A Cross-Tier Scheduling Scheme for Multi-Tier mmWave Wireless Networks

ABSTRACT

Due to abundant frequency resources, millimeter wave (mmWave) spectrum has drawn much attention as a solution to bandwidth scarcity. However, many characteristics of mmWave transmissions, such as blockage and reduced coverage, make conventional network architectures very inefficient for use in mmWave networks. A recently proposed multi-tier mmWave network architecture allows for relaying around blockages and enlarges the coverage of each base station at an acceptable deployment cost. Nevertheless, this architecture introduces major challenges to the scheduling of each tier. The necessity of both enabling flexible user association and fully exploiting the wireless backhaul requires a cross-tier consideration of the multi-tier mmWave network. We comprehensively analyze the scheduling problem of a downlink multi-tier mmWave network by jointly regulating the transmissions in all tiers. The crosstier optimization problem is NP-hard, but a sub-optimal scheme which iteratively optimizes the schedule in different tiers of the network is proposed with polynomial computational complexity. Simulation results show that our algorithm significantly outperforms the benchmarks in both spectral efficiency and fairness with various user distributions.

EXISTING SYSTEM

- The user association and load balancing problem in mmWave networks. It pays attention to energy-efficient scheduling for mmWave backhauling.
- However, it requires a joint consideration of the user association and the backhauling problem in order to pursue the optimality in a multi-tier mmWave network.
- Independently solving schedules for different tiers may result in a mismatch between tiers and in turn lead to performance degradation, especially when the network is not homogeneously deployed.

PROPOSED SYSTEM

- The crosstier optimization problem is NP-hard, but a sub-optimal scheme which iteratively optimizes the schedule in different tiers of the network is proposed with polynomial computational complexity.
- Our algorithm first aims to maximize the sum throughput from all APs to users by scheduling Tier links, and then leaves the BS a simple sub-problem of AP selection.

SYSTEM REQUIREMENTS

HARDWARE REQUIREMENTS

- Processor - Intel core i3
- RAM - 2B
- Hard Disk - 20 GB

SOFTWARE REQUIREMENTS

- Operating System : LINUX
- Tool : Network Simulator-2
- Front End : OTCL (Object Oriented Tool Command Language)

REFERENCE

[1] D. Wu, J. Wang et al., “Millimeter-wave multimedia communications: challenges, methodology, and applications,” IEEE Commun. Mag., vol. 53, no. 1, pp. 232–238, 2015.

[2] T. Rappaport, S. Sun et al., “Millimeter wave mobile communications for 5G cellular: It will work!” IEEE Access, vol. 1, pp. 335–349, 2013.

[3] H. T. Friis, “A note on a simple transmission formula,” Proceedings of the IRE, vol. 34, no. 5, pp. 254–256, 1946.

[4] S. Singh, F. Ziliotto et al., “Blockage and directivity in 60 GHz wireless personal area networks: from cross-layer model to multihop MAC design,” IEEE J. on Sel. Areas in Commun., vol. 27, pp. 1400–1413,2009.

[5] C. R. Anderson and T. S. Rappaport, “In-building wideband partition loss measurements at 2.5 and 60 GHz,” IEEE Trans. on Wireless Commun., vol. 3, pp. 922–928, 2004.