

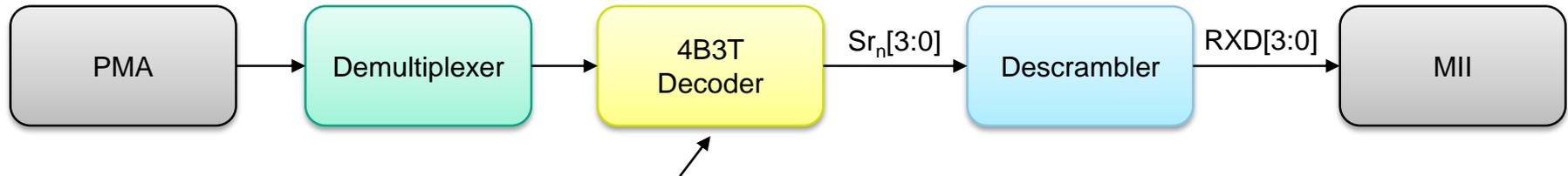


10 Mb/s Single Twisted Pair Ethernet 10BASE-T1L Receive State Diagram (Comment #577)

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10BASE-T1L Receive State Diagram

- Currently the 10BASE-T1L receive path is done in the following way:



This is the actual DECODE function in the receive state diagram.

- The descrambler is currently sitting outside the decode function of the receive state machine.
- Therefore the Receive state diagram currently returns the scrambled receive data $Sr_n[3:0]$ instead of the descrambled receive data $RXD[3:0]$ as in other standards.
- Returning $Sr_n[3:0]$ instead of $RXD[3:0]$ has several disadvantages:
 - Signaling “Assert LPI” on the MII, requires to return $RXD[3:0] = “0001”$, which currently is not possible.
 - The preamble currently cannot be recovered and is shortened, which is preventing back-to-back PHY configurations.
 - Being in “BAD DELIMITER” state cannot return a „False Carrier indication“ and $RXD[3:0]$ will be undefined.
 - Due to descrambling of the data before going to the MII, being in “LOW POWER IDLE” or “BAD DELIMITER” state can return wrong status information to the MII (not indicating an “Assert LPI” condition or a “False Carrier indication” correctly).
- Detecting a disparity error currently is resetting the Receive state machine, going to „LINK FAILED“ state.
 - Just setting RX_ER would provide a „less aggressive“ behavior, but still allows to detect disparity errors.
 - In this case reception continues, until an ESD or ESD with Error is received.

10BASE-T1L Receive State Diagram

- The following steps are taken to solve the previously mentioned issues:

- The DECODE function in the current draft D2.0 is defined as:

$$Sr_n[3:0] = \text{inverse}_{table_{4B3T}}(Rx_n)$$

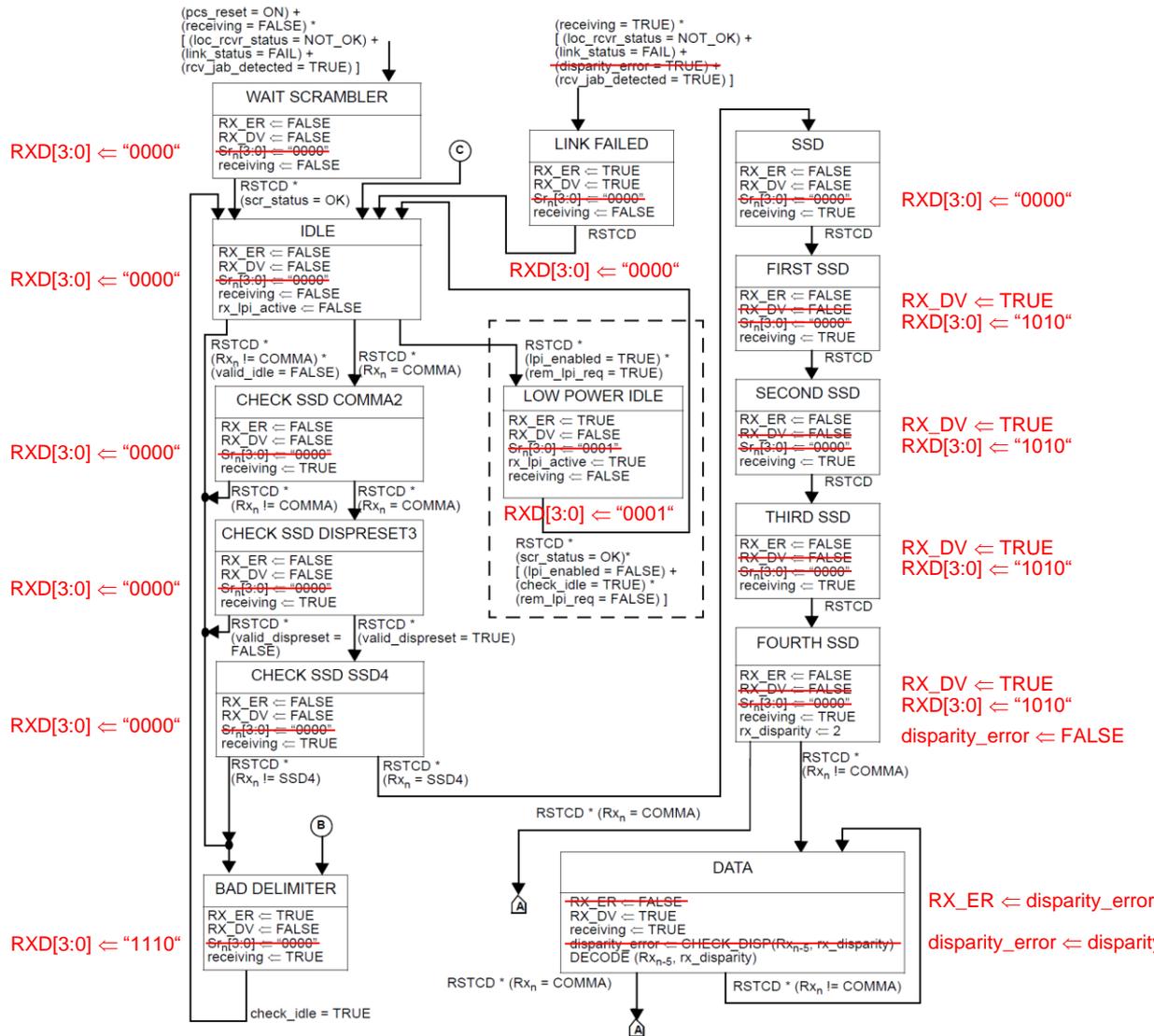
- Including the descrambler functionality it needs to be changed to:

$$RXD[3:0] = \text{descramble}(\text{inverse}_{table_{4B3T}}(Rx_n))$$

- Additionally the changes provided on the next two pages are proposed to be done:

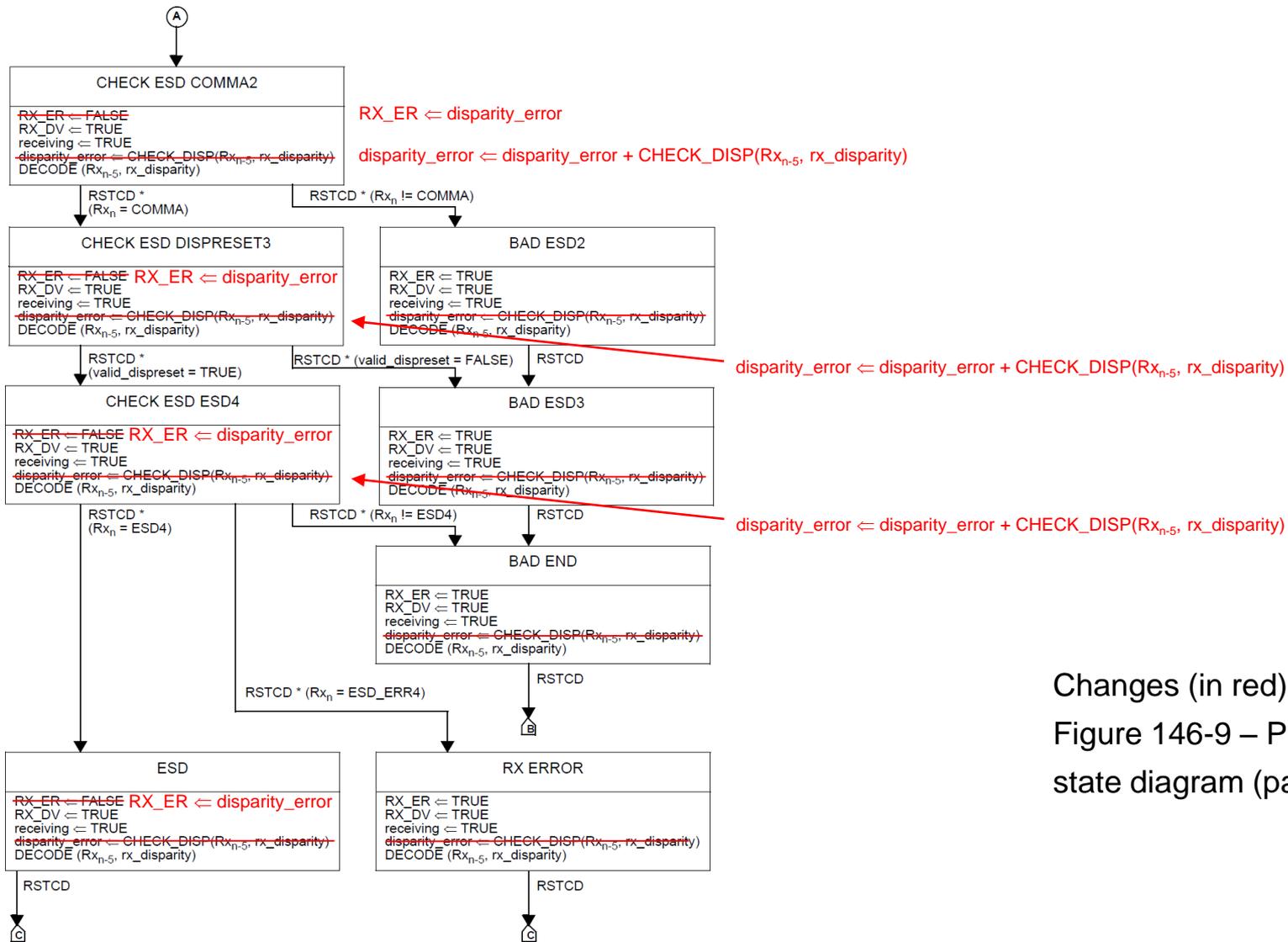
- These changes allow to output RXD[3:0] instead of Sr_n[3:0] and therefore support to provide the correct LPI encoding “0001” on the MII.
- In „BAD DELIMITER“ state RXD[3:0] is encoded as „1110“, which is a „False Carrier indication“.
- Additionally the part of the preamble being replaced by the SSD is now recovered, allowing back-to-back PHY configurations, as the preamble is not shortened anymore.
- A detected disparity error is not completely resetting the state machine anymore, going to state „LINK FAILED“, but just setting RX_ER, which is a „less aggressive“ behavior, but still allows to detect disparity errors.

10BASE-T1L Receive State Diagram



Changes (in red) to:
Figure 146-8 – PCS receive
state diagram (part a)

10BASE-T1L Receive State Diagram



Changes (in red) to:
Figure 146-9 – PCS receive
state diagram (part b)

Thank You