ABSTRACT

Wireless Sensor Network (WSN) technology is now growing rapidly, resulting many implementation of WSN devices in everyday life. In order to answer the growing needs of WSN, Internet Engineering Task Force (IETF) released new standard: 6LoWPAN (IPv6 Low Power and Lossy Network) and RPL as the default routing protocol. RPL is using Timer Trickle algorithm as dynamic timer to transmit control packets. Trickle Timer designed to reducing routing overhead. However Trickle Timer is not designed for networking with mobility conditions.

To counter these weaknesses, this research provide modification of RPL mechanism. Original RPL only use hopcount and not using RSSI calculation, In the other hand, RSSI has a direct influence on Receptance Packet Ratio (PRR). Modification has done by entering a special mechanism to locate a parent node when the topology changes as the effect of mobility. Topology changes are detected if the Receive Signal Strength Indication (RSSI) <- 90 dBm.

Simulations are conducted by Contiki OS platform and Network Simulator COOJA with mobility scenario Random Waypoint Model, Random Walk Model and Self-Similar Least Action for Human Walk (slaw). From the results, RPLMOD showed better performance with improvements of up to 40% in packet delivery ratio. Average packet delivery ratio in RPLMOD is 67.03%, while the original RPL 24.85%. RPLMOD consumes more routing overhead as trade-off to maintain mobile network. RPLMOD has average normalized routing overhead 66.81% while PRL has 64.58%, RPLMOD showed better performance in energy consumption parameter, the average energy consumption of all simulation in RPLMOD 508.2874 kJ while original RPL 530.8158 kJ. In the parameters end-to-end delay, RPLMOD has average 1554.267 ms, while the original RPL 1247.667 ms.

Keywords: Wireless Sensor Network, 6LoWPAN, ContikiOS, Cooja, RSSI, RPL, IPv6, Trickle Timer