SPARSE DATA TRANSMISSION USING AOMDV PROTOCOL WITH WIRELESS SENSOR NETWORK

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Abstract: Our paper proposes the efficient data transmission using AOMDV protocol. The wireless sensor network based data transmission can effectively transmit data to different nodes. In order to reduce data loss and to provide fast data transmission. This system focus CS (Compressive Sensing) techniques and AOMDV (Adhoc On-demand Multipath Distance Vector) routing protocol. However the previous works uses the AODV protocol. The AODV is a single path protocol and AOMDV is a multiple path protocol .In that two levels of data transmission i.e., inter-cluster communication and intra-cluster communication. The inter-cluster communication means between the clusters we have to transmit data from source to any other nodes in any cluster by using CS technique. The intra-cluster communication means within the cluster to transmit the data from source to any nodes without using CS technique. The extensive simulations confirm that our methods reduce the number of data transmissions.

Index Terms- Wireless Sensor Network, CS technique, AOMDV protocol, Cluster.

1. INTRODUCTION:

In Wireless Sensor Network the sensor nodes can transmit the data from one node to another node in the network. Thus in order to transmit the data effectively by using some methods and routing protocols to reduce the data transmissions and data loss. The data to be transmitted through multi-hop routing from source node to sink node (destination) in the wireless networks.
In the existing system AODV protocol was used. Adhoc On-demand Distance Vector routing protocol is a routing protocol. All the routes are to be discovered only it is to be needed; routes are discovered through the route discovery cycle. When a node has a route to the destination node, that route is reported to the source node for further operations.

In the proposed system AOMDV protocol and CS technique are used. It is mainly used for multi-hop routing, reduces the number of data transmission and data loss. AOMDV is an extension to the AODV protocol for multi loop- free and link disjoint paths. A CS technique is to minimize number of samples captured rather than on minimize the cost of each measurement.

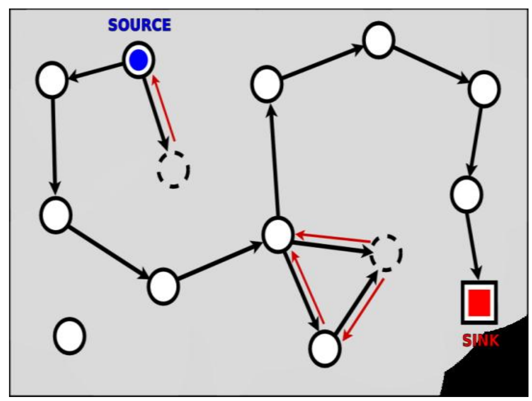

Figure1: Data transmission from source to sink node.

2. AOMDV PROTOCOL

AOMDV protocol is an extension of AODV protocol for measure loop-free and link disjoint. In that it first discovers the route, then request the route and finally transmits the data from source to that particular node in the network. It has some constraints, they are

- Multiple extension to a well-studied single path routing protocol known as AODV
- It also reduces packet loss up to 40%
- Also reduces overhead by 30%
- It also improves signal strength.
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2.1 Route Discover and Route Request

When a source node has send data packets to the destination node. At first it checks the routing table whether it has already a path from source to destination node. If it has a path the source node uses that path. Otherwise it performs the route discover to find out the new routing path. To initiate route discover the source node creates the RREQ (Route Request) packet. In that RREQ packet it has IP address of destination node, its own IP address, and hop count that is initialized to be zero. The source node then sends RREQ to its neighboring node.

The neighbor's node or any nodes in the network can receive the RREQ packet. At first it increments the hop count and it's create the multiple reverse route entry for both the source and the node from which it can receive the RREQ packet. Multiple RREP's travel along these paths to form multiple forward paths at the destination to the source and other intermediate nodes. By using this paths source node can determine its response to the request. The node can send a reply

- Is the destination or,
- Current route to the destination.

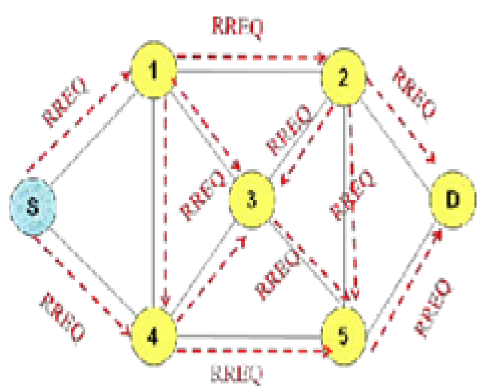


Figure 2: Route Request (RREQ)

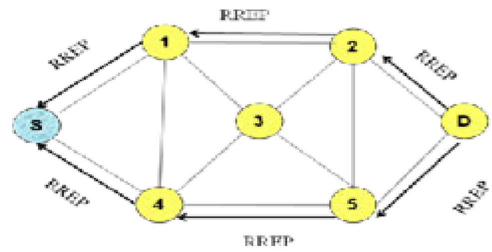


Figure 3: Route Reply (RREP)

2.2 Loop-Free and Link Joint:

The AOMDV protocol loop freedom has it keep route only for the highest sequence number. It has route advertisement rule and route acceptance rule. In route advertisement rule keep multiple routes but always advertise only one of them to others. Hop count of that path is "advertised hop count". Longest path at the time of first advertisement. Maximize the chances of forming multiple paths.

In route acceptance rule, it accepts a route from a neighbor only if it has a smaller or equivalent hop count. Break ties using node ids.

Dstn IP	Seq. #	Hop Count	Next Hop	Lifetime	Energy

Figure 4: AOMDV Routing table entries.

3. COMPRESSIVE TECHNIQUES (CS)

Compressive sensing (also known as compressed sensing, compressive sampling, or sparse sampling) is a signal processing technique for efficiently acquiring and reconstructing a signal, by finding solutions to underdetermined linear systems. CS techniques are used to improve the throughput, lifetime, delay of the wireless sensor network. Normally in WSN the goal is to obtain more amount of information with little amount of energy. Compressed Sensing or Compressive Sensing (CS) is about acquiring and recovering a sparse signal in the most efficient way possible with the help of an incoherent projecting basis.

- The signal needs to be sparse
- The technique acquires as few samples as possible
- Later, the original sparse signal can be recovered
- This done with the help of an incoherent projecting basis.

The compression ratio is to be defined as Compression ratio = (1- Compressed data) Original data

3.1 Cluster Communication

In this CS techniques there are two levels of communication i.e., inter -cluster communication and intra-cluster communication. In inter-cluster communication between the cluster we have to transmit the data's or packets of information .CS techniques is not used in inter-cluster communication. But in intra-cluster communication we have to transmit the data's or packet of information within the cluster. In this type we don't use CS techniques.

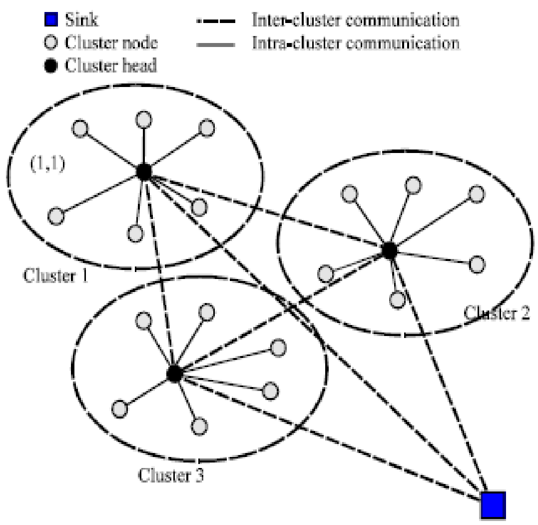


Figure 5: Cluster communications

4. SIMULATION RESULTS AND ANALYSIS

In this section we will use NS-2. NS-2 is a discrete event simulator (timing of events is maintained in a scheduler).It was normally used in wired & wireless protocol. It can be written in C++ and OTcl.

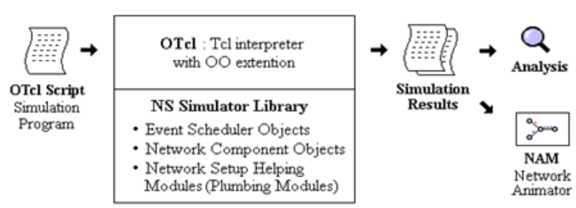


Figure 6: NS-2 Operations

We will show the output in two ways. In the analysis section we will analyze our data transmission through the graph as shown in figure below. In analysis it has

- Trace file

Stores the information of network events (ex., packet sent, received, dropped at the time, node moved from which place to which place…)

- X graph

In this window, we can show the result like as packet delivery radio, packet loss, and delay as graph

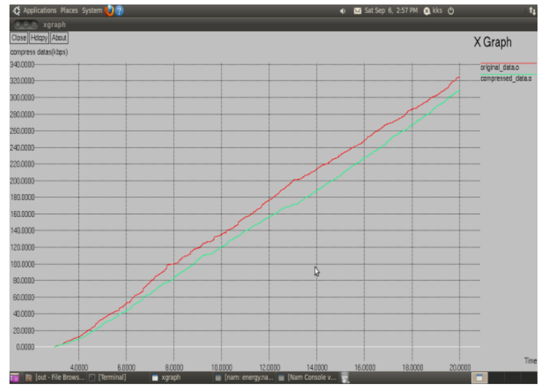
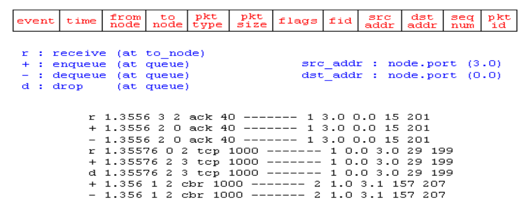


Figure 7: X Graph



event	time	from node	to node	pkt type	pkt size	flags	fid	src addr	dst addr	seq num	pkt id

```
r : receive (at to_node)
+ : enqueue (at queue)          src_addr : node.port (3.0)
- : dequeue (at queue)          dst_addr : node.port (0.0)
d : drop    (at queue)

r 1.3556 3 2 ack 40 ------- 1 3.0 0.0 15 201
+ 1.3556 2 0 ack 40 ------- 1 3.0 0.0 15 201
- 1.3556 2 0 ack 40 ------- 1 3.0 0.0 15 201
r 1.35576 0 2 tcp 1000 ------- 1 0.0 3.0 29 199
+ 1.35576 2 3 tcp 1000 ------- 1 0.0 3.0 29 199
d 1.35576 2 3 tcp 1000 ------- 1 0.0 3.0 29 199
+ 1.356 1 2 cbr 1000 ------- 2 1.0 3.1 157 207
- 1.356 1 2 cbr 1000 ------- 2 1.0 3.1 157 207
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Figure 8: Trace File

In Nam (Network animator) window. In this window, we can show the animation of packet transfer, packet drops, and mobility.

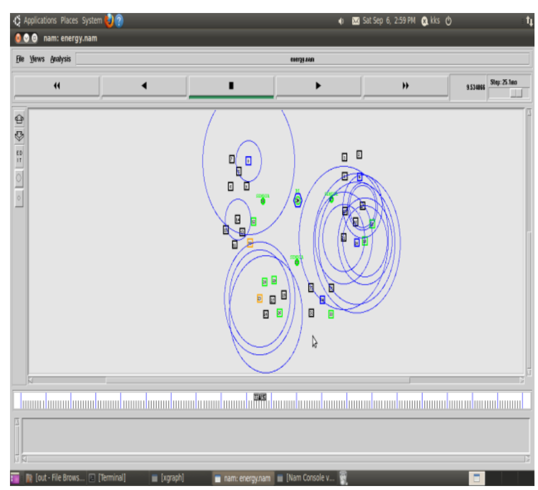

Figure 9: NAM Windows

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