



National Conference on Sustainable Developments in Engineering,
Science, Humanities and Management (NCSDESHM – 2025)
28th December, 2025, Raipur, Chhattisgarh, India.

CERTIFICATE NO: NCSDESHM /2025/ C1225910

Design of Intelligent Computing Techniques for Resilient and Privacy-Preserving Routing in Dynamics Secure Networks

Piyali Ghosh

Research Scholar, Department of Computer Science & Engineering, Mansarovar Global University,
Sehore, M.P., India.

ABSTRACT

Dynamic secure networks face persistent challenges arising from topology changes, mobility, heterogeneous traffic, and sophisticated cyber threats that compromise routing reliability and data confidentiality. Conventional routing protocols lack the adaptability required to maintain resilience while simultaneously enforcing strong privacy guarantees. This research proposes the design of intelligent computing techniques that integrate machine learning, evolutionary optimization, and privacy-enhancing mechanisms to achieve resilient and privacy-preserving routing in dynamic secure networks. The framework develops adaptive routing algorithms capable of real-time anomaly detection, predictive link-failure mitigation, and secure path selection under adversarial conditions. Privacy is enforced through the incorporation of differential privacy, secure multiparty computation, and lightweight cryptographic primitives within the routing decision process, ensuring that sensitive topology and traffic information remain protected. Resilience is enhanced via intelligent recovery strategies that maintain connectivity and quality-of-service during node failures, link disruptions, and targeted attacks. The proposed techniques are evaluated through extensive simulation and analytical modeling across representative dynamic network scenarios, measuring improvements in packet delivery ratio, end-to-end latency, energy efficiency, attack resilience, and privacy leakage metrics. The outcomes are expected to deliver practical, scalable solutions for secure communication in next-generation environments such as IoT, mobile ad-hoc networks, and beyond-5G systems, advancing the state of intelligent, trustworthy networking.

Keywords: *Intelligent Computing Techniques; Privacy-Preserving Routing; Resilient Dynamic Networks.*