Comments on Draft 1.3

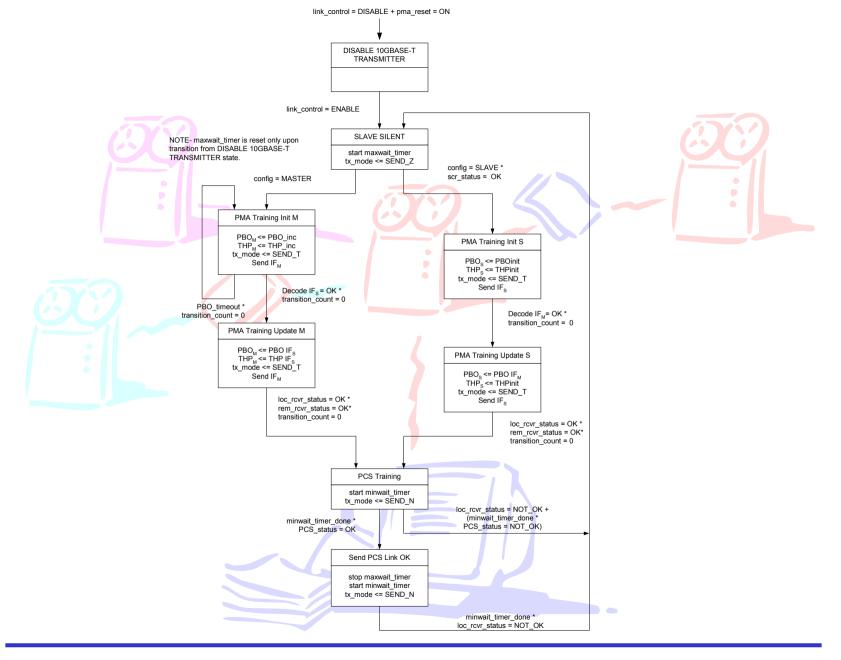**IEEE P803.2an Task Force**
Santa Clara, February '05

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Info Field Proposal

- Info Field: 16 bytes
  - Start of Frame Delimiter: 4 bytes
    - BBA70000- minimum hamming distance of 7
  - Current TX setting: 1 byte
    - X, PBO(2:0), THP(3:0)
  - Next TX setting: 1 byte
    - X, PBO(2:0), THP(3:0)
  - Requested TX setting: 1 byte
    - X, PBO(2:0), THP(3:0)
  - Message Field : 1 byte
    - X(7:5),PBO_increase (master only), loc_rcvr_status, trans_to_Training_Update, trans_to_PCS_Training, trans_to_slave_silent
  - SNR Margin : 4 bits
    - SNR Margin in ½ dB steps from –2.5dB to +5dB
  - Transition Counter : 12 bits
    - Trans_counter(11:0): # of frames until next transition
  - Reserved Field: 4 bytes
    - For future use or vendor field.
  - CRC16: 2bytes $(x+1)(x^{15}+x+1)$

PHY Control State Diagram

- Issues:
  - Missing timer
    - The Master must pass through Slave Silent to start the maxwait timer.
  - Unused timers
    - Remove the timers in PMA Training states
      - The transitions have implicit handshaking.
  - Missing transition
    - There is no exit from PCS Training unless PCS_status=OK
  - Endless loops
    - Loops at PMA Training Update are not necessary

link_control = DISABLE + pma_reset = ON

DISABLE 10GBASE-T TRANSMITTER

link_control = ENABLE

NOTE- maxwait_timer is reset only upon transition from DISABLE 10GBASE-T TRANSMITTER state.

SLAVE SILENT
start maxwait_timer
tx_mode <= SEND_Z

config = MASTER

config = SLAVE *
scr_status = OK

PMA Training Init M
$PBO_M <= PBO\_inc$
$THP_M <= THP\_inc$
tx_mode <= SEND_T
Send IF_M

PMA Training Init S
$PBO_S <= PBOinit$
$THP_S <= THPinit$
tx_mode <= SEND_T
Send IF_S

Decode IF_S = OK *
transition_count = 0

Decode IF_M= OK *
transition_count = 0

PBO_timeout *
transition_count = 0

PMA Training Update M
$PBO_M <= PBO\ IF_S$
$THP_M <= THP\ IF_S$
tx_mode <= SEND_T
Send IF_M

PMA Training Update S
$PBO_S <= PBO\ IF_M$
$THP_S <= THPinit$
tx_mode <= SEND_T
Send IF_S

loc_rcvr_status = OK *
rem_rcvr_status = OK*
transition_count = 0

loc_rcvr_status = OK *
rem_rcvr_status = OK*
transition_count = 0

PCS Training
start minwait_timer
tx_mode <= SEND_N

loc_rcvr_status = NOT_OK +
(minwait_timer_done *
PCS_status = NOT_OK)

minwait_timer_done *
PCS_status = OK

Send PCS Link OK
stop maxwait_timer
start minwait_timer
tx_mode <= SEND_N

minwait_timer_done *
loc_rcvr_status = NOT_OK

PHY Control State Diagram

- Initial settings
- Master
  - PBO_inc
    - 1 of 3 PBO settings for 0m, short and medium cable lengths, the master will increment the setting after PBO timeout (described in Tellado_1_0205)
  - THP_inc
    - 1 of 3 THP settings for 0m (bypass), short and medium cable lengths, the master will increment the setting after PBO timeout (described in Tellado_1_0205) or optionally (as set during autoneg) stays in bypass.
- Slave
  - PBOinit
    - The slave will estimate the cable length and respond with the appropriate PBO setting.
  - THPinit
    - The slave will estimate the cable length and respond with the appropriate THP setting.

Link Monitor

- Issues
  - Link fail timer
    - The link_fail_inhibit_timer (pg 36 ln 32) will timeout in 750ms.
    - If the state machine has not transitioned to Link Up, then the link has failed and autoneg starts over.
    - If the time difference between PHY's entering startup is 192ms (pg 36 ln 46) then only 558ms is available for startup.
    - I propose to set link_status= OK as soon as the training pattern has been detected.
    - The maxwait_timer is responsible for timing the startup and setting link_status=FAIL if startup has not completed.
  - Transitions to Link Down
    - The current diagram does not match the text (PCS_status vs. loc_rcvr_status.
    - The diagram allows an immediate transition to Link Down if PCS_status=NOT_OK in the Hysteresis state.
    - I propose that the transition to Link Down occur only after the maxwait_timer has timed out and either PCS_status = NOT_OK or loc_rcvr_status = NOT_OK.

Link Monitor

- Timers
  - maxwait_timer
    - Limits the time allowed in the Training states before the link has failed.
    - 1000BASE-T was 750ms
    - TBD- needs more study
      - Range could be 750ms to seconds
  - Minwait_timer
    - Sets the minimum amount of time in the PCS Training state
    - ie. the minimum time after transitioning from 2PAM to 16PAM until ready for Link Up
    - Proposal: 1ms (~3000 frames)
      - Equal to 8 x LFER monitor timers

Proposed Link Monitor

pma_reset = ON + link_control != ENABLE

```
                    ┌─────────────────────────┐
                    │        LINK DOWN        │
                    ├─────────────────────────┤
                    │    link_status <= FAIL  │
                    └─────────────────────────┘
```

training_detect = TRUE

```
                    ┌─────────────────────────┐
                    │         TRAINING        │
                    ├─────────────────────────┤
                    │    link_status <= OK    │
                    └─────────────────────────┘
```

maxwait_timer_done *
(PCS_status = NOT_OK +
loc_rcvr_status = NOT_OK)

minwait_timer_done *
PCS_status = OK

```
                    ┌─────────────────────────┐
                    │         LINK UP         │
                    ├─────────────────────────┤
                    │    link_status <= OK    │
                    └─────────────────────────┘
```

maxwait_timer_done *
(PCS_status = NOT_OK +
loc_rcvr_status = NOT_OK)