Hot Standby Router Protocol for a Private University in Malaysia

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Abstract- In the digitized university environment most of the works and activities done by a network-based process which will be adapted to monitor all the activities to be processed and stored in such datacenter, from that particular point, how to maintain connectivity and to prevent the system from any vulnerability? Is there any techniques or protocols that enhance and guarantee stability? If the primary gateway becomes inaccessible, it might lead to a connectivity issues and that might be very disturbing especially inside a university campus that uses digitalized system to perform their operations, and other education purpose.
Keywords: HSRP, FHRP, Redundancy, First Hop, Availability.

INTRODUCTION

The implementation of the Hot Standby Router Protocol in a Private University is to prevent any undesired disruption caused by a physical or technical error. HSRP is a routing protocol that allows the hosts on the network to use multiple routers that act as a single/dynamic virtual router as shown in Figure 1 below.
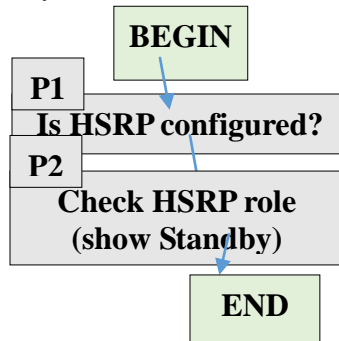

Figure: HSRP flowchart

When designing a network, one of the common and serious things to focus on after the simple access is how the network will deal with failure. For a private university datacenter, sometimes the routers might be down or has a fault and that my cause disruption because it will cut off the availability and the uptime, and the department should wait for the technician to solve the fault, and that may take some valuable time to be solved deepened on the failure type which may delay some activates of all the departments within the campus and that is undesirable satiation and wasting of university, stuff and student time.

The following are objectives of the HSRP within the university:

- To establish a fault-tolerant default gateway and high availability for student's uninterrupted internet access
- Load Balancing and optimization for maximum resource utilization.
- Improve students and staff satisfaction to enhance service level experiences.

SEGi University is private university located at Petaling Jaya, Malaysia and it is a leader in term of technology and science courses and it has its own datacenter that is located in the main campus, and it's running a multiple operations and keeps its data interacting through the data center to perform all the educational and financial operations. (Miller, 2011)

MATERIAL AND METHODOLOGY
i. Research Material

As a part of the First Hop Router Protocol (FHRP), the aim and advantage of the HSRP protocol is to stabilize connectivity when the forwarding router (First Hop) function is down. (JosephNg, 2012). The group of routers simultaneously take part in this protocol. Thus, originate the illusion of a virtual single router.
HSRP basic is that the master router is forwarding packets to the entire network on behalf of the other backup/virtual router. The end hosts are forwarding their packets straight to the virtual router.

- HSRP operates with an active or standby model, and allow two or more routers to corporate. All of the routers can be acting as a default router. The HSRP active router implement a virtual IP address and matching virtual MAC address, this virtual IP address is a part of the configuration of HSRP.
- HSRP provides a consistent and reachable network layer address for IP, the most common usage of HSRP is in LAN environments, where two routers share a common host address between them, called the hot standby address.
- Setting up a router as an active router will be done by prioritizing the active roster, by giving it higher priority number, the rest of the HSRP-configured routers will take lower priority number than the active router. 100 is the default priority number, the higher priority number will identify the default router. (Hayasaka, 2011)

ii. Methodology

Is termed of an applied collection of procedures, tools used, applied documentation, and control management of information systems. Selecting the appropriate methodology is an important stage to improve the final result. Different methodology methods utilize different development process and strategies.

The right method of applying a great research can be summarized as the following table:

Table : Research Methodology Summary (JosephNg, 2013a, 2013b))

Research Dimension	Explanatory Sequential Design
Research Methodology	Mixed Mode (Quantitative Generalizability + Qualitative Reasoning)

Research Validation	i. Content Validity
	    - Domain Distribution
	    - Depth
	    - Jargon
	ii. Concurrent Validity
	    - Focus Group
	iii. Construct Validity
	    - Lecturer
	    - Industry peers
	    - Industry Experts

Research Methods	Phase 1 : Literature Review Phase 2 : Simulation Testing

- **Network Simulator**

A network simulator is software or hardware that predicts the behavior and has the ability to simulate networking topology of a computer network in the absence of the real equipment. The computer network is typically represented and simulated with network devices, traffic etc. the performance is totally analyzed. (Techrepublic, 2003) (Priyanka, 2013) (Lucas, 2009)

Universities and education centers use the network simulator software which helps to simulate the network traffic and operation, there are benefits as well as a few drawback of using the simulation software over the real equipment. Here are some advantages of using the simulation software:

One of the essential reasons why using simulation over real equipment when implementing networking project or proposal ideas, is that it is hard to get all the equipment (Teerawat Issariyakul, 2011)

I. Results and Tables

The outcome of the efficient business technology when architecting an enterprise network is most essential aspect of its backbone terms for managing the business.

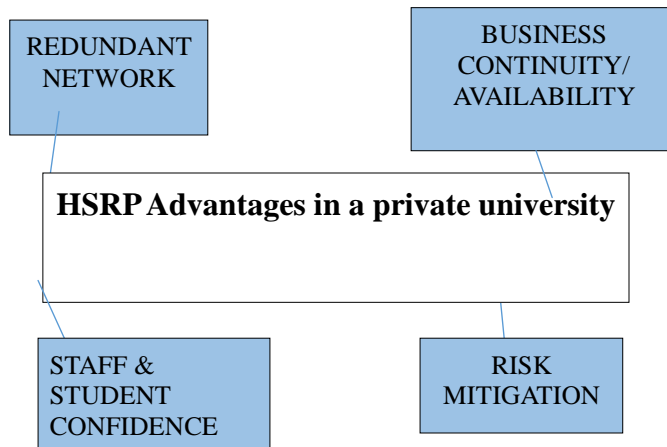Below is short description of the Business Advantages:

Figure: HSRP Business Advantages

The Following are the operational advantages of HSRP that increase and enhance the Business Advantages:

- Ease of configuration, routing tables will not be affected as well as hosts configuration.
- Minimum traffic increment caused by the HSRP protocol.
- Possibility to run HSRP between two routers on two different networks, in order to have HSRP configured on two interfaces different routers you need to have a two HSRP groups.

Possibility of performing a forced failover of the HSRP active router without shutting down on the interface, which can be done by manually changing the priority in the HSRP configuration.
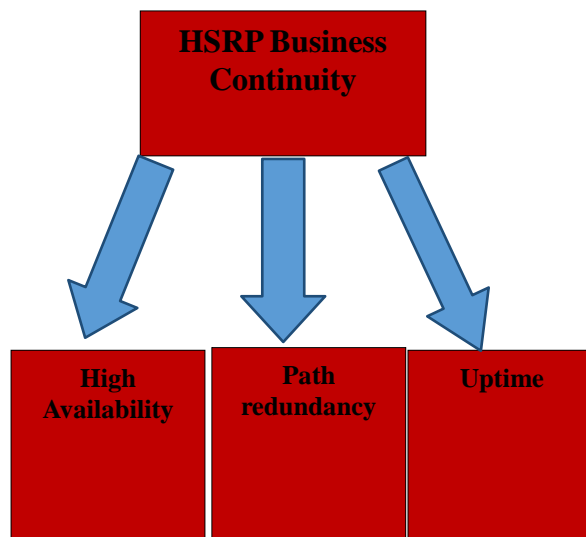

Figure: Challenges that exist on Network Availability

(Snedaker, 2012) (JosephNG, 2013a, 2013b) (Cisco, 2010)

II. Conclusion

As a conclusion to this paper, technology has become more worldwide, networking and communication plays a very essential role in connection and enhancing communication

throughout the world, when attempting to configure a valid solution for a network redundancy failure, HSRP will be a very successful choice to maintain the issues.

Acknowledgement

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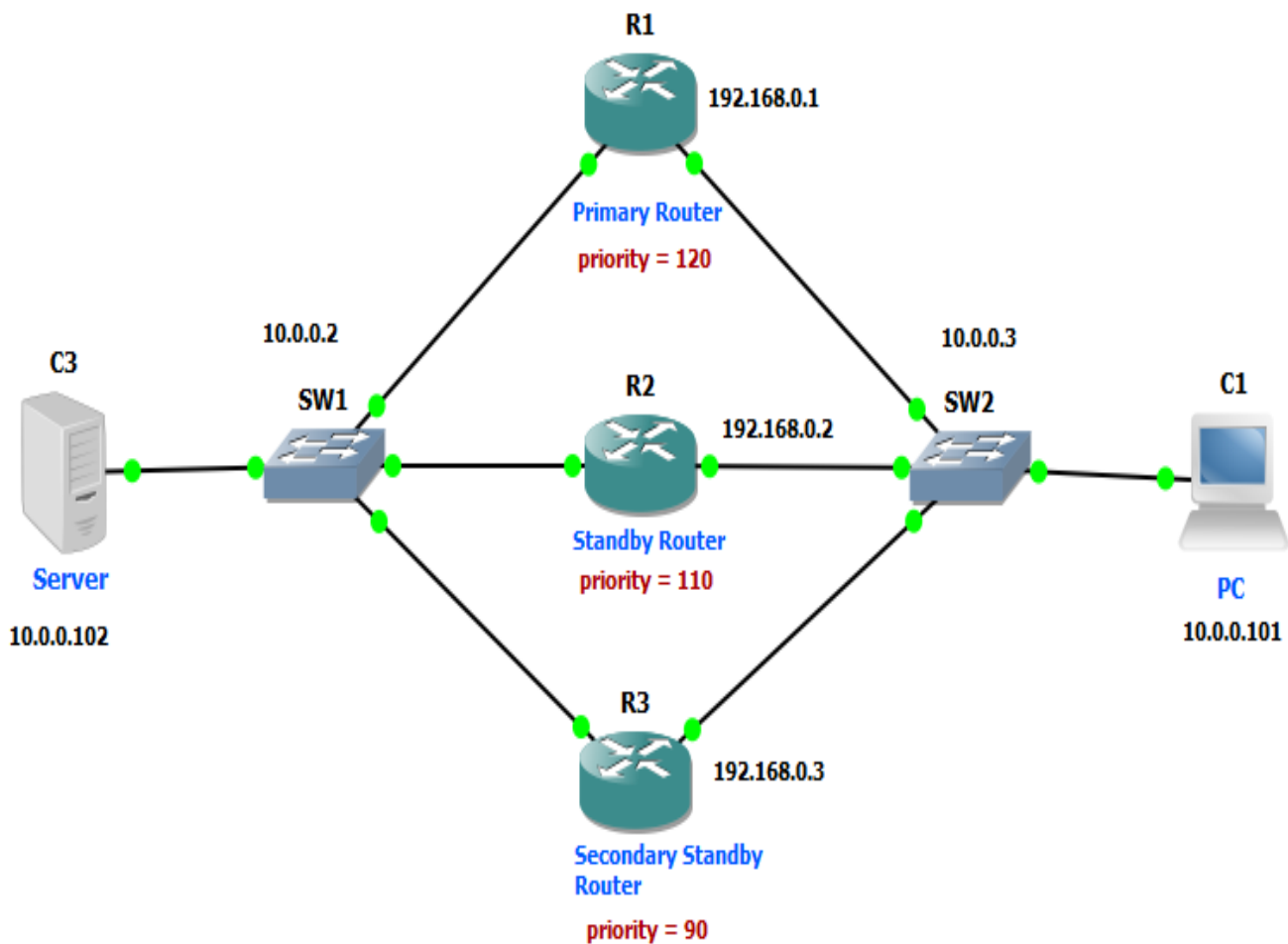
Figure: HSRP Network Implementation Using GNS3