

Green Data Communication: Reducing Energy Consumption In Networks

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Abstract: *Green data communication has emerged as an important research area within Computer Networks, focusing on reducing the energy consumption of modern communication systems while maintaining reliable data transmission. With the rapid growth of internet services, cloud computing, and wireless communication technologies, network infrastructures such as routers, switches, and data centers consume significant amounts of electrical energy. This increasing energy demand not only raises operational costs but also contributes to environmental concerns such as carbon emissions and electronic waste. Green data communication addresses these challenges by introducing energy-efficient networking strategies, including intelligent routing protocols, adaptive resource allocation, virtualization, and power-aware network management. These techniques aim to optimize network performance while minimizing energy usage across both wired and wireless communication systems. Furthermore, emerging technologies such as software-defined networking, edge computing, and energy-efficient hardware design play a crucial role in improving overall network sustainability. By integrating energy-aware algorithms and efficient infrastructure management, green data communication can significantly reduce the environmental impact of large-scale communication networks while supporting the growing demand for global connectivity.*

Keywords: Green Data Communication, Energy Efficiency, Computer Networks, Sustainable Networking, Energy- Efficient Routing, Network Optimization, Green Computing

