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SPATIAL REUSABILITY AWARE ROUTING IN MULTI-HOP WIRELESS NETWORK

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ABSTRACT
In this spatial reusability aware routing in multi-hop wireless networks is to achieve high end-to-end throughput , By considering spatial reusability of the wireless communication end throughput, it is crucial to find the "best" path from the source node to the destination node. Although a large number of routing protocols have been proposed to find the path with minimum total transmission count/time for delivering a single packet, such transmission count/time minimizing protocols cannot be guaranteed to achieve maximum end-to-end throughput. By this project we can tremendously improve the end-to-end throughput in multi-hop wireless networks. To support our argument, we propose spatial reusability-aware single-path routing (SASR) and any path routing (SAAR) protocols, and compare them with existing single-path routing and any path routing protocols, respectively. Our evaluation results show that our protocols significantly improve the end-to-end throughput compared with existing protocols.

LITERATURE SURVEY

2.1 A multi-radio unification protocol for IEEE 802.11 wireless networks

AUTHORS: A. Adya, P. Bahl, J. Padhye, A. Wolman, and L. Zhou

We present a link layer protocol called the multi-radio unification protocol or MUP. On a single node, MUP coordinates the operation of multiple wireless network cards tuned to non-overlapping frequency channels. The goal of MUP is to optimize local spectrum usage via intelligent channel selection in a multihopwireless network. MUP works with standard-compliant IEEE 802.11 hardware, does not require changes to applications or higher-level protocols, and can be deployed incrementally. The primary usage scenario for MUP is a multihop community wireless mesh network, where cost of the radios and battery consumption are not limiting factors. We describe the design and implementation of MUP, and analyze its performance using both simulations and measurements based on our implementation. Our results show that under dynamic traffic patterns with realistic topologies, MUP significantly improves both

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TCP throughput and user perceived latency for realistic workloads.

2.2 A performance comparison of multi-hop wireless ad hoc network routing protocols

AUTHORS: J. Broch, D. A. Maltz, D. B Johnson, Y.-C. Hu, and J. G. Jetcheva

An ad hoc network is a collection of wireless mobile nodes dynamically forming a temporary network without the use of any existing network infrastructure or centralized administration. Due to the limited transmission range of wireless network interfaces, multiple network "hops" may be needed for one node to exchange data with another across the network. In recent years, a variety of new routing protocols targeted specifically at this environment have been developed, but little performance information on each protocol and no realistic performance comparison between them is available. This paper presents the results of a detailed packet-level simulation comparing four multi-hop wireless ad hoc network routing protocols that cover a range of design choices: DSDV, TORA, DSR, and AODV. We have extended the ns-2 network simulator to accurately model the MAC and physical-layer behavior of the IEEE 802.11 wireless LAN standard, including a realistic wireless transmission channel model, and present the results of simulations of networks of 50 mobile nodes.

EXISTING SYSTEM

- ❖ Most of existing routing protocols, no matter single path routing protocols or any path routing protocols, rely on link-quality aware routing metrics, such as link transmission count-based metrics and link transmission time-based metrics (e.g., ETT and EATT). They simply select the (any) path that minimizes the overall transmission counts or transmission time for delivering a packet.
- ❖ Zhang et al. formulated joint routing and scheduling into an optimization problem, and solved the problem with a column generation method.
- ❖ Pan et al. dealt with the joint problem in cognitive radio networks considering the vacancy of licensed bands.
- ❖ Jones et al. implemented k-tuple network coding and proved throughput optimality of their policy.

DISADVANTAGES OF EXISTING SYSTEM:

- ❖ A fundamental problem with existing wireless routing protocols is that minimizing the overall number (or time) of transmissions to deliver a single packet from a source node to a destination node does not necessarily maximize the end-to-end throughput.
- ❖ Most of the existing routing protocols do not take spatial reusability of the wireless communication media into account.

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❖ They need centralized control to realize MAC-layer scheduling, and to eliminate transmission contention.

PROPOSED SYSTEM:

❖ In this paper, we investigate two kinds of routing protocols, including single-path routing and anypath routing. The task of a single-path routing protocol is to select a cost minimizing path, along which the packets are delivered from the source node to the destination node.

❖ In this primer work, we argue that by carefully considering spatial reusability of the wireless communication media, we can tremendously improve the end-to-end throughput in Multihop wireless networks.

❖ The algorithms proposed in this work do not require any scheduling, and the SASR algorithms can be implemented in a distributed manner

MODULES DESCRIPTION

System Construction Module

We consider a static multi-hop wireless network with a set of N nodes. For clarity, we assume that the nodes use the same transmission rate, and do not employ any power control scheme in this work.Since wireless signal fades in the process of propagation, two wireless (hyper-)links can work simultaneously, if they are spatially far enough from each other. We define non-interfering set I, in which any pair of (hyper-) links are out of the interference range of each other, i.e., the (hyper-)links in the same non-interfering set can work at the same time.

Cost Minimizing

This module is used by users for minimizing the cost of file transferring process from sender to receiver. Path cost minimizing collection reflects the best possible performance of the path. Then, the path with the smallest cost can be selected.

In spatial reusability-aware path cost evaluation for single-path routing a given each of the paths found by an existing source routing protocol (e.g., DSR), our SASR algorithm calculates the spatial reusability aware path cost of it. Then, the path with the smallest cost can be selected.

In SpatialReusability-Aware Single-Path Routing we propose the First-Fit Algorithm for Min-Cost Fusion all the maximal non-interfering set on path P needs time, which is still inefficient when the path P is long. Therefore, we propose a first-fit algorithm, namely SASR-FF, which can achieve good performance in most of the cases.

In Spatial Reusability-Aware Anypath Routing we present the spatial reusability-aware anypath routing algorithm. Since finding the minimized end to-end cost considering the spatial reusability is NP-hard, our algorithm SAAR is designed to calculate a suboptimal route, which can achieve superior performance to existing anypath routing protocols in most of the cases.

Shortest path

This module is used to choose a shortest path in spatial reusability aware single-path routing as a binary program and propose two complementary categories of algorithms for path selection.SASR-MIN tends to exploit the best performance of the paths, the other category (SASR-MAX) evaluates the performance of the paths in the worst case. Given each of the paths found by an existing source routing protocol (e.g., DSR, our SASR algorithm calculates the spatial reusability aware path cost of it. Then, the path with the smallest cost can be selected.

Here we use approximation algorithm for finding the path delivery time minimizing collection of non-interfering sets, namely SASRMIN algorithm, when the collection of all the maximal non interfering sets on path P can be calculated efficiently.

CONCLUSION

In this project, we have demonstrated that we can significantlyimprove the end-to-end throughput in multi-hop wireless networks, by carefully considering spatial reusability of the wireless communication media. We have presented two protocols, SASR and SAAR, for spatial reusability-aware single-path routing and any path routing ,respectively. We have also implemented our protocols, and compared them with existing routing protocols with the data rates of 11 and 54 Mbps. Evaluation results show that SASR and SAAR algorithms can achieve moresignificant end-to-end throughput gains under higher data rates. For the case of single-flow, SASR achieves a throughput gain of as high as 5:3 under 54 Mbps, while for SAAR, the maximum gain can reach 71:6 percent. Furthermore, in multi-flow case, SASR can also improve the per-flow average throughputs by more than 20 percent. Meanwhile, the tremendous throughput gains onlyrequire acceptable additional transmission overheads.The extra transmission overheads of route request areless than10 percent in our evaluation. In 80 percentcases, the overall transmission counts are increased byno more than two with SASR.

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