Erratum: Single- and cross-channel nonlinear interference in the Gaussian Noise model with rectangular spectra

Alberto Bononi,[1*] **Ottmar Beucher,**[2] **and Paolo Serena**[1]

[1]*Dip. Ing. Inf., Università degli Studi di Parma, Parma, Italy.* [2]*Fakultät Maschinenbau und Mechatronik, Hochschule Karlsruhe - Technik und Wirtschaft, Karlsruhe, Germany.*

[*]*alberto.bononi@unipr.it*

Abstract: We correct a typo in the key equation (20) of reference [Opt. Express **21**(26), 32254–32268 (2013)] that shows an upper bound on the cross-channel interference nonlinear coefficient in coherent optical links for which the Gaussian Noise model applies.

References and links

1. A. Bononi, O. Beucher, and P. Serena, "Single- and cross-channel nonlinear interference in the Gaussian Noise model with rectangular spectra," Opt. Express **21**(26), 32254–32268 (2013).
2. P. Poggiolini, "The GN Model of Non-Linear Propagation in Uncompensated Coherent Optical Systems," J. Lightw. Technol. **30**(24), 3857–3879 (2012).

In section 5 of our manuscript [1], we provided in eq. (20) an upper bound (UB) of the cross-channel interference (XCI) nonlinear coefficient a_{XCI-UB} in coherent optical links for which the Gaussian Noise (GN) model [2] applies. A typo is present in such an equation: the square bracketed term should be the argument of a natural logarithm. Hence the correct equation is:

$$a_{XCI-UB} = \frac{16}{27}\frac{R}{\delta^3}\ln\left[\frac{\Gamma(N_c+1+\frac{\eta}{2})\Gamma(1-\frac{\eta}{2})}{\Gamma(N_c+1-\frac{\eta}{2})\Gamma(1+\frac{\eta}{2})}\right]\int_0^\infty |\mathscr{K}(v)|^2 \mathrm{d}v$$

where R is the per-channel symbol rate, 2δ is the per-channel bandwidth, the channel spacing is Δ, the bandwidth efficiency is $\eta = 2\delta/\Delta$, the wavelength division multiplexed signal has $N_{\mathrm{ch}} = 2N_c + 1$ channels, and the channel under test is the central one. Finally, $\mathscr{K}(.)$ is the link kernel. Note that the square bracketed term $[.]$ is the same as in [2, below eq. (42)], where it gets approximated as $(N_{\mathrm{ch}})^\eta$. Hence $\ln[.] \sim \eta \ln(N_{ch})$ which immediately shows the scaling law

$$a_{XCI-UB} \propto \frac{1}{(2\delta)^2}$$

at fixed Δ that we proved below eq. (20) of [1] though a different approximation.