IEEE P802.11
Wireless LANs

Title

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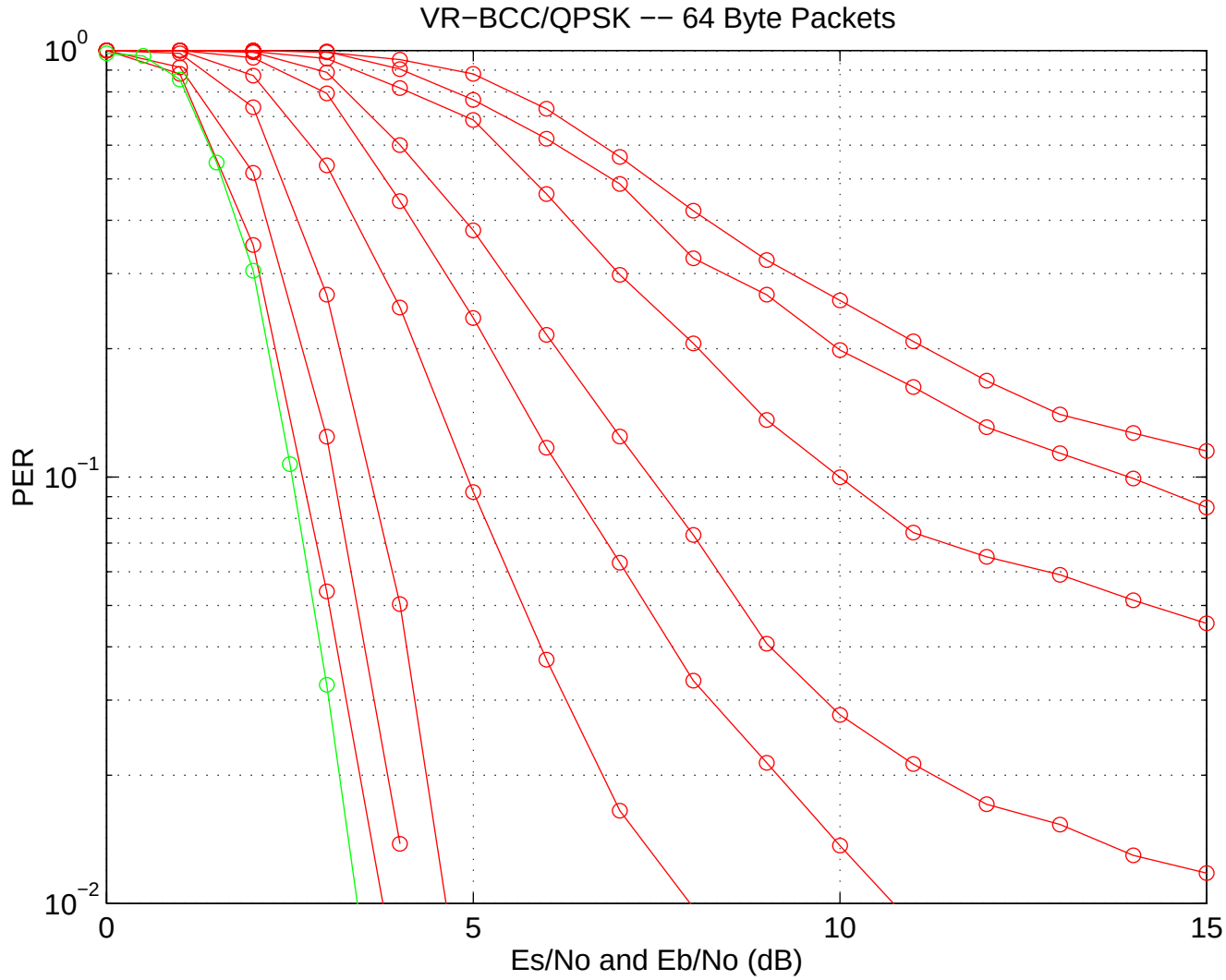
Abstract

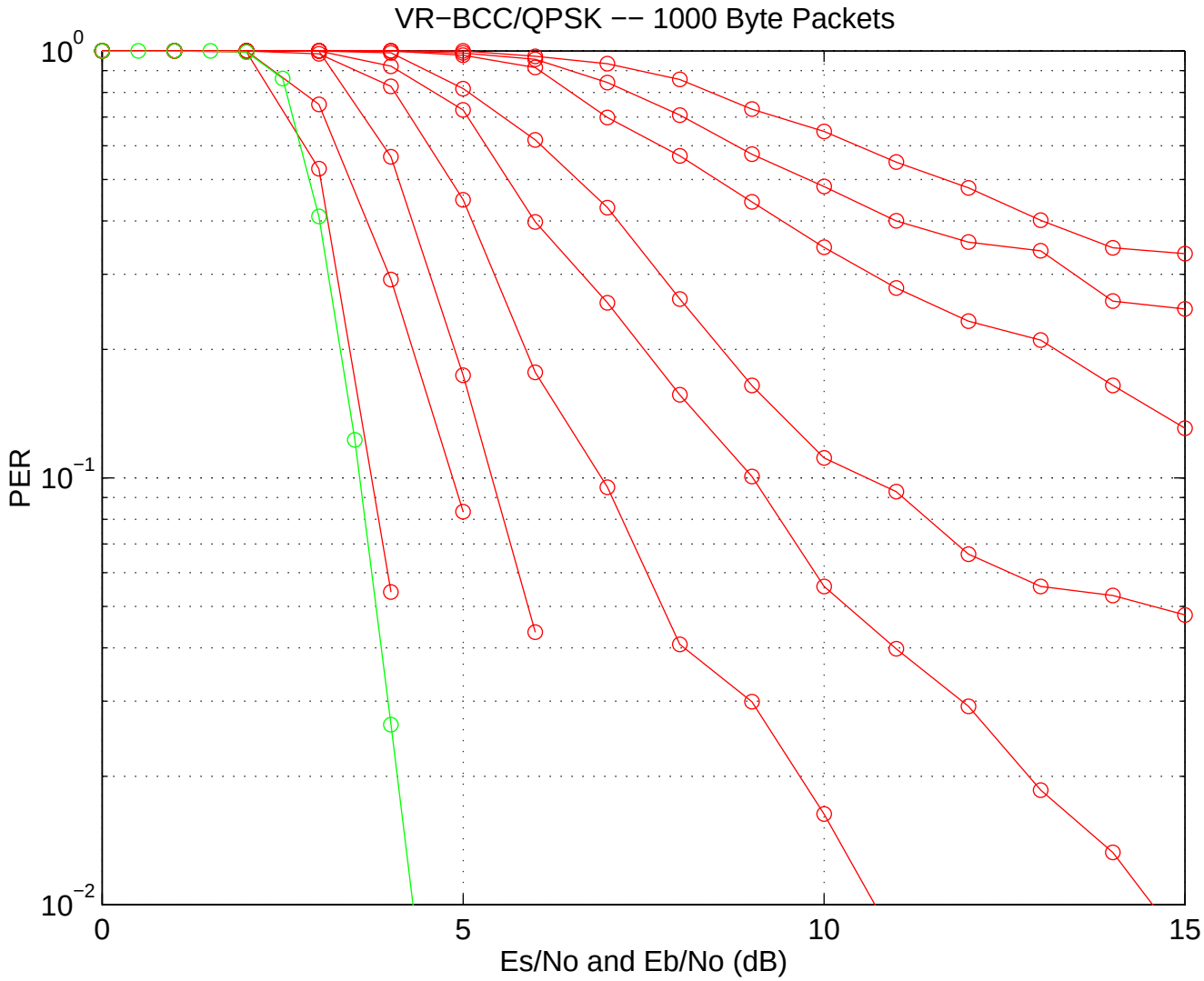
In an effort to fairly compare proposals to 802.11 TGb, a multipath channel model has been defined that is to be used by each proposer. For such a channel model to useful, there must be no ambiguity in its definition. It is shown here that the multipath channel model as defined in 802.11 document 97/157 does not fully removed all ambiguity, and that there exists a parameter that has been left unspecified that affects performance. Performance of the Alantro Communications system is shown for several settings of this parameter.

The multipath channel model specified for TGb is an exponentially decaying Rayleigh fading channel. The rate of delay is specified by T_{RMS}.

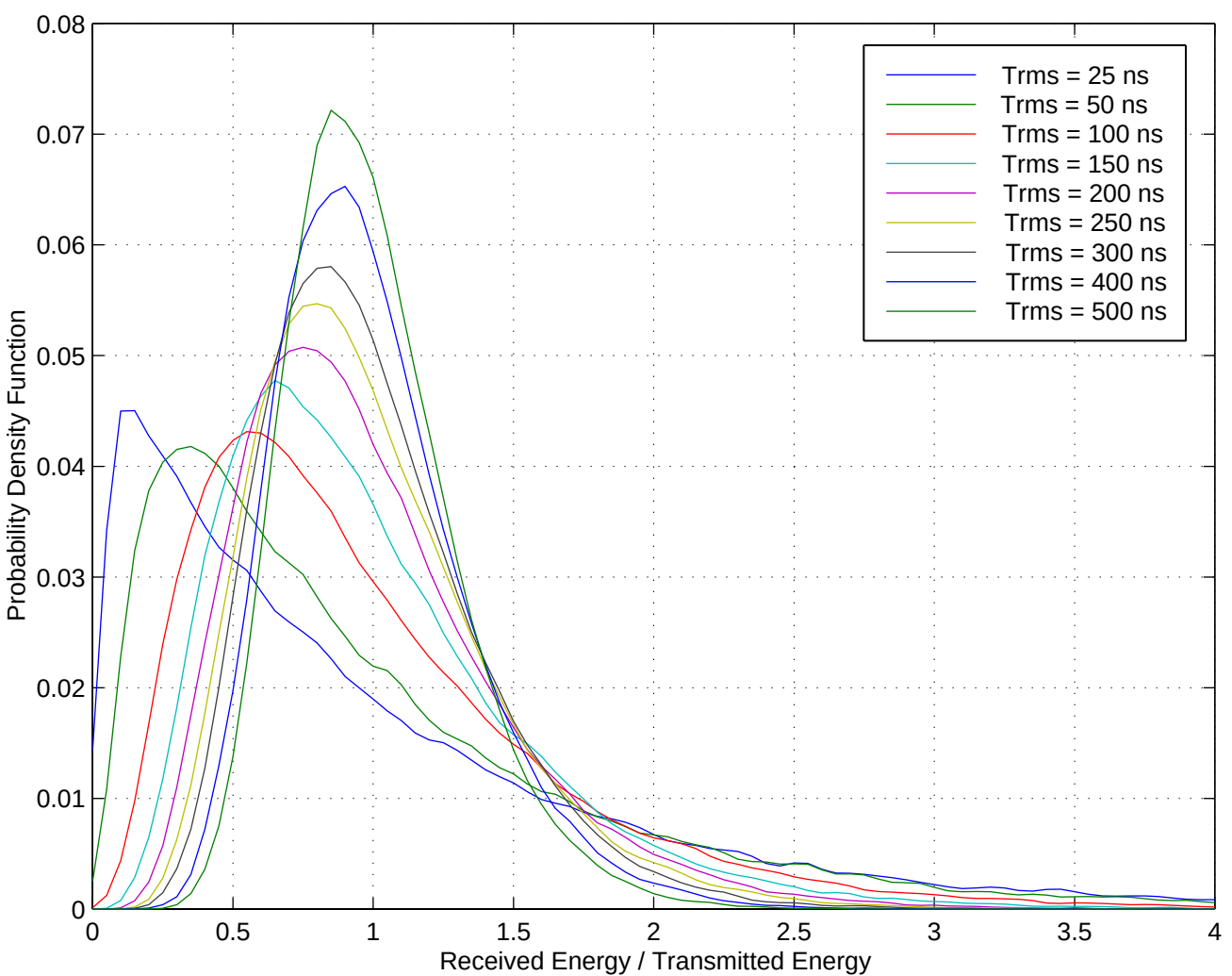
In the model the expected value of the received energy over the transmitted power is equal to unit, but the variance is **not** zero.

If the variance is set to zero by normalization of each channel, the Alantro proposal performs as follows for the 11Mbps rate. (T_{RMS} = 0, 25, 50, 100, 150, 200, 250, 300, 400, 500ns)



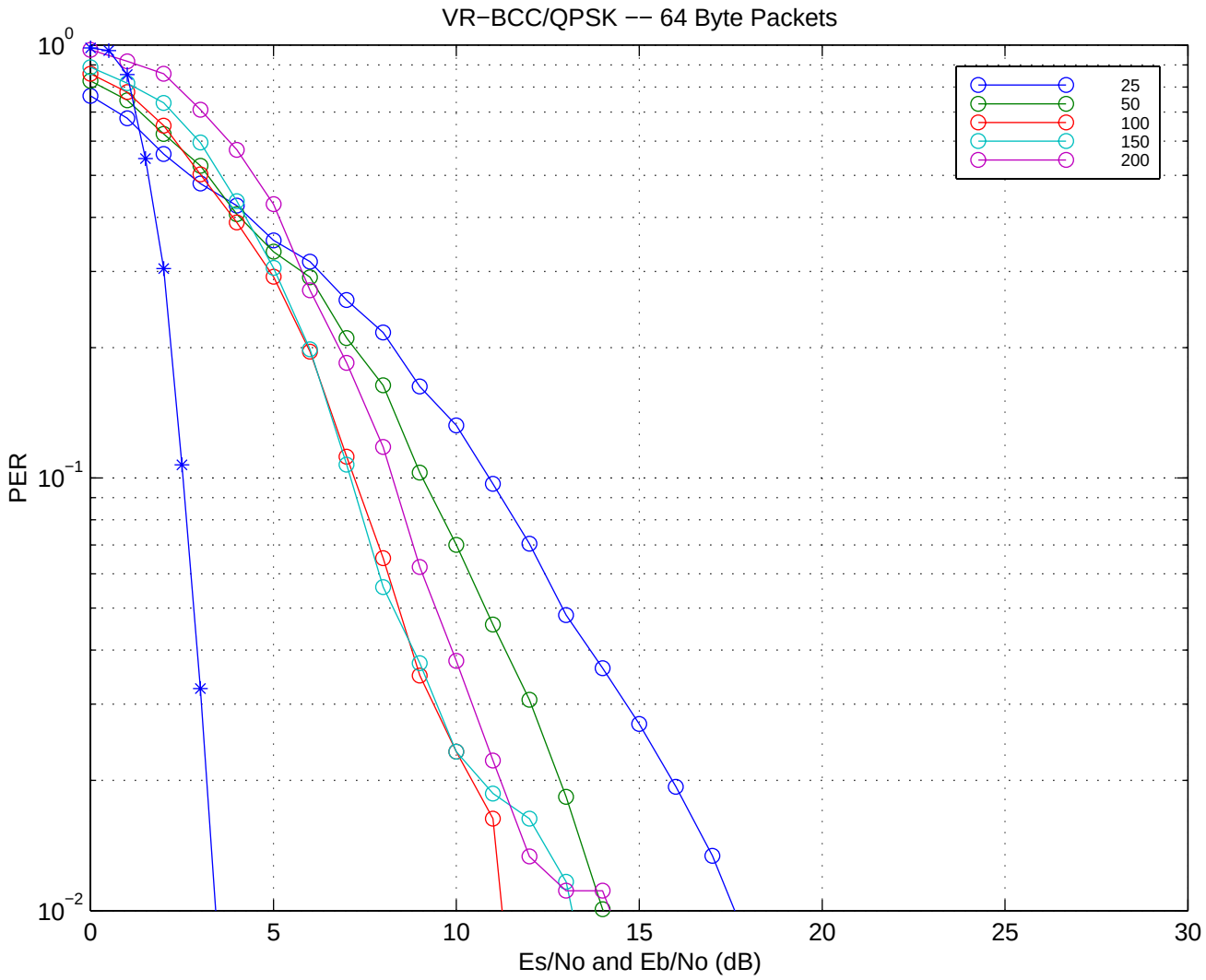

VR−BCC/QPSK −− 1000 Byte Packets
PER
10^{0}
10^{-1}
10^{-2}
0
5
10
15
Es/No and Eb/No (dB)

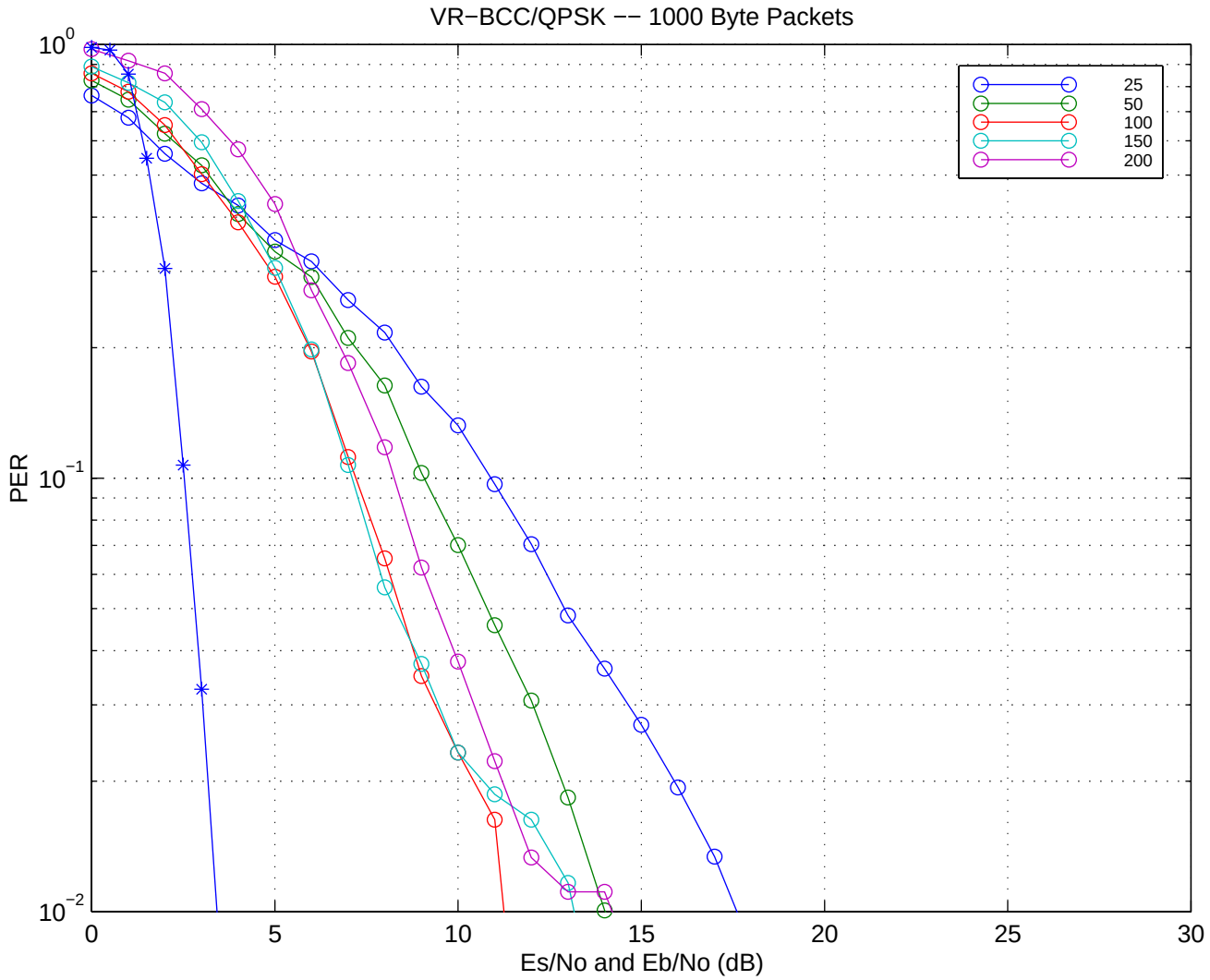
In the following plot, the probability density function of the ratio of received energy to the transmitted energy is plotted for various T_{RMS} values. (T_S = 1/(11e6) seconds)


Trms = 25 ns
Trms = 50 ns
Trms = 100 ns
Trms = 150 ns
Trms = 200 ns
Trms = 250 ns
Trms = 300 ns
Trms = 400 ns
Trms = 500 ns
Probability Density Function
Received Energy / Transmitted Energy
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.5
1
1.5
2
2.5
3
3.5
4

From these p.d.f. curves, it can be seen that for low T_{RMS} the variance of the received over the transmitted energy is higher for low values of T_{RMS}.

This means that that for two values of T_{RMS}, it is possible that the performance is worse for the shorter value of T_{RMS}.

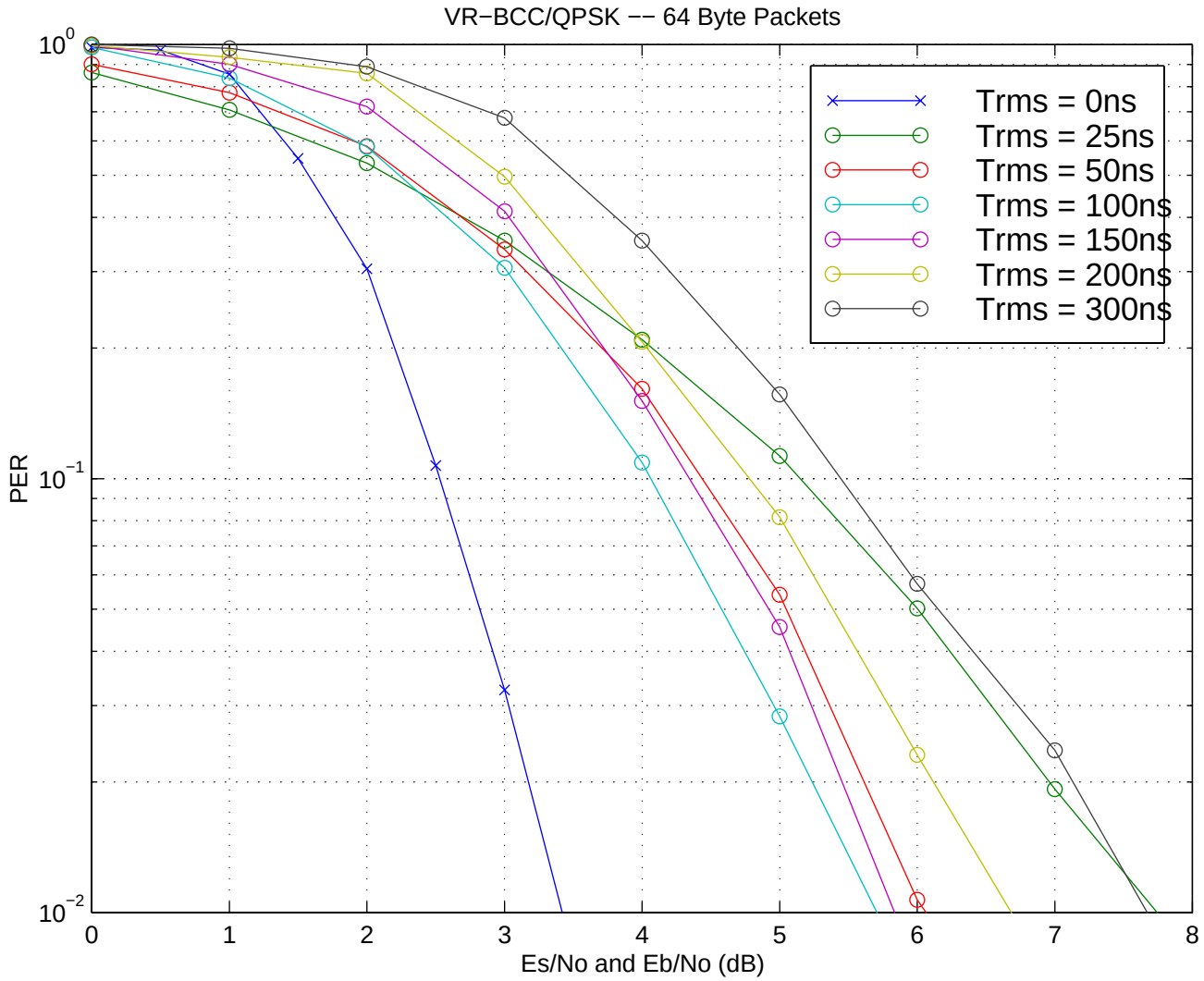

VR−BCC/QPSK −− 64 Byte Packets
PER
Es/No and Eb/No (dB)
25
50
100
150
200


VR−BCC/QPSK −− 1000 Byte Packets
PER
Es/No and Eb/No (dB)
25
50
100
150
200

In the specification, the sampling time, T_S , is given an upper bound:

"... Ts in the simulation shall be no longer than the smallest of 1/(signal bandwidth) or $T_{RMS}/2$..."

Unfortunately, the value of T_S effects the variance of the received energy.


VR−BCC/QPSK −− 64 Byte Packets
PER
Es/No and Eb/No (dB)
Trms = 0ns
Trms = 25ns
Trms = 50ns
Trms = 100ns
Trms = 150ns
Trms = 200ns
Trms = 300ns