



6G Wireless Communication Networks: Challenges and Potential Solution

Md. Alimul Haque, Department of Computer Science, Veer Kunwar Singh University, Ara, India*


 <https://orcid.org/0000-0002-0744-0784>

Sultan Ahmad, Department of Computer Science, College of Computer Engineering and Sciences, Prince Sattam Bin Abdulaziz University, Alkharj, Saudi Arabia & University Center for Research and Development (UCRD), Department of Computer Science and Engineering, Chandigarh University, Gharuan, Mohali, India


 <https://orcid.org/0000-0002-3198-7974>

Ali J. Abboud, Department of Computer Engineering, College of Engineering, University of Diyala, Iraq


Md. Alamgir Hossain, Department of Computer Science and Engineering, Prime University, Dhaka, Bangladesh

 <https://orcid.org/0000-0001-5120-2911>

Kailash Kumar, College of Computing and Informatics, Saudi Electronic University, Riyadh, Saudi Arabia


 <https://orcid.org/0000-0003-2916-719X>

Shameemul Haque, AL-Hafeez College, Ara, India

 <https://orcid.org/0000-0001-8078-8499>

Deepa Sonal, Department of Computer Science, Patna Women's College, Patna, India

Moidur Rahman, College of Computer Science and Information Technology, Jazan University, Jizan, Saudi Arabia

 <https://orcid.org/0000-0002-0770-2238>

Senapathy Marisennayya, Rural Development & Agriculture Extension, College of Agriculture, Wolaita Sodo University, Sodo, Ethiopia

ABSTRACT

This paper presents a comprehensive survey of security needs, applications, and current challenges and threats for 6G wireless communication networks. 6G technology has brought much attention to business entities and academia recently. The development of a relevant 6G wireless technology to meet the security issues and technical challenges of 5G networks as well as major system upgrades over previous wireless technologies are discussed. The importance of the comparative study is estimated for security issues and communication of devices like wireless devices and focuses on creative innovations that would offer the progression changes required for empowering 6G. First, the authors present the evolution and security threats landscape of wireless communication networks. Then they explore the potential applications of 6G networking technologies. Finally, this paper concludes with a detailed discussion of security issues, research challenges, and possible solutions in 6G that enable critical technologies.

KEYWORDS

5G, 6G, Artificial Intelligence, Blockchain, Massive Connectivity, Security Issues

DOI: 10.4018/IJBDCN.339889

*Corresponding Author

This article published as an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>) which permits unrestricted use, distribution, and production in any medium, provided the author of the original work and original publication source are properly credited.

INTRODUCTION

The fifth-generation networks (5G) are under construction commercially soon launched in most countries worldwide. It is predicted that 4G may arrive at the bottleneck before 2020, and 5G might be 2030. However, the upcoming wireless network system is being evolved based on recent advances in wireless and networking systems such as software-defined networking and virtualization in 5G and Artificial Intelligence (AI), Internet of Thing (IoT), Internet of Everything (IoE) and Virtual Reality need high reliability, low latency and ultra-high-speed for the uploading and downloading in 6G(Ahmad & Afzal, 2020)(Almrezeq et al., 2022). 5G has higher bit rates with more than 10 gigabits per second than previous technologies, more capacity, and low latency. This is a strong point for the one thousand million attached devices regarding the Internet of Things. Moreover, there are exceptional services available in the age of 5G like blockchain-based facilities, Unmanned Aerial Vehicle (UAV), data networking, fog computing, vehicle-to-vehicle communication, smart grid and smart parking etc. The up-gradation work of 5G networks has been finished and is now ready for deployment worldwide with its full features for commercialization.

The significant drawbacks of 5G wireless communication are less able to deliver a fully cybernetic and expert system that provides all kinds of service with an altogether fascinating experience (Nawaz et al., 2019). Even though the 5G mobile technology will be started coming week with new facilities over the established systems, but cannot resist completing the needs of the next-generation system after ten years (Md. Alimul Haque, Anil Kumar Sinha, 2017). The 5G technology will provide significant advancement and give high quality of service (QoS) compared to previous technologies (Shafi et al., 2017). However, the rapid development of automatic and data-centric systems can transcend 5G wireless communication's properties. Some technologies, like the virtual reality (VR) system, needed to go beyond 5G (B5G) because it requires a minimum rate of 10 Gbps data rate (Mumtaz et al., 2017). So, in 2030 5G has no scope to sustain itself in the technology sector due to limitations. Drawbacks and limitations of 5G and the emerging revolutionary technologies drive the development of next-generation called 6G networks (Zong et al., 2019).

To overcome constraints of 5G, the transition from radio to sub terahertz (sub-THz) and optical spectra supporting explosive 6G applications with new features that are attractive(Whig et al., 2022). The significant attributes of 6G will be the convergence of all the prior attributes, such as excellent connectivity and reliability, low power intake, network densification and higher throughput using security. Even the 6G wireless network would likewise continue the rate of these past generations, which contained services, which included new services with new technologies. Sensible wearables devices, Artificial Intelligence, autonomous automobiles, computing reality devices, enhancements, sensor and 3D mapping (Elsayed & Erol-Kantarci, 2019) will undoubtedly be popular and new services in 6G. Managing a huge volume of data and fast connectivity of each device would be the primary and vital challenges in 6G wireless networks. Even though the 5G arrange time has not yet wholly shown up, the obstacles of 5G innovation mean we should start researching the 6G network now.

Be that as it may, what is a 6G network? Also, by what method will it be different from 5G systems? Up until now, the 6G network has no standard capacities or particulars, just numerous prospects. A few expert users fight that 6G systems should be something other than a quicker form of a 5G technology; actually, the advancement in 5G connectivity in different ways. For instance, inclusion will not be constrained to the bottom level, like the 5G system. Instead, it would have complete undersea surface region inclusion.

Furthermore, the Six Generation system should have a lot of higher Artificial Intelligence (AI) capacity. In perspective on numerous specialists, the 6G network ought to be a "simulated intelligence-enabled" organize, which means AI is the two its driver and most conspicuous element(M. A. Haque et al., 2023). It uses AI in technologies as the 5G network would. Therefore,

25 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/article/6g-wireless-communication-networks/339889

Related Content

Congestion Prediction System With Artificial Neural Networks

Fatma Gumusand Derya Yiltas-Kaplan (2020). *International Journal of Interdisciplinary Telecommunications and Networking* (pp. 28-43).

www.irma-international.org/article/congestion-prediction-system-with-artificial-neural-networks/256186

Designing and Implementing a Globally Focused Interdisciplinary STEM Program: A Model for Preservice Teacher Preparation Programs

Moe D. Greene, Yaoying Xuand Jill E. Blondin (2024). *Encouraging Transnational Learning Through Virtual Exchange in Global Teacher Education* (pp. 172-194).

www.irma-international.org/chapter/designing-and-implementing-a-globally-focused-interdisciplinary-stem-program/346842

Wireless Middleware

Ken MacGregor, Nico de Wet, Bonnie Lamand Nadim Yazdani (2004). *Wireless Communications and Mobile Commerce* (pp. 213-246).

www.irma-international.org/chapter/wireless-middleware/31441

Economical Aspects of Heterogeneous Networks: When Money, Quality, and Context Matter

Andreea Molnarand Cristina Hava Muntean (2014). *Convergence of Broadband, Broadcast, and Cellular Network Technologies* (pp. 1-15).

www.irma-international.org/chapter/economical-aspects-of-heterogeneous-networks/108086

S-? Fractional-N Phase-Locked Loop Design Using HDL and Transistor-Level Models for Wireless Communications

Ahmed El Oualkadi (2012). *Wireless Radio-Frequency Standards and System Design: Advanced Techniques* (pp. 99-118).

www.irma-international.org/chapter/fractional-phase-locked-loop-design/62930