Wideband CDM Transceiver Performance in Presence of Multiple Interference Scenarios

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For secure and reliable communications, one must suppress noise and/or interference from other users and intermodulation products. This can be done by incorporating coding into the transmitted signal, including Code Division Multiplexing (CDM), and carry out the necessary decorrelation at the receiver side. When wide bandwidth is available, simulations have demonstrated that secure and reliable communication can be achieved. However, so far, such wideband transceivers have yet to be realized in practice.

In this paper, we present a wideband transceiver to experimentally demonstrate their superior interference mitigation properties. With the addition of ultra-high speed data converters and direct RF sampling techniques, one can realize and demonstrate practical multi-GHz CDM transceivers. These transceivers have improved processing gain, implying communication at much lower signal levels, and with higher data rates due to the available multi-GHz bandwidth. At millimeter wave bands, swaths for large frequency sectors are becoming available, making these wideband CDM systems of practical interest.

In this paper, we demonstrate the performance of an experimental high data rate wideband CDMA system with operation below 6 GHz and at millimeter wave bands. More specifically, measurements are presented to assess the impact of CDM under various interference scenarios across multiple operational bands. The employed experimental set-up employs a transceiver with direct RF sampling and a custom transmit/receive chain for operation in the millimeter wave (28 GHz) band. The examined interference measurements include various tests that record the Bit-Error-Rate (BER) under spot, barrage, sweep and random interference using external over-the-air interferers. At the conference, we will discuss trade-offs using different set of codes in the context of static and non-static interference scenarios.