INTERNATIONAL JOURNAL OF RESEARCH IN COMPUTER APPLICATIONS AND ROBOTICS
ISSN 2320-7345

A REVIEW ON ENERGY EFFICIENT ROUTING PROTOCOL IN WIRELESS SENSOR NETWORK

Gurpreet kaur[1], Er. Vinay Bhardwaj[2]

[1]Master of technology in CSE, SGGWU, Fatehgarh Sahib,
Punjab, India
Email: gurpreet.kaur6498@gmail.com

[2]Assistant Professor, Department of CSE, SGGWU, Fatehgarh Sahib,
Punjab, India
Email: vinaybhardwaj0708@gmail.com

Abstract: The distributed nature and dynamic topology of Wireless Sensor Networks introduces very special requirements in routing protocols that should be met. The most important feature of a routing protocol is the energy consumption and the extension of the network's lifetime. During the last recent years, various energy efficient routing protocols have been proposed for WSNs. But in this paper main focus on the flat and hierarchical type of protocols. The flat routing protocols are basically three type's proactive, reactive and hybrid type of protocols. The AODV is the reactive type protocol in this multicasting is done and communication link is bi-directional. But the DSDV Uni-directional and it is loop free protocol. It is the type of proactive approach. ZRP is the hybrid type means combination of both proactive and reactive approach. ZRP is Bi- directional Communication links.

Keywords – Wireless sensor networks (WSNs), AODV, DSDV, ZRP, IARP, IERP etc.

I. INTRODUCTION

A wireless sensor network is a self-configuring network of Small sensor nodes communicating among themselves using radio signals, monitor and understand the physical word [1]. A WSN can be described as a network of sensor nodes that cooperatively sense and may control the environment interaction between persons or computers and the surrounding environment. Sensor nodes area also called as motes. These motes are well constrained in terms of size, CPU power, bandwidth and memory. The sensor node provides a bridge between the real physical and virtual words. The sensor nodes are autonomous devices use a variety of sensors to monitor the environment in which it is

deploy. Due to the feature of ease of deployment of sensor nodes, WSNs have a huge range of applications such as monitoring of environment and rescue missions. WSN's is composed of large number of sensor nodes.

"This work was supported in part by the CSE Department of Computer science and engineering", Head and faculties

Er. Gurpreet kaur is M.tech Student, department of Computer Science and Engineering, SGGWU, Fatehgarh Sahib Punjab, India.
Email: gurpreet.kaur6498@gmail.com
Er. Vinay Bhardwaj Assistant Professor, Department of CSE,SGGWU Fatehgarh Sahib, Punjab, India Email: vinaybhardwaj0708@gmail.com

The event is sensed by the low power sensor node deployed in neighborhood and the sensed information is transmitted to a remote processing unit or base station [3]. Wireless sensor networks are used in many applications like seismic sensing, military applications, health applications, home applications and environmental applications. There are two major applications of wireless sensor networks which can be categorize as: monitoring and tracking and other commercial applications. [4] In general the two different types of wireless sensor networks are: unstructured and structured. The first structured wireless sensor networks are those in which the sensor nodes deployment is in a planned manner whereas the second unstructured wireless sensor networks are the one in which sensor nodes deployment is in an ad-hoc manner.

II. ROUTING PROTOCOLS

The main two types of routing protocols i.e. PROACTIVE and REACTIVE Protocols.

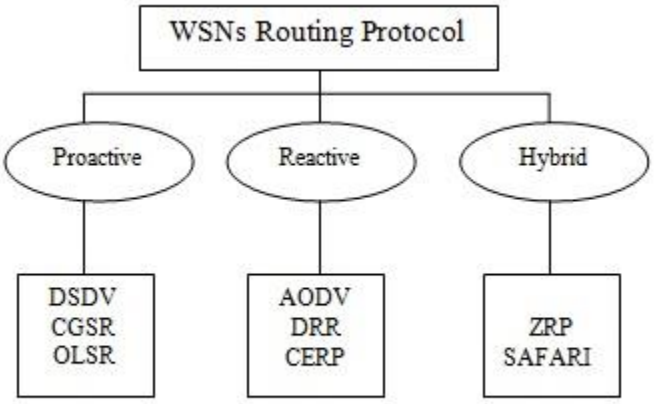

Fig.1 Classification of routing protocols

Hybrid routing is the combination of both proactive and reactive protocols.

The Proactive routing fresh lists of destinations and their routes are maintained by periodically distributing routing tables during the network. Here the routing information is computed and shared, the path is set prior to the actual transfer of data packets between the source and destination. The example of Proactive routing are- DSDV, CGSR, OLSR.

In the reactive routing, the routes are found on demand by flooding the network with route request packets. Here the source initiates the data transfer process by issuing a route request, the most relevant immediate neighbor issues a route reply to this request and takes forward the data transfer process. This happens till the destination is reached and the data packet received. The main examples of Reactive routing are- AODV, DRR, CBRP.
In the hybrid routing is combination of both proactive and reactive protocols. The main example of Hybrid routing is ZRP protocol.

1). Destination Sequenced Distance Vector (DSDV): The DSDV Routing Algorithm is based on the idea of the classical Bellman-Ford Routing Algorithm with certain improvements. Every mobile station maintains its routing table that lists all existing destinations, number of hops to reach the destination and the sequence number assigned by the destination node. A sequence number is used to distinguish routes from new ones and thus avoid the formation of loops. These stations periodically transmit their routing tables to their immediate neighbors. A station also transmits its routing table if a significant change has occurred
in its table from last update sent. So, the update is time-driven and event-driven. The routing table updates can be sent in two ways: - full dump or an incremental update. The full dump sends the full routing table to the neighbors and could span many packets whereas in an incremental update only those entries from the routing table are sent that has a metric change since the last update and it must fit in a packet. [2] If there is space in the incremental update packet then those entries may be included whose sequence number has changed. While the network is relatively stable, the incremental updates are sent to avoid extra traffic and full dump are relatively infrequent.

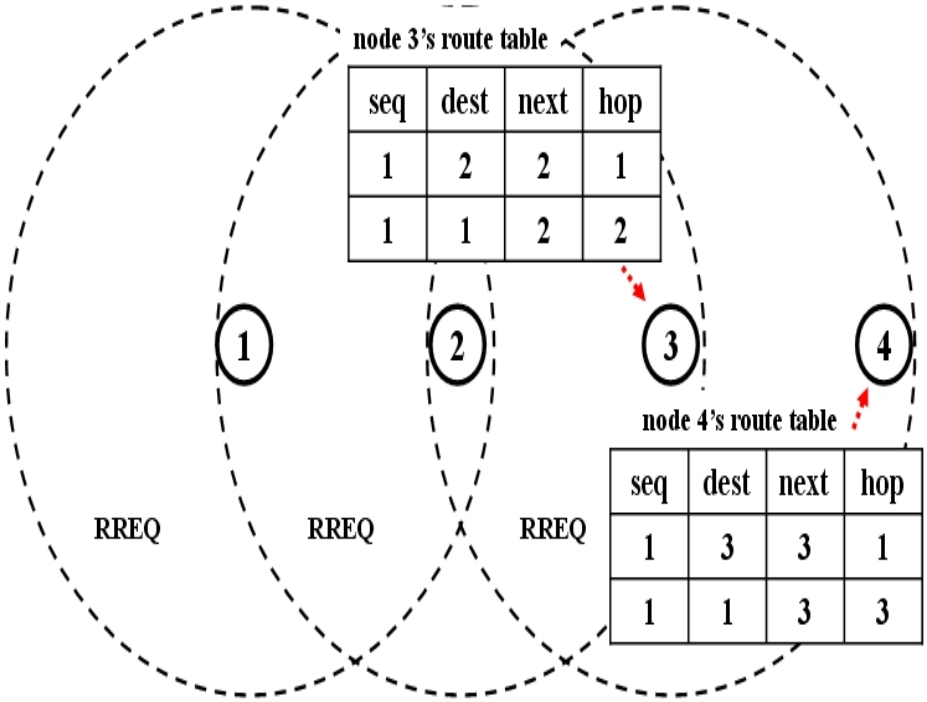

Fig2. DSDV Routing

2).Ad-Hoc on Demand Distance Vector Routing Protocol (AODV): In a reactive routing
Protocol AODV uses traditional routing tables. In the AODV one entry per destination and sequence numbers are used to determine whether routing information is up-to-date and to prevent routing loops. This helps in both multi-casting and Uni-casting. The AODV makes use of RREQ and RREP pair to find the route. A source node broadcast the RREQ i.e. Route Request message to its neighbors to find the route to destination. The RREQ message contains the source and destination address, lifespan of message, sequence numbers of source and destination and request ID as unique identification.[2] The Destination Sequence Number is the latest sequence number received in the past by the source for any route towards the destination and the Source Sequence Number is the current sequence number to be used in the route entry pointing towards the source of the route request. If any node from a list of neighbors is destination or knows the route to destination, it can send RREP i.e. route reply message to source.

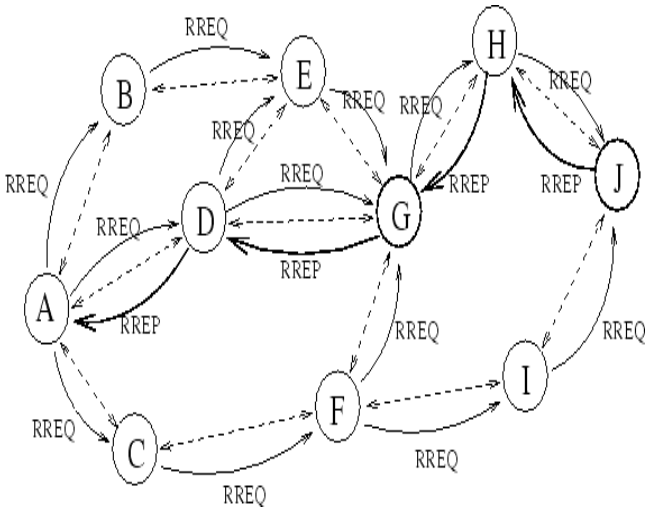

Fig3.AODV Routing

3).Zone Routing Protocol (ZRP): The Zone routing protocol is a hybrid type of protocol means this is a combination of proactive and reactive approaches. The hybrid approach can be more efficient than traditional routing. The main advantage of ZRP is that it requires a small amount of routing information at each node, so it produces much less routing traffic than a pure reactive or proactive scheme. The zone routing protocol can be classified into two ways:

- Intrazone Routing(IARP)
- Interzone Routing(IERP)

Intrazone routing (IARP): In ZRP, a node proactively maintains routes to destinations within a local neighborhood, which refer to as a routing zone. The collection of nodes is known as routing zone that has a minimum distance from the node in question is not larger than a parameter referred to as the zone radius. Every node maintains its own routing zone. An important consequence, as we shall see, is that the routing zones of neighboring nodes overlap.

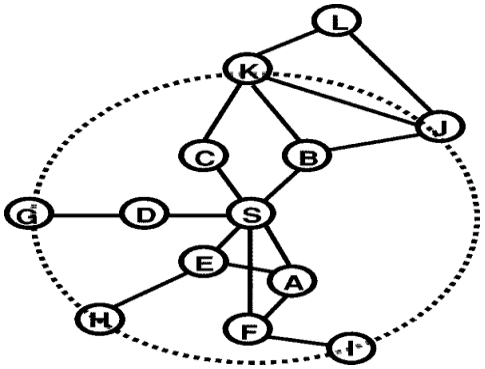

Fig.4 Intrazone routing

In the above figure (fig.1) S is the control node of the routing zone. K, J, G, H and I are called border nodes. In the IARP directly send the information to the destination.

Interzone routing(IERP):On the other hand, IERP uses a scheme, when a node needs a route to a node outside its zone; it performs a border casting by sending a RREQ (Route REQuest) to each node on the ”border” of this zone. On receiving such a packet at a border node, it first checks its intra-zone routing table for existence of a

route to the requested destination node. If so, a RREP (Route Replay) can be sent; otherwise, it performs another border casting in its zone. This is repeated until a route is found.

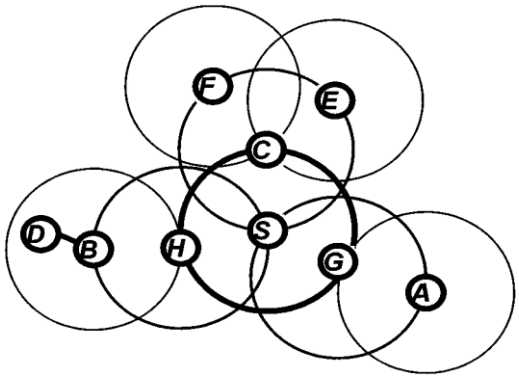

Fig.5 Interzone routing

In the above figure (fig.2), data send from node S to D firstly S checks D is within routing zone or not. If so S already knows the route to node D. Otherwise S sends query to all its border nodes (H, G, and C) and these nodes send the query to next zone nodes and so on until a route is not found. In particular, H sends the query to B, which recognizes D as being in its routing zone and responds to the query, indicating the forwarding path: S –H –B –D.

Table.1 Comparison of DSDV, AODV and ZRP.

Metrics	DSDV	AODV	ZRP
Category	Proactive	Reactive	Hybrid (both Proactive and Reactive)
Large Network Size	NO	YES	YES
Communication Links	Uni - Directional	Bi - Directional	Bi – Directional
Multicasting	NO	YES	YES
Protocol Type	Link state scheme	Distance Vector	Link Reversal
Mobility	Performa -nce will Demean	High	High

III.CONCLUSION

In the Wireless sensor network, the energy is an important issue. So designing the energy efficient protocol is very important. In this paper, different energy efficient routing protocols that are based on Proactive approach, Reactive and hybrid type have been discussed. And at the end of paper comparison of the AODV, DSDV and ZRP protocol. The ZRP protocol more efficient because it is the combination of both proactive and reactive protocol. So in future we will propose a new algorithm by using ZRP protocol to improve its performance further.

REFERENCES

[1] S. john, "Wireless Sensor Networks," Department Of Computer Science, University Of Virginia, June 19, 2006.

[2] Anu Arya, Jagtar Singh" Comparative Study of AODV, DSDV and DSR Routing Protocols in Wireless Sensor Network Using NS-2 Simulator, International Journal of Computer Science and Information Technologies," ISSN:0975-9646, Vol. 5,Page No. 5053-5056, 2014.

[3] I. F. Akyldiz, S. Weillian, S. Yogesh and C. Erdal, "A Survey on Sensor Networks", Vol: 40, Page No. 102-114, Aug 2002.

[4] Rajashree.V.Biradar, V.C.Patil, Dr. S.R. Sawant, Dr. R.R. Mudholkar," Classification and Comparison of Routing Protocols in Wireless Sensor Networks, Special Issue on Ubiquitous Computing Security Systems."

[5] Nikolaos A. Pantazis, Stefanos A. Nikolidakis and Dimitrios D.Vergados "Energy-Efficient Routing Protocols in Wireless Sensor Networks: A Survey," IEEE communications surveys & tutorials, ISSN: 153-8878, Issue No.2, Vol.15, Page No. 551-591, Second quarter 2013.

[6] Ji Peng, Wu Chengdong, Zhang Yunzhou, Chen Fei "A Low-Energy Adaptive Clustering Routing Protocol of Wireless Sensor Networks," IEEE computer networks , ISSN:4244-62521, Issue No.11, Vol.10, Page No. 116-119, 2011.

[7] Poonam Rautela, Vinod Kumar Mishra, Pankaj kumar "Zone based routing protocol in WSNs for varying zone size," International Journal of Advanced Research in Computer Engineering & Technology, ISSN: 2278–1323, Issue No.6, Vol.1, Page No. 7-13 , Aug 2012.

[8] I. F. Akyildiz, W. Su, Y. Sankarasubramaniam, and E. Cayirci, "Wireless Sensor Networks: a Survey, Computer Networks", International Journal of Advanced Research in Computer Engineering & Technology, no. 4, Vol. 38, page No.393-422, 2002.

[9] Usama Ahmed and Faisal Bashir Hussain, " Energy Efficent Routing Protocol for Zone Based Mobile Sensor Network," Wireless Communications and Mobile Computing Conference (IEEE), Pakistan, Page 1081-1086, July 2011.

[10] Hrituparna Paul and Priyanka Sarkar," A Study And Comparison Of OLSR, AODV And ZRP Routing Protocols In Ad Hoc Networks," IJRET: International Journal of Research in Engineering and Technology eISSN: 2319-1163 ISSN: 2321-7308, Volume: 02, Issue: 08,Aug-2013,

[11] V. Ramesh, Dr. P. Subbaiah, N. Koteswar Rao and M. Janardhana Raju, "Performance comparison and analysis of DSDV and AODV for MANET," International Journal on Computer Science and Engineering, vol. 02, pp. 183-188, 2010.

[12] http://moment.cs.ucsb.edu/AODV/aodv.html.