Chapter 13
Enabling Secure and Efficient Healthcare Delivery in Smart Cities Through 6G Infrastructure

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ABSTRACT

Smart cities leverage 6G infrastructure for secure, efficient healthcare delivery. 6G's ultra-low latency, high bandwidth, and device connectivity enable real-time data transmission for telemedicine, remote monitoring, and robotic surgeries, improving healthcare access. Ensuring 6G security is crucial; encryption, authentication, blockchain, and zero-trust models protect sensitive data. Integrating 6G with existing systems requires standardized protocols and collaboration. Navigating regulations and ethics related to data privacy and patient consent is essential. As smart cities evolve, secure 6G will revolutionize healthcare delivery through innovation and prioritizing patient well-being.

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1. INTRODUCTION TO SMART CITIES AND 6G INFRASTRUCTURE

1.1 The Concept of Smart Cities and Leverage 6G for Healthcare

Smart cities are urban areas that leverage advanced technologies and data-driven approaches to enhance the quality of life for their residents, improve operational efficiency, and promote sustainable development (Gharaibeh et al., 2017). These cities integrate various systems, such as transportation, energy, healthcare, and governance, through interconnected networks and intelligent infrastructure (Yigitcanlar et al., 2018). By harnessing the power of information and communication technologies (ICT), smart cities aim to address the challenges of urbanization, optimize resource utilization, and create more livable, resilient, and prosperous communities (Khatoun & Zeadally, 2016). The concept of Smart Cities represents a transformative approach to urban development, leveraging cutting-edge technologies to enhance quality of life, optimize resource utilization, and promote sustainable growth (Yigitcanlar et al., 2021). These intelligent urban ecosystems integrate interconnected systems, Internet of Things (IoT) devices, and artificial intelligence to revolutionize various aspects of city life, including healthcare delivery(Singhal et al.,2024).

In the realm of healthcare, Smart Cities are poised to harness the power of 6G technology, the next generation of wireless communication. 6G promises to surpass its predecessor, 5G, offering unprecedented connectivity, ultra-low latency, and massive data capacity (Dang et al., 2020). This technological leap is expected to catalyze significant advancements in urban healthcare systems.

Smart Cities leveraging 6G for healthcare can implement several innovative solutions:

a. Ubiquitous health monitoring: 6G enables the deployment of advanced wearable devices and nano sensors capable of continuous, real-time monitoring of patients' vital signs and biomarkers. These devices can transmit data instantaneously to healthcare providers, facilitating proactive and preventive care (Saad et al., 2020).
b. Holographic telemedicine and remote surgery: The ultra-low latency and high bandwidth of 6G networks facilitate not only seamless remote consultations but also enable surgeons to perform complex procedures from a distance using haptic feedback, augmented reality, and even holographic projections (Viswanathan & Mogensen, 2020).