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Energy Efficient Communication Routing Protocols in Wireless Sensor Network Services.

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Abstract- ***Here In This Paper, We Are Presenting A Comparative Study On The Most Successful Existing Algorithms And Methods For Wireless Sensor Network Technology. This Is Most Challenging, Interesting And Demanding Area And Most Of The Scientist/Researcher Is Attract Toward The Field Of Research Study, I Had Overviewed Of The Past Researcher And Had Used The Effective And Efficient Ideas Here And Ongoing Studies Done By Other Researchers Related To The Same Subject. Eight Different Algorithms Have Been Preferred Based On The Most Widely Used Criteria. The Algorithms Are Low Energy Adaptive Clustering Heirarchy (Leach), Pegasis , Time Division Multiple Acces, Hybrid Energy Effeciency Distributed Clustering, Teen, And Adaptive Periodical Threshold Sensitive Energy Efficiency Sensor Node Protocol (Apteen), Equalized Clustering Head Election Routing Protocol It Is A Novel Energy Routing Protocol(Echerp),Energy Efficiency Unequal Clustering(Eeuc), Energy Delay Index And Tradeoff (Edit), Energy Efficiency Varying Sized Clustering Algorithm(Eevsca), Static Clustering Based Multihop Routing In Wsn(Scrm). Routing Protocols Form One Of The Most Important Communication Paradigms That Greatly Affect The Performance Of The Wireless Sensor Networks Certain Parameters Have Been Taken Into Account For The Algorithms' Comparative Based .The Parameters Are Size And Types Of Database Simulator Wireless Channel, Propagation Model, No. Of Nodes, Dimensions Of Simulated Area , Routing Protocol, Energy Model, Initial Energy. However Specific Justification Can Be Comparative Paper Based On Other Researches.***

***Key words**: Wireless Sensor Networks, Clustering Head, High Risk Areas, Novel Energy Efficiency, Parameters.*

1 INTRODUCTION

Wireless sensor network (WSN) is widely considered as one of the most important technologies for the twenty-first century. WSNs are consisting of a large number of sensor nodes that transform physical data into a form that would make it easier for the user to understand [1]. The naive approach to collect data from sensor nodes is direct one where each sensor node transmits the data directly to the sink which is located far away. The cost of data transmission from each sensor node to the sink is very high, thus nodes die quickly and hence reducing the lifetime of the network. Therefore, use a few transmissions as possible leads to efficient energy utilization. Routing protocols from one of the most important communication paradigms that greatly affect the performance of the wireless sensor networks; so that designing routing protocols for sensor networks is a vital aspect. In earlier research, static sink is used to gather data in WSNs. Wireless sensor vision offers a high demanding applications and outcomes specifically global networking system. This area has always become the researchers' major focus in sensor analysis because of its nature as wireless network primary identification method. It is very interesting and becomes such a challenge to teach a machine to do this task. Sensor recognition also is one of the most difficult problems in wireless sensor network vision area. Sensor network and recognition also receives a huge attention in networking field and research communities including education, Wireless sensor networks (WSNs) are networks usually comprised of a large number of nodes with sensing and routing capabilities. The environment surrounding a wireless sensor network application can cover a wide spectrum – from a well controlled environment to an uncontrolled one. Information gathering in sensor networks can follow different patterns, depending mostly on the specific needs of the applications.

We make the following simplifying assumptions in building the system model:

- Sensors remain stationary at the nodes of a bidimensional
- square grid composed of same-size cells. Image sequence of the person is taken manually and then it is taken automatically.
- Sensor nodes are homogeneous and wireless channels are
- bi-directional, symmetric and error-free.

- Sensor nodes communicate with the sink by sending data
- via multiple hops along the shortest path; a hop is of one cell side length, i.e., the distance between two adjacent
- nodes in the grid equals the transmission range of nodes.

- Data transmission and reception are the major energy
- consuming activities.
- The sinks can move freely on the grid from one node to another in eight directions. After the sink arrives at a node, sensors can communicate with the sink. For analytical simplicity, the traveling time of the sink between two nodes is considered negligible, and the sojourn time of the sink visit at sensors is equal.
- The event occurs at any grid cross point independently with stationary distribution.

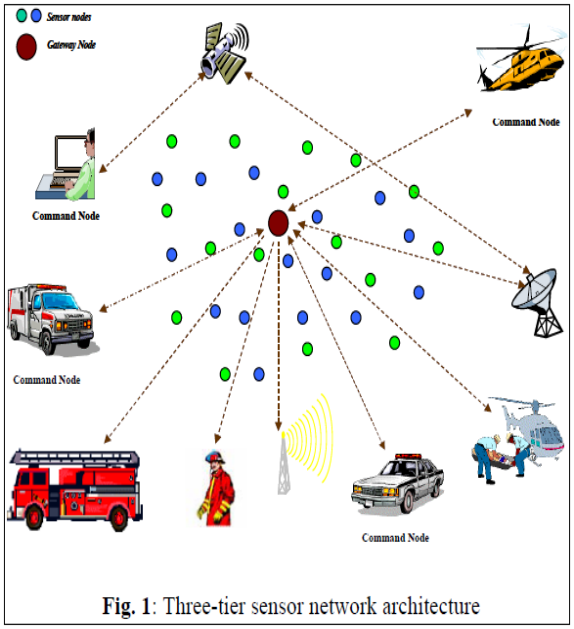

Fig. 1: Three-tier sensor network architecture

2. RELATED WORK

A set of sensors is spread throughout an area of interest to detect and possibly track events/targets in this area. The sensors are battery-operated and are empowered with limited data processing engines. The mission for these sensors is dynamically changing to serve the need of a command center. A gateway node, which is significantly less energy-constrained than the sensors, is deployed in the physical proximity of sensors. The gateway is assumed to know the geographical location of deployed sensors.

2.1 The Sensors of Its Cluster are a Key Factor in the Evolution of Wireless Sensor Networks.

• Sensor Node: A sensor nodes is the main component of a wireless sensor network. Sensor nodes can play multiple roles in a network, such as sensing; data storage; routing; and data processing.

• Clusters: Clusters are the organizational unit for Wireless Sensor Networks. The nature of these networks requires the need for them to be broken down into clusters to simplify tasks such a communication.

• Cluster heads: Cluster heads are the organizational leader of a cluster. They often are required to organize an activity in the cluster. These tasks are included but they are not limited to data aggregation and organizing the communication schedule of a cluster.

• Base Station: The base station is at the upper layer level of the hierarchical Wireless Sensor Network. It provides the communication link between the sensor network and an end-user.

• End User: The data in a sensor network can be used for a wide-range of applications. Therefore, a particular application may use of the network over the internet, using a PDA, or even in desktop computer. In a queried sensor network the query is generated by the end user. The clustering phenomenon can play an important role not just only in an organization of the network, but can dramatically affect network performance.

2.2. QUALITY OF SERVICE

1 Recent technological advances have enabled the inexpensive mass production of sensor nodes, which, despite their relatively small size, have particularly advanced sensing, processing and communication capabilities.
2 Sensor nodes sense the environment and use their communication components in order to transmit the sensed data over wireless channels to other nodes and to a designated sink point, referred to as the Base Station.
3 The collaborative use of a large number of sensor nodes, a WSN is able to perform concurrent data acquisition of existing conditions at various points of interest located over wide areas.
4 The energy expenditure of the sensor nodes occurs during the wireless communication, the environment sensing and the data processing.
5 Since most of the routing protocols developed for wired networks pursue the attainment of high Quality of Service, they are practically improper for application in WSNs

2.3 ENERGY EFFICIENCY

1 Energy efficiency is one of important key factor in designing a wireless sensor network system. Large energy consumption will affect the lifetime of the sensor networks.
2 Clustering is an important method for increase the scalability and lifetime of wireless sensor network system. The sensor network is divided into clusters.
3 In the first step the sensor nodes sense the physical parameter under consideration and collected data are sent to the cluster head. During second phase the cluster head forwards the data to the base station in a single hop or multi-hop manner.

4 Two types of energy consumptions are associated with a CH, inter cluster and intra cluster energy consumption. The energy reduction during receiving and aggregating the data from the cluster members is known as intra cluster energy consumption.

2.4 CLUSTER BASED TRANSMISSION

1 A wireless sensor network consists of hundreds and thousands of micro sensors nodes. These are designed to sense data transmit it to user processor, Base Station (BS).
2 Sensor nodes are basic component of WSNs. These are small in size, portable and light weight; the sensor nodes required sending data to BS.
3 Classical approaches like direct Transmission used to send data from sensor nodes directly to BS and in Minimum Transmission Energy (MTE) nodes near BS has higher probability to send data than nodes which are located far away from BS.
4 In clustering, number of sensor nodes select a Cluster Head (CH) on the basis of nodes are rechargeable, reduce traffic and Simulation results show that our proposed gateway lifetime, stability period, throughput etc; than hop.
5 A Typical Wireless Sensor Network introduce concept of Clustering. Traditional their initial or residual energy, and then cluster the remaining nodes with these heads.
6 It is very basic protocol in which concept of clustering is used. In LEACH, nodes are distributed randomly having same energy.
7 The network by dividing energy on some parameters, here SEP (Stable Election Protocol) is introduced. In SEP, nodes are divided as normal node and advanced node having different energy levels.

2.5 SECURITY & EFFICIENCY FEATURES.

1 the first hierarchical routing approaches for sensors networks. Taxonomy of the different architectural attributes of sensor networks is developed.
2 wireless sensor networks has been developed where both security & efficiency features have been dealt.
3 The sensing area has been divided into a number of equilateral areas, called as clusters. Each cluster consists of six equilateral triangles called cells.
4 The protocol consists of a number of rounds but after forming the clusters they do not change in each round. Both each equilateral triangle & each equilateral hexagon has same number of nodes.
5 The data are sent to the base station by using the multi-hop manner through a secure path consisting of cluster heads. The analysis shows that the improved protocol saves nodes energy, prolongs WSN lifetime.

2.6 COMMUNICATION and NETWORK LIFETIME.

1. Wireless Sensor Networks consists of a large number of small scale low cost devices which integrate simple processing, storage, sensing and communication capabilities.
2. The sensor nodes once deployed over a geographical area organize themselves to analyze some complex phenomena.
3. Sensor nodes usually operate under severe energy constraints due to their non rechargeable battery feature. So sensor nodes should try to minimize energy consumption in order to maximize the network lifetime.
4. Communication energy can be minimized by reducing the number of messages transmitted, by using different power modes such as sleep and active modes for the transceiver and by using different transmission ranges.
5. The sink and localization of most traffic within clusters thereby reducing contention and collisions in the networks. Clustering is especially suitable for large sensor networks.

2.7 PROCESSING POWER and MEMORY STORAGE CAPACITY.

1. A WSN consists of a large number of small and cheap sensor nodes that have limited energy, processing power and memory storage capacity.
2. The achievement in low-power digital circuits and wireless communication facilities, many applications of the WSN are developed and are already been used in building monitoring, military object and object tracking.
3. node's role and functions relative to network communication or the network topology cause some nodes to die quicker than the others. It is then essential to balance load among nodes.
4. The initial probability for each node to become a tentative Cluster Head depends on its remaining energy, and the final CHs are selected according to the intra-cluster communication cost.
5. The main problem is that energy consumption is concentrated on the Cluster Heads, which have to transmit over long distance.

2.8 THE NETWORK DESIGN AND MAKES ENERGY EFFICIENCY.

1. Sensor nodes measure various parameters of the environment and transmit data collected to one or more sinks using hop-by hop communication.
2. Sensor nodes are usually powered by batteries that cannot be replaced in most cases. As a result, the energy constraint has significant effect on the network design and makes energy efficiency
3. In order to achieve high energy efficiency and increase network lifetime, sensors are often hierarchically organized into clusters.
4.The energy for receiving, aggregating and sending the data from their cluster members (intra-cluster energy consumption) and the energy for forwarding data for their neighbor cluster heads (inter cluster energy consumption)
5. Imbalance in network traffic load has a negative effect on network lifetime since transmit and receive operations

are not evenly spread among network nodes.

2.9 BALANCING THE SENSOR NETWORK LOAD.

1. The system architecture for the sensor network nodes are grouped into clusters controlled by a single command node. Every cluster has a gateway node that manages sensors in the cluster.
2. the gateways collaboratively locate the deployed sensors and group them into clusters so that sensors transmission energy is minimized while balancing the load among the gateways.

2.10 PROCESSING CAPABILITY in WIRELESS SENSOR NETWORKS.

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1. Wireless sensor networks (WSN) are new generation of networks which typically consist of many inexpensive nodes and these nodes can be connected wirelessly.
2. The major difference of ad-hoc networks and WSNs is their limited energy resources and low processing capability.
3. Each sensor node of WSN is consist of four blocks namely, sensing unit, processing unit, communication unit and power unit.
4. The sensing unit measures a physical condition like pressure and temperature in the environment.
5. In flat routing, each sensor node has the same role and sends its data to sink node directly which always results in faster energy consumption and excessive data redundancy
6. The field is divided into several clusters, in accordance with the distance between the nodes and the hop count.

211. THE TIMELINESS OF REAL-TIME PACKETS.

1. Given our interest in providing on-time delivery of real-time data and minimizing the impact of gateway mobility on the timeliness of real-time packets, we used the following metrics to capture the performance of our approach:
2. Average delay per packet: Defined as the average time a packet takes from a sensor node to the gateway. The applications that deal with real-time data is delay sensitive, so this metric is important in our case.
3. *Deadline Ratio*: This is one of the most important metrics in real-time applications, which indicates the number of packets that could not meet the specified delivery deadline.
4. Average energy per packet: This metric represents the average energy consumed in the network for transmitting and relaying a data packet until the gateway successfully receives it.
5. We have used the same cost function with same routing algorithm without doing any service differentiation. That is, we have only one queue in each sensor node for all kinds of packets.

2.12 NETWORK LIFETIME APPROACH and ENERGY SAVINGS

1. Node reach ability The number of sensors that can be reached by the gateway. It is an indication of the effectiveness of the architecture and the use of sensor grouping.
2. Time for first node to die: Losing an active node typically trigger either reorganization or re-routing or both. This metric gives an indication of network lifetime since the network can get partitioned and become hard to manage.
3.Average and standard deviation of node lifetime: This also gives a good measure of the network lifetime. An approach, which minimizes the standard deviation of node life, is predictable and thus desirable.
4. Average energy consumed per packet: A routing algorithm that minimizes the energy consumed per packet will, in general, yields better energy savings.

2.13 CLUSTER-BASED ENERGY-AWARE PROTOCOL

1. We have described a novel multi-hop hierarchical cluster-based multi-path routing energy-aware protocol that prolongs the sensor network lifetime while ensuring robustness and fault-tolerance.
2. It takes into account the broadcast nature of radio. Moreover, this protocol is scalable to large and dense sensor networks that consist of thousands of nodes.
3. The main idea is using hierarchical fuzzy soft clusters enabling non-exclusive overlapping clusters, thus allowing partial multiple membership of a node to more than one cluster, whereby for each cluster the cluster head takes in charge intra-cluster issues of aggregating the information from nodes members, and then collaborate and coordinate with its related overlapping area heads.

The communication protocol consists of five standard protocol layers for packet switching: application layer, Transport layer, network layer, data-link layer, and physical layer. In this survey, we study how protocols at different layers address network dynamics and energy efficiency. Functions such as localization, coverage, storage, synchronization, security, and data aggregation and compression are explored as sensor network services.
Implementation of protocols at different layers in the protocol stack can significantly affect energy consumption, end-to-end delay, and system efficiency. It is important to optimize communication and minimize energy usage. Traditional networking protocols do not work well in a WSN
Since they are not designed to meet these requirements. Hence, new energy-efficient protocols have been proposed for all layers of the protocol stack. These protocols employ cross-layer optimization by supporting interactions across the protocol layers. Specifically, protocol state information at a particular layer is shared across all the layers to meet the specific requirements of the WSN.

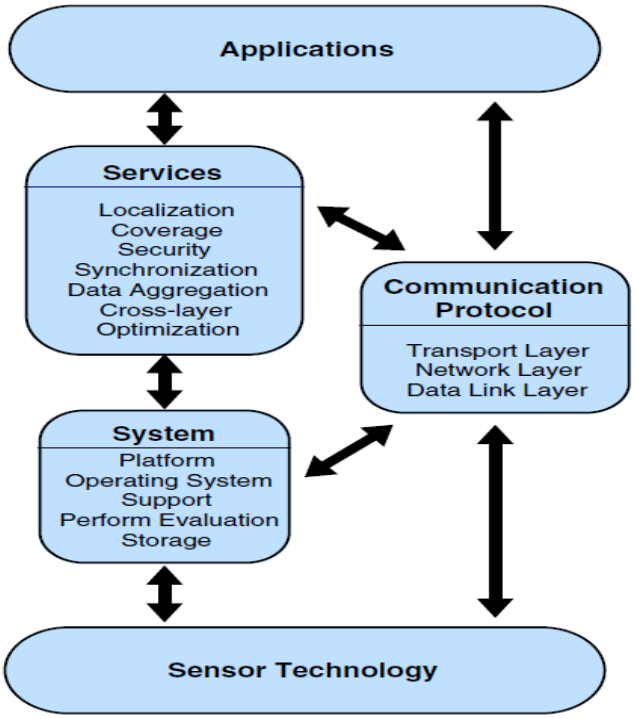

Figure. 3. Broad classification of various issues in a WSN.

3. OBJECTIVE

Research in WSNs aims to meet the above constraints by In this study, we present a top-down approach to survey different protocols and algorithms proposed in recent years. Our work differs from other surveys as follows:

[1]While our survey is similar to our focus has been to survey the more recent literature.
[2]We address the issues in a WSN both at the individual sensor node level as well as a group level.
[3]We survey the current provisioning, management and control issues in WSNs. These include issues such as localization, coverage, synchronization, network security, and data aggregation and compression.
[4] We compare and contrast the various types of wireless Sensor networks.
[5]Study of Different current Wireless sensor technologies.

4. PROPOSED APPROACH

WSN are use to intellect different attributes of a most favorable way. In mission serious appliances, interruption in environment by using wireless sensors. Wireless Routing data deliverance is not acceptable such as in reforest fire protocol do your utmost. WSN. As the capable energy operation is especially proposes a propose of course-plotting algorithm for delay sensitive important acquisition in WSN, it is possible by using relevancies. portrays importance of cluster sequence mobility in WSNs. Routing protocols, that attempt based protocols which always compete with ensure proficient energy consumption in WSN based protocols performance in case of power good quality organization.

Routing in wireless sensor networks differs from conventional routing in fixed networks in various ways. There is no infrastructure, wireless links are unreliable, sensor nodes may fail, and routing protocols have to meet strict energy saving requirements [5]. Many routing algorithms were developed for wireless networks in general. All major routing protocols proposed for WSNs may be divided into seven categories as shown in Table 1. We review sample routing protocols in ach of the categories in preceding sub-sections.
1.Location-based Protocols:- MECN, SMECN, GAF, GEAR, Span, TBF, BVGF, GeRaF
2.Data-centric Protocols:- SPIN, Directed Diffusion, Rumor Routing, COUGAR, ACQUIRE, EAD, Information-Directed Routing, Gradient- Based Routing, Energy-aware Routing, Information-Directed Routing, Quorum-Based Information Dissemination, Home Agent Based Information Dissemination.
3.Hierarchical Protocols:- LEACH, PEGASIS, HEED, TEEN, APTEEN.
4. Mobility-based Protocols:- SEAD, TTDD, Joint Mobility and Routing, Data MULES, Dynamic Proxy Tree-Base Data Dissemination
5. Multipath-based Protocols:- Sensor-DisjointMultipath, Braided Multipath, N-to-1Multipath Discovery
6. Heterogeneity-based Protocols:- IDSQ, CADR, CHR.
7. QoS-based protocols:- SAR, SPEED, Energy-aware routing

5. RESULT

We have summarized and compared different proposed designs, algorithms, protocols, and services. Moreover, we have highlighted possible improvements and research in each area.

5.1 WIRELESS SENSOR AREA NETWORK AND ITS WORK

Types of wireless networks are defined on the bases of their ***Size, Range*** and the ***Speed*** of ***Data Transfer:-***

5.1.1 *WIRELES – PERSONAL AREA NETWORK*

Interconnected Devices in Small Premises Example Invisible Infra Red Light and Bluetooth Radio Interconnects a Headphone to a Laptop by the Virtue of WPAN

5.1.2. WIRELESS LOCAL AREA NETWORK

Simplest Wireless Distribution Method that is Used for Interlinking Two or More Devices, Spread Spectrum Technology give Client Freedom to Move Within a Local Coverage Area.

5.1.3. WIRELESS METROPOLITAN AREA NETWORK

(A) Connect at High Speed Multiple Wireless LAN That are Geographically Close.

(B) The Set Up Makes Use Of Routers Or Switches For Connecting With High Speed Links Such As Fiber Optic Cable.

(C) WiMax Described as 802.16 Standard by the IEEE is a type of WMAN

5.1.4. WIRELESS MOBILE DEVICES NETWORK

(A) Today Telephone Are Nt Meant To Converse Only To Carry Data.

(B) The Advent Of Smart Phones Have Adds A New Dimension In Telecommunication.

5.1.5 PERSONAL COMMUNICATION SERVICE –

(A) PCS is Radio Band That Is Employed in South Asia and North America.

(B) The First PCS Service Was Triggered Sprint

5.1.6 TINY AREA NETWORK-TINY AREA NETWORK

(A) Some Time Called Campus Area Network, it provide Bandwidth, TINY AREA NETWORK working is like LAN but comparatively smaller**.**

5.1.7. WIRED EQUIVALENT PRIVACY –

(A) As Well As firewall could be Used For Securing the Network.

(B) Wireless Network is the Future of Global Village

Sensor Network Referring To Security of Wire less LAN Network.

6. CONCLUSION

Sensor network lifetime depends on the number of active nodes and connectivity of the network, so energy must be used efficiently in order to maximize the network lifetime. Performance studies provide valuable information for developing tools and solutions to improve system performance. Critical factors that influence system performance include scalability, communication, protocols at different layers, failures, and network management.

7. ADVANTAGES

1. Reduce cabling cost and geographically locate your measurement events.
2. Monitoring software designed and real time measurement.
3. Wireless sensor provides a low cost gathering system and health information to decrease consumption and better manage resources.

8. APPLICATIONS OF WIRELESS SENSOR NETWORK

(1) Sensor networks: Smart sensor nodes and actuators can be buried in appliances to allow end user to manage home devices locally and remotely. Environment application includes tracking the movements of Animals chemical/biological detection, precision agriculture. Tracking date highly connected in time and breathing space e.g. secluded sensors for weather conditions, earth behavior [1].

(2) Tactical networks: Military communication, operations, auto-mated battlefields [2].

(3) WSNs, due to the numerous benefits that their utilization offers, support an ever growing variety of applications, including agriculture, traffic control, environment and habitat monitoring, object tracking, fire detection, surveillance and reconnaissance, home automation, biomedical applications, inventory control, machine failure diagnosis and energy management.

(4) Emergency services: search and rescue operations, as well as disaster recovery e.g near the beginning recovery and communication of uncomplaining data (record, status, diagnosis) from the hospital. substitution of a fixed communications in case of earthquake, hurricanes fire etc.

(5) Guidance services: Transmission of news, road condition, weather, melody Local ad hoc network with nearby vehicle for road/calamity guidance [1, 2].

(6) Sensor network System can be used in health care area some modern hospital and monitoring patients and doctors and inside a hospital.

(7) Entertainment: Many user's games, automatic pets, out-of-doors internet right of entry.[1]

(8) setting aware air force: automating call forwarding, trans-mission of the actual workspace information services such as advertise location specific, location dependent travel guide services like printer, fax, phone, and server [2].

8. Future Work

proactive routing protocol and reactive routing protocols which discuss key features of each of these routing protocols in wireless sensor Network and performance analysis on the basis of qualitative comparison of both routing protocols.

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