Cl 136.8.11 Link Training Issue (comment #1)

Oct 2020

Kent Lusted, Intel

Supporters

- Phil Sun, Credo
- Adee Ran, Intel

Solution Space Update

Some solutions include, but are not limited to:

Removed based on feedback in D1.2

- ~~Do nothing~~
- ~~Increase the duration of the holdoff_timer to exceed that of the max_wait_timer (>= 12 seconds)~~

Detailing options

- 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 by the end of Oct 2020. Contact Kent for details

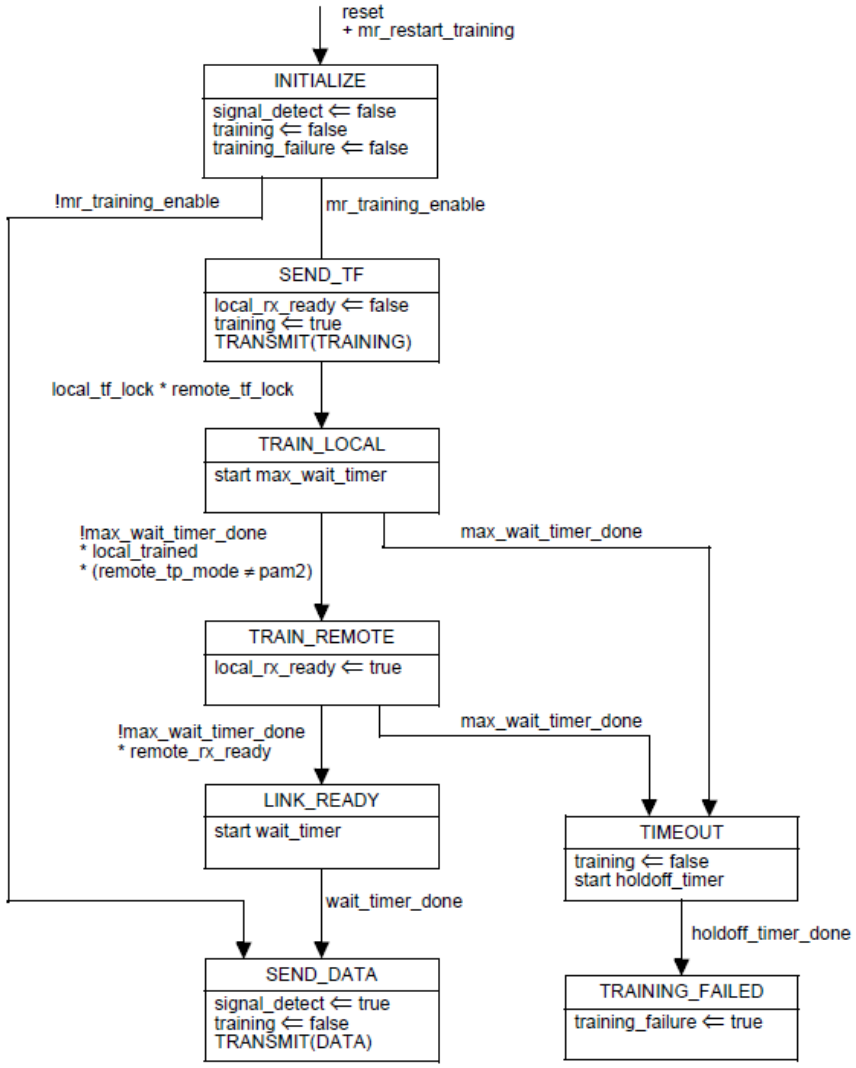

Figure 136–7—PMD control state diagram

Backup

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: Cl 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
*** THE CYCLE CONTINUES ***	