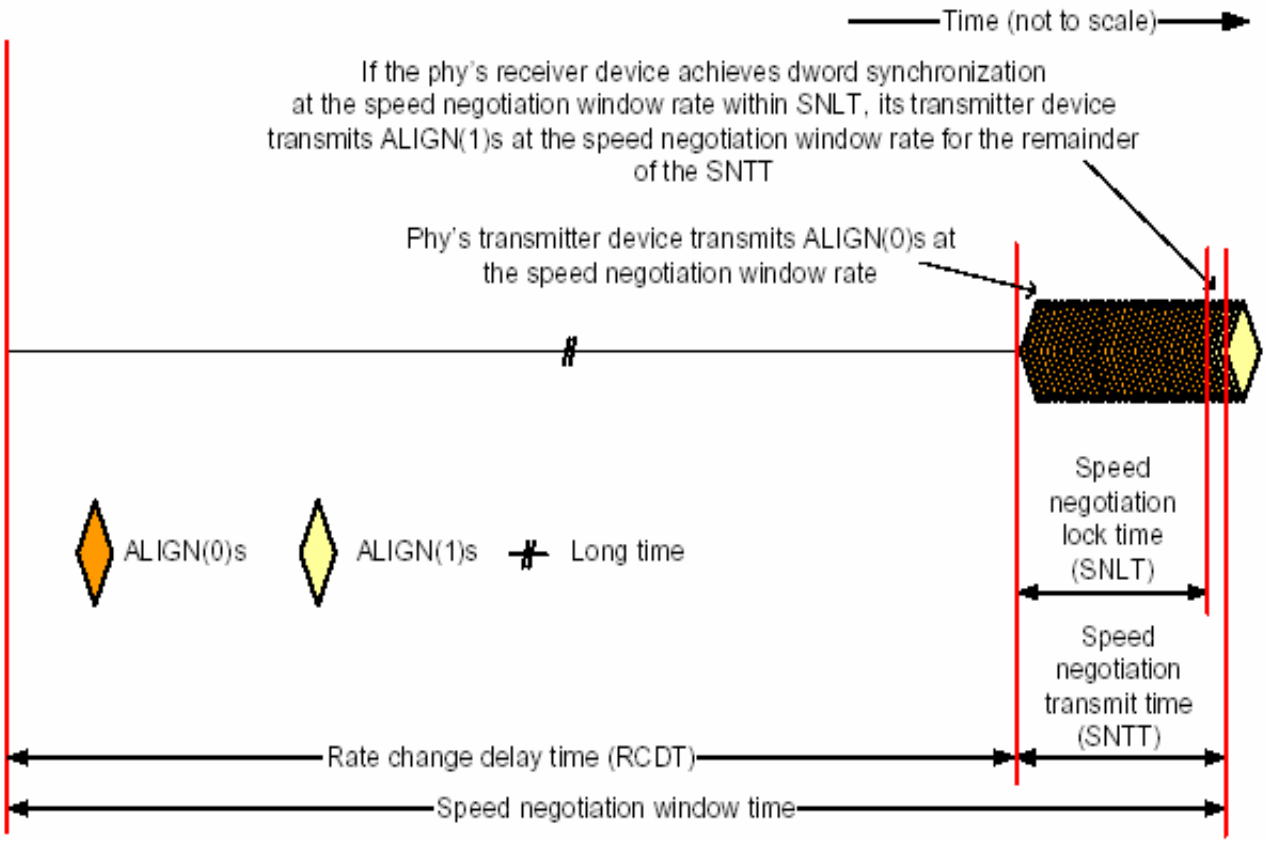

Figure 118 — SAS speed negotiation window

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SAS Speed Negotiation Table

Table 66 defines the timing specifications for the SAS speed negotiation sequence.

Table 66 — SAS speed negotiation sequence timing specifications

Parameter	Time	Comments
Rate change delay time (RCDT)	750 000 OOBI	The time the transmitter device shall transmit D.C. idle between rates during speed negotiation. 500µs
Speed negotiation transmit time (SNTT)	163 840 OOBI	The time during which ALIGN (0) or ALIGN (1) is transmitted at each physical link rate during the speed negotiation sequence. Derived from: OOBI x 4 096 x 40. 109µs
Speed negotiation lock time (SNLT)	153 600 OOBI	The maximum time during the speed negotiation window for a transmitter device to reply with ALIGN (1). Derived from: OOBI x 3 840 x 40 102µs
Speed negotiation window time	913 840 OOBI	The duration of a speed negotiation window. Derived from: RCDT + SNTT. 609µs

SAS Speed Negotiation Sequence

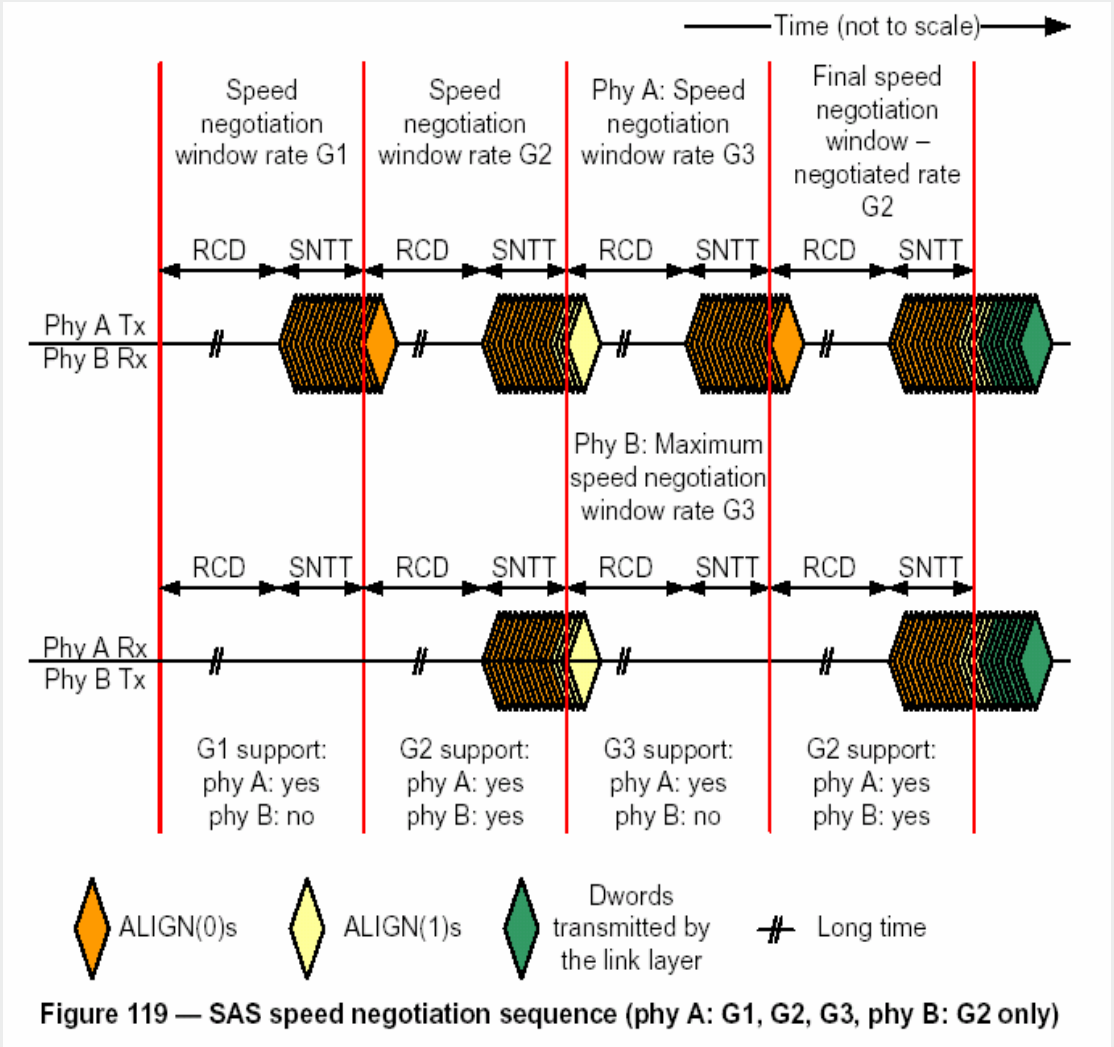

Figure 119 — SAS speed negotiation sequence (phy A: G1, G2, G3, phy B: G2 only)

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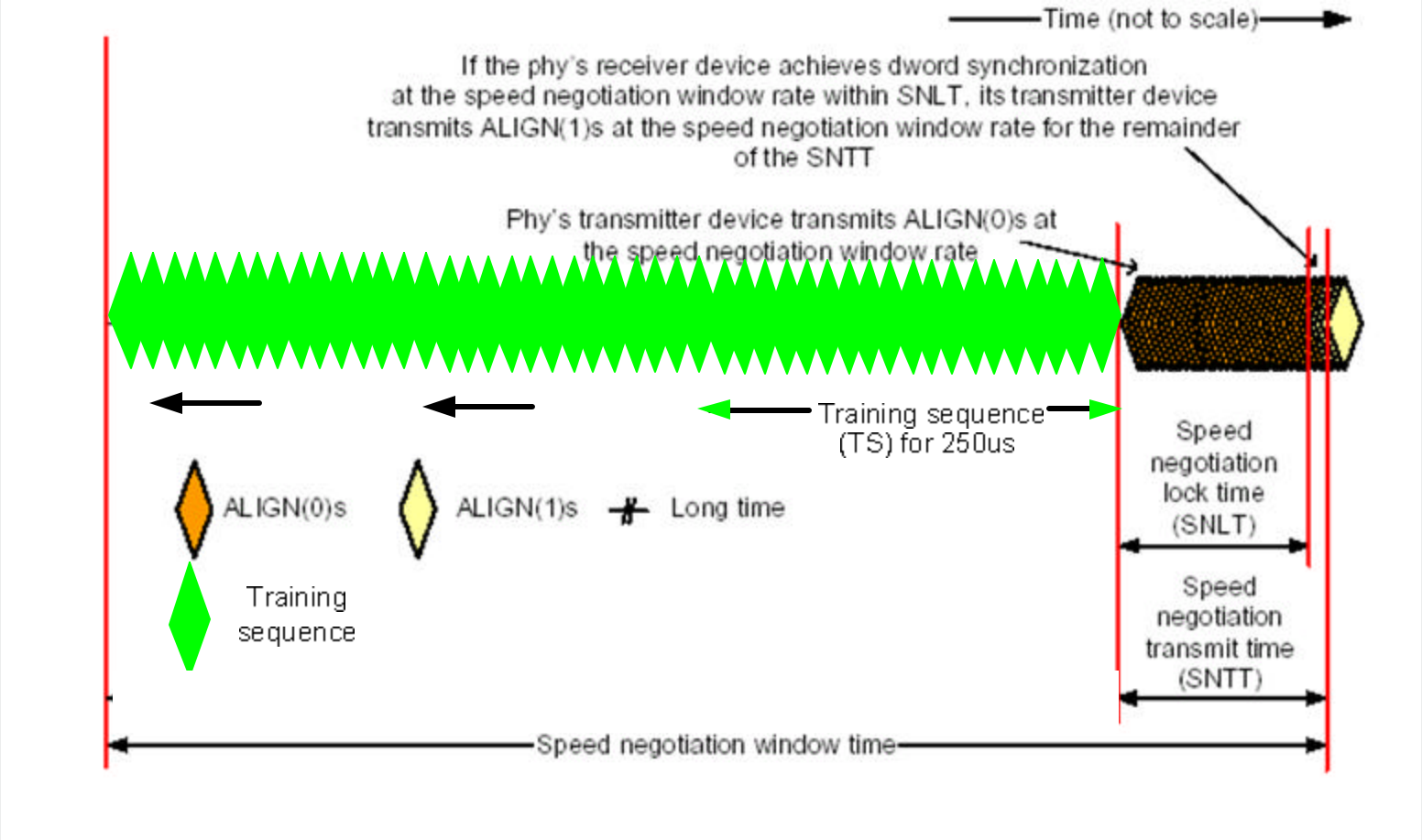
Training Sequence

Pattern (in Hex)	Purpose
00 FF 00 FF 00 FF	48 bits - f/16 square wave
00 80 00	24 bits - positive impulse with 12 leading and trailing zeros
FF EF FF	24 bits - negative impulse with 12 leading and trailing ones
55 55 55 55 55 55	48 bits - f/2 square wave
00 FF 00 FF 00 FF	48 bits - f/16 square wave
Scrambled data starting with seed 0h	192 bits - pseudo-random

Training Sequence Only Used for G3 Speed Negotiation



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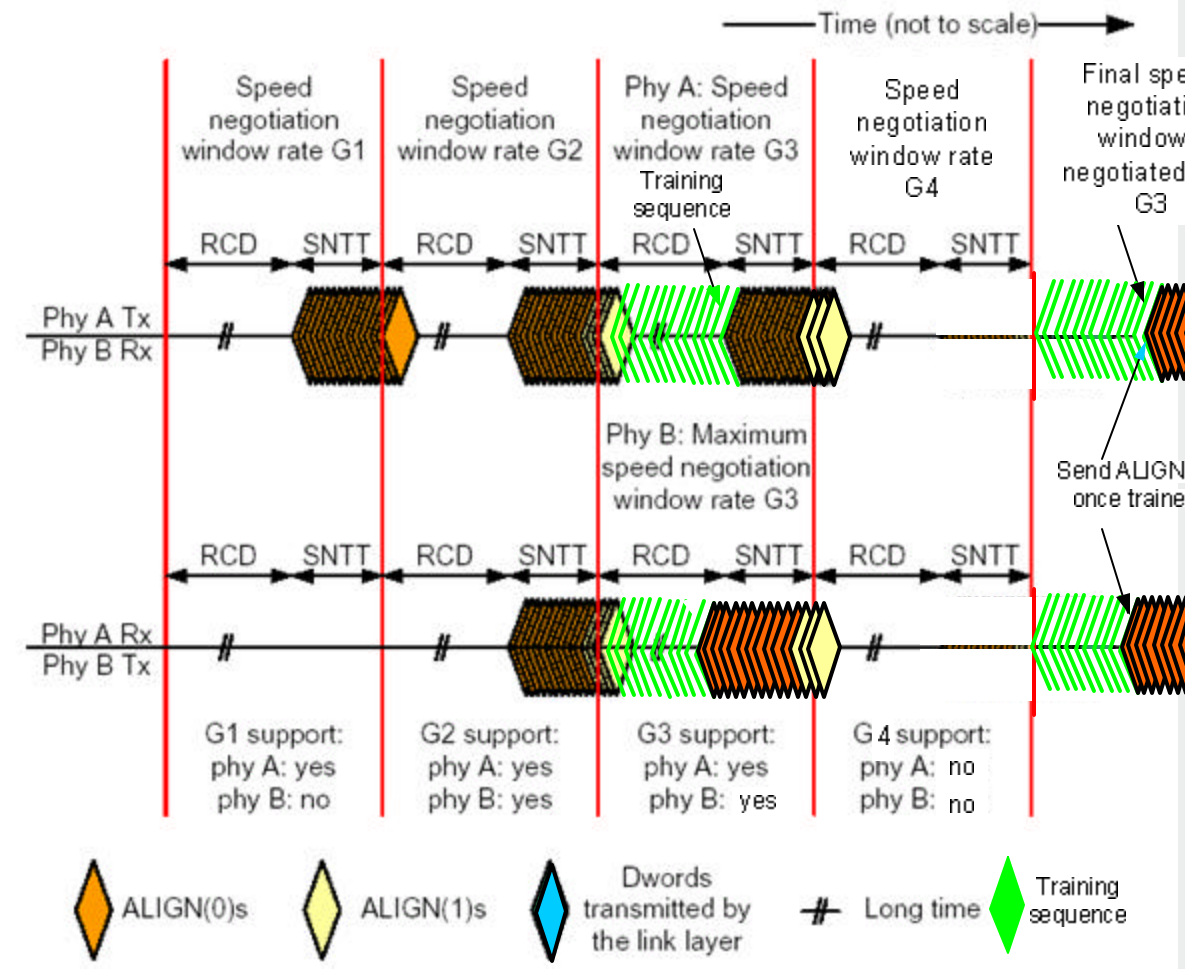
Training Sequence Only Used for G3 Speed Negotiation



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New table for Speed Negotiation Window Rate G3

Parameter	Time	Comments
		The time the transmitter device shall transmit D.C. idle between rates during speed negotiation.
Speed negotiation transmit time (SNTT)	163 840 OOBI	The time during which ALIGN (0) or ALIGN (1) is transmitted at each physical link rate during the speed negotiation sequence. Derived from: OOBI x 4 096 x 40.
Speed negotiation lock time (SNLT)	153 600 OOBI	The maximum time during the speed negotiation window for a transmitter device to reply with ALIGN (1). Derived from: OOBI x 3 840 x 40
Speed negotiation window time	913 840 OOBI	The duration of a speed negotiation window. Derived from: RCDT + SNTT.
Training sequence (TS)	750 000 OOBI	Training sequence.