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Wireless Mesh Data Communications and Reliability Analysis for Anti-theft Application Deployment in Educational Institutions

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This research is a continuation of a security application to protect portable computer devices against theft in educational institutions of South Africa. The project is an initiative from the School of Physics with the goal of in-house development of a low-cost anti-theft system where devices require secure communication to a wireless mesh network. Hundreds of thousands of packets were transmitted and logged between interconnected nodes to analyze the quality of the network's service in harsh indoor building environments. Similar methodologies in big data analysis as found in particle physics at the Large Hadron Collider were adopted between multiple point data communications to analyze the network's performance and reliability. Network development is further extended consisting of hardware and software development for transceiving encrypted messages between interconnected nodes using the User Datagram Protocol. Finally, the anti-theft application will focus on proprietary firmware and Android application development to render the device inoperable using the encrypted messaging scheme as a medium for communication to devices. Results thus far indicate reliable data transmissions in noisy indoor environments and between multiple asynchronous transmitting nodes in the network. The distance vector routing algorithm adopted by the Thread networking protocol is simulated to determine hop routing distances between source and destination routers. The results are compared with the network's multipoint data to determine coverage in large geographical areas.

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