INTRODUCTION

Clock recovery is the process of synchronizing a clock signal to a random stream of data. Clock recovery is one of the first stages in any optical receiver, transceiver, 3R regenerator, and demultiplexer. Future high-speed optical networks will require optical clock recovery systems rather than electronic techniques. Two-photon absorption (TPA) is a nonlinear process that can be used for clock recovery. Optical clock and data signals can be coupled to a TPA photodetector to produce TPA current. Two-photon absorption is a polarization-insensitive optical clock recovery system.

ADVANTAGES OF THIS DITHERING SYSTEM

- No moving parts as opposed to traditional mechanical methods.
- Ability to provide very high dithering frequencies up to 10 GHz.
- Modulates the clock in the optical domain rather than the electrical domain.
- Satisfies the requirements of high data rate communications.

OPTICAL CLOCK RECOVERY SYSTEM USING TIME DITHERING AND TPA

- Time dithering and TPA can be combined to provide a polarization-insensitive optical clock recovery system.
- TPA output, produced by time-dithered clock and data signals, can be used with a balanced detector to produce a polarization insensitive clock and data.
- We have built the phase-selector circuit which includes an amplifier, mixer, and a low-pass filter (LPF).
- The mixer multiplies the TPA output by the reference electrical modulation signal.
- The LPF produces a zero output when the clock and data are synchronized.

CONCLUSIONS

- We introduce an optical clock recovery system based on Two-Photon Absorption.
- The novel idea of an optical time dithering makes the system polarization-insensitive.
- The system is also compact, broadband, and scalable to very high data rates required for future optical networks.

OPTICAL TIME DITHERING SYSTEM

Periodically modulates the timing of the optical clock signal between two states.

GOAL:

- The output of our dithering system on the sampling oscilloscope.