OAM Extension Proposal

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Design Goals

- Minimize changes to 1000BASE-T1 OAM
  - Already works
  - Text is available
  - No need to re-invent a new mechanism
- Add more bits to indicate status

Anatomy of a 1000BASE-T1 OAM Frame

Constant Update

	D8	D7	D6	D5	D4	D3	D2	D1	D0
Symbol 0	Even Parity	Reserved	Reserved	Reserved	Reserved	Ping Rx	Ping Tx	SNR<1>	SNR<0>
Symbol 1	Odd Parity	Valid	Toggle	Ack	TogAck	Message_Number<3:0>			
Symbol 2	Odd Parity	Message<0><7:0>							
Symbol 3	Odd Parity	Message<1><7:0>							
Symbol 4	Odd Parity	Message<2><7:0>							
Symbol 5	Odd Parity	Message<3><7:0>							
Symbol 6	Odd Parity	Message<4><7:0>							
Symbol 7	Odd Parity	Message<5><7:0>							
Symbol 8	Odd Parity	Message<6><7:0>							
Symbol 9	Odd Parity	Message<7><7:0>							
Symbol 10	Odd Parity	CRC16							
Symbol 11	Odd Parity	CRC16							

Queued Exchange

PHY	Link Partner
3.2308.3:0	3.2313.1:0
3.2308.15:8	3.2313.15:4, 11:8
3.2309 to 3.2312	3.2314 to 3.2317

- Queued Exchange
  - PHY A user writes data
  - PHY B user reads data
  - Never lose data
  - PHY A cannot write data if queue is full
  - PHY B drains the queue by reading data
- Constant Update
  - PHY A keeps sending latest data
  - PHY B updates the latest received data
  - Can miss events if PHY B does not read
  - Used for slowly changing data
  - Automatic – No user intervention required

Anatomy of a MGBASE-T1 OAM Frame

- Define 4 additional bytes of constant update data

Constant Update

	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0	PHY	Link Partner
Symbol 0	0	Even Parity	Reserved	Reserved	Reserved	Reserved	Ping Rx	Ping Tx	SNR<1>	SNR<0>	3.2308.3:0	3.2313.1:0
Symbol 1	0	Odd Parity	Valid	Toggle	Ack	TogAck	Message_Number<3:0>				3.2308.15:8	3.2313.15:4, 11:8
Symbol 2	0	Odd Parity	Message<0><7:0>									
Symbol 3	0	Odd Parity	Message<1><7:0>									
Symbol 4	0	Odd Parity	Message<2><7:0>									
Symbol 5	0	Odd Parity	Message<3><7:0>								3.2309 to	3.2314 to
Symbol 6	0	Odd Parity	Message<4><7:0>								3.2312	3.2317
Symbol 7	0	Odd Parity	Message<5><7:0>									
Symbol 8	0	Odd Parity	Message<6><7:0>									
Symbol 9	0	Odd Parity	Message<7><7:0>									
Symbol 10	0	Odd Parity	Message<8><7:0>									
Symbol 11	0	Odd Parity	Message<9><7:0>								3.2318 to	3.2320 to
Symbol 12	0	Odd Parity	Message<10><7:0>								3.2319	3.2321
Symbol 13	0	Odd Parity	Message<11><7:0>									
Symbol 14	0	Odd Parity	CRC16									
Symbol 15	0	Odd Parity	CRC16									

Queued Exchange

How to insert OAM symbols into RS-superframe

- nX interleaving has n OAM symbols per superframe
- OAM symbol 0 must be in first RS frame of the superframe
- A 16 symbol OAM frame aligns to 1X, 2X, 4X, 8X interleaving

- If 4 additional bytes not enough then the next increment is to add 12 bytes to make 24 symbol OAM frame.

Minimal Changes to 1000BASE-T1 Text

- Define new registers 3.2318 to 3.2321
- Extend mr_tx_message[63:0] to mr_tx_message[95:0]
- Extend mr_rx_lp_message[63:0] to mr_rx_lp_message[95:0]

Receive State Diagram Change

- Change from 63 to 95
- Change from 12 to 16
- Change from 11 to 15

- Add mr_rx_lp_message[95:64] ← rx_oam<13 to 10><7:0>

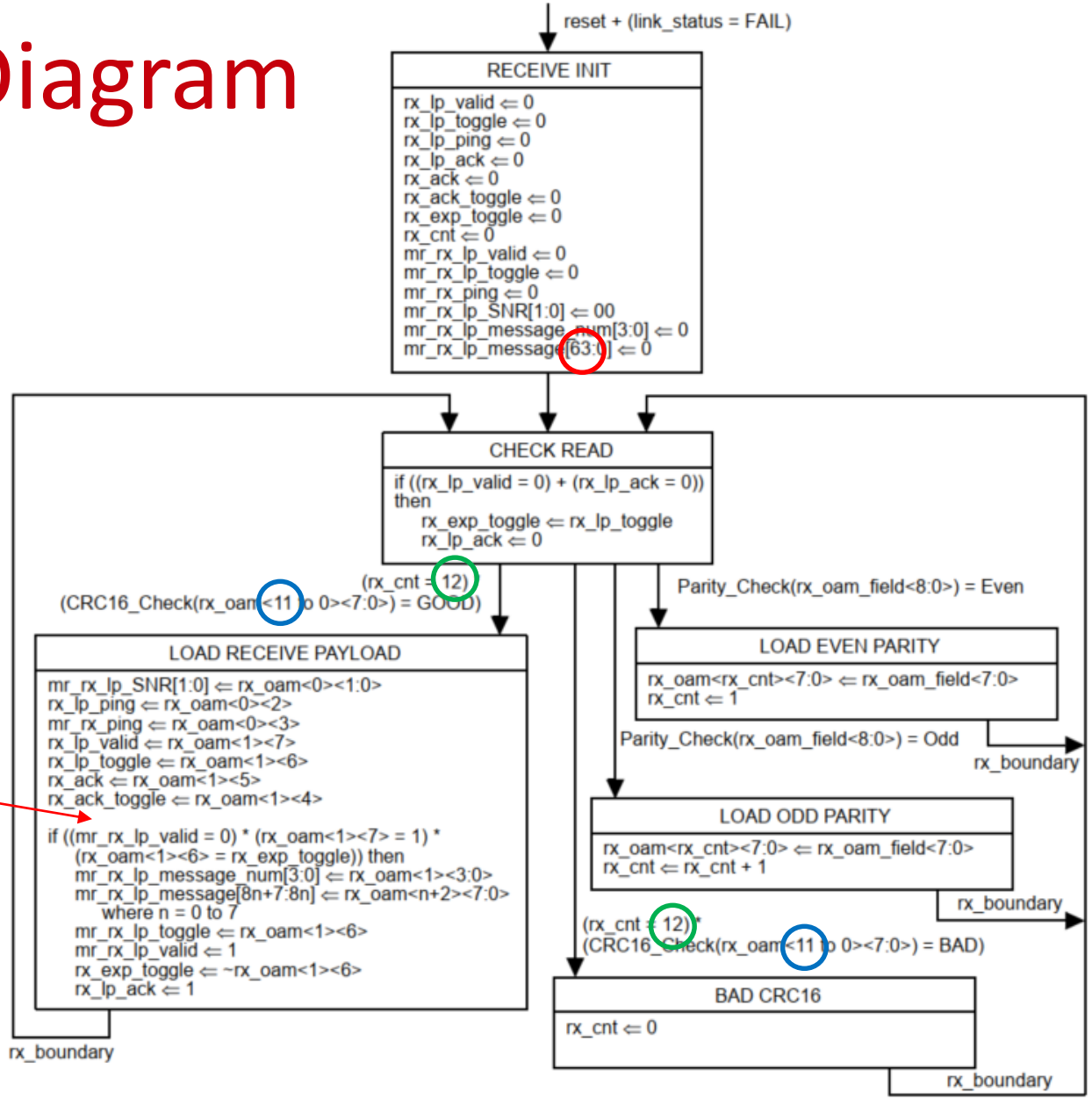

Figure 97–17—Receive state diagram

Transmit State Diagram Change

- Change from 12 to 16
- Change from 11 to 15
- Change from 10 to 14
- Change from 9 to 13
- Change from 8 to 9

- Add tx_oam<n+2><7:0> ← mr_tx_message[8n+7:8n] where n = 8 to 11
- Add tx_oam<15 to 0><9> ← 0

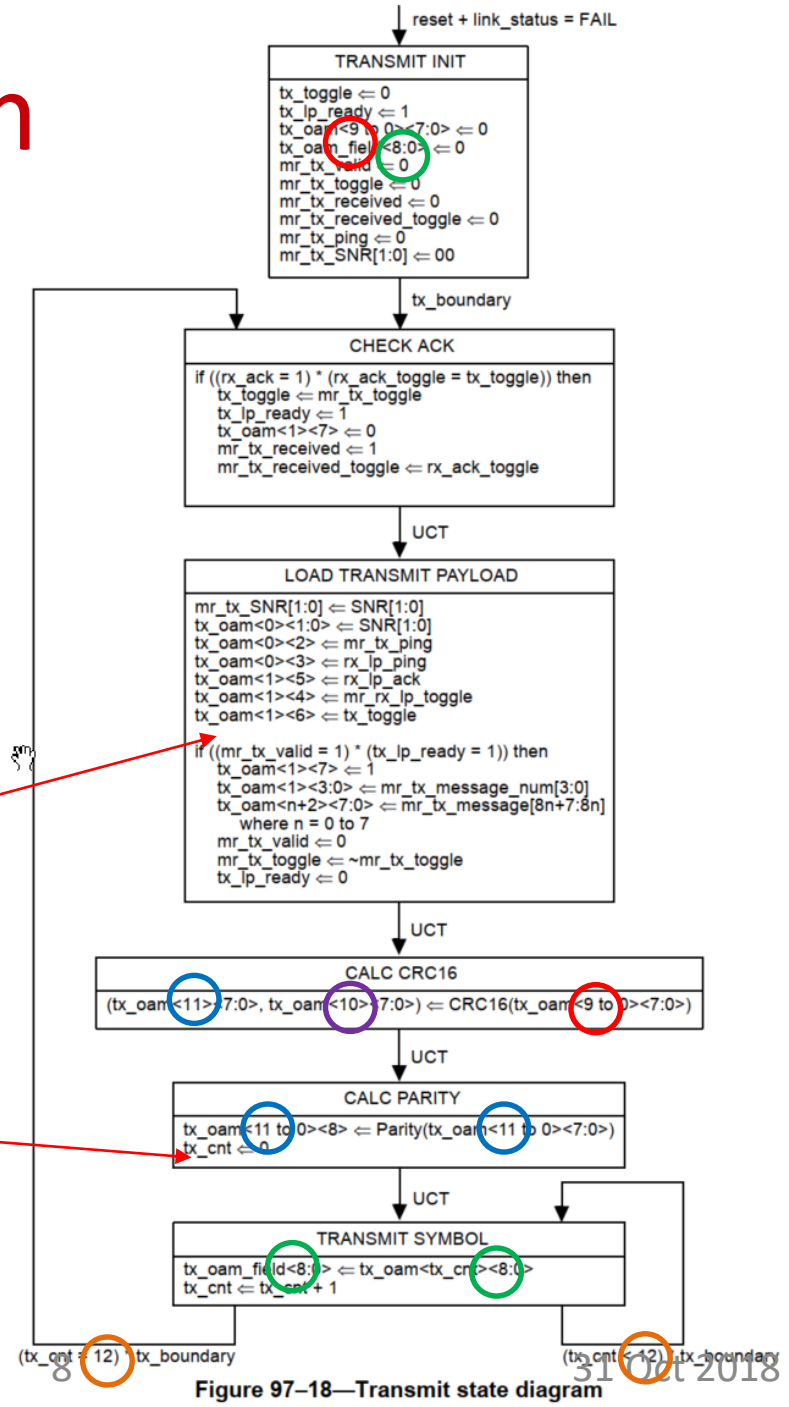

Figure 97–18—Transmit state diagram

THANK YOU