100GBASE-KP4 full termination block encoding

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Supporters

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Introduction

- Addresses comment #10080.

- Draft 1.1 100GBASE-KP4 termination blocks coding with partial state pinning (PSP).

- Proposal to replace PSP with more conventional full state pinning (based on dabiri_01_0911).

Reasoning

- Full-state pinning enables efficient implementation of broader range of architectures.

- Broader consensus that enhanced performance over the channels under consideration is possible.

Randomized Full State Pin 45/46
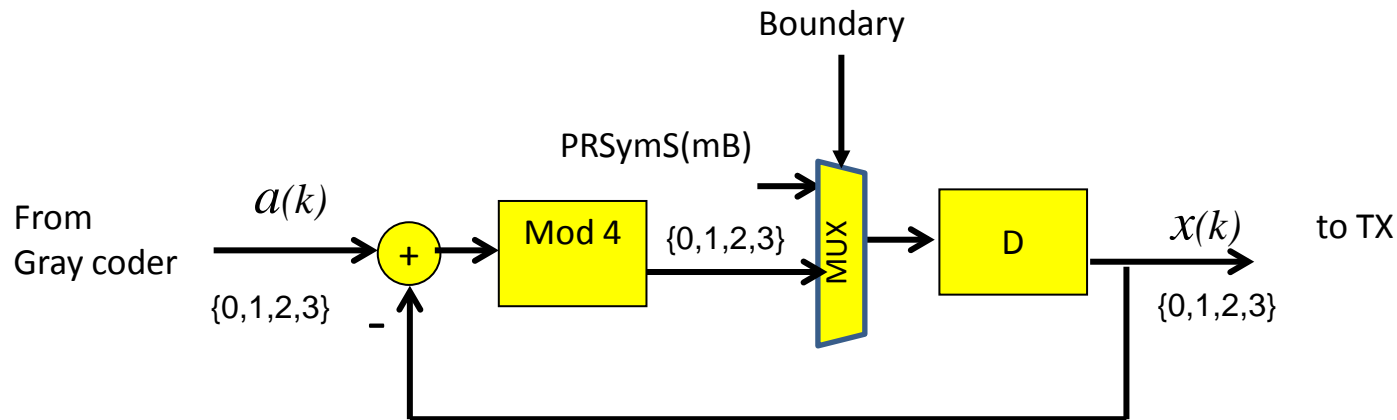
- Full state pinning works on PAM-4 symbols
- One boundary symbol for every 45 'user symbols'
- The channel state (and state of precoder) is forced at each Boundary to a randomized state from the Pseudo Random Symbol Sequence (PRSymS)
- The power spectrum is time-invariant and white
- Block VA, block DFE, and Extended Slicer Detector architectures are all supported.
- Block VA and block DFE detector targets of the form 1+ αD are enabled
- When the termination symbol is inserted, the input stream a(k) is halted to allow for termination symbol insertion. During the gap, the value of a(k) is irrelevant and the termination symbols are inserted in the output stream in place of a(k). The inserted termination symbol in effect resets the state of the precoder.

Draft 1.1 termination block

- Termination block (46:45), 23 PAM4 symbols
  - 45 data bits (from FEC codeword)
  - 1 bit to force last pair to map to either +1 or -1 PAM4 encoded symbol
- The termination bit in combination with that data bit in the block, forces the termination symbol to 0 or 3 at the precoder output.

Proposed termination block

- Termination block (92:90), 46 PAM4 symbols
  - 90 data bits (from FEC codeword); 45 symbols
  - 2 termination bits; 1 symbol (termination symbol)
- Precoder output forced to the value of a randomly generated termination symbol.
  - Two bits at a time are mapped to one of four levels {0,1,2,3} of the precoder symbol.
- No change to symbol rate or PMA frame size.

Proposed PMA frame details

- Frame = 348 termination blocks = 32016 bits (16008 symbols)
  - 40 overhead bits
  - 23*5440/4 = 31312 codeword bits
  - 696 termination bits
  - 32016 total
- Reference factor 87
- FEC/PMA gearbox 40:90

Termination Symbol Generation

- Use same PRBS generator used for training frame.

  – Current proposal (lusted_3bj_01_0912) is PRBS13.

- Use two bits at a time and map these to 0, 1, 2, 3 in the same way proposed for the training frame.

- The termination symbol forces the output to the value derived from the PRBS generator.

- PRBS synchronized on transition from training or alert (for EEE) to data mode.

Other work

- Re-map the training and ALERT frame proposed in lusted_03_0912 and brown_01_0912, respectively.
  - Indentified changes are listed in an updated version of lusted_03a_0912.

Thanks!