Analysis of High Efficiency Coding Scheme for PAM3 Based Physical Link

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***Abstrac*t—Three-level pulse-amplitude-modulation (PAM3), is adopted in IEEE 802.3bp 1000BASE-T1 physical layer device (PHY) with 3 bits-2 trits (3B2T) line coding, Universal Serial Bus 4 version 2.0 (USB4 V2) and JESD239.01 graphics double data rate 7 SGRAM standard (GDDR7) with 11 bits-7 trits (11B7T) coding scheme. For higher physical link rate, 11B7T coding has higher bandwidth efficiency advantage with in general to ask Reed-Solomon forward error correction (RS FEC) to improve post-FEC Bit-Error-Ratio (BER) performance and reliability, especially in scenarios of prone to burst error introduced by decision feedback equalizer (DFE). In this article, optimized 11B7T coding schemes based on partitioned three grouped 3B2T and leftover 2 bits-1 trit, and related RS FEC are analysed for PAM3 based physical link, furthermore these 11B7T scheme methodology can evolve to non-power-of-two-level PAM, such as PAM6 with 18 bits-7 senary symbols based on partition to three grouped 5 bits-2 senary symbols and leftover 3 bits-1 senary symbol coding application.**

***Keyword*—BER, Constellation, FEC, Gray-Coding, PAM3**

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