



IJMRD 2015; 2(3): 921-924
www.allsubjectjournal.com
Received: 26-01-2015
Accepted: 28-02-2015
E-ISSN: 2349-4182
P-ISSN: 2349-5979
Impact Factor: 3.762

Parveen

M. Tech (Department of
Computer Science &
Application) CDLU, Sirsa,
Haryana, India

A zone adaptive bi-directional bfs model for route optimization

Parveen

Abstract

To provide the effective network communication in sensor network, the route optimization is one of the adaptive approach. In this work, a zone adaptive bi-directional BFS approach is defined to generate the optimized path. The route optimization at first level is provided for individual zones and later on the route of these zones is connected to form the aggregative route. The work is applied on a random scenario. The results shows that the method has improved the network communication and network life

Keywords: WSN, Routing, BFS, Bi-Direction, Zone based

1. Introduction

A sensor network is the adaptively deployed entwor defined with specification of environment constraints and applied in real time network. The restricted resources and constraints increases the criticality of the network. To optimize the network, there is the requirement to improve the architecture and the communication behaviour of the network. Different factors that affects the network life and the performance are listed hereunder.

A) Topology

The topology is the architectural specification of the network that depends on the application and the activity performed in the network. It actually defines the deployment and placement of nodes and the controllers in specific pattern so that the network utilization will be done. In the lower form, the topology is defined in standard form such as ring topology, star topology etc. In the higher form, network scenarios are defined. These scenario includes class room scenario, war-zone scenario etc. The distribution of the resources is also defined by the network.

B) Application

The requirement and communication characterization can be adjusted based on the application. According to the application and the process, the roles of sensor nodes are defined. The heterogeneous or the homogenous node type, architecture type can be defined for the network. The node criticality, energy left, fault prone features can be defined based on the application specification. The network problems, distortion and attack probability is also defined according to the application specification. The security requirement, optimization requirement can be defined based on the application type. Some constraints at different level can be upgraded or updated based on the application environment.

C) Routing

After setting up the architecture and the protocol, the final requirement is to perform the communication over the network. According to the application and the process requirements, the communication can be single-cast or multi-cast. To ensure the effective data delivery, there is the requirement of an effective routing approach. The routing must be controlled by some environment specific, domain specific and communication specific constraints. The routing is about to generate the cooperative multichip adaptive path under distance and energy optimization. In more critical network, fault and some other constraints are considered for route optimization. In clustered network, the intra-cluster and inter-cluster routing are the major requirements to optimize the network communication.

Correspondence

Parveen

M. Tech (Department of
Computer Science &
Application) CDLU, Sirsa,
Haryana, India

To optimize the network communication, the stage specific solution is required. In sensor network, the main objective is to achieve the energy adaptive and fault prone communication. Different methods and the improvement at various stages are given here under.

D) Deployment

The first level improvement to the network can be achieved by deploying the network adaptively. The arrangement of the nodes and controller is done so that the maximum network coverage and resource utilization will be achieved. The deployment is about to provide the equalized distribution of resources so that the starvation, bottle neck and congestion situations will not occur. The deployment must be considered in such way, the node degree must be higher so that the alternative node selection will be done on requirement. Deployment must be adaptive to the application, environment, architecture and the routing. The network density, infrastructure devices and the service distribution is provided for effective network deployment.

E) Topology Control

The topology control is the architectural constraint defined to provide the effective communication and resource management. The energy consumption over the network can be controlled by controlling the topology. The topology adjustment is required to achieve the communication at node level and network level. The transmission control, communication control can be achieved via topology control.

F) Mobile Sink/Relay Nodes

To provide the long distance communication, some relay nodes can be defined over the network. These nodes are distributed over the region with optimization criteria. These specialized infrastructure devices can be defined in weak zones so that optimization at the region level will be obtained. The mobile sink can be defined to provide many to one communication support. The receiver can change the position to achieve the effective data receiving in different regions.

G) Data Aggregation

In case of multicast or the broadcast communication, the network traffic increases which results the communication loss. Data Aggregation is one such method that can be defined to generate the collective single path. It generates the path by considering all the transmission nodes as the intermediate node. The communication is started at distance node and cover each of the transmission node as the intermediate node. It collects the data and generates a aggregative packet by applying some aggregative operator. The compression and the adaptive data gathering at node level is applied to generate the aggregative data packet.

H) Energy-Balanced Routing

The network communication optimized by improving the routing algorithm. The adaptive route selection is based on multiple possible parameters including the energy, fault and distance optimization. At the early stage of optimization, the feasible routing paths can be obtained. Later on, the cost specific objective function can be applied to obtain the best energy adaptive solution.

2. Related work

Communication optimization is primary requirement of any network which can be achieved at routing level also. Lot of work is already defined by different researchers to optimize the

routing path. Author ^[1] has defined a work on to generate the aggregative communication path in the clustered network. The analytical decision was defined under multiple vectors including energy, capacity and the communication vector. The clustered communication was optimized by the author so that the improved routing is performed. Author ^[2] has provided a work on scheduling algorithm to optimize the network communication and routing. The communication throughput has been improved under energy and connectivity observation. Author defined the work on static and dynamic clustering measures to generate the adaptive routing path. The sensing range based communication was provided to provide the constraint specific routing. Author ^[3] has provided an intelligent method for communication optimization using multi-agent approach. Author has analyzed the network under node level, energy level and data level so that the communication optimization will be improved. Author analyzed the nodes under fuzzy adaptive measures to provide effective route discovery. The power management specific communication is also provided by the author. Author ^[4] has provided the work on convergence feature analysis along with communication constraint observation. The architectural improvement was provided to design the network in effective way. The multi-factor analysis was provided to identify the intermediate nodes. Author ^[5] has defined a work on topology adaptive communication to optimize the network deployment. The architectural design issue was handled by the author to improve the network communication. Author ^[6] has defined a study work on different routing protocols. The analysis was here provided under energy resources, storage capability and the node level reliability analysis. The node level strength analysis was provided to improve the network communication. Author ^[7] has provided a resource constraint specific method to improve the network communication and life. Author applied the work on data aggregation along with data integrity. Author observed the network security so that the communication improvement is required. The cryptography was applied at data level to improve the communication and to provide the capability driven communication. Author ^[8] has defined a work on data management and provided the simulation under efficiency, competence and effectiveness parameters. The data management and integrity was improved at node and network level. Author ^[9] improved the data aggregation method with energy constraint evaluation. The communication diffusion along with multi-path routing was provided to control the sensitive data communication along with data aggregation. Author defined the aggregative framework along with light weight verification to achieve the tamper resistant communication. Author ^[10] has work on the aggregative communication along with aggregation so that the communication reliability and integrity will be maintained. The security scheme was provided with light weight communication so that reliable communication will be performed. The protocol level observation was provided to reduce the cost and to generate the effective communication path. Author ^[11] has defined the improvement over the network integrity and combined the cryptography method to improve the security. The security against the attack and relative to different communication measures is provided by the author. Author ^[12] has defined a work to achieve the inter-connectivity based communication so that the reliable communication characterization was provided. The base station specific collective information method was provided to achieve the content driven optimization. The memory based analysis was defined to select the intermediate nodes more effectively. Author ^[13] has combined the cryptography method at node

level to achieve the data security and integrity. The cryptography model is here integrated at the infrastructure level so that the improved network communication will be achieved. The applied security scheme has improved the communication reliability. Author [14] has defined a neural network modeling for optimizing the network communication under energy and cost vector. The predictive decision is taken along with data integrity and path discovery. Author [15] has defined a work on data secrecy and privacy under communication measure so that the key management specific communication will be formed. The key management and distribution was provided by the author to improve the reliability of the network. Author [16] has defined a work on shared communication network without ZCK (Zero Common Knowledge). The association specific communication was provided to improve the communication security and reliability.

3. Research methodology

In this present work, an improved communication is provided for the sensor network by using zone driven bidirectional DFS algorithm. The work is here defined to analyse the nodes under different parameters including energy and distance parameters. The algorithmic process is defined to divide the network in smaller zones. Each of the zone is process on both direction from source and sink. The DFS is applied on each zone from both directions and to form the aggregative path. The work process is here shown in figure 1.

Now the complete network is divided in smaller zones so that the zone based node selection will be performed. Each zone is here identified by a source and destination node based on peak ends. The DFS based path generation approach is applied on each zone in parallel. These zones are then combined to form the single individual path. The path selection is here done based on energy, distance and destination direction aspects. After generating the path, the communication is performed for fix number of rounds. The sensor nodes are here defined with energy specification at node level. The communication optimization is here provided to generate the adaptive path. The work is here defined to reduce the energy consumption so that the improved communication will be performed.

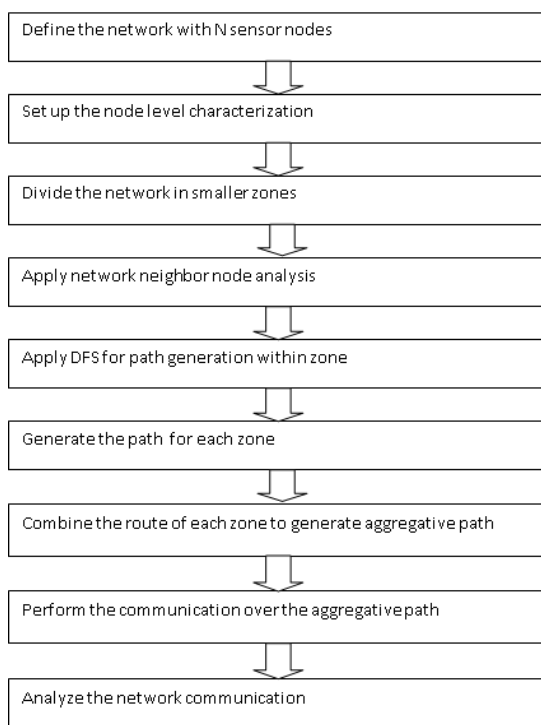


Fig 2: Proposed Model

Here figure 2 is showing the proposed work model. The figure shows that the work flow from the network generation. Later on the network is divided in smaller zones and finally, the bidirectional BFS is applied on each zone for route formation. The work is applied on a random network. The route formation and the optimization results are described in next section.

4. Results

The presented work is here implemented in mat lab environment with specification of random network scenario. The communication is performed from multiple source nodes and single destination node. The network is defined in limited area with random energy specification. Network life analysis is here provided in terms of dead and alive nodes. The dead node analysis is here provided in figure 2.

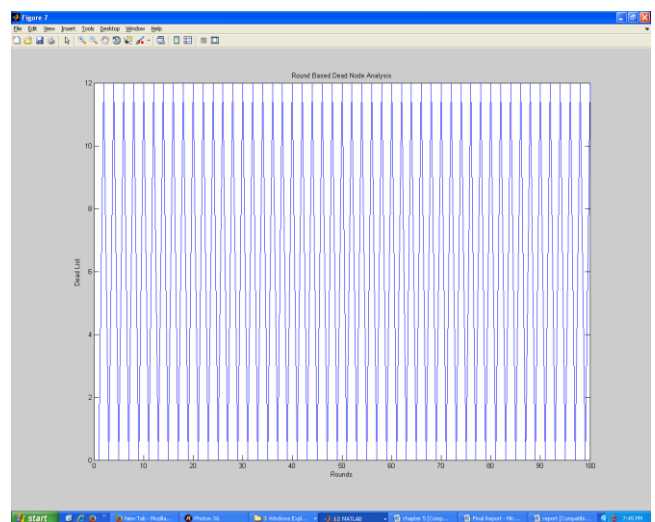


Fig 2: Dead Node Analysis

Here figure 2 is showing the dead node analysis applied on the work. The network life is evaluation in this work. The communication is performed for 100 rounds. Figure shows, After 100 rounds about 12 nodes are dead because of energy loss.

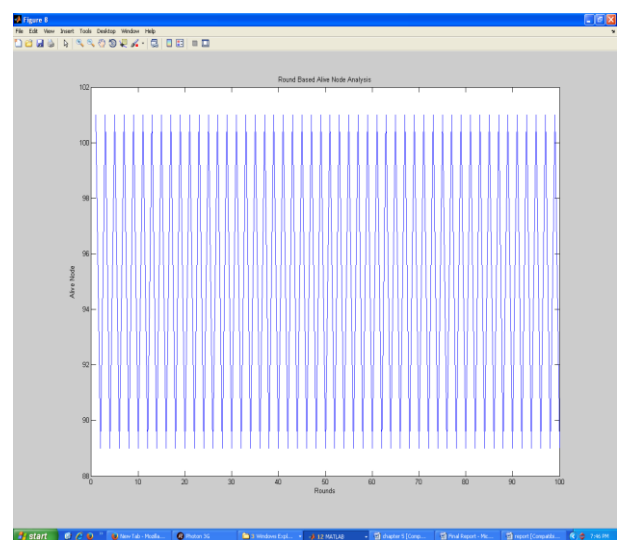


Fig 3: alive Node Analysis

Here figure 3 is showing the dead alive node analysis applied on the work. The network life is evaluation in this work. The communication is performed for 100 rounds. Figure shows, After 100 rounds about 88 nodes are still alive in the network.

5. Conclusion

In this present work, the sensor network optimization is provided using zone adaptive routing method. The work model has divided the network in smaller zones and applied the BFS algorithm for each zone. The zone formation and zone adaptive route formation is applied from both directions. The simulation results shows that the method has improved the network communication and network life.

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