IJCSE International Journal of Computer Sciences and Engineering Open Access
Research Paper Vol.-7, Special Issue-14, May 2019 E-ISSN: 2347-2693

Study on Various TCP Variants of Reactive Routing Protocols with Their Performance Analysis

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DOI: https://doi.org/10.26438/ijcse/v7si14.4144 | Available online at: www.ijcseonline.org

***Abstract*—**MANET is a continuously self-configuring, in infrastructure less network of mobile devices where they are connected wirelessly.TCPprotocol which is a reliable protocol, which is widely developedforwirednetworks. TCP protocols have different TCP variantstodetectand controlcongestionin thenetwork.However, all these variants do not succeed in showing similar performances of controlling congestion in MANE. Inthispaper,we analyzed the performance of three main congestion controlling TCP variants such as NEW RENO, SACK and VEGAS in AODV (Ad-hoc on demand distance vector) and DSR (Dynamic source routing) reactive routing protocols. FileTransfer Protocol(FTP)application is used to provide network traffic between nodes.Differentscenarios arecreatedandtheaveragevaluesofeachperformance metrics such asJitter, Throughput, and Packet drop and end-to-end delay areused toevaluate theperformance.

***Keywords*—**Congestion Control, NEW RENO, SACK, VEGAS, DSR, AODV

I. INTRODUCTION

Mobile Ad-hoc Networks (MANET) alludes to gathering of portable hubs that speak with one another without anyone else's input designing consistently in framework less system. Every node in MANET fills in as switch and customer to screen the enactment of correspondences arrange. Every one of the node in MANET are moving in irregular design and send bundles to one another nodes as opposed to relying upon the switch which facilitates the stream of parcels in the system. In MANET, the nodes participate with one another in the activity of directing parcels from the source node to the node, as each node in the system is equipped for discussing just with those nodes that situated inside its transmission sweep, at the same time, source node and destination node can be situated at a range extremely higher than span of those nodes. In this manner, the nodes in MANET need to reroute the bundles to different nodes to empower the correspondence among the nodes that are situated outside the transmission run. Along these lines, the hub in MANET changes its connection case deliberate with other portable nodes [2].

TCP variations have demonstrated its execution in wired system where parcel misfortunes because of clog in system however it doesn't execute as so when connected to MANET on the grounds that there are numerous purposes behind bundle misfortune in MANET like commotion, multipath proliferation, interface disappointment, the impact of blurring, obstruction from different gadgets notwithstanding system blockage. This causes a blame identification of clog at the hubs which makes the TCP to call blockage control calculation which diminished the Throughput of the systemnetwork.

Figure 1.ExampleofMANET

II. RELATED WORK

In system field, Congestion control in MANET has been considered broadly as a fascinating exploration subject. In this paper distinctive TCP variations had been thought about every one of them have diverse qualities and disadvantages one can't fit into all system.

Poonam, Tomar and PrashanthPanse [1], their investigation dependent on a "Comprehensive Analysis and Comparison of TCP Tahoe, TCP Reno and TCP Lite". In this paper they had looked at three TCP variations (TCP Tahoe, TCP Lite, and TCP Reno) utilizing DSR steering convention to control the clog in Adhoc systems. The finish of their work demonstrates that none of the TCP variations can beat the clog of the system, every convention can perform better under explicit conditions. The study on "Scenario Based Performance Analysis of Variants of TCP" utilizing NS2-Simulator by YuvarajuB N and Niranjan N Chiplunkar [3], in which they had completed an exhibition investigation of six distinctive TCP variations, for example, TCP TAHO, TCP RENO, TCP New Reno, TCP SACK, TCP FACK and TCP Vegas in MANET utilizing AODV directing convention dependent on various ecological parameters utilizing the NS2 test system. The consequences of their work demonstrates that TCP Vegas had performed superior to the next TCP variations in transmission of information. In any case, the paper did not give any data about execution of DSR directing convention with these TCP variations. SuneelKumarDuvvuri and Dr.S.RamaKrishna [5], their study on "PerformanceEvaluationofTCPalternatives inMANET using Reactive RoutingProtocol", this paper mainly focuses on congestion control and avoidance mechanisms which have been proposed for TCP/IP protocols explicitly using AODV protocols. Their work shows that all the TCP variants have their own significance and they all have their own advantages and disadvantages. In most situation TCP Vegas is better than all other variants of TCP.

NehaArora[4] proposed a paper on "Comparative Analysis of Routing Protocols And TCP in MANETS". In this paper the conduct of four TCP variations (TCP Tahoe, TCP Reno, TCP New Reno, and TCP Sack) under three directing conventions, for example, AODV, TORA, and OSLR are concentrated to control blockage in MANET utilizing OPNET test system. They reasoned that the conduct of TCP variations is better under AODV directing convention. M.Jehan&Dr.G.Radhamani [6], their study based on "Scalable TCP: Better Throughput in TCP Congestion Control Algorithms on MANETs", had looked at the conduct of three TCP blockage variations, for example, TCP Binary Increase Congestion Control(TCP BIC), SCALABLE TCP and TCP Vegas under DSR and DSDV steering conventions in MANET utilizing NS2 test system. The consequences of their work demonstrated that SCALABLE TCP gives the most noteworthy Throughput and TCP Vegas gives a superior round-trip delay in DSDV. IffatSyad, SehrishAbrejo and Asma Ansari [7], proposed a paper on "Analysis of proactive and reactive MANET routing protocols under selected TCP variants". In this paper they thought about the execution of TCP Vegas and TCP New Reno in both DSDV and DSR directing conventions in MANET utilizing NS2 test system. The finish of their work is that the execution of TCP variations in proactive DSDV steering convention had a higher Throughput than receptive DSR directing convention, alongside downside of higher bundle drop rate and delay.

III. METHODOLOGY

In this paper three diverse TCP variations are considered. Each has them have their very own preference and inconvenience.

A. NEW RENO

NEW RENO variation of TCP is like TCP-RENO yet with slight change. NEW RENO is likewise ready to identify various bundle misfortunes and therefor it is considerably more productive than TCP-RENO in case of numerous parcel misfortunes. At the point when a NEW RENO gets crisp ACK , the two stages will occur they are :

- It exits from Fast recuperation on the off chance that it recognizes every one of the fragments which were remarkable, at that point it refreshes blockage window (CWD) to edge esteem and in this manner maintaining a strategic distance from congestion.

- If it incompletely recognizes then it makes that the following fragment in line was lost and re-transmits the section again by setting the quantity of copy ACKS got to zero. When every one of the information in the window gets recognized it will exit from Fast-recuperation.

B. TCP SACK

TCP-SACKconquers the issue looked by TCP-RENO and TCP NEW-RENO, the issue of re-transmitting more than one lost parcel and identifying lost bundles. In the event that SACK neglects to distinguish the parcel misfortune by its altered calculation, at that point it timeouts to fall back on. TCP-SACK needs that fragments ought to be recognized specifically instead of in total. SACK sends new bundles if no sections are remarkable.

C. TCP VEGAS

TCP-VEGASis based on the way that effective of identifying clog in proactive is more productive than recognizing blockage in receptive.TCP-VEGAS also finds an answer for the problem of coarse grain timeouts by recommending a algorithm of calculation based to overcome from it. The three noteworthy changes of TCP-VEGAS are:

- Re-Transmission Mechanism.
- Congestion evasion or avoidance.
- Modified Slow-begin.

Table1.Advantages and Disadvantages Of TCP Variants

TCP	Advantages	Disadvantages
NEW RENO	-Performs better than TCP RENO in multiple packet loss. -Modifications are only needed in the	-It takes one RTT to detect each packet loss. -Cannot distinguish between Congestion

	sender	
SACK	-The source have better information of the packets that have been successfully delivered compared to other TCP versions -Therefor it can avoid unnecessary delays and retransmission	-Requires modification to the acknowledgement procedure at both the sender and receivers sides
Vegas	-It suggests modified algorithm for slow start which helps in reducing congestion network -new retransmission mechanisms are used	-Cannot distinguish between congestion loss and packet errors.

IV. RESULTS AND DISCUSSION

This paper displays a study on various TCP variations with an alternate reactive routing protocols and analysing their performances. The comparison is held by running a simulation scenario ordinarily utilizing NS2. Four execution measurements were utilized to examine the execution of TCP variations they are Throughput, Jitter, Packet drop and start to finish delay under three TCP variations, for example, NEW RENO, TCP SACK and TCP VEGAS utilizing DSR and AODV routing protocols.

The simulation is executed commonly in various situations and the quantity of nodes as 20, 30, 60 and 80. AODV furthermore, DSR routing protocols are arranged for every node with a greatest speed of 20 m/s and with 5s stop time and normal estimation of every execution parameter is utilized to assess execution of responsive steering conventions.

A. Throughput

Throughput is effectively transmitted quantity of packets from source to destination in one second. It relies upon the quantity of parcels sent and various packets dropped through the system.

B. Packet Drop

Packets drop or Bundles drop more often, it occurs when the sender neglects to convey a few or all parcels to the recipient. In MANET parcel misfortune happens because of numerous reasons some of them are likewise because of connect disappointment, impedance from different gadgets notwithstanding system blockage.

C. Jitter

Jitter is the variety in the deferral of received packets. So as to get an elite system for ongoing traffic, the Jitter esteem ought to be limited as could be expected under the circumstances.

D. End to End Delay

End to End Delay is the time taken to transmit a packet from sender to destination.

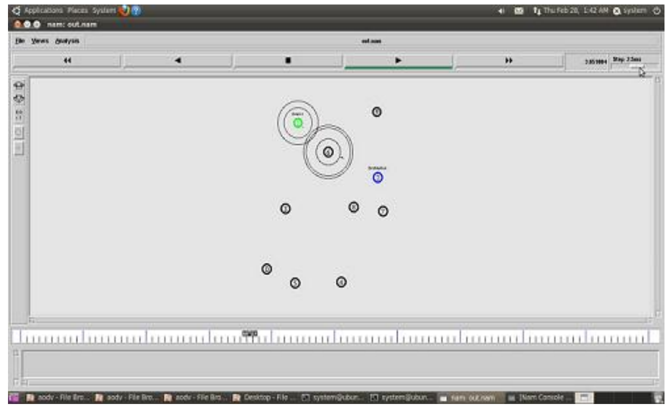

Figure2. Packet transmission between Node1 and Node 2 with intermediate Node6 at time 3.53ms

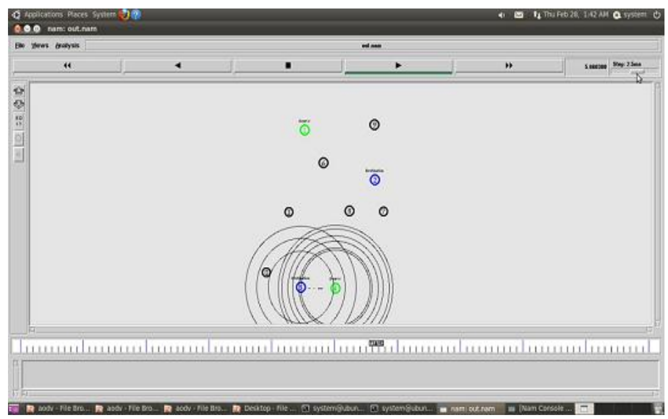

Figure 3. Packet transmission between Node5 and Node 4 at 5.5ms without Intermediate node

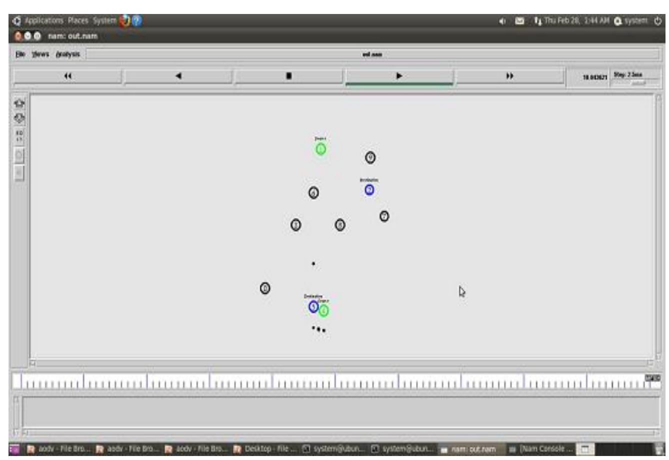

Figure 4. Packet drop during transmissions

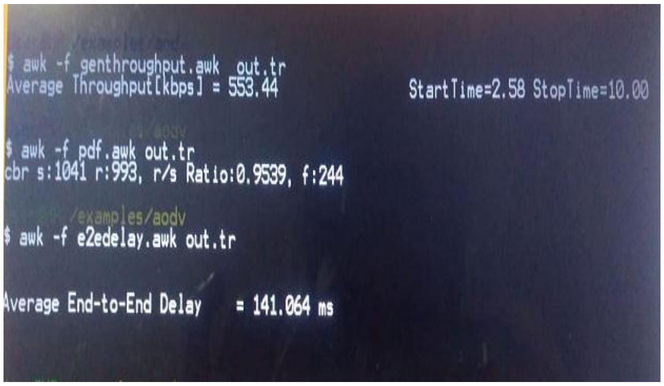

Figure5. Average value of Jitter, End-to-end delay, Throughput and packet drop ratio

IV. CONCLUSION

This paper introduces a performance comparison between various congestion control TCP variations with an alternate reactive routing protocol, for example, AODV and DSR. There is no much impact on the routing protocol on the TCP variations. TCP-Vegas beat the other two variations in all parameters primarily packet drop and throughput. We conclude that DSR has better execution compared with AODV, in light of the fact that DSR directing convention gives low traffic, portability than AODV routing protocol. It produces less routing burden and depends more on storing.

ACKNOWLEDGMENT

The author acknowledges his sincere thanks to reviewers and editors for their valuable suggestion and good comments.

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