Coherent detection in optical fiber systems: erratum

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Abstract: We correct a table showing the signal-to-noise ratio obtained in coherent detection. We also clarify a table showing the bandwidth requirements for homodyne and heterodyne downconverters. Otherwise, our previous results and conclusions are unchanged.

OCIS codes: (060.0060) Fiber optics and optical communications; (060.1660) Coherent communications; (060.2920) Homodyning; (060.4080) Modulation; (060.5060) Phase modulation; (060.2840) Heterodyne.

References and links

1. E. Ip, A. P. T. Lau, D. J. F. Barros and J. M. Kahn, "Coherent detection in optical fiber systems," Optics Express **16**, 753−791 (2008).

In Section 3 of article [1], we showed a table of the signal-to-noise ratios (SNR) per symbol γ_s obtained when using coherent detection in conjunction with different optoelectronic downconverters under different noise regimes. We found an error for single-quadrature homodyne downconversion in the shot-noise-limited case. The corrected table is given in Table 1.

Table 1. SNR per symbol for various receiver configurations. For the ASE-limited cases, $\bar{n}_s$ is the average number of photons received per symbol, N_A is the number of fiber spans, and n_{sp} is the spontaneous emission noise factor of the inline amplifiers. For the LO shot-noise-limited cases, $\bar{n}_r = \eta \bar{n}_s$ is the number of *detected* photons per symbol, where η is the quantum efficiency of the photodiodes. For the ASE-limited heterodyne case, image-band rejection is assumed.

Regime	Homodyne (Single Quadrature)	Homodyne (Two Quadratures)	Heterodyne
ASE-limited	$\frac{\bar{n}_s}{N_A n_{sp}}$	$\frac{\bar{n}_s}{N_A n_{sp}}$	$\frac{\bar{n}_s}{N_A n_{sp}}$
Shot-noise-limited	$2\bar{n}_r$	$\bar{n}_r$	$\bar{n}_r$

In addition, we wish to clarify the bandwidth requirement for a heterodyne downconverter by making the following modification to Table 2.

Table 2. Comparison between homodyne and heterodyne downconverters.

	Homodyne	Heterodyne
No. of balanced photodetectors per polarization required for QAM	2	1
Minimum photodetector bandwidth	BW	$BW + \omega_F \approx 2BW$

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