

# PreFEC BER Signaling Features

---

David Ofelt – Juniper Networks

2016-04-28

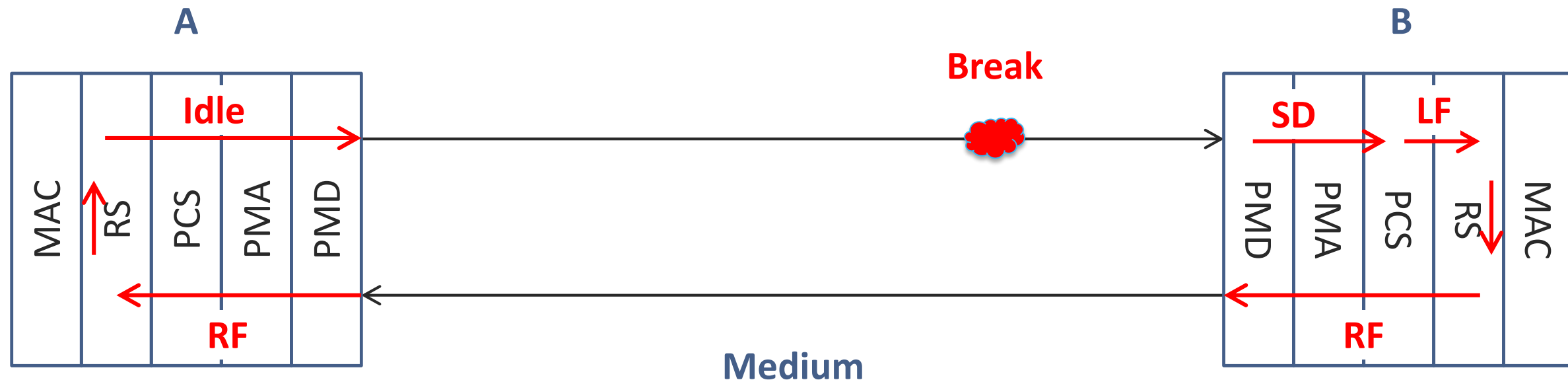
# Supporters

- Mark Gustlin - Xilinx

# Background

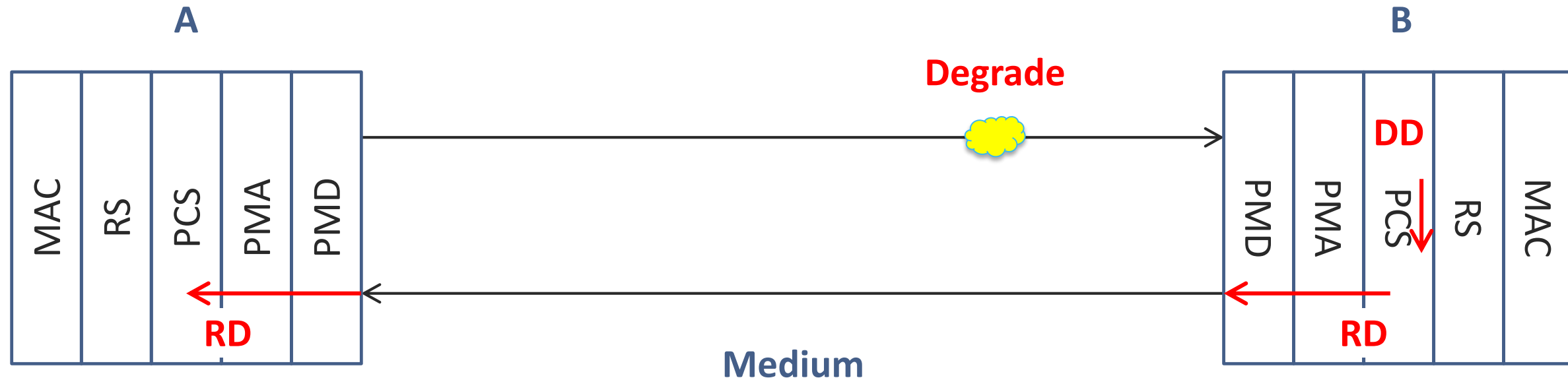
- Working to add PreFEC BER monitoring features to 802.3bs
  - maki\_3bs\_01a\_1115.pdf – Background and Justification
  - ofelt\_3bs\_01a\_0116.pdf – Initial proposal
  - ofelt\_3bs\_01\_0316.pdf
- Status:
  - Detailed PreFEC SER signaling proposal made at March meeting
  - Consensus is positive for the features, but not the current details
  - Punted it to the May meeting so we can work out the issues

# Existing local fault / remote fault



- PMD Rx at B sets SIGNAL\_DETECT (SD) to FAIL
- PCS at B sends local fault (LF) to RS at B
- RS at B sends remote fault (RF) to A
- RS at A receives RF and sends all idle characters

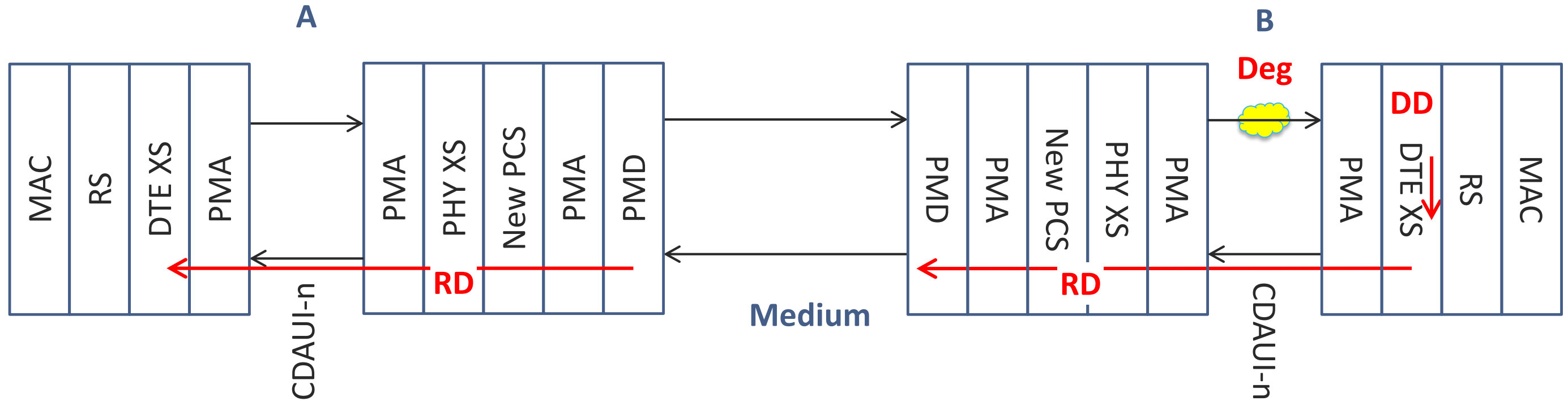
# Pre-FEC degrade no extender sublayer



- PCS at B exceeds pre-FEC symbol error ratio (SER) threshold and detects degrade (DD)
- PCS at B sends remote degrade (RD) to PCS at A
- Traffic unaffected

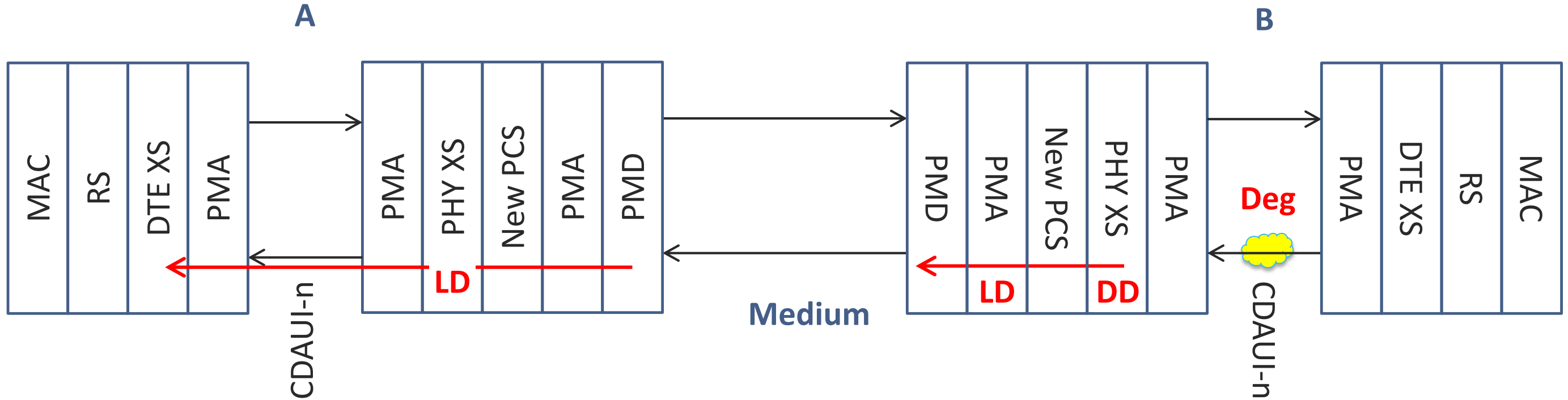


# Pre-FEC degrade with extender sublayer 2



- DTE XS at B exceeds pre-FEC symbol error ratio (SER) threshold and sends remote degrade (RD) to DTE XS at A
- Traffic unaffected

# Pre-FEC degrade with extender sublayer 3

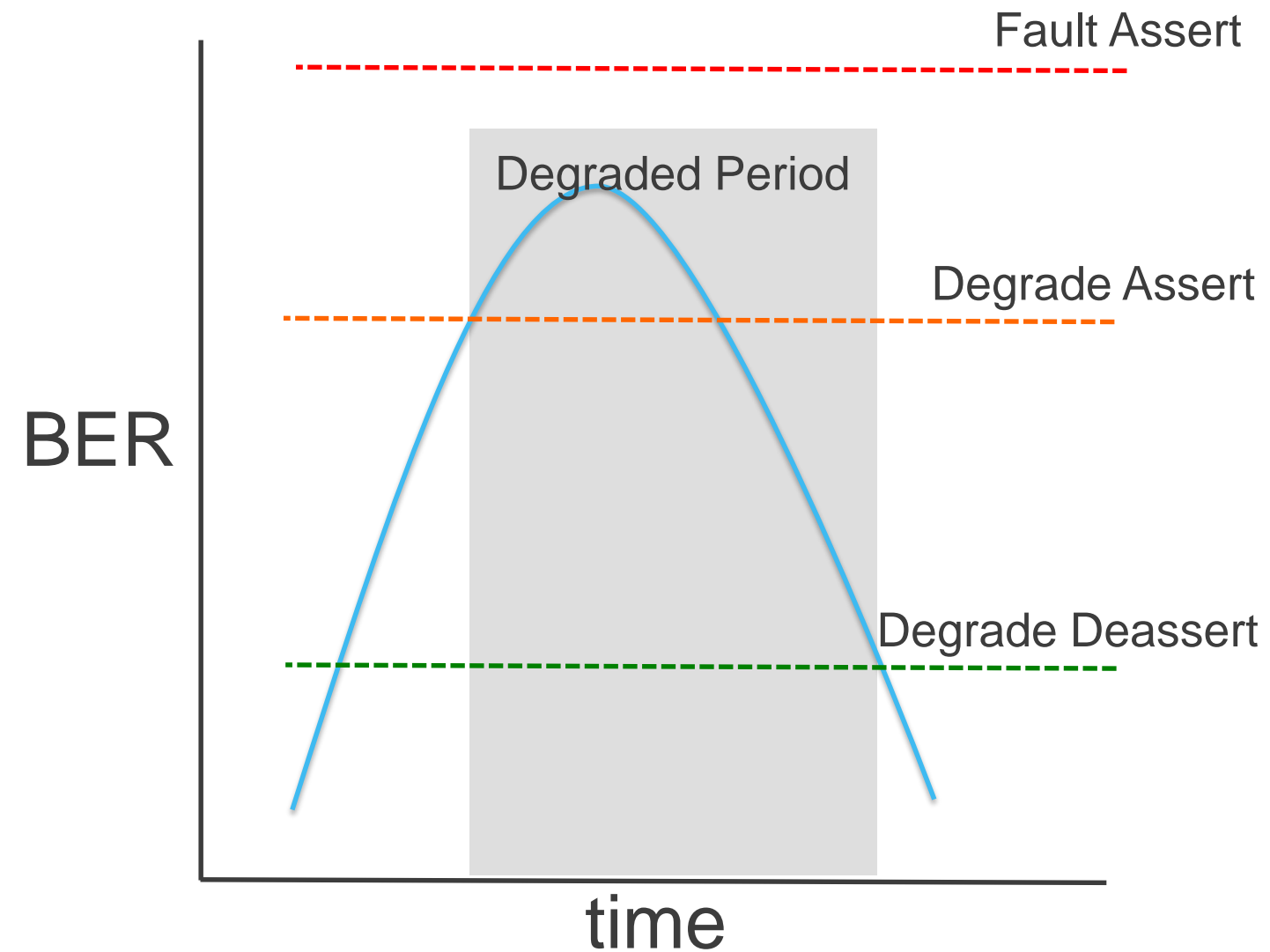


- PHY XS at B exceeds pre-FEC symbol error ratio (SER) threshold and sends local degrade (LD) to DTE XS at A
- Traffic unaffected



# PreFEC Fault and Degradate

- Fault
  - Single threshold & interval
- Degradate
  - Separate activate and de-activate threshold and intervals



# Issues From March

- PreFEC Fault
  - Why piggyback on FEC Bypass Indication?
  - Is PreFEC Fault needed?
- Why have separate intervals for both Degrade assert & deassert?
- How exactly does LD/RD work with an external FEC (XS)?
- Is using bits in the alignment markers the best way to carry LD/RD?

# PreFEC Fault

- The proposal built the PreFEC Fault feature by teasing apart the FEC Bypass Indication (FBI) feature into a FBI piece and a HighBER piece.
- There was push back for two reasons:
  - Trying to reuse parts of the FBI feature didn't really simplify the specification nor was it a significantly cheaper approach than just having two separate features.
  - There was a desire to write the standard such that if the FBI feature was on, then there was no option on how you set the threshold and interval, since there is a safety/correctness issue if you don't set them correctly.
    - Basically- "you shall set the threshold and interval to 5560 and 8192 respectively"
- Proposal:
  - Add PreFEC Fault as an orthogonal feature to FBI (if we add it)

## PreFEC Fault (2)

- In the discussions around PreFEC signaling - the PreFEC Fault feature has not garnered much support.
- PCS has mechanisms for shutting down interface when too many uncorrectable FEC frames.
- A PreFEC Fault setting will be between this and the Degrade setting
  - Not clear if having this intermediate fault setting is useful
  - General feeling is that the Degrade detect is good enough
- Proposal:
  - Skip the PreFEC Fault feature unless someone makes a good case.

# Degrade Assert & Deassert intervals

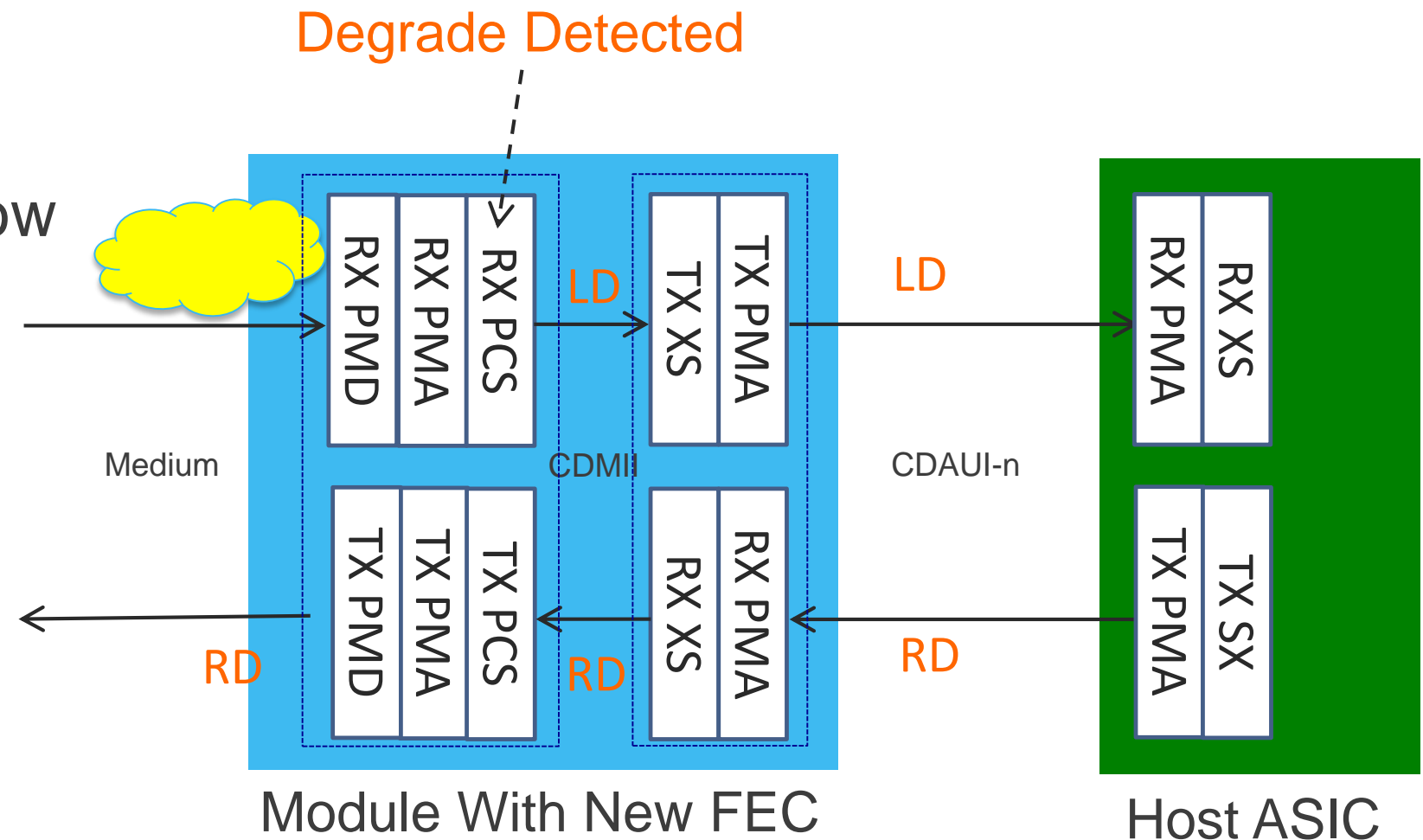
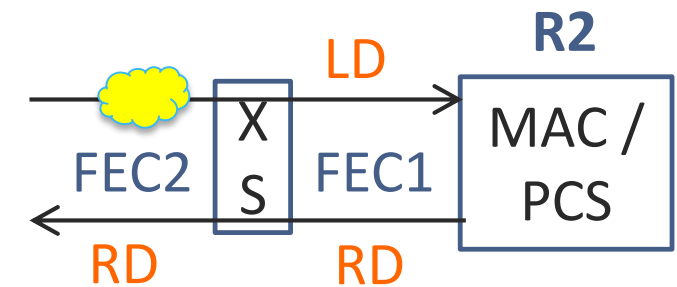
- The proposal specified separate interval and threshold values for both the PreFEC degrade assert and deassert settings
- At least one person felt that there should be just a single interval but two thresholds.
  - Some concern that the deassert SER needs to be significantly lower than the assert SER and having a separate interval would make easier to set appropriate values.
- Proposal:
  - Use a single interval and separate thresholds in the standard.
  - Implementations are free to have separate intervals

# How does LD/RD work with an external FEC (XS)?

- The original proposal did not properly document the way PreFEC Degrade needs to work when using an external FEC in an extender sublayer.
- Extender Sublayer has two sets of transmit and receive blocks and information is not passed between them in the way described in the proposed text.

# Pre-FEC Degradate External FEC

- Module with new FEC
- Degradate detected in module
  - Need to inform host
- New FEC is future work
  - But need to build host ASIC now
- LD/RD needs to pass over
  - CDMII
  - CDAUI



# How does LD/RD work with an external FEC (XS)?

- Proposal:
  - In the 400GbE PCS Clause (119):
    - Document how LD/RD is carried in the data stream (see next issue)
    - Document how LD/RD is handled and generated
  - In the 400GbE extender sublayer clause (118):
    - Include picture showing layer diagram
    - Include text indicating how the LD and RD information moves between blocks
      - Could add formal CDMII signaling, but it doesn't seem necessary



# Is using bits in the alignment markers the best way to carry LD/RD?

- Current proposal uses reserved alignment marker bits for the in-band PreFEC local & remote degrade signaling.
- Someone asked why we are putting things in the alignment markers.
  - If this feature is useful, then it is likely useful across multiple rates, PCS variations, etc, so it would be better to make it first-class and use an ordered set or similar approach.
- Proposal:
  - Stick with the AM approach. Significantly more to specify if we use ordered sets and increases the scope of the feature.
  - It does mean that I'll be supporting a CWM in 50GbE 😊

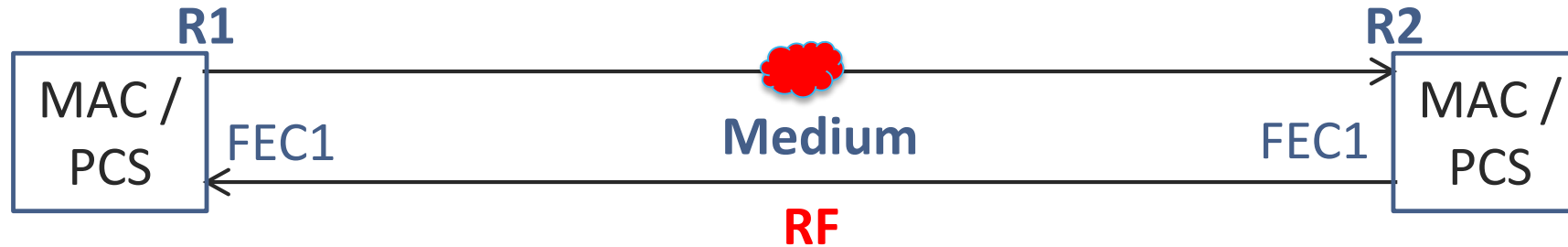
# Summary & Next Steps

- Reviewed four issues with the previous PreFEC signaling proposal
  - PreFEC Fault implementation and justification
  - Degrade assert & deassert intervals
  - LD/RD handling in the extender sublayer
  - LD/RD transport mechanism
- Next steps:
  - If there is consensus, then I will provide detailed edits to D1.3 in the May meeting

# Thanks

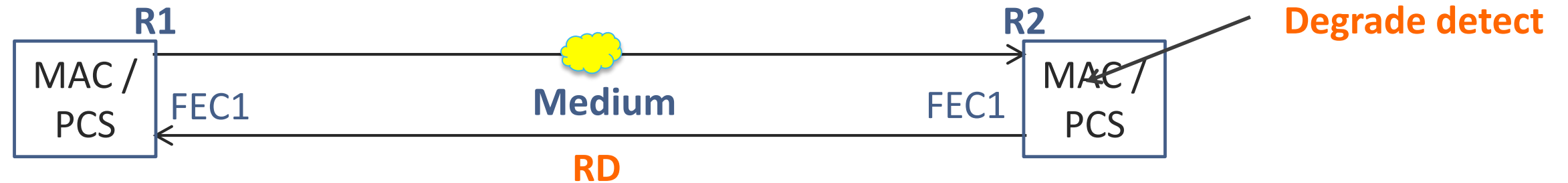
---

# Pre-FEC Fault Example



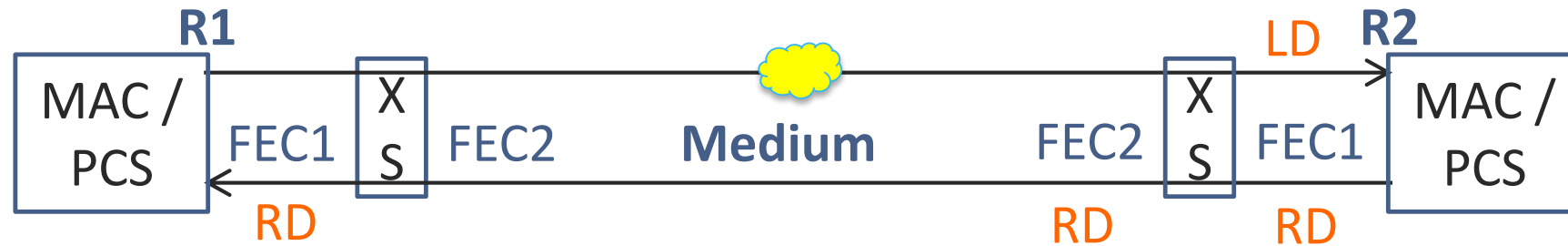
- Receive MAC in R2 detects pre-FEC count above the fault threshold
- RF sent to transmit MAC in R1
- Interface brought down

# Pre-FEC Degradate Example



- Receive MAC in R2 detects pre-FEC count above the degrade threshold
- Remote Degradate (RD) signal sent to the transmit MAC in R1
- Traffic not affected

# Pre-FEC Degradate Example with XS



- Receive XS at R2 detects pre-FEC error above degrade threshold
- Receive XS at R2 signals Receive MAC using LD (Local Degradate)
- MAC in R2 signals a RD (remote degrade) to the MAC in R1. The RD signal is regenerated by both the XS in R2 and in R1.
- Packet traffic not affected