Distributed Node Management in Multi Service Network To Detect Selfish Node

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Abstract- *In Wireless Network communication, every node transmits data packets to further nodes. In ideal situation all the nodes forward packets to other nodes according to their requirements. Presence of selfish nodes is a very big problem in Wireless Networks. A selfish node doesn't forward packets and utilize to its own profit but it is hesitating using personal resources for others. If such activities occur within most of the nodes in the network, the network is interrupted. Selfish behavior detection is an essential condition in wireless networks. In this project we have described an efficient method for detection and punishment of a selfish node. Under the distributed node-selfishness management, a path selection criterion is designed to select the most reliable and shortest path in terms of RNs'. Degree of intrinsic selfishness nodes affected by their available resources, and the optimal reasons are determined by the source to stimulate forwarding multiservice of the RNs in the selected path.*

I. INTRODUCTION

Maintaining connectivity within a wireless network is the precondition for guaranteeing efficient networking relying on the functions of routing, power control, topology control, etc. Given the increase of smart devices in intelligent networks, each node is expected to be endowed with smart autonomic functions. By nature, the individual network nodes would prefer to act selfishly rather than altruistically in distributed network situations. For instance, while forwarding the packets of other nodes at the cost of sacrificing their own limited resources, they expect to satisfy some of their own objectives, such as maximizing their own transmission rate and/or minimizing their own resource consumption. To enforce cooperation among nodes and detect selfish nodes in ad hoc wireless networks, various collaboration schemes have been proposed in the literature. Majority of these proposals are based on trust and reputation frameworks which attempts to identify misbehaving nodes by suitable decision making systems and then isolate or punish them. The reputation of participating nodes is built based on local observation at the node, second-hand observation at other nodes or both. To address the issue of selfish nodes in a WMN, this paper presents a scheme that uses local observations in the nodes for detecting node misbehavior. The scheme is applicable for on-demand routing protocol like AODV, and uses statistical theory of inference and clustering techniques to make a robust and reliable classification (cooperative or selfish) of the nodes based on their packet forwarding activities as observed by their neighbors. In addition, it introduces some additional fields in the packet header for AODV protocol so that detection accuracy is increased.

A Brief Review of Network Security

This section shows security requirements, possible attacks in traditional networks.

Passive attack happened without the interrupting in the communication operations. For the Active attack node works as active node. It can perform the operations like interruption, modification, or fabrication, at the time of attack directly. In the Internal Attack nodes are the part of network in order to perform attack. Whereas External Attack nodes does not belong the network in order to perform attack. In the purpose of Black hole Attack, malicious user broadcast the message having the false information of shortest path. This shortest path is work for the attack. Some time it also makes the set of intermediate nodes and works as an attacker. The operation can perform like routing loops and forwarding packets dropping packets. It will degrade the quality of services.

The Routing protocols are responsible to perform dynamic routing and information sharing as well. Table Driven Protocol is the type approach the protocol will store the table in order to get the route of destination.

With the help of that table the route will decides and forward the packet to the destination node. There are many table driven protocol has developed like DSDV, WRP etc. this approach is also known as the proactive protocols. On Demand Protocol is another approach to route the packet in the wireless network. This approach does not have any pre decided route.

Authentication is needed in order to be sure about the identity of the sender or receiver of a message. The attack is

called masquerading, that is pretending to be somebody else. Since in mobile ad hoc networks there are no central authorities available for certificates and key distribution to authenticate identities, it becomes harder to detect corrupted nodes. A distributed kind of authentication is needed. All other services depend on authentication.

Confidentiality concerns the content of a message. Only the sender and the receiver are supposed to know the content. Attacks include message interception (man in-the-middle attacks), content release to other parties, etc. In mobile ad hoc networks, wireless link broadcast facilitates eavesdropping and key distribution is more difficult.

Integrity ensures that system assets and transmitted information are modified only by authorized parties. Modification includes writing, changing, changing status, deleting, creating, and the delaying or replaying of transmitted messages. Availability of services or devices is attacked by denial of service. This is traditionally done by interruption, network or server overload. With mobile ad hoc networks of potentially low powered devices, sleep deprivation (engaging the devices CPU until the battery power is exhausted) or incorrect forwarding of messages are effective attacks. Network overload is easier on small bandwidth wireless links and bogus routing advertisements are harder to detect in a dynamic environment.

Access Control restricts resources, services or data to special identities according to their access rights or group memberships for instance. Access control enforces authorization.

Means to attack are again masquerading, message interception and modification, forging, etc. Since with mobile ad hoc networks there is no infrastructure and the network is potentially highly dynamic, it is hard to detect corrupted nodes. In order to exercise access control, distributed authentication management is needed.

Non-Repudiation is about not being able to deny having sent or received a message. A typical attack is masquerading. Threats endanger the security, they can be deliberate or accidental. Attacks are materialized threats. Safeguards aim at protecting against threats and can be physical control, mechanism, policy, procedure to protect assets from threats. A policy governs whether a service is used. Vulnerability is the absence of a safeguard. Mechanisms provide services. Attacks are interruption for availability, interception for confidentiality, modification for integrity, fabrication for authenticity. Attacks are passive (release of contents, traffic analysis) or active (masquerade, replay, modification, denial of service).

Networks Special Properties

Mobile ad hoc networks exhibit properties different from fixed networks or infrastructure based wireless networks. These properties make it harder to implement security services or even exhibit vulnerabilities to different and additional security attacks:

Unreliable wireless links are vulnerable to jamming and by their inherent broadcast nature facilitate eavesdropping.

Constraints in bandwidth are caused by the limits of the air interface with fading and noise. Computing power in mobile devices require security mechanisms to be low in computation overhead. Battery power in mobile devices can lead to application specific trade-offs between security and longevity of the device.

Mobility/Dynamics make it hard to detect behavior anomalies such as advertising bogus routes since routes in this environment change frequently. It is difficult to employ mechanisms like firewalls, because the border between being inside or outside the network is blurred.

Self-organization is a key property of ad hoc networks. They cannot rely on central authorities and infrastructures. Therefore, trust management has to be distributed and adaptive. On the bright side, self-organization leads to inherent better fault tolerance thanks to the absence of the potential bottleneck of centralized authorities.

Latency is increased by the fact that in order to save battery power devices can decide to sleep and only wake up, when there is a message for them, which increases the reaction time of the device by the time it takes to wake up. Inherently the round-trip-time for packets is increased in wireless multi-hop networks, rendering message exchange for security more expensive.

Multiple paths are likely to be available given sufficient node density. This property offers an advantage over infrastructure-based local area networks that can be exploited by diversity coding. This means that multiple copies of a packet or parts of it can be sent over different paths to increase the probability of a packet actually arriving at a destination unchanged.

A wireless network which consists of nodes exhibiting a selfish behavior is hence referred to as a selfish wireless network (SeWN). In such network situations, the selfish behavior network nodes may reduce the throughput of the nodes and/or their integrity, thus potentially leading to degraded network connectivity. The node-selfishness of the network node is affected by some intrinsic and extrinsic factors, such as its own energy and bandwidth resources, the QoS requirements and the employed incentive mechanisms. For improving the network performance, the node individuals need to obtain the information on the node-selfishness of the other nodes and to determine the relationship between the aforementioned factors and the node-selfishness. In such distributed network scenarios, each network node may obtain the aforementioned information, directly collected by it and/or indirectly received from its neighboring nodes. Accordingly, each network node should establish a distributed node-selfishness management for managing therefore mentioned information on the node-selfishness, whilst improving the network performance of delivering multiservice, i.e., the reliability of the selected path and the successful probability of delivering multi-services.

II. WORKING PRINCIPLE

2.1 BLOCK DIAGRAM

Server:

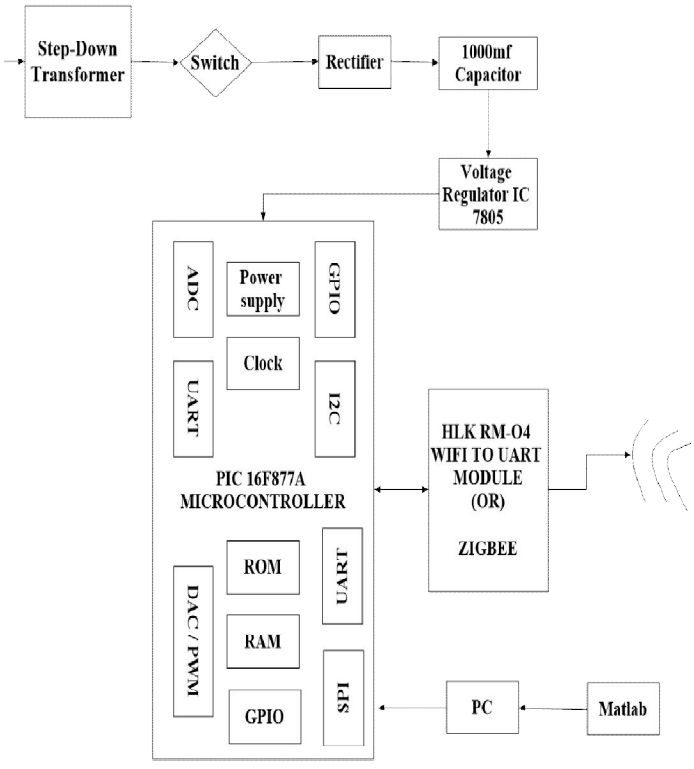


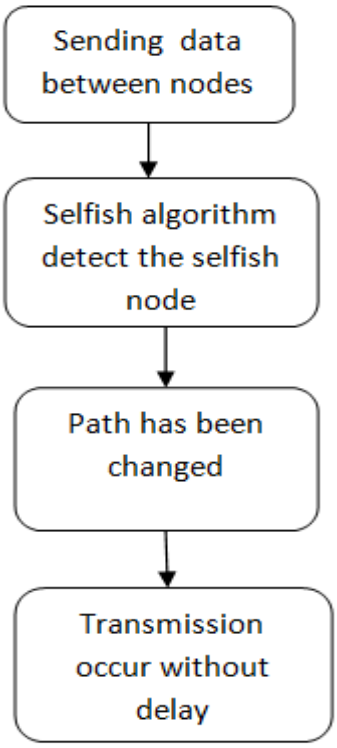
Fig 2.1.1 – Block Diagram

2.2 SELFISH ALERT ALGORITHM

Algorithm for detection of selfish nodes in a wireless networks. It uses reliable clustering of the nodes. The algorithm has a high detection rate. The proposed algorithm initially clusters the neighbours of a monitoring node and then classifies the clusters into selfish node. This proposed algorithm initially plots the neighbours of a monitoring **node** into clusters and then classifies the clusters into selfish and cooperative. Detecting selfish nodes that drops packets based on the level of reputation. This mechanism decides a node as selfish when the number of packets forwarded by a mobile node to its neighbor is equal to the number of packets received by that node from its neighbors. The proposed algorithm initially maps the neighbors of a monitoring node into two clusters and then classifies the clusters into two types: selfish and cooperative.

2.3 PROPOSED SYSTEM

Wherever, in the existing schemes, there is still having a problem of selfish nodes which creates problem in accessing data and slow down the network performance. And also they are considering partial selfish nodes as selfish nodes which may not create problem sometimes so there may be a problem and also there is no server or control to monitor the replica allocation of nodes. The main objective of the proposed method is to monitor the selfish node properly in wireless networks. Here two types of method is implement i.e., static and dynamic to find the selfish node. The selfish node is required to send trust information to the destination node. Based on that, the server monitors the selfish node at all the time. That means few data will send from source to destination for monitoring purpose. If the relay node is properly to send all the data to destination at any time data transfer will not stop that node is called non-selfish node.



2.4 ADVANTAGES

The proposed method Improve the network security. It reduces the loss of pack by selecting optimal shortest path for multiservice delivery.

The source should reduce the selection frequency and maintain the reliability of the selected path.

3.1 NS -2 (NETWORK SIMULATOR 2

3.1 Software Overview:

Wireless Sensor Networks (WSNs) is built of few to several thousands of distributed interconnected sensor nodes. Deploying a complete test bed for such huge network becomes costly and time consuming. In such cases; network simulator saves lot of time and money.

3.2 Simulation:

Simulation is used for data networking and by it helps researchers to resolve queries in time and in minimal cost. Simulation is the imitation of some real thing or a process. Simulation is a very important modern technology. It can be applied to different science, engineering, or other application fields for different purposes.

3.3 Network simulation:

Network simulation is used in different areas; academic researchers, industrial development, to analyze, design, simulate and verify the performance of different network protocols. Wireless sensor network consists of several tiny sensors called nodes; each sensor node has several components. Each node has the ability to communicate with every other node. To build a test bed for such huge WSN it becomes very costly work. Deploying real experiments for WSN takes so much of time and it becomes a difficult task.

3.4 Network Simulator:

Network simulator is a discrete event network simulator. A network simulator is software that predicts the behavior of a computer network. Network simulator is used to understand system behavior accurately.

In simulators, the computer network is typically modeled with devices, links, and applications to analyze the performance. Simulators provide support for the most popular technologies and networks.

3.5 Use of Network Simulator

- Network simulators provide a cost effective method for network design and validation for sensor networks facility for addition or modification to exiting network
- Network simulator must enable user to model the network topology to specify the nodes and the links between those nodes
- Model the application flow (traffic) between the nodes
- Provides network performance metrics as output
- Visualization and animation of packet flow

3.6 Network Simulator 2:

Network Simulator-2 is most widely used simulator for the research work. Ns2 is an open source discrete event network simulator. It is used for the simulation of network protocols with different network topologies. It can be supported for wired as well as wireless networks simulation. Network animator (NAM) is used for the graphical view of the network. NAM interface has facility to allow users to forward, pause, stop and play the simulation.

3.7 Ns2 Architecture:

Ns2 is basically an Object Oriented TCL (OTcl) script interpreter with network simulation event scheduler, network component object libraries and network setup (plumbing) module libraries. Network simulator is used for setting up and running a network simulation and user writes a

simulation program in OTcl script language. The OTcl script is used to initiate the event scheduler, setup the network topology and tell traffic source when to start and stop sending packets through event scheduler.

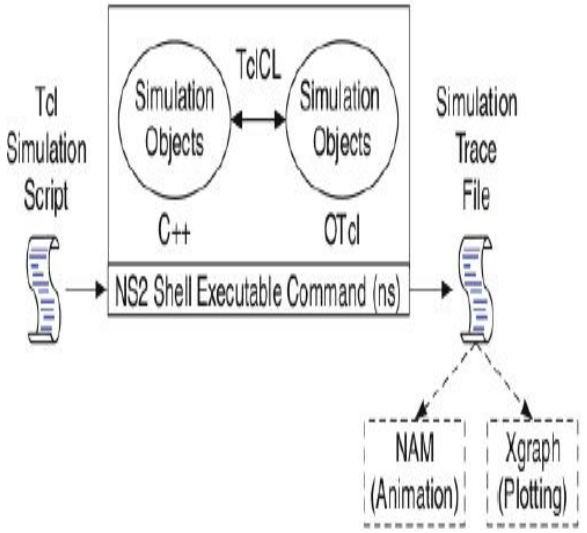


Fig.3.1.1 - Basic architecture of Ns2

NS2 comes with a package called NAM (Network Animator); it's a Tcl based animation system that produces a visual representation of the network described.

3.8 APPLICATIONS OF NS2

Educational uses

- General information about using ns/nam for networking education
- Web index of educational scripts

Other applications

- Network Animator - nam
- Topology Generation for large simulations
- Scenario generation in ns.
- NS Network Emulation Capability
- Search ns web pages

IV. SIMULATION AND OUTPUT:

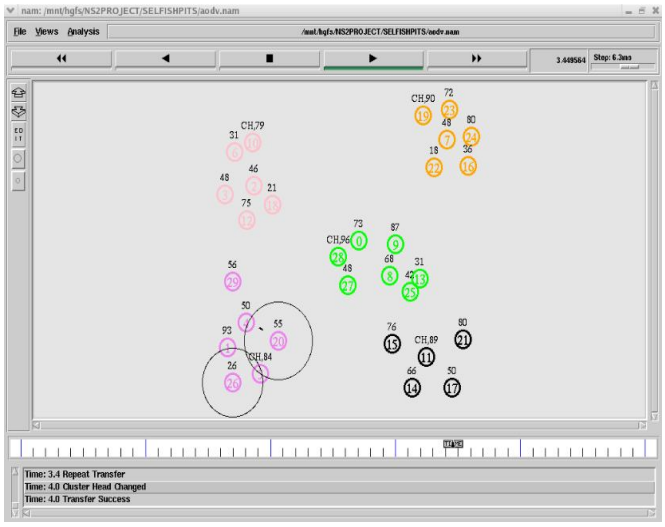


Fig.5.1.1 – Node Transmission in Network

The proposed protocol is evaluated with network simulator ns-2 (version 2.29) [15] with parameters presented in Table III. The objective is to evaluate the efficiency of the algorithm and compare its performance with the protocol proposed by Wang et al in [13]. At the start of the simulation, a fraction of nodes are chosen randomly as the selfish nodes. A selfish node adopts either of the two strategies--dropping RREQs (DROP_REQ) or dropping RREPs (DROP_REP). In both cases, control packets are dropped with a constant probability. For DROP_REP, a selfish node always rebroadcasts RREQs even if it has a route in its cache. To evaluate the detection efficiency and speed, the packet dropping probability is varied from 1.0 to 0.1. β is chosen as 0.4 to have the best tradeoff between detection rate and false positive rate.

V. CONCLUSION

Proposed system introduced the distributed framework of the node-selfishness management, where every RN manages its Node Selfishness Information that is Intrinsic and Extrinsic information and other nodes' NSI and every source node manages the RNs' NSI in distributed SeWNs. In this framework, the RN's models of intrinsic and extrinsic selfishness have been developed to manage its DeIS and DeES, and the other RNs' NSI has been obtained in terms of the RNs' historical behaviors and their recommended NSI. Under this distributed framework of the node-selfishness management, the path selection criterion has been designed to select the most reliable and shortest path for the multi-service delivery. Additionally, the optimal incentives have been adjusted by the source for maintaining the path reliability of the E2E multi-service delivery.

Future work

We have designed selfish node monitoring system based on communication by using NS2 simulation software to provide live monitoring and detect selfish node. When detects selfish node then the node is automatically change to transfer the data to destination. In future, the system will implement the real time monitoring through dynamic mode of the find selfish node. Also changeover the node automatically to transfer the data. WIFI or zig bee wireless device is used to transfer the data from source node to destination node.

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