

CI 136.8.11 Link Training Issue

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Supporters

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Background

- In the IEEE 802.3cd-2018 project, an updated PMD Control Function (i.e. link training) was defined and specified in Cl 136.8.11
- Among other things, specific changes enabled the link training protocol to support link establishment between two devices without using Cl 73 Auto-Negotiation
 - For the customer use case of “forced PHY speed” on the link
 - See:
http://grouper.ieee.org/groups/802/3/cd/public/adhoc/archive/slavick_101916_3cd_adhoc.pdf

Issue Summary

- The currently defined state machine in Clause 136.8.11 (Figure 136-7) does not autonomously recover from a partner restarting during link training in this “force PHY speed” case
 - Note: observed when the Clause 73 Auto-Negotiation state machine is not used.
- Unless a high-level management agent (i.e. SW or FW) detects the condition, the result could be either a persistent link down (i.e. link never comes up) or a link oscillation (up/down/up/down/etc).

Example Behavior

- Reset of Device #1 was not captured by Device #2
- The signals local_tf_lock and remote_tf_lock are only checked moving from the SEND_TF state to the TRAIN_LOCAL state.
 - Note: CI 73 AN state machine (if it was used in this case) would expire link_fail_inhibit_timer and breakout out of the condition

Device #1	Device #2
INITIALIZE	INITIALIZE
SEND_TF	SEND_TF
TRAIN_LOCAL	TRAIN_LOCAL
__ERROR:_RESET	TRAIN_LOCAL
INITIALIZE	TRAIN_REMOTE
SEND_TF	TRAIN_REMOTE
TRAIN_LOCAL	TRAIN_REMOTE
TRAIN_LOCAL	TIMEOUT
TRAIN_LOCAL	TRAINING_FAILED
TRAIN_REMOTE	INITIALIZE
TRAIN_REMOTE	SEND_TF
TRAIN_REMOTE	TRAIN_LOCAL
TIMEOUT	TRAIN_LOCAL
TRAINING_FAILED	TRAIN_REMOTE
INITIALIZE	TRAIN_REMOTE
SEND_TF	TRAIN_REMOTE
TRAIN_LOCAL	TRAIN_REMOTE
TRAIN_LOCAL	TIMEOUT
TRAIN_LOCAL	TRAINING_FAILED
TRAIN_REMOTE	INITIALIZE
TRAIN_REMOTE	SEND_TF
TRAIN_REMOTE	TRAIN_LOCAL
TIMEOUT	TRAIN_LOCAL
TRAINING_FAILED	TRAIN_REMOTE
INITIALIZE	TRAIN_REMOTE
SEND_TF	TRAIN_REMOTE
TRAIN_LOCAL	TRAIN_REMOTE
TRAIN_LOCAL	TIMEOUT
TRAIN_LOCAL	TRAINING_FAILED
TRAIN_REMOTE	INITIALIZE
TRAIN_REMOTE	SEND_TF
TRAIN_REMOTE	TRAIN_LOCAL
TIMEOUT	TRAIN_LOCAL
TRAINING_FAILED	TRAIN_REMOTE
INITIALIZE	TRAIN_REMOTE
SEND_TF	TRAIN_REMOTE
TRAIN_LOCAL	TRAIN_REMOTE
TRAIN_LOCAL	TIMEOUT
TRAIN_LOCAL	TRAINING_FAILED

*** THE CYCLE CONTINUES ***

Solution Space

Some solutions include, but are not limited to:

- Do nothing
- Increase the duration of the holdoff_timer to exceed that of the max_wait_timer (≥ 12 seconds)
- Add monitoring of the local and received frame lock status (with TBD hysteresis) after the initial frame lock is achieved
- Implement an abort signaling mechanism

Consensus building is in progress to bring a detailed solution for TF consideration in the forthcoming weeks. Contact me for details

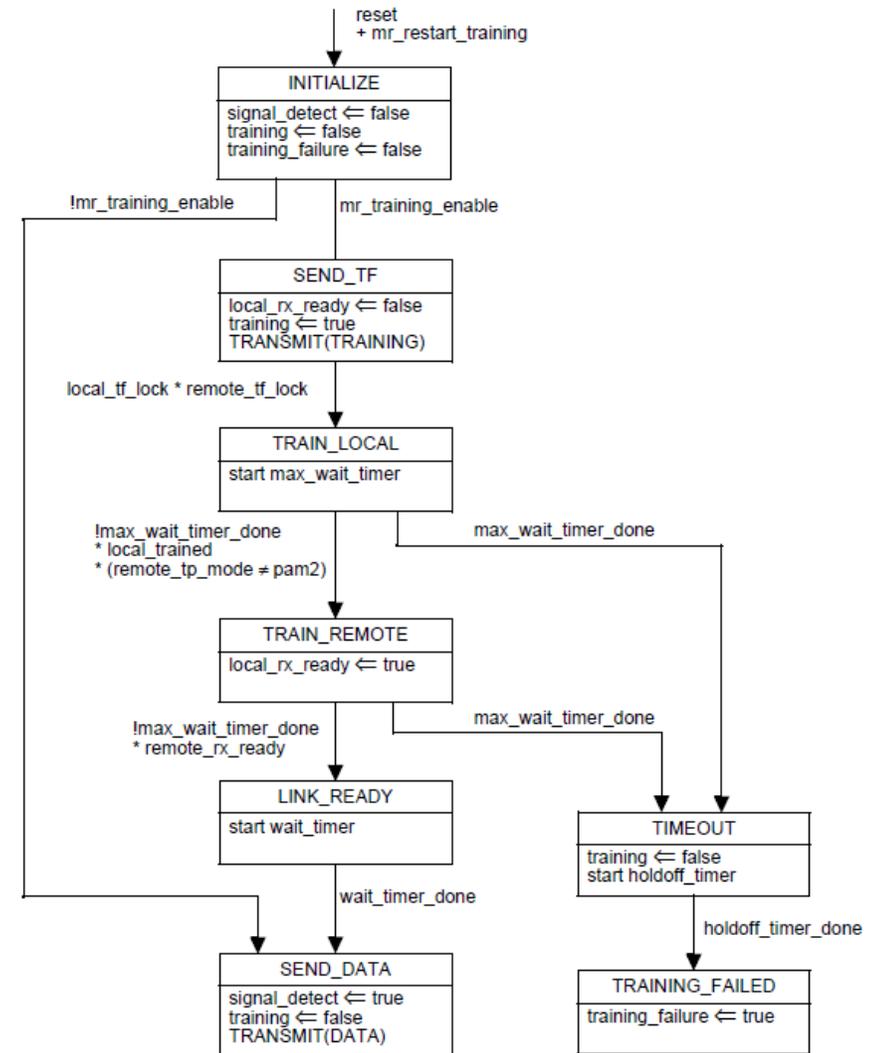


Figure 136-7—PMD control state diagram

Backup