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A Review on Protected Data Collection for Different Methods in Wireless Sensor Network

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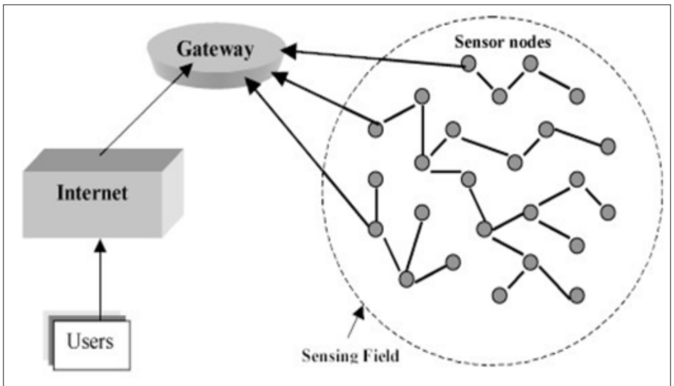
ABSTRACT
Wireless sensor network (WSN) is a complex network system these network are provide is extraction of data collection for using different process for protecting data. Data collection is a essential task in Wireless Sensor Network. A several of the issues in data collection are energy, time delay, packet collision, more bandwidth constraint, latency, scalability and subsequently on. To overcome these issues is a demanding task in Wireless Sensor Network. Wireless sensor network are huge resources for data collections.
Keywords:- Wireless sensor network, Data collection, Data security, Application in WSN.

I. INTRODUCTION
A wireless sensor network (WSN) is a special ad-hoc, multi-hop and self-organizing network that consists of a huge number of nodes deployed in a wide area in order to monitor the phenomena of interest. They can be useful for medical, environmental, scientific and military applications. [1] WSNs mainly consist of sensor nodes or *motes* responsible for sensing a phenomenon and base nodes which are responsible for managing the network and collecting data from remote nodes. However, the design of the sensor network is influenced by many factors including scalability, operation system, fault tolerance, sensor network topology, hardware constraints, transmission media and power consumption [2].Sink nodes are base - stations in the network that wirelessly receive and transmit data packages generated from sensor nodes in the network and provide them to the user as described in **Figure**. A From the base station users can access the data through internet for further processing and extract useful information [3]. Depending upon the size and protocols



implemented, one or more sink nodes can be used. Sink Nodes can either be stationary at one fixed point or patrolling in the network [4][5]. Sensor Nodes are electronic devices which are widely deployed in the network so as to completely cover the environment. The sensor node generates data packets and transmits them to the sinks or other sensors, i.e. Sensors nodes perform dual role [5] as both a data generator and a data router. Sensor nodes closer to the sinks are typically required to forward data (generated by sensors which are far away from the sink in the network topology) to the sink. Compared to the sink nodes, the battery power of sensor nodes is weaker. The sensor consumes energy from its battery and when the sensor runs out of energy, it is referred as dead and is removed from the network. The lifetime of sensor nodes depends strongly on the battery power. A small portion of dead sensor nodes could directly affect the entire network lifetime and may lead to huge loss in the network due to routing path reallocation and failure of sensing and reporting events in the environment. The more modern networks are bi-directional, also enabling control of sensor activity. The development of wireless sensor networks was motivated by military applications such as battlefield surveillance; today such networks are used in many industrial and consumer applications, such as industrial process monitoring and control, machine health monitoring, and so on. The WSN is built of "nodes" – from a few to several hundreds or even thousands, where each node is connected to one (or sometimes several) sensors. Each such sensor network node has typically several parts: a radio transceiver with an internal antenna or connection to an external antenna, a microcontroller, an electronic circuit for interfacing with the sensors and an energy source, usually a battery or an embedded form of energy harvesting. A sensor node might vary in size from that of a shoebox down to the size of a grain of dust, although functioning "motes" of genuine microscopic dimensions have yet to be created. The cost of sensor nodes is similarly variable, ranging from a few to hundreds of dollars, depending on the complexity of the individual sensor nodes. Size and cost constraints on sensor nodes result in corresponding constraints on resources such as energy, memory, computational speed and communications bandwidth. The topology of the WSNs can vary from a simple star network to an advanced multi-hop wireless mesh network.

II. REVIEW LITRETURE

In 2000, W.Heinzelman et al. [6] proposed clustering-based protocol Low-Energy Adaptive Clustering Hierarchy (LEACH), it utilize randomized rotation of local cluster base stations to evenly issue the energy load along with the sensors in the network. A process to coordinate scalability and robustnes of dynamic. The amount of information reduce transmission base station for network. In 2001, Arati Manjeshwar and Dharma P. Agrawa [7] proposed a formal classification of sensor networks, based on proactive and reactive networks.Reactive networks, as opposed to passive data collectingproactive networks, respond mmediately to changes in therelevant parameters of interest. And also introduced a newenergy efficient protocol, TEEN (Threshold sensitive Energy Efficient sensor Network protocol) for reactive networks. In 2002, Konstantinos Kalpakiset al. [8] proposed the maximum lifetime data gathering problem, with and without aggregation and polynomial time algorithms for maximizing the network lifetime, which is defined as the time until the first sensor runs out of energy. The aggregation problem is formulated as a problem of a network flow problem using an ILP (Inductive logistic programming), Maximum Lifetime Data Aggregation (MLDA), to find a maximum lifetime plan. The case without aggregation, called the Maximum Lifetime Data Routing (MLDR) problem is formulated as a maximum flow problem with energy budgets on the nodes and again solved using an ILP. In 2003, Shah et al. [9] proposed an idea of mobile sinks called "data MULEs (Mobile Ubiquitous LAN Extension)" for random walk to pick up and drop off after a few access points to the data. Because of the short transmission range of the sensors, energy consumption is largely reduced. The results showed that the proposed MULE achieved minimum energy consumption in sensors and avoided the energy intimidate problem. In 2003, Liang Qin Thomas Kunz [10] presented a link breakage prediction algorithm to the Dynamic Source Routing (DSR) protocol. In the approach, the mobile node uses signal power strength from the received packets to predict the link breakage time, and sends a warning to the source node of the packet if the link is soon-to-be-broken. It was found that the proactive route maintenance does not cause any significant improvement in average packet latency and average route length. Enhanced route cache maintenance based on the link status can further reduce the number of dropped packets. In 2003, Seema Bandyopadhyay et al. [11] proposed a distributed, randomized clustering algorithm to organize the sensors in a wireless sensor network into clusters. The method is used to coordinate sensors in WSN in to cluster. In 2004, Gang Lu et al. [12] proposed DMAC (Dynamic Medium Access Control) protocol, an energy efficient and low latency MAC (Medium Access Control) that is designed and optimized for such data gathering trees in wireless sensor networks. The DMAC is designed to solve the interruption problem and allow continuous packet forwarding by giving the sleep schedule of a node as an offset that depends upon its depth on the tree. DMAC also adjusts the duty cycles adaptively according to the traffic load in the network. Further a data prediction mechanism is proposed to More-To-Send (MTS) packets in order to alleviate problems pertaining to channel contention and collisions. In 2004, OssamaYounis and Sonia Fahmy [13] proposed a Hybrid Energy-Efficient Distributed clustering for periodically selects cluster heads according to the hybrid of a node residual energy and a secondary parameter, such as node proximity to its neighbors or node degree. Hybrid Energy-Efficient Distributed terminates after more iteration, incurs low message overhead and achieves fairly uniform cluster head distribution across the network. In 2004, Ignacio Solis and Katia Obraczka [14] evaluated the effect of timing in data aggregation algorithms. In network, the method uses energy-efficient data propagation by processing data as it flows from information sources to sinks. When it is enabled, the data accuracy and freshness of the target node in the database showed that there is a significant performance impact. Three aggregation timing policies are analyzed and compared based on information produced by the entire node in sensor network. In 2005, Mao Ye et al. [15] proposed a clustering schema Energy Efficient Clustering Scheme (EECS) for wireless sensor networks, which are better suited for the periodical data gathering applications. In this approach cluster heads are elected with more residual energy through local radio communication while well cluster head distribution is achieved. In 2006, Selvadurai and Sukunesan [16] proposed the Time-Controlled Clustering Algorithm (TCCA) to minimize the total energy dissipated by using non-monitored rotating cluster head election without location information in priori.TCCA control a cluster's diameter based on the message TTL (Time-To-Live) and approximate distance between nodes and cluster heads using the message timestamp, which could be used to create a collision-free transmission schedule. An analytical model for algorithm is derived based on stochastic geometry to determine a realistic energy dissipation and network lifetime patterns. It was demonstrated that there is an optimal probability, which could easily be determined from the given expression and pre-configured into the nodes, to achieve an overall energy efficient operation. It was also found that there is degradation in the improvement on network lifetime, when more nodes are deployed within the same region. In 2006, Dajin Wang [17] proposed a data collection energy saving scheme for the WSN, based on the concept of the center of the graph in graph theory. The purpose of the scheme is to use less power in the process of data collection. The sensors of WSN are powered by batteries where power saving is an especially important issue in WSN. In 2007, Wenyu Qu et al. [18] proposed a data aggregation algorithm. It exploited the tradeoff between data quality and network lifetime to improve data collection accuracy while the network lifetime is modified. This problem is formulated as an optimization problem by combining the changing pattern of sensor readings, the residual energy of sensor nodes and the communication cost from the sensor node to the base station. This data aggregation algorithm is theoretically analyzed and

further evaluated by conducting simulation experiments. In 2007, Guihai Chen et al. [19] proposed an Unequal Cluster-based Routing (UCR) protocol for grouping the nodes into clusters of unequal sizes. The distance from base station to cluster head and its size is smaller because thus they can some energy for inter-cluster data sharing. A greedy Energy- Aware a Routing Protocol is designed for the inter-cluster communication, which is the tradeoff between the energy cost of relay paths and the residual energy of relay nodes. In 2008, M.Vahabi et al. [20] proposed a Traffic Adaptive Periodic Data collection Medium Access Control (TA-PDCMAC) protocol which is designed in a TDMA (Time Division Multiple Access) fashion. It assigns the time slots for each node due to their sampling rates in a collision avoidance manner. The method ensures minimal consumption of network energy and increases network lifetime, as well as it provides small end-to-end delay and less packet loss ratio. The results showed that the protocol achieve up to 35% better performance than others in terms of energy consumption. ("Adaptive Data Collection Algorithm for Wireless Sensor Networks") In 2008, Tran Minh Tam et al. [21] formulated the minimum optimization problem of building a minimum cost hierarchical architecture for correlated data gathering with in a network. To solve this problem, a minimum cost distributed algorithm is developed using only simple message passing rules. The method acts as energy aware because Highpowered sensor nodes. The priority encoding and an appropriate sense of the raw data from the relaying nodes are acting as cluster heads. The results showed that the network lifetime can be significantly improved. In 2009, Ayon Chakraborty et al. [22] proposed a data gathering protocol for enhancing the network lifetime by optimizing energy dissipation in the nodes. To achieve the design objective, Particle Swarm Optimization (PSO) with Simulated Annealing (SA) is applied to form a sub-optimal data gathering chain and a method was for selecting devised an efficient leader for communicating to the base station. In this scheme, each node communicates only with a close neighbor depending on its residual energy and location. It rules out the unequal energy dissipation by the individual nodes of the network that gives superior performance as compared to LEACH and PEGASIS. In 2009, A. Allirani, and M. Suganthi [23] proposed an energy efficient cluster formation protocol for the objective of achieving low energy dissipation and latency without sacrificing application specific quality. The objective is achieved by applying randomized, adaptive, self-configuring cluster formation and localized control for data transfers. It involves application specific data processing, such as data aggregation or compression. In 2010, Young Sang Yun et al. [24] proposed a framework to maximize the lifetime of the wireless sensor networks (WSNs) by using a mobile sink when the underlying applications tolerate delayed information delivery to the sink. Within a prescribed delay tolerance level, each node does not need to send the data immediately as it becomes available. Instead, the node can store the data temporarily and transmit it when the mobile sink is at the most favorable location for achieving the maximum WSN lifetime. In 2010, Cheng et al. [25] presented two approaches for data collection; Top-down and bottom up approaches. In bottom up approach, the network structure is not much energy efficient while transmitting the data to base station since large network structure consumes large amount of energy. More numbers of nodes are involved to transmit their data to a longer distance. The problem of reducing the transmission distance among nodes by forming a different network structure for the nodes is addressed to transmit data as fast as possible. In 2010, Mohamed Yacoab M.Y and Dr.V.Sundaram [26] proposed multiple sink based data aggregation technique for WSN. In this technique, initially a sink oriented tree is constructed for each sink. If the amount of data in the network becomes large, the data is transmitted in the slots allocated for the specific part of the data in order to avoid interference in the data transmission. As data is aggregated at the nodes which are nearer to the sink, data will be compressed and then forwarded to the next level. By this way, data is efficiently transmitted to the sink without any loss and interference. The results showed that the proposed technique achieved good packet delivery ratio with reduced energy consumption and delay. In 2011, Volkan Dedeoglu et al. [27] proposed energy consumption model that allows to allocate variable transmit power and data compression rate for each sensor node. The total energy cost of lossless data gathering is minimized by using joint power and transmission rate allocation under Slepian-Wolf rate and capacity constraints. It is analyzed for the special case that when the cost of being active dominates, the power allocation separates from the rate allocation problem. In 2011, Bin Cheng et al. [28] focused on collecting spatial correlated data in multi-sink scenario. The main challenge in this scenario is that data collection process is considered as how to exploit the spatial correlation and decide which sink transmit the data at the same time. To address this challenge, heuristic algorithm is proposed to select a subset of sensor nodes as representative to represent the whole multi-sink sensor network based on the spatial correlated sensing readings. In 2012, Arun K et al. [29] proposed a mobile data collection model to reduce the data latency. The MDC collects the data from the nodes and transfers it to the sink in multihop. Using a combination of a touring strategy based on clustering and a data collection mechanism based on wireless communication, the delay can be reduced significantly without compromising on the advantages of MDC. In 2012, Xu Li and Jiulin Yang [30] proposed a localized Integrated Location Service and Routing (ILSR) scheme, based on the geographic routing protocol (GFG), for data communications from sensors to a mobile sink in WSNs. In ILSR, sink updates location of neighboring sensors after or before a link breaks and whenever a link creation is observed. Considering both unpredictable and predictable sink mobility, ILSR is compared with other competing algorithm. In 2012, Zhenzhong Huang and Jun Zheng [31] proposed Slepian-Wolf coding based Energy Efficient Clustering (SWEEC) algorithm, which is based on a heuristic algorithm for solving the minimum set weight cover problem in graph theory. SWEEC considers both the correlation structure of data from different sensor nodes and the distance from a cluster head to the sink nodes for cluster head election. In 2013, Jin Wang et al. [32] proposed the uneven clustering algorithm with mobile sink strategy. CHs will be selected mainly based on their competition range and residual energy for guarantee data collection and transmission. The mobile sink node will move at a certain speed along a predetermined path back and forth at some special locations to communicate with sensors In 2013, Rashid M. Awadi.et al [33] presented a complete solution for energy consumption in WSNs. Associated Cluster Head Array (ACHR) is introduced to reduce the energy by selecting optimal choice for the CH. The Dynamic Sleep time for Aggregation Data (DSDA) algorithm uses dynamic sleep time rather than fixed sleep time to reduce the wasted time and energy. The results showed that the proposed dynamic sleep time with data aggregation model consumes less power, than a fixed sleep time in WSNs, either with single message, or aggregation message. In 2013, S.Nirmala and S.Jancy Sickory Daisy [34]proposed a delay-aware data collection network structure and its formation algorithms. For different applications, network formation can be implemented in either centralized or decentralized manner. The performance of the proposed network structure is compared with a multiple-cluster two-hop network structure, a single-chain network structure, a minimum spanning tree network structure, and a collection tree network structure. The proposed network structure is more efficient in terms of data collection time among all the network structures mentioned above. In 2013, Devasahayam and Kaliyamurthie K.P [35] Discussed fast converge cast methods in wireless sensor Network, where nodes are communicated using TDMA (Time Division Multiple Access) protocol so as to minimize the Scheduling length. It is focused on fundamental short coming Of interference and half duplex transceivers available on the Nodes. It was observed that multiple channel method is useful In reducing schedule length and link-based (JFTSS) channel Assignment schemes which are more energy efficient in Removing interference, compared to TMCP scheduling Schemes. In 2013, Dongfeng Xie et al. [36] proposed a Weighted Probabilistic Clustering Algorithm (WPCA) clustering Scheme after a comprehensive analysis on various protocols. In clustering each and every node independently decides Whether to be a cluster head according to a weighted Probability, which is related to the ratio between node's Residual energy. The nodes with more residual energy are Assigned with larger weight value and further increase the Chances to be elected as cluster heads. In 2014, Neethu Joy et al. [37] proposed a model zone division hierarchical multiple clustering approaches with multiple moving collectors to overcome the problem of exhaustion of energy of the node nearer to sink and increasing the lifetime of the WSN. Multiple mobile collectors collect data from master node, while traversing through their transmission range to reduce the data collection latency. In 2014, P.Madhumathy and D. Sivakumar [38] proposed a Mobile Sink Based Reliable and Energy Efficient Data Gathering technique for WSN. The method determine the next position of the sink using biased random walk model and also finds the optimal data transmission path by using rendezvous point selection with splitting tree approach. Once the data is sensed and ready for transmission, the sensor node encodes the data and transmits it to the sink. On receiving the encoded data from the sensors, the mobile sink decodes the messages and stores the resulting block in its local buffer. In 2014, M. Sasipriya and Dr. B. Kaalavathi [39] proposed a protocol called Mobi-cluster to minimize the overall network overhead and energy expenditure associated with the Multi-hop data retrieval process while also ensuring balanced energy consumption among Cluster Nodes and maximize network lifetime. The route is formed as cluster of nodes from member node to Cluster Head. The cluster heads passes collected data to the sink node in the network. The Cluster Head performs filtering operation upon the raw data by exploiting potential spatial-temporal data redundancy and forward the filtered information to the Mobile sink. It uses Neighbor Discovery Distance Algorithm to provide ID based data transmission on the network without any damage. In 2014, Ramya.D and Ramar.C.K [40] proposed a technique called Approximate Data Collection (ADC) algorithm which divides a sensor network into number of clusters and determines data association for each cluster head. It performs global approximation of data collection from the sink node according to model parameters uploaded by cluster heads. It is formulated as the problem of selecting the minimum subset of sensor nodes. In particular, a proposed an Optimize Link State Routing (OLSR) Protocol is used to reduce the flooding of control traffic in selected nodes and also to retransmit the control messages called MPR (Minimize Packet Radio).

III. DIFFERENT APPLICATION IN WSNs

There are following application used in Wireless Sensor Networks:

A. Area monitoring:

Area monitoring is a common application of WSNs. In area monitoring, the WSN is deployed over a region where some phenomenon is to be monitored. A military example is the use of sensors detect enemy intrusion; a civilian example is the geo-fencing of gas or oil pipelines.

B. Health care monitoring:

The medical applications can be of two types: wearable and implanted. Wearable devices are used on the body surface of a human or just at close proximity of the user. The implantable medical devices are those that are inserted inside human body. There are many other applications too e.g. body position measurement and location of the person, overall monitoring of ill patients in hospitals and at homes. Body-area networks can collect information about an individual's health, fitness, and energy expenditure.[41][42]

C. Environmental/Earth sensing:

There are many applications in monitoring environmental parameters,[43] examples of which are given below. They share the extra challenges of harsh environments and reduced power supply.

D. Air pollution monitoring:

Wireless sensor networks have been deployed in several cities (Stockholm, London, and Brisbane) to monitor the concentration of dangerous gases for citizens. These can take advantage of the ad hoc wireless links rather than wired installations, which also make them more mobile for testing readings in different areas.

E. Forest fire detection:

A network of Sensor Nodes can be installed in a forest to detect when a fire has started. The nodes can be equipped with sensors to measure temperature, humidity and gases which are produced by fire in the trees or vegetation. The early detection is crucial for a successful action of the firefighters; thanks to Wireless Sensor Networks, the fire brigade will be able to know when a fire is started and how it is spreading.

F. Landslide detection

A landslide detection system makes use of a wireless sensor network to detect the slight movements of soil and changes in various parameters that may occur before or during a landslide. Through the data gathered it may be possible to know the impending occurrence of landslides long before it actually happens.

G. Water quality monitoring

Water quality monitoring involves analysing water properties in dams, rivers, lakes & oceans, as well as underground water reserves. The use of many wireless distributed sensors enables the creation of a more accurate map of the water status, and allows the permanent deployment of monitoring stations in locations of difficult access, without the need of manual data retrieval.[44]

H. Natural disaster prevention

Wireless sensor networks can effectively act to prevent the consequences of natural disasters, like floods. Wireless nodes have successfully been deployed in rivers where changes of the water levels have to be monitored in real time.

I. Machine health monitoring:

Wireless sensor networks have been developed for machinery condition-based maintenance (CBM) as they offer significant cost savings and enable new functionality.[45]Wireless sensors can be placed in locations difficult or impossible to reach with a wired system, such as rotating machinery and untethered vehicles.

J. Data logging:

Wireless sensor networks are also used for the collection of data for monitoring of environmental information this can be as simple as the monitoring of the temperature in a fridge to the level of water in overflow tanks in nuclear power plants. The statistical information can then be used to show how systems have been working. The advantage of WSNs over conventional loggers is the "live" data feed that is possible.

K. Water/Waste water monitoring:

Monitoring the quality and level of water includes many activities such as checking the quality of underground or surface water and ensuring a country's water infrastructure for the benefit of both human and animal. It may be used to protect the wastage of water.

L. Structural health monitoring:

Wireless sensor networks can be used to monitor the condition of civil infrastructure and related geo-physical processes close to real time, and over long periods through data logging, using appropriately interfaced sensors.

M. Wine production:

Wireless sensor networks are used to monitor wine production, both in the field and the cellar.[46]

IV. CATEGORIZATION OF SECURE DATA

The work on secure information conglomeration can be ordered taking into account encryption of information at particular hubs into three classes, bounce by-jump encoded information conglomeration end-to-end scrambled information accumulation and Privacy Homomorphism

A. Hop-by-Hop Encrypted Data

In the bounce by-jump encoded information accumulation, middle hubs unscramble each message got by them. Along these lines, get the plaintext .Then total the plaintext as indicated by the total capacity, and encode the total result some time recently transmitting it. In this all the moderate sensor hub needs to decode the got information and apply conglomeration capacity on it. Because of numerous decoding perform by the moderate hub its expending more battery force and not give end-to-end security.

B. End-to-End Encrypted Data

To beat the downsides of the bounce by-jump scrambled information total an arrangement of end-to-end scrambled information total conventions are proposed. In those plans, halfway hubs can total the figure content straightforwardly without decoding the messages. Contrasted with the jump by-bounce one, it can promise the end-to-end information privacy and result in less transmission inertness and calculation cost. Foes won't have the capacity to perceive what understanding it is amid information transmission. Regarding security, they planned intends to wipe out excess perusing for information accumulating however this perusing stays mystery to the aggregator.

C. Protection Homomorphism

A Privacy Homomorphism (PH) is an encryption change that permits direct calculation on encoded information. In homomorphism encryption certain total capacities can be ascertained on the scrambled information. The information is scrambled and sent toward the base station, while sensors along the way apply the collection work on the scrambled information. The base station gets the scrambled total result and decodes it. In particular, a homomorphic encryption plan permits the accompanying property to hold enc (a + b) = enc (a) + enc (b)

V. CONCLUSION

The time hold-up in data collection is the major problem in wireless sensor network. This paper present the summary of data collection methods in wireless sensor network and the performance is based on the energy consumption, data collection, data secure and use different application in wireless sensor network. At present a days we can observe a vide scope and various implementations of data collection with secure database management in wireless sensing devices.In our future research work more protected diffenerent data collection with data security.

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