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6G Fundamentals: Vision and Enabling Technologies

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From 5G to 6G Trustworthy and Resilient Systems

Abstract

This article reviews the 6G global landscape and the most relevant private and public initiatives, with US\$ billions of investments in next generation information and communication (ICT) systems and application services. Then, it presents the 3rd Generation Partnership Project (3GPP) technology roadmap towards 6G and 5G New Radio (NR) releases. This is followed by an introduction to the latest shift in paradigm “from Internet of Things (IoT) to Internet of Intelligence (IoI)”, which paves the way towards 6G wireless. The new system is anticipated to provide pervasive connectivity to functions with the ability to represent knowledge, process knowledge, and make decisions, with or without human intervention. Beyond that, the paper discusses the new carrier frequency bands above 110 GHz; and innovative fundamental enabling technologies, such as integrated semantic communication and sensing, low earth orbiting satellites, quantum key distribution, post quantum

cryptography, and distributed ledger technology; and portrays a network vision for 6G wireless, looking to 2030 and beyond. Conclusions are drawn on 6G prospects, the needs of security by design for 6G; as well as the potential of 6G for securely connecting pervasive intelligence and preserving privacy; and new research directions to cater for new use categories and requirements.

Please refer to PDF download for the full paper.

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