Title: **Real-Time Resource Allocation for 5G NR**

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Abstract: As the next-generation cellular communication technology, 5G New Radio (NR) aims to cover a wide range of service cases, including broadband human-oriented communications, time-sensitive applications with ultra-low latency, and massive connectivity for Internet of Things. With its broad range of operating frequencies, the channel coherence time for NR varies greatly. To address such needs, a number of different OFDM numerologies are defined for NR, allowing a wide range of frequency and time granularities for data transmission. Under this numerology, it is necessary to perform scheduling with a time resolution as small as ~100 μs. This requirement poses a new challenge that does not exist in LTE and cannot be supported by any existing LTE schedulers. In this talk, I will present the design of GPF – a GPU-based proportional fair (PF) scheduler that can meet the ~100 μs time requirement. The key ideas in the design include decomposing the scheduling problem into a large number of small and independent sub-problems and selecting a subset of sub-problems from the most promising search space to fit into a GPU platform. By implementing GPF on an off-the-shelf Nvidia Quadro P6000 GPU, we show that GPF is able to achieve near-optimal performance while meeting the ~100 μs time requirement. GPF represents the first successful design of a GPU-based PF scheduler that can meet the new time requirement in 5G NR.

Speaker Biography: Tom Hou is the Bradley Distinguished Professor of Electrical and Computer Engineering at Virginia Tech, USA. He received his Ph.D. degree from NYU Tandon School of Engineering (formerly Polytechnic University) in 1998. His current research focuses on developing innovative solutions to complex science and engineering problems arising from wireless and mobile networks. He is particularly interested in exploring new performance limits at the network layer by exploiting advances at the physical layer. In recent years, he has been actively working on cross-layer optimization problems for cognitive radio wireless networks, cooperative communications, MIMO-based networks and energy related problems. He is also interested in wireless security. Prof. Hou was named an IEEE Fellow for contributions to modeling and optimization of wireless networks. He has published two textbooks: Cognitive Radio Communications and Networks: Principles and Practices (Academic Press/Elsevier, 2009) and Applied Optimization Methods for Wireless Networks (Cambridge University Press, 2014). The first book has been selected as one of the Best Readings on Cognitive Radio by the IEEE Communications Society. Prof. Hou's research was recognized by five best paper awards from the IEEE and two paper awards from the ACM. He holds five U.S. patents.

Prof. Hou is a prominent leader in the research community. He was an Area Editor of IEEE Transaction on Wireless Communications (Wireless Networking area), and an Editor of IEEE Transactions on Mobile Computing, IEEE Journal on Selected Areas in Communications – Cognitive Radio Series, and IEEE Wireless Communications. Currently, he is an Editor of IEEE/ACM Transactions on Networking and ACM Transactions on Sensor Networks. He is the Steering Committee Chair of IEEE INFOCOM conference – the largest and top ranked conference in networking. He is a member of the Board of Governors as well as a Distinguished Lecturer of the IEEE Communications Society.