RF-Carrier Embedded Optical Radio-Signal

Optical radio-signals composed of two optical pure carriers and an optical data sideband

Researchers at the Georgia Institute of Technology have invented a mm-Wave generation scheme based on heterodyne optical-carrier suppression (HeteroOCS) technique for a full-duplex mm-Wave transmission without rising cost of WAPs. A proof-of-concept experiment of a full-duplex 60-GHz BPSK HeteroOCS system has been demonstrated for 25-km SSMF transmission, showing 0.7 dB downlink power penalty. Such a radio-over-fiber technique can be seamlessly integrated with the most advanced modulation and transport systems, e.g. LTE and WiMax used for wireless vector bidirectional signal transmission.

Summary Bullets

- Preserves the phase-lock loop and local oscillator (LO). The pure RF carrier is a frequency source to down-convert the incoming signals at the intermediate frequency (IF), where it can be easily modulated by a low-frequency optical modulator.
- Frequency, phase and amplitude of the incoming signals are preserved at the IF band, since the RF carrier is spontaneously synchronized with the original source.
- The detector linearity is improved since the two pure optical carriers have more power compare to the optical data band.

Solution Advantages

- Preserves the phase-lock loop and local oscillator (LO). The pure RF carrier is a frequency source to down-convert the incoming signals at the intermediate frequency (IF), where it can be easily modulated by a low-frequency optical modulator.
- Frequency, phase and amplitude of the incoming signals are preserved at the IF band, since the RF carrier is spontaneously synchronized with the original source.
- The detector linearity is improved since the two pure optical carriers have more power compare to the optical data band.
- Reduced inter-beating interference.

Potential Commercial Applications

- Embedded RF-carrier
- Optical carrier suppression
- Optical modulation

Background and More Information

Radio over Fiber technology (RoF) efficiently integrates wireless and fiber optic networks to facilitate the untethered access to broadband wireless communications in a wide range of applications, such as last mile solutions, radio coverage/ capacity extension and backhaul. Due to its low cost, small footprint and excellent transmission characteristics, optical fiber is the most flexible solution for radio signal transporting to the remote wireless access points (WAPs).

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