Enhancing Robustness of Link Synchronization in Automotive Ethernet at 802.3cy-Part II

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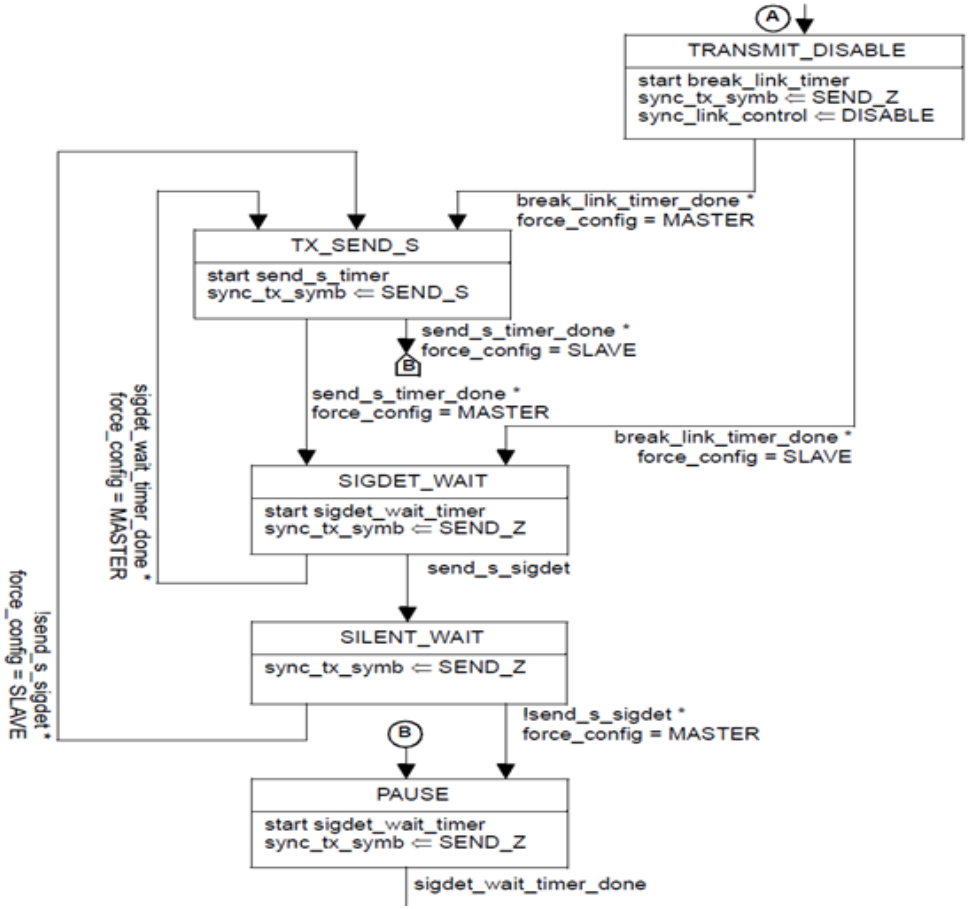
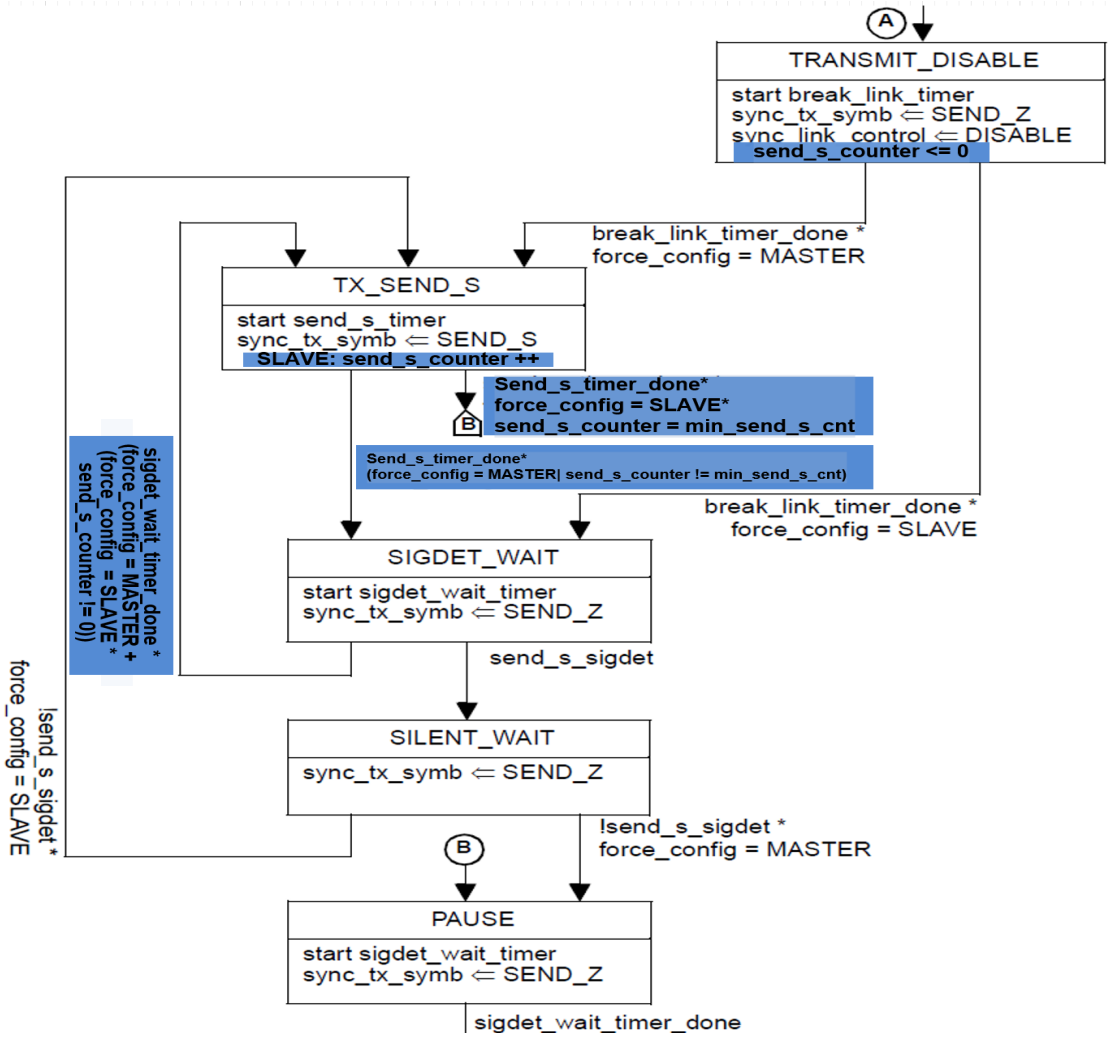
Introduction

- Link synchronization - SEND_S Signal is used by the MASTER and SLAVE to discover the link partner, and synchronize the start of PMA training
- SEND_S – PN sequence with a length of 255, defined at Eqn. 149-10(11)
- It was first adopted at 802.3bp for 1000BASE-T1
- Adopted at 802.3ch with the same signaling at 703.125MHz for all 3 speed modes
- It has been included in the text in 802.3cy-D0p4
- At wu_3cy_01_1121.pdf, the following was proposed:
  - SEND_S signal working frequency is proposed to run at same rate as in 802ch
    - Repeating 20X PRBS patterns, 703.125MHz (25GBASE-T1)
  - Multiple Frame feedback of SEND_S Pulses at SLAVE.
- At this presentation, some modifications on scheme at wu_3cy_01_1121.pdf are proposed.

Proposed scheme at Nov, 2021meeting (Multiple Frame at Slave)



state diagram at 802.3ch/802.cy-D0.4



state diagram at wu_3cy_01_1121

Modifications:

- Simplification the scheme:
  - min_send_s_cnt = 16 , fixed value, not programmable
- clarification on state transition

Transition TX_SEND_S -> SIGDET_WAIT, condition for transition is modified

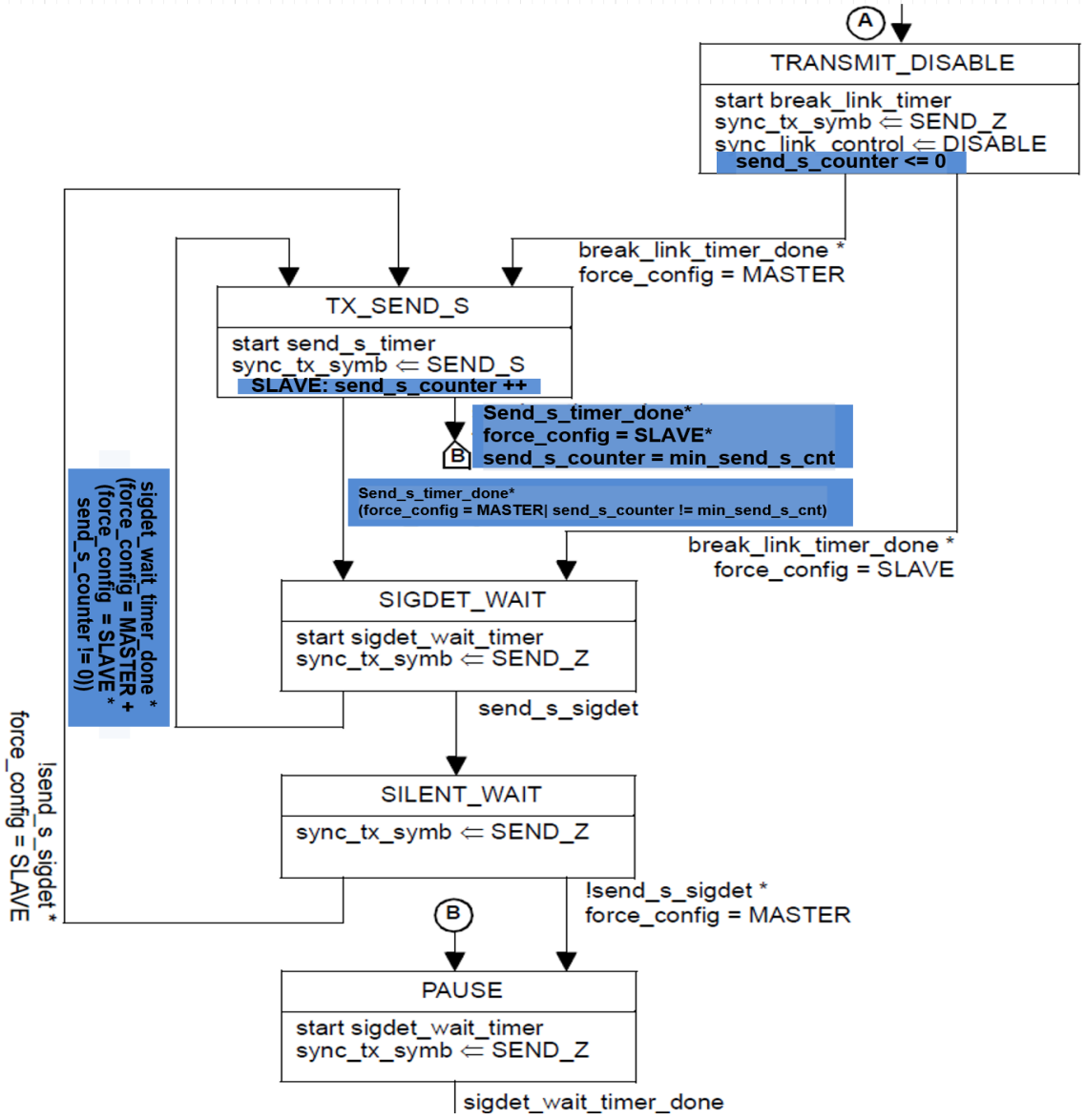
from:

send_s_timer_done * (force_config = MASTER | send_s_counter != min_send_s_cnt)

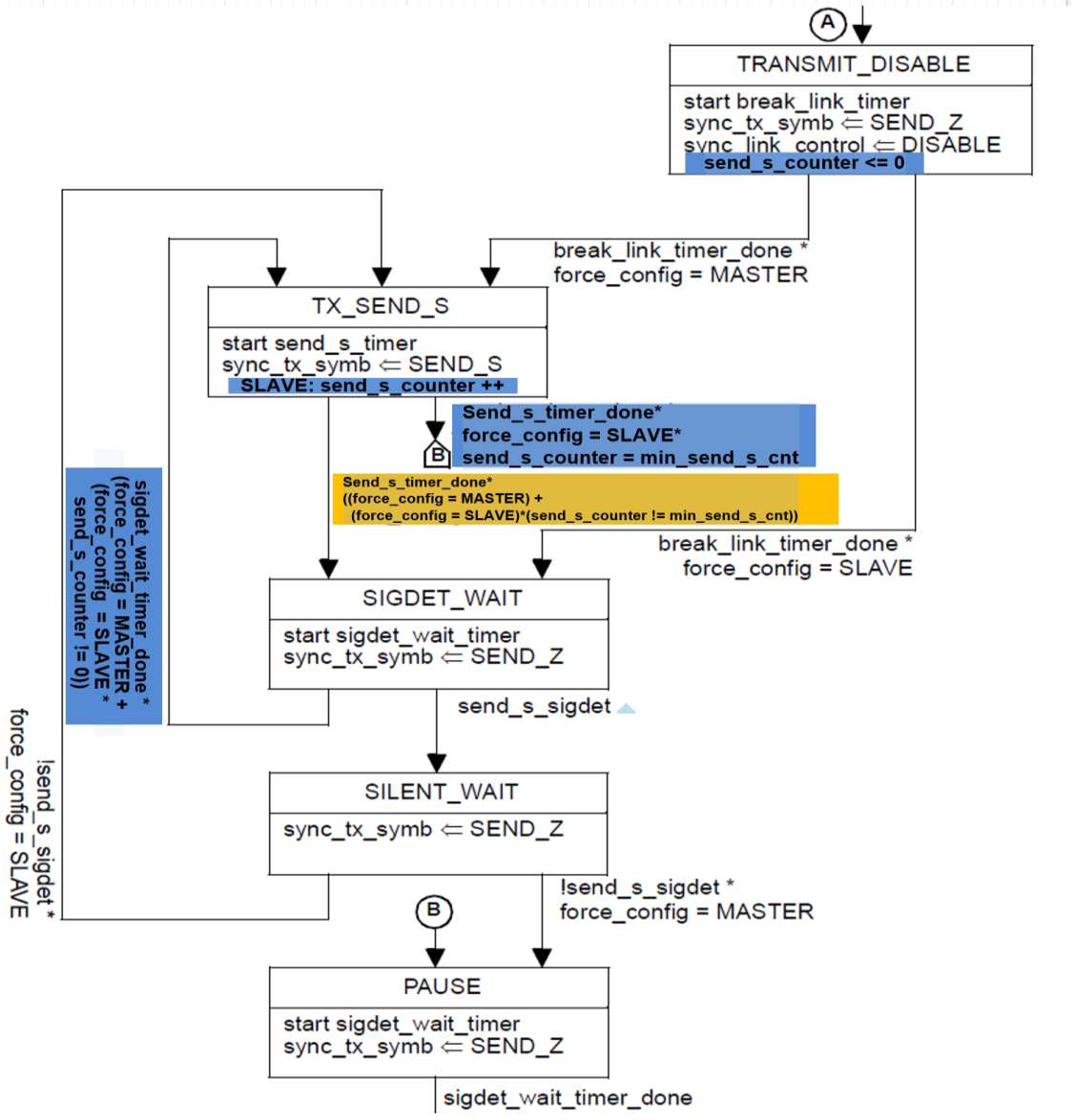
to:

send_s_timer_done * ((force_config = MASTER) + (force_config = SLAVE) * (send_s_counter != min_send_s_cnt))

State transition update:



state diagram at wu_3cy_01_1121



updated state diagram

Summary

- We propose multiple SEND_S frame scheme to reduce the probability of failing link synchronization under strong environmental noise (from: wu_3cy_01_1121.pdf) with a modification:
  - min_send_s_cnt = 16 , fixed value, not programable
- State transition from TX_SEND_S updated as shown at state diagram on Page 5.
- SEND_S signal to be kept at 703.125MHz, and related parameters stay the same (wu_3cy_01_1121.pdf).
  - Repeating by 20X of PRBS patterns when sent, assuming 14.065GHz baud rate at 25GBASE-T1
  - send_s_timer: 1.25 µs ± 0.05 µs
  - sigdet_wait_time: 5 µs ± 0.15 µs

Motion #:

- Motion #n: Move to adopt the link synchronization scheme updates proposed on Page 6 in wu_3cy_01_0122.pdf.

M: Peter Wu

S: Mike Tu

Technical (>=75%)

A: D: A:

Motion