

Ergodic capacity analysis of full-duplex mimo relay channel using tracy-widom distribution with processing delay

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Deskripsi Lengkap: <https://lib.ui.ac.id/detail?id=9999920532046&lokasi=lokal>

Abstrak

We explore full-duplex technique in wireless communication particularly for relay networks. We consider the relay to operate in full-duplex, which transmission and reception are conducted in the same channel. We investigate potential benefits of full-duplex technique in relay networks, which uses multiple antennas for transmission and reception combined with Amplify-Forward (AF) scenario. We study the effects of multiple antennas in terms of relay capacity. We derive an ergodic capacity expression using Tracy-Widom distribution. Using Singular Value Decomposition (SVD) and perfect Channel State Information (CSI), we investigate three scenarios: First, we consider the relay to have antenna larger than that of both source and destination. Second, we consider both relay and destination to have antenna larger than that of source. Third, we consider both relay and source to have antenna larger than that of destination. We show the results that the capacity of relay with full-duplex technique is almost twice the capacity of half-duplex. We show that increasing the number of destination antennas is not help much when one of source antennas is small. Moreover, the capacity decreases due to channel hardening effect, when the number of destination antennas is larger than that of source.