Calculation of the Necessary Bandwidth
for SATELLINE-3AS(d) Epic Radio Modem

ANNEX 1

Technical Clarification on the Underlying Factors to the Calculation of the Necessary Bandwidth

SATELLINE-3AS Epic radio data modem uses CML FX919B integrated circuit for encoding the data to the Tx modulator and further to the other stages of the transmitter. The encoder block of the FX919B circuit translates the binary data to 4-level symbols. Each symbol contains the information of two bits. As a consequence, the maximum deviation step does not occur very often.

After encoding, the data symbols are passed through a linear-phase lowpass filter with a 'Root Raised Cosine' frequency response defined by the function

$$
\begin{aligned}
H(f) &= 1 && \text{for} \quad 0 \le f < (1-b)/(2T) \\
&= \text{square root of } \{0.5\,[1 - \sin(\pi T\,(f - 0.5/T)/b)]\} && \text{for } (1-b)/(2T) \le f \le (1+b)/(2T) \\
&= 0 && \text{for } (1+b)/(2T) < f \\
&\text{, where } b = 0.2 \text{ and } T = 1/\text{symbol rate,}
\end{aligned}
$$

to eliminate the high frequency components of the modulating signal.

As a result, SATELLINE-3AS Epic radio modem meets the requirements of EN 300 113-1 and EN 300 220-1 standards for the adjacent channel power, i.e.

- 70 dB below the carrier (no need to be below 0.2 uW=–37 dBm) @25 kHz channel spacing, and
- 60 dB below the carrier (no need to be below 0.2 uW) @12.5 kHz channel spacing

and the radio modem also complies with the emission masks outlined in §90.210 of FCC rules.

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