

The Best Route Selection and Internet Routing Application in PT. IndosatM2

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Abstract: The best internet routing and route selection are one of the crucial parameters together with other parameters such as network quality and capacity, network device reliability, and a good network monitor system, which must be considered by PT. IndosatM2 as an Internet Service Provider (ISP). During this time the process of selecting the best internet route and routing is carried out entirely by the network administrator so that it cannot be done at any time and the existing alternative lines are checked one by one with a level of accuracy which often disrupts due to lack of documentation. The Best Route Selection and Routing Internet Application at PT. IndosatM2 will integrate and connect a web-based online application with network devices that are routers that interact with each other to run a script command on the router network device, that is, the script command from BGP routing protocol that is used between Service Providers on the internet to know and provide track information and the best routing to a particular destination. The output of this application is the best internet route and routing, also noted the requested changes in the form of 6 requests could be done the best internet routing and routing processor about 75% of the total 8 requests. 2 requests cannot be made for the best internet routing and routing processor around 25% of the total 8 requests reducing the processing time to complete the request for the best internet routing and routing that is very significant, so that it can improve service levels above the average value of 99.5% to customers

1. INTRODUCTION

PT. IndosatM2 (IM2) a company with a head office located on Jl. Kebagusan Raya No. 36 Pasar Minggu South Jakarta and has branches in many major cities in Indonesia, wholly owned by PT. Indosat Tbk, the leading provider of telecommunications services in Indonesia, has been operating fully since 2000 to build and implement IP, internet and multimedia based services and products in Indonesia. Serving four customer segments: corporations (large, medium and small), government, institutions, residential, and individuals. Corporate and institutional services include Virtual Private Network (VPN) networks, direct connections to international internet backbones, and multimedia service providers.

IM2, as one of the internet service providers or often referred to as an Internet Service Provider (ISP) in Indonesia places great importance on the quality of internet access for its customers. IM2 as one of the ISPs is connected to the internet through various other ISPs called Uplink Providers. The current business process flow system is that the Helpdesk accepts path

selection requests and internet routing to specific IP address destinations from customers, then the helpdesk creates and forwards the ticket to the Person In Charge (PIC) administrator, then the administrator processes the request by logging into the gateway router use the application to telnet and run the script command to check the number of available IP routing paths to the destination IP address requested by the customer, the administrator manually changes the BGP routing protocol configuration on the router, ie for the outbound path by increasing the local preference value and pinging to the destination IP address and record the time lag results, while for the inbound path by adding prepend AS and ping the destination IP address and re-record the time lag result, the administrator does the work manually for configuration changes and records the time lag to the purpose of this particular IP address repeats according to the number of paths and routing available from the results of previous checks, after which it will be selected from the results manually recorded, the smallest time lag value and configuration are changed to match the selected path to the destination of a

specific IP address, then obtained the best path and routing, then the administrator will resolve the ticket, based on the ticket that has been resolved, the helpdesk will inform the customer that the path selection request and internet routing to the destination IP address requested has been completed.

A router is one of the main devices to connect between one network and another network which also functions to manage exchanges and data traffic routes with each other (Thiel, 2014). Routers are also connected to other routers throughout the world, which allows two computer networks connected to different routers to be able to channel their data with the best travel routes among various alternative routes. But not always the route determined by the router is the most optimal or best because of several factors that can not be known by the router, for example, there is a relationship in the middle of the track with full traffic capacity or a transmission interruption. Thus human interaction is needed as a network manager to determine the best route for themselves to a particular destination after checking the existing path alternatives. A router's functions are to read the destination address marked in an incoming IP packet, to consult its internal information to identify an outgoing link to which the packet is to be forwarded, and then to forward the packet (Medhi and Ramasamy, 2017).

The best path selection and internet routing takes a long time, because routing access permissions should only be done at the administrator level, including each connection of each Uplink Provider connection, all of which are done manually so that it helps with the long transition, plus the need for data access and information for the company's internal interests as a material for analysis, decisions and strategic decision making of the company going forward (Goralski, 2017).

The problems faced in the existing system mechanism are as follows: it is necessary to examine alternative paths one by one for two directions (Upstream and Downstream), so that it takes more than 1 hour, Requires expert staff at administrator level who have the highest access rights to Router configuration changes, with a limited number and not always ready 24 hours to do so, changes made often cause disruption of internet access due to inadvertent conduct in checking and changing internet routing lines, and not well-documented for information on changes made as reports to supervisor and management.

The main objectives expected with the development of application systems are internet routing and routing, which are: design and implement

the best internet routing and routing application system in PT. IndosatM2, provides an easy, precise and fast system that is the result of automation of the best internet routing and routing processes., providing continuity of information systems for the best internet route and routing selection, providing recapitulation of the best internet routing and routing processes, so as to produce information that is more accurate and can be utilized by internal and company management.

In this paper, we propose the use of a blockchain-based mechanism to secure the Internet BGP and DNS infrastructure; A tamper-resistant DNS infrastructure also ensures that it is not possible for the application-level PKI to spoof HTTPS traffic (Hari and Lakshman, 2016).

Nearly all network applications rely on the global Internet routing infrastructure to compute routes and deliver packets; unfortunately, false Internet routes can be maliciously introduced with relative ease into the routing infrastructure. This is because Border Gateway Protocol(BGP), the Internet's global routing protocol, lacks basic authentication and monitoring functionalities, currently, it is impossible to prevent such malicious injection off also traffic routes, we believe that an ability to identify false paths through efficient validation, proper recording and forensic analysis of routing data, will considerably help in the prosecution of them is created and will act as a strong deterrent (Kim, Massey and Ray, 2005).

BGP routing updates collected by monitoring projects such as Route Views and RIPE have been a vital source to our understanding of the global routing system. However, the collected BGP data contains both the updates generated by actual route changes and the updates of BGP routing table transfers resulted from BGP session resets between operational routers and the data collection stations, In this paper, we present the design and evaluation of the minimum collection time (MCT) algorithm. Given a BGP update stream, MCT can identify the start and duration of each routing table transfer in the stream with high accuracy. We evaluated MCT performance by using three months of BGP data from 1 RIPE collectors. Our results show that out of the total 1664 BGP resets with 166 monitors, MCT can identify BGP routing table transfers with over 95% accuracy, and pinpoint the exact starting time of the detected table transfers in 83% of such cases (Chenga, Zhang, and Massey, 2011).

Abnormal BGP events such as attacks, misconfigurations, electricity failures, can cause anomalous or pathological routing behavior at either a global level or prefix level, and thus must be detected in their early stages. Instead of using ad-hoc

methods to analyze BGP data, in this paper we introduce an Internet Routing Forensics framework to systematically process BGP routing data, discover rules of abnormal BGP events, and apply these rules to detect the occurrences of these events (Li, Dou, Wu, Kim and Agarwal, 2005).

The Border Gateway Protocol (BGP) is one of the fundamental computer communication protocols. Monitoring and mining BGP update messages can directly reveal the health and stability of Internet routing; specifically, we developed BGPIens, an automated BGP updates analysis tool, that has three desirable properties: it is effective, able to identify phenomena that would otherwise go unnoticed, such as a peculiar 'clothesline' behavior or prolonged 'spikes' that last as long as 8 hours; it is scalable, using algorithms that are all linear on the number of time-ticks (Prakash, Valler, Andersen, Faloutsos and Christos, 2009).

2. METHOD

This study uses a research method with the following steps:

2.1 Running System Analysis

One of the activities carried out by the Network Operation & Monitoring sub-section, the Network Operation Center (NOC) Division of PT. IndosatM2 (IM2) is monitoring continuity and carrying out operational systems and production networks for the continuity of services and products of PT. IndosatM2 is used by customers, which includes the process of selecting the best internet route and routing.

Previously there was no application system that was made to determine the best online and automatic route and internet routing selection that could serve customers' requests easily, quickly and precisely, so the process flow in the system was still done manually, both from the start of the request, forward the ticket to the Administrator, check and report the results of the internet routing and routing selections made. This manual method is very inefficient, and the report data obtained is no longer accurate.

2.2 Running System Process Flow

The process flow that is written is limited to the process flow of the best internet routing and routing received by IM2 NOC. Explanation of the system process flow running for the best internet routing and routing paths is as follows:

2.2.1 The customer requests and makes a ticket to the Helpdesk.

2.2.2 The Helpdesk creates and forwards the ticket to the Personal in Charge (PIC) Administrator concerned.

2.2.3 The administrator processes the ticket request for the best internet route and routing and resolves the ticket after getting the best internet route.

2.2.4 Based on the ticket that has been resolved, the Helpdesk informs the Customer that the request has been completed.

2.3 Data Savings Analysis

Deposits of data are still in the form of paper documents, so it needs to be stored in the form of a database as part of the system application for the best internet routing and routing.

2.4 Analysis of Problems in the Running System

After discussing and analyzing the system that is running, various problems can be found in the system. The problems in question are:

2.4.1 Storage of data from the best path and internet routing results is manual so that it can cause data duplication and data search will take a long time, then new and automatic database storage is needed.

2.4.2 The best internet routing and routing process are still manual, so the implementation of the best internet routing and routing process from many customers will take time and be hampered if the Administrator is not available, so the process automation is needed in the best internet routing and routing to overcome the problem.

2.4.3 The recording and recapitulation of tickets by the Helpdesk produced are still manual, so it takes a long time in grouping and calculating tickets and difficulties in compiling reports for management, it requires a new reporting process that is automated so that fast and accurate data reporting needs can be resolved.

2.4.4 There needs to be a policy regarding the best process of internet routing and routing that is automatic in a system. This policy will enable the old problems handling the process of requesting the best internet route and routing and can only be done by the Administrator is not an obstacle, and the availability of reports for management regarding the process and the best internet routing can be handled and presented online.

2.4.5 Based on observations, it can be seen that the flow of the process of requesting the best internet routing and routing paths rests everything on the Administrator who must be stand-by on the spot.

2.5 Problem Solving Strategies

Based on problem analysis, it is necessary to make the design and implementation of the best internet path and routing selection system.

2.6 Problem Solving Strategy Process Flow

Explanation of the process flow of problem-solving strategies for the best internet route and routing selection is as follows:

2.6.1 The customer requests the best internet route and routing request to the Helpdesk.

2.6.2 The Helpdesk accepts requests, ensures customer profiles are in the customer database, and assigns tickets to requests for the best internet routing and route selection.

2.6.3 The system processes the best internet path and routing for the internet IP address as requested on the ticket.

2.6.4 From the results of the new route and routing obtained, the helpdesk resolves the ticket and information that is ready to be delivered to the customer.

2.6.5 From the resolving ticket, the Helpdesk informs the results to the Customer.

2.6.6 The Flow of the Path Selection Process and the Best Internet Routing in General

Explanation of the best flow path and internet routing process, are as follows:

2.6.7 Connection and Login to the gateway router console using Telnet.

2.6.8 Check each connection to the existing internet, by typing the console command: show IP BGP, note the available alternative path, namely the BGP Peer IP address for each available BGP path that is visible on the console.

2.6.9 Specify the path to the destination address (Upstream):

a) Of all the alternative paths available from number 2.7.2 above, prioritize one for the destination IP address requested by the Customer, by increasing the local-preference prefix IP value obtained from BGP Peer for this path, with console commands namely like the following example:

- (1) IP IN permit 10.10.100.0/24 prefixes
- (2) route-map IN permit 5
- (3) Match IP IN. Prefix-list
- (4) local-preference set of 150
- (5) clear IP BGP peer-group IN soft in

- b) Check and record the amount of latency obtained at the destination IP address using the console ping command to the destination IP address, which is the average round-trip value.
- c) Repeat steps a) and b) above for each of the other paths until all BGP Peers in number 2) above.
- d) From the latency recorded, prioritize the destination address requested to the alternative path with the smallest latency, by way of point a) above.

2.7.1 Determine the return path from the destination address (Downstream):

a) From all the alternative paths available from number 2.7.2 above, make the downstream path to the Origin IP address pass one of the paths, by advertising the Customer IP prefix by doing a US Prepend to all BGP Peers on the other path, with commands console that is like the following example:

- (1) IP prefix-list UPLINK1-OUT permit 20.20.200.0/24
- (2) IP UPLINK2-OUT permit prefix-list 20.20.200.0/24
- (3) UPLINK1-OUT permit-map route 5
- (4) match IP UPLINK1-OUT prefix-list
- (5) set as-path prepend 4795 4795 4795 4795
- (6) UPLINK2-OUT permit route-map 5
- (7) match IP UPLINK2-OUT prefix-list
- (8) set as-path prepend 4795 4795 4795 4795
- (9) clear IPBGP peer-group UPLINK1-OUT soft out
- (10) clear IPBGP peer-group UPLINK2-OUT soft out

- b) Check and record the amount of latency obtained at the destination IP address using the console ping command to the destination IP address, which is the average round-trip value.
- c) Repeat steps a) and b) above until all BGP Peers from number 2.7.2.
- d) From the latency recorded, prioritize downstream to the Customer address to the alternative path with the smallest latency, as in point a) above.

2.7.2 The best internet path and routing to the requested destination has been obtained and Customer traffic has gone through that path both Upstream and Downstream.

3. RESULT AND DISCUSSION

By implementing the implementation process and using the best internet routing and routing application system programs, an analysis was achieved by the program. Analysis of the results achieved by the program during the first 2 weeks (17-30 April 2019) the use of the best internet routing and routing application system, including:

3.1 The best internet routing and routing application system program can be used easily, precisely and quickly and runs well to process the best customer routing and internet routing for a total of 8 requests, as in figure 1.

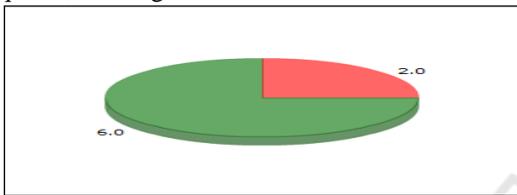


Figure 1: Pie Chart Best Total Path Selection Requests and Internet Routing

With the explanation for the Pie Chart above are:

3.1.1 6 requests can be carried out by the best internet routing and routing processor, around 75% of the total 8 requests.

3.1.2 2 requests cannot be carried out by the best internet routing and routing processor around 25% of the total 8 requests because the IP Destination requested by the Customer cannot be pinged.

3.2 The program can do the best internet routing and routing selection from 6 Customer requests with Latency and Processing Time as shown in figure 2.

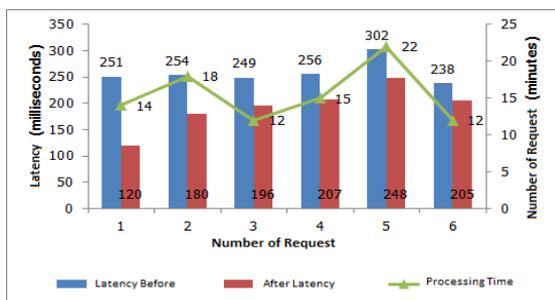


Figure 2: Bar Line Chart Latency and Processing Time

3.3 From the results of a new internet routing and routing check for 6 requests from the Customer, there is the best internet routing and routing selection based on the Uplink Provider, as shown in figure 3.

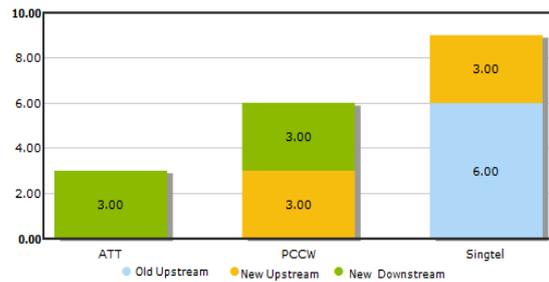


Figure 3: Uplink Bar Chart For Best Internet Path and Routing Selection

With the explanation for the Chart Bar above are:

3.3.1 Singtel is an old Upstream path of 6 requests and selected as the best new Upstream for 3 requests resulting from the process of selecting the best internet route and routing.

3.3.2 PCCW is selected as the best new Upstream for 3 requests and selected as the best new Downstream for 3 requests resulting from the best internet routing and routing process.

3.3.3 ATT is selected as the best new Downstream for 3 requests as a result of the best internet routing and routing process.

4. CONCLUSIONS

Conclusions can be taken as follows: the program can run well according to the objectives and design of the program and as a solution to the problems faced beforehand and can be used quickly, precisely and easily by the user as part of process automation to support daily operational activities, remote application process or remote control directly to the router gateway device automatically and real time, reducing dependence on administrators and reducing the possibility of errors during the inspection process and the best internet routing and routing, checking and selecting the best internet routes and routing can be done in a fairly short and efficient time, reducing the process time to complete the request for the best internet routing and routing that is very significant, so that it can increase service levels above the average value of 99.5% to customers, and documentation of the process and results of examinations as well as the best internet route and routing selection, so that a report on recapitulation of requests and completion of the best internet route and routing selection can be made based on the time period needed quickly and accurately to support the continuity of information

systems company management to support and improve company performance and services.

Suggestions for further enhancing and developing application systems, namely: there is a monitor feature to monitor the best internet routes and routing to the IP destination address requested by the customer so that it can be known if there is a change back and can be used all the time as long as this feature is activated, the visualization feature of the best internet routing and routing process is done so that it can help and as an illustration for the uplink provider selection process, the best internet routes and routing going forward, and can be integrated with a Web Analyzer system that has a world-wide popular website address data bank that is accessed by many customers, so that the system can monitor and select the best internet routes and routing to the website's IP address.

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