Matrix: Multihop Address allocation and dynamic any-To-any Routing for 6LoWPAN

Bruna Peres 👤 ✉, Bruno P. Santos ✉, Otavio A. de O. Souza ✉, Olga Goussevskaia ✉, Marcos A. M. Vieira ✉, Luiz F. M. Vieira ✉, Antonio A. F. Loureiro ✉

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Abstract

Standard routing protocols for IPv6 over Low power Wireless Personal Area Networks (6LoWPAN) are mainly designed for data collection applications and work by establishing tree-based network topology, enables packets to be sent upwards, from the leaves to the root, adapting to dynamics of low-power communication links. In this work, we propose Matrix, a platform-independent routing protocol that utilizes the existing tree structure of the network to enable reliable and efficient any-to-any data traffic in 6LoWPAN. Matrix uses hierarchical IPv6 address assignment to optimize routing table size while preserving bidirectional routing. Moreover, it uses a local broadcast mechanism to forward messages to the right subtree when a persistent node or link failures occur. We implemented Matrix on TinyOS and evaluated its performance both analytically and through simulations on TOSSIM. Our results showed that the proposed protocol is superior to available protocols for 6LoWPAN when it comes to any-to-any data communication, concerning reliability, message efficiency, and memory footprint.

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