

Tapping nodes in actively stabilized fiber optic time transfer

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In our previous papers we described the idea of a multipoint distribution of frequency signal in a fiber optic system with an active delay stabilization^{1,2}. In this work we extend this idea for joint time and frequency distribution. The proposed solution (see Fig. 1) allows to place the tapping nodes along the actively stabilized time and frequency distributing link. In the paper we describe the idea of stabilizing the tapping node outputs, and present the timing model of the system. Analysis of this model shows that the calibration of the delay of the time signal outgoing the tapping module requires knowing the phase relationships between the signals in the tapping node and the round-trip delay of the system.

Finally we describe an experiment with tapping nodes located along the 170 km-long link exploiting field deployed fiber. Initial results show TDEV below 5 ps for averaging time 10^5 s, and calibration error below 25 ps for all tapping locations.

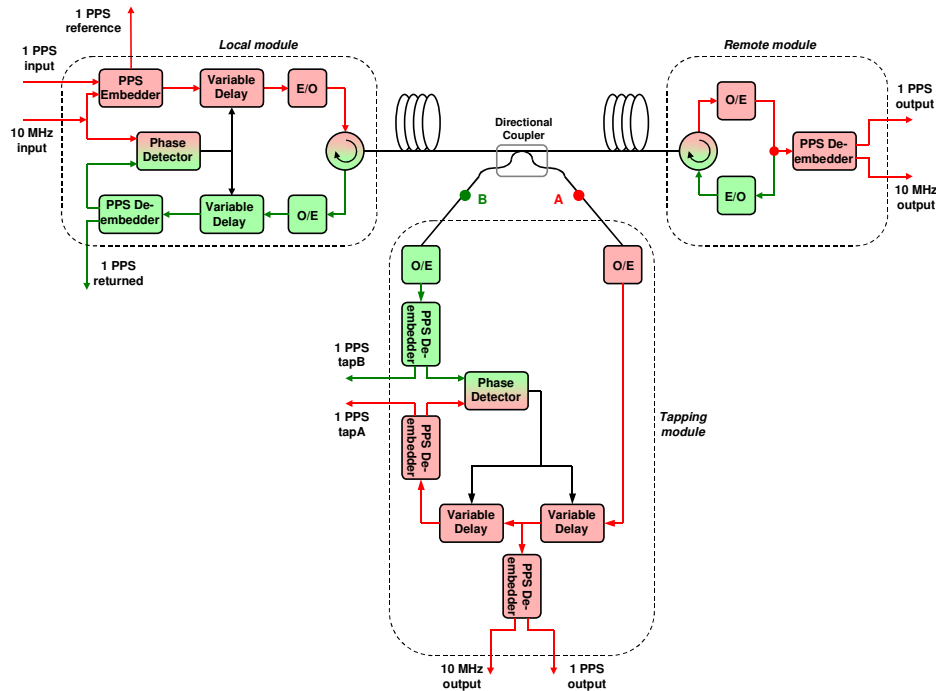


Fig. 1: Stabilized time and frequency distribution with tapping node.

Acknowledgment

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¹ P. Krehlik, Ł. Śliwczyński, Ł. Buczek, M. Lipiński, "Multipoint dissemination of RF frequency in fiber optic link with stabilized propagation delay", IEEE Trans. on Ultrasonics Ferroelectrics and Frequency Control., vol. 60, 2013.

² Ł. Śliwczyński, P. Krehlik, Ł. Buczek, M. Lipiński, "Multipoint dissemination of RF frequency in delay-stabilized fiber optic link in a side-branch configuration", 2013 Joint UFFC, EFTF, EFTF and PFM symposium, Prague 2013.