

Noise in Telecommunications: Challenges and their Strategies- A Review Paper

Adarsh A. Sathe, Aaditya A. Ingole, Anurag D. Shinde, Gaurav P. Vyawahare, Vrushabh S. Khandare

Dr. Rajendra Gode Institute of Technology and Research, Amravati, India

adarshsathe079@gmail.com, aadityaingole2004@gmail.com, anuragshinde232@gmail.com,

gauravvyawahare368@gmail.com, khandarevrushabh88@gmail.com

Abstract: *Noise in communication systems presents a significant barrier to reliable data transmission, often disrupting or breaking connections. Categorized into internal and external sources, noise impacts both wired and wireless systems, challenging the stability of modern multiservice telecommunication networks (MTNs). As the demand for data transmission grows, enhancing noise immunity has become crucial, with a focus on achieving high information, spectral, and energy efficiency to improve message reliability. Recent studies explore advanced mathematical modeling, optimal reception theories, and signal-code constructions (SCC) to bolster noise resistance, focusing on error-correcting receivers and efficient modulation schemes. However, optimization of SCC in line with energy efficiency remains complex due to varied system requirements and design constraints. This review discusses current methods for calculating noise immunity indicators, the limitations of existing models, and the need for a comprehensive framework to address noise immunity in next-generation networks (NGN) and future networks (FN). The proposed approach emphasizes optimizing signal processing and reception quality based on energy efficiency criteria, which is critical for improving the robustness of telecommunication systems in increasingly data-intensive environments.*

Keywords: Noise, Telecommunication, Performance, Bandwidth, Error Probability