

OAM Extension Proposal

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Design Goals

- Keep 1000BASE-T1 OAM Framework
 - Already works
 - Text is available
 - No need to re-invent a new mechanism
- Add more bits to indicate status
- Give option to protect OAM frame without full RS during LPI

Anatomy of a 1000BASE-T1 OAM Frame

Constant Update

	D8	D7	D6	D5	D4	D3	D2	D1	D0		PHY	Link Partner
Symbol 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	Odd Parity	Valid	Toggle	Ack	TogAck	Message_Number<3:0>					3.2308.15:8	3.2313.15:4, 11:8
Symbol 2	Odd Parity					Message<0><7:0>						
Symbol 3	Odd Parity	Queued				Message<1><7:0>						
Symbol 4	Odd Parity	Exchange				Message<2><7:0>						
Symbol 5	Odd Parity					Message<3><7:0>					3.2309 to 3.2312	3.2314 to 3.2317
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 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
- Changed CRC16 to RS(16, 14) – Allows for error correction of OAM frame

	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0	PHY	Link Partner		
Symbol 0	0	0	Reserved	Reserved	Reserved	Reserved	Ping Rx	Ping Tx	SNR<1>	SNR<0>	3.2308.3:0	3.2313.1:0		
Symbol 1	0	1	Valid	Toggle	Ack	TogAck	Message_Number<3:0>				3.2308.15:8	3.2313.15:4, 11:8		
Symbol 2	0	1	Queued Exchange				Message<0><7:0>				3.2309 to 3.2312	3.2314 to 3.2317		
Symbol 3	0	1					Message<1><7:0>							
Symbol 4	0	1					Message<2><7:0>							
Symbol 5	0	1					Message<3><7:0>							
Symbol 6	0	1					Message<4><7:0>							
Symbol 7	0	1					Message<5><7:0>							
Symbol 8	0	1					Message<6><7:0>							
Symbol 9	0	1					Message<7><7:0>							
Symbol 10	0	1	Message<8><7:0>				3.2318 to 3.2319	3.2320 to 3.2321						
Symbol 11	0	1	Message<9><7:0>											
Symbol 12	0	1	Message<10><7:0>											
Symbol 13	0	1	Message<11><7:0>											
Symbol 14	RS(16, 14) parity													
Symbol 15	RS(16, 14) parity													

Constant Update

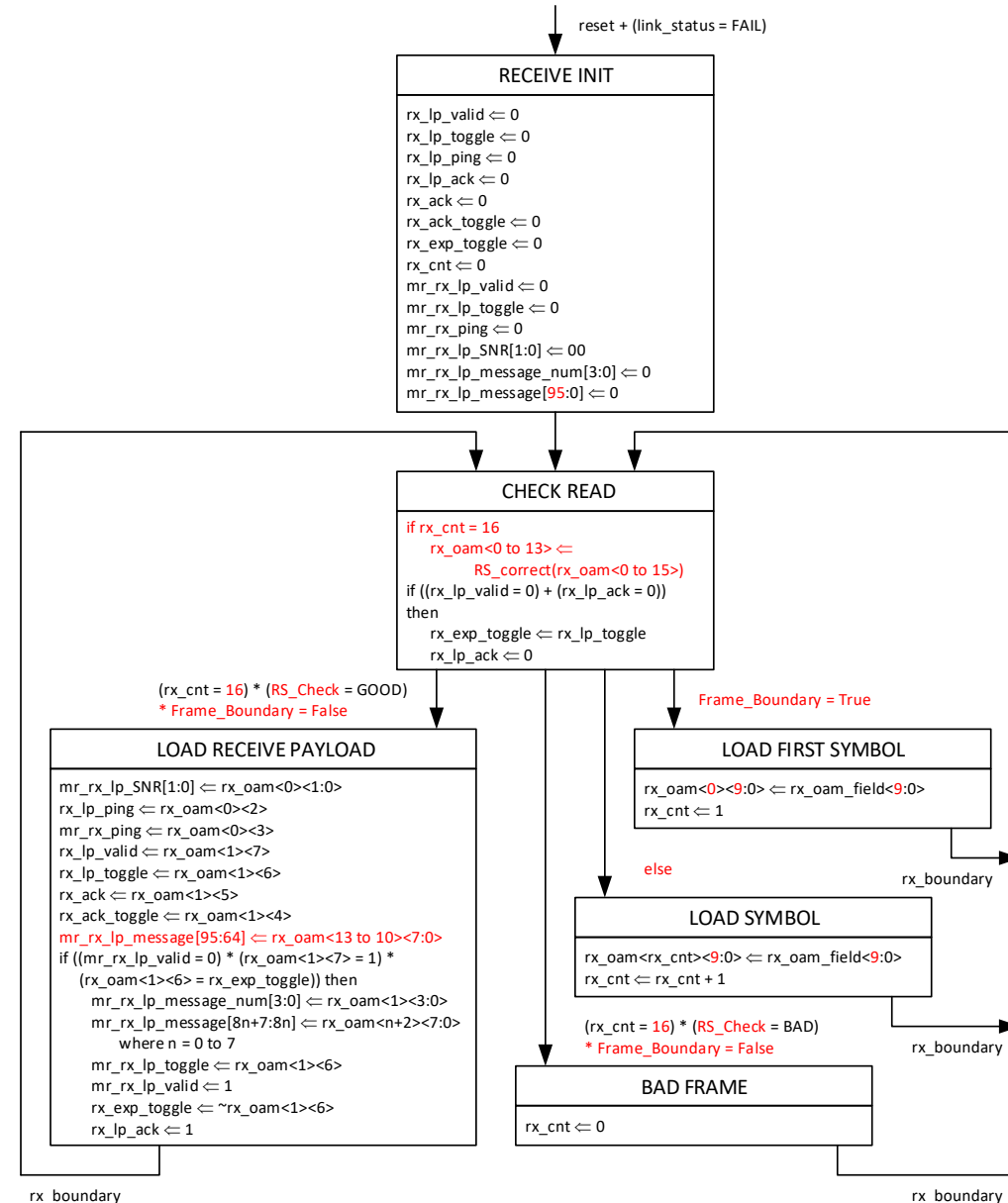
How to insert OAM symbols into RS-superframe

- 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.

Changes to 1000BASE-T1 Text

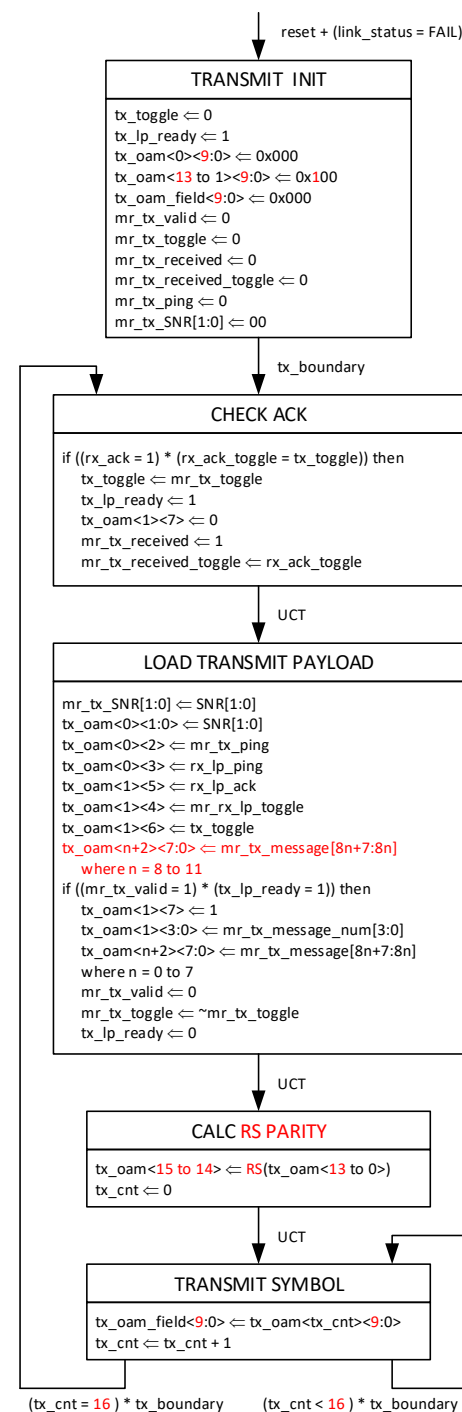
- Define new registers 3.2318 to 3.2321
- Extend mr_tx_message[63:0] to mr_tx_message[95:0]
- Extend mr_rx_lp_message[63:0] to mr_rx_lp_message[95:0]
- Define Reed Solomon functions RS(), RS_correct() to replace CRC16
- Define RS_Check variable to indicate whether error is correctable
- Define Frame_Boundary to indicate OAM frame boundary detected
 - Bit D<8> sequence from 16 consecutive OAM symbols = 1000_0000_0000_00xx
- Redefine rx_boundary and tx_boundary to account for RS superframes
- Modification to state diagrams

Receive State Diagram Change



Transmit State Diagram Change

- Note: The CALC PARITY state in 1000BASE-T1 OAM diagram is deleted



THANK YOU