

Evaluasi kinerja metode network breathing untuk konstruksi topologi jaringan yang hemat energi pada jaringan grid router zigbee =
Performance evaluation of network breathing method for construction of energy efficient topology in zigbee grid router network

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Deskripsi Lengkap: <https://lib.ui.ac.id/detail?id=20404442&lokasi=lokal>

Abstrak

[ABSTRAK

Penelitian ini bertujuan untuk melakukan evaluasi metode Network Breathing sebagai suatu rancangan metode konstruksi jaringan yang adaptif pada komunikasi ZigBee. ZigBee merupakan salah satu protokol komunikasi untuk Wireless Personal Area Network (WPAN) yang dibangun di atas standar IEEE 802.15.4. Karakteristik low power dari ZigBee menjadi salah satu alasan utama dalam pemilihan protokol ini. Suatu metode konstruksi jaringan yang adaptif dapat dirancang untuk mendukung karakteristik ini. Metode ini dimaksudkan untuk membentuk topologi jaringan ZigBee yang senantiasa meminimalkan jumlah router ZigBee yang harus aktif. Metode ini akan menghemat konsumsi energi pada jaringan ZigBee dengan membuat router dalam kondisi tidak aktif ketika tidak ada perangkat akhir dalam jangkauan yang harus dilayani. Rancangan metode ini memiliki prosedur implementasi seperti membentuk jaringan yang bernafas, dan memanfaatkan algoritma shortest path Dijkstra untuk menentukan jumlah minimal dan posisi router yang harus aktif sesuai dengan posisi keberadaan perangkat akhir yang harus dilayani. Validasi terhadap rancangan metode ini dilakukan dengan tool perangkat lunak simulasi jaringan NS2, yang menunjukkan penghematan konsumsi energi router hingga 87% tanpa mengurangi kinerja throughput dan end-to-end delay pada jaringan.

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ABSTRACT

This work aims to evaluate Network Breathing method as an adaptive network tree construction method for ZigBee communication. ZigBee is a communication protocol for Wireless Personal Area Network (WPAN) which is built on the IEEE 802.15.4 standard. Low power characteristic of ZigBee is one of the main reasons in the selection of this protocol. An adaptive network tree construction method is designed to support this characteristic. The method is intended to form a ZigBee network topology which always minimizes the number of ZigBee routers to be active. This method will save energy consumption by turning the ZigBee routers to sleep condition when there is no end device within range to be served. The design of this method has implementation procedure such that the network topology acts like breathing, and uses Dijkstra shortest path algorithm to determine the minimum number and the position of routers to be active based on the position of the end devices. Validation to the method is carried out using the NS2 network simulator software tools, which shows reducing in router energy consumption up to 87% without degrading the throughput and end-to-end delay performance. This work aims to evaluate Network Breathing method as an adaptive network tree construction method for ZigBee communication. ZigBee is a communication protocol for Wireless Personal Area Network (WPAN) which is built on the IEEE 802.15.4 standard. Low power characteristic of ZigBee is one of the main reasons in the selection of this protocol. An adaptive network tree construction method is designed to support this characteristic. The method is intended to form a ZigBee

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