SNS COLLEGE OF ENGINEERING

Kurumbapalayam(Po), Coimbatore – 641 107

Accredited by NAAC-UGC with 'A' Grade

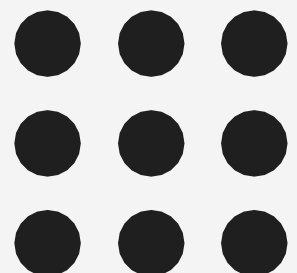**Approved by AICTE, Recognized by UGC & Affiliated to Anna University, Chennai**

Department of Information Technology

Course Name – 19IT503 Internet of Things

III Year / V Semester

Unit 3 – EVOLVING IoT STANDARDS & PROTOCOLS

Topic 1- IETF IPv6 Routing Protocol for RPL Roll

- Low power and lossy networks (LLNs) are a class of networks in which both the routers and their interconnect are constrained.

- LLN routers typically operate with constraints on processing power, memory, and energy (battery power);

- Their interconnects are characterized by high loss rates, low data rates, and instability.

- The IPv6 Routing Protocol for LLNs (RPL) is a mechanism proposed by the IETF to support multipoint-to-point traffic from devices inside the LLN toward a central control point, as well as

- Point to multipoint traffic from the central control point to the devices inside the LLN

IETF IPv6 Routing Protocol for RPL Roll

Existing routing protocols include
- OSPF/IS-IS (open shortest path first/ intermediate system to intermediate system),
- OLSRv2 (optimized link state routing protocol version 2),
- TBRPF (topology-based reverse path forwarding),
- RIP (routing information protocol),
- AODV (ad hoc on-demand distance vector),
- DYMO (dynamic MANET on-demand), and
- DSR (dynamic source routing).

Some of the metrics to be considered for IoT applications include the following:
- Routing state memory space—limited memory resources of low power nodes;
- Loss response—what happens in response to link failures;
- Control cost—constraints on control traffic;
- Link and node cost—link and node properties are considered when choosing routes.

The existing protocols all fail one or more of these goals for IoT applications

- RPL is designed to be able to operate over a variety of different link layers, including ones that are constrained, potentially lossy, or typically utilized in conjunction with highly constrained host or router devices.

Some of the features of RPL are
- Neighbor unreachability detection
- RPL Packet Information
- The IPv6 Hop-by-Hop RPL option
- RPL may, in particular, disseminate IPv6 neighbor discovery (ND) information ,
- Prefix information option (PIO) and the
- Route information option (RIO).

IETF IPv6 Routing Protocol for RPL Roll

Some basic definitions in RPL are as follows:
- Directed acyclic graph (DAG) is a directed graph with no cycles.
- Destination-oriented DAG (DODAG) is a DAG rooted at a single destination.

DAG roots

DAG root

DAG
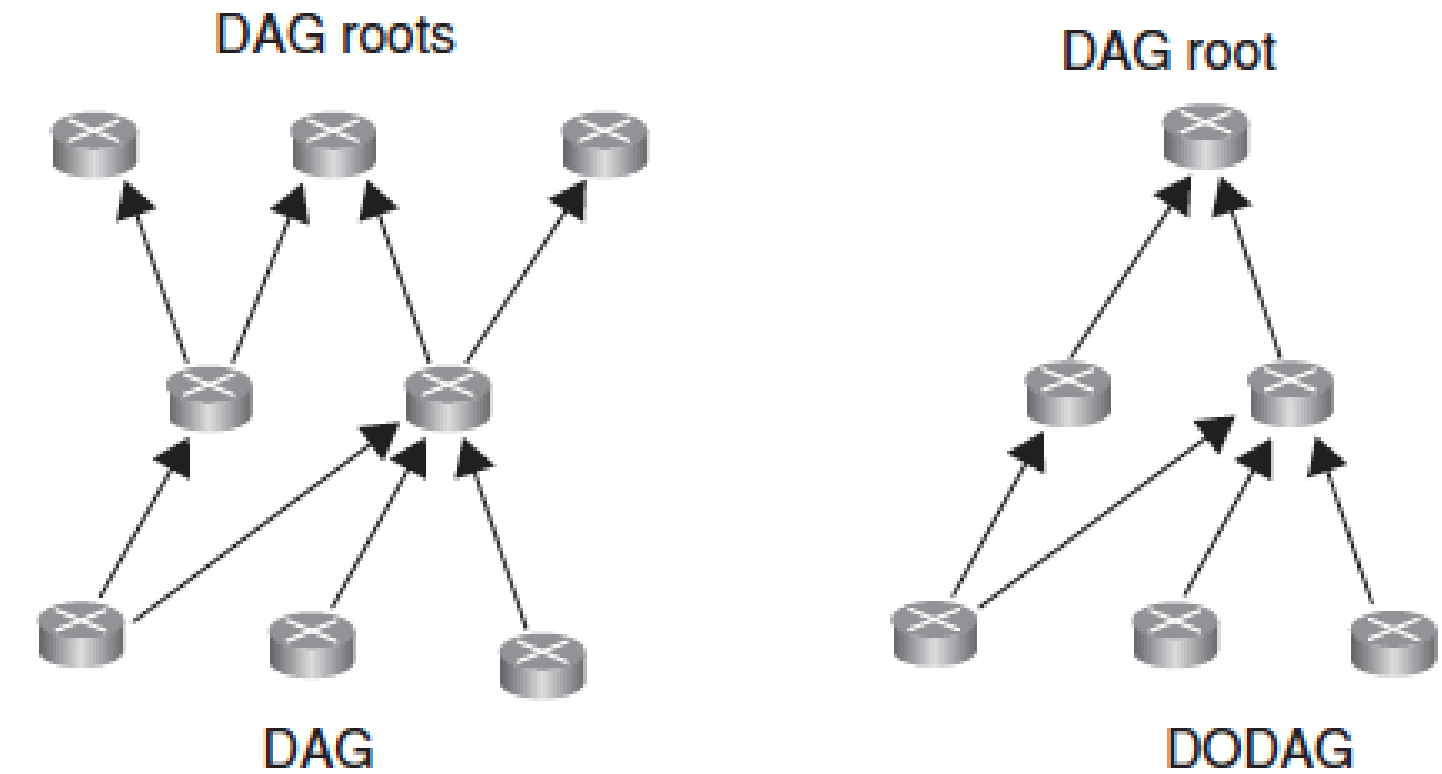
DODAG

RPL defines a new ICMPv6 message with three possible types

DAG information object (DIO)—carries information that allows a node to discover an RPL instance, learn its configuration parameters, and select DODAG parents;

DAG information solicitation (DIS)—solicit a DODAG information object from an RPL node;

Destination advertisement object (DAO)—used to propagate destination information upward along the DODAG.
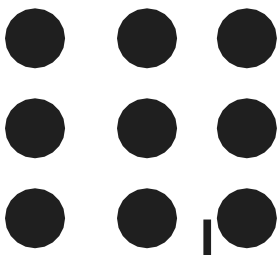
IETF IPv6 Routing Protocol for RPL Roll

A node rank defines a node's relative position within a DODAG with respect to the DODAG root

DODAG construction proceeds as follows
- Nodes periodically send link-local multicast DIO messages;

- Stability or detection of routing inconsistencies influence the rate of DIO messages;

- Nodes listen for DIOs and use their information to join a new DODAG, or to maintain an existing DODAG;

- Nodes may use a DIS message to solicit a DIO;

- Based on information in the DIOs, the node chooses parents that minimize path cost to the DODAG root.

THANK YOU