

NET-PATROL-X – Next-gen Encrypted Traffic Patrol

Pramilarani K

Associate Professor, Department of Computer Science and Engineering, New Horizon College of Engineering, Bengaluru, India

Aditya Kumar

Department of Computer Science and Engineering, New Horizon College of Engineering, Bengaluru, India

Sriram KN

Department of Computer Science and Engineering, New Horizon College of Engineering, Bengaluru, India

Sri Vishnu J

Department of Computer Science and Engineering, New Horizon College of Engineering, Bengaluru, India

Prashant C

Department of Computer Science and Engineering, New Horizon College of Engineering, Bengaluru, India

Abstract:

The increasing reliance on digital infrastructure has heightened the importance of robust national cybersecurity systems, yet the widespread use of encryption presents significant challenges for effective threat detection without infringing on user privacy. This research introduces NET-PATROL-X, a comprehensive, real-time surveillance framework that combines Deep Packet Inspection (DPI), artificial intelligence (AI), and privacy-preserving technologies to monitor encrypted network traffic at scale. Through an in-depth analysis of current surveillance methodologies, privacy regulations, and emerging AI techniques such as federated learning, this study proposes a balanced approach that ensures both national security and civil liberties. Drawing upon case studies of existing systems and regulatory frameworks like GDPR, the research highlights the ethical and technical challenges in encrypted threat detection. The findings demonstrate that NET-PATROL-X can effectively identify cyber threats in encrypted data streams while maintaining compliance with legal standards and safeguarding user privacy. This project offers a scalable, modular architecture deployable at ISP nodes nationwide, aiming to enhance digital defence capabilities without compromising transparency or individual rights