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Stability and Capacity of Regular Information Theory and Communication Networks

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Abstract
The problem of throughput optimization in decentralized wireless networks with spatial randomness under queue stability and packet loss constraints are investigated. Two key performance measures are analyzed, namely the effective link throughput and the network spatial throughput. Specifically, the double of medium access probability, coding rate, and maximum number of retransmissions that maximize each throughput metric is analytically derived for a class of Poisson networks, in which packets arrive at the transmitters following a geometrical distribution. Necessary conditions so that the effective link throughput and the network spatial throughput are stable and achievable under bounded packet loss are determined, as well as upper bounds for both cases by considering the unconstrained optimization problem. It results show in which system configuration stable achievable throughput capacity obtained as a function of the network density and the arrival rate. Finally the time delay has get reduced at high rate. The throughput for the two nodes has been found efficiently.

1. Introduction

Mobile computing is any type of computing which use Internet or intranet and respective communications links, as WAN, LAN, WLAN etc. Mobile computers may form a wireless personal network or a piconet. Mobile computing is human–computer interaction by which a computer is expected to be transported during normal usage. Mobile computing involves mobile communication, mobile hardware, and mobile software. Communication issues include ad hoc and infrastructure networks as well as communication properties, protocols, data formats and concrete technologies. Hardware includes mobile devices or device components. Mobile software deals with the characteristics and requirements of mobile applications.

The decentralized wireless networks to have throughput optimization problem with spatial randomness under queue stability and loss constraints. This scheme proposed a spatial throughput framework by studying single-hop networks with Poisson field of interferers and a limited number of retransmissions under maximum packet loss probability and queue stability constraints. This provides another step towards a combined approach for addressing the long time unconsumed union between information and networking theory. Specifically, a constrained maximization problem for the effective link throughput and the network spatial throughput of a random access network is cast, in which transmitters are located according to a PPP, packet inter-arrival time is geometrically distributed, and there is a bounded number of retransmissions. In both optimization problems interested in determining the operating points, i.e. access probability, coding rate and maximum number of retransmissions, which lead to the highest performance subject to those constraints, given the packet arrival process and the density of transmitters in the network. Closed-form approximate solutions are then derived for both design settings as well as upper bounds on their highest achievable values.

The throughput of a wireless data communications system depends on a number of variables. I've examined several of them including: packet size, transmission rate, the number of overhead bits in each packet, received signal power, received noise power spectral density, modulation technique, and channel conditions. The main result is a mathematical technique for determining the optimum transmission rate and packet size as a function of the other variables. The key to maximizing the throughput rate is maintaining the signal-to-noise ratio at an optimum level determined by the nature of the modem and the channel. The Decentralized wireless networks to have the simple deployment without the need for pre-existing infrastructure. The Transport Capacity is to characterize the behaviour of multi-hop ADHOC networks and it have the infinite number of nodes .The Transmission capacity (TC) metric are used to define the maximum density of successful transmissions of a certain rate and outage probability constraint supported per unit network area. To solve the throughput optimization problem using the PPP and HOL and ARQ

The Random Access Transport Capacity (RTC) and poisson point processing (PPP) are the techniques are used to improve the throughput metric. The Random Access Transport capcity as to capture the effect of multi-hop communication on the end-to-end throughput performance.Its also to improve the throughput optimization in number of multihop communication. The techniques are also to Measure the two key performances such as link stability and packet loss constraints. To propose a spatial throughput framework by studying single-hop networks with Poisson field of interferers and a limited number of retransmissions under maximum packet loss probability and queue stability constraints. This provides another step towards a combined approach for addressing the longtime unconsumed union between information and networking

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theory. Its also provide the link stability and packet loss constraints.

2. Related Work

Here we are using different techniques in wireless networks. Those are Random access transport capacity, Poisson point processing, HOL and Automatic repeat request.

A. Random Access Transport Capacity

The Random Access Transport capacity as to capture the effect of multi-hop communication on the end-to-end throughput performance. It is also to improve the throughput optimization in number of multi hop communication.

B. Poisson point Processing

The point process is a type of random process for which any one realisation consists of a set of isolated points either in time or geographical space, or in even more general spaces. For example, the occurrence of lightning strikes might be considered as a point process in both time and geographical space if each is recorded according to its location in time and space. The Poisson point processing metric are used to normally evaluating a snapshot of single-hop network in which the node locations of the network.

C. HOL and Automatic Repeat Request

Head-of-line blocking (HOL blocking) in computer networking is a performance-limiting phenomenon that occurs when a line of packets is held-up by the first packet, for example in input buffered network switches, out-of-order delivery, and multiple requests in HTTP pipelining. Automatic repeat-request (ARQ) protocol is used to measure the success or failure (outage) of the packet detection at RX is reported back to TX through an error and delay-free control channel. In that case, the undelivered packet returns to the head-of-line (HOL) of the queue, waiting to be retransmitted in the next medium access. Assuming that a packet can be retransmitted through the TXk–RXk link at most mk times, then there are two possible outcomes for packet departure from T xk, namely (i) it is either correctly received or (ii) it is not successfully received after 1 + mk attempts and the dropped from the queue, declaring a packet loss event.

3. System Design

The transmission capacity (TC) metric, defined as the maximum density of successful transmissions of a certain rate and subject to an outage probability constraint that can be supported per unit network area. This performance metric is normally evaluated by considering a snapshot of a single-hop network, in which transmitters access the network using a slotted ALOHA protocol and node locations follow a homogeneous Poisson point process (PPP). Based on the analytical convenience of PPP, this framework allows for accurate performance evaluation of several cutting-edge communication strategies in wireless ad hoc networks, as summarized or by evaluating the average performance of the network over different spatial realizations. The proposed an extension of TC, namely random access transport capacity (RTC), so as to capture the effect of multi-hop communication and retransmissions on the end-to-end throughput performance. They evaluates how the number of hops and retransmissions of packets detected in error employing an ARQ protocol affect a revisited version of the transmission capacity metric. Interestingly, the number of multiple hops and a delay constraint, which is related to them and packet retransmissions, are incorporated in the modified TC metric. Existing methods having different challenges, those are Packet data loss, Low Queuing stability, High network throughput and High packet retransmission.

Nevertheless, in all exiting studies, neither queuing delay nor packet arrival process are considered, which may lead to unstable system operation. Queue stability has been extensively studied in general settings for stochastic networks as well as in slotted ALOHA systems. In, Traditional System the authors study the interplay between stability and capacity in two-dimensional grid and ring (regular) networks. Recently, the problem arrows in such papers made a first step towards the combination of the stochastic geometry framework and queuing theory by analyzing the stability and the average delay of single-hop ad hoc networks.

The spatial throughput framework by studying single-hop networks with Poisson field of interferers and a limited number of retransmissions under maximum packet loss probability and queue stability constraints. This provides another step towards a combined approach for addressing the long time unconsumed union between information and networking theory. Specifically, a constrained maximization problem for the effective link throughput and the network spatial throughput of a random access network is cast, in which transmitters are located according to a PPP, packet inter-arrival time is geometrically distributed, and there is a bounded number of retransmissions.

In both optimization problems, we are interested in determining the operating points, i.e. access probability, coding rate and maximum number of retransmissions, which lead to the highest performance subject to those constraints, given the packet arrival process and the density of transmitters in the network. Closed-form approximate solutions are then derived for both design settings as well as upper bounds on their highest achievable values. It results show the effect of the network density and arrival rate on the network performance, indicating under which network parameters the optimal constrained performance converges to its unconstrained optimal value. Necessary conditions so that the effective link throughput and the spatial throughput are achievable under the stability and packet loss constraints are also provided.

In our proposed model, the source will be sending the data from source to destination, then the intermediate node will be receiving the data and again it will pass to the destination by the intermediate node and to check the Packet status to whether the data was to reach the destination or not. If the Packet was failed it goes to HOL and ARQ buffer and its waiting for retransmissions and after the packet was sent to the destination to achieve the spatial throughput in efficient manner.

A. Discovery of Nodes

The Node name, Internet protocol address, and port number is get from the user and the user Details are stored in the data base successfully. The user can enter in to the network through the login If the user can enter the correct port number and user name in login means login successfully otherwise the login failed.

B. Random Access Transport Capacity

The details of the nodes have been retrieved from the data base and the Random access transport capacity splits the nodes in the different parts of the network, the link between the nodes have been created through by creating dynamic path between the node the HOL and ARQ have been set successfully in the network.

C. Poisson point processing

The source sends the data to the destination through dynamic path and the intermediate node receives the message. Poisson Point Processing has been checked for the message and Sending the Acknowledgment to next neighbour node if the message is not belongs to that node.

D. HOL & Automatic Repeat Request

If the acknowledgment has not arrived from the neighbour node means the intermediate node sends the data to HOL & ARQ server and the HOL and ARQ server finds the path for routing and sends that path to the source. The detail of node that not responds correctly is stored in the data base if the acknowledgment have been received successfully means the intermediate node sends the data to the neighbouring node.

E. HOL as Authenticator

If any data loss in the intermediate node automatically it will transferred to the HOL . The HOL to get data to transferred to the Destination. Suppose if the Hacker tries to get data from the HOL then the HOL should be highly authenticated. So to make the HOL as highly secured authenticated Technique

F. Time Delay Reduction

During the packet loss the data will transfer to HOL and then it will be send to the destinations in this process the time delay during the retransmission will be so high. So as to reduce the time, even when the data takes pass through the HOL the time should be less taken.

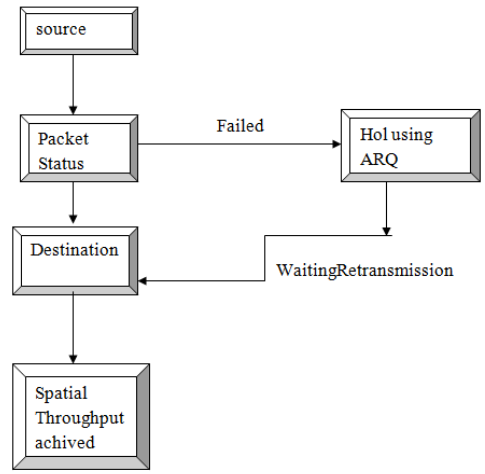

Figure 1: System Architecture

4. Conclusion

To investigate the performance of random spatial networks in terms of effective link throughput and the network-wide spatial throughput under a queue stability constraint and bounded packet loss probability. Considering an ad hoc network in which transmit nodes are located according to a homogeneous Poisson point process and are subjected to geometric packet arrivals, In this method is possible to achieve the non constrained throughput performance and also established a necessary condition so that both throughputs are achievable under the above constraints. The individual link design parameters that lead to the highest effective link throughput are not always a wise choice for maximizing the network spatial throughput. In this work mainly talks to optimize the throughput efficiency. The drawbacks in this work to overcome in future work are if the neighbour misbehaves to send the data to the HOL and AQR server. The HOL and AQR server may send falsified data report due to node compromise by malicious users and there is time delay due to multipath routing in future technique are going to avoid these problems.

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