

Are Today's 5G Networks Ready to Support 5G "Killer Apps"?

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Abstract—5G rollout started in 2019 and the wide-scale deployment has been rapid and aggressively marketed by all mobile network operators. 5G promises unprecedented high bandwidth and ultra-low latency, particularly in the millimeter wave (mmWave) frequency bands and holds the promise to finally support the next-generation of latency-critical applications such as augmented and virtual reality (AR/VR), panoramic video streaming, cloud gaming, and connected autonomous vehicles (CAVs), often dubbed as 5G “killer apps”. Most recent measurement studies of 5G performance have focused on measuring performance primarily in the downlink direction under static conditions while the uplink performance (which is critical for several uplink-oriented 5G “killer apps” such as AR, XR, CAVs) and the performance under driving remain largely unknown. In this talk, I will present our research efforts towards a detailed understanding of the performance of today's 5G networks and their potential to support 5G “killer apps”. The talk will focus on the first in-depth measurement study of the mobile networks of all three major US carriers while driving across the continental US (5700km+, from Los Angeles to Boston) and our findings in terms of coverage, performance, and impact on applications. I will also discuss our recent and ongoing work on exploring the potential of 5G mmWave to support single-user and multi-user AR. I will finish by describing our recent efforts to deploy an open, programmable, multi-vendor 5G O-RAN testbed at Northeastern University.

2017 and the Early Career Researcher of the Year Award in 2015, the NSF CAREER Award in 2016, Best Paper Awards in IEEE GLOBECOM 2023, ACM WINTech 2022, ACM mmNets 2019, IEEE WCNC 2017, and SENSORCOMM 2007, and a Best Dataset Award in PAM 2021. He has served as general chair for IEEE LANMAN 2024, IEEE WoWMoM 2023, and ACM EWSN 2018, and as TPC chair for IEEE LANMAN 2023, IEEE HPSR 2023, IEEE DCOSS 2022, IEEE WoWMoM 2021, and IFIP Networking 2021. He is a senior member of the IEEE and the ACM and a member of USENIX.

BIO

Dimitrios Koutsonikolas received his Ph.D. in Electrical and Computer Engineering from Purdue University in August 2010 and worked as a Postdoctoral Researcher in the same department from September to December 2010. He is currently an Associate Professor in the Electrical and Computer Engineering Department at Northeastern University and a member of the Institute for the Wireless Internet of Things. Previously, he was in the Computer Science and Engineering Department at the University at Buffalo (UB), The State University of New York, first as an assistant professor (2011-2016) and then as an associate professor (2017-2020) and Director of Graduate Studies (2018-2020). Dimitrios' research interests are broadly in experimental wireless networking and mobile computing, with a current focus on 5G and Beyond 5G networks and applications. He received an IEEE Region 1 Technological Innovation (Academic) Award in 2019, the UB Teaching Innovation Award in 2018, the UB School of Engineering and Applied Sciences Senior Teacher of the Year Award in