Proposed detail 68.6.4
N. Weiner comment on 802.3aq Draft 1.0
January 2005

68.6.4 OMA:rms noise ratio measurement - EXAMPLE 1

Table 68–3 gives the minimum transmitter OMA:rms noise ratio. Table 68–4 gives the OMA:rms noise ratio condition for the comprehensive stressed receiver tests. OMA:rms noise ratio is defined by the measurement method presented here.

Applying the square wave test pattern specified in Table 68-5, histograms of the ONE and ZERO levels are taken, with 1 UI wide windows at the positions indicated in Figure 68-XX.

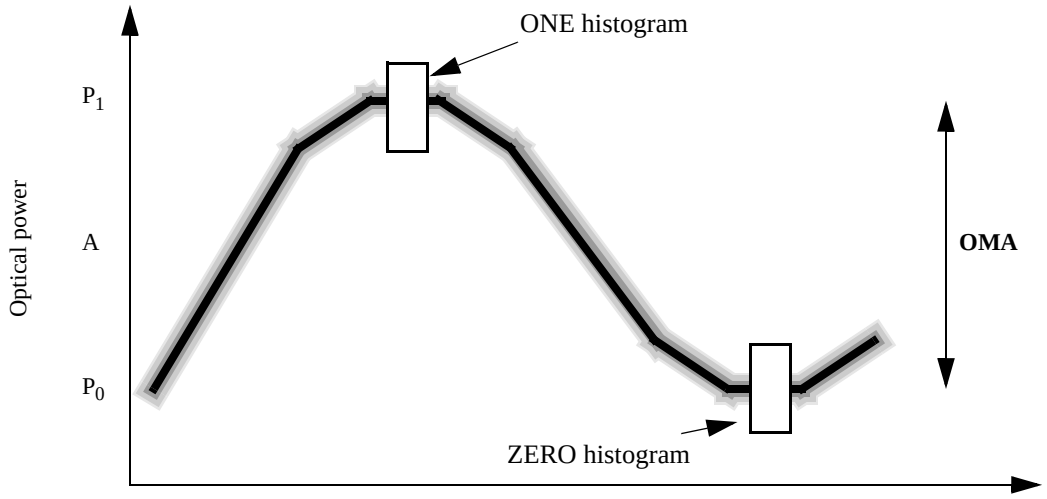

Figure 68-XX - ZERO and ONE histograms for OMA:rms noise ratio measurement

The OMA:rms noise ratio is given by:
:

$$\frac{\text{ONE mean - ZERO mean}}{0.5 \times (\text{ONE noise + ZERO noise})}$$

Where: ONE mean is the mean of the ONE histogram;
ZERO mean is the mean of the ZERO histogram;
ONE noise is the standard deviation of the ONE histogram;
ZERO noise is the standard deviation of the ZERO histogram.

The bandwidth of the oscilloscope is to be approximately equal to the bit rate (i.e. 10 Gbps). The low frequency cutoff is to be less than 1 MHz.

The measurement setup for transmitter OMA:rms noise ratio is given in Figure 68-XXX. The optical path and detector combination are configured for a single dominant reflection with an optical return loss specified in Table 68-3. The length of the test cable not critical, but should be in excess of 2 m. The polarization rota-

tor is required to be capable of transforming an arbitrary orientation elliptically polarized wave into a fixed orientation linearly polarized wave, and should be adjusted to maximize the noise.

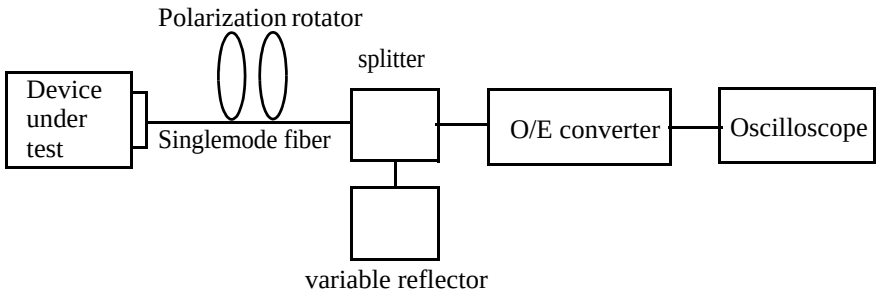

Figure 68-XXX Transmitter OMA:rms noise ratio measurement setup

Calibration of the OMA:rms noise ratio for the comprehensive stressed receiver tests is to be conducted without ISI impairment.

For information, similar OMA:rms noise ratio measurement results may be obtained using a power meter, and by following an appropriate method.

8.6.4 OMA:rms noise ratio measurement - EXAMPLE 2

Table 68–3 gives the minimum transmitter OMA:rms noise ratio. Table 68–4 gives the OMA:rms noise ratio condition for the comprehensive stressed receiver tests. OMA:rms noise ratio is defined by the measurement method presented here.

The measurement setup for the transmitter OMA:rms noise ratio measurement is shown in Figure 68-XXX.

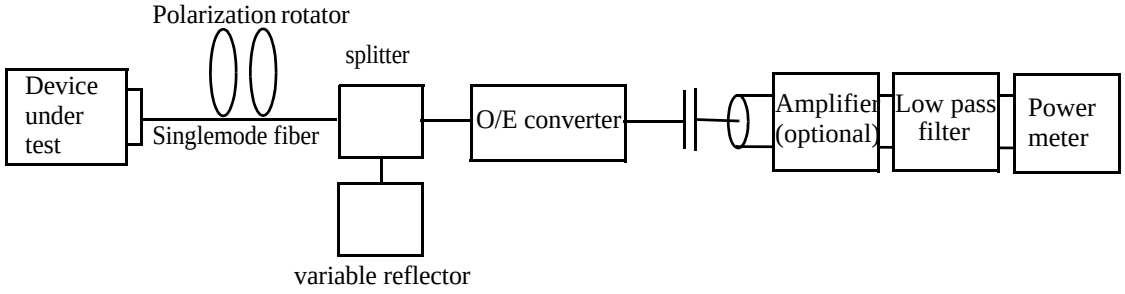

Figure 68-XXX Transmitter OMA:rms noise ratio measurement setup

Optical path: The optical path and detector combination are configured for a single dominant reflection with an optical return loss specified in Table 68-3. The length of the test cable not critical, but should be in excess of 2 m.

Polarization rotator: The polarization rotator is required to be capable of transforming an arbitrary orientation elliptically polarized wave into a fixed orientation linearly polarized wave, and should be adjusted to minimize the OMA:rms noise ratio.

The O/E converter (and optional amplifier): The O/E converter (and optional amplifier) deliver an output level appropriate for accurate measurement by the power meter.

Filter: The bandwidth of the measurement apparatus is to be approximately equal to the bit rate (i.e. 10 Gbps). The low frequency cutoff is to be less than 1 MHz.

Power meter: The RMS electrical power meter should be capable of being zeroed in the absence of input optical power, to remove any residual noise.

Measurement proceeds as follows:

a) With the DUT disconnected, zero the power meter;
b) Connect the DUT, turn on the laser, and ensure that the laser is not modulated;
c) Operate the polarization rotator while observing the power meter output to maximize the noise read by the power meter. Note the maximum power, P_N;
d) Turn on the modulation to the laser using the specified square wave pattern and note the power measurement, P_M. It may be necessary to change or remove the effective reflection to obtain an accurate reading;

OMA:rms noise ratio is given by $(2 \times P_M)/P_N$.

For calibration of the OMA:rms noise ratio for the comprehensive stressed receiver tests is to be conducted without ISI impairment.

For calibration of the OMA:rms noise ratio for the comprehensive stressed receiver tests, the measurement differs in that:

i) *device under test* is replaced by *system under calibration*;

ii) the system under calibration is connected directly to the optical to electrical converter.

For information, similar OMA:rms noise ratio measurement results may be obtained using a histogram method.