Clock Synchronization Technique- A Review

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Abstract— The wireless network uses the communication protocols and it uses the air through the operation of the communication protocols. Wireless networks use a carrier sense protocol for the synchronization and these protocols are similar to the Ethernet standard. In this paper we have reviewed CSMA and RFID protocol. CSMA/CA is Carrier Sense Multiple Access/Collision avoidance protocol for carrier transmission in 802.11 networks. RFID is an enhancement of CSMA protocol. By using RFID protocol, collision and packet loss problem can be controlled.

*Keywords—*RFID, CSMA/CA, Packet loss, Collision

I. INTRODUCTION

A wireless network is the collection of mobile nodes without the requirement of any centralized access point. Now a days, wireless networking is used for the commercial uses and it becomes the newly trend to adapt the wireless networks. There are the many applications for the wireless networks as it applied in the military, planned and other security sensitive operations [3]. Secure routing is an important issue in the routing applications. The wireless network uses the communication protocols and it uses the air through the operation of the communication protocols [2]. Wireless networks use a carrier sense protocol for the synchronization and these protocols are similar to the Ethernet standard. These protocols are used to enable the group of wireless computers to share the same frequency and space. The wireless is a collective media skill as bandwidth is shared by all the users. Wireless Sensor Network is its type.
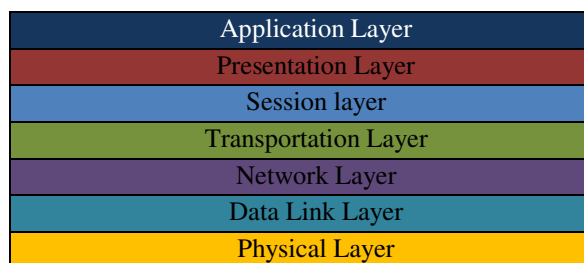
Application Layer
Presentation Layer
Session layer
Transportation Layer
Network Layer
Data Link Layer
Physical Layer

Fig.1.1 OSI Model

1.1 Wireless Sensor Network: The WSN are the self configured wireless networks. These networks are used to monitor the physical and the various environmental conditions such as temperature, pressure, motion, sound etc. The WSN network pass their data through the sink, these sink basically act as the foremost location of the network [4]. In this location sink the data can be observed and analyzed.
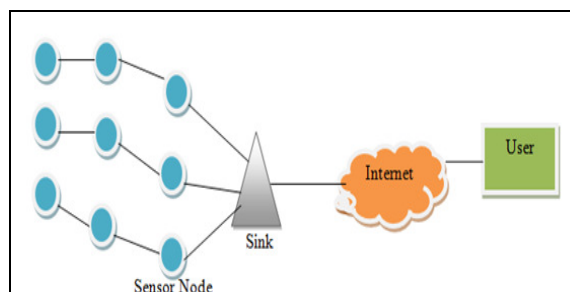
A sink acts as an interface between the user and the network. If they want to retrieve any information from the network, they inject the queries and the sink gives the required information about the given query in the network. In other words, wireless sensor is a computer network which is collected of a more number of sensor nodes. Sensor nodes are those which are able of sensing environment around them. Sensor nodes are devices which are able of gathering, storing, sensing and transmitting information. Sensor nodes can be deployed anyplace without install it. The gathered information can be retrieved. Wireless sensor network is a term which is used to describe an emerging class of embedded communication products that provide fault-tolerant wireless connections between sensors, controllers and actuators. A wireless sensor network consists of a large number of nodes spread over a particular area.

 In the WSN GPS and NTP algorithms are used. GPS stands for the global positioning system whereas NTP stands for the Network Time Protocol [5]. These algorithms are used to obtain location of the particular information. NTP is generally used for synchronization of time between clocks.

1.2 CSMA/CA

CSMA/CA is Carrier Sense Multiple Access/Collision avoidance protocol for carrier transmission

in 802.11 networks. It is slightly different from CSMA/CD i.e. Carrier Sense Multiple Access/Collision Detect which concern with transmissions after a collision has occurred [8], CSMA/CA helps to put off collisions before they happen. In CSMA/CA, as soon as a node accepts a packet that is to be sent, it checks to be sure the channel is clear. If the channel is busy, then the packet is transferred from source and destination. If the channel is not busy, the node chosen period of time after some wait, and again checks to see if the channel is busy or not. This period of time is called the backoff factor, and is counted down by a backoff counter. If the channel is busy when the backoff counter reaches zero, the node transmits the packet. If the channel is not busy when the backoff counter reaches zero, the backoff factor is set again, and the process is repeated [9]. Carrier sense multiple access with collision avoidance (CSMA/CA) in computer networking, is a network multiple access method in which carrier sensing is used, but nodes attempt to avoid collisions by transmitting only when the channel is sensed to be "idle". The basic idea behind *CSMA/CD* is that a station needs to be able to receive while transmitting to detect a collision. When there is no collision, the station receives one signal: its own signal. When there is a collision, the station receives two signals:

its own signal and the signal transmitted by a second station. RFID is its extension.

1.2 Major Issues in Sensor Networks

There are several problems which are faced by the sensor networks. These are as follows:

1. *Energy Consumption:* It is one of the major issues of sensor network. The entire node use battery power as a energy source. During communication it consumes more energy. So it is very difficult to change batteries regularly.

2. *Localization:* In the wireless network the sensor nodes are deployed in adhoc manner so they do not have knowledge about their position. The problem of determining the position of nodes is called localization. This problem can be solved by using GPS and bacon nodes.

3. *Data Gathering:* Data gathering is a commission of collecting data from different sensor by removing redundant data. Sensors node transfer their own packet and also frontward packets produced by others sensors. Therefore to consume more energy and form the energy holes near the sinks. There are number of security threads in data gathering which are condensed by compression technique and aggregation technique.

4. *Scheduling:* It is a major issue of WSN. In this method nodes switch from one mode to another. Scheduling also plays an important role for coverage and connectively. During scheduling from one mode to other, nodes consume energy also.

II. REVIEW OF LITERATURE

In paper Imad S. Alshawi, et al. propose**d [2**] a new routing method for WSNs to extend network lifetime using a combination of a fuzzy approach and an A-star algorithm . These techniques a r e to determine an optimal routing path from the source to the destination by favoring consume less battery power, number of hops minimum, and traffic loads less. To demonstrate the effectiveness of the proposed method in terms of balancing energy consumption and maximization of network lifetime, they compare their approach with the A-star search algorithm and fuzzy approach using the same routing criteria in two different topographical areas. In paper Ossama Younis and Sonia Fahm [3] discussed that in a sensor network topology control balances load on sensor nodes and improve network scalability and lifetime. In sensor network clustering of sensor nodes is an effective topology. In this paper, they proposed a distributed clustering approach for long-lived ad-hoc sensor networks. They obtained a protocol; HEED which choose cluster heads according to a hybrid of the node residual energy and a secondary parameter, such as node proximity to its neighbors or node degree periodically. In paper Ming Zhang and Suoping Wang [3] summarized the design paradigms of the MAC protocol in wireless sensor networks, which were based on ring topology and virtual grid and token ring ideas has an novel energy-efficient MAC protocol based on collision avoidance (EECA-MAC) for wireless sensor networks was proposed. If compare with other algorithms, it was founded that EECA- MAC has two understandable features: Firstly, it tries to enhance energy utility by changing the activity of wireless communication module of sensor nodes, energy model and state transition of sensor nodes. Secondly, EECA-MAC used ring topology based on virtual grid intra cluster and time slot ideas to avoid collision. Simulation results showed that, compared with TDMA and SMAC, EECA-MAC significantly reduce in energy consumption and prolong the network lifetime.

In paper [4] Changsu Suh and Young-Bae Ko a new energy efficient MAC protocol for wireless sensor networks was proposed which was named the TEEM (Traffic aware, Energy Efficient MAC). To reduce energy consumption, TEEM is also based on the concept of 'listen/sleep modes cycle' like SMAC. However, TEEM is more energy efficient because it has much shorter and adaptive listen period by utilizing 'traffic information'. The experimental results confirmed that the scheme works well and saves significant energy compared to S-MAC or 802.11 schemes. Dahlila P. Dahnil [6], et al. presented an comparative study of clustering techniques and cluster quality of a single criterion cluster heads election and cluster formation in Wireless Sensor Networks . The HEED, LEACH and Energy-based LEACH protocols are implemented and their working are compared

in terms of the cluster size, number of cluster head generated cluster head distribution, scalability and coverage. The consequences of these protocols are presented to show how the cluster formation helps to prolong the network lifetime. They find out scalability aspects in the existence of advanced nodes in the network and its effect on the network lifetime. In paper T Shankar [7] explained the selection of cluster head done by using neural network for energy efficiently used by sensor nodes. In cluster based routing, special nodes called cluster heads form a wireless backbone to the sink. The cluster heads gather the data from sensing nodes and promote data to their sink. In homogeneous networks all nodes have same capabilities. In heterogeneous networks cluster nodes have more resources than other nodes. Energy saving in these approaches can be obtained by, cluster-head election, cluster formation and data aggregation at the cluster-head nodes to reduce data redundancy and thus save energy. In the cluster each node became a cluster head for a limited time period in this way they saved energy of each node.

III. RFID PROTOCOL

RFID (Radio Frequency Identification) is a contactless automatic identification skill that is based on radio frequency. There are usually two types of RFID according to the power source: active RFID and passive RFID. Active RFID is less advantageous than passive RFID in terms of its tag cost, size, and battery management, but more advantages in term of sensing nature, its nature, sensing rate ad sensing distance [10]. RFID is developed so that physical information can be stored and sensed for a long time to improve quality of the system in addition of basic functions.

Active RFID/WSN will be performing the availability of tag-to-tag communication. Active RFID is less useful than passive due to its cost, tags size, battery consumption but having low advantage in the form of stability, sensing rate, and sensing distance. Active RFID save the energy of tag operate on the tag ID period and data collection period [1]. The active RFID tag uses the radio module to deliver the stored physical information to the reader. RFID provides the point-to-multipoint (P2MP) Communication structure where the reader controls the tags. To minimize the energy consumption of the tag, the reader reins the energy that the radio module consumes by making the tag works in the active and sleep periods [5]. The reader transmits a collection command to multiple tags which are going to deliver the ID to the reader with contention. Data collection period, the reader collects the data on the tags that are sensed from the tag ID collection period using their IDs with the help of the point-to-point(P2P) method. The active period is divided into two periods first one is the tag identification period and other is data collection period. The id period is called contention period [9]. A reader can

be transmitting a command to multiple tag which also deliver id to reader via contention. In the data collection period, the reader collects the data on the tags that are sensed from the tag ID collection period using their IDs, via the point-to-point (P2P) method. Then the sleep command turns off the radio module of the tag from which the data have been collected. This is called the collection period (CP). The reader repeats this process until all the tags within its communication range are collected.

IV. CONCLUSION

Wireless sensor network is an application based method. It is deployed far-away places. Communication is takes place through sink. Energy consumption is a major problem of wireless sensor network. When we try to resolve the issue of Energy consumption then there come the issue of synchronization due to which packet loss and collision occur. We can conclude that to avoid collision and packet loss clock synchronization should be there. CSMA/CA protocol was used for synchronization and after that RFID is used. RFID is an enhancement of CSMA/CA protocol to reduce collision and packet loss.

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