A MULTI-PARAMETRIC NETWORK CONFIGURATION AND RECONSTRUCTION APPROACH IN CLUSTERED MOBILE NETWORK

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Abstract— **A Mobile Network is one of dynamic network in which nodes are having frequent mobility, because of which positional changes occurred over the network. To achieve the network effectiveness, the configuration of network is required. Another associated in this dynamic network is inclusion of new node to network at any instance of time. When the size of network increases, the number of nodes in network and its dynamic behavior becomes more critical. In this paper, we define an intelligent auto-configuration in mobile network so that network efficiency and reliability will be improved. In this work, the complete network will be defined in small segments called controlled by Cluster Head (CH), which will be defined under multiple parameters including Connectivity vector, Stability vector, and Trust vector. This work also handle the situation of network reconfiguration if some overload or under load situation occurs in particular Cluster. The entire work will be implemented in Mat lab environment.**

Index Terms— **MANET, auto Configuration.**

I. INTRODUCTION

A Mobile ad-hoc network (MANET) is a group of wireless mobile computers (or nodes), in which nodes collaborate by forwarding the packets with each other to allow them to communicate with outside range of direct wireless transmission. Mobile ad hoc networks require no centralized administration or fixed network infrastructure such as base stations or an access points, can be set up quickly and inexpensively as needed. A MANET is an autonomous group of Mobile users that communicate over reasonably slow wireless links. The network topology may vary over time very rapidly, because nodes are mobile. The network is said to be decentralized, where all network activities including the topology discovery and delivering the messages which are executed by nodes themselves. Thus, routing functionality will have to be incorporated in mobile nodes.

MANET is a kind of wireless ad-hoc network and self-configuring of mobile routers and their associated hosts that are connected through wireless links. All the participating nodes act as a router, and are free to move randomly. The network wireless topology may change unpredictably and rapidly. Such a network operates in standalone fashion, or it can be connected with larger Internet problems occurring in Ad Hoc networks.

Manuscript received June, 2014.
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SYSTEM ARCHITECTURE OF MANET

In this architecture, one or more predefined nodes act as a *Group Controller* (GC) (which has an authority to assign resources to the nodes in MANET), which is trusted by all group nodes. This allocation of resources is represented as a Key Note style capability called *Policy Token*. These are signed cryptographically by GC, which can be verified by any node in MANET. When an (initiator) node requests a service from responder node using the policy token assigned to initiator, the responder node provides a capability back to an initiator. This is known as *Network Capability*.

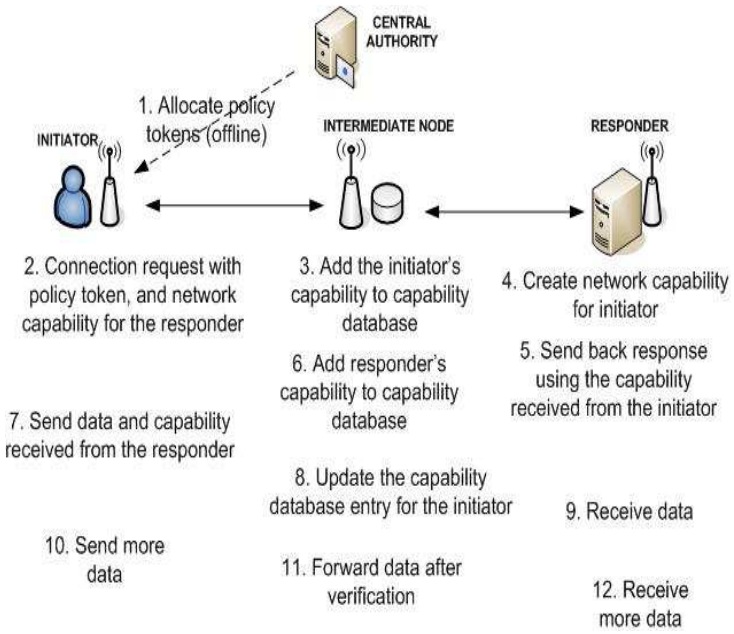

Fig1. MANET System Architecture

In this fig 1.all the nodes in path between an initiator node to a responder node enforces and abide by the resource allocation encoded by GC in *Policy Token* and the responder in *Network Capability.* A responder node accepts the packets from an initiator node only if the initiator node has an authorization to send, in form of valid *Network Capability*.

It accepts the first packet only if an initiator *Policy Token* is included then an intermediate node will forward the packets from a node only if the packets have an associated Policy Token or Network Capability. All the available resources are

allocated by intermediate nodes in particular manner.
The capability need not be contained in all the packets. The first Packet carries the capability, along with Transaction Identifier (TXI) and a public key. Subsequent packets contain only TXI and packet signature based on public key. An intermediate node cache policy tokens and the network capabilities in *Capability Database*, treating them as a soft state. A *Capability Database* entry contains the Source and Destination addresses.

The Characteristics of these networks are as follows:

- Communication via means of wireless.
- The role of Hosts and Routers Performed by nodes.
- The Bandwidth-Constraints and Variable Capacity Links.
- Limited physical security.
- Dynamic Network Topology.

Properties of MANET routing protocols:

The properties in MANET routing protocols are described as follows:

1). Distributed operation: The protocol must be distributed. It should be independent of centralized node. The dissimilarity is that nodes in Ad Hoc network can enter or leave the network very easily due to which the network can be partitioned.

2). Loop free: To improve an overall performance, the routing protocol should assure that routes supplied are Loop free. This avoids the misuse of bandwidth or CPU Consumption.

3). Demand based operation: To minimize the control overhead in the network and do not misuse the network resources. The protocol should react only when it is needed.

4). Unidirectional link support: The radio environment causes the formation of unidirectional links. Utilization of these links improves the routing protocol performance.

5). Security: The radio environment is vulnerable to impersonation attacks in order to ensure the behavior of routing protocol we need Security measures. Authentication and Encryption are the ways to go.

6). Multiple routes: To reduce the various topological changes and Congestion Multiple routes can be used.

Problems in routing with MANET:

1). Asymmetric links: Most of wired networks rely on symmetric links which are fixed always. But in Ad Hoc networks the nodes are mobile and changing their position constantly within the network.

2). Routing Overhead: In MANET, nodes changes their position in network then some stale routes are generated in routing table which leads to Routing Overhead.

3). Interference: This is the major problem with MANET as links come and go which depends on transmission characteristics.

4). Dynamic Topology: Since the topology is not constant, so mobile nodes may change. In Ad Hoc networks, Routing tables must reflect these changes in Topology and Routing algorithms have to be adapted.

II. EXISTING WORK

In the existing work, the network is defined in form of clusters in which there are some cluster heads defined that are responsible for the configuration in mobile network [1]. The network is partitioned through address allocation schemes identifying the differences between weak merging and strong merging support.

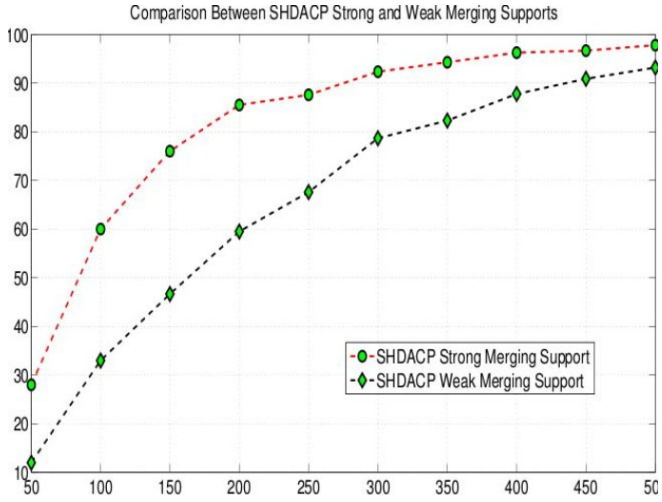

Fig 2.Comparing merging scenarios detection

In this work, as the name suggested no hierarchical network defined if any of node is dead during communication then whole network get disturbed due to which whole the network get disturbed.
In this work, no actual work is defined for the inclusion of new node in Network.
In this work, no trust vector is defined and no monitoring is defined by CH for the overload and under load conditions.

III. PROPOSED WORK

ISSN: 2278 – 1323

In this proposed work, an improvement over mobile network is defined with the concept of auto-configuration. In this work, a multi-parametric approach is suggested to configure the network. The work is defined as follows:

A. Cluster Based Network Formation

At the initial stage, when the sensor network will be composed. The analysis of network will be under the clustering mechanism. The network will be divided in small partitions called clusters and each cluster will be identified as cluster member. The cluster membership of a node will depend on three main parameters as:

- Connectivity vector
- Trust vector
- Stability vector.

The Trust vector depends on communication analysis and cluster membership analysis. A node that stays for maximum time with particular Cluster will be considered as Cluster Head (CH).

B. Handle the Overload and under load conditions

Once clustering is performed, the next work is to monitor these clustering to identify the overload and under load conditions. In case of overload condition, the cluster partitions will be done while in case of under load conditions cluster merging will be performed. The re-clustering and network configuration will be performed with such situations. The re-clustering will perform equalize distribution of nodes over the network as well as provide the stability over the network.

C. New Node Insertion

In the third stage, the inclusion of new node to the network will be performed using sequential level based analysis (algorithmically).

IV. IMPLEMENTATION

At the first stage, the cluster based network is formed as in figure 3.

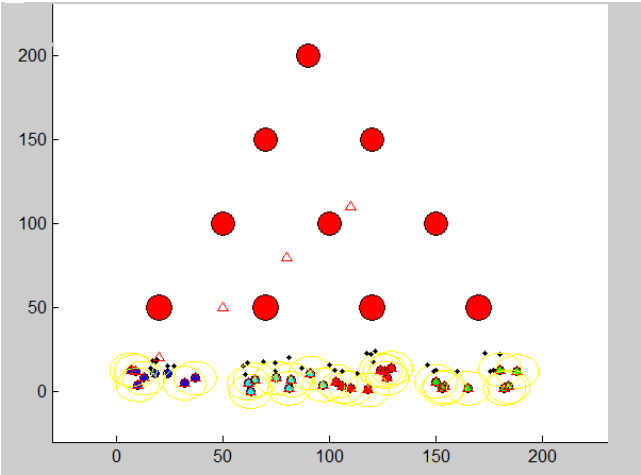

Fig3. Cluster based network formation

The hierarchical network is formed under cluster mechanism that is used to describe the communication among all the nodes responsible for improvement of reliability and efficiency of network. The network is having base station. The nodes red in color are the clusters and all other are communicating nodes responsible for communication over the network. The number of nodes found dead during communication are shown in figure 4.

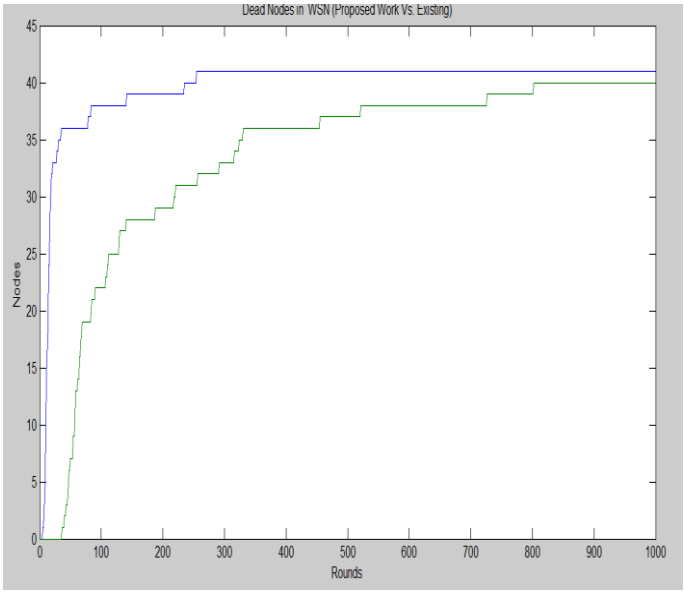

Fig4.dead nodes in WSN (Proposed work vs. Existing)

figure4. Shows the analysis of dead nodes in both existing work and proposed work, which means higher energy is lost in existing work regarding proposed work that makes it more efficient.

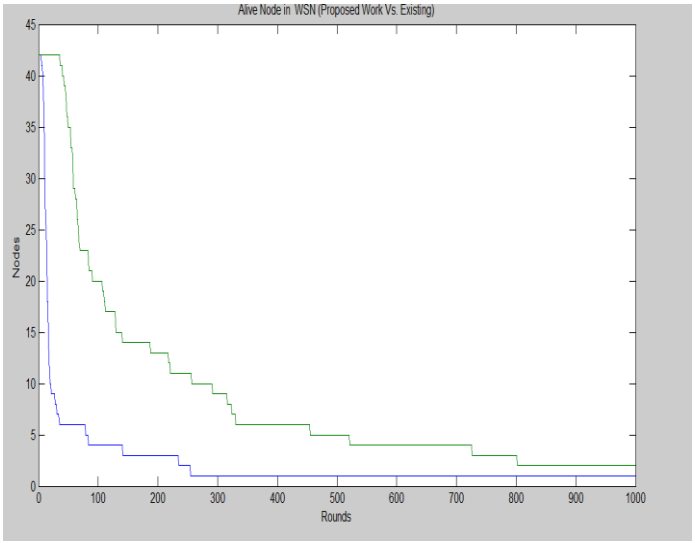

Fig5.Alive node in WSN (Proposed work vs. Existing)

Figure5. Shows that an alive node analysis in WSN in both proposed and existing work. It shows that network life remains up to 250 rounds in existing work whereas network life remains up to 800 rounds in proposed work.

Figure6.Shows the analysis of work in terms of the number of packets communicated to base station (i.e. overall transmission over the network).

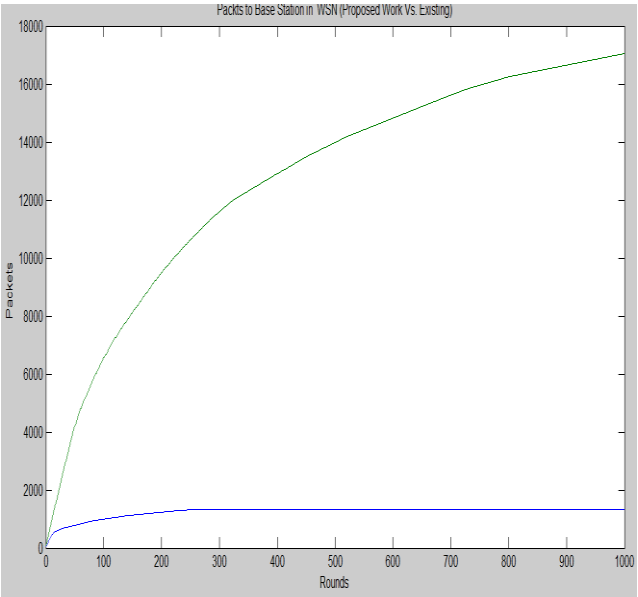

Fig6. Packets to base station (proposed work vs. existing)

V. CONCLUSION AND FUTURE WORK

In this work we proposed a multiparametric network configuration in which a network is partitioned into clusters and cluster head election is performed based on trust vector so that network reliability can be improved. The network also handles the overload and under load situations occurred over the network .In this work, a network can handle the inclusion of a node in level based approach in order to make network more effectiveness. Further in this work, we can improve network efficiency and reliability by performing the experiments with existing auto configuration protocols which includes the size adjustment of transmitted packet.

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ISSN: 2278 – 1323