5G_BER_Analysis_FBMC

Where To Find This Example

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Design Notes

5G BER Analysis with Convolutional Encoding, 64QAM and FBMC Modulation

This example demonstrates:

The use of 5G candidate waveform FBMC modulator and demodulator

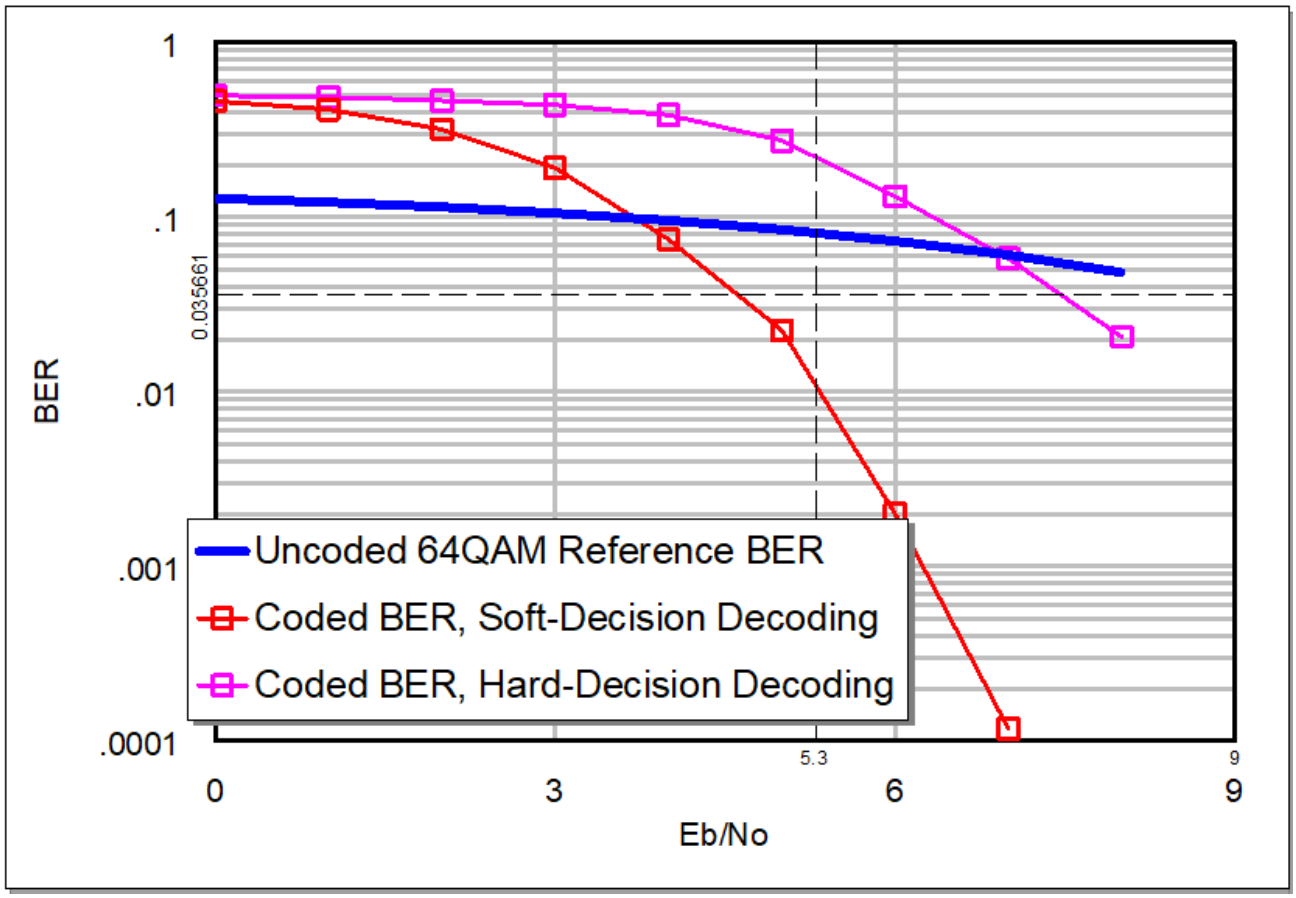
The impact of convolutional encoding on BER performance.

The use of a 64QAM mapper/demapper.

This example shows how a link with channel coding and FBMC modulation can be setup to analyze BER performance. The BER meter at the end of the link controls the power sweep of the AWGN channel and automatically compares the received digital data with the output of random digital source block (SRC_D). The PWR value is equivalent to Eb/N0 with respect to the uncoded bits (input to convolutional encoder). By default the QAM mapper will generate a gray encoded constellation of a user-defined size (M).

Two decoder types, hard and soft decisions, are implemented and the BER plot shows the result from both. For low Eb/N0 levels, encoded BER performance (red curve) is worse than that of reference 64QAM (blue curve). However, the benefit of convolutional encoding "kicks in" at higher Eb/N0 levels; for hard decision decoding, the cross-over occurs at an Eb/No of 7dB, while for soft decision decoding this occurs at about 4dB.

The VSS BER curve (red points) in the "BER" graph will be generated faster if the spectrum measurement is disabled.



Below are two equivalent example settings for the AWGN block:

PWRTYP parameter is set to Eb/N0 (dB); power level is set to PWR - 10*log10(2). The convolutional encoder of rate 1/2 generates two output bits for each input bit. Therefore, the Eb/N0 at its output is reduced by a factor of 2.

PWRTYP parameter is set to Es/N0 (dB); power level is set to PWR + 10*log10(3). The 64QAM mapper generates a symbol for every 6 (encoded) bits it receives, which is translated to one symbol for every 3 uncoded bits. Therefore, Es/N0 is equal to 3 times the Eb/N0 at the input of the system.

For details of the FBMC waveform, please refer to the help file:

Help > VSS System Block Catalog > Modulation > FBMC Modulation Block: FBMC_MOD