

# Securing the Next Wave: A Comprehensive Review of 5G System Security

More Meghana Laxman and Prof. Sapike N. S.

Department of Computer Engineering,  
Viswabharti College of Engineering, Ahmednagar, India  
meghanamore415@gmail.com

**Abstract:** This review paper delves into 5G system security, examining various research papers encompassing various technologies. Through an extensive analysis, explore the multifaceted landscape of 5G security, including but not limited to authentication protocols, encryption mechanisms, threat detection, and mitigation strategies. By synthesizing insights from diverse sources, this paper provides a comprehensive understanding of the current state of 5G security, highlighting both challenges and advancements. The findings presented herein aim to contribute to the ongoing discourse on fortifying the security posture of 5G networks, which is crucial for fostering trust and reliability in the burgeoning era of ultra-fast connectivity.

**Keywords:** 5G, Security, Authentication, Encryption, Threat Detection

## REFERENCES

- [1]. Ramraj Dangi, Praveen Lalwani, Gaurav Choudhary, Ilsun You, and Giovanni Pau, "Study and Investigation on 5G Technology: A Systematic Review", MDPI Sensors (Basel). 2022
- [2]. Ishika Sahni, "A Systematic Literature Review on 5G Security", arXiv:2212.03299v1, 2022
- [3]. Chataut R., Akl R. Massive MIMO systems for 5G and beyond networks—Overview, recent trends, challenges, and future research direction. *Sensors*. 2020
- [4]. Alcardo Alex Barakabitze <sup>a</sup>, Arslan Ahmad <sup>b</sup>, Rashid Mijumbi <sup>c</sup>, Andrew Hines, "5G network slicing using SDN and NFV: A survey of taxonomy, architectures, and future challenges", *Computer Networks*, 2020
- [5]. Ahmad I., Kumar T., Liyanage M., Okwuibe J., Ylianttila M., Gurtov A. Overview of 5G security challenges and solutions. *IEEE Commun. Stand. Mag.* 2018
- [6]. Park J.H., Rathore S., Singh S.K., Salim M.M., Azzaoui A.E., Kim T.W., Pan Y., Park J.H. A Comprehensive Survey on Core Technologies and Services for 5G Security: Taxonomies, Issues, and Solutions. *Hum.-Centric Comput. Inf. Sci.* 2021
- [7]. Choudhary G., Kim J., Sharma V. Security of 5G-mobile backhaul networks: A survey. *arXiv*. 2019
- [8]. Choudhary G., Sharma V. *A Survey on the Security and the Evolution of Osmotic and Catalytic Computing for 5G Network*. Springer; Berlin/Heidelberg, Germany: 2019
- [9]. Rajoria S., Trivedi A., Godfrey W.W. A comprehensive survey: Small cell meets massive MIMO. *Phys. Commun.* 2018
- [10]. Li S., Da Xu L., Zhao S. 5G Internet of Things: A survey. *J. Ind. Inf. Integr.* 2018
- [11]. Parvez I., Rahmati A., Guvenc I., Sarwat A.I., Dai H. A survey on low latency towards 5G: RAN, core network, and caching solutions. *IEEE Commun. Surv. Tutor.* 2018
- [12]. Dash L., Khuntia M. Energy efficient techniques for 5G mobile networks in WSN: A Survey; Proceedings of the 2020 International Conference on Computer Science, Engineering and Applications (ICCSEA), 2020
- [13]. Jasim A.H.H., Ögren N., Minovski D., Andersson K. Packet probing study to assess sustainability in available bandwidth measurements: Case of high-speed cellular networks. *J. Wirel. Mob. Netw. Ubiquitous Comput. Dependable Appl.* 2020
- [14]. Gerrit Holtrup; William Lacube; Dimitri Percia David; Alain Mermoud; Gerome Bovet; Vincent Lenders, "5G System Security Analysis", arXiv:2108.08700v2, 2021

- [15]. Ijaz Ahmad; Tanesh Kumar; Madhusanka Liyanage; Jude Okwuibe; Mika Ylianttila; Andrei Gurtov, "5G security: Analysis of threats and solutions", IEEE Conference on Standards for Communications and Networking (CSCN), 2017
- [16]. Kim H. 5G core network security issues and attack classification from network protocol perspective. *J. Internet Serv. Inf. Secure.* 2020
- [17]. Lal N., Tiwari S.M., Khare D., Saxena M. Prospects for Handling 5G Network Security: Challenges, Recommendations and Future Directions. *J. Phys. Conf. Ser.* 2021
- [18]. Kim J., Choudhary G., Heo J., Duguma D. G., You I. 5G wireless P2MP backhaul security protocol: An adaptive approach. *EURASIP J. Wirel. Commun. Netw.* 2019
- [19]. Kiani A., Ansari N. Edge computing aware NOMA for 5G networks. *IEEE Internet Things J.* 2018
- [20]. Kang M. The Study on the Effect of the Internet and Mobile-Cellular on Trade in Services: Using the Modified Gravity Model. *J. Internet Serv. Inf. Secur.* 2020
- [21]. Mae M., Ohnishi W., Fujimoto H. MIMO multirate feedforward controller design with selection of input multiplicities and intersample behavior analysis. *Mechatronics.* 2020
- [22]. Deka K., Sharma S. Hybrid NOMA for Future Radio Access: Design, Potentials and Limitations. *arXiv.* 2020
- [23]. Slalmi A., Chaibi H., Saadane R., Chehri A., Jeon G. 5G NB-IoT: Efficient network call admission control in cellular networks. *Concurr. Comput. Pract. Exp.* 2021
- [24]. Kaur J., Khan M.A., Iftikhar M., Imran M., Haq Q.E.U. Machine learning techniques for 5g and beyond. *IEEE Access.* 2021
- [25]. Suomalainen J., Juhola A., Shahabuddin S., Mämmelä A., Ahmad I. Machine learning threatens 5G security. *IEEE Access.* 2020
- [26]. Bashir A.K., Arul R., Basheer S., Raja G., Jayaraman R., Qureshi N.M.F. An optimal multitier resource allocation of cloud RAN in 5G using machine learning. *Trans. Emerg. Telecommun. Technol.* 2020
- [27]. Tayyaba S.K., Khattak H.A., Almogren A., Shah M.A., Din I.U., Alkhalifa I., Guizani M. 5G vehicular network resource management for improving radio access through machine learning. *IEEE Access.* 2020
- [28]. Sim G.H., Klos S., Asadi A., Klein A., Hollick M. An online context-aware machine learning algorithm for 5G mmWave vehicular communications. *IEEE/ACM Trans. Netw.* 2018
- [29]. Sevgican S., Turan M., Gökarslan K., Yilmaz H.B., Tugcu T. Intelligent network data analytics function in 5g cellular networks using machine learning. *J. Commun. Netw.* 2020
- [30]. Abidi M.H., Alkhalefah H., Moiduddin K., Alazab M., Mohammed M.K., Ameen W., Gadekallu T.R. Optimal 5G network slicing using machine learning and deep learning concepts. *Comput. Stand. Interfaces.* 2021
- [31]. Fang H., Wang X., Tomasin S. Machine Learning for Intelligent Authentication in 5G and Beyond Wireless Networks. *IEEE Wirel. Commun.* 2019
- [32]. Nowaczewski S., Mazurecyk W. Securing Future Internet and 5G using Customer Edge Switching using DNSCrypt and DNSSEC. *J. Wirel. Mob. Netw. Ubiquitous Comput. Dependable Appl.* 2020