Outage Analysis of Multi-hop AF Millimeter Wave Relaying Network over Mixed Rician/Rayleigh Fading Channels

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Abstract: In this work, outage performance of multi-hop variable-gain amplify and forward (AF) millimeter wave (mmWave) relaying network is analysed over independent but non-identically distributed mixed Rician/Rayleigh fading channels for an indoor environment. In the considered system model, the end-to-end communication is taking place via mmWave links along with ultra-high frequency (UHF) links to provide high data rate and coverage, targeted in 5G systems. We derive the closed-form expressions for the outage probability for the proposed system model. The analysis for the outage probability is verified through the Monte-Carlo simulations for different SNR levels. Furthermore, the impact of the Rician K-factor on the considered system performance is also discussed.

System Model

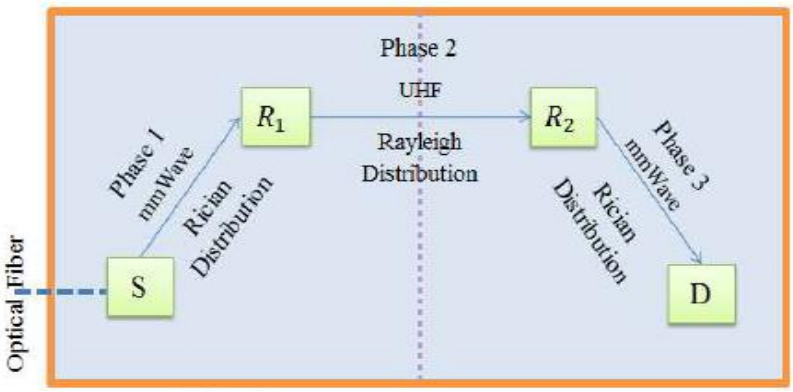

Fig. 1: System model of the multi-hop AF mmWave relaying network

Results

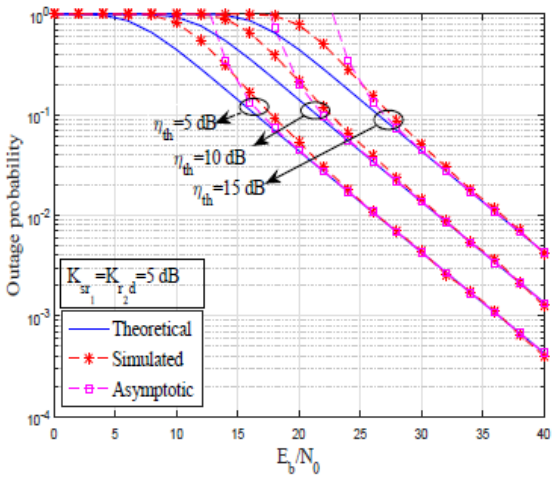

Fig. 2: Theoretical, simulation and asymptotic results for the lower bound of the outage probability versus transmit SNR

Conclusion

Multi-hop variable-gain AF mmWave relaying network, over i.n.i.d. mixed Rician and Rayleigh distributed channels is analysed. Closed-form expressions for the outage probability are obtained and validated through Monte-Carlo simulations. From the results, it is observed that the analytical results follow the simulation results with significant accuracy in the medium and high SNR regime.