QoS analysis of WSN Communication Through accountability of Dead and alive node

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***Abstract*: A sensor network is the small scale network generally distributed in limited geographical area based on the application requirement. Normally because of the smaller capabilities of sensors, this kind of network is composed under dense network architecture. These sensor nodes execute multi-hop communications and supply information to the controller end. The optimization is required in this network under different aspects in terms of localization of nodes or in architectural form of network. There are different kind of network architectures are available to provide the effective network localization. In the simplest form, the architecture is unstructured and having a dense and random placement of nodes. This kind of network architecture is comparatively costly and not energy effective. In the second form of network architecture, the nodes are placed in a defined pre planned form. In this structured architecture, the nodes are placed under the prejudgment of network requirements as well as communication requirement. This network architecture is considered as an intelligent network and improves the network life and throughput.**

1. Introduction

This localization aspect also includes the dynamic change while generating the network or after the network construction. These aspects include the clustering concept, area coverage, load balancing etc. Clustering is about to divide the network in smaller sub networks in which each sub network is controlled by a centralized controller called cluster head. This cluster head is responsible to manage the communication over the cluster. This clustering is here based on the various concepts including the load balancing. It means, a cluster should have effective number of nodes so that the load of the particular cluster head will not be increased. Another concept associated here is area coverage. Area coverage is considered as the node placement in such way, the maximum area will be covered over the network. It will provide the equalize distribution of nodes over the network will provide the improvement to the network. This kind of architecture is also able to identify the density estimation over the network will provide the reduction in communication failure. It will provide the improvement in terms of network life and network throughput [1] [2].

The Characteristics of Wireless Sensor Networks

A sensor network is having the larger number of components in smaller geographical area. The network is defined under various constraints and limitations. These all constraints include the application as well as environment aspects identification and reducing the real time criticality of the network. Networks are important in many of the critical areas of real-time applications where networks are directly connected to open environments. This architecture specification comes under the functionality and component level specification so that the improvement to the network formation and extraction will be obtained. The type of sensors used in these network are given here under [1]

2. Classification of Sensors

A sensor can be classified in two main categories based on the sensor features defined in terms of technological aspects. Based on this type, the cost, application and the capabilities are represented for different network. These two types of sensors are:

Active Sensors: These kind of sensors are attached in real time environment to extract the environmental constraints such as laser scanner, infrared sensors etc.
Passive, Directional Sensors: This kind of sensor monitors the environmental aspects but not distributed in the environment itself such as humidity sensor, light sensor etc.

Sensor Node Components

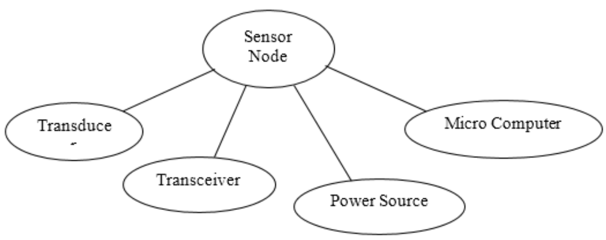

Figure 1: Sensor Node components

Transducer: This component is defined to read the electrical signal and obtained the physical effect analysis for the sensing device.
Micro-computer: It is the processing device that performs the actual analysis over the obtained signal and derives some application result.
Transceiver: This sensor component actually connects the informational aspects to the computer system.
Power-source: It provides the energy or the power to the network or the sensor itself.
A sensor network is having various associated complexities because of the computational requirements and involvement of the environmental aspect. The network is considered with lot of assumptions and constraints. Most of the sensor networks are defined with fix node position and characteristics exploration. This kind of characteristics exploration includes the difference analysis over the network under protocol specification.

3. Limitations

Sensor networks depend on the type of application you need to develop and different requirements are imposed on each application. For example, if you are developing an application at ground level, you need GPS to track your node location, but if your application is underwater, it is quite different because there is no GPS for applications underwater. Node positions are variously calculated.

Small node size

Sensor networks depend on the type of application you need to develop and different requirements are imposed on each application. For example, if you are developing an application at ground level, you need GPS to track your node location, but if your application is underwater, it is quite different because there is no GPS for applications underwater. Node positions are variously calculated.

Low node cost

A large number of sensors must be placed very close to each other which cannot be used again and again. Hence the higher the number of sensors, the greater the cost. Therefore, in order to reduce the cost of the entire network, the cost of individual sensors must be cut.

Low power consumption

Energy is the major problem with the sensor networks. Electricity is limited, and cannot be replaced easily. Therefore, to improve the lifespan and overall longevity of the network, it is important to reduce the amount of power utilized during communication between sensor nodes.

Scalability

The protocols created for sensor networks must be scalable to allow them to work with any sensor network whatever their size. The network size varies from application to application, and the number of nodes can vary between tens and thousands.

Reliability

We need a protocol that handles the error and, if necessary, corrects it over the wireless channel for reliable data transfer, consistent in noise, time-varying and prone to error.

Self-configurability

Sensor nodes need to be organized to form a communication and connectivity restore sensor network when there is a change in the topology of the network or if one of the nodes fails. It's a must. The network should not halt working in both cases.

Adaptability

The size of the sensor networks is continuing to change. You can add new nodes to the network and one of the nodes may fail and be removed. Hence the network's structure and size is not static. The protocol designed must be capable of adapting to those changes.

Channel utilization

Because of the limited bandwidth it is resource intensive in the case of sensor networks. This is the protocol's responsibility to make efficient use of the channel.

Fault tolerance

Since the sensor is inactive for a period of time, the sensor status can be similar to the readings collected by the sensor. Also they suffer from failures. A node must therefore have the ability to survive a failure, run its own tests, repair the node itself and recover after a failure.

Security

Malicious users can attack sensor networks, who can access the network and perform malicious tasks. Therefore, you must find a way to safeguard your network data and avoid harm to unauthorized users.

4. Comparative Analysis

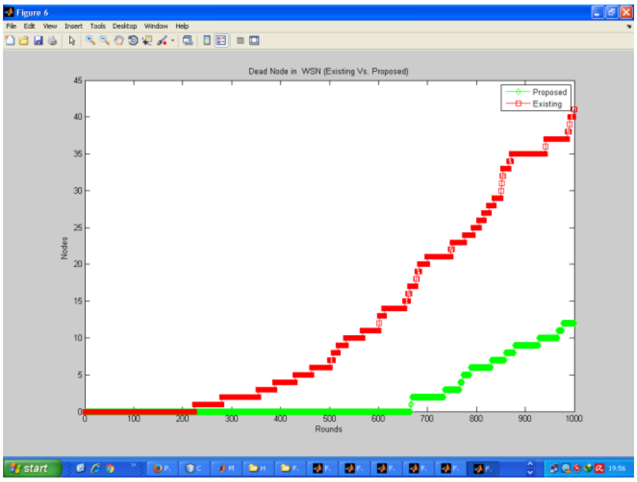

Figure 2: Dead Node Analysis (Comparative)

Here, a comparative analysis of existing and proposed work on dead nodes is shown in Figure 2. Here figure shows that the numbers of dead nodes in existing work are 48 whereas in this proposed work only 9 nodes are dead.

Figure 3: Alive Node Analysis (Comparative)

Here a comparative analysis of existing and proposed work for a work node is shown in Figure 3. Here the x-axis is the number of communication rounds and the y-axis represents the live nodes. Here figure shows that the numbers of alive nodes in existing work are 52 whereas in this proposed work only 91 nodes are alive.

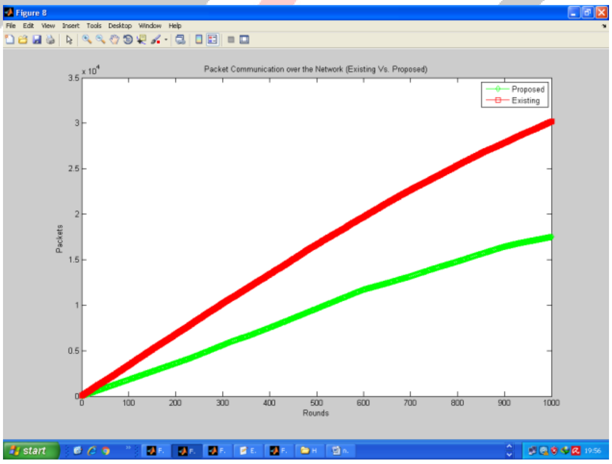

Figure 4: Network Communication Analysis (Comparative)

Here, a comparative analysis of existing and proposed packet communication work is shown in figure 4. Here the x-axis represents the number of communication rounds and the y-axis represents the communication between the packets. This figure shows that, in this proposed work, packet communication is improved.

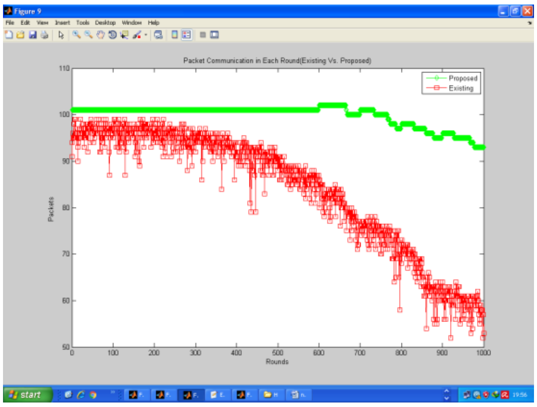

Figure 5 : Round Based Network Communication Analysis (Comparative)

Here a comparative analysis of existing work and proposed work on packet communication is shown in Figure 5. Here the x-axis represents the number of communication rounds and the y-axis represents the communication between the packets. This figure shows that, in this proposed work, packet communication is improved.

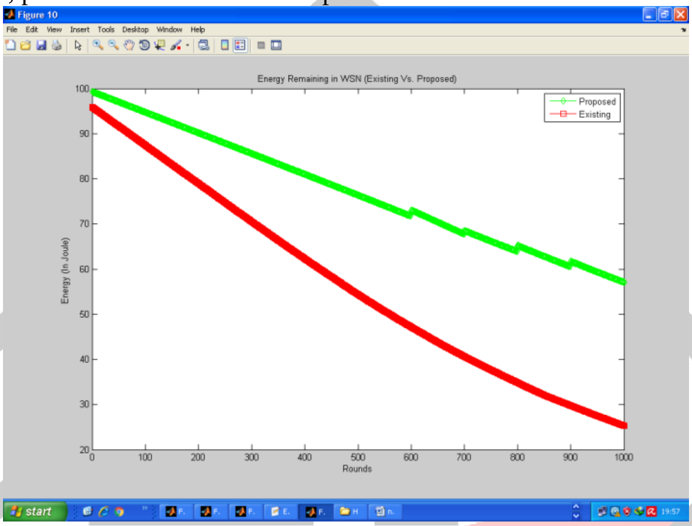

Figure 6: Network Energy (Comparative)

This Figure 6 shows a comparative analysis of the grid power of existing work and proposed work.

5. Conclusion and Future Scope

A sensor network is defined in real time network with critical features. The network suffers from various network level and node level restrictions. Clustering provides the architectural improvement to the network to improve the network communication. In this work, two phase architecture is provided to improve the communication in sensor network. The network is split into smaller segments in the first phase, called clusters. Here group formation is done using the grouping techniques of multiple parameter-based K-Means. The parameters included here are node specific and neighbor specific. The node specific parameters included node energy, probability vector and coverage range. The neighbor specific parameters are density and degree of node. Once the clusters are generated, the spanning tree adaptive communication is formed. In second phase, the genetic approach is applied to generate the optimize path between clusters to deliver the data packets to base station. The proposed work is implemented in matlab environment. The simulation comparative results shows that the method improved the life and packet communication over the network.

6. Future Scope

A two-phase model is defined in this current work to improve the architecture for the clustering of sensor networks. The work can be extended in future under following aspects.

- In this work, the generic parameter based clustering method is provided using clustering approach. In future more critical environment can be considered with fault existence.
- The plain data communication is performed in this work. In future, the work can be applied on encoded communication.

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