IEEE P802.11
Wireless LANs

GBT9 Performance in Multipath Channel

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Abstract

GBT9 offers the possibility of using a total of 1 to 12 orthogonal codes, at the same time, in order to obtain a variable data rate. Data is presented for simulations which show the Packet Error Rates (PER) for 1, 2, 3, 4, 5, 6, 7, 8, 10, and 12 codes. These codes produce data rates of 1.83, 3.67, 5.50, 7.33, 9.17, 11.00, 12.83, 14.67, 18.33 and 22 Mb/s, respectively. The performance of these data rates is shown for RF propagation channels which are impaired by exponentially fading, as described by doc: IEEE P802.11-97/157r1. The results plot PER for packet lengths of 64 and 1000 bytes, for each of these data rates, against Trms for the channel.

Introduction

GBT9 offers the possibility of using a total of 1 to 12 codes. Eleven of these are advanced Barker codes. The twelfth is the cover code without the advanced Barker code (i.e. all 1's). These 12 codes are all orthogonal to each other, so they may be used simultaneously to transmit packets at a higher data rate than if only one code were to be used. The LSI implementation is straightforward, and easily permits any number of these codes to be used. The variable data rate enables each vendor to meet their goals for performance, cost and power consumption.

Below are the data rates produced by using each number of codes:

Codes	Data Rate in Mb/s
1	1.83
2	3.67
3	5.50
4	7.33
5	9.17
6	11.00
7	12.83
8	14.67
9	16.50
10	18.33
11	20.17
12	22.00

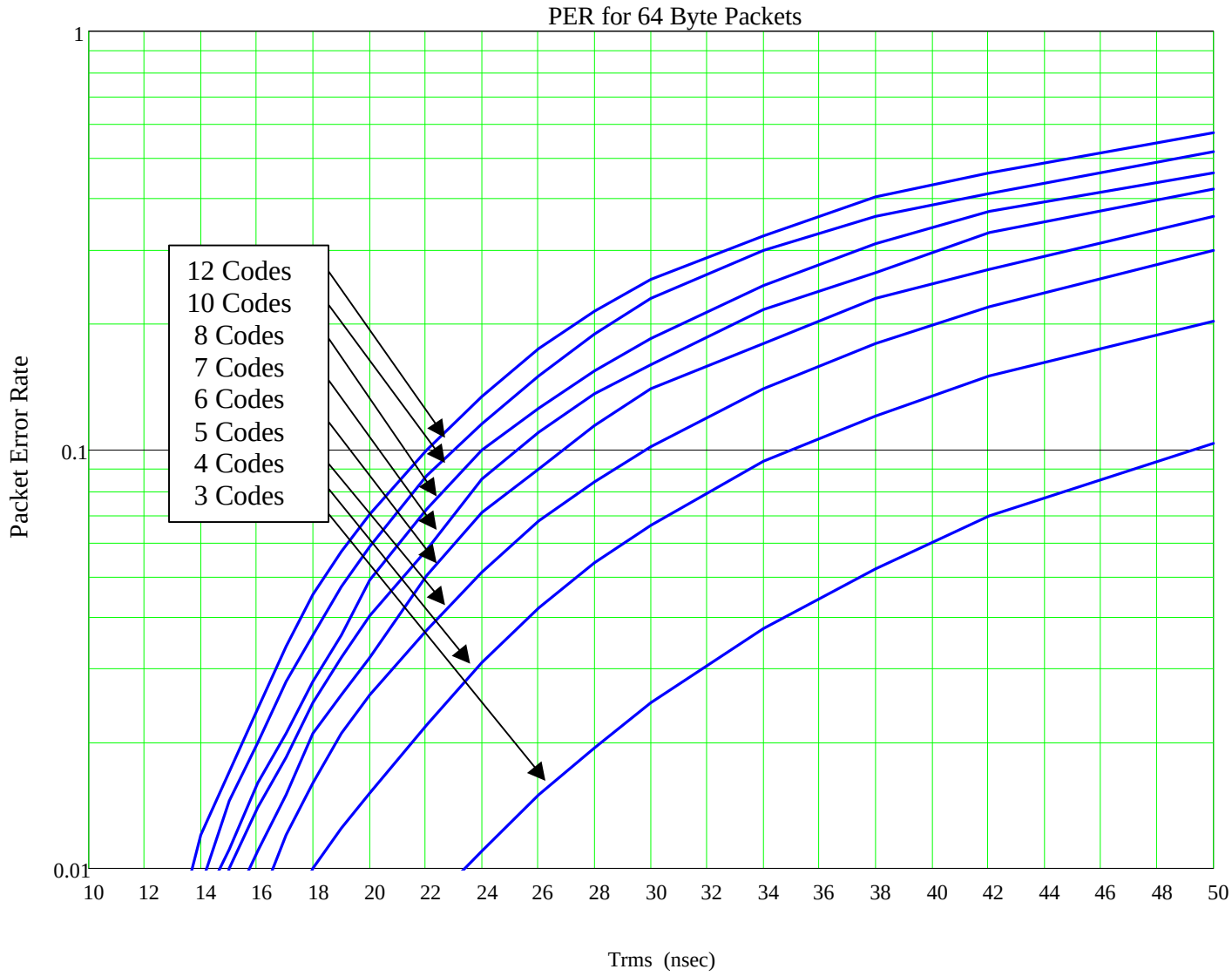

Figure 1. 64 byte packets, with 3 to 12 simultaneous codes

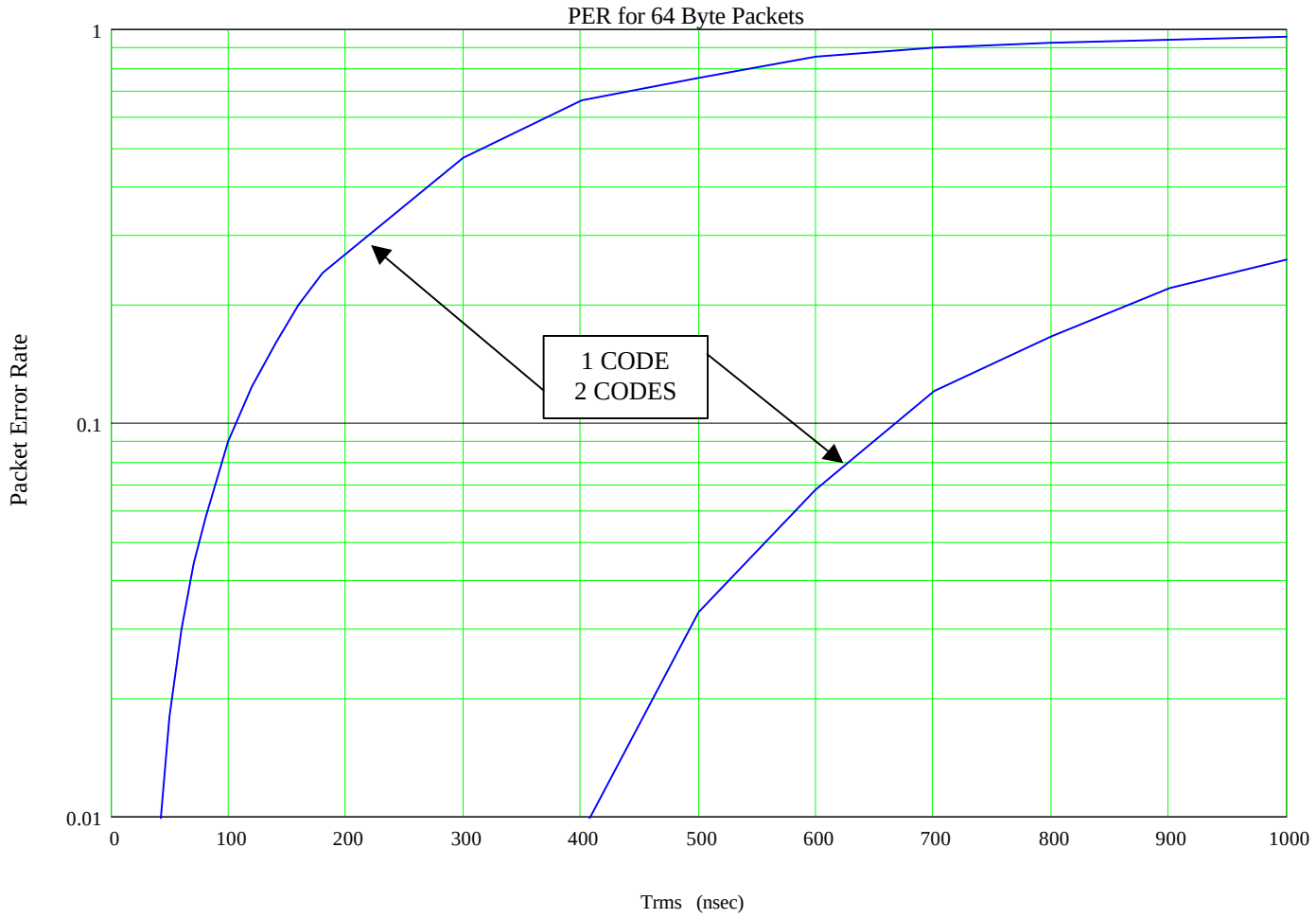

Figure 2. 64 byte packets, with 1 and 2 simultaneous codes

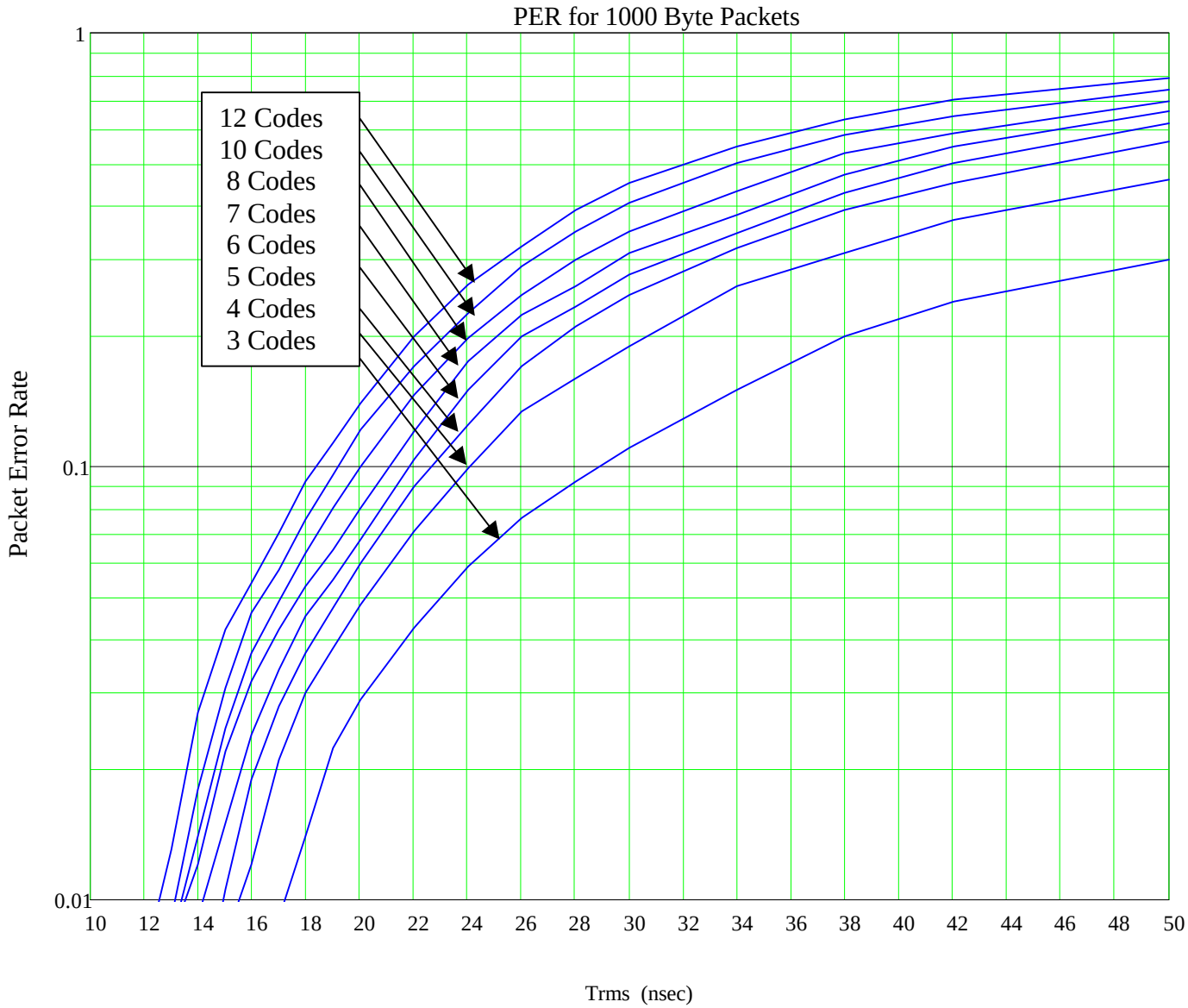

Figure 3. 1000 byte packets, with 3 to 12 simultaneous codes

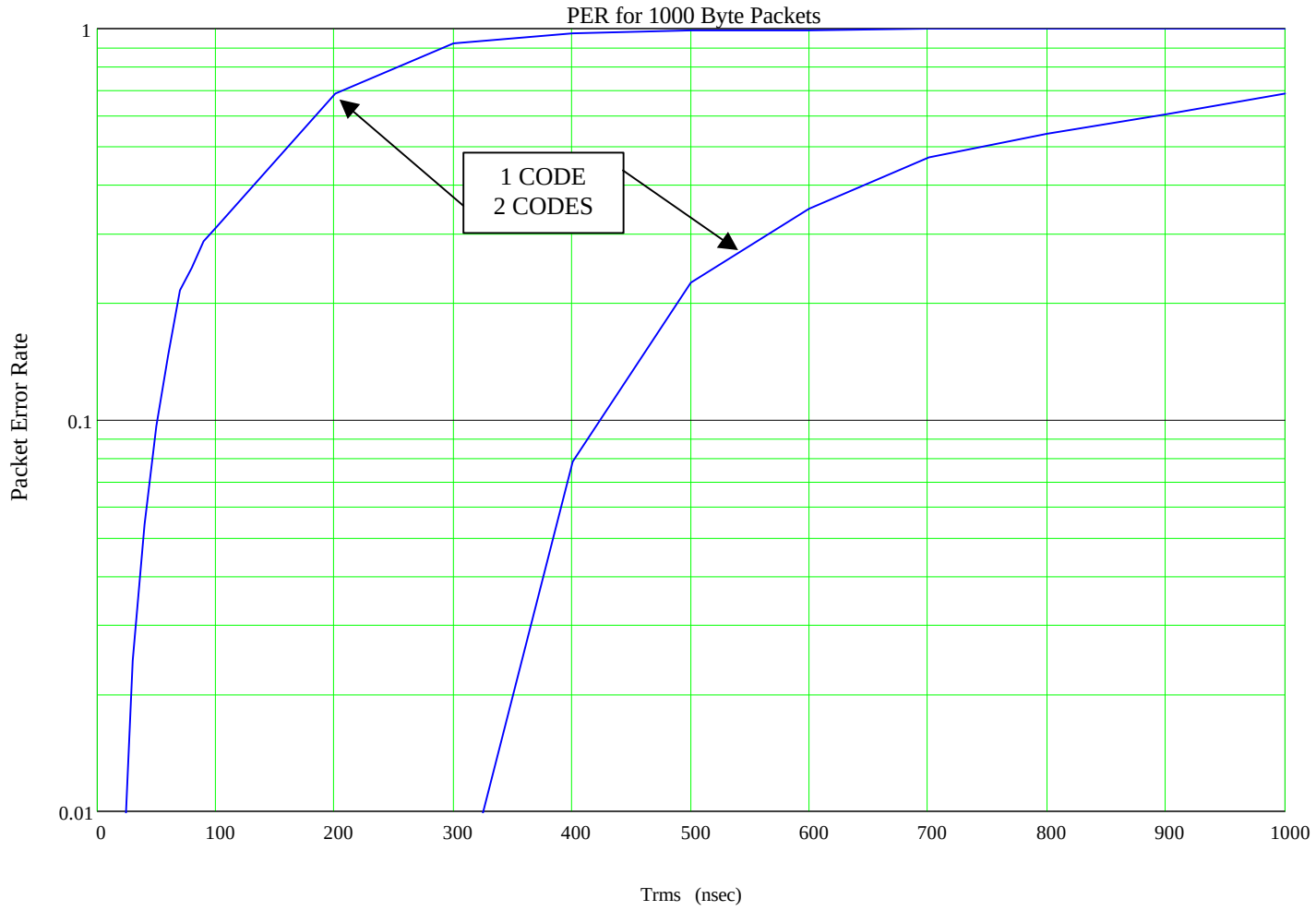

Figure 4. 1000 byte packets, with 1 and 2 simultaneous codes

Data

Figures 1, 2, 3, and 4 are presented as simulation results which show the Packet Error Rates (PER) for 1, 2, 3, 4, 5, 6, 7, 8, 10, and 12 codes. The cases for 9 and11 codes, respectively, have been examined in other documents and are not covered here.

Figure 1. shows the PER for Packets of 64 bytes length, for 3 to 12 codes, or data rates from 5.5 Mb/s to 22 Mb/s. The case for 1 and 2 codes are on a separate graph as they have a much greater Trms scale.

Figure 2. shows the PER for Packets of 64 bytes length, for 1 and 3 codes, or data rates of 1.83 and 3.67 Mb/s, respectively.

Figure 3. shows the PER for 1000 byte Packets, and for 3 to 12 codes, or data rates from 5.5 Mb/s to 22 Mb/s. As for the shorter packets, the case for 1 and 2 codes are on a separate graph as they have a much greater Trms scale.

Figure 4. shows the PER for 1000 byte Packets, for 1 and 2 codes, or data rates of 1.83 and 3.67 Mb/s, respectively.

Discussion

The major cause of PER is the payload, which uses a high rate modulation. The contribution of the relatively more robust BPSK header can be neglected.

There does not seem to be a preferred data rate. To state this another way, comparing the different number of codes, there is a monotonic and gradual progression in the trade-off of PER versus multipath impairment. This is true not only for any particular code, but also for performance across data rates, for any particular Trms.

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