Available Online at www.ijcsmc.com

International Journal of Computer Science and Mobile Computing

A Monthly Journal of Computer Science and Information Technology

ISSN 2320–088X

IJCSMC, Vol. 3, Issue. 2, February 2014, pg.546 – 551

RESEARCH ARTICLE

An Approach for Minimization of Power Consumption in Ad-Hoc Network

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Abstract— The mobile phones that have rich media and wireless networking capabilities has ushered in a new paradigm in mobile computing with new emerging social behaviours. New enabling technologies now allow users to search, locate, download, and share dynamically created content with friends and family from their mobile devices. With ad hoc networking capabilities in mobile devices, we are beginning to see the above trend shift from wide-area communities of users to dense local area social situations such a shift presents opportunities to design proximity aware systems that deliver novel social experiences. For example, fans watching a football game can automatically share pictures taken on their mobile phones with each other, while commenting/rating pictures being taken around them. Designing systems for ad hoc environments presents several interesting research challenges, including the difficult problem of providing scalable, energy efficient presence and content updates. To keep information fresh in such environments, the distribution mechanisms have to focus on frequent, small metadata updates rather than large infrequent payloads, which could also be a cause of significant battery drain from a mobile device.

Keywords— Networks Security (NS); Computer Science(CS); Ad-hoc networks; Energy efficiency; Power control; Synchronization

I. INTRODUCTION

During the last few years we have all witnessed continuously increasing growth in the deployment of wireless and mobile communication networks. Ad hoc networks consist of nodes that are able to communicate through the use of wireless mediums and form dynamic topologies. The basic characteristic of these networks is the complete lack of any kind of infrastructure, and therefore the absence of dedicated nodes that provide network management operations like the traditional routers in fixed networks The rapid development of small, cheap and computationally powerful devices and major advancement in short range wireless communication technologies have increasingly made it possible to build scalable and efficient ad hoc network. This project is to minimize and synchronize the transmissions of nodes periodically to optimize the power consumption in Ad-hoc network. In order to maintain connectivity in an ad hoc network all participating nodes have to perform routing of network traffic. Ad hoc networks consist of nodes that are able to communicate through the use of wireless mediums and form dynamic topologies. "IEEE 802.11 ad-hoc Wireless LAN (WLAN) consists of stations (STAs) that transmit independently without any centralized control. Probability of collisions is reduced by delaying transmission by following a random exponential back off algorithm." The energy consumption required for a transmitter usually increases dramatically with the distance, and that for a receiver is considered as a constant. Because such a node is usually battery-powered, there is a strong demand in power-aware routing, and a number of research results were reported.

In this paper, we propose and implemented the synchronization of nodes and its minimization of power using the combination of three protocols. Content and Presence Multicast Protocol (CPMP) which nodes use to send updates to their neighbours. It also addresses the energy efficiency problem by synchronizing the transmission times of all the nodes in the system. Rating based algorithm (RBA) that rates neighbours based on the consistency of their behaviour. By favouring well-behaved nodes in the synchronization process, we show that RBA quickly stabilizes the synchronization process and reduces the number of lost updates by 85 percent.

II. BACKGROUND

Network coding is an elegant and novel technique to improve network throughput and performance in wireless network. Because of broadcasting nature of wireless, network coding is more effective. The principal of network coding is to allow intermediate nodes between the source node and receivers to encode packets.

In recent years, various network coding methods have been proposed to enhance the performance of P2P system. In the network coding method, in each transmission a sender needs to send a packet to another sender, the source client creates and sends a linear combination of all the information available to it (similarly to XORing multiple packets)

After clients receive enough linearly independent combinations of packets, they can reconstruct the original information. Network coding can reduce the number of transmission for the communication which can lead the faster transmission as well as save the bandwidth.

III. RELATED WORK

A. Performance of Cooperative Protection:

In this section we analyse the performance improvement of` cooperation in detecting corrupted blocks of information when network coding is used. Cooperative scheme performs significantly better compared to non-cooperative schemes.

We notice that a cooperative scheme provides significant benefits when content is encoded in the network but also when content is not encoded at all.

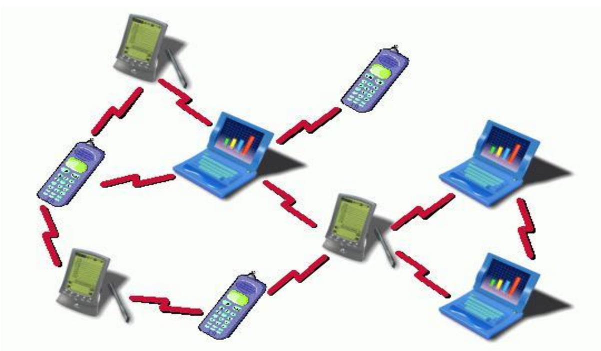


Fig. 1: This fig. implies the demonstration of basic ad-hoc network where different nodes are connected in a network which is decentralized in nature

B. ***CPMP Protocol***

Proposing the CPMP to support social content consumption experiences. CPMP provides a framework for periodically communicating information about what content is currently being consumed and what content is being sought for future consumption at each participating node[5]. Our goal was to make the protocol efficient and scalable while including features intended to support synchronization of presence message transmissions.[5] CPMP messages are transmitted periodically to inform nearby devices of updated content presence information using IP multicast[5]. CPMP headers have the following format "CPMP; device identifier; TX;" containing aTX field specifying the number of seconds in which to expect a new CPMP message from the node specified by device identifier. Note that this does not include any redundant transmissions of the current message—if retransmission is used to improve reliability, each retransmission must update the TX field so that it accurately reflects the delay until the new message will be transmitted.[5] By transmitting CPMP messages at approximately the same time CPMP messages are expected, an implementation can avoid powering on the wireless LAN radio for transmissions—essentially piggybacking CPMP transmission with reception[5]. Ideally, all participating nodes will use this technique simultaneously, resulting in synchronization of CPMP activity [5]. Each message is encapsulated in a single UDP/IP message and transmitted to the CPMP multicast address. In order to avoid IP fragmentation, the protocol requires that implementations limit message sizes to the link layer maximum transmission unit.

C. ***Weight Based Synchronization***

We first describe an algorithm that uses the size of synchronization clusters as a catalyst for synchronization[8]. We call the algorithm WBS**—**weight based synchronization. As mentioned previously, at the end of each active interval, a node uses the slot Array structure to decide its next transmission time[8]. The slot Array structure has s entries, one for each slot of the next (sleep) interval. The node has to choose one of these slots, called winner slot, and synchronize with it. That is, the node has to advertise the time of its next transmission (its TX value in the CPMP update packet) such that the update packet will be placed into that winner slot by its neighbors.[8] WBS requires each node to locally maintain a variable monitoring the size of the cluster of synchronization which contains the node. [8] The variable is called the weight of the node/cluster. Initially, the weight of each node is 1. Each node includes its weight in all its CPMP updates. [8]

IV. SYSTEM DESIGN

The system designed consists of three modules:

- Networking Module
- Synchronization Data forwarding Module
- Rating Based Data Transmission Module

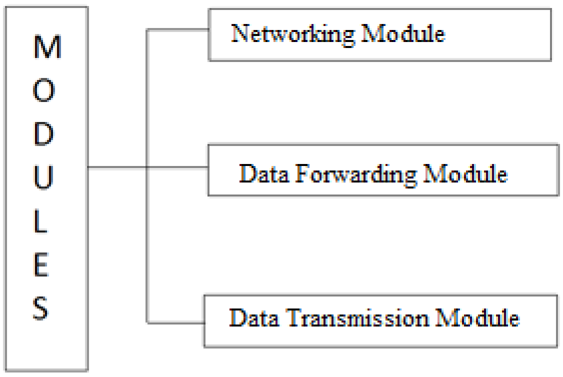


Fig. 2: System Design Modules.

*A. **Networking Module***

Client-Server computing or networking is a distributed application architecture that partitions tasks or workloads between service providers (servers) and service requesters, called clients. Often clients and servers operate over a computer network on separate hardware. A server machine is a high performance host that is running on or more server programs which share its resources with clients. A client also shares any of its resources; Client therefore initiates communication sessions with servers which await (listen to) incoming requests.

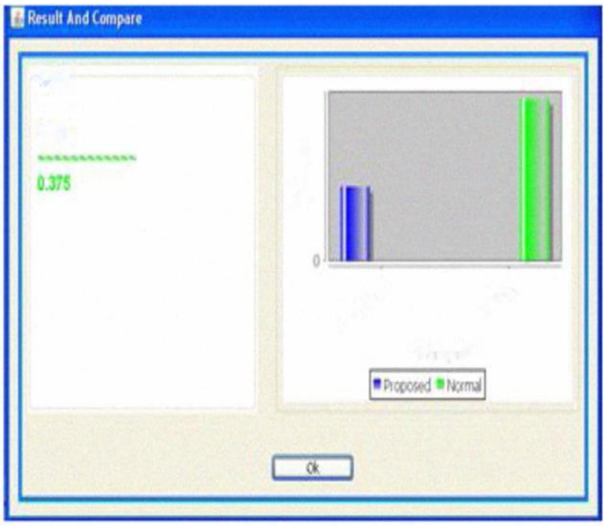
B. Synchronization Data forwarding Module

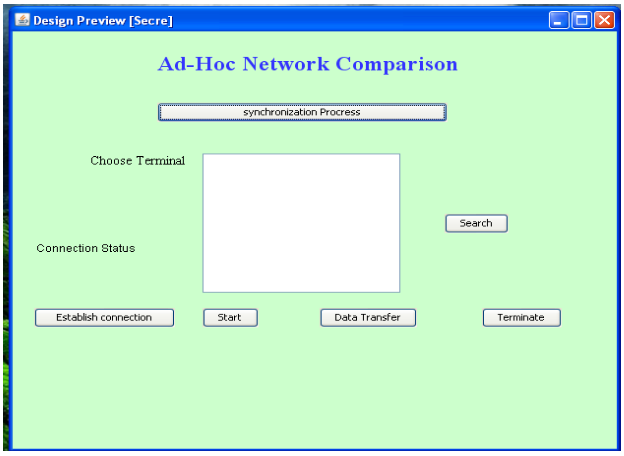
Aligning duty cycles, our algorithm synchronizes the periodic transmission of nodes[8]. This allows nodes to save battery power by switching off their network cards without missing updates from their neighbours.

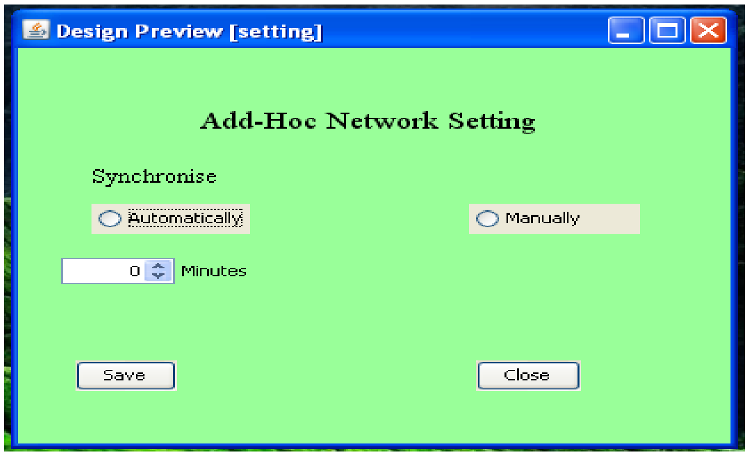
*C. **Rating Based Data Transmission Module***

We device a Rating Based Algorithm that rates neighbours based on the consistency of their behaviours. By favouring well behaved nodes in the synchronization process [8], we show that RBA quickly stabilizes the synchronization process and reduces the number of lost update by 85 percent. RBA requires each node to build statistics of its neighbour's Transmission stability [5]: a neighbour that consistently sends its CPMP updates in the same slot is considered more stable than a node that regularly changes slots [5]. In effect, each node is building a rating value for each neighbour. Ratings are used only locally and are not propagated to neighbours. After an active interval, a node will synchronize with the slot in which the packet from the highest rated neighbour has been placed. Thus, neighbours with lower ratings [5] (e.g., newly seen or unstable) will have little chance to influence the synchronization process.[5]
The ratings are built as follows:
When a node A receives a packet from a neighbour B, if the It is important to note that the decision on which packets to generate and send at given node does not require for nodes to keep information about what the other nodes in the network are doing, or how the information should propagate in the network, so it allows to take advantage of the broadcasting capabilities of the shared wireless medium to provide benefits in terms of bandwidth, transmission power, and delay [5]. It can offer benefits in terms of reliability against channel errors and security. Packet's slot coincides with B's previous transmission slot, B's rating is incremented. If not, B's rating is dropped to zero. Note that B's rating is set to zero also if B misses one transmission or if B is a newly seen neighbour. In order to prevent impersonation attacks [5], we also extend the CPMP to include minimal overhead authentication information. While this additional data does not prove that the node is who it claims to be, it allows its neighbors to make a reasoning of the form: "this packet was sent by the same device that has sent a similar packet one interval ago."

V. SCREEN SHOTS







VI. CONCLUSION

An Approach for Minimization of Power Consumption is very usable and reduces total power consumed by Ad-hoc network. , we have studied the important issue of power management in Ad-hoc network as wireless communication. The goal of this paper is not to address the issue of prediction, but provide the mechanism by which predictive algorithms can be used to adjust power management parameters; in particular the timeout and sleep duration parameters in our implementation.

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