Perception of Functional and Performance Problems using ATPG

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Abstract

Each day, network engineers struggle with router misconfigurations, mislabeled cables, fiber cuts, intermittent links, software bugs and countless other reasons and to overcome these problems, An systematic and automated approach for debugging and testing networks called ATPG (Automatic Test Packet Generation). It generates a minimum number of test packets so that each and every forwarding rule in the network is utilised and covered by at least single test packet. Test packets are sent at regular intervals of time by ATPG and it activates a different mechanism for fault location, if failures are detected. In network applications most of the transactions are finding the functional and performance problems. So it is also one of the reasons to introduce ATPG to reduce the effect of the mentioned problems. In my project, here functional problem relates to incorrect firewall rule and performance problem relates to congested queue. It can detect the problems in a two dimensional manner, i.e. static problems and dynamic problems.

Keywords

Test Packet Generation

I. Introduction

An ATPG (Automatic Test Packet Generation) framework can automatically produces minimum number of packets for testing liveness of the fundamental topology. This ATPG tool can also by design produces packets to test presentation assertions like packet latency. In case 1, rather doing by Alice manually determining what packets to send, ATPG tool do cyclically on behalf of Alice. In case 2, ATPG tool concludes that it should send packets with certain headers to "exercise" the video queue, and resolve that packets being plummet. ATPG tool perceive and diagnose faults by in competition and carefully examining every firewall rules, forwarding entries, and any packet meeting out rules of network.

II. Related Work

In control plane, Here NICE endeavors efficiently wrap code ways allegorically with in controller applications along with assistance of chop down host/switch models. With in dataplane, Anteater models with invariants Boolean satisfiability exertion and verify them by arrangements by SAT solver. The Header Space Analysis utilizes symmetric model for checking reachability, identify circles, and affirm cutting. SOFT is proposed to affirm consistency between diverse Open Flow operators usage that are accountable for crossing over control and information planes in SDN connection. ATPG parities all these checkers by straight forwardly for examining information plane with wrap critical arrangement of enthusiastic or execution lapses that can't or else be kept.

III. Literature Survey

THE AUTHOR, YigalBejerano(ET .AL), AIM IN [1], we expand failure-resilient methods for examining faults and link delays in Enterprise IP network or Service Provider. A two-phased method efforts to decline the two controlling communications costs besides the extra traffic payable to examine messages. During first phase, the approach is to find the positions of a negligible number of the monitoring stations so that every network link is enclosed, even among the company of various link failures. Then, in second phase, we practice a minimum number of probe messages which are broadcasted by stations to determine cut off network faults and link delays. We explain that the two together station selection difficulty and also the probe obligation problem is NP-hard. A greedy approximation algorithm is proposed which attain the logarithmic approximation factor for constant factor for the probe assignment problem and position selection problem. The approximation ratios are certainly very close to the most likely constrained for any type of algorithm.

THE AUTHOR, AmoghDhamdhere(ET.AL) AIM IN [2], The disseminated quality of the Internet is troublesome for lone service provider for troubleshooting the interruptions experienced by customer. A troubleshooting algorithm, NetDiagnoser is proposed for naming the failures position in internetwork situation. Foremost, we get used to the renowned Boolean tomography practice to achieve in this kind of environment. This system to radically enlarge advance the judgment exactness in the vicinity of logical failures, incomplete topology inference and multiple link failures. In fastidious, NetDiagnoser will make use of routing messages, rerouted paths composed at one provider's network and Looking Glass servers. We assess every characteristic of Net Diagnoser independently making use of C-BGP simulation in contact of sensible topologies. Based on the results, NetDiagnoser can productively recognize small number of links, that are approximately forever takes in fact failed/misconfigured links.

IV. Problem Definition

The main issue for Internet Service Providers (ISP) and vast server farm administrators is testing liveness of a framework. Dissemination evaluation among each pair of edge ports are neither adaptable nor thorough. It is adequate to find base number of end-to-end parcels which cross at every connection. However, doing this needs a procedure for non allegorical crosswise over machine specific arrangement records, creating headers and also the connections they will reach, and finally developmental base quantities of the test bundles (Min-Set-Cover). It is to guarantee upholding dauntlessness during the time of arrangement and the configuration.Not planned to perceive liveness failures, bugs switch equipment or software, or act problems.The two continuous reasons for the system glitch are software bugs and equipment disappointments and those issues obvious themselves both as throughput/inactivity filthiness and reachability failures.

V. Proposed Approach

ATPG (Automatic Test Packet Generation) framework by design produce minimum number of packets for testing the liveliness of causal topology and the equivalence between data plane state and

constructionstipulation. This tool can repeatedly create packets for examining routine allegations like packet latency. It will producea minimum number of packets to test each and every link for network liveness. A fault localization algorithm is to cut off defective devices and rules. ATPG use cases for purposeful and presentation testing.
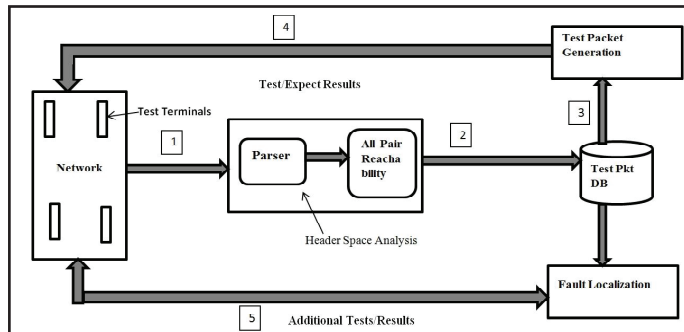
VI. System Architecture

Fig. 1: ATPG System Block Diagram

Network forward state is collected first by ATPG (step 1). This commonly include perusing of ACLs, FIBs, config records, and additionally discovering topology. Header Space Analysis is used by ATPG to ascertain reachability among every test terminal (step 2). Test packet selection algorithm utilizes the obtained result to calculate minimum number of test packets that can examine complete rules (stage 3)Test terminals frequently passes the packets (step 4). An algorithm (fault localization) is called upon when error is discovered (step 5).

VII. Proposed Methodology

A. Test Packet Generation
A package of the test terminals in the system post and be given test bundles. Here goal is to make an arrangement of test bundles for utilizing every tenet in every switch capacity, Any slip that is experiential by at scarcest one test parcel. It's equal to programming a test gathering which endeavor for examining every potential branch of a project. The most comprehensive point is deficient for testing each connection or every line up. When creating test packets, ATPG should profound respect two key restraints.In First Port, ATPG tool employs test terminals that are reachable and Header. Here ATPG will make use of headers for each test terminal is legitimate to transmit.

B. Generate All Pairs Reachability Table
ATPG tool start calculating the absolute number of every packet headers, which are transmited from every test terminal to all the remaining test terminals. For all the header, ATPG tool discover inclusive number of rules that it make use of all the path. Here ATPG be relevant the all pairs reach ability algorithm explained. On terminal port, all-header (header that has every wild carded bits) functional for transfering function of primary switch linked to every test terminal. Header limitations are applied here.

C. ATPG Tool
Automatic Test packet Generation(ATPG) generate minimum number of test packets where all forwarding rules in network is implemented and enclosed by a minimum single test packet. If there occurred any fault, ATPG utilize algorithm called fault localization to resolve the links or failing rules.

D. Fault Localization
ATPG episodically dispatches minimum number of test packets. Test packets, If packets falls short of destination, ATPG identify fault(s) which source the difficulty. Rule will fails if the experiential behaviour changes from ordinary behaviour. ATPG take follow of rules fail by a function result i.e "Success" and "failure" depends upon character of rule. Forwarding rule failure occurs, if the test packet did not arrive to the future output port, while drop rule performs accurately if packets go down. Likewise, the link breakdown is a failure of a forwarding rule in topology purpose. On the alternative side, if a production link is overcrowded, failure is imprisoned as in the latency of test packet departure over threshold.

VIII. Algorithm

A. Fault Localzation Algorithm
INPUT: N1,N2,N3,R1,R2,R3,ATPG TOOL
START:
STEP 1: A packet PK arrives in a network portP.
STEP 2: Switch function that T contains the input port PK.P
STEP 3: Produce a list of packets.
STEP 4: If packet attain destination it is recorded.
else
Topology function invokes switch function which contains new port.
STEP 5: Process is repeated until a packet reaches or dropped to destination.
END
OUTPUT: Packets reached status

B. Rate Control Algorithm
On arrival of BF packet p from egress router e
if (p.asynchronous== FALSE)
    e = cur_time- p.timestamp;
if (e.currentRTT<e.baseRTT)
e.baseRTT= e.currentRTT;
deltaRTT= e.currentRTT- e.baseRTT;
RTTElapsed=(CurrentTime-LastFeedbacktime)/currentTime;
for each flow f listed in p
f.mrc= min (MSS / e.currentRTT, f.egress_rate/ MF);
if (f.phase== SLOW_START)
if (deltaRTT* f.ingress_rate<MSS * e.hopcount)
f.ingress_rate= f.ingress_rate* 2^RTTElapsed;
else
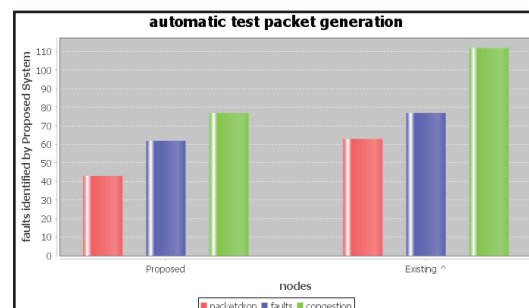f.ingress_rate = f.egress_rate - f.mrc;

IX. Results

Fig. 2:

This graph shows the efficient result of proposed approach in terms of packet drop, faults and congestion.

X. Enhancement

In routers, we will have congested queue problems, to overcome this problem we are proposing rate control algorithm in routers. Absence of many undelivered packets prevents overload due to retransmission. Fair allocation of bandwidth is ensured.

XI. Conclusion

Liveness testing of network is the primary problem for large data centres and Internet service providers. ATPG provides testing liveness of the similar framework. It can also test for a reachability system by all principles correlating to tally drop standards and presentation routine measures, for example, misfortune and idleness with the test packets. Our execution additionally extends testing with simple shortcoming confinement design in which header space structure is used. As a support to the project all outcomes are purely based on the forward rules of single sending principle in Internet2 or Stanford backbone.

XII. Future Work

Now a days networks are more complex and having different types of models. Future research should focus on improving performance of ATPG tool and add more functionality to detect routing attacks and performance problems.

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