QPRBS13 definition

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Overview

- QPRBS13 is not an appropriate test pattern for 400 Gb/s Ethernet
  - Does not include block termination
  - Does not include [mandatory?] precoding
  - These aspects of the test pattern should be removed
- QPRBS13 inverts every other cycle of the PRBS13 sequence
  - This is presumably done to ensure DC balance
  - This is not necessary
- Removing the inversion yields a test pattern with superior properties
  - Symbol balance
  - Baseline wander
  - Number of PAM4 sequences exercised
- Simple Gray mapping of a PRBS sequence to a PAM4 sequence is sufficient

“Quaternary PRBS13” patterns

Property	With inversion	Without inversion
Symbol count • 0 • 1 • 2 • 3	 2048 2101 2048 1994	 2047 2048 2048 2048
Baseline wander, pk-pk [1]	2.7%	2.3%
Transition density, min. [2] All transitions Transitions through 0 V Symmetrical transitions Symmetrical transitions through 0 V	 71.3% 45% 45% 20.6%	 71.3% 45% 45% 20.7%
Longest fully-represented sequence [3]	5 UI	6 UI

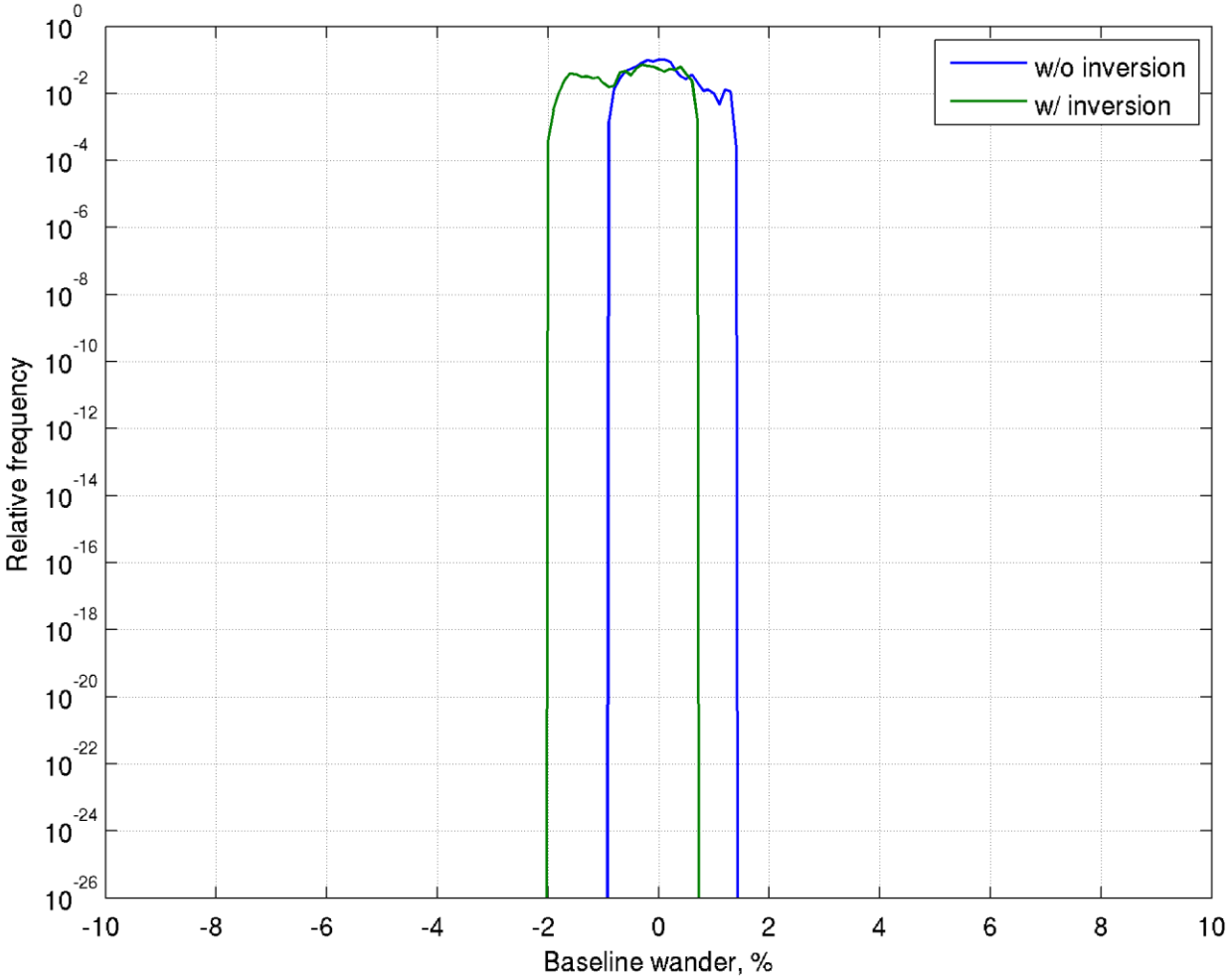
[1] Normalized to twice the transmitter steady-state output amplitude. Measured with high-pass corner frequency set to 1/10,000 of the signaling rate.

[2] Measured with the corner frequency set to 1/1,667 of the signaling rate.

[3] When a sequence of length n is “fully-represented”, all L^n combinations of L-level symbols appear in the test pattern.

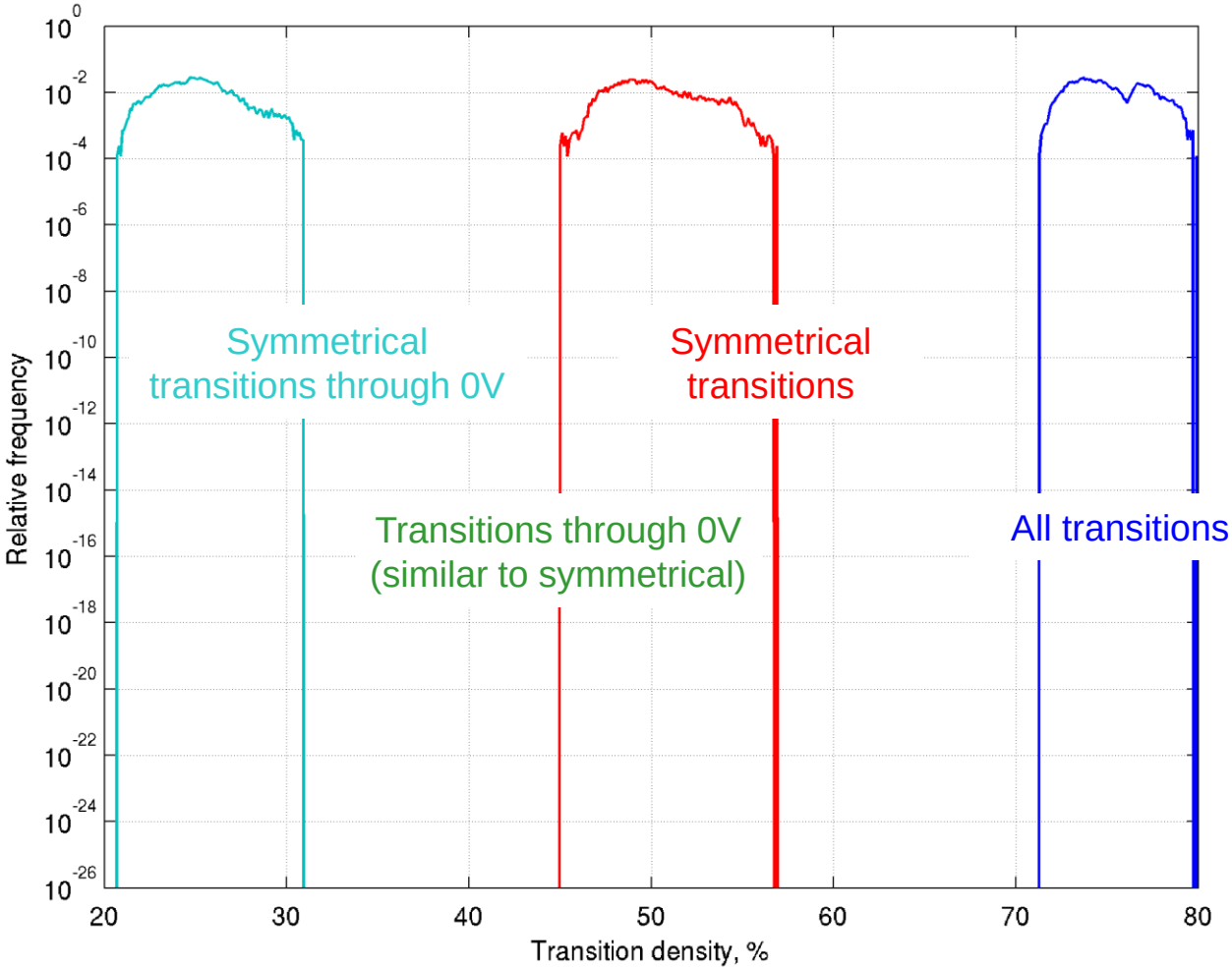
Backup slides

Baseline wander



- Normalized to twice the transmitter steady-state output amplitude
- Measured with corner frequency set to 1/10,000 of the signaling rate

Transition density



- Measured with the corner frequency set to 1/1,667 of the signaling rate
- Results similar with and without inversion