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Congestion Control in Cognitive Radio Networks with Event-triggered Sliding Mode

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Abstract

The increasing demand for assorted services from extensive wireline and wireless users place a significant burden on the band-limited radio spectrum. To settle the demand, smart reuse and management of the spectrum are necessary. In this contribution, Cognitive Radio being an emerging technology provides a platform to share the same spectrum between Primary Users (licensed) and Secondary Users (unlicensed) for significant improvement in the spectrum efficiency. The coexistence of users for data communications in a band-limited channel calls for a robust congestion controller to maximize throughput. This work presents the design of a robust nonlinear congestion controller based on event-triggered sliding mode for Cognitive Radio Networks. The goal is to maintain desired Quality of Service of the network with optimum bandwidth and resource utilization. The controller has been designed on the notions of sliding mode, better known for its inherent robustness and disturbance rejection capabilities. An event-triggering scheme has been incorporated with the sliding mode for optimum utilization of the available resources. The signal is sampled and control is updated only when a predefined condition gets violated while ensuring acceptable closed-loop behavior of the system. The efficiency of the proposed controllers has been validated using simulations.

Keywords: Event-driven sliding mode control, Quality of Service, Cognitive Radio Networks, Fluid Flow Model, Event-triggering, Inter-event time.

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