Chapter 16
IoT–Fog–Blockchain Framework: Opportunities and Challenges

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ABSTRACT

Exploring the unique blockchain-internet of things (IoT) framework may be an attractive structure for enhancing communications efficiency in the 5G networks. The wireless communication would have been the largest research area that allows users to communicate with each other. Nowadays, high-speed, smart, efficient with many technologies, such as low power consumption, and so on, appear to be available to communicate with each other in today's globe. Throughout this framework, the expansion of fog features is enabled for physical objects within IoT. Several of the challenging issues in the field of wireless communications would be to build a new blockchain-based virtualization system across the IoT architecture. The main purpose of this framework is to connect blockchain technology to the IoT and fogging or maintains the IoT cryptography secured when transactions occurred. This strengthens blockchain and fog to build an effective IoT communication system. The recommended method is an important estimation of the extensive work.

INTRODUCTION

The proposed study is a move forward in the area of Internet of Things in 5G diverse systems in which the author proposes a unique blockchain-based virtualization structure of interacting 5G network-connected devices along with the network. That study result would be to introduce a new structure of communications on the IoT. The suggested study utilizes the required study's appropriate as well as effective simulation and could be introduced through an IoT structure. It seems the whole universe is now becoming completely reliant on mobility facilities as well as wireless technology. The Blockchain (BC) throughout the Internet of Things (IoT) has become a novel innovation that behaves on a decentralized, distributed, public as well as a real-time database to collect operations among IoT endpoints (Alam, T., 2019-1). The blockchain is indeed a sequence of blocks, every block is connected to the prior blocks. Every block must have the cryptographically secure key, prior block hash, as well as its information.

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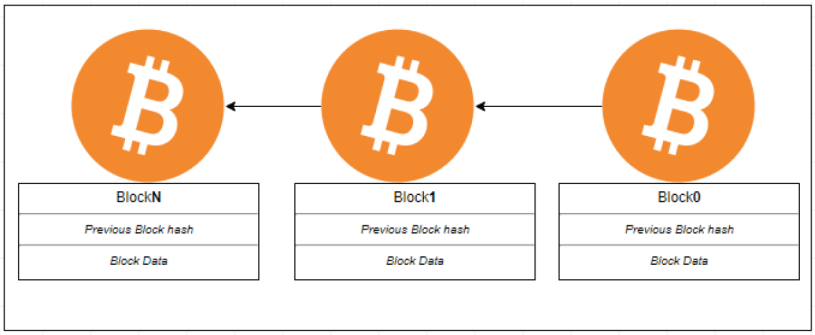
Figure 1. Blocks in a blockchain



The BC operations will be the fundamental modules that had to transmit information among IoT endpoints. The IoT access points seem to be different kinds of natural however smart devices with integrated detectors, sensors, systems as well as worthy of interacting with several other IoT endpoints (Figure 1). BC's role in IoT would be to have a mechanism for handling protected information records by IoT endpoints (Alam, T., 2019-2). BC seems to be a safe innovation that could be used openly as well as publicly. The Internet of things enables this technology to enable asymmetric cryptography among IoT endpoints in such a diverse system. BC transactions might be monitored as well as traversed through everything accessed to interact throughout the IoT. BC might well enhance interaction protection. The Internet of things has been increasing dramatically throughout the year with its objective in 5G innovations, like Smart Homes as well as Cities, e-Health, distributed intelligence, etc., but has privacy and security obstacles. The protection of confidentiality in connectivity among IoT gadgets paid too much publicity from 2017 to 2019. Many papers were written from 2017 to 2019 in the same field of research. Scott Stornetta wrote an article (Haber, S., & Stornetta, W. S., 1990) on exchanging a report with confidentiality without storing any data about the time-stamping system. A concept of blockchains came, however, in 2008 Satoshi Nakamoto described the first blockchains (Nakamoto, S., 2019). In such a decentralized strategy, the IoT devices have been directly linked. It is therefore much more complicated to be using the conventional current security strategies in the interaction among IoT endpoints. BC is an innovation that provides security in transactions among IoT gadgets. This offers a decentralized, distributed as well as publicly available mutual ledger to collect blocks information which is stored or confirmed in such an IoT system. Its information stored throughout the distributed ledger is immediately attempted to use peer-to-peer configuration. The BC is an innovation at which IoT endpoints handle the transactions in the type of such a block in the blockchain (Figure 2). A blockchain with IoT functions together with its goals that could be summarized:

1) Decentralization structure: Internet of things as well as BC, both approaches would be identical. This structure eliminates the centralized approach or even provides the facility for a decentralized architecture. This enhances the aggregate control system probability of failure or efficiency.
2) Protection: transactions among endpoints were often protected throughout the BC. This is a really different approach to secure interactions. The BC enables IoT gadgets to interact reliably with one another.