Chapter 12
Blockchain-Based IoT-Enabled Secure 6G Smart City Applications

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ABSTRACT

When block chain technology is integrated with IoT in 6G network, it has the possibility to transformation smart city applications in variety ways. Modern cities are rapidly going digital, so the requirements for safe, fast, and scalable systems are essential. The core paradigm of blockchain, consisting of a distributed and immutable register, is safe for IoT networks when addressing threats such as a

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data breach and unauthorized access. The expansion of this relationship becomes possible with the help of introductions of 6G networks resulting in ultra-low latency, extensive connectivity, and bringing high data rates necessary for real-time applications in smart cities. It can also be used for several purposes including; self-driving transport systems, smart energy-based grid systems, healthcare, and public safety. Implementation of 6G based IoT systems along with blockchain also helps in emphasizing the trustworthiness of smart city frameworks and transparent and secure data trading.

1. INTRODUCTION

A combination of 6G networks and blockchain technology combined with the Internet of Things will revolutionize smart city solutions. As urban areas get smarter and connected getting good secure efficient and scalable systems increases. Due to blockchains decentralized and permanent record keeping property, most security issues that IoT networks experience such as data leakage, unauthorized access, and lack of trust between stakeholders are addressed. Especially, 6G networks, characterized by ultra-low latency, extensive connectivity, significantly higher data rates than the previous generations, will allow the integration of a multitude of IoT devices and applications in smart cities. Through such a close integration between blockchain and 6G-enabled IoT, the intelligent environment of the Smart City receives a reliable, solid, and effective base for the development of several applications, such as smart transport, smart energy, smart health, public security, and smart environment (Alghamedy et al., 2024).

One of the advantages of employing blockchain and IoT in synergism with 6G is that the network becomes more secure and private. Blockchain eliminates the risk of centrally located key that can be accessed by hackers once or for the entire network. Every purchase or any kind of exchange is stored on an immutable public ledger, which is quite transparent. This is particularly important in the exigent smart city services such as energy management in smart grids where accuracy of data helps in ensuring reliability in services provided. Also, it provides a secure solution of identity management for the IoT devices where the problem of unauthorized access and data manipulation can be minimized through blocks. The characteristics of being fast and having low latency of the 6G networks also complement the use of blockchain in IoT systems. Since the processing of data will be real-time in 6G, it creates the capability of checking and finalizing the blockchain-based transactions in real-time. This is important when it comes to specific timing where an AI operated car needs to make a quick decision on a certain situation. This has the potential of handling many connected devices that are likely to be present in smart city projects

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