

Multi-Channel All-Optical Clock Recovery from 40 Gbit/s RZ-OOK Signal with Cascaded MRRs

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All-optical clock recovery is essential operation in optical communication systems [1, 2]. Single and dual channel all-optical clock recovery from 40 Gbit/s return to zero on off keying (RZ-OOK) signal has been demonstrated using a silicon microring resonator (MRRs) assisted with a semiconductor optical amplifier (SOA) [1]. The main reason for SOA implementation after clock extraction is to minimize the impact from patterning effects [2]. In this paper we numerically demonstrate the properties of all-optical clock recovery with cascaded single ring MRRs [3] in four channel from 40 Gbit/s 50% RZ-OOK optical signal using OptSim simulation software. Channels are spaced 0.16 THz apart. MRR filter cascadability is used to minimize patterning effects for recovered optical clock. Fig.1 shows simple simulation setup and recovered optical clock waveform of third channel after 1st and 5th MRR. Third channel clock signal fluctuation after first MRR is 73 % of waveform amplitude. The cascade of MRRs allow to reduce the fluctuations of output signal up to 33% in this case. In multi-channel recovered optical signal quality significantly depends on channel spacing.

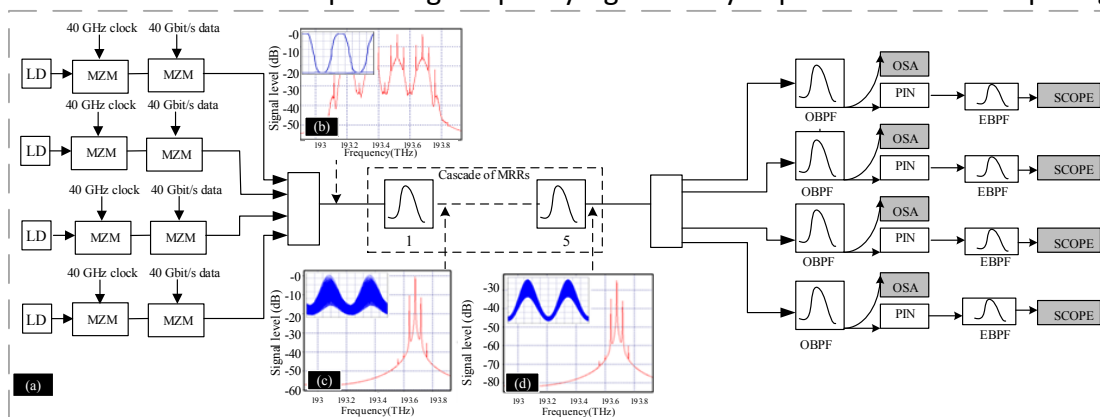


Fig.1. All-optical clock recovery (a) setup, (b) 4 channel WDM optical spectrum and input signal eye diagram, (c) 3rd channel optical spectrum and eye diagram after 1st MRR, (d) 3rd channel optical spectrum and eye diagram after 5th MRR.

Our simulation results shown that the method for all-optical clock recovery from RZ-OOK signals based on cascaded MRRs provide clock recovery with low patterning effect impact. The drawback of this method is low signal power level output after cascade of MRRs, which can be improved adding SOA.

References

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