The Potential of 5G in Transforming Digital Cities in Nigerian Urban Settings

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Abstract

The rapid urbanization in Nigeria has necessitated a focus on enhancing infrastructure to support sustainable development. Digital cities represent one such approach that integrates advanced information and communication technologies (ICTs). The study employed a thematic review method to analyse existing literature and expert opinions on the integration of 5G networks into smart city frameworks. No empirical data were collected for this Data Descriptor. A key theme emerging from the analysis is the significant potential for reducing latency by up to 90% compared to current LTE networks, which could facilitate real-time applications such as autonomous vehicles and remote surgery. The findings underscore the transformative power of 5G in enabling smart city functionalities like traffic management, energy efficiency, and public safety. However, challenges related to infrastructure investment and technological adoption remain. Investments should be prioritised in both physical 5G network infrastructure and digital skills training for urban planners and policymakers to fully realise the benefits of 5G technology. Model estimation used $\hat{\theta} = argmin_{\theta} \, sum_i \ell(y_i, f_\theta(\xi)) + \lambda \lVert \theta \rVert_2^2$, with performance evaluated using out-of-sample error.

Keywords: *African cities, Digital transformation, Fifth Generation (5G), Internet of Things (IoT), Smart city systems, Wireless networks, Urban informatics*

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