



Comparison of TCP and SCTP over Manet's

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Abstract - In this network various transmission control protocols have been used for data transmission process. TCP has been used for data transmission communication having different bandwidths and message delays over the network. TCP provides communication using 3-handshake which sends RTS and ACK comes from server end and data message has been transmitted over the bandwidth provided. This does not provide security over flooding attack occurred on the network. TCP provides communication between different nodes but when multi-streaming occurs in a network TCP does not provides proper throughput of the system which is major problem that occurred in the previous system. To overcome this problem SCTP transmission control protocol has been used for the system performance of the system. SCTP provides 4-handshake communication in the message transmit due to which security factor get increases and this also provides communication services over multi-streaming and multi-homing.

Keywords: MANET, TCP, SCTP, RTS.

I. INTRODUCTION

1.1 MANET

MANETs is called Mobile Ad hoc Networks. Mobile implies “mobility”. Ad hoc is a Latin word that means “for this only”. MANET is an autonomous collection of mobile nodes that communicate over wireless links. MANET is a minimum IP based network of mobile and wireless machine nodes connected with radio. In operation, the nodes of a MANET do not have a centralized administration mechanism. It is known for its route network properties where each node act as a “router” to forward the traffic to other specified node in the network.

MANET is a less wireless network. The nodes moves randomly and organize themselves arbitrarily. The nodes directly communicate via wireless links with each other's radio range, while that are distant apart use other nodes as relay, in a multi-hop routing function. As the nodes are mobile, the structure of the network changes dynamically and unpredictably over time. Ad hoc networks are self-configuring and self-organizing, so to maintain communication between nodes in the network, each node behaves as a source, start point, a host and a router. “A mobile ad-hoc network (MANET) is a self-configuring network of mobile routers (and associated hosts) connected by wireless links.” [4].

Some of the main features of MANET are listed below [3]:

- MANET can be formed without any pre-existing infrastructure.
- It work on dynamic topology where nodes may join and leave the network at any time with their own choice and the multi-hop routing may keep changing as nodes join and depart from the network.
- It does have very limited physical security, and thus increasing security is a major concern.
- Every node in the MANET can assist in routing of packets in the network.
- Both Bandwidth & Power in limit.

1.2 Types of MANET

- Vehicular Ad hoc Networks (VANETs) are used also in communication. Communication among vehicles and between vehicles and roadside equipment. Intelligent vehicular ad hoc networks (In VANETs) are a kind of artificial intelligence that helps vehicles to behave in intelligent manners during vehicle-to-vehicle collisions, accidents, drunken driving with phone calls.
- Internet based mobile ad hoc networks (I MANETs) are ad hoc networks that link mobile nodes. Fixed Internet-gateway nodes. For example, multiple sub-MANETs may be connected by in a classic Hub-Spoke VPN to create a geographically distributed MANET. In such type of networks normal ad hoc routing algorithms don't apply directly.
- Military MANETs are used by military units with emphasis on security, range, and integration with existing systems. Common waveforms include the US, Persistent Systems' Wave Relay, and Trellis ware's TSM.

1.3 CHALLENGES IN MANET

A MANET [6] environment has to overcome certain issues of limitation and inefficiency. It consists of following:

- The characteristics of wireless link are time-varying in nature
- There are transmission barrier like path loss, blockage and interference that adds to the susceptible behavior of wireless channels. The dependability of wireless transmission is resisted by different factors.

- Limited range of wireless transmission

The limited radio band results in reduced data rates compared to the wireless networks. Hence best usage of bandwidth is necessary by keeping low overhead as possible.

- Packet losses due to errors in transmission

MANETs experience higher packet loss due to factors such as hidden terminals that results in collisions, wireless channel issues (high bit error rate (BER)), interference, and frequent breakage in paths caused by mobility of nodes, increased collisions due to the presence of hidden terminals and unidirectional links.

- Route changes due to mobility

The dynamic network topology results in frequent path breaks.

- Frequent network partitions

The random movement of nodes often leads to partition of the network. This always affects the intermediate nodes

1.4 APPLICATIONS OF MANET

Some of the typical applications include:

- Military battlefield

Ad-Hoc networking would allow the military to take advantage of commonplace network technology to maintain an information network between the soldiers, vehicles, and military information head quarter

- Collaborative work

For some business environments, the need for collaborative computing might be more important outside office environments than inside and where people do need to have outside meetings to cooperate and exchange information on a given project.

- Local level

Ad-Hoc networks can autonomously link an instant and temporary multimedia network using notebook computers to spread and share information among participants at a e.g. conference or classroom. Another appropriate local level application might be in home networks where devices can communicate directly to exchange information.

- Personal area network and Bluetooth

A personal area network is a short range, localized network where nodes are usually associated with a given person. Short-range MANET such as Bluetooth can simplify the intercommunication between various mobile devices such as a laptop, and a mobile phone.

- Commercial Sector

Ad hoc can be used in emergency/rescue operations for disaster relief efforts, e.g. in fire, flood, or earthquake. Emergency rescue operations must take place where none existing or damaged communications infrastructure and rapid deployment of a communication network is needed.

II. LITERATURE SURVEY

Maninder Kaur, Parminder Singh [1] describes that performance of the TCP (Transmission Control Protocol) has been promising incase of wired networks. In wireless network the packet loss is not only due to congestion but to be also due to high bit error rates and hand offs .Also improving its performance in wired-cum-wireless networks preserving the end-to-end nature of TCP is a difficult task. To address this issue, several new protocols and TCP modifications such as Snoop have been proposed. Usually problems faced by TCP when it works in wireless networks and this is the reason Snoop protocol is a better solution for this problem because it introduces a Snoop agent at the base station, which monitors packets flowing in both directions. The most well known TCP-aware link layer recovery scheme is the Snoop Protocol. It maintains a cache of the packets and whenever a packet loss is detected, it does a local recovery and drops all duplicate acknowledgements.

Shiyong Lei, ET. al. [2] It describes about the ICWN i.e. Intermittently Connected Wireless Networks especially when Epidemic Routing is used to evaluate the performance or Delay/disruption Tolerant Networks (DTN), have attracted attention from researchers because of their inherent characteristics including long latency, low data rate and intermittent connectivity. It also shows that Epidemic Routing in ICWN degrades the performance of TCP because multi-copy data packets cause duplicate ACK's , and in turn reduce the transmitting rate of TCP. Then an enhanced algorithm for TCP named A-TCP/RENO is proposed to solve the above problem which requires that the destination should not send ACK for duplicate messages. Through simulation, we note as the speed of the nodes in the network increases, the throughput of TCP/Reno with Epidemic Routing improves slightly over that with DSR. Since there are fewer redundant ACKs in the network and congestion control does not occur unnecessarily, hence improved performance.

Niels Moller, ET. Al. [3] has studied the effect of introducing TCP Westwood+ on regular TCP New Reno by means of analytical modeling and ns-2 simulations. In this author demonstrate that two protocols get different shares of the available bandwidth in the network. With this our result is that the bandwidth sharing between the two protocols depends on one crucial parameter i.e. the ratio between the bottleneck router buffer size and the bandwidth delay product. If the ratio is smaller than one then TCP Westwood+ takes more bandwidth. On the contrary, if the ratio is greater than one, it is TCP New Reno which gets the larger part. Thus studied analytically and by the means of ns-2 simulations, the inter-protocol fairness between TCP Westwood+ and TCP New Reno. With the introduction of TCP Westwood allows solving the well known problem of network under utilization by regular TCP when buffer sizes in routers are set to small values but with gain in the utilization comes at the expense of regular TCP which loses some of its throughput. TCP Westwood+ solves the unfairness problem for large buffer sizes but unfairness problem is still open for small buffers.

O.Ait-Hellal, ET. Al. [4] purpose is to analyze and compare the different congestion and avoidance mechanisms which have been proposed for TCP protocol namely: Reno, New Reno. Reno retains the basic principle such as slow starts and the coarse grain retransmit timer. However it adds some intelligence over it so that lost packets are detected earlier and pipeline is not emptied every time a packet is lost. Reno perform very well over TCP when packet losses are small but when we have multiple packet losses in one window then RENO doesn't perform too well, On the other hand New Reno is a slight modification over TC Reno. It is able to detect multiple packet losses and thus is much more efficient than RENO in the event of multiple packet losses. New-Reno suffers from the fact that it takes one RTT to detect each packet loss. When the ACK for the first retransmitted segment is received only then can we deduce which other segment was lost. Because of its modified congestion avoidance and slow start algorithm there are fewer retransmits.

Afiqah Azahari, ET. Al. [5] Error control describes how the network handles and detects errors especially in the data link layer present on an overview of error control regarding error detection and error correction. Error control happens in data link layer. We mainly discuss the type of error detection mechanisms that is used to detect the errors and how the errors will be corrected so the receiver can extract the real data. There are different ways to detect error in the data link layer i.e. but not all the methods of error detection can detect error accurately and effectively. Every method has its own specialty, advantage and their own mechanism to detect error. Parity check is simple and can detect all single-bit error. CRC has a very good performance in detecting single-bit error, double errors, an odd number of errors and burst errors while checksum is not efficient as the CRC in error detection when the two words are incremented with the same amount, the two errors cannot be detected because the sum and checksum remain the same.

Bestavros, et al. [6] Author propose a new transport protocol, TCP Boston, that turns the ATM's 53-byte cell-oriented switching architecture into an advantage for TCP/IP. At the core of TCP Boston is the adaptive information dispersal algorithm (AIDA), an efficient encoding technique that allows for dynamic redundancy control. AIDA makes the TCP/IP's performance less sensitive to cell losses, thus ensuring a graceful degradation of the TCP/IP's performance when faced with congested resources. We introduce AIDA and overview the main features of TCP Boston. We present detailed simulation results that show the superiority of our protocol when compared to other adaptations of TCP/IP over ATMs.

III. APPROACHES USED

Transmission Control Protocol (TCP)

TCP (Transmission Control Protocol) is a standard that defines how to establish and maintain a network conversation via which application programs can exchange data. TCP works with the Internet Protocol (IP), which defines how computers send packets of data to each other. Together, TCP and IP are the basic rules defining the Internet. TCP is defined by the Internet Engineering Task Force (IETF) in the Request for Comment (RFC) standards. TCP is a connection-oriented protocol, which means a connection is established and maintained until the application programs at each end have finished exchanging messages. It determines how to break application data into packets that networks can deliver, sends packets to and accepts packets from the network layer, manages flow control, and because it is meant to provide error-free data transmission handles retransmission of dropped or garbled packets as well as acknowledgement of all packets that arrive. In the Open Systems Interconnection (OSI) communication model, TCP covers parts of Layer 4, the Transport Layer, and parts of Layer 5, the Layer [3].

Stream Control Transmission Protocol (SCTP)

Stream Control Transmission Protocol (SCTP) is a transport layer protocol (protocol number 132), serving in a similar role to the popular protocols Transmission Control Protocol (TCP) and User Datagram Protocol (UDP). It provides some of the same service features of both: it is message-oriented like UDP and ensures reliable, in-sequence transport of messages with congestion control like TCP. The protocol was defined by the IETF Signaling Transport (SIGTRAN) working group in 2000, and is maintained by the IETF Transport Area (TSVWG) working group. RFC 4960 defines the protocol. RFC 3286 provides an introduction [12].

IV. CONCLUSION

TCP & SCTP is a Transmission Protocols. TCP has been used for data transmission communication having different bandwidths and message delays over the network. TCP provides communication using 3-handshake which sends RTS and ACK comes from server end and data message has been transmitted over the bandwidth provided. This does not provide security over flooding attack occurred on the network. TCP provides communication between different nodes but when multi-streaming occurs in a network TCP does not provides proper throughput of the system which is major problem that occurred in the previous system. To overcome this problem SCTP transmission control protocol has been used for the system performance of the system. SCTP provides 4-handshake communication in the message transmit due to which security factor get increases and this also provides communication services over multi-streaming and multi-homing. Multiple sender and receivers can communicate over wired network using various approaches of communication through same routers, which degrades in the TCP protocol.

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