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An Algorithm for Dynamic SDN Controller in Data Centre Networks

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Abstract*:The Geographic And Opportunistic Routing With Depth Adjustment Based Topology Control For Communication Recovery Over Void Regions Uses The Greedy Opportunistic Forwarding To Route Packets And To Move Void Nodes To New Depths To Adjust The Topology. Simulation Results Shown That MANET Outperforms The Baseline Solutions In Terms Of Packet Delivery Ratio, Latency And Energy Per Message. The Objective Of The Topology Control Algorithm Is To Adjust The Transmission Power To Minimize Interference Taking Into Account The Delay Constraint Also To Find The Duplicate Data. To Minimize The Delay For Transmission Of Data. In Opportunistic Routing, Each Packet Is Broadcast To A Forwarding Set Composed Of Several Neighbours. The Packet Will Be Retransmitted Only If None Of The Neighbours In The Set Receives It. Opportunistic Routing Can Work Together With Geographic Routing And Improve Data Delivery.*
Keywords*- AODV Algorithm, Cluster Forming, Data Centre Networks, Reliable Minimum Energy Routing, Software Defined Networks.*

I. Introduction

We Propose Two Novel Energy-Aware Routing Algorithms For Wireless Ad Hoc Networks, Called Reliable Minimum Energy Cost Routing (RMECR) And Reliable Minimum Energy Routing (RMER). RMECR Addresses Three Important Requirements Of Ad Hoc Networks Energy-Efficiency, Reliability, And Prolonging Network Lifetime. It Considers The Energy Consumption And The Remaining Battery Energy Nodes As Well As Quality Of Links To Find Energy-Efficient And Reliable Routes That Increase The Operational Lifetime Of The Network. RMER, On The Other Hand, Is An Energy-Efficient Routing Algorithm Which Finds Routes Minimizing The Total Energy Required For End-To-End Packet Traversal. RMER And RMECR Are Proposed For Networks In Which Either Hop-By-Hop Or End-To-End Retransmissions Ensure Reliability.

Simulation Studies Show That RMECR Is Able To Find Energy-Efficient And Reliable Routes Similar To RMER, While Also Extending The Operational Lifetime Of The Network. This Makes RMECR An Elegant Solution To Increase Energy-Efficiency, Reliability, And Lifetime Of Wireless Ad Hoc Networks. A Mobile Ad Hoc Network (MANET) Further Considers Node Mobility Within The Ad Hoc Setting. Efficient Use Of Resources And Adaption Are Vital In Order To Create A High Performance MANET. This Dissertation Addresses The Efficient Use Of Network Resources To Obtain The Desired Quality Of Service And Performance In Manets.

II. Related Work

2.1 Medium Access Control In Manets

In Wireless Communication, The Goal Of The Medium Access Control (MANET) Protocol Is To Effectively Utilize The Wireless Medium, Which Is A Limited Resource. This Approach Uses A Soft Cluster Formation Approach Where The Clustering Mechanism Is Utilized Only For Providing Channel Access To Member Nodes. Hence, Each Node Is Capable Of Communicating Directly With Every Other Node Provided That They Are Within Communication Range Of Each Other.

2.2 MH-TRACE Summary

In This Work, We Analyse The Performance Of Soft Clustering Protocols To Determine How To Best Set Their Parameters For Efficient Use Of The Channel Resources. Specifically, We Analyse The MH-TRACE Protocol. Here We Briefly Explain The Clustering Mechanisms Of MH-TRACE. In MH-TRACE, Time Is Divided Into Super Frames Of Equal Length, Where The Super Frame Is Repeated In Time And Further Divided Into Frames. Each Frame In The Super Frame Is Further Divided Into Sub-Frames. The Control Sub-Frame Constitutes The Management Overhead. Beacon, Cluster Announcement (CA), And Header Slots Of The Control Sub-Frame Are Used By The Chs, Whereas Contention Slots And Information Summarization (IS)

Slots Are Used By The Ordinary Nodes. At The Beginning Of The Frame, The CH Announces Itself To The Nearby Nodes By Sending A Beacon Message In The Beacon Slot Of The Control Sub-Frame.

2.3 Routing In Manets

Routing Makes Use Of The Clustering Structure. The Protocol Sends A Copy Of Each Data Packet To All Of The (Cluster Heads) Chs, And The Chs Retransmit These Packets To Their Cluster Members. Each Data Session Starts With An Initial Flooding Stage Where Each Rebroadcasting Node Implicitly Acknowledges Its Upstream Node Through IS Packets As A Part Of Its Transmission. In The Case Of The Existence Of More Than One Upstream Node, Only One Of Them Is Selected And Announced In The Downstream Nodes IS Packet.

III. Proposed Work

3.1 Introduction

Our Proposed Considers Energy Efficiency, Reliability, And Prolonging The Network Lifetime In Wireless Ad Hoc Networks Holistically. We Propose A Novel Energy-Aware Routing Algorithm, Called Reliable Minimum Energy Cost Routing (RMECR). RMECR Finds Energy Efficient And Reliable Routes That Increase The Operational Life Time Of The Network. In The Design Of RMECR, We Use An In-Depth And Detailed Analytical Model Of The Energy Consumption Of Nodes. RMECR Is Proposed For Networks With Hop-By-Hop (HBH) Retransmissions Providing Link Layer Reliability, And Networks With E2E Retransmissions Providing E2E Reliability. HBH Retransmission Is Supported By The Medium Access Control (MANET) Layer To Increase Reliability Of Packet Transmission Over Wireless Links. Nevertheless, Some MANET Protocols Such As CSMA And MANETA May Not Support HBH Retransmissions. In Such A Case, E2E Retransmission Could Be Used To Ensure E2E Reliability.

Changes In The Node Distribution And Packet Generation Patterns Result In A Non-Uniform Load Distribution. Similar To Cellular Systems, Coordinated MANET Protocols Need Specialized Spatial Reuse And Channel Borrowing Mechanisms That Address The Unique Characteristics Of Manets In Order To Provide As High Bandwidth Efficiency As Their Uncoordinated Counterparts.

We Incorporate These Two Algorithms For Managing Non-Uniform Load Distribution In Manets Into The MH-TRACE Framework. Although MH-TRACE Incorporates Spatial Reuse, It Does Not Provide Any Channel Borrowing Or Load Balancing Mechanisms And Thus Does Not Provide Optimal Support To Dynamically Changing Conditions And Non-Uniform Loads. Hence, We Apply The Dynamic Channel Allocation And Cooperative Load Balancing Algorithms To MH-TRACE, Creating The New Protocols Of DCA-TRACE, CMH-TRACE And The Combined CDCA-TRACE.

CDCA-TRACE Is A Novel MANET Protocol That Maintains The Same Energy Efficiency And Channel Regulation Principles Of MH-TRACE While Enabling Dynamic And Scalable Channel Assignment In Addition To Cooperative Load Balancing. Instead Of Message Exchanges Between The Channel Regulators (Chs), CDCA-TRACE Utilizes Spectrum Sensing To Keep Track Of Channel Usage In Nearby Clusters. This Feature Minimizes The Overhead Found In Dynamic Channel Allocation Schemes For Cellular Networks And Makes CDCA-TRACE Suitable For Manets.

CDCA-TRACE Also Incorporates Cooperation Among The Member Nodes To Improve The Distribution Of The Load Among The Chs And Complements Dynamic Channel Allocation To Enhance The Service Rate. The Contributions Of The Chapter Are: I) We Propose A Light Weight Dynamic Channel Allocation Scheme For Cluster-Based Mobile Ad Hoc Networks; Ii) We Propose A Cooperative Load Balancing Algorithm; Iii) We Incorporate These Two Algorithms Into Our The TRACE Framework Leading To DCA-TRACE And CMH-TRACE; And Iv) We Combine Both Algorithms Leading To CDCA-TRACE That Provides Better Support For Non-Uniform Load Distributions.

3.2 Bandwidth Efficiency Techniques For Coordinated MANET Protocol

The First Mechanism That We Propose Is A Dynamic Channel Allocation (DCA) Algorithm Similar To The Ones That Exist In Cellular Systems. Under Non-Uniform Loads, It Is Crucial For The MANET Protocol To Be Flexible Enough To Let The Unused Bandwidth Be Allocated To The Controllers In The Heavily Loaded Region(S). Cellular Systems Usually Handle Channel Allocation Through Message Exchanges Between The Cell Towers. However, These Messages Would Be Too Costly For A MANET System Due To The Highly Dynamic Behavior Of The Network. Instead, We Adopt A Dynamic Channel Borrowing Scheme That Utilizes Spectrum Sensing.

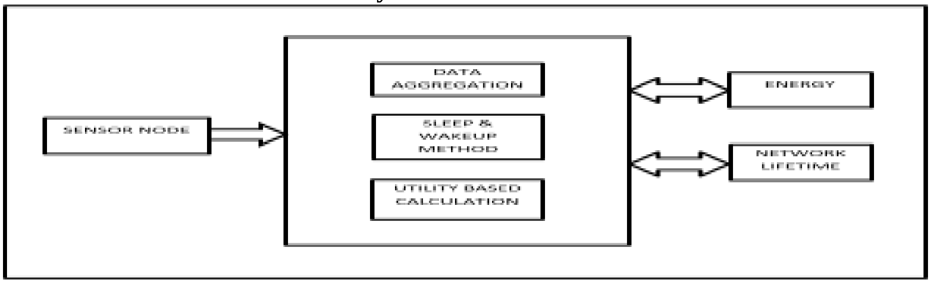
In This Algorithm, The Channel Controllers Continuously Monitor The Power Level In All The Available Channels In The Network And Assess The Availability Of The Channels By Comparing The Measured Power Levels With A Threshold. If Local Load Increases Beyond Local Capacity, Provided That The

Measured Power Level Is Low Enough, The Channel Coordinator Starts Using The Channel With The Lowest Power Level Measurement. Once The Channel Coordinator Starts Using The Channel, Its Transmission Increases The Power Level Measurement Of That Channel For Nearby Controllers, Which In Turn Prevents Them From Accessing The Same Channel. Similarly, As The Local Network Load Decreases, Controllers That Do Not Need Some Channels Stop The Transmissions In That Channel, Making It Available For Other Controllers.

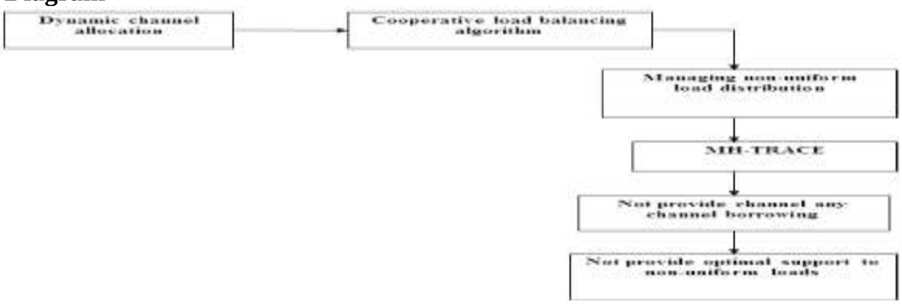
In This Dynamic Channel Allocation Algorithm, Channel Coordinators React To The Increasing Local Network Load By Increasing Their Share Of Bandwidth. Although Being Effective In Providing Support For Non-Uniform Network Loads, The Reactive Response Taken By The Channel Coordinators Increases The Interference In The Entire.

IV. System Design Analysis

4.1 System Architecture

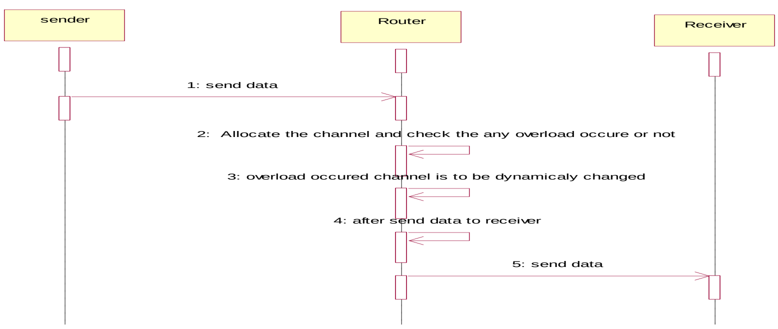


4.2 Data Flow Diagram



4.3 Sequence Diagram

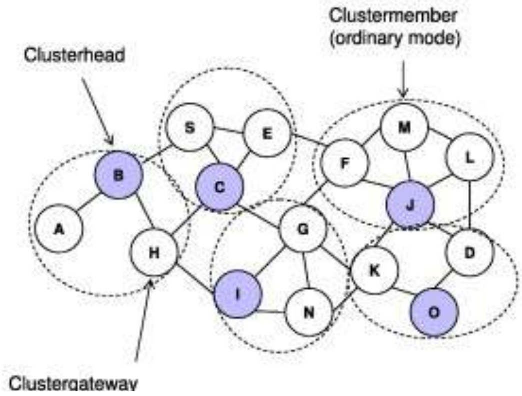
A Sequence Diagram Is An Interaction Diagram That Shows How Processes Operate With One Another And In What Order. It Is A Construct Of A Message Sequence Chart. A Sequence Diagram Shows Object Interactions Arranged In Time Sequence. It Depicts The Objects And Classes Involved In The Scenario And The Sequence Of Messages Exchanged Between The Objects Needed To Carry Out The Functionality Of The Scenario. Sequence Diagrams Are Typically Associated With Use Case Realizations In The Logical View Of The System Under Development. Sequence Diagrams Are Sometimes Called Event Diagrams Or Eventscenarios.



V. Physical Security Technologies

5.1 Cluster Formation

Nodes Cooperate To Form Clusters, And Each Cluster Consists Of A CH Along With Some Cluster Members (Cms) Located Within The Transmission Range Of Their CH. While A Node Takes Part In The Network, It Is Allowed To Declare Itself As A CH. In This Model, If A Node Proclaims Itself As A CH, It Propagates A CH Hello Packet (CHP) To Notify Neighboring Nodes Periodically. The Nodes That Are In This CH's Transmission Range Can Accept The Packet To Participate In This Cluster As Cluster Members. On The Other Hand, When A Node Is Deemed To Be A CM, It Has To Wait For CHP. Upon Receiving CHP, The CM Replies With A CM Hello Packet (CMP) To Set Up Connection With The CH. Afterward, The CM Will Join This Cluster; Meanwhile, CH And CM Keep In Touch With Each Other By Sending CHP And CMP.



5.2 Certification Authority

Before Nodes Can Join The Network, They Have To Acquire Valid Certificates From The CA, Which Is Responsible For Distributing And Managing Certificates Of All Nodes, So That Nodes Can Communicate With Each Other Unrestrainedly In A MANET. The CA Is Also In Charge Of Updating Two Lists, WL And Blacklist, Which Are Used To Hold The Accusing And Accused Nodes Information, Respectively. Concretely, The BL Is Responsible For Holding The Node Accused As An Attacker, While The WL Is Used To Hold The Corresponding Accusing Node. The CA Updates Each List According To Received Control Packets. Note That Each Neighbor Is Allowed To Accuse A Given Node Only Once.

5.3 Certificate Revocation

To Revoke A Malicious Attacker's Certificate, We Need To Consider Three Stages, The Revocation Procedure Begins At Detecting The Presence Of Attacks From The Attacker Node. Then, The Neighboring Node Checks The Local List BL To Match Whether This Attacker Has Been Found Or Not. If Not, The Neighboring Node Casts The Accusation Packet (AP) To The CA. After That, Once Receiving The First Arrived Accusation Packet, The CA Verifies The Certificate Validation Of The Accusing Node: If Valid, The Accused Node Is Deemed As A Malicious Attacker To Be Put Into The BL. Meanwhile, The Accusing Node Is Held In The WL. Finally, By Broadcasting The Revocation Message Including The WL And BL Through The Whole Network By The CA, Nodes That Are In The BL Are Successfully Revoked From The Network.

VI. Conclusion

In This Project We Have Not Investigated The Effects Of Upper Layers Such As The Routing Layer, And Instead Focused On The MANET Layer Capability And Local Broadcasting Service. Packet Routing Has A Significant Impact On The Load Distribution. Local Link Layer Broadcasting Service Is Directly Used By Some Routing Algorithms Such As Network Flooding. Moreover, It Can Be Used Alongside With Network Coding And Simultaneous Transmission Techniques For Cooperative Diversity.In General, Joint Optimization Of The MANET And Routing Layers May Enable Even More Efficient Solutions. Investigation Of The Effects Of Routing Is Left As Future Work.

REFERENCES

[1]. Bora Karaoglu, Tolga Numanoglu, And Wendi Heinzelman. Analytical Performance Of Soft Clustering Protocols. Ad Hoc Networks, 9(4):635 – 651, 2011.

[2]. H. Liu, X. Chu, Y.-W. Leung, And R. Du, "Minimum-Cost Sensor Placement For Required Lifetime In Wireless Sensor-Target Surveillance Networks," IEEE Trans. Parallel Distrib. Syst., Vol. 24, No. 9, Pp. 1783–1796, Sep. 2012.

[3]. D. Yang, S. Misra, X. Fang, G. Xue, And J. Zhang, "Two-Tiered Constrained Relay Node Placement In Wireless Sensor Networks: Computational Complexity And Efficient Approximations," IEEE Trans. Mobile Comput., Vol. 11, No. 8, Pp. 1399–1411, Aug. 2012.

[4]. T. Numanoglu, B. Tavli, And W. B. Heinzelman. The Effects Of Channel Errors On Coordinated And Non-Coordinated Medium Access Control Protocols. In Proceedings Of IEEE International Conference On Wireless And Mobile Computing, Volume 1, Pages 58–65, Aug 2014. 261.