

Quasicoherent Receiver Solution for Improved Signal (#8051)

A low cost and efficient quasicoherent receiver with increased sensitivity for high speed optical networks.

Inventors at Georgia Tech have created envelope detection based quasi-coherent receivers. Envelope detection can be used to demodulate a previously modulated signal by removing all high frequency components of the signal. Quasi-coherent receivers use an LO to produce signal gain, but do not need to extract phase information, resulting in high sensitivity. Instead of using expensive DSP algorithms, these receivers utilize envelope detection for signal extraction. Envelope detection involves electronic circuits that take high-frequency amplitude modulated signals as input and provide an output, which is the envelope of the original signal. Quasi-coherent receivers display a receiver structure that attempts to provide benefits of coherent detection with a fraction of the complexity. This device relies on full-wave rectification, allowing the transmission of higher data rates. Additionally, the design of these receivers provides significantly improved sensitivity over direct detect receivers while still having a simpler structure than classic coherent receivers.

Benefits/Advantages

- **Low cost** – short reach optics are the lowest priced optical interconnects available
- **Simple** – quasicoherent receivers are significantly less complex than digital coherent receivers
- **Efficient** – use of a full-wave rectifier increases output and efficiency because of AC supply
- **Increased sensitivity** – quasicoherent receivers have better sensitivity than direct detect receivers

Potential Commercial Applications

- High speed optical networks

Background/Context for This Invention

Digital Coherent Receivers (DCRs) typically include a computationally expensive digital signal processing (DSP) and frequency recovery algorithms. Direct detection receivers fail to utilize a Local Oscillator (LO) laser and complex DSP algorithms. Therefore, they lack the signal gain benefits of mixing with a strong LO, leading to a significantly lower receiver sensitivity. There have been recent efforts to design new, low cost coherent receivers.

Dr. Stephen E. Ralph

Professor – Georgia Tech School of Electrical and Computer Engineering

Saeed Zeinolabedinzadeh

Research Engineer – Georgia Tech School of Electrical and Computer Engineering

Dr. Varghese Antony Thomas

Research Associate – Georgia Tech School of Electrical and Computer Engineering

Dr. Siddharth Jacob Varughese

Graduate Research Assistant – Georgia Tech School of Electrical and Computer

More Information

Publications

[Quasicoherent Receivers for Access Networks Using Fullwave Rectification Based Envelope Detection](#)
, OSA Technical Digest (Optical Society of America, 2019), May 2019

[Quasicoherent Receivers](#), Optical Fiber Communication Conference ThIA.3, March 2018

For more information about this technology, please visit:

<https://licensing.research.gatech.edu/technology/quasicoherent-receiver-solution-improved-signal>

Images: