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| Project | **IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>** |
| Title | **Low Coding Rate for QPSK** |
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| Re: | Contribution for a small packet of Band-Width request |
| Abstract | This document contains a suggestion for a low rate small encoded packet |
| Purpose | This proposal should be used for the bandwidth request packet when sent by itself |
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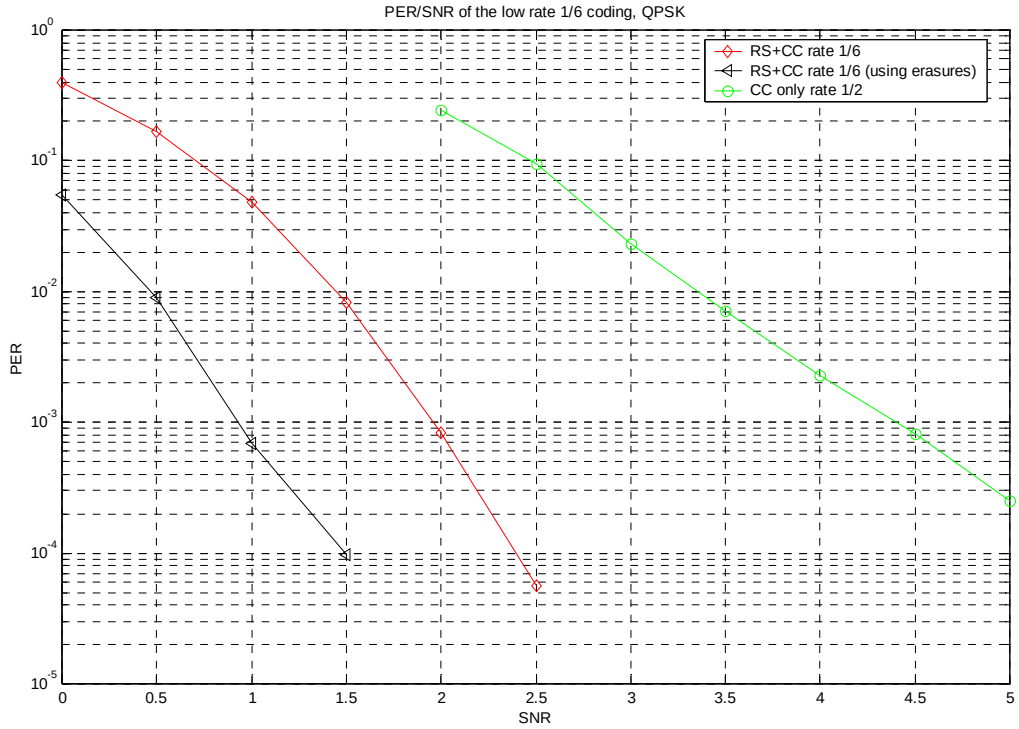
# Low Coding Rate for QPSK

The need to send short blocks (about 6 bytes) was raised due to the smallest packet to be sent (Bandwidth-Request). There could be a demand (still to be resolved in the MAC group) that this short packet (bandwidth request) can be sent on it's own and in a well known period of time (to enable deterministic demodulation and decoding). Due to the PHY granularity the smallest block size for the 256 FFT is 192 carriers (24 bytes for QPSK rate ½), therefore for this FFT size the coding rate could be lowered.

The concatenated scheme which is already used in the system fits perfectly (without changing the encoding/decoding manner) to reduce the coding rates below 1/2, by concatenating a RS(8,24,16) and CC (rate ½) we can go down to rate 1/6, and accommodate a 8 byte short packet for OFDM.

The following graphs show the PER of the 1/6 coding of the QPSK, the channel used was a static SUI1, and the system BW was 20MHz, for comparison the CC only (rate ½) is added.




As can seen the improvement is 2-3dB at PER of $10^{-2}$ , the PER of the concatenated scheme has a much sharper curve 1dB/decade at PER of $10^{-3}$, comparing to 0.5dB/decade of the convoultional coding.

This code reduction can be performed very easily without changing the way the decoding or encoding is performed, and making sure that the packet will go through, due to the SNR reduction.