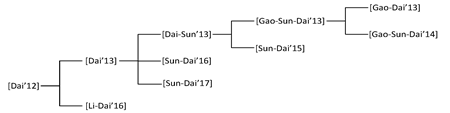
代林老师研究方向

#### 1.****A Coherent Theory of Random-Access Networks****

Random access provides a simple and elegant solution for multiple users to share a common channel. Studies on random-access protocols date back to 1970s. After decades of extensive research, random access has found wide applications to Ethernet, IEEE 802.11 networks, cellular networks, and wireless ad-hoc networks. The minimum coordination and distributed control make it highly appealing for low-cost data networks.It has been long observed that a random-access network may suffer from low throughput, large delay jitter and even risks of collapse if the backoff parameters are improperly selected. Yet due to the difficulty in modeling and performance analysis, how to adaptively tune backoff parameters to optimize the network performance remains largely unknown. In many cases, the problem is complicated by the fact that the improvement in throughput/stability performance is obtained at the cost of sacrificing the delay performance. It is, therefore, highly desirable to develop a unified framework, within which the effect of key parameters on the network performance can be evaluated in a systematic manner.Such an analytical framework was recently proposed for two most representative random-access networks, Aloha [Dai'12] and Carrier Sense Multiple Access (CSMA) [Dai'13], further extended in [Li-Dai'16], [Sun-Dai'16], [Sun-Dai'17] and applied to IEEE 802.11 (WiFi) networks in [Dai-Sun'13, Gao-Sun-Dai'13, Gao-Dai'13, Gao-Sun-Dai'14, Sun-Dai'15]. Based on the proposed framework, the network steady-state points can be derived as explicit functions of key system parameters such as the network size, sensing capability and backoff parameters, which further enable the characterization of stable regions and performance optimization. The analysis sheds important light on the design and control of practical networks, and serves as a crucial step toward a unified theory of random access.



Lin Dai, "[Toward a Coherent Theory of CSMA and Aloha](http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6525472" \t "http://www.ee.cityu.edu.hk/~lindai/_blank)," IEEE Trans. Wireless Commun., vol. 12, no. 7, pp. 3428-3444, July 2013.