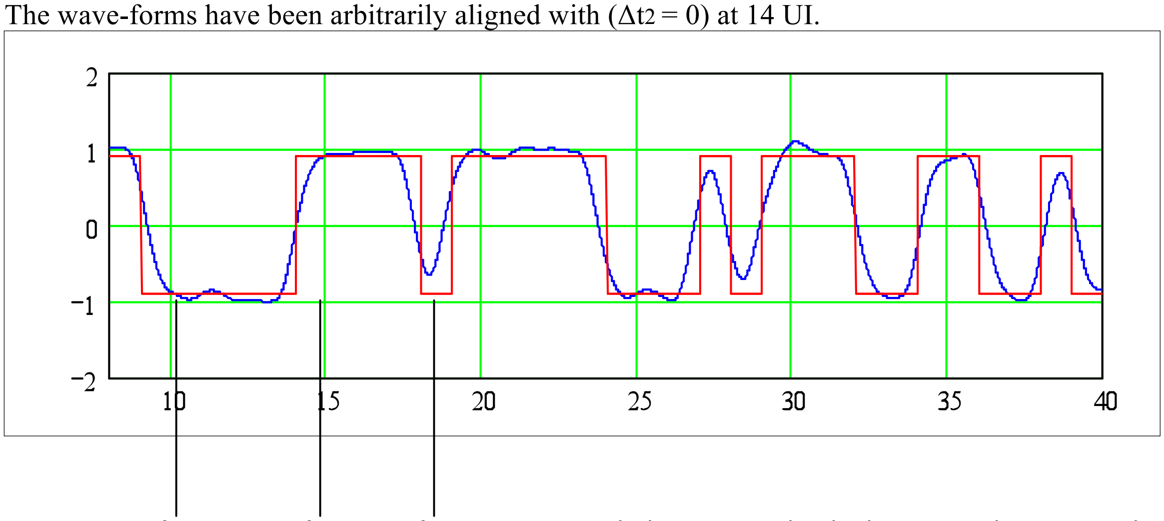
Proposed Data Dependent Jitter (DDJ) measurement (IEEE 802.3ba CL 85)

A high-resolution oscilloscope, time interval analyzer, or other instrument with equivalent capability may be used to measure DDJ and DDPWS. A repeating PRBS9 pseudo-random test pattern, 511 bits long, is used. For DDJ jitter measurements, the measurement bandwidth should be at least 12 GHz. If the measurement bandwidth affects the result, it can be corrected for by post-processing.

Establish a crossing level equal to the average value of the entire waveform being measured. Synchronize the instrument to the pattern repetition frequency and average the waveforms or the crossing times sufficiently to re-move the effects of random jitter and noise in the system. The PRBS9 pattern has 128 positive-going transitions and 128 negative-going transitions. The mean time of each crossing is then compared to the expected time of the crossing, and a set of 256 timing variations is determined. DDJ is the range (max-min) of the timing variations. Keep track of the signs (early/late) of the variations. Note, it may be convenient to align the expected time of one of the crossings with the measured mean crossing.

The following Figure x illustrates the method. The vertical axis is in arbitrary units, and the horizontal axis is plotted in UI. The waveform is AC coupled to an average value of 0, therefore 0 is the appropriate crossing level. The rectangular waveform shows the ideal crossing times, and the other is the waveform with jitter that is being measured. Only 32 UI are shown (out of 511). The wave-forms have been arbitrarily aligned with ($\Delta t_2 = 0$) at 14 UI.



Δt_1 Δt_2 =0 Δt_3 etc., such that every edge in the pattern is measured

$$DDJ = \max(\Delta t_1, \Delta t_1, \ldots \Delta t_n) - \min(\Delta t_1, \Delta t_1, \ldots \Delta t_n)$$