OAM FEC During LPI

Austin, TX, USA

February 9, 2015

Jim Graba and Mike Tu

jgraba@broadcom.com

tum@broadcom.com

Contributors

- BZ Shen
- Ahmad Darabiha
- Steven Chen
- Ahmad Chini
- Peiqing Wang
- Mehmet Tazebay

Summary

- FEC justification
- FEC choices
- RS during OAM
- Choice comparison
- Proposal
- Motion

Advantages of using FEC

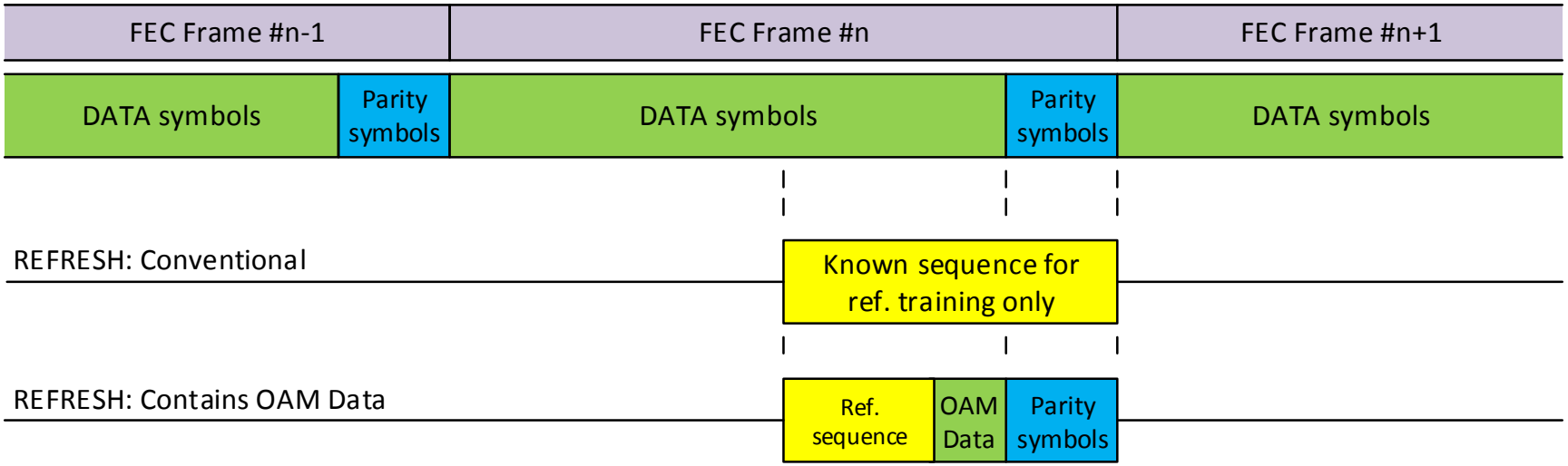
- Enable robust OAM channel during LPI mode
  - REFRESH signals always starts with known reference sequence for maintaining link integrity
  - Rest of REFRESH signal aligned to FEC data and parity symbols, which enabled FEC error protection
  - This is orthogonal to the OAM proposals in lo_3bp_02_115.pdf and lo_3bp_03_115.pdf
- Mechanism for passing user data at a reduced rate while in LPI mode
  - For example: 0.36 us (OAM + Parity) + 0. 72 us (User data) + 0.36 us (Reference data) => 9.259 Mbps
  - Future proofing for highly asymmetrical data transfer requirements

OAM Error Correction During LPI

- Proposal #1: Use existing FEC
  - Next slide
- Proposal #2: Use a repetition code
  - Simple
  - More suited to correcting one symbol

OAM During LPI Proposal

- Use the existing systematic block forward error correcting code (FEC).
- Align the LPI REFRESH signal with the FEC frame so that it consists of 3 sections:
  - Known reference sequence
  - OAM symbol
  - The entire FEC parity symbols
- Apply shortened FEC encoding and decoding on the OAM data symbols and the parity symbols.



RS vs Repetition Comparison

- RS power is more but doesn't greatly affect the power savings in LPI mode
- Need to pay the decoding latency in Normal mode anyway

	Reuse RS encoder/decoder	Repetition encoder/decoder
Area increase* (%)	0.42	2.9
FEC Power usage* (%) (Symmetric LPI)	4	0.4
Decoding Latency (ns)	~2160	< 20

*Area increase/power usage due to using FEC divided by estimated FEC encoder/decoder area/power during normal mode

Conclusion

- Use the existing RS code to correct OAM data during LPI

Proposed text

- Insert into 97.3.5.3 Refresh period signaling
- The OAM9 symbol and its associated parity symbols are XOR'ed with the scrambler stream at the same relative position to the RS boundaries as they occupy during normal mode. The parity is generated using Equation (97–2) with D_{405} … $D_1 = 0$ and $D_0 = OAM9$.

Motion

- Adopt FEC protection for OAM data during LPI using the proposed text on page 8 of graba_3bp_01a_0215.pdf.