Name	Shinya Sugiura, Associate Professor	Location	Institute of Industrial Science	Research area	Wireless Communication Networks

Advanced Wireless Communication Networks

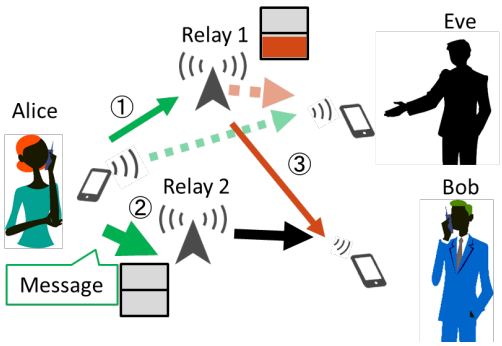
http://sgurlab.iis.u-tokyo.ac.jp/en/

We focuses our attention on exploring key technologies of next-generation wireless communication networks, such as 6G and 7G. More specifically, our research interests include, but are not limited to: transmission technology, digital signal processing, network protocols, information theoretic security, cooperative communications, and wireless sensor networks. Further detailed research topics and the related publication list can be found in `http://sgurlab.iis.u-tokyo.ac.jp/en/'.

■ Networking technology

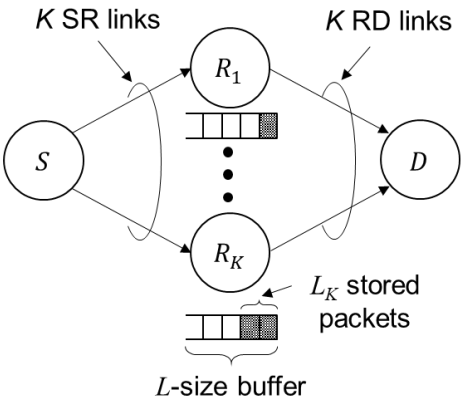
・Physical layer security ～Info-theoretic security for IoT networks～

Secure buffer-aided decode-and-forward relay selection, which does not rely on encryption, is considered. More specifically, the benefits of buffer-state-based relay selection, the max-ratio criterion, simultaneous activation of multiple source-to-relay links, and cooperative beamforming are amalgamated in the context of dual-hop networks. Furthermore, we introduce the concept of cooperative jamming into the proposed scheme, in order to interfere with an eavesdropper's reception, while dispensing with full channel state information associated with an eavesdropper at a central coordinator.



・Delay-tolerant reliable cooperative networks

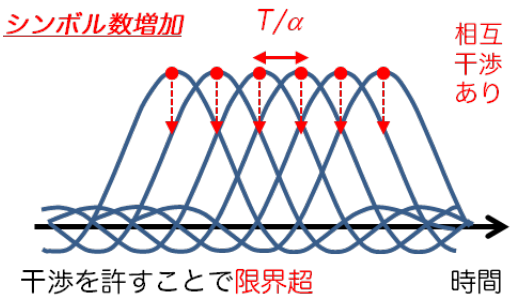
A novel hybrid buffer-aided cooperative protocol that attains the benefits of high reliability and reduced packet delay is studied. By introducing a periodic Markov chain model, we derive the theoretical outage probability of our hybrid buffer-aided scheme under the realistic assumption of finite-buffer relays. Our analytical and simulation results demonstrate that the proposed protocol benefits from the aforementioned high-diversity reliable performance and the reduced end-to-end packet delay.



■ Signal processing

・Faster-than-Nyquist Signaling ～Beyond the Nyquist-criterion limit～

After the first proposal of the faster-than-Nyquist (FTN) concept in the 1970s, it has recently been rediscovered as a means of boosting a transmission rate beyond that defined by the Nyquist criterion, without imposing any additional bandwidth expansion. Hence, FTN signaling is promising technique for the next-generation wireless systems. Naturally, this signaling may induce unavoidable ISI effects at the receiver, hence imposing a higher demodulating complexity for eliminating ISI.



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