

Impact of Packet Bursting on GMI and PCS

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11-November-1996**

Goals for Packet Bursting

- Use existing PCS code space
- Maintain existing PCS code rules
- Maintain PCS error robustness
- Use existing GMII signal set
- Maintain existing GMII signalling rules
- Maintain compatibility with GMII based repeater

(in short, don't break anything)

GMI and PCS signalling proposal

■ GMI rules:

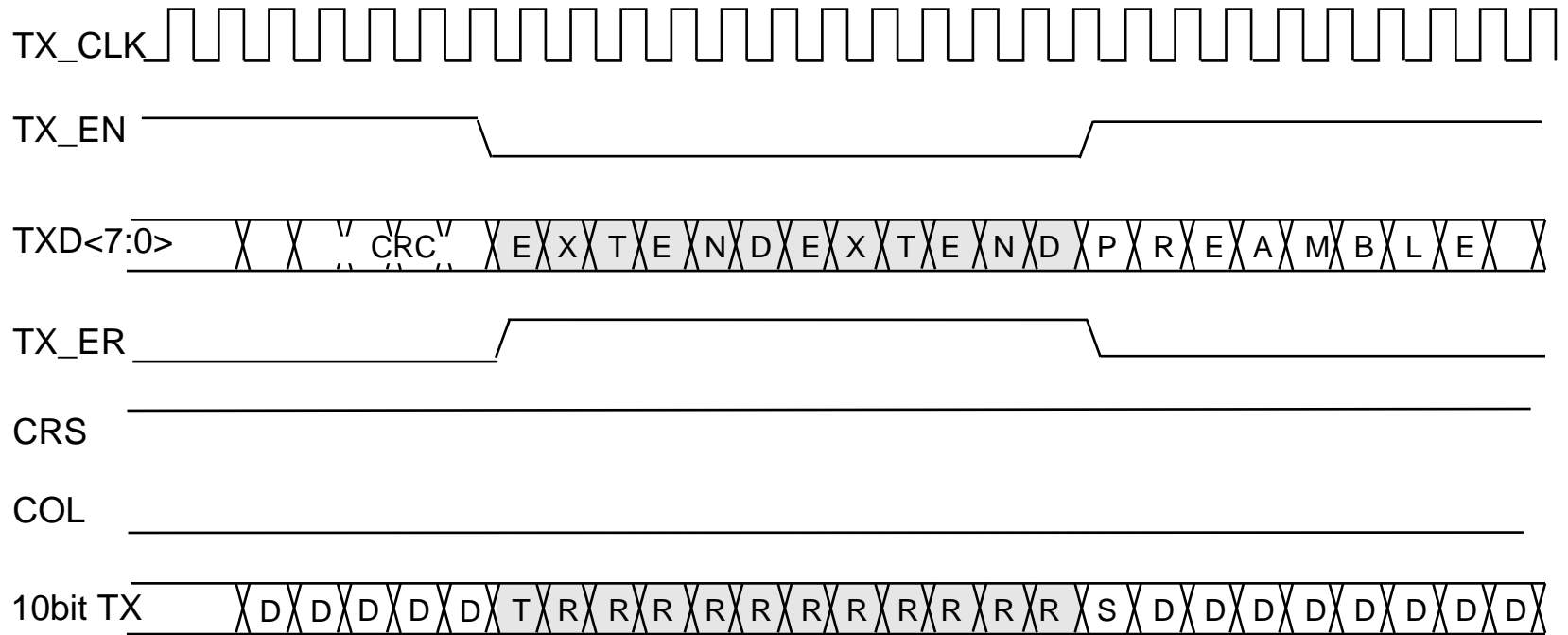
- Packets are transmitted and received during a burst using the same signal behavior as described in Bob Grow's presentation
- While bursting, the Carrier Extend encoding is applied to the GMI during the Inter-Frame Spacing (IFS) interval
- The TX_EN and RX_DV signals are used to delimit packets

■ PCS rules:

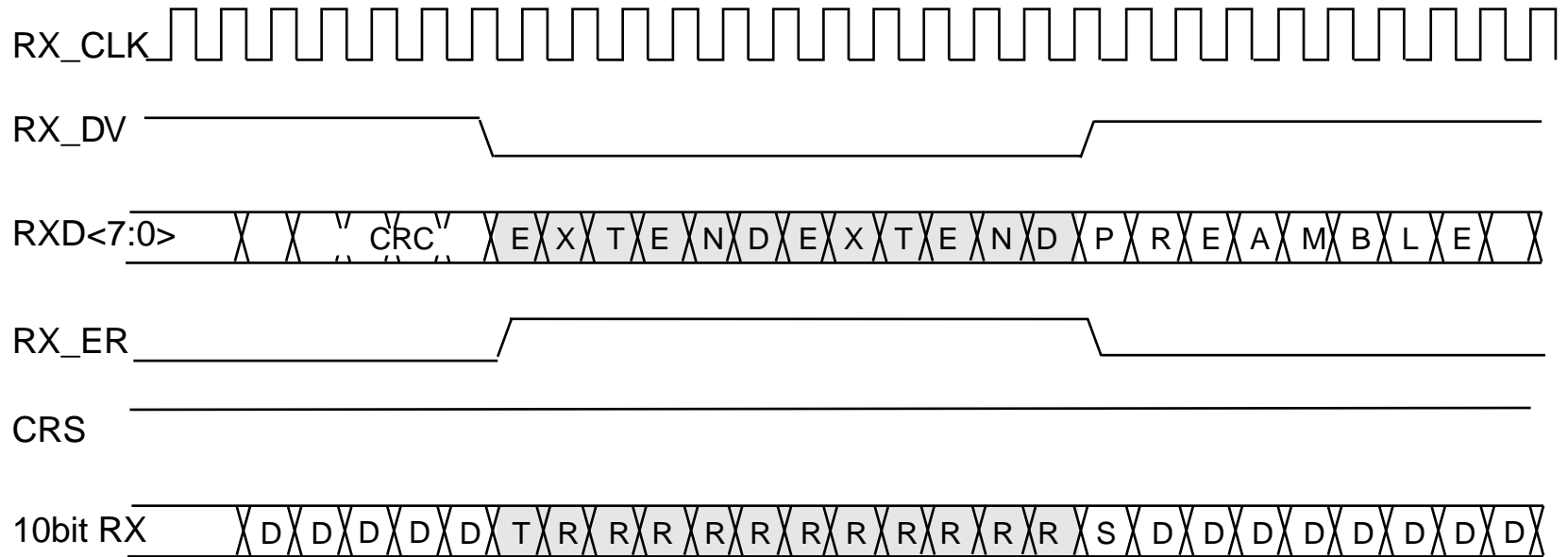
- The PCS initiates packets with the "S" code, and terminates packets with the currently defined combinations of "T" and "R" codes
- The PCS maps the Carrier Extend encoding into the "R" code
- The CRS signal is asserted throughout the burst

(so far, so good)

Packet Transmission Example



Packet Reception Example



Error Robustness

- **But wait! What about Error Robustness?**

- **/S/ (K27.7) and /R/ (K23.7) differ by only two bits!**

A two bit error could result in the concatenation of two packets, and all kinds of horrible things could happen, right? Wrong.

- **If an /R/ in the middle of the inter-frame interval gets turned into an /S/ the next /R/ will violate the “normal packet termination” rule**

Because it is not paired with a /T/

- **If the /R/ which immediately precedes an /S/ gets turned into an /S/ then the preamble could grow by one byte**

No impact on error robustness, but we could have PCS indicate an error if we want, based on detecting /S/S/

- **If an /S/ turns into an /R/ then the next symbol will be “Dx.y” (preamble) which should result in an error indication to the MAC**

RX_DV=1 and RX_ER=1

Impact on Reconciliation Sublayer

- In baseline Carrier Extension, the PLS_DATA_VALID.indicate primitive must be derived from:
 - $RX_DV \#$
 $RX_ER \ \& \ (RXD<7:0>==Carrier \ Extend)$
- With Packet Bursting, the PLS_DATA_VALID.indicate primitive must be derived from:
 - $RX_DV \ \& \ !(RX_DV_{[t-1]} \ \& \ RX_ER_{[t-1]}) \ \#$
 $RX_ER \ \& \ (RXD<7:0>==Carrier \ Extend)$

You don't have to implement the Reconciliation Sublayer
Your implementation just has to behave like you did

- Implies a shortened IFS at the receiver

Clever implementations can get the full IFS back, if they need it

Summary

- No new codes in the PCS
- Consistent with existing PCS code rules
- No harm to PCS error robustness
- No additions to GMII signal set
- Consistent with existing GMII signalling rules
- Since signalling behavior is symmetric, this proposal is compatible with a GMII based repeater

(See, I told you I wouldn't break anything)