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Exploring future generation wireless communications: 6G perspectives on requirements, technologies, challenges, and applications

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Abstract:

Over the past few decades, wireless connectivity has undergone an extraordinary expansion. With a plethora of advancements surpassing the capabilities of 4G communications, the imminent global deployment of next-generation (5G) networks is on the horizon. Looking ahead to the years 2027 through 2030, the emergence of sixth-generation (6G) wireless systems, bolstered by artificial intelligence, is poised to take center stage in the realm of wireless communication. Beyond the realm of 5G, pivotal considerations encompass heightened system capacity, amplified data rates, diminished latency, fortified security measures, and elevated quality of service (QoS) in comparison to current 5G infrastructures.

This paper delineates the roadmap for the prospective 6G wireless networks, elucidating the burgeoning technologies and the architectural framework within which they will operate. The focal points of this discourse encompass key performance indicators, prospective applications, novel services, and pivotal technologies pivotal in facilitating the advent of 6G networks. By proffering a fresh outlook on forthcoming research trajectories, this article aims to significantly influence the trajectory of future investigations.

Keywords:

5G, 6G, Cybersecurity, Privacy preservation, Wireless communication, Data rate, Massive connectivity, Virtual reality, Terahertz (THz), Tactile Internet, Free-space optics (FSO), Backhaul, Fronthaul.