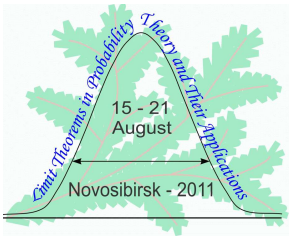


# Stability of Random Access Protocols

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In this talk, we review recent advances in the analysis of the stability of random medium access control (MAC) protocols such as Aloha and CSMA (Carrier Sense Multiple Access). Users receive packets arriving in infinite buffers according to some independent Markovian stationary ergodic processes, and attempt to transmit these packets using random MAC protocols. We first investigate scenarios where all users interfere with each other. In this case, the stability condition of an idealized version of CSMA (each user attempts to send a packet at the instants of a Poisson process) can be explicitly derived. However, in practice back-off windows take integer values, and collisions cannot be avoided. In presence of collisions, the stability condition proves impossible to characterize. To circumvent this difficulty, we use mean field approximations assuming that the number of user grows large. Under such assumption, we are able to provide an exact stability condition, and show that this condition remains very accurate for systems with restricted number of users. We then extend our analysis to scenarios with partial interference where users do not interfere with each other. Finally, we discuss back-log based random MAC protocols where the intensity at which users attempt to send packets depends on the number of packets in their buffers.