Fundamentals for Low Latency Communications

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Abstract: Information theory provides fundamental insights into communication system capabilities, and the classical theory of Shannon has guided development of such systems over many decades. However, the classical models are based on assumptions of infinite block-length codes and do not address situations in which short block-lengths are imposed by system design considerations. Notably in this context, latency has become a critical design issue in emerging wireless networking paradigms, such as the Internet of Things and associated applications like autonomous driving, factory automation, etc. This situation has inspired the development of a finite-block-length information theory, with many new results coming in recent years. This talk will review these developments, including fundamental finite-block-length limits on basic functions such as channel coding and secure communications, as well as implications of these limits in some practical settings.

Biosketch: H. Vincent Poor is the Michael Henry Strater University Professor of Electrical Engineering at Princeton University. From 1977, and until joining the Princeton faculty in 1990, he was on the faculty of the University of Illinois. During 2006 – 2016, he served as Dean of Princeton's School of Engineering and Applied Science. He has also held visiting positions at several other universities, including most recently at Berkeley and Cambridge. Dr. Poor's research interests are in signal processing and information theory, and their applications in wireless networks, energy systems and related fields. He is a member of the National Academy of Engineering and the National Academy of Sciences, and is a foreign member of the Chinese Academy of Sciences, the Royal Society, and other national and international academies. He received the Society Award of the IEEE Signal Processing Society in 2011, and the IEEE Alexander Graham Bell Medal in 2017.