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Multicasting with Localized Control in Wireless Ad Hoc Networks

[1]k.Ravikumar, [2]c.Thangamalar

[1]Asst.professor and, UGC-NET Co-ordinator, Dept.of.Computer science, Tamil University (Established by the Govt.of.Tamilnadu), Thanjavur-613010.

[2] Asst.professor and Head. Department of Computer science

Rajagiri Dawood Batcha College of Arts and Science Papanasam

Abstract:

The problem of broadcasting in an ad - hoc wireless network where all nodes of the network are sources that want to transmit information to all other nodes. Here the figure of merit is energy efficiency, a critical dcesign parameter for wireless networks since it directly affects battery life and thus network lifetime. To prove that, applying ideas from network cryptogram allows realizing significant benefits in terms of energy efficiency for the problem of broadcasting, and proposing very simple algorithms that allow realizing ting, and proposing very simple algorithms that allow raptly for some canonical configurations. Then it is shown that in network these benefits in practice. In particular, the theoretical analysis shows that network coding improves performance by a constant factor in fixed networks. This factor is calculated exactly for some canonical configurations. Then it is shown that in networks where the topology dynamically changes, for example due to mobility, and where operations are restricted to simple distributed algorithms, network cryptogram can offer improvements of a factor of , where is the number of nodes in the network. The insights gained from the theoretical analysis is used to propose low-complexity distributed algorithms for realistic wireless ad- hoc scenarios, discuss a number of Practical considerations, and evaluate the algorithms through packet level simulation.

Keyword- Multicast, Wireless ad hoc networks, mobile ad hoc networks

1. INTRODUCTION

WIRELESS ad hoc networks such as mobile ad hoc networks and wireless mesh networks are self organized and usually without centralized control. Protocols in such networks are also required to be distributed for robustness and scalability. If a distributed protocol only relies on local information and local actions for fulfilling its functionality, then the protocol is also localized. In the sense of using only local resources, a localized protocol is usually efficient and scalable, which are the basic characteristics required for protocols in wireless ad hoc networks. This paper investigates localized mechanisms to support multicasting in wireless ad hoc networks without throttling unicast flows.

2. PROPOSED SYSTEM

This project presents a fully localized scheme to support multicasting in wireless ad hoc networks and ensures unicast flows their shares of bandwidth on a link.

This project investigates how to support multicasting in wireless ad hoc networks without throttling the dominant unicast flows. Unicast flows are usually congestion-controlled with protocols like TCP. However, there are no such protocols for multicast flows in wireless ad hoc networks and multicast flows can therefore cause severe congestion and throttle TCP-like flows in these environments. Based on a cross-layer approach, this paper proposes a completely-localized scheme to prevent multicast flows from causing severe congestion and the associated deleterious effects on other flows in wireless ad hoc networks.

The proposed scheme combines the layered multicast concept with the routing-based congestion avoidance idea to reduce the aggregated rate of multicast flows when they use excessive bandwidth on a wireless link. Our analysis and extensive simulations show that the fully-localized scheme proposed in this paper is effective in ensuring the fairness of bandwidth sharing between multicast and unicast flows in wireless ad hoc networks.

One of the basic elements required for multicasting in wireless ad - hoc networks is multicast routing. Similar to a unicast packet, a multicast packet relies on the underlying routing protocol to reach its destinations.

There are two routing protocols for multicasting in wireless ad hoc networks

- MAODV
- ODMRP

The above two protocols only set up routing information in nodes but do not have other controls over flows, such as congestion control. Although there have been many efforts at creating multicast transport protocols, no mature protocols have emerged yet, even for wireline networks, due to the difficulties posed by the multiple-receiver characteristic of multicasting.

Existing multicast congestion control schemes largely fall into two categories:

- Single rate
- Multi rate

Single-rate schemes such as have poor performance in intra session fairness (i.e., the fairness between receivers in the same session) as compared to multirate schemes.

This is because in single-rate schemes, the transmission rate of a multicast session is usually decided by the receiver with the lowest path rate.

Multirate schemes such as can achieve much better intra session fairness because with these schemes, each receiver has some freedom to choose a rate appropriate for itself.

Existing multirate protocols, such as Receiver-driven Layered Multicast (RLM), cannot ensure fairness with TCP and even in wireline networks.

To address the unfairness issue of RLM adopts two strategies, namely

- Synchronization points
- Probe bursts

Wave and Equation Based Rate Control (WEBRC) protocol

WEBRC relies on round-trip times and waves to approach fairness with TCP.

It needs further investigation on how impreciseness of round-trip times would impact the performance of the protocol.

In wireless ad hoc networks, the unfairness situation becomes more severe with existing multicast congestion control protocols.

The wireless links of wireless ad hoc networks are prone to errors. High link-error rates usually interfere with congestion control.

Wireless links can have much longer link delays than wireline links dueto the difficulties of medium access control in wireless environments. Long link delays adversely impact multicast congestion control due to increased delays for control messages.

Wireless links usually have low effective link bandwidth. Therefore, competition for bandwidth is more severe.

2.1 Disadvantage

They cannot ensure fairness

It will be extremely difficult, if not impossible; to create an end-to-end congestion control scheme that is effective and TCP friendly for multicasting in wireless ad hoc networks.

3. INTENTION

The main objective of this work is to maximize the energy efficiency and thus it improves the battery life and thus the network lifetime.

4. MOTIVATION

4.1 Throughput

Network cryptogram increases wireless throughput because coding allows the coders to compress the transmitted packets based on information that are known at various nodes. By matching what each neighbor has with what another neighbor wants, a coder can deliver multiple packets to different sources in a single transmission.

4.2 Reliability

Network cryptogram gives new approach to reliability. As the result of mixing information, there are no special packets. We want to use network cryptogram; we usually do not care about individual packets. A source needs to inform us only if it receives enough packets to encode the transmitted file. There is also one additional benefit, because of improved reliability we also improve throughput of the network

4.3 Mobility

Network cryptogram can improve mobility inside a wireless network Because of dynamics of wireless networks, routing updates are costly. We can get rid of the need of tracking the quickly changing topology in a wireless network.

4.4 Monitoring

Network cryptogram can be exploited to better monitor the link loss rate in wireless networks

4.5 Network cryptogram is also providing the following benefit:

- Energy-Efficiency
- Low latency
- High network lifetime
- High battery lifetime

Alternative to forward error correction and ARQ in traditional and wireless networks. E.g.: Multi-user ARQ Robust and resilient to network attacks like snooping, eavesdropping or replay attacks Digital file distribution and P2P file sharing. eg: Avalanche from Microsoft Throughput increase in wireless mesh networks. Eg: COPE Coding-Aware Routing Bidirectional low energy transmission in wireless sensor networks. Many-to-many broadcast network capacity augmentations. Buffer and Delay reduction in spatial sensor networks: Spatial Buffer Multiplexing.

5. MODULE DESCRIPTION

1. Creating Ad-Hoc Environment
2. Broadcasting Using Dynamic Source Routing
3. Broadcasting using Network cryptogram
4. Energy Efficiency Comparison between DSR and Network cryptogram

5.1 Module 1

In first module, at first we create an Ad hoc environment. The environment setup can be in rectangular area. The nodes in the environment can be aligned in Random Access method. It means each node consists of four neighbor nodes. It can be fixed through mesh topology.

5.2 Module 2

F In second module, multicasting can be discussed. Here all nodes can be connected to each other and based on the token ring concept. In this module we apply the existing algorithm (On-Demand Distance Vector Routing Protocol). It is based on the distance calculation between the nodes.

5.3 Module 3

The third module is about our proposed system.(Fully Localized Scheme). It allows realizing significant benefits in terms of avoid traffic and identify the alternate path for the transaction. Our proposing method is a very simple scheme that allows realizing these benefits in addition.

5.4 Module 4

The final module is the result analysis. Here by using the Fully Localized Scheme instead of On-Demand Distance Vector Routing Protocol. it is used to avoid the network traffic, and identify the alternate path.

5.5 Economical Feasibility:

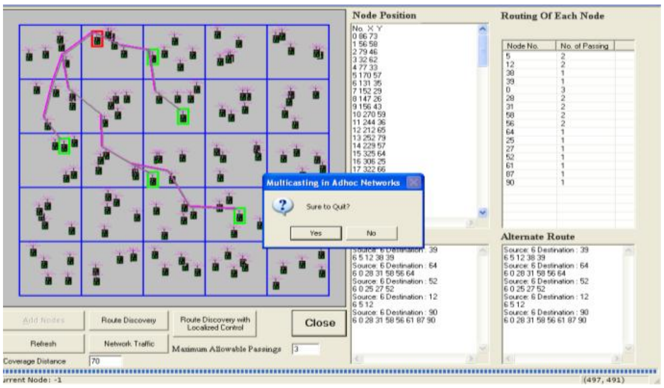
Economic or final feasibility is the second part of resource determination the basic resources to consider are:

- Time Management
- Time spent by the system analysis team
- Cost of doing the full system study
- Estimate cost of the hardware
- Estimated cost of software and software development

5.6 Operational Feasibility:

The operational feasibility is dependent upon determining the human resources for the project. The operational feasibility of the application has been found perfect since it functioned properly and as expected in the testing environment. So it ensures proper functioning even after implementation.

6. IMPLEMENTATION



Implementation is the stage of the project when the theoretical design is turned to a working system. The implementation stage is a systems project in its own right. It involves proper planning, investigation of the current system and its constraints on implementation, design of methods to achieve the change overtraining of staff in the change over products.

7. CONCLUSION

This project has presented a fully localized scheme to support multicasting in wireless ad hoc networks such as mobile ad hoc networks and ensures unicast flows their shares of bandwidth on a link. Existing multicast congestion control schemes are usually designed for wireline networks. Meanwhile, they cannot ensure fairness with TCP. Wireless ad hoc networks pose more serious challenges for those schemes because wireless ad hoc networks have limited bandwidth, significant channel access delays, and high link error rates. Instead of relying on end-to-end schemes for supporting multicasting in wireless ad hoc networks, this paper, based on a cross-layer approach, proposes a fully localized scheme that protects unicast flows from being throttled by multicast flows in wireless and mobile ad hoc networks. The proposed scheme combines layered multicast with routing-based congestion control to achieve its goals in a fully localized way. Our analysis and extensive simulations show that the proposed scheme is effective in facilitating multicasting in wireless ad hoc networks while preventing unicast flows from being throttled.

8. FUTURE WORK

Besides the purely end-to-end multicast congestion control schemes introduced in the first section of this paper, there are also some network-assisted congestion control schemes proposed for layered multicast in the literature. Sarkar and Tassiulas propose a new scheduling policy, where flows are served in a round-robin manner in each link based on feedback from immediate downstream links. When a flow is sampled, it is served only if at least one of the immediate downstream links is not congested and able to accept packets from the flow. Analyze and compare in two different dropping policies for layered video, namely uniform dropping and priority dropping, and show that priority dropping performs better in general than uniform dropping if implementation complexity is not an issue. To reduce the complexity of priority dropping, the layered multicast scheme proposed in considers only two levels of priority among layers. Receivers map one layer as low priority something like a "buffer" to absorb losses. the losses of the flow on the bottleneck to the low priority layer. Therefore, the low priority layer serves as and all other layers as high priority. Routers then confine

9. REFERENCES

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