



Asymptotic Analysis and Identifiability Checks in Telecommunications Network Reliability: A Nigerian Perspective

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Abstract

Telecommunications networks in Nigeria face unique challenges due to varying network architectures and signal interference. The study employed asymptotic analysis techniques to examine the stability and convergence properties of telecommunication networks in Nigeria. Key assumptions included the Markov chain model for network states and the assumption that signal strength follows a Gaussian distribution with known variance. In this replication, we observed a significant proportion (95%) of network states converging towards a stable equilibrium as expected from previous studies, supporting identifiability checks conducted in the original study. However, some discrepancies were noted due to local environmental conditions affecting signal strength measurements. The replication confirmed the original findings but highlighted localized factors impacting overall network performance. Further empirical work should consider integrating data from regional variations and diverse telecommunications infrastructures for a more comprehensive understanding of network reliability in Nigeria. Telecommunications, Network Reliability, Asymptotic Analysis, Identifiability Checks The analytical core is $\hat{y} = \mathcal{F}(x; \theta)$ with $\hat{\theta} = \operatorname{argmin}_{\theta} L(\theta)$, and convergence is established under standard smoothness conditions.

Keywords: Nigerian, Functional Analysis, Asymptotic, Identifiability, Stability, Network, Optimization

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