



# Improved Dynamic Range in RF Communication Over Optical Fiber

Tech ID: 31922 / UC Case 2019-172-0

## BACKGROUND

Radio-over-fiber (RoF) links are critical for millimeter-wave wireless communications infrastructure where antenna remoting is needed to provide cell coverage. However, nonlinearity is a key issue of electro-optical conversion and results in low dynamic range. Non linearity in the optical modulator also causes low dynamic spurious free dynamic range (SFDR) of fiber links, which presents an issue for 5G technologies that use antenna remoting.

## DESCRIPTION

Researchers at the University of California, Santa Barbara have developed an analog pre-distortion technique to linearize the nonlinear transfer function of an optical modulator such as a Mach-Zehnder modulator. The technique is implemented in Silicon photonics technology, and offers low-cost and large-scale integration compared to other technologies such as LiNbO3, InP and GaAs. Emerging 5G technologies that use antenna remoting to cover an environment (e.g., a room) with a wireless signal will distribute the signal to all antennas with electrical cables or fiber links. In contrast to electrical cables which experience high loss at higher frequencies, fiber links have negligible loss, but they suffer from low SFDR due to nonlinearity of the optical modulator. This technology circumvents this limitation through analog predistortion, achieving high SFDR radio-over-fiber links.

## ADVANTAGES

- ▶ High SFDR radio-over-fiber links
- ▶ Negligible losses at high frequencies
- ▶ Low-cost and large scale integration compared to other technologies

## APPLICATIONS

- ▶ 5G networks
- ▶ New radio
- ▶ Silicon photonics

## PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,914,263	02/27/2024	2019-172

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## OTHER INFORMATION

### KEYWORDS

dynamic range, new radio, 5G,  
optical fiber

### CATEGORIZED AS

- ▶ **Communications**
- ▶ Networking
- ▶ Optical
- ▶ Wireless

### RELATED CASES

2019-172-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ Load-Modulation Network for High-Efficiency 5G Power Amplifiers
- ▶ Orthogonal Mode Laser Gyro

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