Energy Efficiency in Heterogeneous Wireless Sensor Network using Multiple Mobile Sinks

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Abstract

To Increase Network Lifetime, We Use Heterogeneous Sensor Nodes And Multiple Mobile Sinks. We Introduce Multicriteria Based Clustering Protocol, Outlier Detection Algorithm, Energy Aware Routing To Achieve Efficient And Secure Data Aggregation In Heterogeneous Wireless Sensor Network (WSN) With Multiple Mobile Sink Nodes. Our Proposed Work Composed Of Two Mobile Sink Nodes Where One Sink Node Moves In Clockwise Direction And Another One Moves In Anti-Clockwise Direction. To Maximize Network Lifetime Of The Heterogeneous WSN, We Include Multicriteria Based Clustering Protocol (Mbcp) And Energy Aware Routing (EAR). We Also Reduce Energy Consumption Of Each Cluster Head (CH) In The Network By Proposing Multiple Mobile Sink Nodes. Initially, We Deploy Heterogeneous Sensor Nodes In Sensing Field To Sense The Environment. Our Proposed Work Composed Of Three Sequential Processes That Include Clustering, Malicious Node Detection And Routing. Our Clustering Process Is Executed Through Mbcp That Selects Optimum CH Based On Multi Criteria. We Identify Malicious Node Via Outlier Detection (OD) Algorithm That Is Performed Through CH. Finally, CH Transmits Aggregated Data To Mobile Sink Node Via Optimum Path Which Is Selected By EAR.

Keywords - *Mobile Sink ,Heterogeneous Sensors, Malicious Node, Routing.*

I. INTRODUCTION

Wireless Sensor Network is a Modern Technology That Covering The Application Area of Monitoring Like Bridge Monitoring , Tunnel Monitoring And Forest Fire Monitoring. Energy Of Sensor Nodes Is Important Resource In Wireless Sensor Network. It Is Used To Reduce Energy Consumption. As Some Sensors Exhaust Their Energy, This Lead The Network To Be Fail. A Way To Improve Lifetime Is To Divide The Sensor Network Into Groups Called Cluster .In Cluster, High Energy Sensor Node Act As A Leader Of The Cluster Called Cluster Head. Cluster Head Is Responsible For Managing Communication Within Clusters And Across Mobile Sinks. Energy Level Of Cluster Head At A Given Point Of Time Determines Lifetime Of Cluster And Also The Whole Sensor Network.The Nodes Which Are Placed Near Static Sink Consumes High Energy.To Avoid High Energy Consumption, Mobile Sinks Are Used.

II. EXISTING SYSTEM

The Wireless Sensor Networks Have Homogeneous Nodes. Homogeneous Nodes Means All Sensors Have Same Sensing Ability And It Has Static Sinks. Each Sensor Is Communicate With So Many Sensors In The Network. The Node Located Near The Static Sink Consumes High Energy.IN Cluster Based Network, Some Nodes Are Fixed As Cluster Head. Sink Collect Data From Cluster Head.

III. DRAWBACKS OF EXISTING SYSTEM

- Homogeneous Network Causes High Cost.
- Static Sink Result In High Energy Consumption.
- Fixed Cluster Head Leads To Network To Get Fail Easily.

IV. PROPOSED SYSTEM

We Propose An Efficient And Secure Data Aggregation And Routing In Multiple Mobile Sink Heterogeneous WSN. Our Proposed Work Composed Of Three Sequential Processes That Include Clustering, Malicious Node Detection And Routing. In Order To Balance The Energy Consumption Of CH Nodes, Our Sensing Field Composed Of Two Mobile Sink Nodes Where One Moves In Clockwise Direction And Another One Moves In Anti-Clockwise Direction. In The Beginning, We Deploy Heterogeneous Sensor Nodes In Sensing Field. Our Clustering Process Is Executed Through Mbcp That Selects Optimum CH Based On Multi Criteria.CH Is Selected By Computing Two Factors For Each Node That Are Node Score And Residual Energy Of The Node. Here, Node Score Is The Combination Of Node Degree And Node Centrality Factor. Sensor Node Having Highest Score Value And Residual Energy Is Selected As CH. After Electing Optimum CH, CH Node Informs It Neighbor About It Election. . We Execute Malicious Node Detection Process Using Outlier Detection (OD) Algorithm That Is

Performed Through CH. CH Detects Malicious Node By Implementing Local Outlier Factor (LOC) Algorithm That Categories Sensor Node Readings Into Two That Are Reliable And Unreliable Readings. Finally, CH Transmits Aggregated Data To Mobile Sink Node Via Optimum Path Which Is Selected By EAR. EAR Method Selects Optimum Path By Computing Bi-Factor That Is Combination Of Farness From The CH To Sink Node And Residual Energy Of The Node. Using These Paths CH Sends Aggregated Data To The Mobile Sink Node.

V. MODULES

In Our Project, We Have Designed Five Modules That Are Explained As Follows:

- Sensor Network Model
- Cluster Head Selection
- Malicious Node Detection
- Routing
- Performance Evaluation

A. Sensor Network Model

Our Sensor Network Model Composed Of Multiple Sink Node, Ch Node And Cluster Member Node. Ch Node Collects Data From Its Cluster Member Nodes And Aggregates The Collected Data Send It To The Mobile Sink Node.

B. Cluster Head Selection

In This Module, Ch Is Selected Using Mbcp That Elects Optimum Ch Based On Multiple Criteria. Herein, For Each Node Score And Residual Energy Is Computed Where Score Is Combination Of Node Degree And Node Centrality. Sensor Node That Has Highest Computed Score And Residual Energy Is Selected As Ch. Elected Ch Inform Its Neighbor About Ch Election.

C. *Malicious Node Detection*

In This Module, Malicious Node Is Detected Which Is Performed By The Ch. Cluster Member Nodes Are Sends Their Readings To Ch. Ch Node Implement Local Outlier Factor Algorithm To Classify The Reading Into Two Different Categories: Reliable And Unreliable Reading First To Categories The Sensor Reading, We Use Set Union And Intersection Factor To Identify Neither Bad Nor Good Sensor Nodes. By Using The Data Aggregation Algorithm We Eliminate The Unreliable Reading.

Good Node: Sensor Nodes That Contains Reliable Readings And There Is No Malicious Attack.

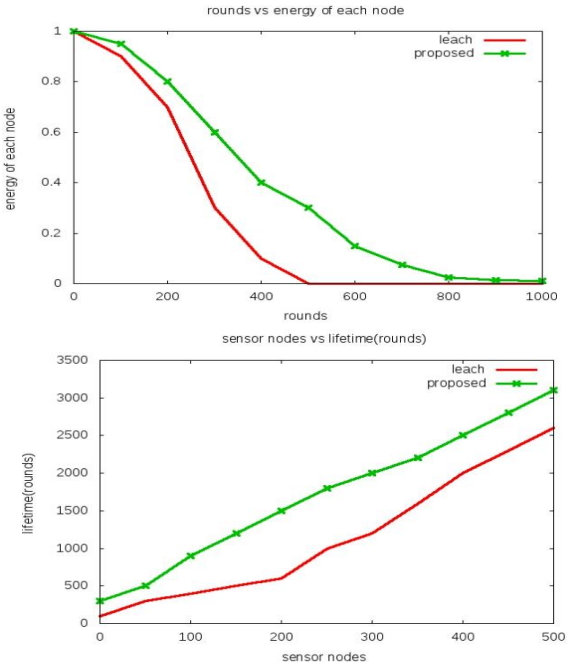
Malicious Node: Sensor Nodes That Contain Unreliable Readings And It Attack By Malicious.

D. Routing

In This Module, CH Sends Aggregated Data To The Mobile Sink Node Through Optimum Path Which Is Selected Using EAR. Here, EAR Selects Optimum Path By Computing Bi-Factor That Is Combination Of Residual Energy And Farness From CH To Sink Node.

E. Performance Evaluation

In This Module, Performance Of Our Proposed Work Is Evaluated By Comparing Succeeding Metrics Such As Energy Consumption, Network Lifetime With Leach protocol. Our Proposed Method Achieves Better Lifetime And Reduced Energy Consumption Through Effective Clustering And Routing.



VI. SYSTEM REQUIREMENTS

Software Requirements

Language - NS3

Operating System - Ubuntu14.04LTS-32 Bit System

Hardware Requirements

Processor - Pentium III & Above

RAM - 2GB

Hard Disk - 40GB

Speed - Minimum 2.5 GHZ

VII. BENEFITS OF PROPOSED SYSTEM

- Accurately Identify Malicious Nodes.
- Perform Secure Data Aggregation.
- Energy Consumption Minimized
- Lifetime Of Network Gets Improved.

VIII. CONCLUSION

In This Project, We Propose Effective Clustering, Malicious Node Detection And Routing Process. To Balance Energy Consumption Of Ch Node, We Deploy Two Mobile Sink Nodes Where One Moves In Clockwise And Another One Anti Clockwise Direction. Our Proposed Mbcp Based Clustering Operation Achieves Better Energy Consumption. It Selects Optimum Ch Through Score And Residual Energy. We Also Identify Malicious Node Using Od Algorithm That Classifies Good And Malicious Node Based On The Readings Which Is Performed Through Ch. Finally, Ch Sends Aggregated Data To The Mobile Sink Node Via Optimum Path Which Is Selected Through Ear.

IX.FUTURE WORK

For Future Enhancement We Planned To Propose Homomorphic Encryption Process Which Encrypts The Data And Then Transmit The Packet In Secure Way. It Is Very More Effective Way For Secure Data Transmission. In Addition To It, We Intend To Propose Better Optimization Algorithm To Select Route Between Ch And Sink Node.

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