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AI-DRIVEN SECURITY ORCHESTRATION AND AUTONOMOUS RESPONSE IN NEXT-GENERATION NETWORKS (5G/6G & IOT): A SYSTEMATIC REVIEW

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ABSTRACT

As the global telecommunications landscape shifts from 5G to 6G, the integration of billions of Internet of Things (IoT) devices has drastically increased the network attack surface. Traditional security protocols, reliant on manual intervention and static rules, are increasingly inadequate for the low-latency and high-reliability requirements of next-generation infrastructures. This paper provides a systematic review of recent advancements in AI-driven threat detection and autonomous response mechanisms. We evaluate the performance of state-of-the-art machine learning (ML) and deep learning (DL) models, including XGBoost, CNNs, and Federated Learning, specifically with respect to 5G-NIDD and IoT-centric datasets. Our analysis identifies a paradigm shift toward "Zero-Touch" security and Zero-Trust Architectures (ZTA), where AI engines facilitate real-time anomaly detection and self-healing network reconfigurations. Furthermore, we discuss critical challenges, including adversarial AI, model explainability (XAI), and the computational constraints of edge-based IoT nodes. The review concludes by outlining a roadmap for future research, emphasising the necessity of decentralised, privacy-preserving AI to secure the future of connected intelligence.

KEYWORDS:

IoT – Internet of Things

ML – Machine Learning

DL – Deep Learning

XG Boost – Extreme Gradient Boost

CNN – Convolutional Neural Networks

NIDD – Network Intelligent Data Detection.

Article History

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