

1. Hong Huang, Yousef Jaradat, Satyajayant Misra, and Reza Tourani: "Towards Achieving Linear Capacity Scaling in Wireless Networks through Directed Energy Links", IEEE Transactions on Wireless Communications, 13(4): 1806-1814 (2014).

Abstract:

Large-scale multi-hop wireless networks have many important applications. However, Gupta and Kumar showed that the capacity of multi-hop wireless networks decreases as the number of nodes in the network increases. Subsequent research efforts to achieve linear capacity scaling have significant limitations such as long latency, high technical complexity, restricted traffic pattern, or infrastructure requirement. We propose to achieve close-to-linear (CTL) capacity scaling through the use of directed energy (DE) links such as laser communications links or highly directional $\hat{\Delta}$, Spencil beam $\hat{\Delta}$ links in the EHF band in a hybrid network that also contains traditional omni-directional (OD) antenna links. Our approach has none of limitations mentioned earlier. We show that when the probability distribution of DE links follows the inverse-square law, a distributed scheme with local routing information suffice to achieve CTL capacity scaling.