Backup Link Reviewed Layer Distribution Method Using Virtual Router Redundancy Protocol (VRRP)

Nurhazmi Hawari¹, Iskandar Fitri², Andri Aningsih³

Informatika, Fakultas Teknologi Komunikasi dan Informatika, Universitas Nasional, Jl. Sawo Manila, Jakarta 12520, Indonesia

Email: hazmihawari@gmail.com, Iskandar.fitri@civitas.unas.ac.id, andrianingsih@civitas.unas.ac.id

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ABSTRACT

Internet networks run 24 hours a day and must provide a stable performance and reliable, the networks of local SMK Tridharma Budhidaya there is only one router and when the router such disturbances then the internet at the school disrupted and therefore to prevent the internet is not happen down the proposed use by implanting method Backup Router Virtual Router redundancy Protocol (VRRP) After that is done four stages of testing and Throughput Loss Package. Software testing is done using Wireshark results in Loss Package testing get 10, 20, 30, 40, 50, 60 Minutes yield value of 0.43%, 0.21%, 0.20%, 0.10%, 0.8%, 0.10% Loss Package Referring TIPHON below 3% is quite good and the testing Throughput for 10, 20, 30, 40, 50, 60 minutes, producing a value 275 Bit/s, 280 Bit/s, 282 Bit/s, 282 Bit/s, 279 Bit/s, 278 Bit/s referring to standardize TIPHON that the average yield testing Throughput 279 Bit/s is said to be very good. with this result VRRP method is able to provide solutions when the Main Router encountered a problem and still maintain good quality of the network.

Keywords: Network, VRRP, Packet Loss, Throughput, VLAN

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1. Introduction

Failure on the network consists of device failures and link failures. Network device failure means that the device itself is down / experiencing problems, causing Router device failure on the network will be down because no one can forward packets [1]. At SMK Tridharma Budhidaya Frequent disruption of the Internet network and result in activities that use the Internet at school paralyzed, resulting in losses in all sectors, the collapse of the Internet in schools caused by the main router which often have problems error.

The solution of the problem Router main frequently encountered problems is to apply Router Backup using the method of the Virtual Router Redundancy Protocol (VRRP) The goal when Router Top / Master impaired then Router Backup immediately replace the task of Router principal if Router Master has returned to normal then the Router Master back take over its function [2].

Previous research by I Gede Made Surya test the Virtual Router Redundancy Protocol Method backup link without combining with VLAN method and produce Delay, with 80ms Delay value and 16-18% Loss Package. Delay good value calculated according to Standard TIPHON [3]. According to Indra Chaidir From the results of tests performed, Virtual Router Redundancy Protocol (VRRP) can be used to address the device failure occurring on one network and can improve network performance. By applying the protocol VRRP Router when the load is increased and the network has a link failure, it is known that VRRP can work well, so that all the data transmission process continues to run as it should, So based on previous research VRRP method can be used as a solution to overcome the failure of the main links due to problematic and VRRP Router is able to provide optimal network and can be applied to the network in Tridharma Budhidaya vocational school.

2. Research Methods

The design will be made is to build Backup link at Layer 3 to overcome Link Failure on the main router / Master using the Method virtual Router Redundancy Protocol (VRRP) and in kombinasiakan
by using VLAN and DHCP method to give naming a bunch of different LANs, and granting IP Address Automatically using Network Simulation Software Generation 3 (GNS3) after that in measuring the quality of Loss Package and Throughput on the network using the Software Wireshark [4].

A. Device needs

There are several devices used in the study, including:
1) hardware: Laptop Windows 10, Strix ROG-i5 Processor G531, 4.1GHz CPU, 16GB DDR4 RAM, 1TB SSHD
2) Software: GNS3 Version 2.2.0
3) tools supporters: Wireshark (Capturing Traffic Network)

B. Methods Virtual Router Redundancy Protocol

Figure 1 is a topology (VRRP) is an election protocol that dynamically assign responsibility to one or more of the Virtual Router to Router VRRP on the LAN, which allows several routers on multiaccess links to utilize the same virtual IP address. A VRRP Router configured to run the VRRP protocol in conjunction with one or more other routers attached to a LAN. In a VRRP configuration, the router chosen as the Master router to another router to act as a backup [5]

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>router Master</td>
<td>Is router that working forwarding Packet Data (Router Main)</td>
</tr>
<tr>
<td>Backup router</td>
<td>Router backup if Router Dead major</td>
</tr>
<tr>
<td>Priority 1-254</td>
<td>Priority value priorities given to determine router Master and router backups Priority value is 1-254 If router given the highest value it is the Router Master / Main</td>
</tr>
</tbody>
</table>

C. Methods Virtual LAN (VLAN)
Figure 2 VLAN is a group of devices on a LAN or over, which is configured (using virtual devices) so that they can communicate as well as when the device is connected to the same line, when in fact these devices are on different LAN segments [6].

D. Method of Dynamic Host Configuration Protocol (DHCP)

Method DHCP is a service that automatically giving out the IP address of the computer that is requesting it [7].

E. Parameters Quality Of Service

A parameter calculation about kualitas on a network that included a Package Loss, Delay, Jitter, Bandwidth, Throughput.

1) Loss Package is a parameter that describes a condition that indicates the total number of packets lost,

<table>
<thead>
<tr>
<th>Category</th>
<th>Loss package</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very good</td>
<td>0%</td>
</tr>
<tr>
<td>Well</td>
<td>3%</td>
</tr>
<tr>
<td>Ugly</td>
<td>15%</td>
</tr>
<tr>
<td>Very ugly</td>
<td>25%</td>
</tr>
</tbody>
</table>

In Table 2 Referring to the outcome of the testing TIPHON Standards Loss Package on the Network at say Very Good when the value of 0% Loss Packages, Nice 3%, Medium 15% and the Ugly 25% [8].

2) throughput namely the speed (rate) effective data transfer, measured in bps (bits per second). Throughput is the total number of successful packet arrival observed on goal during a specified time interval divided by the duration of this time interval. Throughput category.

<table>
<thead>
<tr>
<th>Category throughput</th>
<th>Throughput (Bps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very good</td>
<td>&gt; 100</td>
</tr>
<tr>
<td>Well</td>
<td>75</td>
</tr>
<tr>
<td>moderate</td>
<td>50</td>
</tr>
<tr>
<td>Ugly</td>
<td>&lt;25</td>
</tr>
</tbody>
</table>
In Table 3 refers to the Standards of Testing Throughput TIPHON results on the network is said to Very Good when the value Throughput 100 Bps, Good 75 bps, 50 bps Average, Poor <25 Bps [8].

3. Results and Discussion

![Fig 3 draft topology proposal]

In Topology this proposal there are 2 routers each of which serves as a Router Master and Backup if Router Master are having problems then the task Router main taken over by the Router Backup and also there are 5 Switch, 1 as Switch Center to divide VLAN and 4 Switch branch to channel bedasarkan the data sector by VLAN, on the left side is given a colored Yellow Label Lab VLAN 10 and on the right side of the Red colored label given VLAN 20 Business Management.

A. Configuring VRRP

<table>
<thead>
<tr>
<th>Table 4</th>
<th>VRRP division at 100 Router Priority Master</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>Vlan</td>
</tr>
<tr>
<td>Int F0 / 0</td>
<td>10</td>
</tr>
<tr>
<td>Int F0 / 0</td>
<td>20</td>
</tr>
</tbody>
</table>

Table 4 is a configuration method in the VRRP Router Master, there are 2 pieces in a configuration interface that is Int F0 / 0 VLAN10 With 192.168.10.1/24 IP address and IP Address 192.168.10.254 on the Virtual Router Interface F0 / 0 VLAN 10 granted Priority 100 The term means that the highest value VRRP method will be made as Primary Router / Master. At Interface F0 / 0 VLAN 20 with an IP address and the IP address 192.168.20.1/24 Virtual Router 192.168.20.254 given VLAN 20 and provided also Priority 100 as the Master.

<table>
<thead>
<tr>
<th>Table 5</th>
<th>The division of the VRRP Router Priority 10 Backup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>Vlan</td>
</tr>
<tr>
<td>Int F0 / 0</td>
<td>10</td>
</tr>
<tr>
<td>Int F0 / 0</td>
<td>20</td>
</tr>
</tbody>
</table>

Table 5 is the configuration method in the VRRP Router Backup, there are 2 pieces in a configuration interface that is Int F0 / 0 VLAN10 With 192.168.10.2/24 IP address and IP Address 192.168.10.254 on the Virtual Router Interface F0 / 0 VLAN 10 granted Priority 10 the term means that the lower value VRRP method will be Router Backup. At Interface F0 / 0 VLAN 20 with an IP address and the IP address 192.168.20.2/24 Virtual Router 192.168.20.254 given VLAN 20 and 10 Backup Priority is also given.
B. VLAN configuration

![VLAN Configuration](image)

**Fig 4 VLAN configuration on Switch center**

<table>
<thead>
<tr>
<th>Name</th>
<th>VLAN</th>
<th>ip Address</th>
<th>ip Gateway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab</td>
<td>10</td>
<td>192.168.10.11</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>192.168.10.253</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>192.168.10.253</td>
<td></td>
</tr>
<tr>
<td>System</td>
<td>20</td>
<td>192.168.20.11</td>
<td></td>
</tr>
<tr>
<td>effort</td>
<td></td>
<td>192.168.20.253</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>192.168.20.253</td>
<td></td>
</tr>
</tbody>
</table>

**Table 6**

explanation VLAN configuration on Switch Center

Table 6 is the configuration of VLANs on Switch Center. VLAN serves as a grouping of several different LAN jars. In the table above, there are two VLANs, namely VLAN 10 and supplied by Label Lab using DHCP IP 192.168.10.11 - IP Gateway and its 192.168.10.253 192.168.10.254, in VLAN 20 by Label Business Management with the IP address 192.168.20.11 Range - 253 192.168.20 and IP Gateway 192.168.20.254.

C. Testing Method on Router VRRP Master

![Router VRRP](image)

**Fig 5 when the Master Router is turned off**

Figure 5 When the router is turned off, the status of the Master Router Master Master changed previously turned into Init means that all tasks Router Master in devolved to the Router Backup.

![Router VRRP](image)

**Fig 6 when Router Backup turned into Master**

Figure 6 when the main router processes have died quickly Router Backup replaces the duty of the Master Router for dead. By using VRRP Method Down time of the Main Router to Router Backup active within 1-4 seconds.
Figure 7 shows when the client PC and the ISP router to ping when a timeout occurs Router Master switched off 3 seconds after the return to normal.

D. scenario Testing

Scenario tests performed on the backup system links include:

1) Loss Package Testing on tissue from the Start Backup Router Active headed by testing four stages:
   a) Testing for 10 Minutes PING to an ISP using ICMP Protocol
   b) Testing for 20 Minutes PING to an ISP using ICMP Protocol
   c) Testing for 30 Minutes PING to an ISP using ICMP Protocol
   d) Testing for 40 Minutes PING to an ISP using ICMP Protocol
   e) Testing for 40 Minutes PING to an ISP using ICMP Protocol
   f) Testing for 40 Minutes PING to an ISP using ICMP Protocol

2) testing Throughput
   a) Testing for 10 Minutes PING to an ISP using ICMP Protocol
   b) Testing for 20 Minutes PING to an ISP using ICMP Protocol
   c) Testing for 30 Minutes PING to an ISP using ICMP Protocol
   d) Testing for 40 Minutes PING to an ISP using ICMP Protocol
   e) Testing for 50 Minutes PING to an ISP using ICMP Protocol
   f) Testing for 60 Minutes PING to an ISP using ICMP Protocol

F. Test result

![Fig 8 Test results Loss Package](image)

Table 7

<table>
<thead>
<tr>
<th>Packets received</th>
<th>Packets are lost</th>
<th>testing time</th>
<th>Loss package</th>
</tr>
</thead>
<tbody>
<tr>
<td>1142</td>
<td>5</td>
<td>10 minutes</td>
<td>0.43%</td>
</tr>
<tr>
<td>2361</td>
<td>5</td>
<td>20 minutes</td>
<td>0.21%</td>
</tr>
</tbody>
</table>
In Table 7 are results from testing Loss Package consists of 4 stages of testing that is 10, 20, 30, 40, 50, 60 minutes each get Package Loss of 0.43%, 0.21%, 0.20%, 0.10%, 0.8%, 0.10% refers Standards Loss Package TIPHON that results below 3% said Good.

In Table 8 are the results of testing Throughput consisting of four phases of testing are: 10, 20, 30, 40, 50, 60 minutes each gain value Throughput by 275 Bit / s, 280 bits / s, 282 bits / s, 282 bits / s, 279 bits / s, 278 bits / s, referring to standardize TIPHON that the test results Throughput average 279 bits / s is said to be very good.

4. Conclusion

Based Process Simulation and Virtual Router Redundancy Protocol Virtual Lan also produce several points, namely:

a. (VRRP) is able to maintain network availability if Router Master impaired.
b. (VRRP) capable of backing Link Failure with a time of 1-4 seconds.
c. The parameters of the test results in Loss Pack generates value by testing Loss Package, 10, 20, 30, 40, 50, 60 Minutes, Minute yield value of 0.43%, 0.21%, 0.20%, 0.10%, 8%, 0.10% Loss Package Referring TIPHON below 3% in to say good.
d. From the test results Parameter Throughput generates value by testing for 10, 20, 30, 40, 50, 60 minutes, resulting in a value of 275 bits / s, 280 bits / s, 282 bits / s, 282 bits / s, 279 bits / s, 278 bits / s refers to standardization TIPHON that the test results Throughput average 279 Bit / s is said to be very good.
e. Use of methods to facilitate perberian DHCP IP Address of the client because getting Ip Automatic Computer.

5. Reference


