A SCHEME OF ADHOC COMMUNICATION USING MOBILE DEVICE NETWORKS

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Abstract

ADHOC network building is the most current research topic where the communication can be done without any network provider in Mobile networks. ADHOC says that within the range it must have at least one link. This work planned to send messages using blue tooth. By Using a group of Bluetooth enabled mobiles a network channel is dynamically established and the message transfer from the sender to the receiver will be done. These are called hops. The message will transfer via different hops and finally reaches the destination.Mobile adhoc networks are characterized by low bandwidth, lossy links and by constant topology change. Traditional network management techniques, which were designed for static wired networks, do not perform well in such environments their rigid framework and polling requirements imposes additional burden on the network. In this paper, outline the various challenges faced in collecting state and managing mobile adhoc networks, followed by the requirements of a network management paradigm that addresses these challenges and work progressive in adaptive, self-organizing architecture that addresses the requirements and demonstrate its suitability.

Keywords: Adhoc, Mobility management, Quality of service, Mobile service, Device to device Communication.

I. INTRODUCTION

Wireless adhoc networks are characterized by low-bandwidth, high loss rate communication links. The situation is exacerbated when the network nodes are mobile because the links become susceptible to fading and the neighborhoods can change frequently. In mobile networks, changes in location and neighborhoods can change the traffic profile. The Simple Network Management Protocol (SNMP) is the most popular network management protocol for wired networks. SNMP uses a Management Information Base or MIB to store the state of the various entities in a network node. A local SNMP agent is responsible for maintaining the database on the node. Policy-driven approaches have been suggested for adhoc network management such as ANMP, Phanse's PBNM, PECAN and Guerilla..

The primary QoS attributes affecting the overhead imposed by the network management traffic are bandwidth and latency. Additionally, in a mobile wireless environment, reliability is also a concern since the packet loss rate is higher compared to traditional wired networks, which affects the accuracy of the network state gathered. In this section, list the possible factors that affect each of these QoS attributes.

II. ADHOC INFRASTRUCTURE ENVIRONMENT

A.MULTIHOP-TRANSMISSION

The bandwidth overhead of the network management traffic in MANETs is primarily caused by the multi-hop transmission over the shared wireless medium. The state of each node has to be relayed from node to node along the route contributing to the bandwidth overhead by the amount of state that needs to be transferred every time. This contributes to congestion at the nodes that are closer to the administrator node because all routes from nodes farther away lead through these nodes. In a MANET environment, management is a difficult problem because the constantly changing topology induces additional overhead for network state collection over bandwidth-constrained links if one uses traditional network management techniques.

1. The Policy NM layer is responsible for describing long-term objectives and policies, and also the rules that might need to be applied for specific scenarios.

2. Solomon Architecture

- The creation of a management hierarchy through clustering.
- The dissemination of information between clusters, and
- The dissemination of information within clusters.

B.SELF CRITICAL CLUSTERING

The task of organizing the network into multiple clusters is accomplished by a novel clustering protocol based on self-criticality. It utilizes a behavior found in complex adaptive systems in nature that are able to organize themselves to a critical stable state and maintain themselves in that state. Each node additionally maintains the following state information: a broadcast timer to broadcast its clusterhead information, its current clusterhead and an affinity weight associated with that clusterhead and a list of other known clusterheads and their weights. The node itself may be a clusterhead in which case it will maintain a pointer to itself.. the node has reached or exceeded its broadcast interval', the node is not currently associated with a clusterhead; and if the node is associated with a clusterhead, its affinity to its current clusterhead is less than the maximum possible clusterhead weight by a fixed amount called the "affinity threshold".

C.INFORMATION DISSEMINATION BETWEEN CLUSTERS

Information between clusters is exchanged is through a Gossip protocol. A Gossip protocol is a simple protocol that disseminates information by randomly selecting peers to exchange information with. Ithas been previously used in other applications such as network news dissemination (NNTP), replicated data management and failure detection.

- ***BLUETOOTH FOR AD-HOC NETWORKING***

Ericsson as a method to replace cables in networks created Bluetooth in 1994. In 1998 the Bluetooth SIG was founded and it currently has over 3000 members. The principle aims of the technology were to replace wire and form short-range ad-hoc networks. Since then the bluetooth standard has blossomed so much so that it takes up over 1500 pages!!!

- ***WORKING OF BLUETOOTH***

Now a bluetooth network actually consists of small subnets or piconets. A piconet consists of two or more connected nodes sharing the same channel. Every piconet have one master and up to 7 slaves. There is never a direct transmission between slaves. Rather all communication goes through the master.
Two or more connected piconets form a scatternet. To connect piconets simply let them have a node in common. A node may be a slave in one piconet and a master in another. This is the basis for forming ad-hoc networks in bluetooth.The core bluetooth protocol stack contains 5 layers. The radio and baseband layers describe the physical implementation of bluetooth. It operates on the 2.4GHz frequency. There are 79 1MHz channels and upper and lower guard bands. The technology uses frequency hopping spread spectrum for information transmission with 1600 hops per second.

- Class Power Consumption Range
- One 100mW 100m

- Two 10mW 10m
- Three 1mW ~10cm

D.BLUETOOTH LINKS

There are two types of link between bluetooth nodes. The first is a synchronous connection orientated (SRO) link and the second is an asynchronous connectionless (ACL) link. An SRO link is a fixed bandwidth point-to-point link between master and slave nodes. The master maintains the connection by reserving slots at regular intervals. It is suitable for time bound transmissions like audio. Packets are not resent in an SRO link. A master can maintain up to 3 SRO links, while a slave can maintain 2 or 3.

III. PROBLEMS IN BLUETOOTH FOR AD-HOC NETWORKS

Policy-driven approaches have been suggested for ADHOC network management such as ANMP, Phanse's PBNM, PECAN and Guerilla. In such approaches, policy servers or mobile agents are deployed in a distributed manner in the network. This distribution may be full or partial. The agents carry policies for monitoring and reporting of local events to a central reporting node. Examples of policies implemented at the agents include "report event if cpu utilization exceeds 50%" or "do not report events if bandwidth of the reporting interface is less than I Mbps". If the topology changes quite often due to mobility or otherwise, then a dynamic placement policy is required These approaches enable specific policies to be enforced such that the management framework only responds to certain types of events or changes in the network. This minimizes the amount of data collection but the information granularity and its accuracy depends on whether a correct policy has been devised for the situation that the node is experiencing at any given moment. This is because anticipating, defining and deploying the correct policies is not feasible for all possible situations. The Problems in Bluetooth For Ad-Hoc Networks are given

- Ad-hoc networks can be formed using many different wireless technologies, but Bluetooth has become almost a household name in the ad-hoc networking world for the numerous advantages it offers over competing technologies.

- The main reason Bluetooth is so popular for ad-hoc networks is that it was specifically designed for use in this fashion; while the likes of the 802.11 standard were designed to provide a replacement for wired infrastructure networks.

- Bluetooth was designed to require as little power as possible, to be implemented in the smallest possible design, and to be cheap to produce.

- Unfortunately, Bluetooth does have some limitations. The second downfall is the lack of bandwidth. Bluetooth is capable of transmitting and receiving data at a mere 720kbps.

IV. PROCEDURE FOR BLUETOOTH IN AD-HOC NETWORKS

The Network management involves two steps: the collection and dissemination of the network state (obtaining information about the network) and Intelligent Decision based on that information (such as provisioning or assigning QoS priorities to data traffic). SOLOMON focuses on the collection and dissemination of network state since that is the critical high-overhead component of adhoc mobile network management SOLOMON reduces the network overhead compared to traditional SNMP protocol by summarizing. network state before sending the information. Stadler and Dam. the BFS tree. The authors do not specify which transport protocol was used for sending messages.

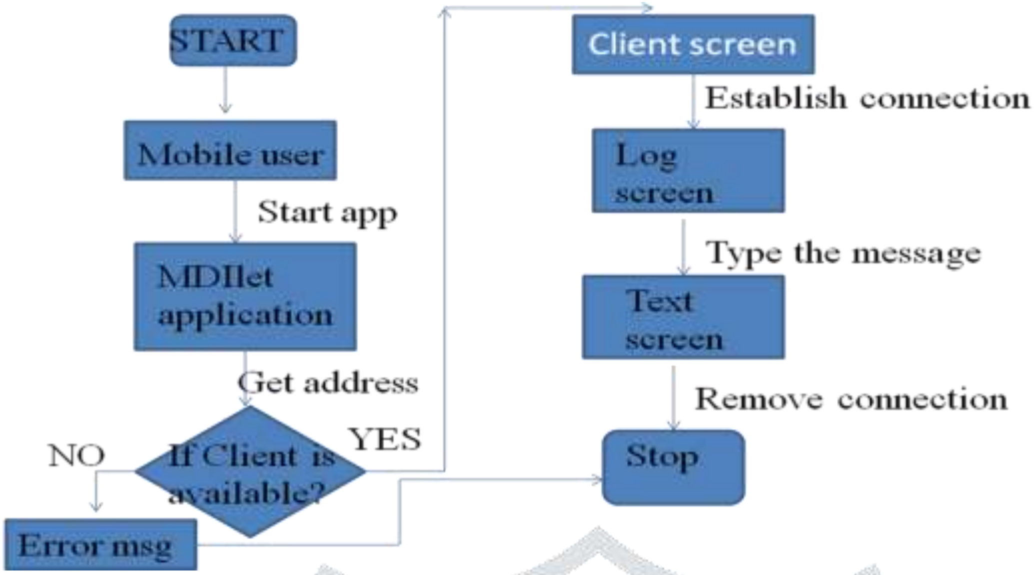

Fig 1: Transaction process of mobile device connection

It is reasonable to assume that UDP was used since sending messages using TCP would incur huge overhead and delay. Sending messages using UDP would imply that the packet loss rate in the network would significantly affect performance of GAP. In SOLOMON, even though packets are sent unreliably using UDP, message redundancy is obtained via gossiping to offset packet losses. It focused in the SOLOMON paradigm there is a computational cost trade-off with bandwidth (or network messaging overhead), but it assume that this computational overhead is negligible.

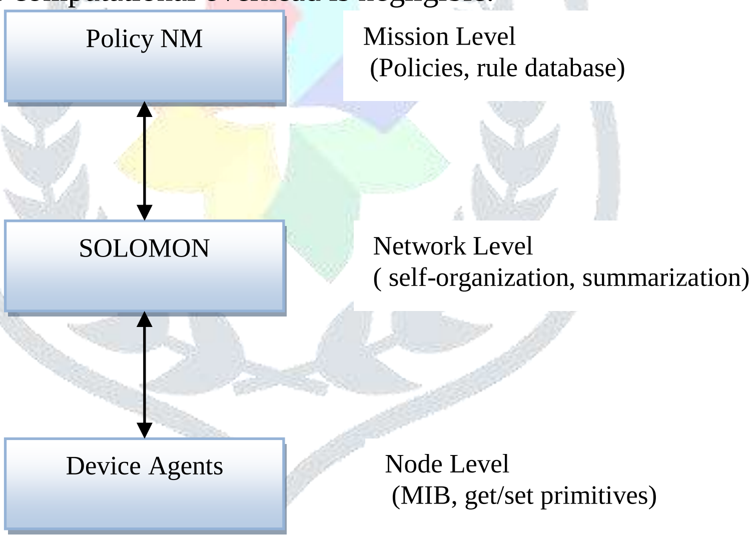

Fig 2: Network Messaging System

The collection of network state involves three key operations:

- The creation of a management hierarchy through clustering.
- The dissemination of information between clusters, and
- The dissemination of information within clusters.

V. FORMING PICONETS

When forming bluetooth nodes form a piconet they goes through a series of states. The two major states are STANDBY- not part of a piconet and CONNECTION – device is part of a piconet. To form a piconet the master transmits an ID packet over 32 of the 79 channels. Devices in the STANDBY state periodically scan for this packet. If it hears it, the device sends its address and timing info to the master. The device then waits for the master to page it.

A. FUNCTIONAL REQUIREMENTS:

- To create user interface for the client node.
- To create a user interface for the server node.
- To handle the list of clients available.

B. NON FUNCTIONAL REQUIREMENTS

- Usability

The system must be designed with ease of use of the client.

- Performance

The system must have a high accuracy levels. The system must exhibit high performance.

- Supportability

The system is supportable among a wide range of mobiles which are CLDC compliant.

- Implementation

The system must have good security in transferring the messages through hops. The system must exhibit the QoS.

VI. GENERIC AGGREGATION PROTOCOL (GAP)

The protocol uses message passing instead of shared registers.Each node needs to maintain information about its children in the BFS tree, in order to correctly compute aggregates, and it performs the actual aggregation..GAP is event-driven. This reduces traffic overhead at the expense of self-stabilization, and it introduces some twists to ensure that topology changes are properly handled.

- While GAP also proposes a continuous monitoring strategy similar to SOLOMON, there a few key differences.
- Sending messages using UDP would imply that the packet loss rate in the network would significantly affect performance of GAP.
- In SOLOMON, even though packets are sent unreliably using UDP, message redundancy is obtained via gossiping to offset packet losses.
- It note that in the SOLOMON paradigm there is a computational cost trade-off with bandwidth (or network messaging overhead), but it assume that this computational overhead is negligible.

Table 1: Node status Indication

Node	Status	Level	Weight
n_1	*child*	4	312
n_2	*self*	3	411
n_3	*parent*	2	7955
n_4	*child*	4	33
n_5	*peer*	4	567

The each loop iteration consists of three phases:

1. Get the next message and update table accordingly.

2. Update the neighborhood table to take the newly received information into account.

3. Notify neighbors of state changes as necessary. In

Particularlly, when a new node has been registered, the update vector must be sent to it to establish connection, and when the update vector is seen to have changed and sufficient time has lapsed, the new update vector is broadcast to the known neighbors.

VII.IMPLEMENTATION TECHNIQUES FOR BLUETOOTH IN AD-HOC NETWORKS

The current software with the Bluetooth is available for MANETs but it is not QoS compliant. The current software is based on the mobile development of the Ericson compliant mobiles. These approaches are a policy-driven approach which uses UDP, SNMP, MIB, ASN, PBNM, PECAN and Guerila.. It is based on SOLOMON protocol. The architecture is as follows.

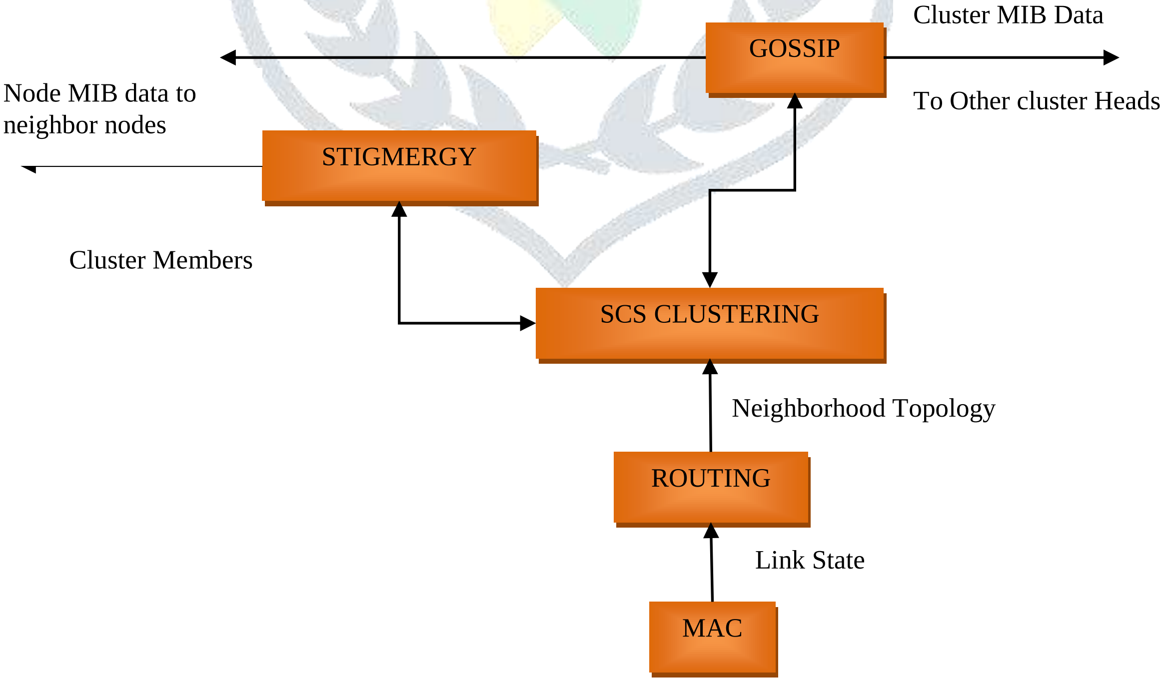

Fig 3: SOLOMON Protocol System

The module is intended for developing the core interface for communication. This includes automatic detection of nodes in the Bluetooth range. Data sending, data receiving ..etc., This module is the concrete implementation of JSR 85 optional package, typically known as Buletooth Optional Package for J2ME given in JSR 86 specification. This module provides the user to enter the message with in the mobile phone to transmit across the Bluetooth MANET. The user can type the message in the text box provided and can save the message. He can also select the nodes that required sending the message. This works as a separate thread in the system that always looks at the nodes that are connected to the MANET. It always continuously connected to the Bluetooth implementation module. It uses different routing algorithms to send the message in the network. It dynamically builds the fast changing network topology.

VIII.CONCLUSION

This paper focused on a self-organizing architecture for managing adhoc networks with minimal overhead and complexity while satisfying latency criteria. It demonstrates that existing NM techniques such as SNMP do not adapt well in a wireless adhoc environment for mission-critical networks with stringent bandwidth and latency requirements. It also show that the distributed architecture of SOLOMON delivers superior performance in terms of lower overhead, faster convergence, higher reliability and improved fault tolerance. Future work in this area will focus on performance analysis for mobile networks and adaptive parameter configuration for optimal performance across network scale and traffic load.

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