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Impact of Blockchain in 5G

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Abstract: ***People have grown socially dependent on the internet as a result of its tremendous convenience and increased influence. Fifth-generation wireless networks, or 5G, are a game-changing technology standard in mobile telecommunications that promises to be 20Gbps faster than current 4G technology. One of the main goals of 5g internetis to I deliver higher multi-Gbps peak data speeds, (ii) ultra low latency, (iii) more reliability, (iv) massive network capacity, (v) increased availability, (vi) higher performance, and (vii) improved efficiency. 5g (Fifth-generation wireless networks) is the most recent iteration of cellular technology. The blockchain technology, on the other hand, is one of the contentious technological enablers that addresses the majority of the present restrictions and offers the functional standards for 5G. Making the best possible use of the tools and resources at hand is essential for creating smart cities. In this paper, we first examine how blockchain might help to solve the difficult problems posed by 5G, and then we discuss potential future applications and research possibilities.***

I. INTRODUCTION

Blockchain is a decentralized, unchangeable database that makes it easier to record and track commercial transactions [1]. A distributed ledger is a specific kind of blockchain. DLT, or distributed ledger technology, enables the sharing of records among numerous computers, or "nodes." A node can be any blockchain user, but it requires a lot of computing power to run. Nodes store data in the ledger and check, authorize, and save it. This contrasts with conventional record-keeping techniques, which preserve data in a single location, such a computer server [2]. Two research scientist, W. Scott Stornetta and Stuart Haber discussed about the blockchaintechnology first time in 1991. To ensure that digital documents could not be alteredor retroactively time-stamped, they sought to provide a computationally feasible approach [3]. Researchers have suggested using blockchain to solve the problems with 5G since itcan provide transparency, data reliability, trustworthiness, and immutability in a distributed setting [4]. By providing data provenance, authenticity, accountability, immutability, and non-repudiation for every user, blockchain enables users of 5G IoT networks to connect and transact (save and retrieve data) [5]. Fifth-generation wireless technology, also known as 5G, has now supplanted 4G in the wireless technology race due to an exponential rise in customer demand [6]. In intelligent networked communication environments, the fifth generation of mobile technology, or 5G, connects people, things, data, apps, transportation systems, and cities. The networks analyze extraordinarily high volumes of data with little lag time,reliably connect a very large number of devices, and transfer enormous amounts of data much more quickly [7].

II. LITERATURE REVIEW

This section classifies some of the researchers with their concepts and achievements.

1) *Blockchain for 5G: Opportunities and Challenges:* Abdulla Chaer, Khaled salah, Claudio lima, Partha Pratim Ray, Tarek Sheltami, 2019. In this research paper, they highlighted decentralized storage of 5g and their services, opportunities which support smart contract elements to develop security,trusted oracle and ecosystem.
2) *Blockchain Technology for the 5G-Enabled Internet of Things Systems: Principle, Applications and Challenges:* Tianqi Yu, Xianbin Wang, Yongxu Zhu, 2019. In this research paper, they summarized through Blockchain Technology which makes smart property trading, smarter manufacturing, distributed data storage and their privacy with 5G.
3) *Blockchain-Based Mobility Management for 5g:* Han Lee, Maode Ma, 2020. In this research paper, they mentioned how is blockchain is used to support full forward key separation, provide some native security features, derivation schemethat improves network performance for handover in 5g.
4) *Blockchain-Enabled 5G Edge Networks and Beyond: An Intelligent Cross-Silo Federated Learning Approach:* Sandi Rahmadika, Muhammad Firdaus, Seolah Jang, Kyung-Hyune Rhee, 2021. In this research paper, they highlighted a concept of a new machine learning empowered by blockchain technology on 5G edge networks. They cover blockchain platform with smart contracts features by the system adequately in a secure manner.
5) *Revealing Development Trends in Blockchain-Based 5G Network Technologies through patent Analysis:* Fei Gao, De-Li Chen, Min-Hang Weng, Ru-Yuan Yang, 2021. In this research paper, they proposed analysis method to investigate developmentand investment opportunities of the blockchain technology-based 5G network technologies and more security assurances.

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III. BLOCKCHAIN FOR 5G

This section classifies the opportunities offered by the Blockchain technology in5G (Fifth-generation wireless networks). The help of the diagram will show some of the opportunities. Fig. 1 describes the classification of the opportunities that explain how is blockchain integrated to 5G.

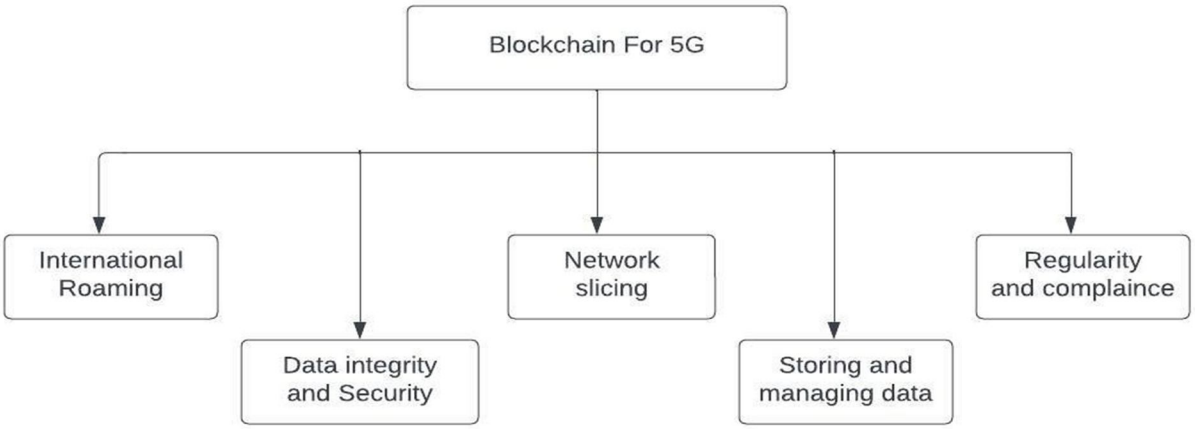


Fig. 1 Classification of the opportunities that how is blockchainintegrated to 5G [8].

As per the above fig. 1, we also provide the details about these opportunities suchas

1) *International Roaming*: Roaming is one of the difficult difficulties in the telecom business that they require third parties to settle down rates and rules between them. Therefore, a large number of parties will be involved in using 5Gnetworks.
2) *Network Slicing:* It is an end-to-end network concept that incorporates all of the current network parts. With 5G network slicing, connections are split up into several connections that provide various resources to various traffic kinds.
3) *Data integrity and Security:* System confidentiality, integrity, and encryption are prioritized by 5G security standards for both user devices and 5G network infrastructure [9]
4) *Storing and managing data:* With the help of blockchain, 5G network services can be made immutable, meaning that there can be no tampering with ormodification of shared data or resource trading records [10].

IV. CHALLENGES

In this section, we highlighted the difficulties that could prevent the widespread adoption and use of blockchain in 5g. The figure will be used to illustrate some of the potential difficulties. The classification of the difficulties that explain how blockchain is integrated with 5G is shown in Fig. 2.

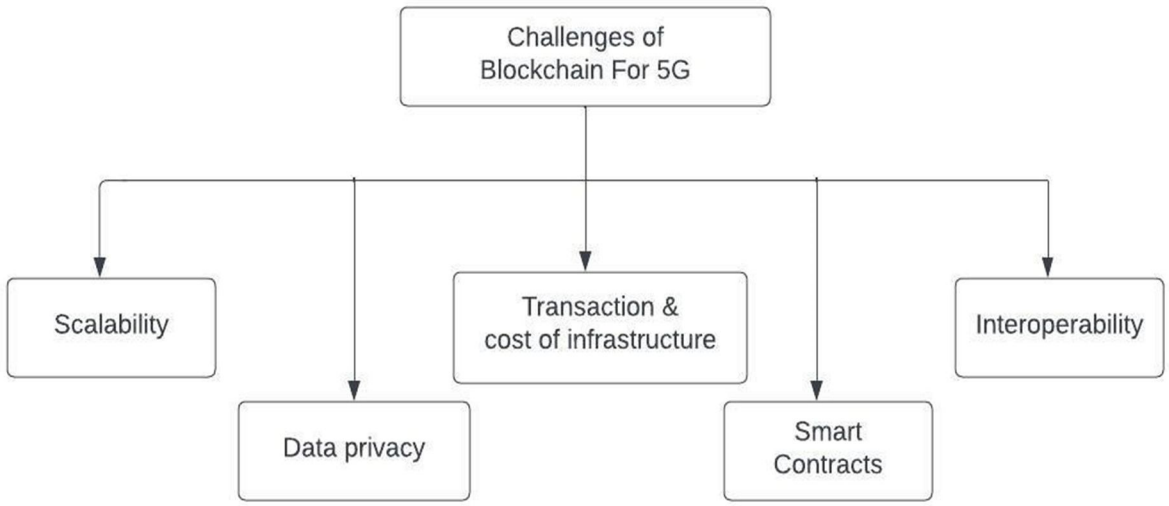


Fig. 2 Classification of the challenges that how is blockchain integrated to 5G.

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As per the above fig. 2, we also provide the details about these challenges such as

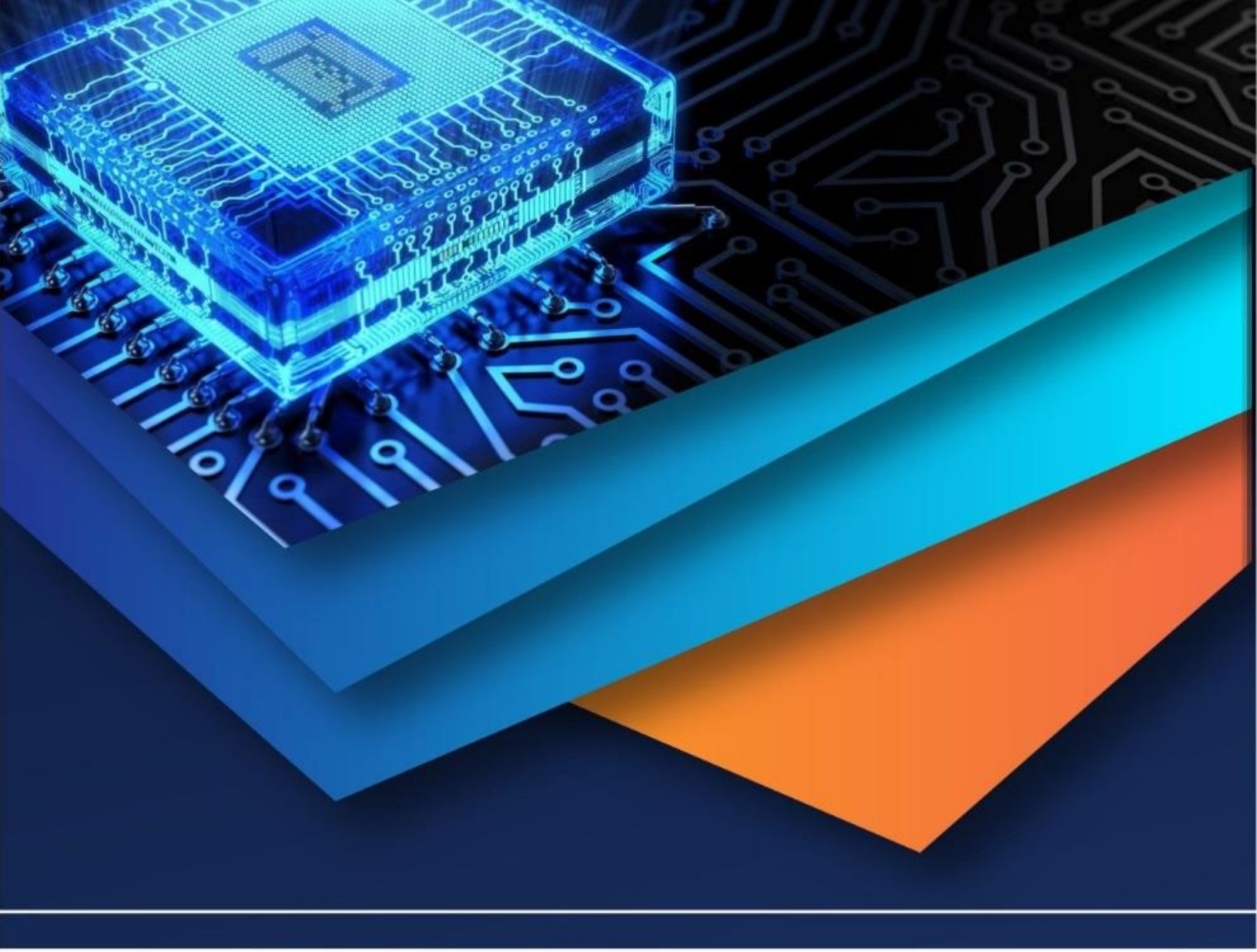
1) *Scalability:* Because payload and data are transmitted in just one millisecond, there is a high throughput rate. The public block chains can process10–14 TPS, thus academics are looking into ways to increase throughput.
2) *Data privacy:* It is the most significant and troubling issue because, with 5G, it is challenging to view critical user information like banking information orpersonal information. Due to the immutability of the information saved onblockchains, users should keep this in mind and only store data in the form of pointers. The EU GDPR regulation lays out stricter privacy requirements in orderto prevent user privacy requests and to provide users control.
3) *Transaction and cost of infrastructure*: The cost of running a blockchain network is extremely high because it needs a cloud infrastructure to host blockchain nodes. The transaction costs varied depending on the function that thecontractors were hired to perform; for example, if the code or function was complex, the transaction costs would be higher. The greater the host, the heavierthe code, and the higher the transaction cost are both caused by inefficient code writing.
4) *Smart contracts:* How to get the massive amount of contracts into the 5G system is the main immediate challenge. The security of smart contracts, which may contain flaws and vulnerabilities that allow hackers to exploit data, is a significant issue as well. It is a challenging task to find a solution to this. Legalityis yet another important problem. There is a need to fix this problem and make the smart contractor patchable and upgradeable in order to resolve this issue. Thesmart contractor was not upgraded by the form of their designs, so they cannot bepatched or upgraded whenever a bug is found.
5) *Interoperability*: Another significant obstacle is the complete interoperability of the blockchain technology platform with the 5G network. These two problems are significant obstacles that the researchers must overcome over time. The availability of various blockchain technology platforms to connectto 5G stakeholders is the other significant issue.

V. CONCLUSION

In this paper, we provided a summary of how blockchain technology is integratedwith 5G (fifth-generation wireless networks), as well as its benefits and features that open up a new range of opportunities for enhancing security and trust and some significant challenges faced during integration between blockchaintechnology and 5G network.

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