Dual-Polarized Antenna for OFDM

Dual-polarized antenna in an OFDM configuration.

Georgia Tech inventors have invented an improved dual-polarized antenna in an OFDM configuration. The invention focuses on reducing an impairment called Polarization Mode Dispersion (PMD) that occurs when OFDM techniques are used in communication devices. By enabling pre-distortion across subcarriers of the transmitted OFDM signal, PMD can be reduced and an associated aspect called Polarization Dependent loss (PDL) advantageously used to improve overall communications capability. Using the techniques proposed in this invention, the pre-distorted signal captured at the receiver shows improved performance, such as signal power maximization and reduced dispersion, while limiting negative influences on the received signal such as fading. The range of reception of the pre-distorted signal is also improved while simultaneously enhancing the ability to distinguish between signals that are spaced closely together (i.e. signal separation enhancement) and reducing interference. In summary, the PDL that would be present in the signal when it reaches the receiver is controlled (i.e. lowered) by the polarization pre-distortion of the transmitted signal along with maximizing the power of the signal that is being received. This helps in obtaining better data transmission at lower power consumption and more efficient use of the bandwidth to transmit signals wirelessly.

Summary Bullets

- Assists wireless devices conform to power transmission limits that normally accompany FCC transmit mask rules
- Power maximization and substantial gain in Signal-Noise Ratio at the receiver by combating fading on a subcarrier-by-subcarrier basis
- Minimal signal loss within the channel for each subcarrier through the use of polarization control

Solution Advantages

- Assists wireless devices conform to power transmission limits that normally accompany FCC transmit mask rules
- Power maximization and substantial gain in Signal-Noise Ratio at the receiver by combating fading on a subcarrier-by-subcarrier basis
- Minimal signal loss within the channel for each subcarrier through the use of polarization control
- Reduced or zero dispersion in the received signal

Potential Commercial Applications

Wireless devices:

- Cellular phones
- Broadband devices used for Wi-Fi and WiMAX
- Software Defined Radio (SDR)
- Cognitive and Multiple Input Multiple Output (MIMO) systems

Background and More Information

Orthogonal Frequency Division Multiplexing (OFDM) represents a novel way of transmitting wireless signals from cellular phones and other wireless telecommunication devices. It enables radio-frequency (RF) signals being broadcast from the device to be spaced much closer together without interference between signals resulting in lower signal power and consequent data loss. Inserting dual polarization in the OFDM signal further enhances the amount of data that can be transmitted from one device and received by another device. Dual polarization of signals is also suitable when space limitations prevent the use of two separate antennas within the same device while providing enhanced performance.

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Publications

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