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Analysis and Comparison of DSDV and NACRP Protocol in Wireless Sensor Network

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***ABSTRACT*—Wireless sensor networks have become a wide research area due to their large number of applications in monitoring inaccessible areas, which are difficult to be monitored by conventional methods.The Sensor Network may have an infrastructure or sometimes infrastructureless.In an Infrastructureless network the sensor nodes are deployed in random manner where the routing protocol plays a vital role. There are numerous routing protocol among them Proactive routing protocol DSDV is used. The Connectivity loss has a great impact in an infrastructureless network; to overcome this problem a novel protocol NACRP (Neighbour Assisted Connectivity Recovery Protocol) is implemented.In this paper we compare the performance of DSDV and NACRP protocol using different parameters as end-to-end Delay, Packet loss, Throughput using Network Simulator (NS2). By analyzing the performance we proposed that NACRP protocol outperforms well as compare to DSDV.**

Keywords: WSN, Routing protocol (DSDV), NACRP, Connectivity.

I. INTRODUCTION

In recent years WSNs have witnessed a relentless research activity to leverage the deployment of Low Costs, easy to maintain and energy efficient solutions to monitor natural phenomena and man-made activities. Important aspect to be considered while deploying the sensor nodes is the amount of spectrum resources that is required for specific communication constraints. In this work, we consider a popular way of organizing wireless sensors, namely star topology networks. In, Sensor network sensor nodes communicate directly with an access point (AP), which is also the sink of the whole network traffic. In Star network temporary obstacle might clutter the LOS connection between sensors deployed over a wide survey area and the central coordination point or Access point .When this occurs, sensors are not in a position to report sensed data even though they function properly. Depending on the particular monitored phenomena, faulty sensors might trigger unnecessary human intervention or safety alarms. The IEEE 802.15.4k is considered and the standard defines the PHY and MAC layers specifications to support Low Energy Critical Infrastructure Monitoring (LECIM) networks. The IEEE 802.15.4k standard supports simultaneous operation of at least 8 co-located orthogonal networks, with a transfer rate up to 40 kbits/s, minimum 1000 endpoints per AP and reliable operations in changing environments. Channel time is organized in super frames, with each divided in several sub-beacon intervals (BIs) plus an inactive period delimited by the transmission of beacon frames transmitted by the AP. Beacons carry out general network information, along with time synchronization for networked devices. The transmission of a beacon is followed by a Contention Access Period (CAP) and a Contention Free Period (CFP). During the CAP, (CSMA-CA) are used to transmit command frames for association and resource reservations inside the CFP. The CFP is TDMA based and are divided into guaranteed time slots (GTSs). In one GTS, only one sensor is allowed to communicate with the AP.

II. RELATED WORKS

From an allocation point of view, though the concept of a GTS allocation in IEEE 802.15.4 is similar to TDMA the approaches differ in several

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aspects. IEEE 802.15.4 presents several advantages when compared to TDMA for deployment in WSNs. One of the important limitations of TDMA is scalability, as we cannot have more number of nodes within a cluster. Whereas IEEE 802.15.4 can have up to 254 nodes in one cluster**.**The paper [3], deals with the trade-off arising from spectrum occupation and packet delivery time in professionally installed wide area WSNs (WA-WSNs) and the author show that only 10%of the nodes in the mesh network actually need additional spectrum and multiple radio transceivers to keep the delay bounded by that of the star topology. The paper [10], deals with the comparison of the performance of DSR and DSDV protocol using different network conditions as pause time, time interval using different parameters as end-to-end Delay, Packet delivery fraction, Throughput etc. using Network Simulator (NS2). By analysing the performance, author proposed that DSDV is less efficient. The Paper [1], author evaluated the stability of the queue size at the network coordinator, the delay to serve a GTS request, and the achieved throughput for different traffic patterns and protocol parameters. Furthermore, analysed the achieved throughput as a function of the amount of data packets to forward for each request, observed that lower beacon order gives lower delay but ensures a worse throughput because of the higher drop probability. By contrast, higher beacon order increases significantly the average delay and degrades the throughput due to wasted bandwidth. [4] discussed about a system, In this proposal, a neural network approach is proposed for energy conservation routing in a wireless sensor network. Our designed neural network system has been successfully applied to our scheme of energy conservation. Neural network is applied to predict Most Significant Node and selecting the Group Head amongst the association of sensor nodes in the network.

III. ROUTING PROTOCOLS

A. PROACTIVE ROUTING:

These protocols are called table driven protocols where, each node has the route to any destination in its routing table. Transfer of packets is performed to the predetermined route specified in the routing table. The packet transmission is done faster, but the routing overhead is higher since all routes must be defined before transfer of the packets. Examples of proactive are Destination Sequenced Distance Vector (DSDV) and Optimized Link State Routing (OLSR).

1. DSDV (Destination Sequence Distance Vector):

The Destination-Sequenced Distance Vector protocol a table-driven routing protocol is based on the Bellman-Ford routing algorithm. DSDV uses Routing Information Protocol (RIP). With RIP, a node contains a routing table which as all the possible destinations within the network and the number of hops to each destination. DSDV is also based on distance vector routing and thus uses bidirectional links. Each entry in the routing table is labelled with a sequence number. DSDV is one of the early algorithms available and the main advantage of this protocol is that it is more appropriate for ad hoc networks with a small number of nodes. The Main disadvantage of DSDV is hard to maintain routing table for each advertisement in case of large network and it doesn't support Multipath Routing.

B.REACTIVE ROUTING:

In Reactive type of protocol a nodes initialize a route discovery mechanism to find the route towards the destination node, when the source node has data packets to send. The main advantage of these protocols is that overhead messaging is reduced. One of the limitations of these protocols is the delay in discovering a new route. Examples are DSR (dynamic source routing) and AODV (ad-hoc on demand distance vector).

C. HYBRID ROUTING:

It has combine features from both reactive and proactive routing protocols, typically attempting to exploit the reduced control traffic overhead from proactive systems reducing the route discovery delays of reactive systems by maintaining some form of routing table.

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IV. PROPOSED SYSTEM

A.NACRP PROTOCOL:

In the proposed model we consider a sensor network where the AP is the network traffic sink, sensors are deployed over a large survey area. The AP receives sensing data from the connected sensors. The position of the nodes is assumed through a Known localization system (e.g. GPS service when available). The AP, upon missing sensing reports from one or more sensors for a period of time not less than a *Time-of-Failed-Report* (ToFR), shall commence the NACRP. Hence, the AP shall assign some of the sensors located in proximity of the region to start transmitting local beacons in order to create sub-networks.

The AP shall inform the selected sensors using a new Information Element embedded in its beacon referred to as Sub-Net Information Element (SN-IE). The SN-IE contains the identification of the selected sensor(s) and the time offset (with respect to the beginning of the super frame) required to schedule the transmission of *sub-beacon* (s-beacon) frames to avoid collisions between multiple s-beacon transmissions. An s-beacon provides synchronization locally and contains the ID of the parent AP, the ID of the transmitter and a bit field denoting whether the device is an AP or not (to facilitate the joining procedure of newcomer and legacy devices). For a sensor coordinating a sub-network such a bit shall be set to zero.

In sensor networks transmitting sporadic data (in the order of minutes or even hours), it is reasonable to assume long periods of inactivity. Thus, each sub-network should take place during the inactive period within the super frame of the AP. When sensors located inside the region start receiving s-beacons, they have to select the sub-networks they receive with the strongest power, carry out association and reserve resources during the CFP using CSMA-CA within the CAP period. After collecting data from the associated cluttered sensors, each beaconing sensor will do the relay to the AP using the reserved GTS.

V. SIMULATION RESULTS AND OBSERVATIONS

In this paper the simulation results were obtained using Network Simulator 2 version 2.35 (NS2) to perform comparison between DSDV and NACRP.

Table 1.Simulation Parameters:

Design Parameters	Specification/Value
Software for simulation	Network simulator 2.
Channel	Wireless
Simulation runs time	100 seconds
Area in which nodes move	930X600
Packet size	1024bytes
Speed	1m/s to 10 m/s
Routing Protocol	NACRP
Propagation model	TwoRayGround
Network Interface Type	Wireless Physical
Queue Type	Drop Tail
IFQ-Length	50 Packets
MAC Type	Mac/802.11
Antenna Type	Omni Antenna

A. Experimental Setup:

In the Proposed work we considered about nearly 50 nodes and the nodes are deployed randomly in the area (1726x600).

1. Packet Loss:

Packet loss is the time taken for the packets to travel across the network from one node or endpoint to another.

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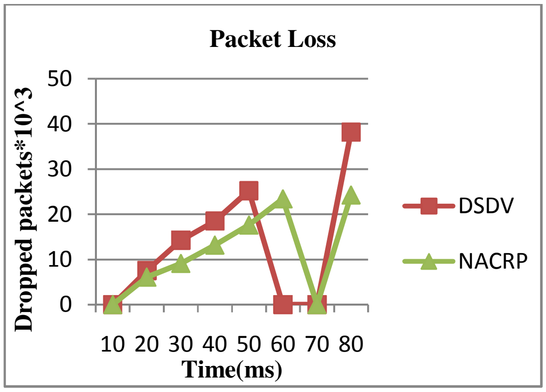

Figure 1 illustrates that packet loss is low in the NACRP protocol when compared to the DSDV protocol.

2. Delay:

Delay refers to the time taken for a packet to be transmitted across a network from source to destination.

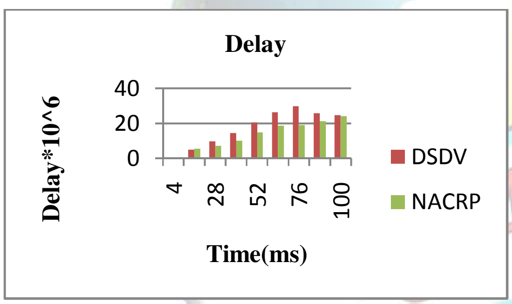

Figure2.illustrates that two Protocols are considered DSDV and NACRP, the delay represents the time taken by the packet to reach the corresponding destination, and the delay is maximum when compared to the proposed protocol NACRP.

3. Packet Delivery Ratio:

Packet delivery Ratio the loss in packet from the time when an event occurs, to the time when the first packet due to this event is received at the sink.

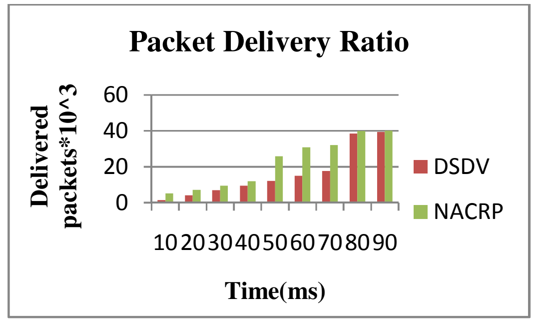

Figure3.illustrates the successful delivery of packets and the ratio is high in NACRP the proposed protocol when compared to the existing Protocol DSDV.

VI. CONCLUSIONS

In this work, we have presented the NACRP, a novel protocol to recover from connectivity loss when the direct link between two or more sensors and the AP is cluttered by the sudden appearance of temporary obstructions. Comparison between DSDV routing protocol and proposed NACRP protocol is performed. Analysis is done based on the results obtained from above mentioned protocols which states that network performance is better when compared to DSDV protocol.

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