IMPROVE PERFORMANCE OF MULTIHOP ROUTING IN WIRELESS NETWORKS

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Abstract- **The use of cooperative transmissions in multipath wireless networks is achieving Virtual Multiple Input Single Output (VMISO) links. The physical layer benefits translate into network level performance improvements. The improvements are nontrivial but rely on two crucial algorithmic decisions: the number of cooperating transmitters for each link and the cooperation strategy used by the transmitters. The system explore the tradeoffs in making routing decisions using analytical models and derives the key routing considerations. Finally, present an adaptive diversity routing protocol that includes algorithmic solutions to the above two decision problems and leverages VMISO links in multihop wireless network to achieve performance improvements. The proposed system evaluated by using NS2 based simulations with an enhancement of physical layer that captures the effect of VMISO link data transmissions.**

Index terms: diversity routing, cooperative transmission

I. INTRODUCTION

A mobile ad hoc network (MANET) is a self configuring network consisting of mobile hosts equipped with wireless communication devices. The transmission of a mobile host is received by all hosts within its transmission range due to the broadcast nature of wireless communication and Omni directional antennae. If two wireless hosts are out of their transmission ranges in the ad hoc networks, other mobile hosts located between them can forward their messages, which effectively build connected networks among the mobile hosts in the deployed area. Due to the mobility of wireless hosts, each host needs to be equipped with the capability of an autonomous system, or a routing function without any statically established infrastructure or centralized administration. The mobile hosts can move arbitrarily and can be turned on or off without notifying other hosts. The mobility and autonomy introduces a dynamic topology of the networks.

A (MANET) is a system of wireless mobile nodes that dynamically self organize in arbitrary and temporary network topologies. People and vehicles can thus be internetworked in areas without a pre existing communication infrastructure or when the use of such infrastructure requires wireless extension. In the mobile ad hoc network, nodes can directly communicate with all the other nodes within their radio ranges whereas nodes that not in the direct communication range use intermediate nodes to communicate with each other. In these two situations, all the nodes that have participated in the communication automatically form a wireless network, therefore this kind of wireless network can be viewed as mobile ad hoc network. The mobile ad hoc network has the following typical features is unreliability of wireless links between nodes. Because of the limited energy supply for the wireless nodes and the mobility of the nodes, the wireless links between mobile nodes in the ad hoc network are not consistent for the communication participants.

Constantly changing topology, due to the continuous motion of nodes, the topology of the mobile ad hoc network changes constantly the nodes can continuously move into and out of the radio range of the other nodes in the ad hoc network, and the routing information will be changing all the time because of the movement of the nodes. Lack of incorporation of security features in statically configured wireless routing protocol not meant for ad hoc environments. Because the topology of the ad hoc networks is changing constantly, it is necessary for each pair of adjacent nodes to incorporate in the routing issue so as to prevent some kind of potential attacks that try to make use of vulnerabilities in the statically configured routing protocol. Because of the features listed above, the mobile ad hoc networks are more prone to suffer from the malicious behaviors than the traditional wired networks. Therefore, it needs a more attention to the security issues in the mobile ad hoc networks.

Generally in the cooperative transmission [9] the signal fading is occurred due to the variation of received signal changes in transmission path and media. Cooperative diversity algorithm based upon relays amplifying their received signals or fully decoding and repeating information. these algorithms are amplify-and-forward and de- code-and-forward, respectively. These algorithms are combat multipath fading in larger networks. An alternative approach to improving bandwidth efficiency of the algorithms based upon space–time codes that allow all relays to transmit on the same subchannel and offer spatial diversity benefits without requiring feedback. The difference between decode- and-forward and amplify-and-forward that are repetition based. In first phase, the source broadcasts to its destination and all potential relays. During second phase, the other terminals relay to the destination either on orthogonal sub channels in the case of repetition –based or same sub channel in the case of space –time-coded. The system focus on slow fading and measure performance by outage probability to isolate the benefits of space diversity.

In distributed cooperative forwarding framework[5] in which packets are forwarded through cooperative links formed on the fly without the need for establishing a prior direct route, by the help of cooperation with randomized distributed space-time codes (RDSTC). The system proposes three co-operative routing mechanisms, namely Cooperative Flooding (CF), Cooperative Forwarding within Progress Region (CFPR) and CFPR with Dual Threshold (CFPR-DT). We show that our cooperative routing schemes provide improvements in total number of hops to reach the destination, while the spatial footprint is kept at a much lower level, as compared to the schemes that employ direct transmission. it is shown that the pro- posed cooperative forwarding framework enables guaranteed progress of the packets towards the final destination even for sparse networks, and provides robustness against mobility and fading with substantially reduced messaging burden as compared to direct forwarding and cooperative schemes based on direct routes.

Cooperative forwarding schemes, packets are forwarded through cooperative links formed on the fly, without the need for establishing a prior route and without any relay selection, actuation process. Distributed cooperative routing frame- work facilitates routes that reduce the total number of hops and improve the spatial reuse of the network, while providing resilience to mobility. The CF can be used as a quick node discovery mechanism instead of conventional direct flooding. it is shown that CFPR and CFPR-DT can reduce the average number of hops to reach the destination, and reduce the spatial footprint on the network.

Variety of low complexity cooperative diversity protocols [10] that can be utilized in the network that including fixed, selection, and incremental relaying. These protocols employ different types of processing by the relay terminals, as well as different types of combining at the destination terminals. For fixed relaying, the relays decode, re-encode, and retransmit the messages. selection relaying builds upon fixed relaying by allowing transmitting terminals to select a suitable cooperative (non cooperative) action Incremental relaying improves upon the spectral efficiency of both fixed and selection relaying by exploiting limited feedback from the destination and relaying only when needed.

Location aware cooperative routing [13] the cross layer problem of combining routing and cooperative diversity in multi hop, bandwidth constrained, networks with dedicated multiple access. Previous work in cooperative diversity nearly always assumes cooperation to be a positive. In the large scale multi hop network, cooperation must only be used selectively. The merit is achievable data rate between a source and destination at a fixed probability of outage. The enforcing multiple hops is detrimental to performance, since each extra hop requires bandwidth expansion. The performance can be significantly improved by incorporating a selective cooperative diversity scheme on a one hop link. On the other hand, the simulation results show that cooperative diversity does not improve performance over a dynamic routing protocol which searches for the optimal, non diversity, route. Including the search for cooperative nodes into the dynamic route search, however, does further increase flow rates by decreasing the average number of hops and thus decreasing the required bandwidth expansion.Therefore points to the importance of an integrated approach to routing and the physical layer used in cooperative networks. The routes selection algorithm is used for transfer the information in the wireless network.

Cooperative transmissions [4] combat various fading effects in wireless communications by employing multiple antennas from different nodes to achieve spatial diversity. Virtual Multiple Input Single Output is one instance of cooperative transmissions capable of achieving higher receiving SNR, which can either extend the transmission range or increase the transmission rate. While the physical layer performance of Virtual MISO has been well studied and describes the Cooperative Source Routing (CSR) protocol to convert physical layer gain into network level performance improvement. With both route request and route reply control packets being transmitted cooperatively, CSR can explore routes with high cooperative diversity. Demonstrate CSR's performance through simulation and compare CSR with other protocols. Building SISO network topology: Each node periodically broadcasts a neighbor update message via SISO transmission. Using a process similar to distance vector routing, the neighbor update messages build up a SISO network topology (SNT), where entries in SNT represent nodes that are reachable via either single hop or multi hop SISO transmissions. CSR explores the benefit cooperative transmissions where cooperatively transmitted RREQ and RREP can be received by nodes in other groups even when the group distance is large.

In this proposed system to achieve the performance improvements of communication links the cooperative communication is used. The cooperative communication consider the two algorithmic decisions: they are the number of cooperating transmitters for each link and the cooperation strategy used by the transmitters. The adaptive diversity routing protocols is used.

II. EXISTING SYSTEM

In a VMISO system, multiple transmitters transmit encoded versions of the same signal so that the error performance at the receiver is improved significantly compared to a traditional Single Input Single Output (SISO) system. In this work, we consider a specific instance of VMISO communication, where all transmitters of the array transmit with the same fixed power. In such systems, the cooperation gain directly leads to a smaller SNR requirement to achieve the same error performance. The gain in SNR in turn can be used to either increase the data rate by the use of higher order modulations or to increase communication range, thereby improving communication performance in the wireless channel. Although there are several challenges to realizing the potential of VMISO communications, the scope of this paper is restricted to routing.

First, of the different virtual array approaches, VMISO requires the lowest coordination effort because it can leverage the broadcast property of the wireless channel to distribute information to the cooperating transmitters with a single transmission. This is unlike VSIMO or VMIMO, where multiple information exchanges are required at the receiver to decode information.

Second, although VMISO allows improved data rates, the coordination overhead and complexity of channel state information and processing are significant challenges in VMIMO which do not affect VMISO.

III. PROPOSED SYSTEM

Although there are several challenges to realizing the potential of VMISO communications, the scope of this paper is restricted to routing. In this context, investigate the benefits achievable when using VMISO in a multihop wireless network. While there have been several related works that discuss how cooperative diversity can improve performance at the physical layer, the higher layer benefits of cooperative diversity have been explored only by a few related works. More importantly none of the related works identify the routing considerations in a wireless network with multiple active flows and using cooperative transmissions. Using a combination of theoretical analysis, simulations and specific examples with arbitrary topologies, and also study about how physical layer benefits of cooperative diversity translate to network level performance metrics. The two important decisions that influence the achievable benefits in a multihop wireless network that uses VMISO: the choice of the number of cooperating transmitters such that the diversity gain and interference tradeoff is appropriately leveraged; and the choice of the cooperation strategy such that the diversity gain is appropriately used for either an increase in the range or the rate of the links or both. Finally, propose centralized and distributed versions of a diversity routing protocol that includes algorithms for optimally arriving at both of the above decisions.

The proposed system highlight that the joint adaptation of rate and range becomes especially important for VMISO rather than MIMO/MISO due to the larger diversity gains obtainable with VMISO. Show that a simple approach of optimizing the throughput of links followed by optimizing the range can greatly reduce the aggregate throughput of flows compared to jointly optimizing the link rates and the hop distances. Propose an adaptive clustering algorithm that dynamically adjusts the cluster size for each flow in the network. Identify several approaches for adapting the rate, range, and cluster size and establish the limitations of each of them.

Diversity Routing Protocol

Distributed diversity routing protocol called Proteus, focus only on the route discovery step of the routing protocol and use conventional route maintenance procedures for maintaining routes. Other components such as forwarding are similar to popular on-demand protocols such as the Dynamic Source Routing protocol (DSR) except that the source route packet also includes the cluster sizes and strategies to be used in addition to the ids of intermediate nodes. This is needed since a given node which is part of multiple flows, can use different cluster sizes to support each of the flows. The communication carried out like client–server communication by sending route request and route response. The nodes also hear pilot tones to track the number of VMISO links in vicinity. When the destination receives the route request, it transmits the Route Response (RREP) after adding the information about the vicinity. The algorithm requires estimates for the following:

1. Approximate Interference powers for every node on the path.
2. Number of flows already served by each node on the path.
3. Node degree of each node on the path.
4. Number of SISO hops in the path

In the existing system Routing failure is possible in the multi hop wireless network. Route re-computation is possible in the wireless network. it lead to routing failure in the wireless network for new route found. The network performance affected, because of array size of antenna not for routing performance of wireless network. And it does not consider the different cluster size of grouping nodes. In cooperative communication highlight and aware of routing but do not consider the varying the strategy (rate, range) or its relation with cluster size.

Space time division multiple access is used for enhance the privacy of the wireless network. Multiple antenna array is used for enhance the privacy of wireless network. The fading of each channel varied Multiple antenna array is used for communication in the wireless network. Virtual antenna is used for communication of cooperative communication. The number of Virtual multiple input is transmitted in the wireless network to initiate the communication. Virtual multiple input is used for cooperative information with single transmission. Although VMISO allows improved data rates, the coordination overhead and complexity of channel state information and processing are significant challenges in VMIMO. In a VMISO system, multiple transmitters transmit encoded versions of the same signal so that the error performance at the receiver is improved significantly compared to a traditional Single Input Single Output system do not affect VMISO. This is realizing the different space time communication. All the transmitter is used for transmit the fixed amount power. The cooperation lead to smaller Signal to noise ratio.

To achieve performance, number of related work have been proposed. The number cooperative transmitter leveraged at the transmitted side. The number of routing protocol is proposed in wireless communication such as dynamic source routing and distributed dynamic source routing protocol is used for transmission of information. The number of cooperative transmitter is used for increase the availability of the link. In a VMISO system, multiple transmitters transmit encoded versions of the same signal so that the error performance at the receiver is improved significantly compared to a traditional Single Input Single Output (SISO) system. The number of virtual transmitter such as diversity gain and interference tradeoff is appropriately leveraged. The cooperation strategy such as diversity gain that is used increase the range or rate of links and both. The space time block coding is used for transmit the virtual packet length L and in Ts. The space coding blocking is used for benefit of diversity of channel. In Receiver know the complex channel fading of a channel and determine the bandwidth utilization.

IV.PROPOSED METHOD

A. *Find the Distance in Joint Throughput Multihop Manner.*

In jointly optimizing for link rate and hop distance to achieve performance improvements using VMISO transmissions. The simple approach of optimizing the throughput of links followed by optimizing range ,reduce the aggregate throughput rather than jointly optimizing the links rates and hop distances.

B. *Determine the Cluster Size*

An adaptive clustering algorithm that dynamically adjust the cluster size for each flow in the network.

C. *Routing Strategies*

The rate ,range and cluster size are used to identify the best approach of joint optimization.

V.PERFORMANCE EVALUATION

We discuss performance in this paper in six different manner

1) Impact of Number of Nodes

The flows are varying when the number of nodes deployed in the network, the throughput increases up to a certain number of flows.

2) Impact of Cluster Size

The throughput of proposed system does not decrease with increase of cluster size.

3) Impact of Grid Size

If the cluster size increase the communication range saturate. the throughput scale increasing cluster size and also improve the rate.

4) Impact of Mobility

The velocity changes in the nodes is called mobility.The system prevent route failure because nodes stay connected for longer duration due to the longer ranges.

5) Distance Between Source and Destination

The throughput also depends on distance between source and destination.The throughput does not affected when number of hops increase with in interference range.

6)Routing Overhead

Routing overhead is higher than that of DSR and increases with cluster size.

VI.SIMULATION RESULTS

In this simulation the data packet is transmitted in multi hops to receiver. The position of node, their transmission range and cluster formation are visible in the below diagram.

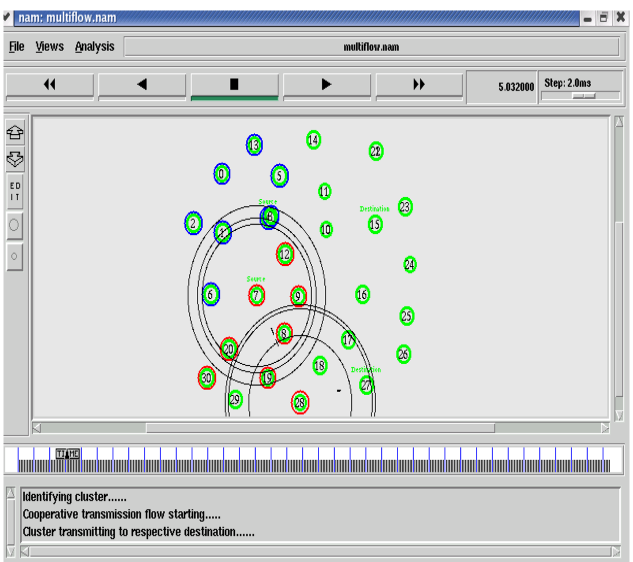

Fig 1 packet transmission using VMISO links

The below simulation shows that the number of flows with aggregate throughput. The Number of flows increase proposed system retains throughput.

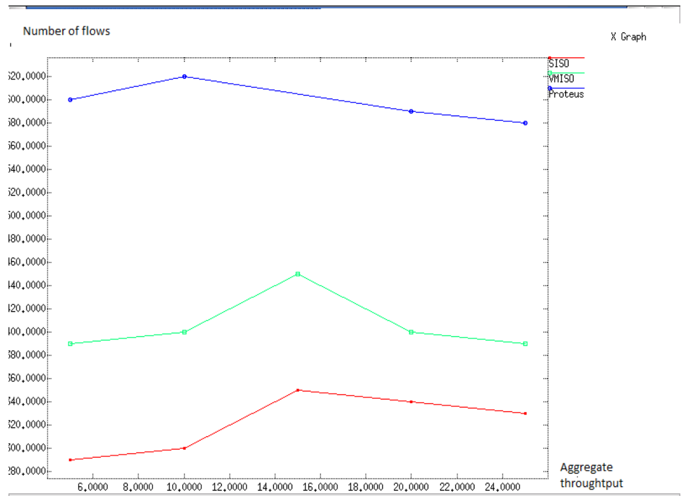

Fig 2 Throughput with 150 nodes

The below simulation shows that cluster size with aggregate throughput. The cluster size increases the throughput also increases.

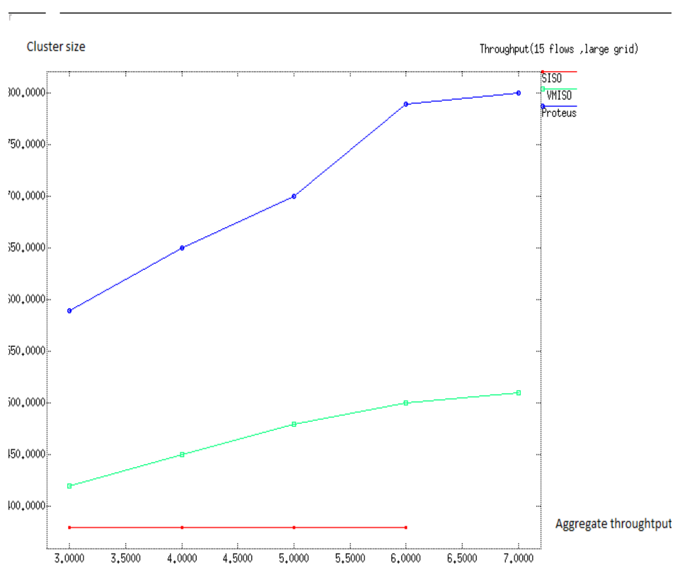

Fig 3 throughput with 15 flows

The below simulation shows that distance between source and destination.

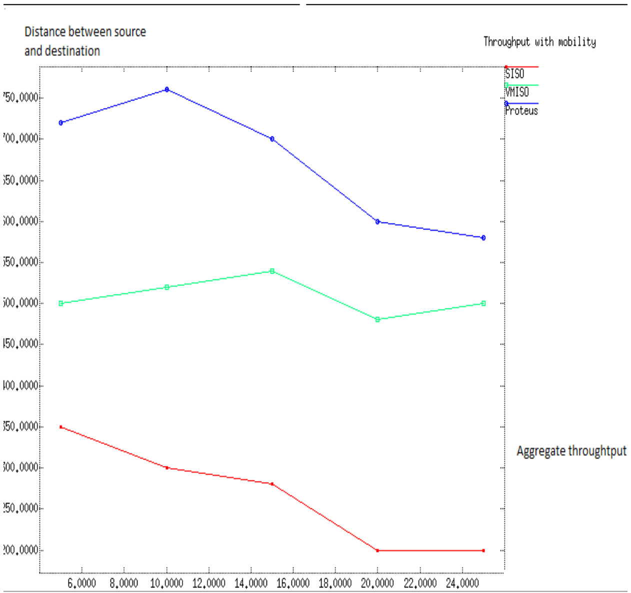

Fig 4 throughput with source –destination distance

VII. CONCLUSION

Cooperative transmissions provide fundamental improvements to multi hop routing performance in wireless networks in terms of better scalability with both hop length and flows compared to existing wireless technologies. Realizing cooperative routing with multiple flows is nontrivial due to inherent tradeoffs between improving a single flow's performance and the interference among flows. Achieving the performance benefits hinges critically on two algorithmic problems: determining the right cluster size and strategy (i.e., combination of rate and range for a given SNR improvement) by appropriately modeling the tradeoffs, intelligent routing decisions can be taken in a distributed manner leading to significant performance improvements confirmed. While system was developed to optimize throughput as the metric, the proposed framework can be used to identify routing solutions that optimize other metrics such as delay, energy, packet delivery ratio, etc.

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