

Chapter 17

Integrating Blockchain IoT and 6G Technologies for Secure Efficient and Sustainable Smart City Applications Enhancing Urban Living Through Innovation

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ABSTRACT

Smart cities are revolutionised by integrating Blockchain, IoT, and 6G technologies, which improve sustainability, efficiency, and security. IoT permits real-time data

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gathering and analysis from a variety of urban sensors, while blockchain guarantees data integrity and secure transactions. With 6G's lightning-fast connection, devices can communicate with one other with ease, facilitating better public services, energy optimisation, and intelligent traffic control. By fostering inventive solutions to urban problems and promoting environmental sustainability via resource efficiency, this synergy enhances the quality of life of inhabitants by fostering smarter, more responsive urban settings. When combined, these technologies change cities into intelligent, networked ecosystems that open up new possibilities for urban existence.

1. INTRODUCTION

Global urbanization is accelerating, and this is putting increasing pressure on cities' infrastructure, resource management, and general quality of life. As a result, innovative technologies are being used by smart city projects to make cities more habitable, sustainable, and efficient. Blockchain technology, the Internet of Things (IoT), (Madakkam et al., 2015) and 6G networks are key components of this revolution. The integration of these technologies promises to change urban living by improving security, efficiency, and sustainability. Each technology brings special skills to the table. Blockchain technology guarantees security, trust, and transparency in digital transactions by providing a decentralized and unchangeable ledger system. Blockchain technology (Yli-Huumo et al., 2016) can protect and simplify a number of applications in the context of smart cities, such as public transportation, energy management, healthcare, and public services. This is because it removes the need for central intermediaries and lowers the danger of fraud and data breaches. The Internet of Things (IoT) links physical objects with software and sensors to allow for the interchange and collecting of data in real time. Cities can more efficiently monitor and manage public services, environmental conditions, and infrastructure thanks to this connectivity. However, blockchain can offer strong security and effective data management solutions, which are necessary given the massive amount of data created by IoT devices.

The next generation of wireless networks, known as 6G networks, offer previously unheard-of speed, capacity, and ultra-low latency. These features are essential for enabling the enormous data flows and real-time processing that Internet of Things applications demand. 6G will enable smooth communication between billions of linked devices, enabling cutting-edge applications like real-time holographic communication, autonomous vehicles, and immersive augmented reality experiences. Data rates are predicted to reach up to 1 terabit per second. Smart cities may achieve higher efficiency and sustainability, better security and privacy, and better quality of life for their citizens by combining Blockchain, IoT, and 6G technology. (Nawaz,

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