

Start-up Training Sequence Proposal

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Never stop thinking

Infineon

- 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

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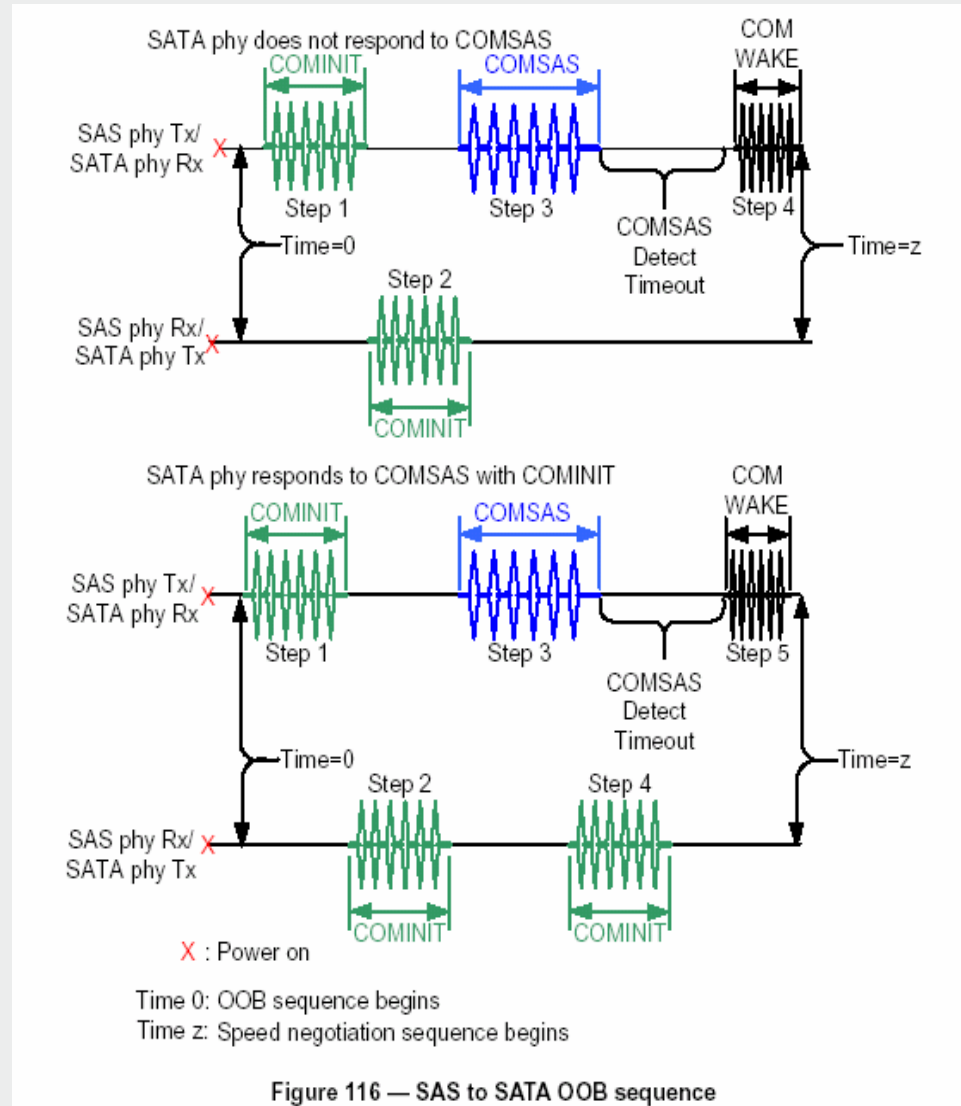


Figure 116 — SAS to SATA OOB sequence

SATA Speed Negotiation (Training not required)

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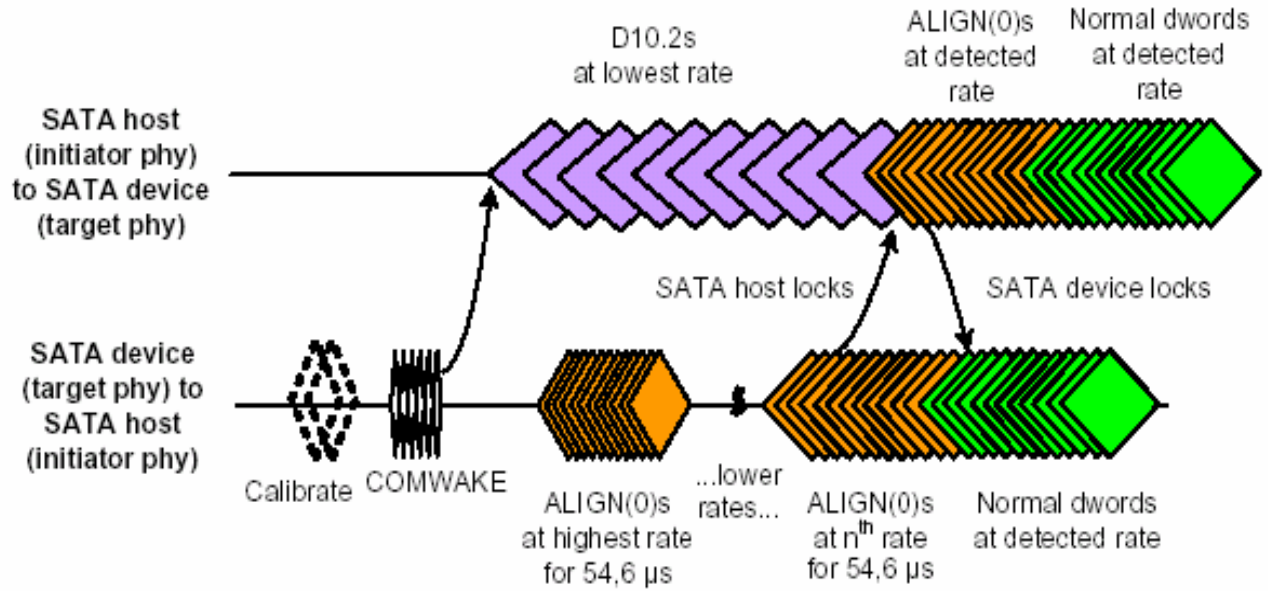


Figure 115 — SATA speed negotiation sequence

SAS Speed Negotiation Window

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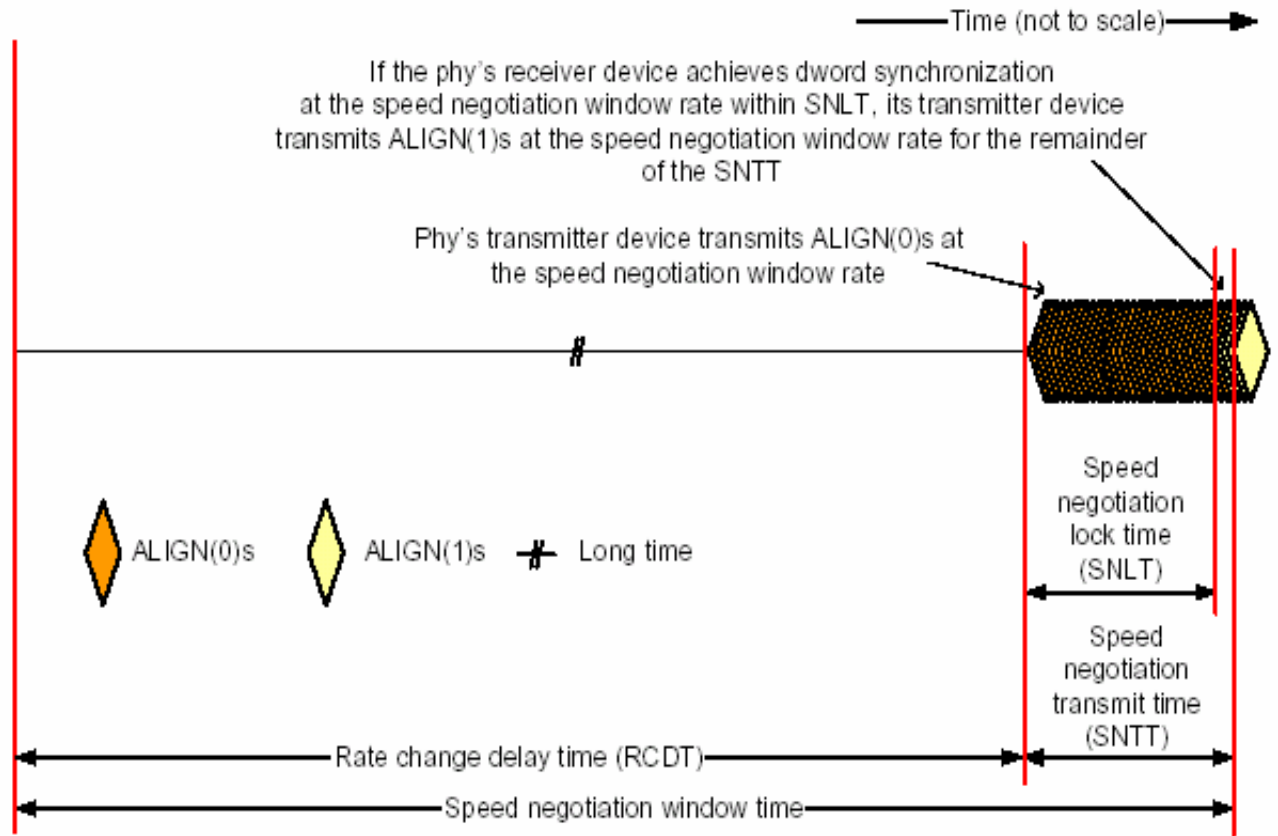


Figure 118 — SAS speed negotiation window

SAS Speed Negotiation Table

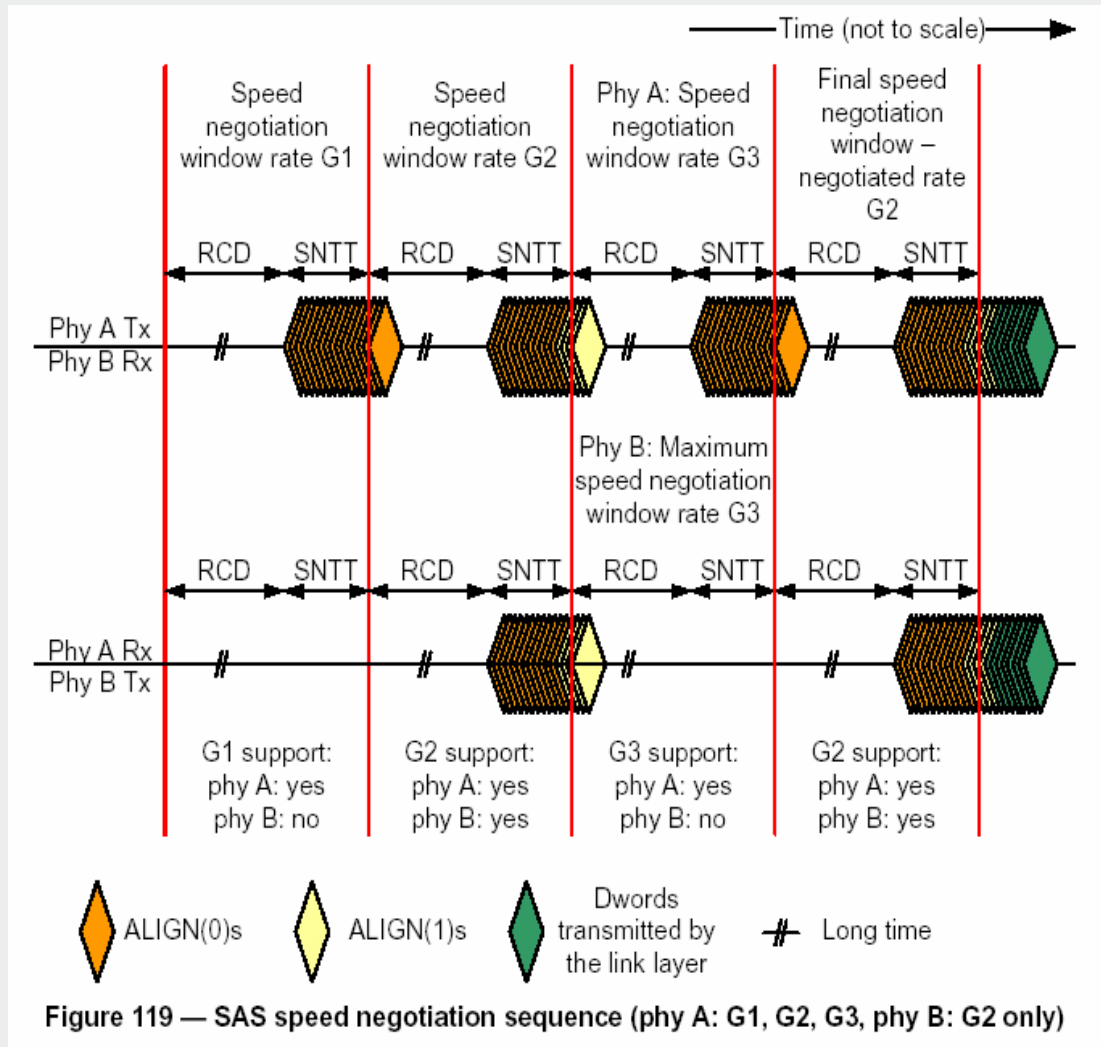
Table 66 defines the timing specifications for the SAS speed negotiation sequence.

Table 66 — SAS speed negotiation sequence timing specifications

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

SAS Speed Negotiation Sequence

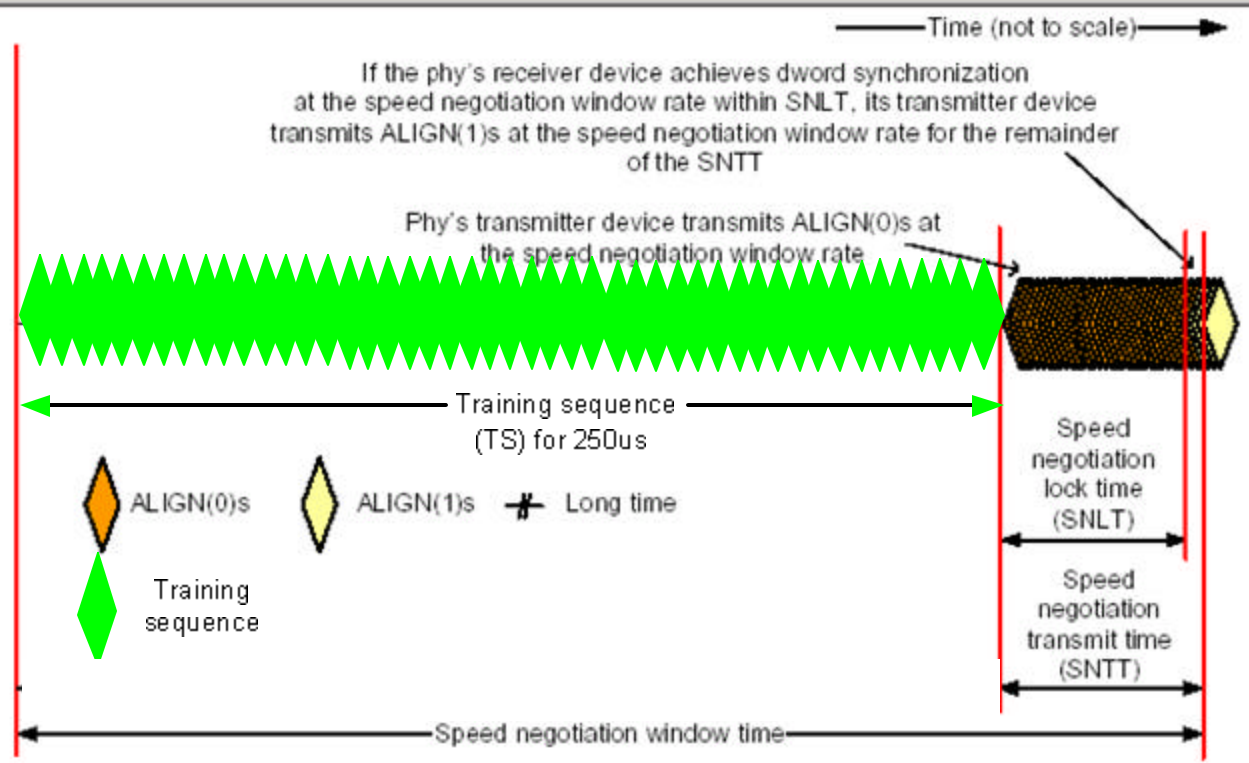
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Never



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 OOB1	The time during which ALIGN (0) or ALIGN (1) is transmitted at each physical link rate during the speed negotiation sequence. Derived from: $OOB1 \times 4\,096 \times 40$.
Speed negotiation lock time (SNLT)	153 600 OOB1	The maximum time during the speed negotiation window for a transmitter device to reply with ALIGN (1). Derived from: $OOB1 \times 3\,840 \times 40$
Speed negotiation window time	913 840 OOB1	The duration of a speed negotiation window. Derived from: $RCDT + SNTT$.
Training sequence (TS)	750 000 OOB1	Training sequence.

Training Sequence Only Used for G3 Speed Negotiation



Pattern	Purpose	Time
Primitive sent twice	80 bits - Status or request	13.3ns
Scrambled data starting with seed 0h	800 bits - pseudo-random	133.3ns

D30.3 = 0111100011 1000011100b low frequency to provide an open eye.

Train_p: training receiver K28.5 D30.3 D30.3 D30.3

IncEmp_p: increase transmitter emphasis K28.5 D10.2 D30.3 D30.3

DecEmp_p: decrease transmitter emphasis K28.5 D30.3 D10.2 D30.3

TrainDone_p: training complete K28.5 D30.3 D30.3 D10.2

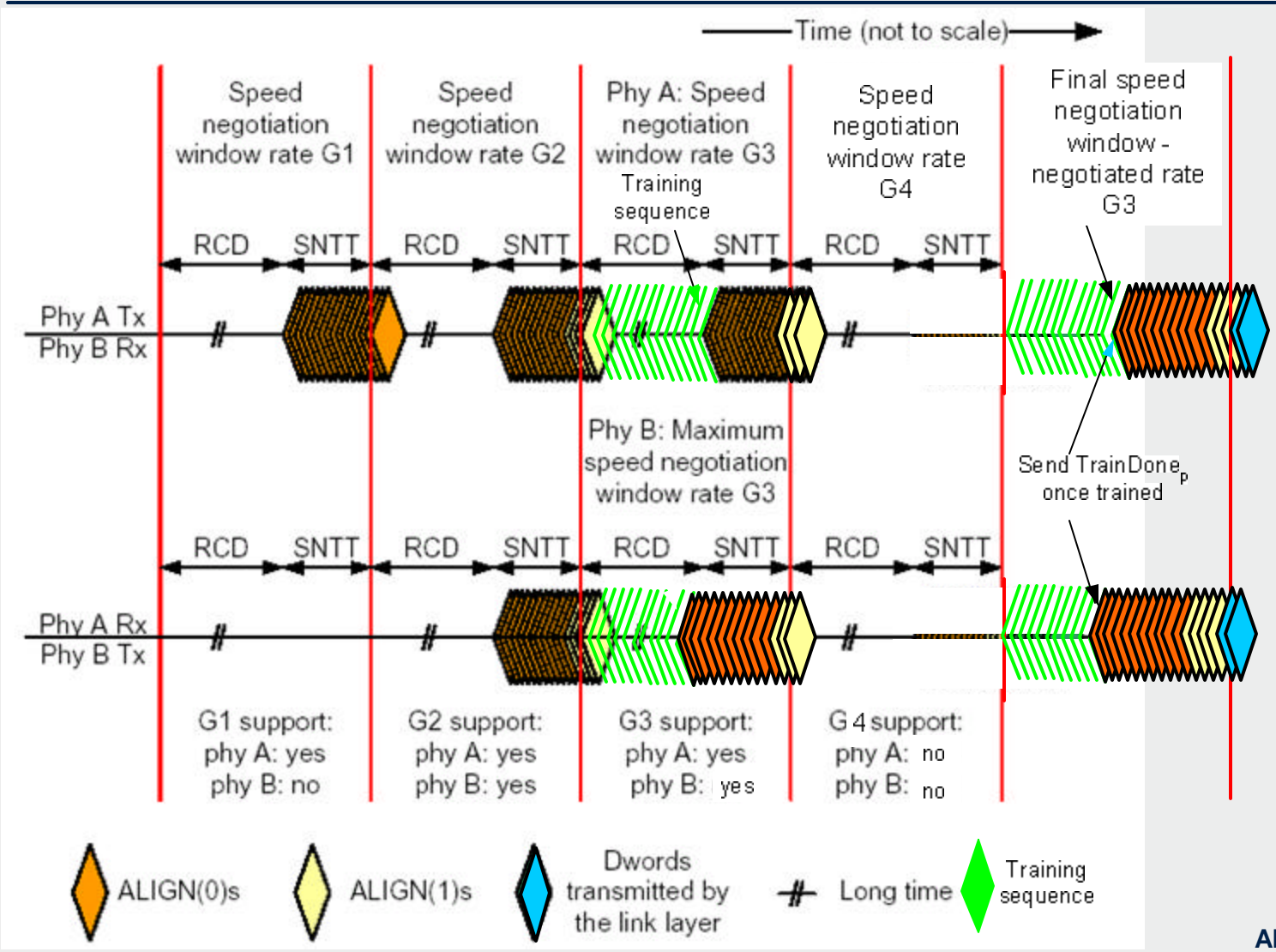
Done (Phy Adjust)_p: adjustment acknowledged K28.5 D30.0 D16.7 D01.4

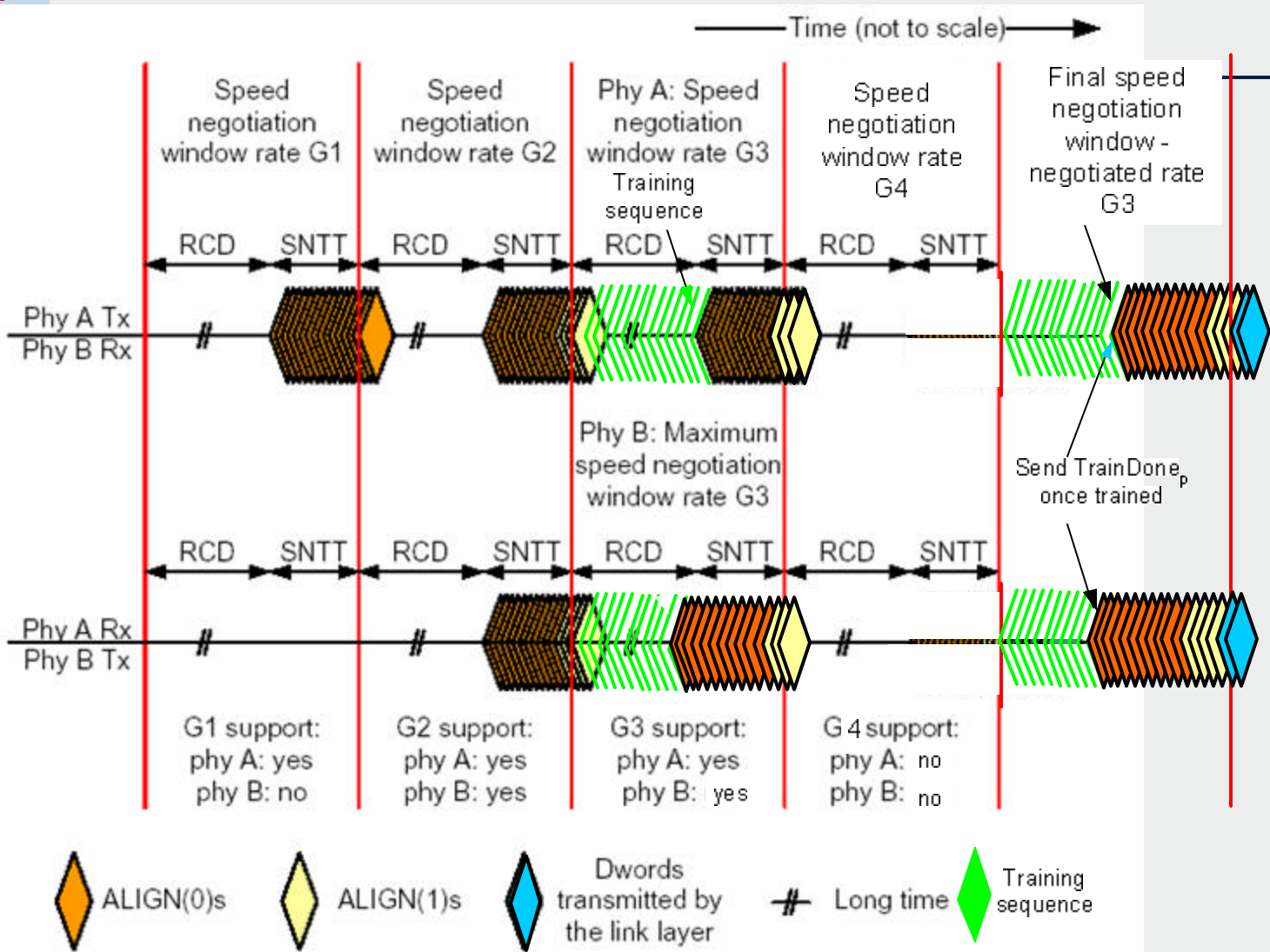
NAK (Phy Adjust)_p: adjustment not acknowledged K28.5 D01.4 D31.4 D29.7

Amplitude adjustment?

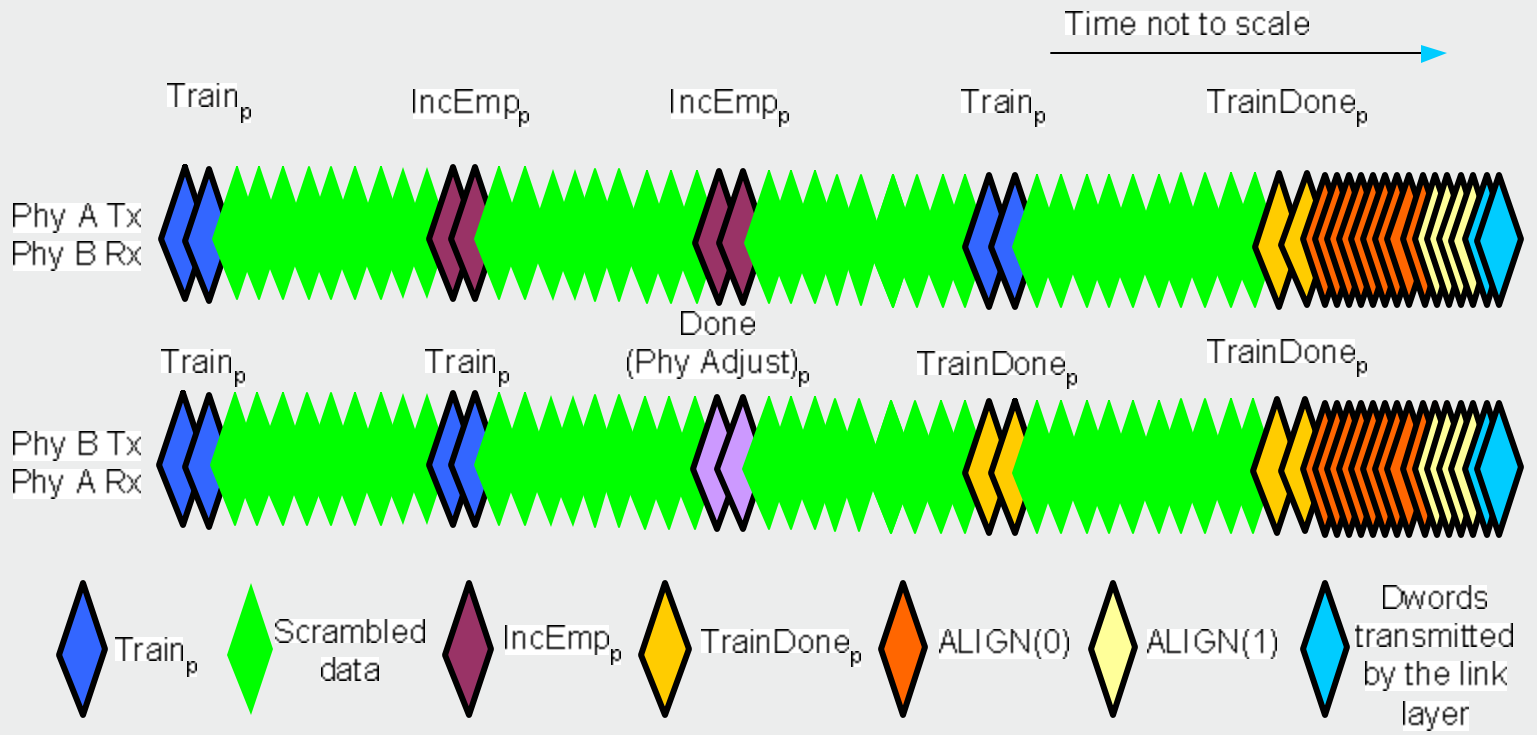
Training Sequence Only Used for G3 Speed Negotiation

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Never





Final G3 Speed Negotiation Window Expanded



If TrainDone_p not received from both phys within 20ms then restart OOB.