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Exposing IoT Platforms Securely and Anonymously Behind CGNAT

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Abstract—The swift expansion of Internet of Things (IoT) devices has resulted in considerable progress in connectivity and automation, yet it has simultaneously brought about notable security weaknesses. This paper presents a novel approach to securing IoT platforms through a comprehensive architecture that integrates a double reverse proxy setup, leveraging Oracle Cloud Virtual Private Servers (VPS), NGINX Proxy Manager, Cloudflare, and Tailscale encrypted peer-to-peer (P2P) tunneling. The proposed solution employs Oracle Cloud VPS to host and manage IoT applications, ensuring robust performance and scalability. NGINX Proxy Manager is utilized to facilitate efficient and secure load balancing and reverse proxy functions. Cloudflare provides additional security layers, including Distributed Denial of Service (DDoS) protection, SSL/TLS encryption, and traffic management. To further enhance security, the encryption of Tailscale P2P tunneling creates a secure mesh network between devices, ensuring data integrity and confidentiality. This architecture not only fortifies the security posture of IoT platforms but also improves the resilience and reliability of data transmission.

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