IPHV1I90005x
International Journal Of Advanced Research and Innovations Vol.1, Issue .9
ISSN Online: 2319 – 9253
Print: 2319 – 9245

Usage of Cooperative Communication in Mobile Adhoc Networks

MA.SHUKOOR[1] B.SAHADEV[2] P.PRADEEP KUMAR[3]

1. [M.Tech(cs)], Dept. of Computer Science, Vivekananda Institute of Technology, Karimnagar
2. Sr. Asst. Professor , Dept. of Computer Science, Vivekananda Institute of Technology, Karimnagar
3. Professor, Dept. of Computer Science, Vivekananda Institute of Technology, Karimnagar

ABSTRACT

Now a day's wireless network has increased its era tremendously in cooperative communication. The article focuses on cooperative communication with physical layer and network layer issues like routing , congestion, topology etc., we fallow and suppose capacity optimized cooperative topology control scheme to improve the network capacity in mobile adhoc networks. In this topology considers the main issues of physical layer communications and network capacity. The proposed topology control scheme can substantially improve the network capacity in MANETs with cooperative communications.

Key words: MANETs, Cooperative Communication, topology, network capacity.

Introduction-Wireless networks

Wireless communication characteristics (when compared to wireline networks) Higher interference, resulting in lower reliability

- ○ Infrared signals suffer interference from sunlight/heat sources and can be shielded by some types of objects and materials
- ○ Radio signals can suffer interference from other electrical devices
- ○ Self-interference due to multipath transmission
- ○ Lower bandwidth
- • Degraded quality of service
- • Higher jitter, delays, and longer connection setup times
- ○ Highly variable network characteristics
- ▪ Higher data loss rates due to interference
- ▪ Frequent disconnection due to device movement
- ▪ Communication channel used can change
- ▪ Received power diminishes with distance

Types of Wireless Networks

- • Categorized by network construction method
- ○ Infrastructure-based network
- ○ Infrastructureless network
- ▪ Ad hoc network
- ▪ Network formed dynamically through cooperation of independent nodes
- ▪ No preexisting network infrastructure
- ▪ Notebook PCs with 802.11b interfaces can form an independent infrastructureless network
- ▪ Subtype: mobile ad hoc network (MANET)
- • Nodes are expected to serve as routers and take part in route discovery and maintenance
- • Categorized by coverage area

- Wireless wide area network (WWAN)
  - Infrastructure-based networks relying on base stations with high power outputs
  - Connections made over large geographical areas
  - Uses multiple antenna sites and/or satellite systems maintained by wireless service providers
  - Example: cellular networks such as GSM or CDMA networks
- Wireless metropolitan area network (WMAN)
  - Sometimes referred to as “fixed wireless”
  - Infrastructure-based networks operating within a metropolitan area

EXISTING WORK

Although some works have been done on cooperative communications, most existing works are focused on link-level physical layer issues, such as outage probability and outage capacity. Consequently, the impacts of cooperative communications on network-level upper layer issues, such as topology control , routing and network capacity, are largely ignored. Indeed, most of current works on wireless networks attempt to create, adapt, and manage a network on a maze of point-to-point noncooperative wireless links. Such architectures can be seen as complex networks of simple links. However, recent advances in cooperative communications will offer a number of advantages in flexibility over traditional techniques. Cooperation alleviates certain networking problems, such as collision resolution and routing, and allows for simpler networks of more complex links, rather than complicated networks of simple links.

Therefore, many upper layer aspects of cooperative communications merit further research, e.g., the impacts on topology control and network capacity, especially in mobile ad hoc networks (MANETs), which can establish a dynamic network without a fixed infrastructure. A node in MANETs can function both as a network router for routing packets from the other nodes and as a network host for transmitting and receiving data. MANETs are particularly useful when a reliable fixed or mobile infrastructure is not available. Instant conferences between notebook PC users, military applications, emergency operations.

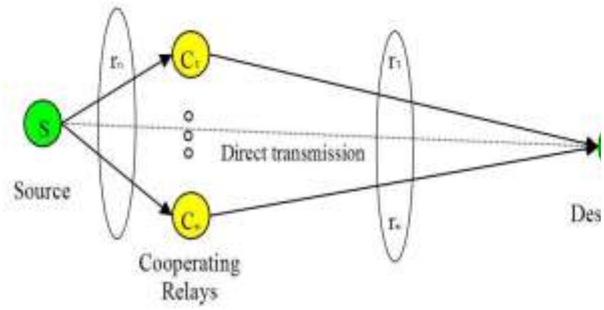
Most existing works are focused on link-level physical layer issues, such as outage probability and outage capacity. Consequently, the impacts of cooperative communications on network-level upper layer issues, such as topology control, routing and network capacity, are largely ignored. Indeed, most of current works on wireless networks attempt to create, adapt, and manage a network on a maze of point-to-point non-cooperative wireless links. Such architectures can be seen as complex networks of simple links.

Disadvantages

1. Low Network Capacity.
2. Communications are focused on physical layer issues, such as decreasing outage probability and increasing outage capacity, which are only link-wide metrics.

International Journal Of Advanced Research and Innovations Vol.1, Issue .9
ISSN Online: 2319 – 9253
Print: 2319 – 9245

ARCHITECTURE



TOPOLOGY

CAPACITY-OPTIMIZED COOPERATIVE (COCO)

A Capacity-Optimized Cooperative (COCO) topology control scheme to improve the network capacity in MANETs by jointly optimizing transmission mode selection, relay node selection, and interference control in MANETs with cooperative communications through simulations, we show that physical layer cooperative communications have significant impacts on the network capacity, and the proposed topology control scheme can substantially improve the network capacity in MANETs with cooperative communications.

PROPOSED SCHEME

We suppose a Capacity-Optimized Cooperative (COCO) topology control scheme to improve the network capacity in MANETs by jointly considering both upper layer network capacity and physical layer cooperative communications. Through simulations, we show that physical layer cooperative communications have significant impacts on the network capacity, and the proposed topology control scheme can substantially improve the network capacity in MANETs with cooperative communications.

Advantages

1. Improve the network capacity in MANETs.
2. Dynamic traffic pattern and dynamic network without a fixed infrastructure.
3. There are a source, a destination and several relay nodes.
4. Cooperation can benefit not only the physical layer, but the whole network in many different aspects.

MODULES

1. Transmission in MANETs
2. Network Constraints
3. Relaying Strategies
4. Cooperative Communications
5. Multi-hop Transmission

1. TRANSMISSION IN MANETS

With physical layer cooperative communications, there are three transmissions manners in MANETs: direct transmissions, multi-hop transmissions and cooperative transmissions. Direct transmissions and multi-hop transmissions can be regarded as special types of cooperative transmissions. A direct transmission utilizes no relays while a multi-hop transmission does not combine signals at the destination. The cooperative channel is a virtual multiple-input single-output (MISO) channel, where spatially distributed nodes are coordinated to form a virtual antenna to emulate multi antenna transceivers.

2. NETWORK CONSTRAINTS

Two constraint conditions need to be taken into consideration in the proposed COCO topology control scheme. One *is network connectivity*, which is the basic requirement in topology control. The *end-to-end network connectivity* is guaranteed via a hop-by-hop manner in the objective function.

Every node is in charge of the connections to all its neighbors. If all the neighbor connections are guaranteed, the end-to-end connectivity in the whole network can be preserved. The other aspect that determines network capacity is the path length. An end-to-end transmission that traverses more hops will import more data packets into the network. Although path length is mainly determined by routing, COCO limits dividing a long link into too many hops locally. The limitation is two hops due to the fact that only two-hop relaying are adopted.

3. RELAYING STRATEGIES

Amplify-and-forward

Decode-and-forward

In amplify-and-forward, the relay nodes simply boost the energy of the signal received from the sender and retransmit it to the receiver. In decode-and forward, the relay nodes will perform physical-layer decoding and then forward the decoding result to the destinations. If multiple nodes are available for cooperation, their antennas can employ a space-time code in transmitting the relay signals. It is shown that cooperation at the physical layer can achieve full levels of diversity similar to a MIMO system, and hence can reduce the interference and increase the connectivity of wireless networks.

4. COOPERATIVE COMMUNICATIONS

Cooperative transmissions via a cooperative diversity occupying two consecutive slots the destination combines the two signals from the source and the relay to decode the information. Cooperative communications are due to the increased understanding of the benefits of multiple antenna systems. Although multiple-input multiple-output (MIMO) systems have been widely acknowledged, it is difficult for some wireless mobile devices to support multiple antennas due to the size and cost constraints. Recent studies show that cooperative communications allow single antenna devices to work together to exploit the spatial diversity and reap the benefits of MIMO systems such as resistance to fading, high throughput, low transmitted power, and resilient networks.

5. MULTI-HOP TRANSMISSION

Multi-hop transmission can be illustrated using two-hop transmission. When two-hop transmission is used, two time slots are consumed. In the first slot, messages are transmitted from the source to the relay, and the messages will be forwarded to the destination in the second slot. The outage capacity of this two-hop transmission can be derived considering the outage of each hop transmission.

CONCLUSIONS

Finally we conclude that To improve the network capacity of MANETs with cooperative communications, we have supposed a Capacity-Optimized Cooperative (COCO) topology control scheme that considers both upper layer network capacity and physical layer relay selection in cooperative communications. Simulation results have shown that physical layer cooperative communications techniques have significant impacts on the performance of topology control and network capacity, and the proposed topology control scheme can substantially improve the network capacity in MANETs with cooperative communications. Future work is in progress to consider dynamic traffic patterns in the proposed scheme to further improve the performance of MANETs with cooperative communications.

REFERENCES

[1] J. Laneman, D. Tse, and G. Wornell, “Cooperative diversity in wireless networks: Efficient protocols and outage behavior,” IEEE Trans. Inform. Theory, vol. 50, no. 12, pp. 3062–3080, 2004.

[2] V. Mahinthan, L. Cai, J. Mark, and X. Shen, “Partner selection based on optimal power allocation in cooperative-diversity systems,” IEEE Trans. Veh. Tech., vol. 57, pp. 511 –520, Jan. 2008.

[3] P. H. J. Chong, F. Adachi, S. Hamalainen, and V. Leung, “Technologies in multihop cellular network,” IEEE Commun. Magazine, vol. 45, pp. 64–65, Sept. 2007.

[4] K. Woradit, T. Quek, W. Suwansantisuk, M. Win, L. Wuttisittikulkij, and H. Wymeersch, “Outage behavior of selective relaying schemes,” IEEE Trans. Wireless Commun., vol. 8, no. 8, pp. 3890–3895, 2009.

[5] P. Santi, “Topology control in wireless ad hoc and sensor networks,” ACM Computing Surveys (CSUR), vol. 37, no. 2, pp. 164–194,2005.

[6] T. Cover and A. E. Gamal, “Capacity theorems for the relay channel,” IEEE Trans. Inform. Theory, vol. 25, pp. 572–584, Sept.1979

[7] Q. Guan, S. Jiang, Q. Ding, and G. Wei, “Impact of topology control on capacity of wireless ad hoc networks,” in Proc. IEEE ICCS, (Guangzhou, P.R. China), Nov. 2008.

[8] P. Gupta and P. Kumar, “The capacity of wireless networks,” IEEE Trans. Inform. Theory, vol. 46, no. 2, pp. 388–404, 2000.

[9] A. Goldsmith, Wireless Communications. Cambridge University Press, 2005.

[10] M. Burkhart, P. von Rickenbach, R. Wattenhofer, and A. Zollinger, “Does topology control reduce interference?,” in Proc. 5th ACMInt. Symposium on Mobile Ad Hoc Networking and Computing, (Tokyo, Japan), pp. 9–19, May 2004..