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An adaptive approach for TCP variants in Wireless Multihop Networks

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ABSTRACT
TCP- transmission manipulate protocol is a connection oriented and reliable process-to-process communication on the transport layer of tcp/ip model. TCP guarantees with the end-to-end flow control, error control and congestion control ears in the past, tcp was brought to work with the stressed out networks where the cause of losses is specially the network congestion. TCP was introduced to work with the wired networks where the cause of losses is mainly the network congestion. In recent years, wireless networking is becoming more and more popular. In current years, wireless networking is turning into increasingly more famous. A full-size quantity of performance degradation is found while conventional tcp versions are used with the wi-fi networks. Wireless networks are greater prone to the losses due to the inherent impairments of wi-fi verbal exchange. This paper surveys various TCP variants with wireless multi-hop networks. Simulation is carried out with NS 2.35.
Keywords: TCP, wireless, NS 2.35

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I. INTRODUCTION

1. Introduction

A growing number of devices are getting equipped with networking capabilities. Many of these devices are mobile and communicate using a variety of wireless technologies, such as Bluetooth, Wi-Fi, etc., which allow them to connect to existing telecommunication networks and to each other. If these devices also support routing, they can forward data for each other. One can then combine a number of such devices with minimal planning to form a network. Such a network would be an ad hoc multi-hop wireless network.

A multi-hop wireless network is a network of computers and devices (nodes) which are connected by wireless communication links. The links are most often implemented with digital packet ratios. Because each radio link has a limited communications range, many pairs of nodes cannot communicate directly, and must forward data to each other via one or more cooperating intermediate nodes. The user has found that Network coding techniques are used with wired networks and hence decided to design an algorithm with the network coding functionality for multi-hop wireless networks. To do this researcher has identified TCP New Reno protocol to be modified

A) Types of performance analysis

There are there techniques that are observed for analyzing the performance of wired and wireless network. Our observations are stated below.

Analytic Modeling

In this model we perfume analysis using numerical calculations with mathematics using probability, calculus, operation research, queuing networks, etc

Computer Simulation

Here modeling is developed on simulator where realization of physical behavior of developed network model is set and developed using probability, statics and queuing theory.

Real Time Physical Measurement.

Actual test are performed over the network under this test. Generation of actual situation is done and test data are fed to the network situations. Each, actual data are sued for analysis.
Analytic model is pure mathematics base and so very tedious which if not computer with accuracy, may give us inaccurate results. Real Time physical measurement so not feasible approach especially when network includes hindered of modes and costly routers with costly other network components. This do not permit us to go with the option of costly Real Time Physical Measurement nor tedious and error pron Analytic Modeling. Thus, we have limited our study methodology up to network simulator as there are a number of advantages to this approach. Lower cost, ease of implementation, and practicality of testing large-scale networks. Simulators provide support for Applications, Protocols, Network Types , Network Elements and Topologies, can as implement Traffic Models using set dest.

B) Types o f network simulators

Network simulator is a pure event based simulator and can be of two types
Discrete Event Simulator
Continuous Event Simulator
Discrete Event Simulator:
In discrete event simulator, the representation of time is quantified and the system state s changes only when an event occurs. For example, arrival of person in queue of railway reservation or departure of person form ticket booth after taking ticket. here, state values are always integer. Eg. NS, OPNET, NetSim, QualNet, SSFNet, Parsec,etc
Continuous Event Simulator
In continuous event simulator, models time as a continuous progression. Here, state values are always real values. Behavior of continuous event simulators is like snake covering distance, water flowing through the mountain Eg. VisSim , SimcardPro, etc

II. LITERATURE SURVEY

In this sub section we summarize the most interesting capabilities, advantages, Base language and Type of existing simulation tools for wired and wireless networks in given table. Table 4.1 has all simulators considered in the previous section listed in the consecutive columns and main features and its base in the contest of all simulators in the consecutive rows, respectively.
Wireless Networks simulators exhibit different features and models. Each has advantages and disadvantages, and each is appropriate in different situations. In choosing a simulator form the available tools, the choose of a simulator should be driven by the requirements. Developers must consider the pros and cons of differ t programming languages, the means in which simulations is driven , component base door object oriented architecture , the level of complexity of the simulator, features to include and not include, use of parallel execution, ability to interact with real nodes, and other design choices[1][2]

III. TCP RENO AND CONGESTION MANAGEMENT

This chapter addresses how TCP manages congestion, both for the connection's own benefit (to improve its throughput) and for the benefit of other connections as well (which may result in our connection reducing its own throughput). Early work on congestion culminated in 1990 with the flavor of TCP known as TCP Reno. The congestion-management mechanisms of TCP Reno remain the dominant approach on the Internet today, though alternative TCPs are an active area of research and we will consider a few of them in 15 Newer TCP Implementations.
The central TCP mechanism here is for a connection to adjust its window size. A smaller winsize means fewer packets are out in the Internet at any one time, and less traffic means less congestion. A larger winsize means better throughput, up to a point. All TCPs reduce winsize when congestion is apparent, and increase it when it is not. The trick is in figuring out when and by how much to make these winsize changes. Many of the improvements to TCP have come from mining more and more information from the stream of returning ACKs
Fast Retransmit requires a sender to set cwnd=1 because the pipe has drained and there are no arriving ACKs to pace transmission. Fast Recovery is a technique that often allows the sender to avoid draining the pipe, and to move from cwnd to cwnd/2 in the space of a single RTT. TCP Reno is TCP Tahoe with the addition of Fast Recovery.
The idea is to use the arriving dupACKs to pace retransmission. We set cwnd=cwnd/2, and then to figure out how many dupACKs we have to wait for. Initially, at least, we will assume that only one packet is lost. Let cwnd = N, and suppose we have sent packets 0 through N and packet 1 is lost (we send Data[N] only after ACK[0] has arrived at the sender). We will then get N-1 dupACK[0]s representing packets 2 through N.

During the recovery process, we will ignore cwnd and instead use the concept of Estimated FlightSize, or EFS, which is the sender's best guess at the number of outstanding packets. Under normal circumstances, EFS is the same as cwnd, at least between packet departures and arrivals.[3][4]

At the point of the third dupACK, the sender calculates as follows: EFS had been cwnd = N. However, one of the packets has been lost, making it N−1. Three dupACKs have arrived, representing three later packets no longer in flight, so EFS is now N−4. Fast Retransmit had the sender retransmit the packet that was inferred as lost, so EFS increments by 1, to N−3. The sender expects at this point to receive N−4 more dupACKs, plus one new ACK for the retransmission of the packet that was lost. This last ACK will be for the entire original windowful.

The new target for cwnd is N/2. So, we wait for N/2 − 3 more dupACKs to arrive, at which point EFS is N−3−(N/2−3) = N/2. After this point the sender will resume sending new packets; it will send one new packet for each of the N/2 subsequently arriving dupACKs.

After the last of the dupACKs will come the ACK corresponding to the retransmission of the lost packet; it will actually be a cumulative ACK for all the later received packets as well. At this point the sender declares cwnd = N/2, and resumes with sliding windows. As EFS was already N/2, and there are no lost packets outstanding, the sender has exactly one full windowful outstanding for the new value of cwnd. That is, we are right where we are supposed to be[5][6]..

IV. MULTI-HOP AD HOC NETWORKS

Mobile Multi-hop Ad Hoc Networks are collections of mobile nodes connected together over a wireless medium. These nodes can freely and dynamically self-organize into arbitrary and temporary, "ad-hoc" network topologies, allowing people and devices to seamlessly internetwork in areas with no pre-existing communication infrastructure, (e.g., disaster recovery environments).

Multi-hop ad hoc networking is not a new concept having been around for over twenty years, mainly exploited to design tactical networks. Recently, emerging wireless networking technologies for consumer electronics are pushing ad hoc networking outside the military domain. The simplest ad hoc network is a peer-to-peer network formed by a set of stations within the range of each other that dynamically configure themselves to set up a temporary single-hop ad hoc network. Bluetooth piconet is the most widespread example of single-hop ad hoc networks.[7][8]

802.11 WLANs can also be implemented according to this paradigm, thus enabling laptops' communications without the need of an access point. Single-hop ad hoc networks just interconnect devices that are within the same transmission range. This limitation can be overcome by exploiting the multi-hop ad hoc paradigm. In this new networking paradigm, the users' devices are the network, and they must cooperatively provide the functionalities that are usually provided by the network infrastructure. Nearby nodes can communicate directly by exploiting a single-hop wireless technology (e.g., Bluetooth, 802.11, etc.), while devices that are not directly connected communicate by forwarding their traffic via a sequence of intermediate devices.

As, generally, the users' devices are mobile, these networks are often referred to as Mobile Ad hoc NETworks (MANETs). Being completely self organizing, MANETs are attractive for specialized scenarios like disaster recovery, vehicle-to-vehicle communications, and home networking. Unfortunately, nowadays they have a very limited penetration as a network technology for mass-market deployment.

To turn mobile ad hoc networks in a commodity, user should move to a more pragmatic scenario in which multi-hop ad hoc networks are used as a flexible and "low cost" extension of Internet. Indeed, a new class of networks is emerging from this view: the mesh networks. Unlike MANETs, where no infrastructure exists and every node is mobile, in a mesh network there is a set of nodes, the mesh routers, which are stationary and form a wireless multi-hop ad hoc backbone. Some of the routers are attached to the Internet, and provide connectivity to the whole mesh network.

Mesh routers are not users' devices but they represent the infrastructure of a mesh. Routing protocols running on mesh routers allow the backbone to be self configuring, self healing, and easy to set up. Client nodes connect to the closest mesh router, and use the wireless ad hoc backbone to access the Internet.

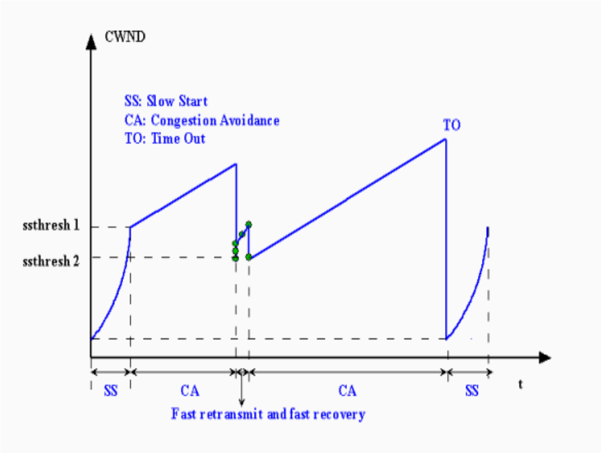
Mesh networks are moving multi-hop ad hoc networks from emergency-disaster-relief and battlefield scenarios to the main networking market.While mesh networks represent a short-term direction for the evolution of MANETs, opportunistic networking constitutes a long-term direction for the evolution of the ad hoc networking concept. The bottom line of this paradigm is providing end-to-end communication support also to very dynamic ad hoc networks, in which users disconnection is a feature rather than an exception.

Nodes can be temporarily disconnected and/or the networks can be partitioned, and the mobility of nodes creates the communication opportunities. The main idea is thus to opportunistically exploit, for data delivery, nodes' mobility and contacts with other nodes/networks.

In opportunistic networks the communication is still multi-hop, with intermediate nodes acting as routers but, in this case, forwarding is not necessarily "on-the-fly". Intermediate nodes store the messages when no forwarding

opportunity exists (e.g., no other nodes are in the transmission range, or neighbours are not suitable for that communication), and exploit any contact opportunity with other mobile devices to forward the data toward the destination. In this view, the existence of a simultaneous path between sender and receiver is not mandatory (as in traditional MANET) to communicate.
This networking paradigm is well suited for a world of pervasive devices equipped with various wireless networking technologies (802.11 family, Bluetooth, ZigBee, etc.) which are frequently out of range from a global network but are in the range of other networked devices, and sometime cross areas where some type of connectivity is available (e.g. Wi-Fi hotspots).
Among multi-hop ad hoc networks, wireless sensor networks have a special role. A sensor network is composed by a large number of small sensor nodes, which are typically densely (and possibly randomly) deployed inside the area in which a phenomenon is being monitored.
Wireless multi-hop ad hoc networking techniques constitute the basis for sensor networks, too. However, the special constraints imposed by the unique characteristics of sensing devices, and by the application requirements, make the solutions designed for multi-hop wireless networks (generally) not suitable for sensor networks. First of all, power management is a "pervasive" issue in the overall design of a sensor network. Sensor networks utilize on-board batteries with limited energy that cannot be replenished in most application scenarios. Furthermore, sensor networks produce a shift in the networking paradigm from a node-centric to a data-centric view
The aim of a sensor network is to collect information about events occurring in the sensor field rather than supporting the communications between users' devices. Multi-hop ad hoc network technologies have big potentialities for innovative applications of great impact on our everyday life. However, after almost a decade of research, ad hoc networking technologies are rarely used and have not yet affected our way of using wireless networks.
It is believed that this is due to a wrong approach in the research, which was dominated by simulation modeling and theoretical analyses with only few attempts to build network prototypes to understand how well MANETs work in reality. In the last few years, this stimulated a new community of researchers combining theoretical research on ad hoc networking with experiences/measurements obtained by implementing ad hoc network prototypes.

V. RESULTS



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VI. CONCLUSION

TCP was initially introduced for wired networks. With the introduction of the wireless networks, the same TCP was implemented in wireless environment too. As wireless networks differ drastically from the wired networks, TCP was unable to perform with the same efficiency. At the same time, many researchers show variants of TCP exclusively for wireless networks. None of them is yet to be accepted as a generalize standard for wireless networks. It all depends upon type of wireless network we are using. Here it shows how user start with computer network and move to the wireless network and then we conclude for the multihop network which is used in a varied number of application in real scenario..

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