Proposed modification of Carrier Status Generation state diagram

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Problem: Diagram sometimes force extra IPG

- Assume 64-byte frame, parity_cnt = 0, tx_cnt = 1.
- A 64-byte frame has 16 columns of data, 2 columns of preamble, and 3 columns of IPG, 21 total.
- When the "S" column is received, CARRIER_STATUS is set to CARRIER_ON, tx_cnt = 2. State diagram will loop around through UPDATE state until frame is done.
- At end of the frame, tx_cnt = 22 and parity_cnt = 0.
- Since parity_cnt = 0, the state diagram will continue to loop around in the UPDATE state until tx_cnt=54.
- During this time CARRIER_STATUS is still equal to CARRIER_ON and no new frame can be sent.
- An extra large IPG will be enforced by CARRIER_STATUS for all frame lengths < 216 bytes.

Proposal: Modified state diagram

- Instead of being set at the beginning of each frame, CARRIER_STATUS is set only when needed.
- This allows multiple small frames to be sent without enforcing gap for parity between all frames.
- Greatly improved performance for small frames.
- Simulation shows delay variability that is provided to MAC is 32 bytes (sometimes there is one more set of 4 columns of IPG to delay just when frame arrives).

Current state diagram

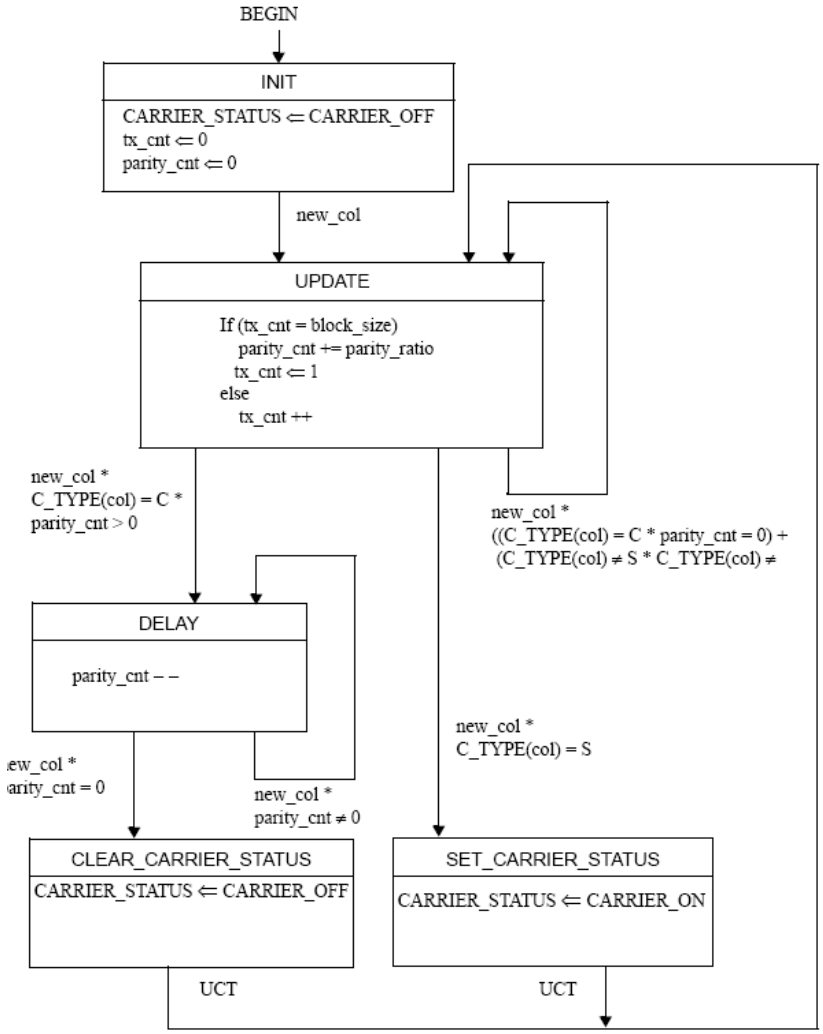
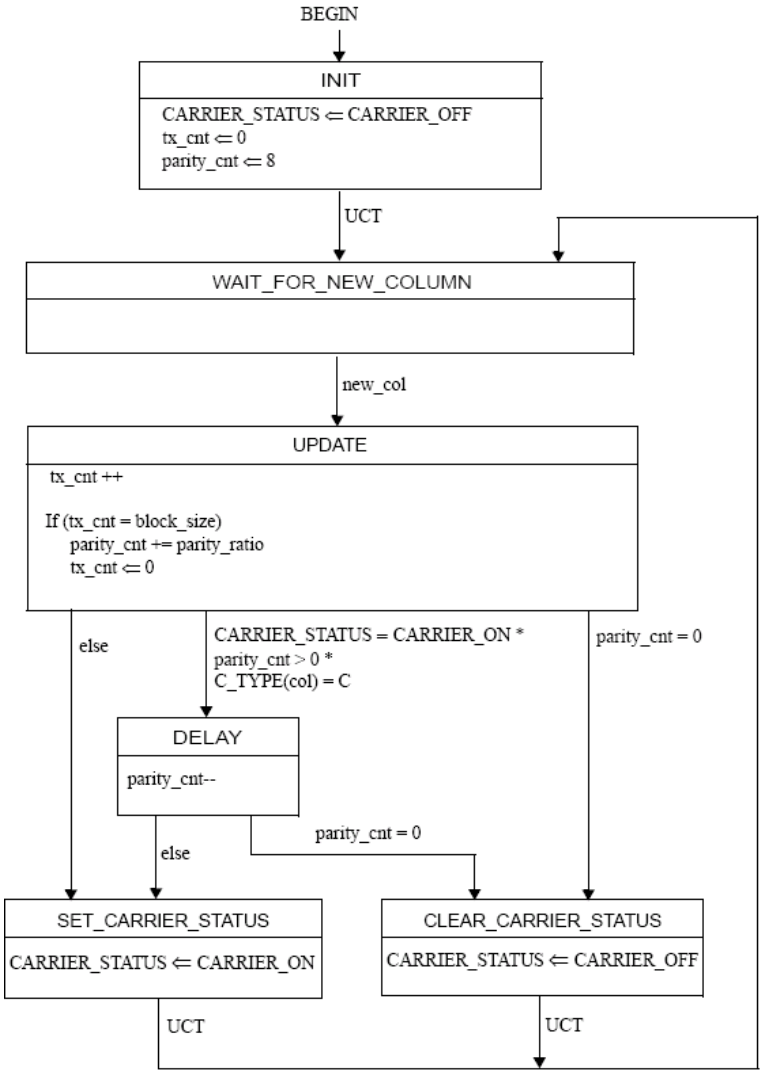


Figure 92–5—Carrier Status Generation state diagram

Proposed state diagram



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Walkthrough of new state diagram

- Wait until a new column is available for transmission across XGMII.
- Keep track of how many columns have been transmitted by updating tx_cnt. Keep track of how many parity columns need to be marked by updating parity_cnt. For every 62 columns transmitted, mark 8 as parity.
- If parity_cnt is 0, then set status to CARRIER_OFF.
- If parity_cnt is non zero and status is CARRIER_OFF, then set status to CARRIER_ON.
- If parity_cnt is non zero and status is CARRIER_OFF, and currently transmitting IDLE, then decrement parity_cnt. If parity_cnt reaches 0, then clear CARRIER_STATUS. Otherwise, reassert it.

Conclusion

- Carrier Status Generation state diagram was modeled.
- Results showed unnecessary delay for some frame lengths.
- Improvements to state diagram have been proposed.
- **Propose that new diagram is used for D2.0.**