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Analysis Load Balancing With Nth Method on Web Video Streaming Using Backup Failover

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***Abstract*— The Internet is a human connector with the virtual world. The number of internet users who access the data resulted in a density of data traffic resulting in inhibition of human work processes, therefore required action Load balancing as a technique to balance traffic data, spread through links, and create data flow backups with failover. Nth is one of the Load Balancing methods that have a Round Robin algorithm. In this research will discuss load balancing technique using the Nth method with backup failover which implemented using a router device by connecting two different ISP links on three virtual clients as test means. Based on the results of trials conducted with two ways of testing the bandwidth for data download is the download speed with the download each client gets an average of 0.6 Mbps, whereas web video streaming test shows the smoothness of the network without buffering streaming compilation.**

Keywords*— *Load Balancing; Nth Method; Failover

I. INTRODUCTION

As internet technology develops, many Internet Providers (ISPs) emerge. This cannot be denied at this time because the need for the internet is a basic need. Starting from access to information to buying and selling online has become commonplace. A large number of requests from the public will be an internet connection, so many internet providers are competing to provide the best services and products. Various government agencies and communities are using more than one internet service provider. Therefore with multiple gateways, this is quite helpful inside management. An internet connection that allows it to run optimally for each link. One of the most common methods is to load balance. From the load balance itself, there are some that can occur, including ECMP (Equal-Cost Multiple Path), Nth, PCC (Per-Connection Classifier).

In this study focused on load balancing using the Nth method with failover as a backup. Nth is one of the Load Balancing methods that have a Round Robin algorithm used by the Mikrotik operating system, where this method guarantees the distribution of the data packet load on several connections will be fair and equitable. Failover techniques as a backup with the meaning of techniques to divide the traffic load through 2 ISP links, and if there is a failure in a link, the connection will automatically be transferred to the link that still exists. Testing will be carried out by utilizing three virtual operating systems that act as clients.

Because of different ISP links visits and interoperability issues, leading to a resource within the same ISP faster visits, when the cross-ISP access, the access speed is slower. As a dual-link access mode, you can avoid a single point of a link failure caused by paralysis of the network. When a network problem occurs, the device will automatically switch to another on a network link, to protect the normal network access. This is through the flow control device configuration management, DNS load balancing settings, policy routing and other aspects of dual-link network management and optimization to ensure the safe use of network load balancing [1].

II. RELATED WORKS

A. Load Balancing

The load is a measure of the amount of computational work that a system performs. The different types of load are CPU Load (the sum of a number of processes that are currently running and the number that are waiting to run), amount of memory used and the network delay load (the time it takes for a bit of data to travel across the network from one node to another). Load balancing is thus one of the key issues in the realm of cloud computing. Load balancing is also a process of distributing processing and communication activities evenly across a computational network so that no single device is overwhelmed. Scalability, one of the most important features of cloud computing, is also enabled by load balancing [2].

The Load balancer is the front end to the service as seen by the outside world. The load balancer directs network connections from clients who know a single IP address for services, to a set of servers that perform the work [3]. Server

load balancing is indispensable in the World Wide Web for providing high-quality service. In server load balancing, since the server loads and capacities are not always identical, traffic should be distributed by measuring server performance to improve the service quality [4].

Fig. 1 classic load balancing architecture in a cloud environment where load balancers balance load using the following general steps:

- Services Receive incoming requests from various clients
- Calculates some of the loading used from requests and builds the Request queue
- Fixing currently checks the status server in the server collection periodically using the monitor server daemon
- Using load balancing/ algorithm/heuristics strategies to choose the right server.

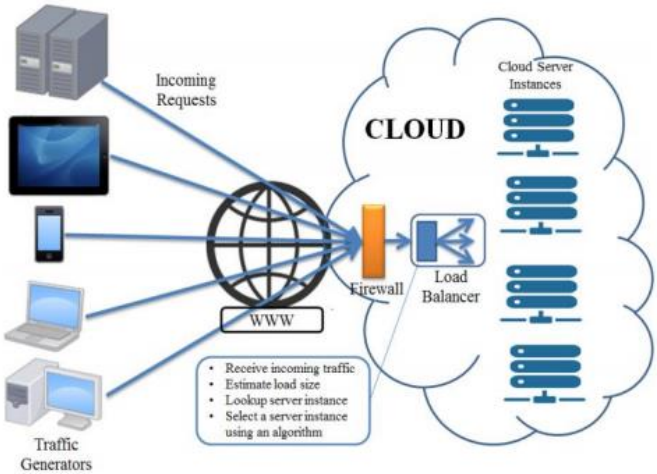

Fig. 1 Load Balancing in Cloud [5]

Complicated computing network systems routinely route data packets every second. Data traffic is very different which can be efficiently distributed on available servers. The server can function smoothly at the end of the user. There is a dedicated server that is allocated to hide this load balancing on the entire server. Provides one of the factors driving load balancing. The main benefits of load balancing below are [5]:

- Helps in finding and traversing traffic
- increase resources
- Balance network load based on node capabilities
- increase resources
- Reduce infrastructure overprovisioning from the use of cloud computing or fast elasticity or in other words appropriate or contract according to demand.

This means whatever application they have to change to one point to meet the user. There must be a device needed in several applications. This is presented with the help of load balancer.

Suppose we do regarding CPU time and suppose that we have a server that cannot allocate CPU time because of other virtual machines that execute in parallel. Now if there is a Server B that is idle, we can distribute from A to B by migrating several guests from A to server B, the server reduces server response and provides high throughput. Therefore, load balancing in the cloud must flow as follows [5]:

- There is no overhead on the load balancing side and saves overhead on resources
- The latest information system
- Maintain the balance of the system and take action regularly
- Can be centralized or decentralized
- Servers that currently serve have adequate resources
- Migration must require a minimum time
- A reliable communication network

B. Nth Method

Nth method is not an abbreviation, but an integer (number n). Nth in load balancing is a load balancing technique that forms a certain row (Nth), which will later be used as a queue system in the mangle of the formed route. The Nth load balancing method uses a round-robin algorithm that determines the division of connections that will be mangle to a route that is load balancing. Nth is implemented in a series consisting of every, packet, and counter that is realized in an integer series. In this method, the incoming data packet will be marked as "n" variable in the integer data type. With the existing rules, the path that has been marked as this Nth will be combined, or the total bandwidth at the output is the sum of each bandwidth in the two connections. One of the shortcomings of this Nth method is the possibility of a connection breakdown due to the gateway switching due to load balance.

The Round Robin algorithm is the most straightforward and most numerous algorithm by load balancing devices. The Round Robin algorithm works in a way to divide the load in turn and sequentially from one server to another server. The concept, The basis of this Round Robin algorithm, is to use time-sharing, in essence, this algorithm processes the queue in turn. Round-robin for incoming algorithm requests that enter the next server. So in three server clusters (servers A, B, and C) Request, 1 will go to server A, request two will go to server B, request 3 will enter server C, and request 4 will enter server A, satellite Perm or Server 'round-robin'. This treats all servers with the same number of incoming connections or successful time responses for each server. Virtual servers provide several advantages over traditional round robin DNS. DNS Round-robin A single domain set to a different IP address, host-based scheduling, and a DNS query cache block basic algorithms. These factors cause significant imbalances between real servers. Virtual scheduling server details are network-based connections, and far superior to round-robin DNS because of good scheduling details [6].

C. Failover

Failover is one of the functions of a vital mission system that provides accessible services. The goal is to move requests from failed systems. All processes are carried out automatically and transparently for end users. Failover or transition solutions and whenever and wherever needed. Adopting such an approach is new or original; However, the

translation of this work is the broad size, the amount involved, and the operational nature of the grid and related operational tools [7][8].

III. METHODOLOGY

In Fig. 2 is a display of the system flow design or load balancing scenario of the Nth method and failover used in this study. In the above system, flow begins setting interfaces where each interface to be connected to any device that will be used and must have been installed on each device operating system and virtual original. In the interface settings, the configuration will be focused on the Winbox application that runs on the main system, Windows 10. The connected interface will be seen on the Winbox screen. Then the interface will be configured, starting with the 2 existing ISPs. In each there will be a public IP ISP to obtain from the DHCP client, the IP will automatically appear and this is called a dynamic IP obtained from each provider. If each ISP is successful, traffic will appear on the interface tab. Next is the configuration of NAT on the firewall with action masquerade which is useful for changing IP addresses (private IP addresses) on each data packet that comes out of the computer into a public IP address so that users can connect to the internet network. After configuring the firewall, to find out which users are connected to the internet is to do a simple ping test, until the configuration is successful. Next is the configuration for each virtual client to use the IP address for each client to connect to the server system. Configure the DHCP server and DHCP client according to the required range. After that, do the ping test, whether each client with the connecting server system, until each other gives a ping response. Next is the main configuration in the load balancing method of Nth. This configuration is done on the firewall mangle tab where there are various complex policy configurations so that 2 ISPs can run together and share each data that passes with the Nth method where the data is tagged with every and packet parameters at each ISP. Next is the Nth method test and failover, whether the configuration that has been done previously has been implemented properly. The Nth trial is carried out with test bandwidth and access to the browser on each client. The failover trial is done by disconnecting one of the ISPs and seeing the data traffic passing by, whether the data will run to the active ISP.

In Fig. 3, there are 2 ISPs that are ISP A connected with GSM Broadband Modem via wireless port and ISP B that is connected to the cable by handheld smartphone via the USB port. Where each ISP gets a WAN IP address, then it is connected to a proxy router. On the Mikrotik router board it is connected to the admin laptop and runs Winbox 3.11 to configure the required network, and at the same time set the Nth method. The laptop admin also runs the Windows XP user client with a virtual box, where the client is connected and has access to the admin. The client that is run is 3 virtual clients. Where each will be a means of testing the Nth method by way of each client doing one of the activities such as speed test, browsing, downloading, streaming.

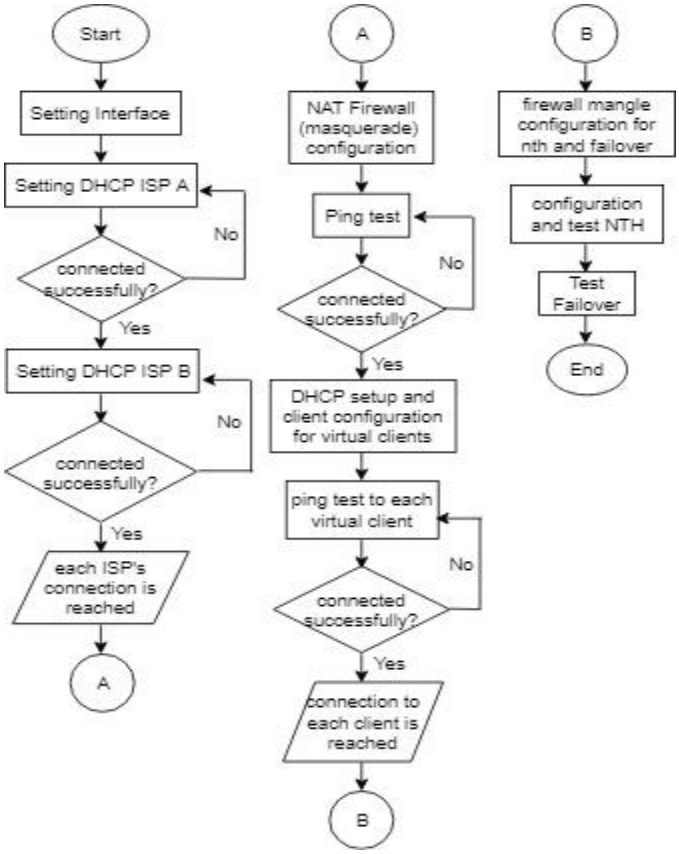

Fig. 2 flow of load balancing design with Nth and failover methods

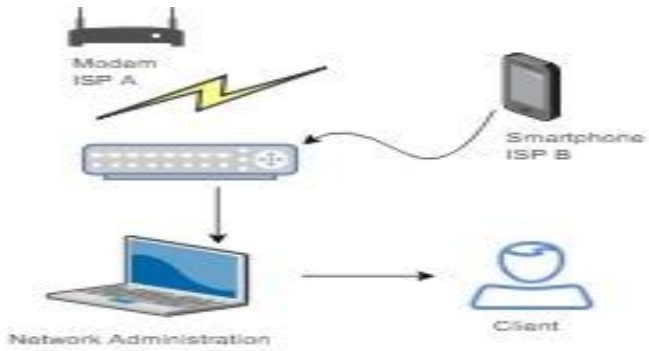

Fig. 3 Nth method test scenario

Fig. 4 describes the failover workflow, which is done by disconnecting the ISP A connection or otherwise disconnecting the ISP B connection. In a Mikrotik routerboard a failover configuration is performed, where if one ISP fails, the data traffic will be directed to the ISP that is still functioning.

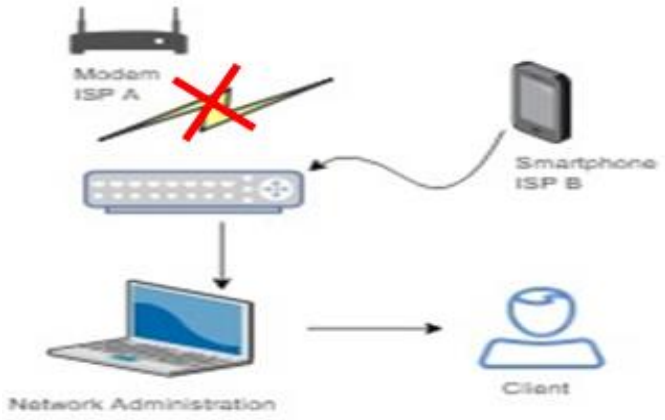

Fig. 4 Failover scenario

IV. Result and Discussion

A. *Nth Load Balancing Test*

Nth method load balancing test several points: download speed and packet (access web video streaming).

1. Download Speed

In table 1, shows the results of the trial results from the download speed test performed on 3 virtual clients. Researchers open the web speed test with the speedtest.cbn.net.id address. The speed test website here will be run simultaneously from all three clients and recorded the results of the download speed generated. This download speed test is carried out 29 times with a variety of different conditions resulting in an average value of 0.6 Mbps

TABLE I RESULTS OF AVERAGE DOWNLOAD SPEED

Test	Download Speed (Mbps)		
	Client 1	Client 2	Client 3
1	2.02		
2	2.08		
3	2.03		
4		2.02	
5		2.04	
6		2	
7			2.01
8			1.2
9			2.07
10	1.1	0.9	
11	1.1	0.9	
12	1	1	
13		0.8	1
14		0.8	0.5
15		0.9	1.1
16	1.3		0.8
17	0.6		1.2
18	0.9		1.3
19	0.8	0.7	0.9
20	0.5	0.7	0.6
21	0.8	0.7	0.6
22	0.8	0.6	0.6
23	0.5	0.5	0.8
24	0.6	0.8	0.7
25	0.8	0.5	0.7
26	0.7	0.5	0.7
27	0.7	0.5	0.8
28	0.8	0.6	0.7
29	0.5	0.7	0.6
Average	**0.68**	**0.63**	**0.65**

2. Test results of video streaming web

In Fig. 5, shows the display of the results of web streaming tests on each of the three clients. Each client runs the Mozilla Firefox browser which is used as a means to open video streaming web. Researchers open one of the famous video streaming websites with the address www.youtube.com.

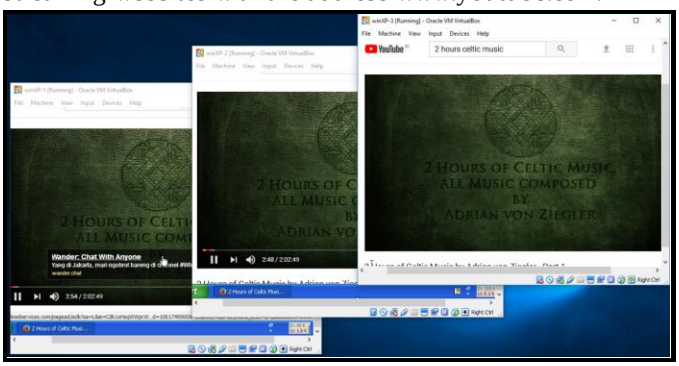

Fig. 5 Web video streaming test

The video streaming website here will be run simultaneously from all three Windows XP clients and see the speed results received using the Attix5 Traffic Monitor software application which can be seen in the following fig. 6

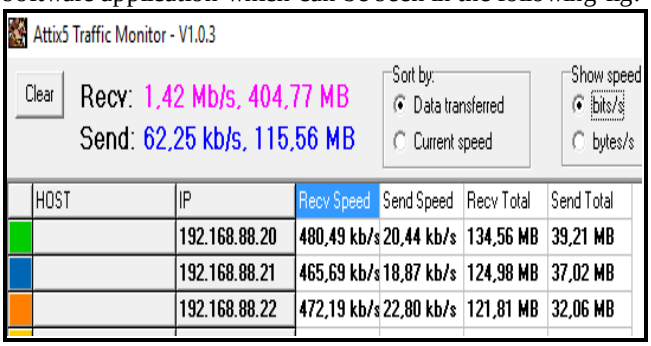

Fig. 6 Traffic monitoring from video streaming web test

The speed obtained in client 1 is 472.19 kbps, for client 2 is 465.69 kbps, and in client 3 is 480.49 kbps. The speed displayed is very volatile so the results cannot be recorded.

B. Failover Test

Test with failover disconnects with one ISP. The first thing to do is to disconnect the ISP B connection, namely lte1. ISP B traffic is disconnected, which is indicated by parameters that are not running. Then ISP B's traffic becomes switched to ISP A and causes ISP A's traffic to overload and vice versa if terminating the ISP A connection is Wlan1. ISP A traffic was disconnected which was indicated by parameters that were not running. Then ISP A traffic will move to ISP B and cause ISP B traffic to become overloaded.

V. CONCLUSION

Based on the results of the speed test it was found that the condition was unsuccessful when the speed test was conducted. Based on the Nth method with the spread of traffic scenarios per connection load balance, it was unsuccessful when the speed test was conducted because the data traffic on both ISPs was in solid state because another client asked new package, so that the client who has a new package request is late does not get a reply from the speed test server, and this causes the speed test to fail.

Based on the results of the web streaming test conducted. YouTube streaming server has new packages that always change, which makes downloading speeds on 3 clients without buffering and connecting to Youtube remain connected.

Tests to find out the results of connection performance when a failover is tested by disconnecting one link, i.e. ISP-B or ISP-A indicates that there is a packet moving to the active link so that data traffic on the active link becomes overloaded.

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