

Title: Waveguide Modes for Terabit Transmission on Ordinary Wiring

Abstract:

This paper proposes a new methodology for ultra-high-speed connectivity using hitherto unexploited waveguide and surface-wave transmission modes. These modes step into the Terahertz gap between electrical signals and optical fiber, and may breathe new life into telephone cables, Ethernet cabling, or coax. This leverages some of the work and exciting positive results in next-generation millimeter wave wireless systems. Known measurements of single-wire copper waveguide modes are extrapolated here to a multi-user multiple-input-multiple-output (MU-MIMO) or, equivalently, “Vectored” model for a twisted pair cable. Projections beyond the known regimes indicate that transmission speeds on the order of Terabits per second (Tbps) may be achieved. Some consideration of practical twisted-pair effects and projected associated complexity are also provided. This work’s intent is encouragement and motivation of other researchers to further investigate and evaluate these projections.