

DEVICE-INDEPENDENT MODEL FOR TEST PACKET GENERATION IN NETWORKS BY USING ATPG

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Abstract: These days networks aren't obtaining any smaller, they are increasing in size and it's turning into a tedious job for network administrators to correct the network since they place confidence in traditional tools like ping and trace route for this work. Our paper throws an advance habitual and systematic approach to test and correct a network referred to as Automatic check Packet Generation (ATPG). ATPG produces a model that isn't reliant on policy once reading arrangement from routers. The model is employed to get minimum variety of check packets to hide each link during a network and every statute net. ATPG is competent of work. Each practical and performance issues check packets are sent at regular intervals and separate technique is employed to localize faults. The working of few offline tools that mechanically generate check packets as well are given. However, ATPG goes on the far side and sooner the work in static checking (Checking aliveness and fault localization).

I. INTRODUCTION

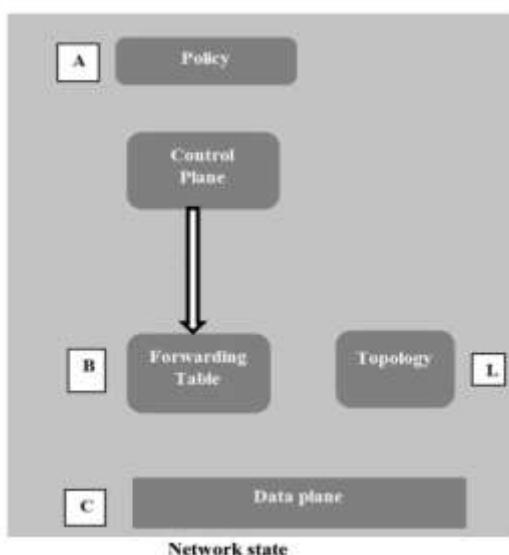
It is not in any respect a simple task to correct a network. The network administrators face issues like router miss configuration, Fiber cut, illegal cables, code bug, Faulty interfaces etc. Network directors try and overcome these issues using largely used tools like ping and trace route. Debugging networks is obtaining tougher as not only size of networks but additionally their level of complexity is also increasing day by day, allow us to contemplate few samples of different types of issues network directors face in day to day life. Consider a router with a line card having a fault, so that it silently drops take a look at packets, as a result, several users for bad connections complain to network administrator. Now if that administrator is administrating one hundred routers he should attend each router to check if configuration isn't altered, and if the answer isn't any, he uses his information of topology to look faulty device victimization techniques like ping and trace route.

Consider another example wherever video traffic is place in an exceedingly particular queue, and token bucket magnitude relation is low that is the reason why packets are born. Such performance faults aren't possible for network directors to research. To make out what difficulties network directors face and at present however they overcome these difficulties, a survey was made in 2011. All responses thereto survey is given in . From the survey it's clear that directors ought to fight with Complex symptoms and causes. Several issues

associated with networks occur often and it takes abundant time to come out of them, that the value of debugging a network becomes insignificant. Pure tools like ping and trace route are largely used, however currently network directors would like additional refined tools. This paper implies an automatic and systematic approach to test and correct a network referred to as Automatic Take a look at Packet Generation (ATPG). ATPG produces a model that isn't dependent on devices once reading configuration from routers. Another advantage of ATPG system is that it covers every link and every rule network with minimum variety of take a look at packets. Uniformly the take a look at packets ar send, and if any fault is detected, it's triggered by separate mechanism specifically fault localization.

ATPG will solve each of the on top of issues, hence it will cowl each practical and performance faults. The figure one is uncomplicated read of network state. In lower half of the figure there's forwarding table. The perform of forwarding table is to forward every packet. Packet is consisting of forwarding info base (FIB), access control lists etc. it's management plane that writes forwarding state. one will be rotten in 3 components as A, B and C. We can contemplate the policy (A), that is compiled by controller into configuration files that are device specific (B), which then shows the forwarding behavior of each packet (C). To ensure the network behaves as per demand, all the 3 steps in any respect times ought to stay consistent, that's same as A=B=C. At an equivalent time, the topology, shown at the lowest right within the figure, ought to even be able to satisfy a collection of liveliness properties shown by L. It is not too some time past once scientists return up with tools showing compactness between policies and configuration files A=B, however these tools can't contend with performance issues which needs checking of aliveness property L or B=C. ATPG will do that job with efficiency.

The define for the remainder of the paper is as given below.
1) 1st take a glance at some earlier works associated with automatic take a look at packet generation, some offline tools.
2) Followed by Header house Analysis [4] employed in ATPG system.

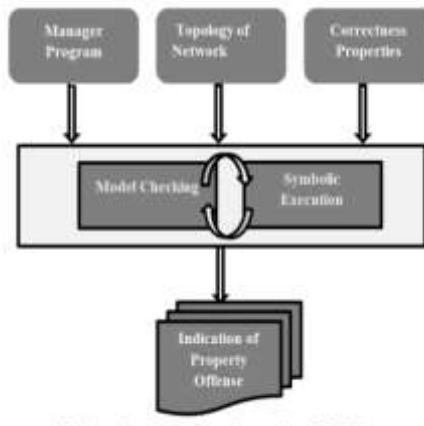


II. RELATED WORK

In this section some of the earlier techniques used for automatically generating test packets are given. Nearest technologies known are few offline tools.
 2.1 Offline Tools Supporting Automatic Test Packet Generation

One of the logged off utensils that are utilized for enable test parcels mechanically in control plane is great. Decent remains for no bugs in controller finishing. Decent is connection logged off device, that get the bug controller project to client's notice a considerable measure of speedily with the help of model weighing and typical execution in open stream characterization. in commission with discharge stream arrangement technologist must be urged to impact difficulties like expansive place of switch state, gigantic place of exertion bundle, tremendous flexibility of occasion requesting and so on to beat these difficulties NICE is of incredible utilization. Working of NICE is demonstrated. Decent technologist brings to the table controller program close by topology of framework that join state of switches and hosts. The technologist will raise NICE for general rightness of properties like, project isn't having any sending circle or system is with none dark openings. the immense in keeping with settled mastermind appearance into the feasible framework conduct and checks it with precision property give by the technologist. The technologist has the independence to draw together inquiry approach which is wanted by him. At long last NICE offers the hints of advantages contradiction or property to aren't up to the imprint with their evidences as yield. The instrument NICE chips away at top of things plane similarly inside of the information plane there's another disconnected from the net apparatus that may be utilized particularly Anteater. Insect eating animal accumulates the setup and sending information bases (FIBs) of method, and depict them as mathematician capacities. At that point a screw up to be checked is determined by administrator against the system, such lapses will be consistency of sending tenets among switches, reachability or circle free forward. Insect eating animal

makes the blend of these slips and proselytes them into tests of mathematician satisfiability drawback (SAT), and makes utilization of a Sabbathum issue solver to execute study. In the event that the framework state ignore unite invariant, Anteater gives a specific nullification, for instance a parcel header, FIB passages, and way that brings concerning the potential bug.



No bugs In Controller Execution (NICE)

Insect eating animal discovers mistakes through differed steps. 1st of all, Anteater assembles the substance of FIBs from systems administration hardware through terminals, SNMP, or administration sessions kept up to switches. These FIBs will be either direct data preparing longest prefix match standards, or a ton of entangled activities like access administration records or alterations of the parcel header. Furthermore, the administrator shapes new invariants or chooses from a menu of typical invariants range unit to be checked against the system. this may be done through ties in Ruby or in an exceedingly explanatory dialect that we have a tendency to intended to redesign the outflow of invariants. Third deed is with the purpose of, Anteater translates each the FIBs and invariants into tests of Sabbathum, which range unit determined by Sabbathum inconvenience solver. Finally, if the result from the Sabbathum issue solver demonstrate that the gave invariants range unit debased, Anteater can get an invalidation to bolster acknowledgment . Just a brief time past analysts have return up with SOFT acclimated demonstrate the consistency between shifted open stream specialists that area piece obligated to assessment for including administration and learning plane in the connection of SDN.

2.2 Other Related works

Since long haul, to take a gander at shortcomings in systems they're analyzed on completion to complete fundamental. right away specialists territory unit enthusiastic about mining mediocre quality chaotic data for sample, we will consider switch arrangement and system tickets. On the inverse hand, primary giving of ATPG framework is giving thick arrangement of completion to complete evaluation that may involve each principle or every connection, and not just blame limitation . Numerous analysts have escort totally distinctive measure generous blueprints. Our methodology is extra to all or any these. bunch by data in conjunction with

port impulses ATPG produces check bundles and reason for infusion for these parcels with the help of circulation of gauge gadgets .

2.3 Header Space Analysis

The programmed check parcel era utilizes the structure of Header region examination, amid which it utilizes a geometrical model, which allows the ATPG framework to factually check the system details and arrangements to bombshell essential classes of disappointments like sending circles, reachability disappointments, activity seclusion and linkage drawback. Another point of interest of header region investigation is ability to attempt and do cutting. Cutting guarantees disengagement between framework has, clients then again movement. Consider virtual LAN as partner sample of cutting. Once the virtual LAN is sorted out legitimately it offers ensure that traffic from one cut can't spill into option cut, so it gives extra security. amid this case cut is virtual LAN. At an equal time by exploitation geometric model of header zone examination, once sanctionative the static investigation of system cut in more broad way the assessment of disengagement will be taken any . A cut is made of mixed bag of different header fields and comprising of topology of mixture of switches and connections. There is situated of headers on every connection and its share of ability comparing to each header. each cut has the different control plane, and its dependent upon its proprietor to pick however parcels are directed and prepared in that cut. In header zone, the that method for header that is specific to conventions in not considered: A header is seen as unbroken game plan of double outline i.e. zeros and ones. A header could be a reason and stream will be seen as district amid a set containing zero and one as parts, that is to the capacity L region wherever, L is higher cutoff on length of header. By making utilization of header region system one can do new, vector free and convention nonreligious individual model of system that encourage the system for parcel era by a superb arrangement.

III. FRAME WORK

As mentioned within the last section, the automated take a look at packet generation (ATPG) system makes use of geometric model of header house analysis. This section explains a number of the key terms related to geometric framework of header space analysis.

3.1 Packet

Packet in a very network will be delineate as a tuple of the shape (port, header) in such the simplest way that, it's the work of port to point out position of packet in a very network at fast time. Each one of the port is assigned with one and only 1 distinctive number.

3.2 Switch

Another term employed in geometric model of header house analysis is switches. it's the work of switch transfer perform T, to model devices in a very network. Example of devices will be switches or routers. there's a collection of forwarding rules contained in every device, that decides however the

packets should be processed. once a packet comes at a switch, a switch transfer perform compares it with every decree descending order of priority. If packet doesn't match with any of the rule then it's born. every incoming packet is coupled with precisely single rule.

3.3 Rules

Piece of labor for rules is generation of list of 1 or a lot of output packets related to those output ports to that the packet is transferred, and justify however fields of port area unit modified. In alternative words, rules explains however the region of header house at entrance in became region of header space at exit.

3.4 Rule History

At any moment, each packet has its own rule history, which can be delineate as ordered list of rules packet have matched up thereto purpose because it covers the network. Rule history provides necessary and necessary unprocessed material for automatic test packet generation (ATPG). that's the explanation why it's fundamental to ATPG .

3.5 Topology

The constellation is sculptured by topology transfer function. The topology transfer perform offers the specification regarding that 2 ports area unit joined by links. Links are nothing however rules that forwards a packet from supply to destination with no modification. If there's not one topology rule matching AN input port, the port is set at edge of a network and packet has return to its desired destination.

3.6 lifetime of a Packet

One will see lifetime of a packet as concluding or execution switch transfer perform and topology transfer perform at length. once a selected packet comes in a very network port p, firstly a switch perform is applied thereto packet. Switch transfer perform additionally contains input port pk.p of that packet. The results of applying switch perform is list of recent packets [pk1, pk2, pk3,]. If the packet reached its destination it's recorded, and if that's not the case, topology transfer perform is used to decision upon switch perform of recent port. This method is done once more and once more unless packet is at its destination.

3.7 ATPG THEORY

Stand on the system normal analyzed above; Automatic take a look at packet generation system makes use of least doable variety of take a look at packets to review whole forwarding rules in a very network, on the condition that every forwarding rule is capped by at least one take a look at packet. once the fault is encountered, ATPG is equipped with fault localization formula to resolve the declining rules or links. Figure represents the work flow of automatic take a look at packet generation (ATPG) system.

- 1) The ATPG system begins by gathering forwarding state from network, that is delineate as start within the figure. Work coated during this step is often not solely retrieving topology of network however additionally learning

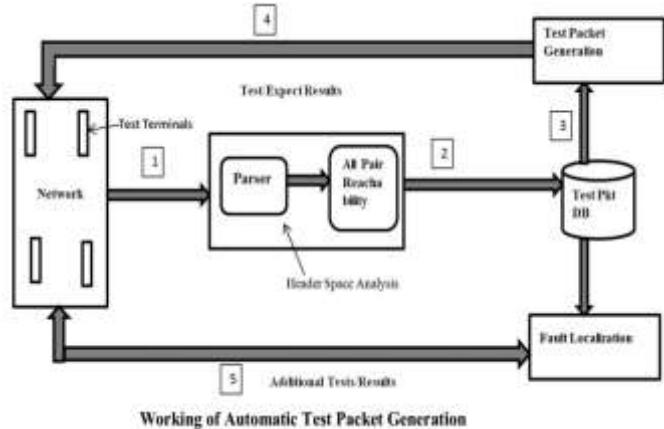
- forwarding info base and configuration files etc.
- 2) The second step follows the primary, within which header house analysis is employed by ATPG system to work out scope of every terminal.
 - 3) the result of second step is taken as input by take a look at packet generation formula to measure smallest variety of take a look at packets sufficient to check all rules. This completes third step.
 - 4) These take a look at packets area unit sent frequently by the take a look at terminals as a penultimate step.
 - 5) Lastly, if a blunder is disclosed ATPG appeals to fault localization formula to curtail root of error.
- Readers will see alternative version of figure three in figure five given in.

3.7.1 Origination of take a look at Packets

The ATPG system will be roughly divided into 2 elements namely take a look at packet generation and fault localization. While developing AN formula for take a look at packet generation a supposition is that, set of take a look at terminals might transmit or take in take a look at packets. The target for formula is generating minimum variety of take a look at packets to apply each decree every switch perform, as a result if a fault happens, it will be watched by a minimum of one take a look at packet. ATPG system makes use of take a look at packets choice formula (TPS) to get take a look at packets. ATPG should solely build use of take a look at terminals that area unit on the market and ATPG should utilize headers that every take a look at terminal is authorized to send area unit 2 necessary restrictions of that ATPG should take a notice of at the time of generating take a look at packets.

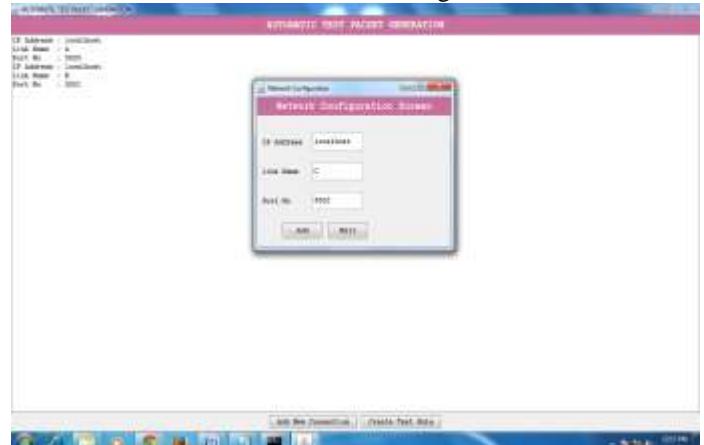
1) ATPG system begins by estimating entire set of take a look at packet headers which will be forwarded from every take a look at terminal to each other take a look at terminal. ATPG achieves this by detective work full set of rules it will total in entire journey. Thus, ATPG refers to all combine reachability formula to perform this task.
 2) later, ATPG selects larger than or adequate one take a look at packet from identical category of take a look at packets to use each rule which is at intervals accessible distance. Automatic take a look at packet generation will complete this with ease by haphazardly selecting single packet in every category. This technique is capable of finding solely those faults that all packets screened by same rule suffer constant fault. Example of such faults includes link failure. On the opposite hand if somebody desired to find out faults that area unit explicit to headers, then he needs to select each header in each category. This method is named sampling.

3) last within the method of generating take a look at packets ATPG goes to compression. Most of the days whereas mistreatment take a look at packet selection formula there return scenario such same rule can be utilized by various take a look at packets. Consequently ATPG chooses smallest family of take a look at packets selected in on top of step in such the simplest way that alliance of their rule histories cowl total rules

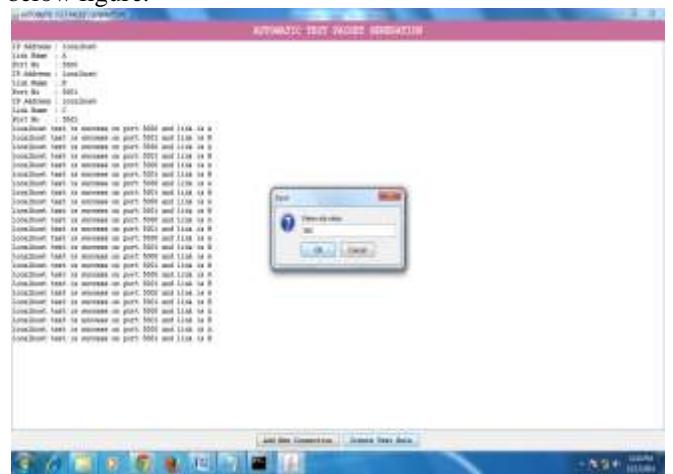


IV. EXPERIMENTAL RESULTS

To start our project we have to add some nodes to add the nodes we have to do like shown in the figure.



After completion we can test the A,B,C as shown in the below figure.



V. CONCLUSION

System chiefs now a day's generally rely on upon old apparatuses for example ping and trace route to right a system. It is watched that they need more refined instrument for this work. In everyday life, network access suppliers and also huge server farm administrators face issues in testing livens of a system. Then again, directing

tests between each Pair of outskirt ports is fragmented as well as unappreciable. One can leave this issue by processing on gadget particular setup documents, making headers and connections came to by them. Ultimately discovering slightest number of test parcels to cover every connection. To beat every one of these issues oblige system like ATPG. By testing all guidelines comprehensive of all drop rules ATPG has the capacity test reachability method. That is not all; by utilizing execution scales, for example, deferral and loss of test parcels ATPG can figure execution soundness of a system. ATPG employments straightforward issue restriction strategy developed with the assistance of header space investigation to confine deficiencies. Customary model of ATPG framework serves to cover most extreme connections or standards in a system with least number of test bundles.

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