REVIEW ON WSN ROUTING WITH OPTIMIZATION OF CLUSTER HEAD

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Abstract-Wireless Sensor Network is an adhoc network of tiny sensors. Each sensor is defined with some energy. As the data is transferred over the network each sensor spends some energy and cost in sending, receiving and forwarding data. Network life depends on how much energy and cost spends in each transmission. Opportunistic routing has been shown to improve the network throughput, by allowing nodes that overhear the transmission and closer to the destination to participate in forwarding packets, i.e., in forwarder list. WSN basically refers to the exploitation and management of data created by the environment of WSN that is usually of very demanding nature, given the huge amount of data being transformed on the basis of real time by a wide number of WSN based Things, which are interlinked on a worldwide scale via the Internet. Moreover, this kind of data is usually imperfect and heterogeneous as they originate from distinct type of sources, which are mainly sampled using a hardware i.e. of low-cost, and are carried over the communication links of unreliable nature. To enable an effective and seamless integration of such a dynamically changing, wide-volume, imperfect, distributed, and heterogeneous data into the applications and services of valuable form, plans are needed to preprocess and clean the data, in order to provide real time data analytics and in a fashion of distributed form, to serve the informational data in a standard form such that it can be reused easily, to search and index the data on the basis of its content or description, and to provide data storage in a scalable form along with its management..

Keywords: multipath, sensor, optimal, routing.

I. INTRODUCTION

The Internet of Things (WSNs) "Any adequately built advanced form of technology is identical from magic." It was devised in "Profile of the future" i.e. a book entitled by Arthur C. Clarke (1973), who is considered as one of the most famous writers' of science fiction along Robert A. Heinlein and with Isaac Asimov. The testimony is renowned as the Clarke's third law that describes the faith of Clarke's in the technology of power that was much enough capable to obscure the borderline between reality and science fiction and to model what in the past was only studied as a magic. His vision was accurately proved as what we are marking today and how greatly such kind of technologies have been attracting our day-to-day life [1] [8] Wearable and handhelds computers (for e.g. body sensor networks, mobile phones, augmented reality (e.g., Google Glass1), GPS-based navigation, human-to-machine based conversation (e.g., voice-assistant), intelligently smart technologies (e.g., smart watch, smart phone, smart office/home), are some of technological examples that were science fiction or even exotic late in early 1970s, are presently possible commercial type of products.Having analogous belief in the technology of power, contemporary (new) visionaries conceptualized a world where the technology is awake of human activities and the uses and, and it basically uses such type of awareness for assisting them to attain the activities in an unobtrusive (unassuming) fashion, i.e., without noticing the assistance (support) by the users of the system. This kind of vision has been illustrated using distinct terms, Internet of Things (WSN), Wireless Sensor Networks (WSN), IBM based Pervasive Computing, Xerox PARC based Ubiquitous Computing, and Ambient Intelligence (Philips) are considered among the most famous technologies ever adopted. The first two technologies mainly focused over the means for realizing the term "what". Whereas, on the other hand, the last three of the terms along with their basic visions mainly focused over what to bring new to the technological users. Particularly, the technology must be really helpful to its users at any place (e.g., at work, on the road or at home), any time (e.g., night or day), for any kind of purpose (e.g., leisure or business), and it must not be of distracting form. In order to realize such a concept, technology must be based over the process of networking, it should be capable to sense via sensors and should be able to respond via actuators to the sensing environment, and in the end, it should be helpful in making the environment to build and work on smart basis. The specific means for realizing such a vision is formed by environment of WSN. With the fusion of the Internet, hardware miniaturization (embedded systems), wireless networking (cellular, WSN), software technologies, and the actuators and sensors, the environment of WSN helps in providing a technological base for initiating a smartly built environment on a world-wide scale. This chapter mainly deeply studies the technology of WSN as a broad WSN understanding basically serves as the thesis background as well as for future-based research. We mainly discuss WSN definition and mainly review various kinds of applications in the next part of this research work.

1.1 Data Management from Smart Things

This form of WSN basically refers to the exploitation and management of data created by the environment of WSN that is usually of very demanding nature, given the huge amount of data being transformed on the basis of real time by a wide number of WSN based Things, which are interlinked on a worldwide scale via the Internet. Moreover, this kind of data is usually imperfect and heterogeneous as they originate from distinct type of sources, which are mainly sampled using a hardware i.e. of low-cost, and are carried over the communication links of unreliable nature. To enable an effective and seamless integration of such a dynamically changing, wide-volume, imperfect, distributed, and heterogeneous data into the applications and services of valuable form, plans are needed to preprocess and clean the data, in order to provide real time data analytics and in a fashion of distributed form, to serve the informational data in a standard form such that it can be reused easily, to search and index the data on the basis of its content or description, and to provide data storage in a scalable form along with its management. Large number of methods for the purpose of cleaning the data are planned and proposed in [19] and [20] for the concept of sensor-based data, on the basis of sensor uncertainty or recalibration of modeling approaches, and for the technology based on RFID data which mainly surveys techniques-based arrays for reduction of redundancy as well as it prevents the readings lost by the readers of RFID. For real-time and distributed data analytics, the framework of Google's MapReduce [20] along with its implementation Hadoop [21], represents an auspicious solution. Modelled for solving the problems of parallelizable form across wide sets of data using a huge number of computers from hardware of heterogeneous form and assigned (distributed) across administrative organizations, and/or geographical areas, the framework of MapReduce is of ideal form which is meant for analyzing the generated data by the environment under WSN. Modelling upon the top of Hadoop implementation systems like Pig10 and HBase9 usually provide functionalities of database for scalable management and storage of data. In the environment of WSN, various methodologies for the process of data searching are based on the description of textual form of the data sensors (sources), the closeness of data streams, and the original content of data. The representatives [22] of such kind of methodologies are based on the textual kind of description such as Micro search, Snoogle, MAX, SenseWeb, GSN, allows the users of the system to search the sources of data by rising a query, which contains a set of keywords like "book" or "room". As a result, the user of the system mainly presents a data source-based rank list that matches the query of the user. The work in [20], [21], and [23] allows the search of finding data sources that produce data streams similar to a given data stream. The work in [34] allows searching for informational data on the basis of its content. The data created by the WSN based environment is very large on volume basis and but still it carries very less knowledge about the sources of data. Without having a clear and clean explanation of what is basically available for the criteria of processing, it is really hard for the consumers of the data to use this kind of data an effective manner. The technology/standard based on Sensor-based Web Enablementenables the sensor resources based interoperable usage by granting the makers to frame all kinds of transducers, discoverable repositories of sensor data, sensors, useable and accessible by means of the Web. The interfaces of service like discovery of sensor, tasking, access, alerting, and evening [19] [20] are graded so that the process of heterogeneity of sensor networks and the sensor data can be concealed on the basis of developers based perspectives. Equipped with semantic data description, developers (makers) can smoothly adopt and re-use the data form for desiging different services and applications. Moreover, the concept of Semantic Web usually offers the technology of RDF i.e. Resource Description Framework12 in order to illustrate the semantic-based data information using the methodology of knowledge-based graphs (for instance, sensor1 is-in room1), where ontologies (logic) of the system defines the context of the vertices (room1 and sensor1) and the (is-in) edges of this type of graph. With the concept of RDF, the researchers are capable to unconditionally illustrate the resource of data, in order to enumerate that how the resources of data are related to each other, and to basically infer the knowledge from the source of data. The technology of RDF, further has the effective potential to represent the large volumes of data created by the environment of WSN. The RDF based data integration represents the data into LOD 13 i.e. linking open data project, and the usage of the language SPARQL14, a query-based language for the documents based on concept of RDF, providing an encouraging set of various solutions for skillful manipulating, reusing, and storing the data modelled by Things.

1.2 WSN Technology

WSN are thick wireless networks of little, cheap, low-control, disseminated self-ruling sensors which amass and proliferate natural information to encourage checking and controlling of physical conditions from remote areas with better exactness [5] [10]. For the most part, it is accepted that every sensor in a system has certain limitations as for its vitality source, power, and memory and figuring capacities. It contains a door that gives wireless network back to the wired world and dispersed nodes. It can likewise be characterized as a system of gadgets that can impart the data accumulated from an observed field through wireless connections. The information is sent through different nodes with an entryway and the information is conveyed to different networks like wireless Ethernet [7] [12]. These networks are utilized to control physical or ecological conditions like sound, weight, temperature and so forth. WSN nodes have constrained battery limit. As the use of WSN is increasing rapidly and simultaneously this technology is facing

various major challenges of energy constraints depending upon the limited lifetime of batteries as each of its node relies on energy demand for performing the basic operational activities which has become the major reason behind the failure in wireless sensor networks. One node interruption may result in shutting down the overall operation of the system. The nodal operation relies on active mode, idle, and sleeping modes. In case of active modes, energy is consumed while transmitting or receiving the data. In case of idle mode, the node consumes the energy same as consumed in active type node whereas in case of sleeping mode, the node gets shut down in order to save the energy. To build the life expectancy of WSN the usage of vitality in a productive way is a most normal issue [1] [6]. As the utilization of WSN are expanding at a very fast pace and using numerous varieties of sensors with limited batteries for target following, physical condition observing and so on. These applications require fast correspondence between sensor nodes [16]. The WSN technology uses the following steps to keep the safe for its longer usage.

- Scheduling the nodes state (receiving, idle or sleep, and transmitting).
- Changing the range of transmission between the sensing nodes used in the process.
- To reduce the redundant or the unwanted data.
- Use of efficient data collecting methods and the routing protocols.

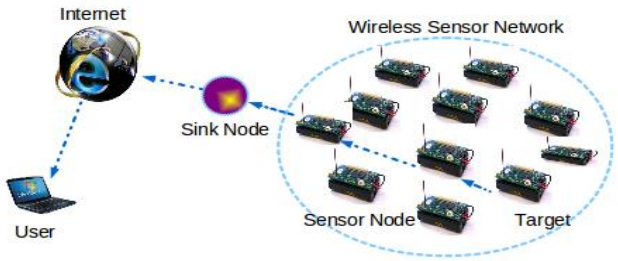

Figure 1: Wireless Sensor Network [5]

1.3 Needs of WSN

There are a few such requirements that must be applied to most of the application of the sensor network [17].

(a) Network size: Most of the applications requires a larger network covering more area and therefore helps in monitoring large events.

(b) Lifetime: The basic need of extending the duration of the WSN is of greater importance as the sensors are not accessed after the process of their deployment.

(c) Minimizing the faults: A network of faulty nature uses various sources to generate more forms of incomplete data or information. In context of sensors, it generally refers to monitor such an environments i.e. broken and many of its events are missing. In case of applications relying on transmitting to the sink, it usually means that the packet loss is very high, and the event knowledge is of incomplete nature, therefore the data gathered is not or reliable nature. So, this condition must be kept in mind that for a reliable collective form of event to its sink plays a significant role on WSN technology [16]. So, in communication protocols such type of requirements explains the following criteria-based strategies:

1. Scalability: The protocol used for the process of communication must be of reliable nature such as maintaining and establishing the connectivity among each of the sensor. When the size of the sensor becomes large, the protocol must perform in a normal way.

2. Reliability: In terms of packet loss, it represents one of the major concern for providing a high level of efficiency in control and monitoring systems. Therefore, it is desired to take account of multi-hop availability, employing techniques which are highly energy efficient which would further improve the lifetime of the network.

3. Multi-hop communication compatibility: In this case the sensors do not communicate with the sinks directly. So, it is usually preferred that the sensors use the other neighbor sensors as hops for the process of communication.

4. Lower energy consumption: The process of energy consumption should be slow between the sensors and the sink in order to increase the lifetime of the working sensor.

5. Latency: This is usually defined by the time taken by the node to monitor, communicate, and sense the working operation or activity. The nodes collect the data, processes it and further send it to the receiver or the destination place. The latency is based on the working activities including the time taken by sensor to send the data in low density or heavy load traffic network [16] [17].

6. Processing Time of Node: It highlights the performing time of the sensor node starting from the initiation of the operation, sensing, processing or storing data, and receiving or transmitting the data over the network.

7. Transmission Scheme: The nodes of the sensor collect the data and transmit it to the base station or the sink using either a multi-hop or flat schemes.

8. Network Power Usage: It represents the power or energy used by the sensor nodes which helps them to perform the allotted activities such as processing, sensing or forming the groups within the area specified.

1.4 WSN Architecture

The architecture of WSN technology comprises of the following:

1.4.1 WSN: Model

The architecture of WSN technology is based on the OSI architectural model. It basically includes three cross layers and five normal layers as represented in [17, Figure.1.2].The sensor network includes the five layers namely, application, transport, n/w, data link, and physical layer whereas the cross layers

namely, task management, mobility management, and power management. These layers accomplishes the network operation and helps in functioning of the sensors together to boost the network efficiency.

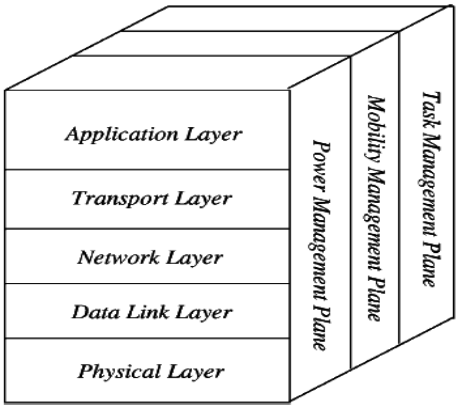

Figure 1: Architectural Model [18]

(a) Application Layer: It is liable for managing the network traffic and offers software for large applications converting the data into a clean and clear form in order to find the information in a positive manner. The sensor networks are arranged in various different application in the fields like military, environment, medical, agricultural, etc.

*(b) Transport Layer:*The function of this layer to maintain reliable operation and to avoid the problem of congestion. The protocols used for such a layer use distinct mechanisms for loss recovery and recognition and such a layer is basically needed where a system thinks or plans to contact with other form of networks [18]. But this process is energy efficient that is one such big major reason of not being fit for the WSN technology. Generally, this layer can get separate into an event driven or packet driven form. Some of the populous protocols used in transport layer are PORT (Price-Oriented Reliable Transport Protocol, PSFQ (pump slow fetch quick), and STCP (Sensor Transmission Control Protocol).

*(c) Network Layer:*The main aim of this layer is the process of routing. But the main tasks are inpartial memory, buffers, and power conserving applications [9] [11]. This layer relies on a simple idea of routing where the basic need is to explain the redundant and the reliable lanes varying from protocol to protocol according to convinced form of scale, known as metric. A lot of protocols already exist for such type of layer that can be separated into hierarchal routing, and flat routing or cane be a time driven, event driven, and query-driven.

(d) Data Link Layer: It is usually liable for the process of data multiplexing (frame detection), MAC, & error control, data streams, and confirms the reliable operation that may be ether point to point or point to multipoint [20].

(e) Physical Layer: It basically provides an edge for the process of transferring the bit streams above the (physical) medium. This type of layer relies on generating of carrier frequency, frequency selection, Modulation & data encryption, and signal detection. It is suggested in areas where there is low rate of power consumption particularly in WSNs with low consumed power, low cost, communication range, and density in order to boost the battery life used for the working operation.

1.4.2 Components of WSN

There are three main components in WSN: nodes, gateways and software. Spatially distributed cluster heads interface with sensors to monitor assets. The collected data transmit to gateway wirelessly, and can operate independently. It is connected to a host system where the data can be collected, processed, analyzed and presented by using software [18].To extend WSN distance and reliability, special type of measurement node is used such as router node. WSN is a widely used system because of its low costs and high efficiency. WSN contains sensor nodes which basically utilized for detecting, imparting and information preparation. Sensor nodes can be utilized as a part of numerous fields like businesses, military, and farming applications, for example, transportation activity checking, natural observing, keen workplaces and front-line observations. In these applications, sensors are conveyed in a specially appointed way and work independently [14].

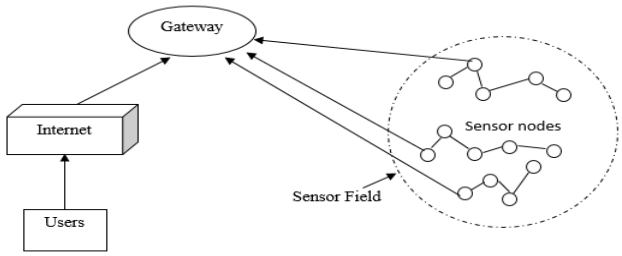

Figure 2: Components of WSN

In these unattended conditions, these sensors can't be effectively replaced or energized, and vitality utilization is the most basic issue that must be considered. The sensor is a small device which is used to detect the amount of physical parameters, event occurring, measures the presence of an object and then it converts the physical parameters to electrical signal values using electrical actuators.

1.5 Characteristics of WSN

The characteristics of WSN include the following:

- The consumption of power limits for nodes with batteries.
- Capacity to handle node failures.
- Heterogeneity of nodes and some mobility of nodes.
- Large scale distribution scalability.
- Ensure and maintaining strict environmental conditions.
- Cross-layer design.
- Simple/ Easy to use.

1.6 Internet of Things

With large advancement in technology and the rising growth of digital assistance in day to day life and working environment that moves forward with it, various technologies are required to include these domains of application up to the next (other) level. For this, one of the most famous vision to be considered is Internet of Things (WSN): devices interconnected, embedded in every object. To divert such kind of vision practically, protocol routing are required to assist the communication between such things in a self-organized, changing infrastructure, and decentralized [1] [3]. WSN represents the vision based on the communication between the devices that are planted in things, so-known smart objects. In order to overcome the process of interference with process-based usability of the thing, the so-called device WSNs are embedded devices, small, supplied with ROM based, a few hundred of kB. These are basically charged by batteries that lasts for even months or years without any kind of maintenance. The WSN devices are represented in a mesh type of network that is linked with the Internet with the help of gateway router. This separates them from the conventional type of Wireless Sensor Networks. Traffic in the system is usually sparse and connectionless, with small type of payloads.

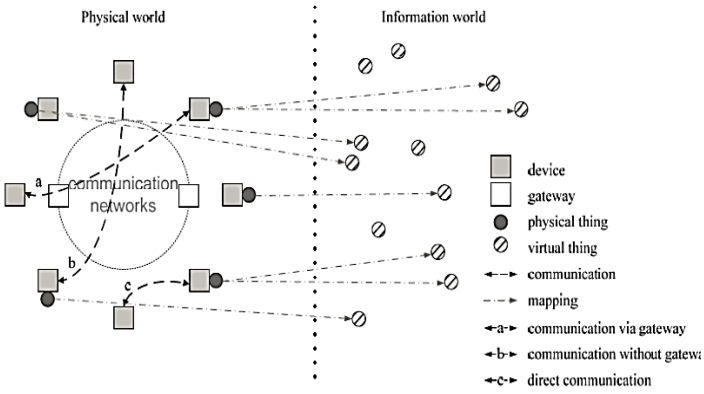

Figure 3: Overview of the WSN [2]

The patterns of traffic that emerges from the devices of WSN may vary with the application-based area, for example, Building Automation, helps in generating point-to-point-traffic in a common way, and whereas the centralized applications based on Home Automation exhibits a traffic mixture i.e. multipoint-to point and point-to-multipoint. Due to interference occurring with foreign-based signals, scattering or signal refection, fading connectivity are encountered often in mesh (wireless) networks, and there is no security for the connectivity of bidirectional type.The most significant part of accomplishing the communication of WSN is to link distinct type of devices, which makes them communicable with others objects of the system. Various properties like sensing, maneuvering, i.e. being able to process, store, and capture the data are not necessary; until your own device particularly needs one of the given properties. In order to label a device of WSN, it is very essential to have the ability to communicate. This type of communication is of low importance, since the real link and physical layer of communication within the structure of WSN can be generalized in various ways. In case C of figure 3 basically indicates that the devices are not needed always to perform communication by communication-based network. For instance, if two of the devices are placed close to other form, then it becomes very simple to communicate directly via for instance, the technology used by radio such as ZigBee or Bluetooth that represents the protocols enabling direct form of communication. Differently, for Case A as depicted in figure above, the process of communication of a device might be done via a gateway that uses single protocol like IPv6 over 6LoWPAN and further the gateway performs communication by the use of another type of protocol say for instance, IPv4 over a network of communication. In case of case B in figure 3 depicts two of the devices that communicate on directly with one another without any requirement of a gateway where both of the devices are connected directly to the network of communication and thus, these are able to perform communication when they are placed in distinct regions.A thing of physical form can be easily mapped into world of information via single or even more kind of virtually-based things, while the things of virtual form do not significantly require to be linked with physical kind of thing and can independently exist like any form of physical appearance. For instance, physical form might initiate application of multiple kind and further it may have identities in this virtually built world. For instance, a virtual thing can be thought of as a video on a USB-based drive. Such type of file may consist of file with multiple names that refers to it and it usually consists of multiple even copies, potentially such kind of copies might involve distinct resolutions, etc. The endless technological advancements have presented a possible concept of modernization, WSN represents a booming globally built network of computing, where everything will be associated or linked to the Internet. WSN is a hot topic of research i.e. constantly evolving, where finite number of opportunities are present. Boundless imaginations in this research have resulted a platform, where the reshaping of the present internet is done to integrate and modify diversion. The internet services availed by a number of devices is increasing rapidly day by day and such services are connected by wire or wireless system that results to keep strong informational source at our finger tips [3]. The methodology of sanctioning interaction among newly built intelligent machines represents an inventive technology but such kind of technologies associated with WSN are not new for us. WSN by its name, presents a methodology of converging the data resulted from distinct things to any of the virtually built platform on an already existing infrastructure of Internet. The WSN concept was initialized in 1982 when a coke machine was modified and was linked to the Internet that reported the information about the drinks explaining that whether the drinks were hot, medium, or cold. Later, Mark Weiser (1991)

represented a newly built vision of WSN in the form of fast computing . Bill Joy (1999), also provided a clue dealing with device to device based communication process in his internet-based taxonomy. On the other hand, Kevin Ashton (1999) proposed the definition of "Internet of Things" in order to describe the interconnection of system devices [17]. The main idea behind WSN is to allow self-governing exchange of fruitful information between embedded form of distinct specifically identifying practically built devices surrounding us, sustained by the outstanding technologies like and WSNs and RFID that sensed by sensor-based devices and is further processed for the purpose of decision making, and based on this an automatic action is usually performed.

II. WSN PROTOCOLS

Both the additional and essential building blocks of the WSN routing protocol have been discussed [10]. Here, not every presented i.e. protocols has been modelled under the environment of WSN; most branch from network of adjacent type in context of research fields like MANETs and DTNs (data transmission network). In spite of this, they mainly exhibit attributes that makes them accurate for standardized WSN.3.1 form.

*(a) Criteria***:** In past recent years, a huge number of protocol modifications and the protocols based on routing mechanisms for the technology of MANETs and LLNs (low power and lossy networks) have been advertised. To filter out such modifications, a criteria was modelled and implemented to overall applicants of protocols.

- *Standardization:*The protocols that represent the part or result of standardized process are preferred greatly [9] [10]. This basically ensures the opportunity for a deep specification of protocol, reviewed by a vast number of analysts having a huge knowledge of the subject, which further boosts the possibility of adoption in the current scenarios.
- *Available implementations:* The ideally existing and available implementations are depicted as an indicators for the property of seriousness and maturity of a protocol. They usually help in allowing the protocol-based evaluation through testbed and simulation experiments.
- *WSN based suitability:* A protocol for routing mechanism is applicable to a single topology of the network as well as the traffic entertaining plot most common in environment of WSN. It must be of scalable form up to a possible extent, and is capable to deal with unidirectional nature routes.

*(b) Overview:*Figure 1.19 presents the protocols on the basis of feature visualization that has been chosen to be presented as follows:

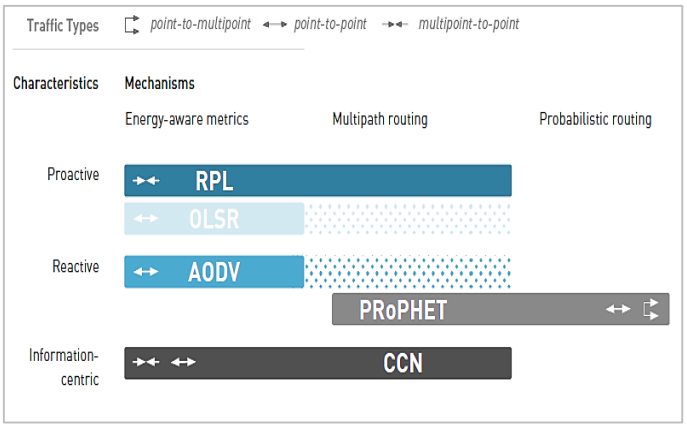

Figure 4: Possible protocols for routing under WSN [13]

*1. LEACH:*The concept ofLEACH was modelled as the protocol of routing for the WSNs and LLNs. LEACH basically supports the traffic that is of multipoint-to-point nature, with acceptable support for the traffic originating from point-to-multipoint form and basic features for point-to-point traffic. It is assumed that topology of the network consists of a node-based sink with large capability of computing [8]. It helps in construction of a DODAG, whose root represents the node of the sink that directs all the traffic towards the node of the sink. Each of the node in DODAG emits DODAG as the data input output (DIOs) are proactively sent and the topology of the network in advanced is explored. However, the DIO frequency decreases that helps in reduction of a uselessly overhead control once the stabilization of DODAG is done. LEACH is an only individual protocol, which may employ the routing source. But this only occurs when it operates in a non-storing manner.

2. OLSR and OLSRv2: However, both OLSR and OLSRv2 are not considered suitable for the environment of WSN due to the statement as follows: Being a proactive protocol of routing, these systematically broadcasts the data packets based on topological control and neighbour discovery. They usually maintain a deeply detailed list both the routes and direct neighbours with overall network of the system. This helps in generation of overhead based on the protocol in air, that drains batteries with unimportant communication in context to the process of transmission along with overhead type of storage as the unused information gets stored in Information Base [13] [14].

3. CCNx/ CCNLite: CCNx (content centric networking)an ICN based implementation, modelled by XEROXPARC i.e. a developing research company. CCNlite presents the lightweight adaption, adopted for the environment of WSN. CCN basically using hop-based processing. When a node is searching for the data, it usually distributes a message of interest. This kind of passion in the form of Interest is further passed through by the network till it gets acknowledged by any of the single competing nodes. Every node that receives the Interest reports it in its PIT. When the Interest gets

acknowledged or answered, then all other nodes that perform the operation of data forwarding stockpiles it that completely performs the data-based distribution over given network. In doing such kind of operation, the CCN assures that the data is capable to sustain the process of network partitioning.

4. AODV, LOADng and AODVv2: As specified by the IETF in 2003, represents a reactively formed a protocol using hop-by-hop routing. It usually makes the use of a RREQ, the (RREP)-based cycle, that gets prompted and every time, a data packet is sent to a destination of anonymous type. During the process of cycle, a section of route is usually disclosed and which gets gathered using hop-by-hop methodology [15] [19]. AODV is basically described as efficient in terms of memory. Two AODV based successors has been developed since its time of specification: One is the AODVv2 and the other is the LOADng presenting the Lightweight On demand Ad hoc Distance-vector-Next Generation routing protocol. The Aodv2 has been usually adopted by a group of MANET-based working on the basis of IETF. While the AODV only takes the value of Hop Count in a metric form, both the successors' helps in allowing alternate form of metrics that opens the deployment possibility for an energy-aware metric.

5. PRoPHET: It is popularly known as the PRoPHET. It was originally published in the year 2012 as a routing protocol i.e. hop by hop for the data transmission networks (DTNs) with the help of IRTF representing Internet Research task Force [13]. PRoPHET basically measures the movements of the network, both in terms of both the network traffic and physically form. On the basis of this data, the predictability based on delivery metric states the successful data transfer probability, which is usually evaluated per neighbour, indicating the PRoPHET as a protocol of probabilistic form.

III. RELATED WORK

JongHyup Lee, et al [1] converted the conventional process of software update to a service of distributed form. The experts have presented a system-based on incentive for obediently perform the patch-based transportation to recipient devices. The system-based on incentive helps in motivating self-interested, independent transporters for serving the devices to get updated. In order to ensure the correct operation of the system, the experts have employed the technology of block chain enforcing the deal in a decentralized methodology Elhadj Benkhelifa, et al [2] concerned the upgradation and advancements in the practices of intrusion detection in WSN based environment. It helps to provide a global review of presents IDSs i.e. intrusion detection systems for the technologies of WSN, that focused over all its types of architectures. Further, a proposal based on future directions in the environment of WSN on the basis of IDS was presented and further it was evaluated. The experts have provided the knowledge on how the practices of conventional type were not suitable due to their inherently passed features that provided a poor WSN domain coverage. For the development of an optimized, robust, and secure possible solutions for such kind of networks, the present area of research for IDSs in WSN will require to move forward in a dissimilar direction. Manu Elappila, et al [3] presented an interference and congestion aware efficient energy technique of routing for one of the routing protocol under the technology of WSN, named as Survivable Path Routing. This type of protocol was basically works in the network, where high level of traffic is present as multiple type of sources tries their best to forward (send) their packets to the place of destination on simultaneous basis. The results based on the simulation has suggested that protocol that was proposed performs well concerning throughput, packet delivery ratio, the left level of node-based energy, and end-to-end delay in context of the network. The packet drop rate was lesser in case of congested topological scenarios.Beni, G., et al [4] addressed the objective transmitted towards efficient energy routing and to gain better QoS i.e. quality of service provisions. This kind of research has analysed several protocols for routing and their efficiency on the basis of energy in constrained environment of WSN.SudipMisra, et

al [7] proposed a Soft-WSN i.e. software-defined wireless sensor network architecture, which provides an effort for supporting the application-aware service-based provisioning in the environment of

Internet of Things. Deeply detailed architecture of proposed method was presented that involves the control, application, infrastructure layers, and control to enable the technology of software-defined networks (SDNs) in WSN. It modelled a software defined controller (SDC), which involves two policies of management. One is the network management and the other is the device management. However, the scheme proposed was mainly implemented in a practically built platform of hardware without transforming the underlying concept of sensor networking, so that the already existing sensor-based devices can be integrated seamlessly.Reem E.Mohemed, et al [8] solved the issues of the network lifetime in context of premature end, where the base station was far apart from the Region of Interest. The researchers have proposed two energy-efficient, connectivity-aware, and distributed routing protocols for solving the issues related to the routing hole. Such type of protocols are OHCR i.e. On-Hole Children Reconnection with local nature and OHA i.e. On-Hole Alert with a global behavior. The protocols proposed helped in preserving the link of all individual setup phases, single network path with any kind of network topology along with maintenance of energy efficiency by avoiding the overhead of topological reformation. The results based on simulation proved that protocols (proposed) performs better than the recent ones on the basis of lifetime of a network, network overhead, and loss rate of node.Jian Shen, et al [9] proposed a newly built EECRP i.e. energy efficient centroid based on routing protocol for the

technology of WSN assisting WSN for improving the network performance. The EECRP that was proposed mainly involves three of the significant parts: a newly built technique of distributed cluster formation enabled the process of self-organization of nodes (local), a new algorithmic series for rotating the cluster head (CH) and for adapting clusters based on the centroid position evenly distributed the energy-based load among each and every sensor node of the network, and a newly built mechanism was applied for reducing the consumption of

Table.1 Existing Scheduling Model

Author's Name	Year	Methodology Used	Proposed Work
Manu Elappila, *et al*	2018	Survivable Path Routing	Presented an interference and congestion aware efficient energy technique of routing for one of the routing protocol under the technology of WSN, named as Survivable Path Routing.
Reem E.Mohemed, *et al*	2017	On-Hole Children Reconnection with local nature and OHA i.e. On-Hole Alert with a global behavior	Solved the issues of the network lifetime in context of premature end, where the base station was far apart from the Region of Interest.
Tang, *et al*	2016	Low-Power and Lossy Networks (LEACH)	Proposed the process of avoiding the congestion of multipath protocol routing. It mainly uses the composite form of routing metrics on the basis of Routing Protocol for Low-Power and Lossy Networks (LEACH), called as congestion avoidance-routing protocol for LLNs (CA-LEACH), where LLN represents the Low power and Lossy Networks.
N. A. M. Alduais, *et al*	2016	Data-based transmission process	Proposed an approach for reducing the number of transmissions in terms of data. It also decreased the data amount that would result in continuing the lifetime (period) of network.
Qingping Chi, *et al*	2014	complex programmable logic device (CPLD)	Proposed a new method designing a smart sensor reconfigurable interface for the industrial technology of WSN in the environment WSN, where complex programmable logic device (CPLD) was adopted as a core controller.

energy in case of communications usually long distance. WeishengTang, et al [10] proposed the process of avoiding the congestion of multipath protocol routing. It mainly uses the composite form of routing metrics on the basis of Routing Protocol for Low-Power and Lossy Networks (LEACH), called as congestion avoidance-routing protocol for LLNs (CA-LEACH), where LLN represents the Low power and Lossy Networks. LEACH based routing metric that minimized the average amount of delay towards directed acyclic graph (DAG) root was proposed, and the path of each of the path was computed using four metric form. The concept was explained and the performance was basically calculated with the help of simulation-based experiment in respect of Contiki. simulation results that have shown that the proposed framework (CA-LEACH) reduces the time-based average delay by about 30% when compared to real LEACH in case of inter packet interval that was short and it resulted packet loss ratio reduction by about 20%.The proposed CA-LEACH effectively alleviated the congestion of the network with poor quality links and large amount of data traffic and it significantly improved the LLNs based performance. N. A. M. Alduais, et al [11] proposed an approach for reducing the number of transmissions in terms of data. It also decreased the data amount that would result in continuing the lifetime (period) of network. The proposed approach mainly aimed to lower the transmitted messages number via a node that supported both the single as well as the multiple sensors based on relative differences or relative transformation or changes between the present (current) and last sensor-based transmitted measured values. The experimental results indicates that the proposed approach

delivered its best performance in context of reducing the packets size and messages transitions. Cristian Bude, et al [12] highlights the introduction of WSN along with its usage. It also includes some of the WSN based threats faced in regards to security of information. In addition to this, the thesis helps to provide some of the major instructions on how to possibly solve the unique requirement for the process of secure communication and authentication. The possible solutions were presented on the basis of newly built technologies and solutions under the process of development for the purpose of future-based research. Contemporary solutions are based on security protocols such as IPSec and Datagram Transport Layer Security (DTLS).M.U Farooq, et al [13] focused on providing an extensive overview of the environment of WSN and it further reviewed its enabled form of the sensor networks including the technologies of the system. It described the architecture of WSN (six-layered) and brings out the associated significant challenges. Kanika Sharma., et al [14] proposed a technique named Enhanced Energy Efficient Chain-based Routing Protocol (EEECRP) for WSNs in order to minimize the transmission delay and consumption. EEECRP helps in organizing the sensor-based nodes into a horizontal and vertical chain set. The heads of the chain were elected on the basis of node-based residual energy and the upper level distance from the header. In each of the horizontal chain region, sensor nodes usually transmits

the own data to their own chain head. The concept of EEECRP also adopted a mechanism of transmission that was based on chained data methodology for sending the packets of data from heads of the chain to the base station. The experimental analysis was based on the simulation process that shows that the proposed EECRP performs well in context of consumption of energy and lifetime of the network. Qingping Chi, et al [15] proposed a new method designing a smart sensor reconfigurable interface for the industrial technology of WSN in the environment WSN, where complex programmable logic device (CPLD) was adopted as a core controller. So, it can perform data reading both in real and parallel and in real time with a high speed on different multiple sensor data. An intelligent sensor interface specification i.e. IEEE1451.2 standard was mainly adopted for this process. It generally provide the software-based design framework and smart hardware sensor and a key protocol interface for realization of intelligently built acquisition for the sensors of common type.

IV. CONCLUSION

The generation of devices with actuating capability of communication brings the vision of Internet of Things (WSNs) closer, where the actuation and sensing functions seamlessly combine into the environment along with possible generation of new capabilities through rich access of newly built sources of information. The evolution on the basis of future generation mobile system will basically depend on the user's based creativity in modelling advanced applications. WSN presents a technology i.e. ideal emerging to attract the domain by providing newly built data. This paper helps to improve the routing either with or without the process of optimization. But the analysis done on the basis of optimization process helps to improve more in terms of parameters such as drop, energy etc.

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