Efficient Transmitter Design Techniques in Digital Communication

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Modulation	Rows (for n_{ldpc} = 64 800)	Rows (for n_{ldpc} = 16 200)	Columns
8PSK	21 600	5 400	3
16APSK	16 200	4 050	4
32APSK	12 960	3 240	5

Fig. 1: Bit Interleaver Structure for various mapping schemes

Contents

***Abstract*—A brief description about the Efficient Transmitter Design techniques. Which includes Interleaver/Deinterleaver for combating bursty errors, Physical Layer Framing for the efficient detection of Frame starting, and Pulse Shaping for combating the InterSymbol Interference.**

1. Interleaver/Deinterleaver

For 8PSK, 16APSK, and 32APSK modulation formats, the output of the LDPC encoder shall be bit interleaved using a block interleaver. Data is serially written into the interleaver column-wise, and serially read out row-wise (the MSB of BBHEADER is read out first, except 8PSK rate 3/5 case where MSB of BBHEADER is read out third).

Fig. **??** shows the various interleaving methods. The configuration of the block interleaver for each modulation format is specified [**?**].

2. Physical Layer Framing(PLFRAMING)

- In order to form the PLFRAME which is used for receiver synchronization, a header is inserted in the beginning of each frame.
- If pilots are used, then a 36 symbols pilot field is inserted every 16 slots of data symbols. Given that a PLFRAME cannot terminate to a

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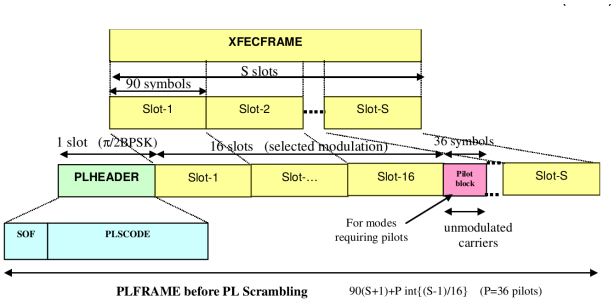

Fig. 2: Structure of PLFRAME.

Parameters of the *normal* and *short* PLFRAME

	normal frame: $\eta_{\text{LDPC}} = 64800$ bits				short frame: $\eta_{\text{LDPC}} = 16200$ bits			
η_{MOD}	S	α_{PIL}	K	η (%)	S	α_{PIL}	K	η (%)
QPSK: 2	360	22	33282	97.35	90	5	8370	96.77
8PSK: 3	240	14	22194	97.32	60	3	5598	96.46
16APSK: 4	180	11	16686	97.09	45	2	4212	96.15
32APSK: 5	144	8	13338	97.17	36	2	3402	95.24

Fig. 3: paramters of plframe

pilot field, the total number of pilot fields is $\alpha_{PIL} = \left\lfloor \frac{(S-1)}{16} \right\rfloor$

- The total length of the PLFRAME in symbols is

$$K = \begin{cases} 90 \times (S+1) & \textit{with out pilots} \\ 90 \times (S+1) + 36 \times \alpha_{PIL} & \textit{with pilots} \end{cases} \tag{2.1}$$

- The different frame formats,parameters of the normal andshort DVB-S2 frame for all constellation formats were tabulated in above table as specified in [**?**]

3. Pulse Shaping

- After randomization, the signals shall be square root raised cosine filtered. The roll-off factor shall be α = 0,35, 0,25and 0,20, depending on the service requirements.

- Suitable $H(f)$ will be choosen from the [**?**].

$$H(f) = \begin{cases} 1 & |f| < f_N(1-\alpha) \\ \left\{\frac{1}{2} + \frac{1}{2}\sin\frac{\pi}{2}\left[\frac{f_N - |f|}{\alpha}\right]\right\}^{\frac{1}{2}} & |f| = f_N(1-\alpha) \\ 0 & |f| > f_N(1-\alpha) \end{cases} \tag{3.1}$$