



Enhanced FEC

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FEC Codes

- RS(255,239) is the baseline for which all codes should be compared since it is used in 802.3ah and is one of the most common codes.
- Enhanced codes include Low Density Parity Checks (LDPC), Convolutional, and Concatenated codes.

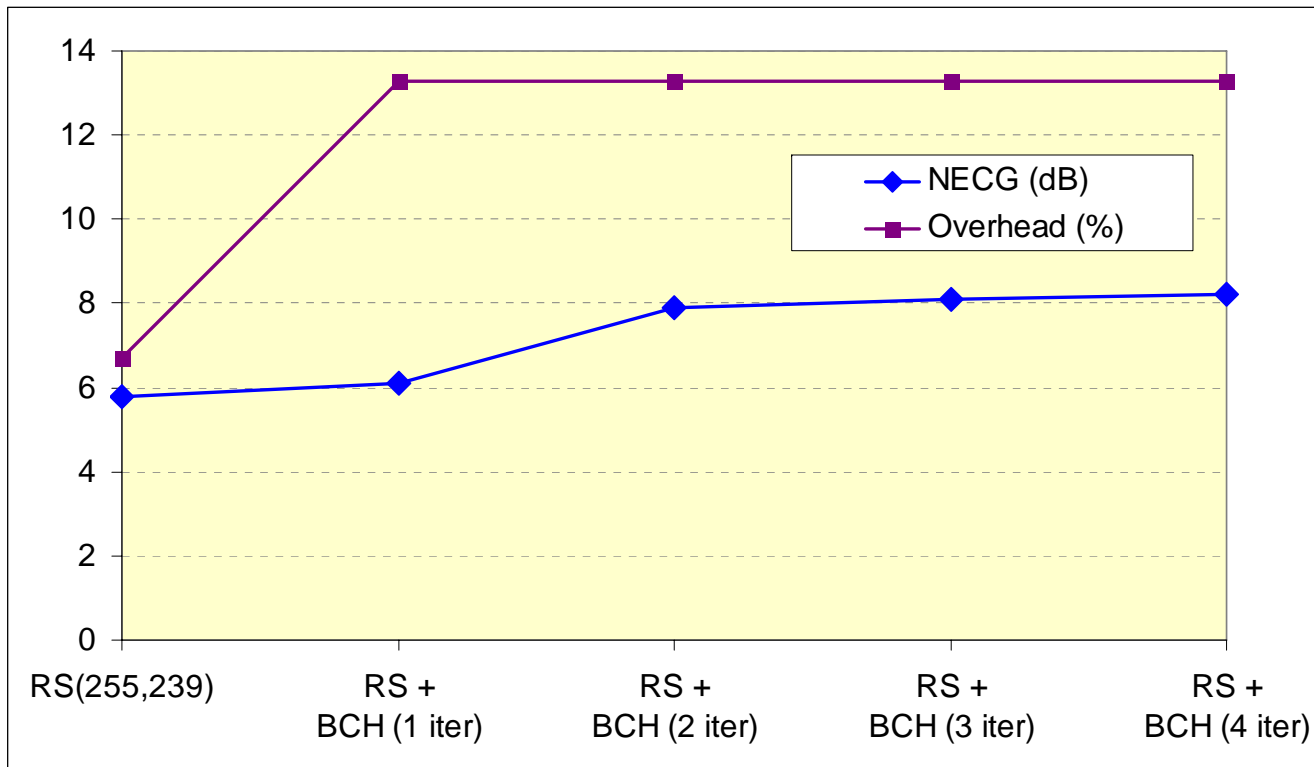
Turbo and LDPC code

- Turbo and LDPC codes can offer greater coding gain by significantly increasing the redundancy in the code word.
- Turbo and LDPC code typically have high overhead
 - Dual (inner and outer) FEC codes are used together in a turbo code
 - For example an inner 3:4 convolutional code will have 33% + a RS(255:239) will have 6.7% = 40% !!

Concatenated codes

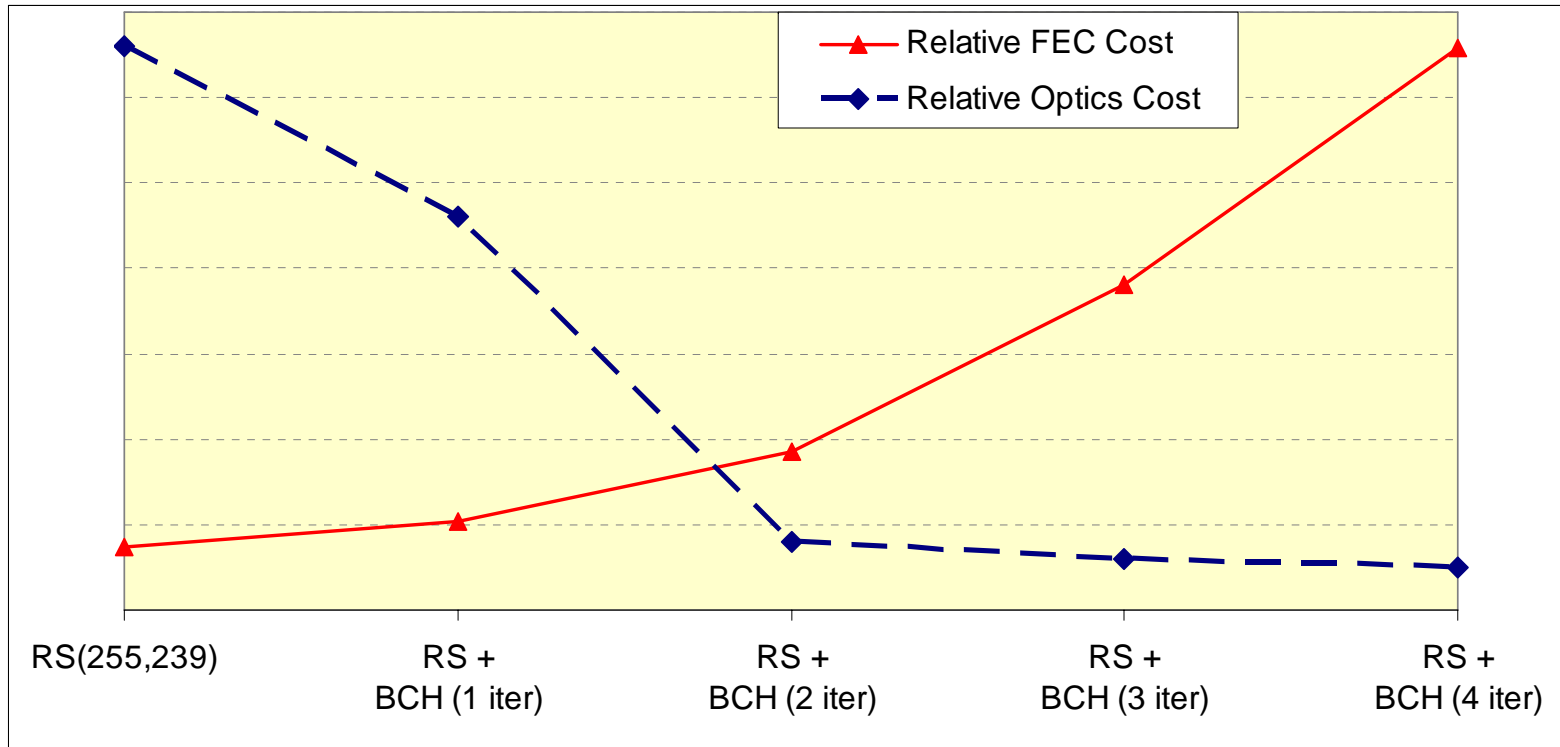
- Reed Solomon and BCH codes may be concatenated
- Iterative decoding improves the outcome.
- Decoding latency increases proportionally to number of iterations
- Concatenated codes come at a cost!!
 - Increased decoding hardware
 - Increased power consumption
 - Increased latency
 - Increased overhead
 - Increased cost
- Is the NECG increase worth this cost?

RS/BCH vs. RS



- RS/BCH concatenated code can offer ~2dB improvement of NECG
- RS/BCH has twice the overhead

Implementation Cost



- At 10Gbps iterative decoding will require multiple decoders resulting in
 - increased die area
 - decreased yield
 - increased power consumption
- Optics cost assumes exponential cost relative to NECG increase to maintain equivalent power budget
 - Scale factor of optics cost is not determined

Question?

- Is 2dB increase of NECG worth the cost?

Answer:

- if the FEC cost is less than the incremental optical cost.