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# Parent Selection for IPv6 Enabled Routing Protocol for Low Power Lossy Network.

A. Dalvin vinoth kumar, Annie Christila S, N. Shakeela,

*ABSTRACT: RPL (IPV6 Routing Protocol for Low power lossy network) is a network layer routing protocol. It is considered as best routing protocol for Internet of Things (IoT). The packet size and techniques used in RPL are designed in such a way to support low powered devices. RPL was developed by Internet Engineering Task Force (IETF) work group and still it is in design phase. RPL construct a loop less tree to maintain all the nodes. The parent selection is the backbone of RPL protocol. In parent selection rank calculation play a vital role. In this paper an extensive survey is done about RPL. The various techniques used in RPL are studied in this paper. The performance of RPL protocol is examined using cooja simulator. The working of RPL tested using Contiki enabled sky motes under cooja environment. The heterogeneity of network density and mote type are the major factors considered to examine RPL in terms of Energy efficiency, Packet Delivery Ratio and Response time.*

*Key words: RPL, RPL Routing, IoT, LLN, Cooja.*

## I. INTRODUCTION

IPv6 Routing Protocol for Low- Power Lossy Network (RPL) is a distance vector routing protocol. It is one of the evident protocol for low power lossy network. It is designed to work from sink node to the child node (Top-bottom approach). The sink node acts as a destination or a collecting point for all the child nodes. RPL establish the network by the formation of Destination Oriented Directed Acyclic Graph (DODAG). The sink node act as the root for DODAG. RPL maintains the rank property to avoid cycle or loops in the network .The rank in RPL is calculated by the various Objective Functions (OF) like OF0, OF1, OF2,...etc. OF0 is the default Objective Function which is used in RPL. It calculate the rank based on the Expected Transmission Count (ETX). RPL uses three various control protocol packets namely DODAG Information Object (DIO), DAO Advertisement Object (DAO) and DAO Acknowledgement (DAO ACK). The sink node initiates DODAG construction by broadcasting DIO.

The nodes which does not participate in any DODAG will respond to the DIO immediately by sending the DAO as shown in figure 1. If the nodes participates in any other DODAG then it will check, the rank of the parent node and the rank in the received DIO. The node will accept the received DIO, when the parent rank is greater than that of the received rank by sending the DAO. The root node receives the DAO and sends the acknowledgement as the token of acceptance. Once, the node receives the DAO Acknowledgement.

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Dr. A. Dalvin vinoth kumar, Assistant Professor, Dept. of Computer Science, Kristu Jayanthi College Bangalore

Annie Christila S, Assistant Professor, Dept. of Computer Science, St. Francis de Sales College Bangalore

Dr. N. Shakeela, Assistant Professor, Dept. of Computer Science, BDU Tiruchirapalli,

It saves the node as the parent node and compute its own rank based on the OF function.

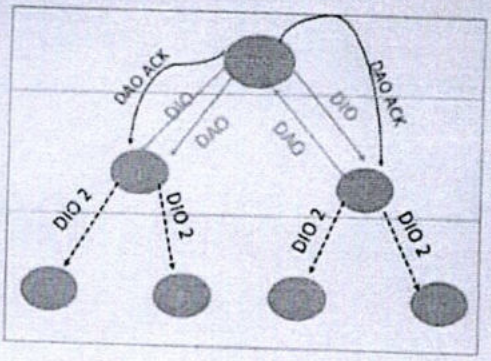


**Figure 1: DOGAG construction in RPL**

This process of DODAG construction is iterated based on Trickle Timer (TT). In RPL, the routing is performed by two methods/ways Storing and Non –Storing. In Storing method, the parent node should be aware of their children and grandchildren, whereas in non-storing method, the root node alone is aware of the child node. Destination Oriented DAG Information Object (DIO) carries the information to build the topology including the root unique identifier, routing metrics rank and other parameters. Destination Oriented DAG is a special kind of DAG where each node wants to reach a single destination with the unique identity. The size of DODAG ID is mentioned in DIO control message structure as shown in figure 2. Here the figure 3 shows the structure of DAO.

| PRL INSTANCE | | | | VERSION NUMBER | RANK | |
|---|---|---|---|---|---|---|
| G | O | MOP | Prf | DTSN | Flags | Reserved |
| DODAG ID (128 bit) | | | | | | |

**Figure 2: Structure of DIO control message**

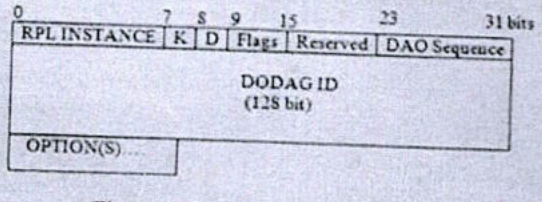


**Figure 3: Structure of DODAG ID**

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