



**XLNT**

# **Gigabit Media Independent Interface Proposal**

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# Objectives



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- Define GMII for 1000 Mb/s Operation
- Integrate MII as a Subset of GMII
  - Maximum use of MII signals
  - Incorporates MII management interface
- Support Pin Mapping to Fiber Channel 10-bit Interface
- Define Logical Interface

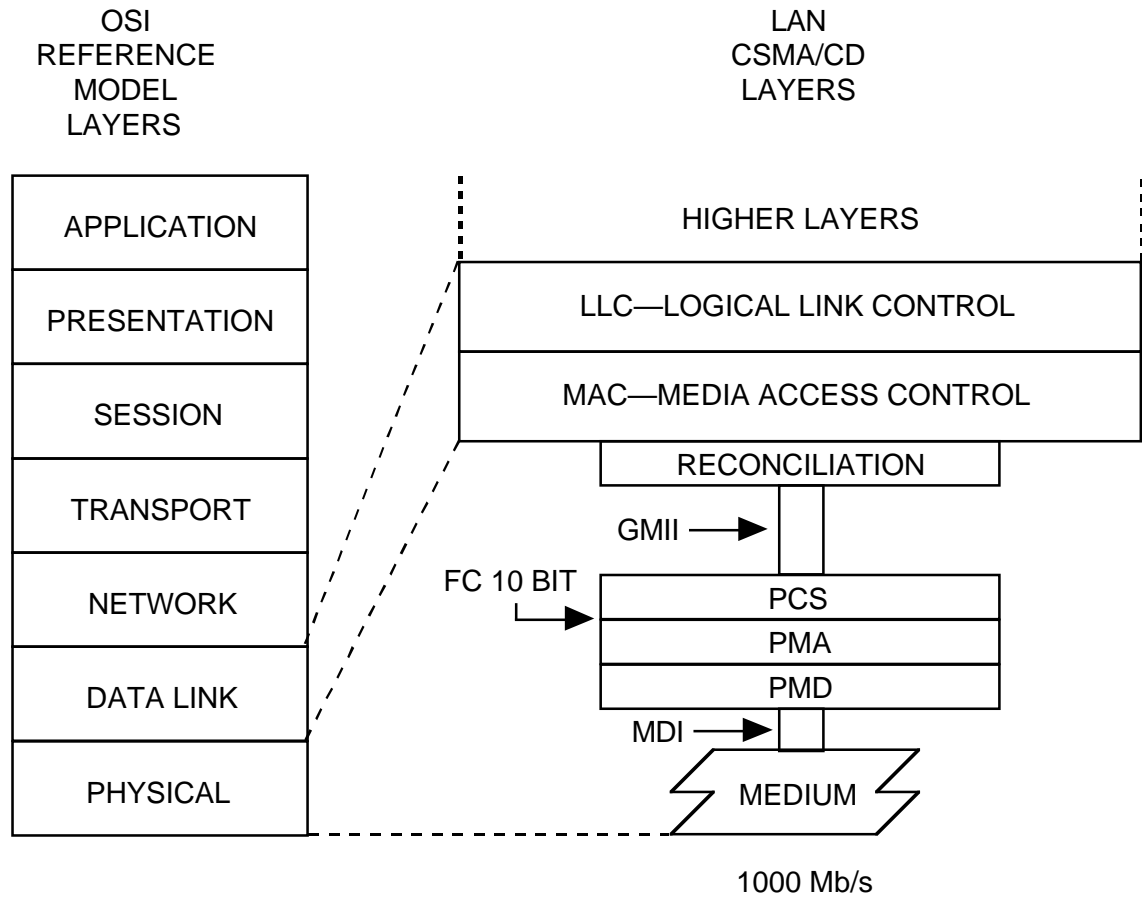
# What's "New"?



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- Multirate operation
- Adopted MII management interface
- Proposed signal mapping
- Added Carrier Extend error encodings
- Timing diagrams

# Location in the Protocol Stack



# Interface Characteristics



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1. Capable of supporting: 10 Mb/s, 100 Mb/s and 1000 Mb/s data rates.
2. Data and delimiters are synchronous to clock references.
3. It provides independent 8-bit wide transmit and receive data paths.
4. It provides a simple management interface.

# Multi-Rate Operation

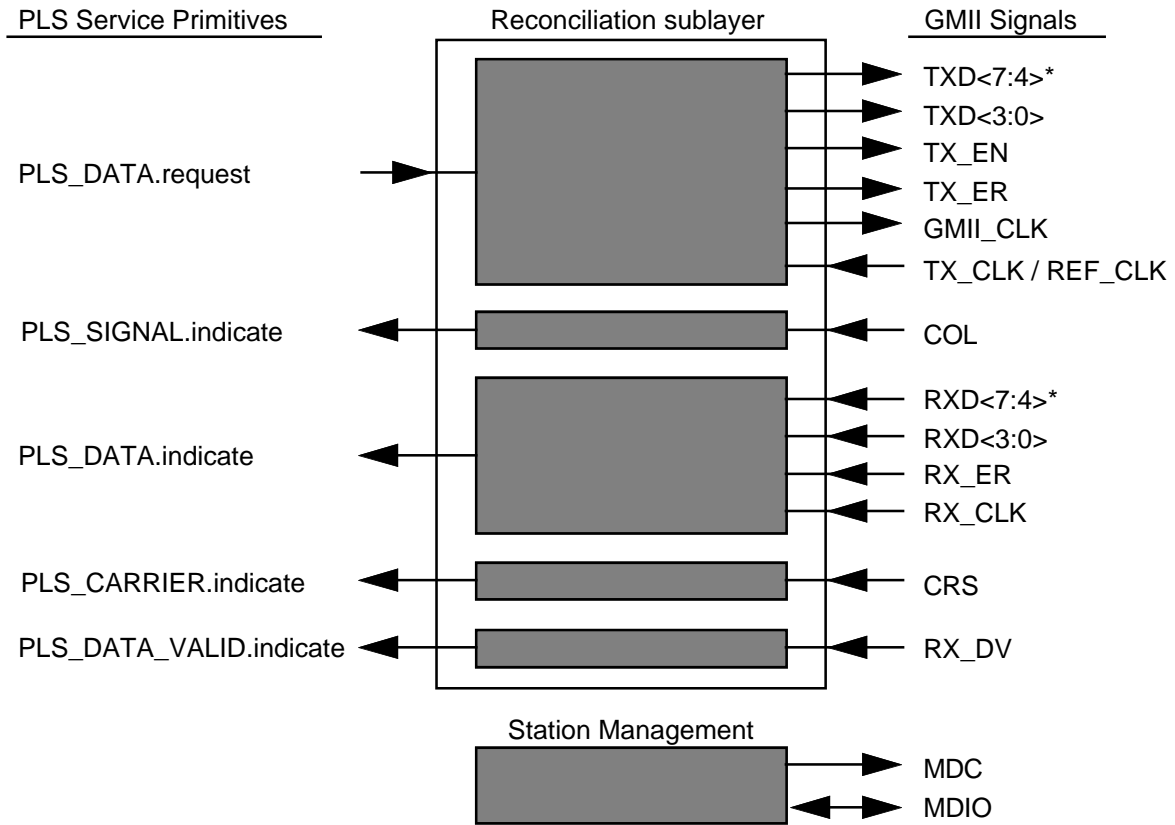


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- 1000 Mb/s
  - Byte wide at 125M code-groups/s
  - Management registers to be defined
- 100 Mb/s or 10 Mb/s
  - Nibble wide at 25M or 2.5M code-groups/s
  - Management as defined in 802.3u



# GMI Signals



\*At 10 Mb/s or 100 Mb/s most significant nibble is not used

# Transmit Encodings



TX_EN	TX_ER	TXD<7:0>	Request
0	0	0000 0000 through 1111 1111	Normal inter-frame
0	1	0000 0000 through 0000 1110	Reserved
0	1	0000 1111	Carrier Extend
0	1	0001 0000 through 0001 1110	Reserved
0	1	0001 1111	Carrier Extend error propagation
0	1	0000 0010 through 1111 1111	Reserved
1	0	0000 0000 through 1111 1111	Normal data transmission
1	1	0000 0000 through 1111 1111	Transmit error propagation



# Receive Encodings



<b>RX_DV</b>	<b>RX_ER</b>	<b>RXD&lt;7:0&gt;</b>	<b>Indication</b>
0	0	0000 0000 through 1111 1111	Normal inter-frame
0	1	0000 0000	Normal inter-frame
0	1	0000 0001 through 0000 1101	Reserved
0	1	0000 1110	False carrier indication
0	1	0000 1111	Carrier Extend
0	1	0001 0000 through 0001 1110	Reserved
0	1	0001 1111	Carrier Extend with errors
0	1	0010 0000 through 1111 1111	Reserved
1	0	0000 0000 through 1111 1111	Normal data reception
1	1	0000 0000 through 1111 1111	Data reception with errors

# Signal Semantics

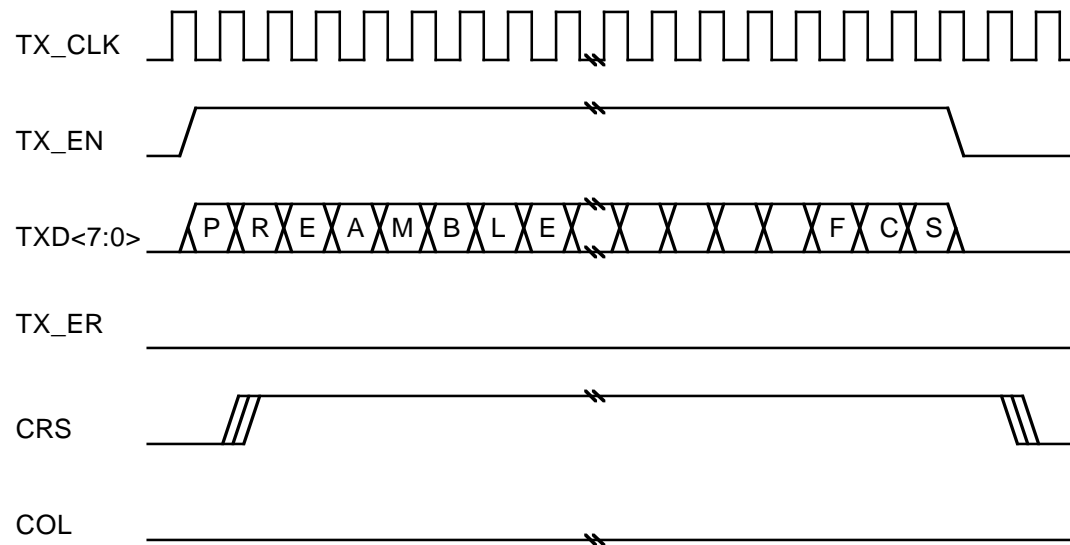


- RX\_DV and TX\_EN
  - Delimit frame
  - Asserted with Start Stream Delimiter
  - Deasserted with End Stream Delimiter, R, I
- RX\_ER and TX\_ER
  - Asserted on errors in frame
  - Asserted for carrier extension
  - Errors within carrier extension indicated by RXD and TXD
- CRS and COL (asynchronous to clocks)
  - CRS is asserted with any non-I, during carrier extension
  - COL is asserted upon detection of collision in frame or carrier extension

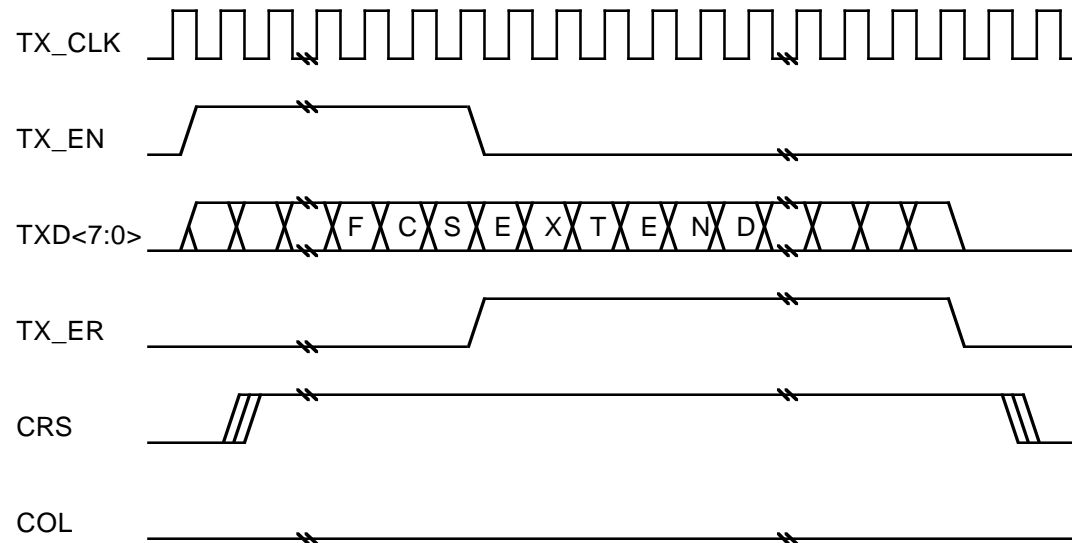
# Tx — No Carrier Extension



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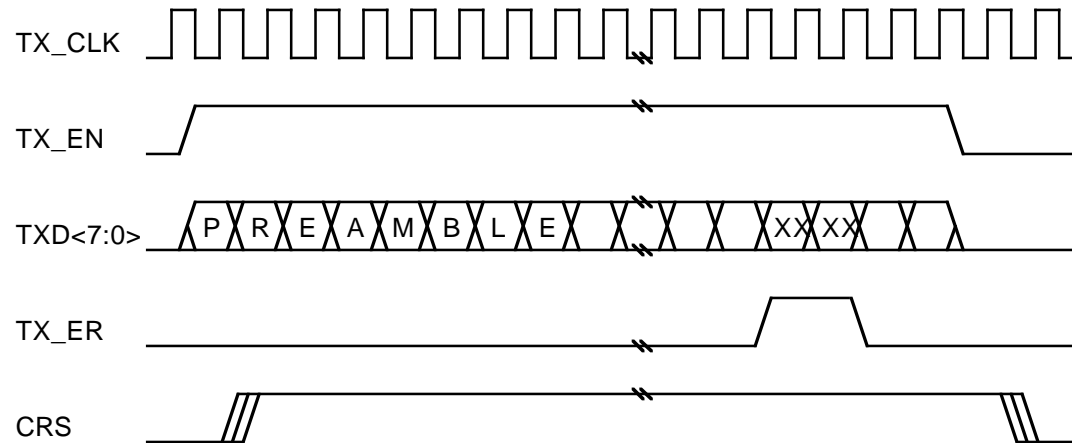
# Tx — Carrier Extension



# Propagating an Error — Frame



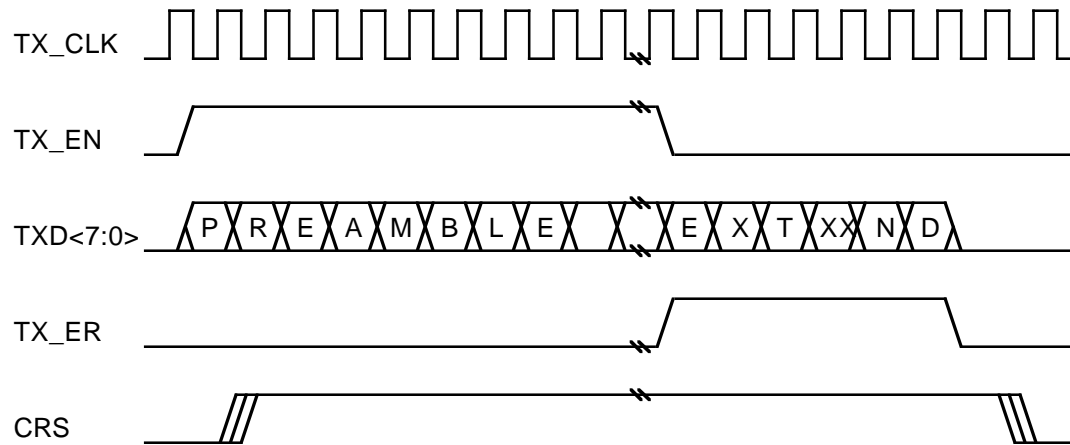
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# Propagating an Error — Extension



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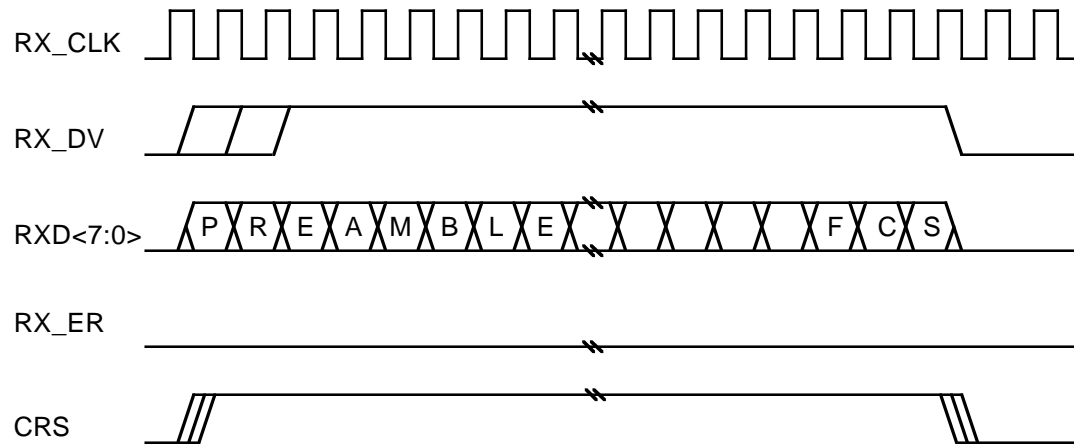


\*Error in extend is indicated by TXD encoding

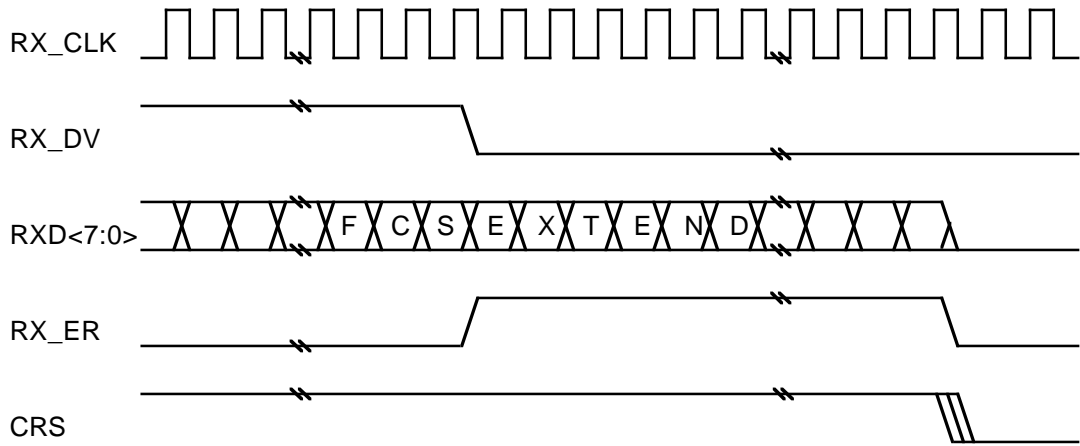
# Rx — No Carrier Extension



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# Rx — Carrier Extension

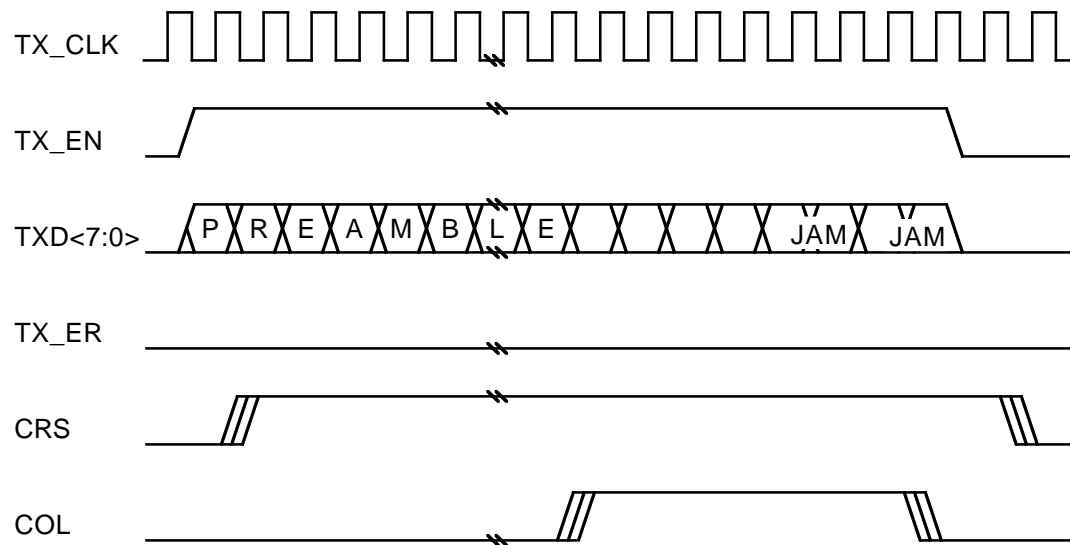




# Tx Collision — No Carrier Extension



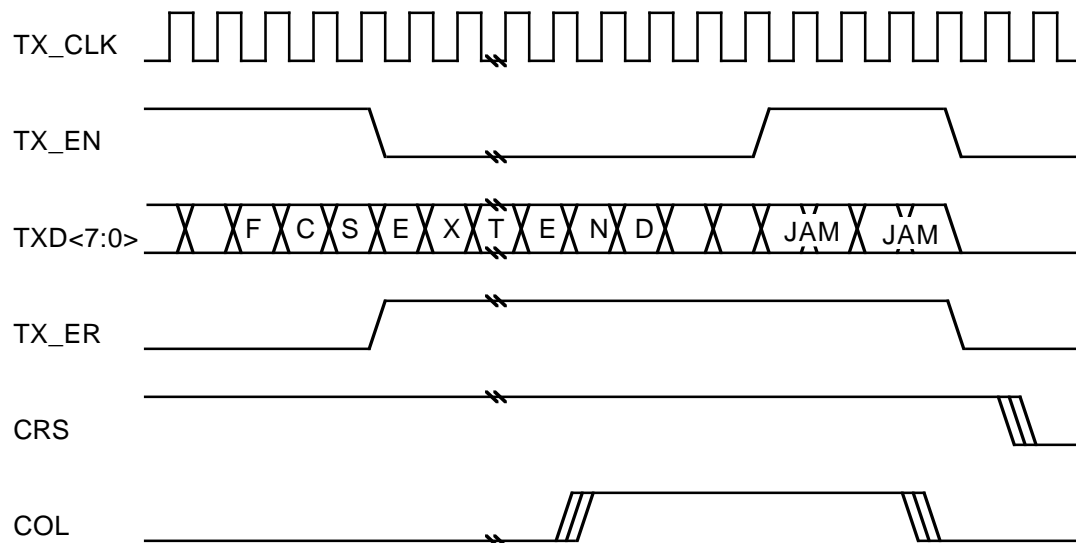
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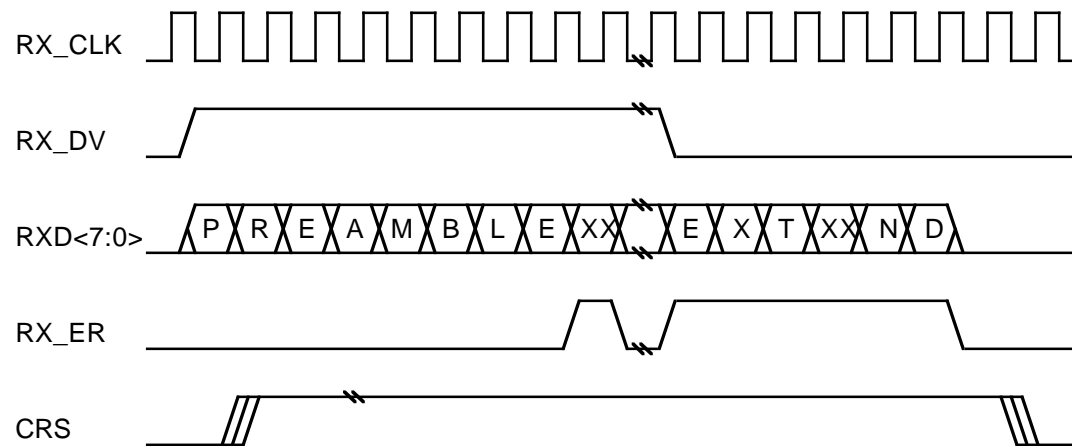
# Tx Collision — Carrier Extension



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# Rx with Errors



\*Error in extend is indicated by RXD encoding

# Signal Mapping



GMII	MII	10-BIT
TX_ER	TX_ER	TX<9>
TX_EN	TX_EN	TX<8>
TXD<7>		TX<7>
TXD<6>		TX<6>
TXD<5>		TX<5>
TXD<4>		TX<4>
TXD<3>	TXD<3>	TX<3>
TXD<2>	TXD<2>	TX<2>
TXD<1>	TXD<1>	TX<1>
TXD<0>	TXD<0>	TX<0>
CRS	CRS	
COL	COL	
REF_CLK	TX_CLK	(TBC)
GTX_CLK		

GMII	MII	10-BIT
RX_ER	RX_ER	RX<9>
RX_DV	RX_DV	RX<8>
RXD<7>		RX<7>
RXD<6>		RX<6>
RXD<5>		RX<5>
RXD<4>		RX<4>
RXD<3>	RXD<3>	RX<3>
RXD<2>	RXD<2>	RX<2>
RXD<1>	RXD<1>	RX<1>
RXD<0>	RXD<0>	RX<0>
RX_CLK	RX_CLK	
		RBC<1>
		RBC<0>

# PLS Interface Changes



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- PLS\_DATA.request (OUTPUT\_UNIT)
  - ZERO, ONE, DATA\_COMPLETE, EXTEND
- PLS\_DATA.indicate (INPUT\_UNIT)
  - ZERO, ONE, EXTEND

# Open Items



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- Clocking
- Management Register Bits
- Electrical Interface