HBRP PUBLICATION

Journal of Advancement in Parallel Computing
Volume 4 Issue 2

5G Enabled IoT with Integrated BlockchainTechnology

A S Ranjitha[1], Priyanka M S[2*]
[1]Student, [2]Professor
Department of CSE, East West College of Engineering, Bengaluru, Karnataka, India.

****Corresponding Author***
E-mail Id:-*priyankams272@gmail.com*

ABSTRACT
The Internet of Things (IoT) is quickly expanding in today's computerized world, with internet technology connecting the majority of objects. With the help of high speed internet, decentralization and secured data IoT connects to millions of devices in the world. But due to decentralization IoT devices face many security issues. In this paper, integration of blockchain technology in 5G enabled IoT devices and security issues are discussed.

Keywords:-*Blockchain, IoT, 5G Technology,Network Function Virtualization (NFV).*

INTRODUCTION

Future can be shaped with the help of three different independent techniques namely 5G, IoT and Blockchain. 5G technology offers a data transmission rate of 10GB/s enabling more IoT devices connected to internet. IoT is used in healthcare, smart farming, smart homes and smart electronics etc. Upto 15-20% of energy consumption can be reduced in smart cities and smart homes but IoT has lot of security issues in smart devices. Blockchain technology helps in solving the security issues as data blocks are linked together and also has the address of previous block which is more reliable than the client server system. Integrating blockchain technology can solve security issues of IoT devices to some extent.

HISTORY OF MOBILE NETWORK

Mobile communication was started in US at 1950's. After 30 years, the first generation (1G) mobile phone was released. The second generation of mobile communication (2G) technology was launched with a microprocessor that includes digitised attributes and the capacity to send SMS. Third generation (3G) arrived in the twenty-first century, enabling of voice communication and messaging at a reasonable speed. A few years ago, the fourth generation (4G) was introduced, allowing for super-fast internet transmission in 4G-enabled devices. Internet usage is now not only limited in mobile devices, but also in other electrical equipment such as refrigerators, televisions, and automobiles. This is a good example and can be the first phase in the development of fifth-generation (5G) technology, with speed up to 25 megabits per second. 5G technology is based on CDMA, BDMA and millimeters wireless technologies. The key benefits of 5G is has a fast data transfer rate, minimal latency, higher bandwidth and virtualization capability.

5G TECHNOLOGY IN INTERNET OF THINGS

Linking of physical devices, automobiles and other objects, as well as the shared data provided by electrical or sensor is done with the help of IoT.

IOT ARCHITECTURE

The business layer, application layer, support layer, connectivity/edge computing layer, and recognition layer

makes up the 5G IoT architecture. The recognition layer covers IoT physical objects such as smart phones and IoT hardware components such as sensors and other data taking devices. This layer's major functions are to collect data from IoT devices and to recognise the IoT environment. The connection/edge computing layer defines communication protocols and networks, and its primary function is interconnectivity. The support layer connects the above and below levels, and it includes cloud computing capabilities and data analysis capabilities. Some of the applications supported by application layer are smart home, smart grid, healthcare and wearables. All IoT systems are managed by the business layer. In each case, there are numerous security concerns. 5G IoT devices requires

NFV which delivers scalability and flexibility in 5G-IoT applications.

SOFTWARE DEFINED NETWORK

5G technology requires an effective network management system which is provided by software defined network. Control and Administration are the functions of SDN. Network Function Virtualization is used to implement Software Defined Network in the 5G network.

In the SDN architecture, the data plane, control plane and administration plane are all clearly separated. SDN architecture plays an important role in managing complex network like 5G. Virtualization of network functions is also possible with SDN.

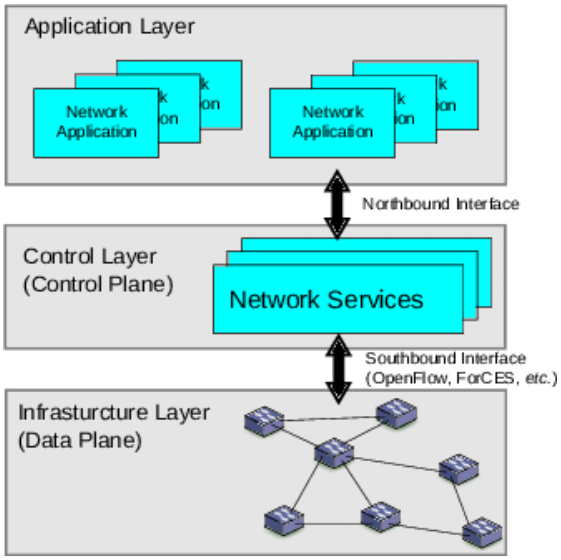

Fig.1:-*Software Defined Network Architecture.*

5G technology allows a physical network to be divided into many virtual networks, as well as support for multiple radio access networks. In a 5G network, Network Function Virtualization aids virtualization and network slicing.

TECHNICAL AND SECURITY CONCERNS WITH 5G AND IOT

Scalability, network management, interoperability, lack of standards, latency, heterogeneity, security assurance, identity, privacy concerns, and authentication are the primary technical and security difficulties in 5G IoT design. Blockchain integration can help with a variety of security challenges of IoT application.

OVERVIEW AND WORKING OF BLOCKCHAIN TECHNOLOGY

Growing collection of blocks or chains connected together by cryptographic hash

functions is known as blockchain. It's a distributed database of records at its core. It is decentralised and contains a public ledger for conducting all transactions involving multiple parties. The blockchain technology is based on the consensus mechanism, which verifies each transaction using a consensus algorithm before being stored in the ledger. The transaction information entered in the ledger is permanent, and they cannot be deleted or changed. Bitcoin is the most well-known application of Block chain technology.

Working: Blockchain technology is based on collection of blocks which are linked together using cryptographic hash function. Hash function is used for identification of next node in the chain. A new node will be created for a transaction requested to blockchain. Then the new node is sent to all other nodes for validation. If validation is successful new node will be added to blockchain and corresponding transaction details will be stored in blockchain.

CHARACTERISTICS AND APPLICATION

Blockchain technology characteristics are distributed, decentralised, smart contract, trust, security and anonymity. Because of these qualities, blockchain technology is being used in the majority of online transactions. Blockchain technology can be used in both financial and non-financial applications.

BLOCK CHAIN CONTAINED IN 5G IOT

Nowadays, digitization is on the rise, and IoT device utilisation is on the rise as well. According to estimates, there will be 20.4 billion linked gadgets in upcoming years. Decentralization, compatibility, privacy, and security vulnerabilities are the key issues of IoT. The majority of these issues can be addressed by combining blockchain technology with 5G-enabled IoT. The use of blockchain in the Internet of Things helps to eliminate centralization and make transactions more safe. Enhanced security, free from tampering and fraud, affordable, trust and autonomous are some of the advantages of decentralised IoT.

Because of its decentralised nature, blockchain applications have become more powerful in the digital world.

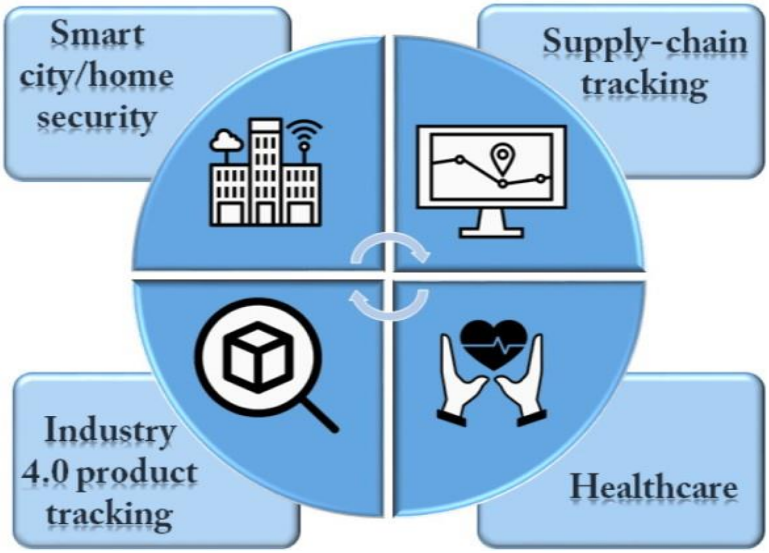

Fig.2:-*Blockchain applications.*

CHALLENGES AND SECURITY ISSUES

The main challenges are higher energy consumption, scalability, slower data transactions, lack of standards, low storage capacity, and poor processing powers. Various attacks like DoS attack, timing attacks, scanning attacks, timing attacks, man in the middle attack and trust are the main security issues.

CONCLUSION

In today's digital world, integrating several technologies into a single platform is critical, as it can solve a variety of technical, network, and security issues. Integration of 5G, IoT and Block chain technology helps in creating an environment for varietyof applications.

REFERENCES

1. Sial, M. F. K. (2019). Blockchain Technology–Prospects, Challenges and Opportunities.
2. "Blockchain applications in internet of things." https://www.blockchaintechnologies.com/applications/internet-ofthings-iot/.
3. Kumar, N. M., & Mallick, P. K. (2018). Blockchain technology for security issues and challenges in IoT. *Procedia Computer Science*, *132*, 1815-1823.
4. Nakamoto, S. (2008). Bitcoin: A peer-to-peer electronic cash system. *Decentralized Business Review*, 21260.
5. Han, D., Kim, H., & Jang, J. (2017, October). Blockchain based smart door lock system. In *2017 International conference on information and communication technology convergence (ICTC)* (pp. 1165-1167). IEEE.
6. Crosby, M., Pattanayak, P., Verma, S., & Kalyanaraman, V. (2016). Blockchain technology: Beyond bitcoin. *Applied Innovation*, *2*(6-10), 71.
7. Menon, K. D., Raj Jain, A., & Kumar Pareek, D. (2019). Quantitative analysis of student data mining.
8. Pai H, A., HS, S., Soman, S., Pareek, D., & Kumar, P. (2019). Analysis of causes and effects of longer lead time in software process using FMEA. *Piyush Kumar, Analysis of Causes and Effects of Longer Lead Time in Software Process Using FMEA (May 17, 2019)*.
9. Pai H, A., HS, S., Soman, S., Pareek, D., & Kumar, P. (2019). ROC Structure Analysis of Lean Software Development in SME's Using Mathematical CHAID Model. *Piyush Kumar, ROC Structure Analysis of Lean Software Development in SME's Using Mathematical CHAID Model (May 17, 2019)*.
10. HS, S., Soman, S., & Kumar Pareek, D. (2019). Fast and efficient parallel alignment model for aligning both long and short sentences.
11. BR, M., Bhavya, B. R., Pareek, D., & Kumar, P. (2016). Education Data Mining: Perspectives of Engineering Students. *International Journal of Innovative Research in Computer Science & Technology (IJIRCST) ISSN*, 2347-5552.
12. Kotagi, M., & Pareek, P. K. (2016). Survey on Challenges in DevOps. *International Journal of Innovative Research in Computer Science & Technology (IJIRCST) ISSN*, 2347-5552.
13. Soman, S., & Pareek, P. K. (2020). An exploratory analysis on challenges prevailing in small and medium IT firms. In *Journal of Physics: Conference Series* (Vol. 1427, No. 1, p. 012010). IOP Publishing.
14. Sangeetha, V., Vaneeta, M., Kumar, S. S., Pareek, P. K., & Dixit, S. (2021). Efficient Intrusion detection of malicious node using Bayesian Hybrid Detection in MANET. In *IOP Conference Series: Materials Science*

and Engineering .1022, No. 1, p. 012077). IOP Publishing

15. Pustokhina, DA, Pareek, P, Gupta, D, Khanna, A, Shankar, K. Energy-efficient cluster-based unmanned aerial vehicle networks with deep learning-based scene classification model. *Int J Commun,Syst. 2021;* 34:e4786. https://doi.org/10.1002/dac.4786
16. K., Swathi, K., & Shetteppanavar, P. (2017, May). An efficient machine translation model for Dravidian language. In *2017 2nd IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology (RTEICT)* . 2101-2105. IEEE
17. Aditya Pai, H., Pareek, P. K., Narasimha Murthy, M. S., Dixit, S., & Karamadi, S. (2021). An Exploratory Study for Process Optimization in IT Industry. In *Emerging Technologies in Data Mining and Information Security: Proceedings of IEMIS 2020, 3* . 617-631. Springer Singapore
18. Soman, S., Pareek, P. K., Dixit, S., Chethana, R. M., & Kotagi, V. (2021). Exploration Study to Study the Relationships Between Variables of Secure Development Lifecycle (SDL). In *Emerging Technologies in Data Mining and Information Security: Proceedings of IEMIS 2020, Volume 3* (pp. 641-649). Springer Singapore.
19. Soman, S., Pareek, P. K., Dixit, S., Kotagi, V.. (2020). An Empirical Investigation on Practicing Secure Software Development in Software Development Life Cycle in Small & Medium Level Software Firms in Bengaluru. *International Journal of Advanced Science and Technology, 29*(7s), 5164
20. Soman, S., Pareek, P. K., Dixit, S., Kotagi, V.. (2020). An Empirical Investigation on Practicing Secure Software Development in Software Development Life Cycle in Small & Medium Level Software Firms in Bengaluru. *International Journal of Advanced Science and Technology, 29*(7s), 5164.
21. Patil, S. S., Pareek, P.,K., Dinesh, H. A., Arlimatti, S.(2017). Review of relay selection techniques in multi-hop wireless sensor network with iot. *International Journal of Creative Research Thoughts (IJCRT), 5*(4).846-850