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Errata to “Replacing the Soft-Decision FEC Limit Paradigm in the Design of Optical Communication Systems”

Alex Alvarado, *Senior Member, IEEE*, Erik Agrell, *Senior Member, IEEE*, Domaniç Lavery, *Member, IEEE*, Robert Maher, *Senior Member, IEEE*, and Polina Bayvel, *Fellow, IEEE*

In [1], different metrics to predict the performance of soft-decision forward error correction were studied. The generalized mutual information was shown to be the correct metric for bit-wise receivers.

Equation (17) and the sentence around it should read “A Monte-Carlo estimate thereof is

$$I(X; Y) \approx \frac{1}{n_s} \sum_{i=1}^M P_X(x_i) \sum_{l=1}^{n_s} \log_2 \frac{f_{Y|X}(y_i^{(l)} | x_i)}{f_Y(y_i^{(l)})}$$

where $y_i^{(l)}$ with $l = 1, 2, \dots, n_s$ are samples from the random variable Y conditioned on $X = x_i$, where $i = 1, 2, \dots, M$.”

The sentence about the memoryless AWGN channel in the first paragraph of Sec. III-D should read “...a memoryless AWGN channel $Y = X + Z$, where Z is a complex, zero-mean, circularly symmetric Gaussian random variable with total variance $\sigma_Z^2 \triangleq \mathbb{E}_Z[|Z|^2]$.”

Equations (28), (29), and (31) in [1] should read

$$f_{i,l} \triangleq \sum_{j=1}^M \exp \left(-\frac{2\Re\{(x_i - x_j)^* z^{(l)}\} + |x_i - x_j|^2}{\sigma_Z^2} \right),$$

$$L_k = \log \frac{\sum_{x \in \mathcal{X}_k^1} \exp \left(-\frac{|y-x|^2}{\sigma_Z^2} \right)}{\sum_{x \in \mathcal{X}_k^0} \exp \left(-\frac{|y-x|^2}{\sigma_Z^2} \right)},$$

and

$$L_k \approx \frac{1}{\sigma_Z^2} \left(\min_{x \in \mathcal{X}_k^0} |y - x|^2 - \min_{x \in \mathcal{X}_k^1} |y - x|^2 \right),$$

respectively.

The above expressions were used in [1], and thus, the analysis and results presented there remain unchanged.

REFERENCES

- [1] A. Alvarado, E. Agrell, D. Lavery, R. Maher, and P. Bayvel, “Replacing the soft-decision FEC limit paradigm in the design of optical communication systems,” *J. Lightw. Technol.*, vol. 33, no. 20, pp. 4338–4352, Oct. 2015; reprinted in this issue.

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A. Alvarado, D. Lavery, R. Maher, and P. Bayvel are with the Optical Networks Group, Department of Electronic and Electrical Engineering, University College London, London WC1E 7JE, United Kingdom (email: alex.alvarado@ieec.org).

E. Agrell is with the Department of Signals and Systems, Chalmers University of Technology, SE-41296 Gothenburg, Sweden.