

# **Generator polynomials for 1000BASE-T1 FEC**

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# 9-bit Field Generator Polynomial

- 9-bit field GF(2<sup>9</sup>)

- Field generator polynomial (primitive) :  $p(x) = x^9 + x^4 + 1$

- Lo\_3bp\_01a\_0914.pdf

- Primitive element:  $\alpha = 02_{HEX}$

- 9-bit symbol representation:

$(m_0, m_1, m_2, m_3, m_4, m_5, m_6, m_7, m_8) =$

$$m_8\alpha^8 + m_7\alpha^7 + m_6\alpha^6 + m_5\alpha^5 + m_4\alpha^4 + m_3\alpha^3 + m_2\alpha^2 + m_1\alpha + m_0, m_i \in \{0,1\}$$

# Reed-Solomon Code Generator Polynomial

- (450,406) Reed-Solomon code

- Generating polynomial:

- shen\_3bp\_01a\_0914.pdf

$$\begin{aligned}g(x) &= (x + \alpha^0)(x + \alpha)(x + \alpha^2) \cdots (x + \alpha^{43}) \\ &= x^{44} + \alpha^{217} x^{43} + \alpha^{328} x^{42} + \alpha^{11} x^{41} + \alpha^{57} x^{40} + \alpha^{33} x^{39} + \alpha^{434} x^{38} + \alpha^{193} x^{37} + \alpha^{46} x^{36} + \alpha^{66} x^{35} \\ &+ \alpha^{314} x^{34} + \alpha^{25} x^{33} + \alpha^{70} x^{32} + \alpha^{16} x^{31} + \alpha^{381} x^{30} + \alpha^{10} x^{29} + \alpha^{452} x^{28} + \alpha^{395} x^{27} + \alpha^{35} x^{26} + \alpha^{419} x^{25} \\ &+ \alpha^{510} x^{24} + \alpha^7 x^{23} + \alpha^{447} x^{22} + \alpha^{50} x^{21} + \alpha^{85} x^{20} + \alpha^{37} x^{19} + \alpha^{207} x^{18} + \alpha^{99} x^{17} + \alpha^{199} x^{16} + \alpha^{311} x^{15} \\ &+ \alpha^{214} x^{14} + \alpha^{403} x^{13} + \alpha^{500} x^{12} + \alpha^{498} x^{11} + \alpha^{319} x^{10} + \alpha^{114} x^9 + \alpha^{137} x^8 + \alpha^{327} x^7 + \alpha^{100} x^6 + \alpha^{253} x^5 \\ &+ \alpha^{320} x^4 + \alpha^{317} x^3 + \alpha^{166} x^2 + \alpha^{98} x + \alpha^{435}\end{aligned}$$

- T=22 erroneous 9-bit symbols per codeword of size 450 9-bit symbols can be corrected.

# Motion

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- Adopt
  - 1) field generator polynomial in page 2 and
  - 2) RS code generator polynomial in page 3of shen\_3bp\_01\_1114.pdf for 1000BASE-T1 FEC