97.3.4 PMA training side-stream scrambler polynomials

The PCS Transmit function employs side-stream scrambling. If the parameter config provided to the PCS by the PMA PHY Control function via the PMA_CONFIG.indication message assumes the value MASTER, PCS Transmit shall employ

$$g_M(x) = 1 + x^{13} + x^{33}$$

as transmitter side-stream scrambler generator polynomial. If the PMA_CONFIG.indication message assumes the value of SLAVE, PCS Transmit shall employ

$$g_S(x) = 1 + x^{20} + x^{33}$$

as transmitter side-stream scrambler generator polynomial. An implementation of master and slave PHY side-stream scramblers by linear-feedback shift registers is shown in Figure 97–8. The bits stored in the shift register delay line at time n are denoted by $Scr_n[32:0]$. At each symbol period, the shift register is advanced by one bit, and one new bit represented by $Scr_n[0]$ is generated. The transmitter side-stream scrambler is reset upon execution of the PCS Reset function. If PCS Reset is executed, all bits of the 33-bit vector representing the side-stream scrambler state are arbitrarily set. The initialization of the scrambler state is left to the implementor. In no case shall the scrambler state be initialized to all zeros.

~~*NOTE: The training scrambler has not been selected.*~~

~~*The PCS Transmit function employs side-stream scrambling for generating 2-level PAM PMA training sequences as shown in Figure 97–8. An implementation of MASTER and SLAVE PHY side-stream scramblers is shown in the “Main PN sequence” box. The bits stored in the shift register delay line at time n are denoted by $Scr_n[32:0]$. At each symbol period, the shift register is advanced by one bit, and one new bit represented by $Scr_n[0]$ is generated. The transmitter side-stream scrambler is reset upon execution of the PCS Reset function. If PCS Reset is executed, all bits of the 33-bit vector representing the side-stream scrambler state are arbitrarily set. The initialization of the scrambler state is left to the implementor. In no case shall the scrambler state be initialized to all zeros.*~~

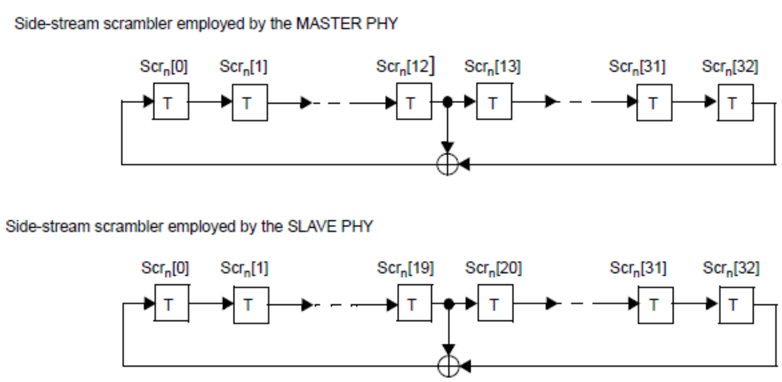

Figure 97–8—A realization of side-stream scramblers by linear feedback shift registers

97.3.4.1 Generation of S_n

During PMA training, the training pattern is embedded with indicators to establish alignment to the RS FEC block and the 15 partial frames that comprise the block. The last partial frame is embedded with an information field used to exchange messages between link partners. PMA training signal encoding is based on the generation, at time n, of the bit S_n. The first bit is inverted in the first 14 partial frames of each RS FEC block. The first 96 bits of the 15th partial frame is XOR'd with the contents of the Infofield.

$$S_n = \begin{cases} Scr_n[32] \oplus \mathrm{Infofield}_{(n \bmod 180)} & if\ 2519 < (n \bmod 2700) < 2616 \\ Scr_n[32] \oplus 1 & else\ if\ (n \bmod 180) = 0 \\ Scr_n[32] & otherwise \end{cases}$$

~~*PMA training signal encoding rules are based on the generation, at time n, of the bit Sa_n. The bit is generated in a systematic fashion using the bits in Scr_n[32:0]. For both MASTER and SLAVE PHYs, they are obtained by the same linear combinations of bits stored in the transmit scrambler shift register delay line. The bit is generated using the bit Scr_n[0] and the equations in Figure 97–8 in the "Derived sequences" box.*~~

97.3.4.2 Generation of symbol T_n

The bit S_n is mapped to the transmit symbol T_n as follows: if $S_n = 0$ then $T_n = +1$, if $S_n = 1$ then $T_n = -1$

~~*NOTE: Training patterns, training scrambler, sync bit, and info field have not been accepted as baseline.*~~

~~*The inversion the pair at 256 intervals ($n = k \times 256$, $k = 0, 1, 2, \ldots$) defines the RS boundary during data mode. If requested by the link partner, the PCS shall reset the training mode scrambler every 16384 periods aligned with the 256 symbol period inversion on pair A, which corresponds to the time instants $n = m \times 16384$, $m = 0, 1, 2, \ldots$*~~

~~*Notice that over the repeating time intervals of 16384 and of length 128, $m \times 16384 - 128 \le n < m \times 16384$, $m = 1, 2, 3, \ldots$, the PMA training pattern in pair A is XOR'ed with the InfoField. Thus, pair A transmits the InfoField, which communicates to the remote transceiver settings of THP and power backoff and other control information.*~~