UMass | Dartmouth

Electrical Engineering and Information Technology

Title: ***Modified Sagnac Loop Coherent Phase Modulated RF Photonic Link***

UMD18-09

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Applications:

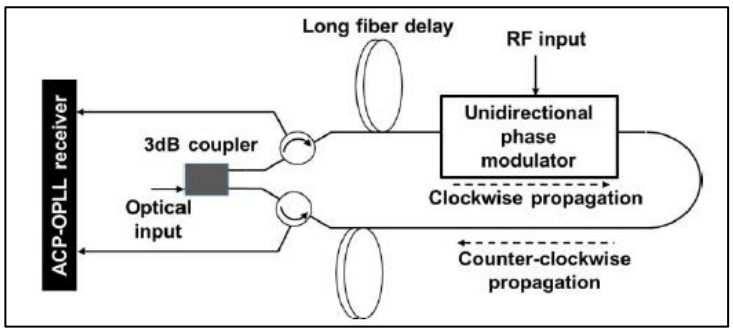
- Antenna remoting
- Radar front end
- Radio-over-fiber link for 5G wireless communication antenna systems

Benefits:

- Eliminates random optical phase perturbation commonly found inside long optical fibers.
- RF information is only encoded on one of the counter-propagating optical signals inside the loop.
- Stable signal transmission over a 1 km optical fiber has been demonstrated.
- Long distance fiber transmission showed no penalty to the noise and linearity performance (except for higher optical loss).

Technology Description: A RF/Photonic link is desirable to allow an antenna to be placed remotely from its signal processing unit. A coherent phase modulated link with an attenuating-counter-propagating optical phase locked loop (ACP-OPLL) photonic integrated circuit (PIC) demodulator has been proposed for this use, but such a system is sensitive to environmental perturbations and is not suitable for links of greater than 1 kilometer distance. Sagnac loop topology, where the phase fluctuations in clockwise and counter-clockwise propagating signal should cancel due to the symmetry, has been proposed as an alternative but has not previously been applied with a linear ACP-OPLL phase demodulator. This invention represents the first modified Sagnac loop coherent phase modulated RF/photonic link employing an ACP-OPLL optical receiver. Except for the optical loss due to the long fiber, no penalties in the link noise and linearity performance were observed through a 1 km fiber transmission.

Patent Status: UMass Dartmouth has filed a U.S. patent application on this invention. The invention is based on research published in IEE Photonics Technology Letters in July 2017.



Modified Sagnac loop coherent PM RF photonic link, in accordance with the invention.

For more information:

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