



Hamilton Institute

Stochastic Models for Random-Access Wireless Networks

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Abstract:

Random-access algorithms such as the Carrier-Sense Multiple-Access (CSMA) protocol provide a popular mechanism for distributed medium access control in large-scale wireless networks. We study the performance of these networks using a model closely related to stochastic loss networks and to the hard-core model. Random-access networks may exhibit severe unfairness in throughput, in the sense that some nodes receive consistently higher throughput than others. We study the unfairness in saturated networks, and adapt the random-access CSMA protocol to remove the unfairness completely. These models primarily pertain to a saturated scenario where nodes always have packets to transmit. In reality however, the buffers may occasionally be empty as packets are randomly generated and transmitted over time. The resulting interplay between the activity states and the buffer contents gives rise to quite complicated queueing dynamics, and even establishing the stability criteria is usually a serious challenge. We explicitly identify the stability conditions in a few relevant scenarios, and illustrate the difficulties arising in other cases.

Venue: Seminar Room, Hamilton Institute, Rye Hall, NUI Maynooth

Time: 2.00pm - 3.00pm

Travel directions are available at www.hamilton.ie