FHRP: AN EFFICIENT IMPLEMENTATION OF FIRST HOP REDUNDANCY PROTOCOL IN CISCO

VAISHNAVI G[1]
M.Phil Research Scholar, Department of Computer Science
Kongunadu Arts and Science College
Coimbatore, India.

IMMACULATE A [2]
Associate Professor, Department of Computer Applications
Kongunadu Arts and Science College
Coimbatore, India.

Abstract: Accessibility and Dependability are very significant issues for the application executing on altered categories of networks. Nowadays, internet acting an essential role in the data communication and lots of business corporations has depends on Internet connectivity. Several changes are charming place in this domain to present continuous internet establishment for their clients and application running over different types of network. The more number of users need of unnecessary paths and load distribution between the routers in internet protocol (IP) networks. To address this issue of IP protocol, in this paper proposed an efficient implementation of First Hop Redundancy Protocol (FHRP) in CISCO packet tracer networks. The proposed protocol presents two approaches to examination the redundancy in the network using FHRP protocols; the initial approach is in standard network process. The next approach is in crash of one of the ISP branches; these tests categorize to demonstrate the administrator allocation in redundant network. Through Experimental simulations, to validate that the proposed framework achieves significantly better detection than conventional methods such as existing HSRP, VRRP and GLBP protocols.

Keywords: Networking, Internet Protocol, FHRP, HSRP, VRRP, GLBP.

I. INTRODUCTION

Networking is performing of connecting two or additional computing devices jointly for the principle of distribution data. Networks are building with a combine of computer hardware and computer software. A network is a group of computers and other hardware components interrelated by communication channels that permit sharing of resources and information.

Internet Protocol (IP) network [1] host does not have any routing intelligence data, in fact the information regarding to direction-finding is positioned in the routers which are default gateway of a network with a public Internet protocol (IP) that switches promoting of messages or packets from a origin to a target and vice versa, Still in single default gateway network all the load will be on a distinct router which ahead the whole request of the clients to further networks, if the distinct default gateway fails hosts within the similar subnet won't be capable to begin communication with further networks [3].

In networking, First Hop Redundancy Protocol (FHRP) is a collection of protocols that permit a router on a LAN network to automatically take over if major default gateway router fails [2]. It is developed to resolution in public networks such as Ethernet or Token Ring. The devices on public network parts are constructed with a distinct default gateway address that points to the router that attaches to the rest of the network. The issue comes when this crucial router fails and there is a subsequent router on the part that is also competent of being the default gateway but end devices don't know about it.

Therefore, if the primary default gateway router fails, the network stops working. Solution to this issue is First Hop Redundancy Protocols. The three main First Hop Redundancy Protocols are Hot Standby Router Protocol (HSRP), Virtual Router Redundancy Protocol (VRRP) and Gateway Load Balancing Protocol (GLBP).

In this paper focuses a data link layer protocols are initially, when designing a network, one of the significant things to focus is on how to deal with failure. A main portion of this research is trying to discover FHRP and presenting as a large amount idleness and security into the network as economically possible, while also preserving performance and manageability. From the client's examination, the initial set of the network they compact without, external of their local subnet, is the defaulting gateway; if this gateway goes downward, then admission to whole network outside their individual network would go down.
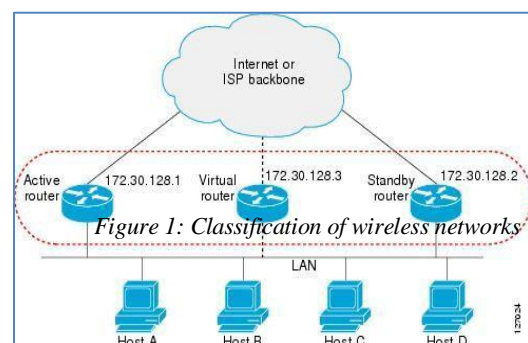

Figure 1: Classification of wireless networks

Fig. 1.1: the three major FHRP's are HSRP, GLBP and VRRP

The objective of this paper is trying to discover First Hop Redundancy Protocol and offering as a large amount idleness and security into the network as financially possible, while also preserving performance and manageability. From the client's observation, the primary group of the network they compact without, exterior of their local subnet is the default gateway; if this gateway exits down, then access to whole network outside their individual network would go down. This research work examines the HSPR implementation to avoid packet losing from network.

The features of the proposed system are as follows:

- It decreases network jamming and allows flexible operation.
- To decrease packet loss and present competent transport of information to the clients who anticipate additional correctness round the clock and also presented auto redundancy, low rate.

II. RELATED WORK

(*Long and James*, **2006**) [4] authors discussed "a primary portion of the book initiates the field of storage networking and the Open Systems Interconnection (OSI) orientation model. The next portion evaluates networked storage knowledge's, together with iSCSI (Small Computer Systems Interface over IP) and Fibre Channel. It besides observes in feature every of the main protocol suites layer-by-layer inside the OSI reference model. The third portion argues complex functionalities of these technologies, such as quality of service (QoS), load-balancing functions (GLBP), security, management, and protocol examination".

(*Nikhil Hemant*, **2011**) [5] addressed the interoperability and redundancy issues between Hot Standby Router Protocol (HSRP) and open standard Virtual Router Redundancy Protocol (VRRP). Furthermore, it shows how the redundancy is maintained in VRRP and how the tracking can be done in VRRP though direct tracking is not possible. The new concept of tracking by creating objects serves the purpose of directly tracking ensuring proper redundancy. The paper further discusses the algorithm of the redundancy in HSRP and VRRP. Demonstration of this proposed algorithm is presented through diagrams for both the protocols, and how VRRP stands a better place in maintaining redundancy than HSRP is shown. Practical implementation of the presented issues and concepts was done and was found to be very effective in establishing efficient redundancy.

(*Pratik NK and Burnase RS*, **2012**) [6] authors investigated the Open Shortest Path First (OSPF) is a routing protocol for Internet Protocol (IP) networks. It employs a link state routing (LSR) algorithm and reduces into the collection of interior gateway protocols (IGPs), working within a distinct autonomous system (AS). It is described as OSPF Version 2 in RFC 2328 (1998) for IPv4.

(*Dharam Vir, Dr. SK Agarwal and Dr. S. A. Imam*, **2013**) [7] discussed a power management in wireless networks deals with the process of managing energy resources by means of controlling the battery discharge, adjusting the transmission power, and scheduling of power sources. To solve this problem here they can described the power management issues in mobile nodes to modified Optimized Link State Routing (OLSR) protocol and it was designed on QualNet 5.0 simulator. The modification is done in effect of power management issue in modified OLSR and existing OLSR routing protocol with the metrics like power consumes in all three modes transmit, received and ideal modes, TC message received, Hello message received, signal received and forward to MAC, signal received but with errors and power consumption have been used. For simulation purpose QualNet5.0 has been used as the tool.

(*Sathis Kumar*, **2015**) [8] author proposed a call centers are a fast growing industry whereby it sees millions of turnover in terms of profit. As the industry grows the need to improvise their network to ensure smooth traffic increases in order to generate more profit. Most call centers which are based in Asia have customers from Europe. Hence, the providence of high availability, redundancy and business continuity is of utmost importance. The implementation of GLBP in this network seeks to do exactly that. This will be achieved because its implementation creates a good fail over, applies virtual routers, implements virtual gateway and load balancing to prevent network congestion and ensure smooth operation. GLBP will overcome the existing problems that call centers face. Its efficacy will be entirely demonstrated using GNS3 network simulator; existing problems will be simulated and compared with GLBP network. Thus, the aim of this research paper can be defended.

(*B.I.D. Kumar*, **2017**) [9] analyzed the performance of the Network and their behavior, they have designed a HSRP based mutli-homed network frame work and simulated the scenarios for two different applications running over the network. In this paper, we have simulated scenario on QualNet HSRP model which is based on RFC 2281 and the results are tabulated. This paper helps the researches to understand the scenario implemented in various companies having two or more internet connectivity (ISPs) to achieve reliable network by using redundancy protocols (Gateway Redundancy Protocols) such as HSRP, VRRP and GLBP.

III. RESEARCH METHODOLOGY

In this paper, proposed method accepts the simulation parameters as input which contains the CISCO packet tracer instructor simulation where the optimal FHRP set of routers work in concert to present illusion of distinct virtual router to the host on the LAN network. This work examines the performance of accessible conventional protocol algorithms and proposes and implements a novel FHRP protocol in CISCO approach networks

A. HSRP (HOT STANDBY ROUTING PROTOCOL)

This protocol establishes a link between gateways to accomplish failure over a default and primary gateway. An HSRP gateway usually shows the message priorities as a current status in an active mode or standby mode. In particular, HSRP fight against the malfunction of the first hop router. The protocol is intended for utilize above multi-access, multicast or broadcast capable LANs (e.g., fast Ethernet0/1).
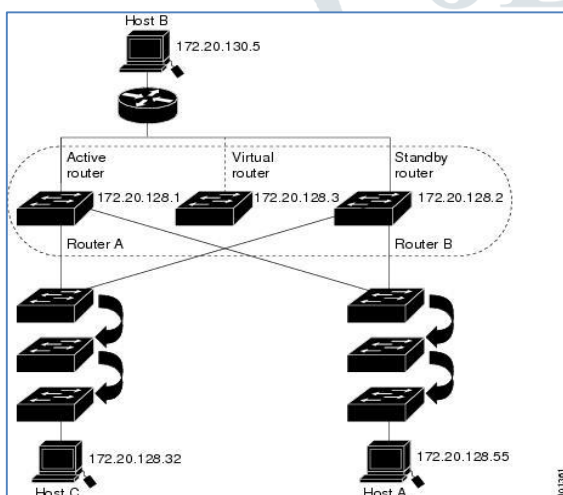

Fig. 2: one or more hosts connected with a multiple routers

In this figure 2 shows a one or many hosts are connected such as host A, host B, host C and it is connected with multiple routers A and B. Other than this virtual router is connected as a third as well as default router. For each host and router the IP address differs for example here it denoted as 172.20.128.55 for host A and 172.20.130.5 for host B and 172.20.128.32 for host C.

B. FHRP ROUTING SYSTEM

First hop redundancy protocols such as HSRP and VRRP provide default gateway redundancy with one router acting as the active gateway router with one or more other routers held in standby mode. Normally routing is a process which directs to forward the packets from their source to destination through a network which is known as packet forwarding. It deals with intermediate nodes which are typically involves hardware devices such as switches, routers, gateways and its firewalls for security all these are connected with one or more hosts as network to transfer more number of packets without failure or loss of any packets during transmission time.

There are many types of routing and they are differentiated in message delivery:

- Unicast : single system to another single node
- Multicast: deliver messages to group of nodes with have same specification.
- Broadcast: message is delivered to all nodes always over a network.

In FHRP routing system these are mainly takes an important role, while setting the router in the network connectivity. FHRP also includes the virtual routing protocol such as VRRP and load balancing protocol, and hot standby redundancy protocol.

C. VIRTUAL ROUTER REDANDUNCY PROTOCOL

In this research methodology this has priority to set the virtual path in which the failover path will be identified and find the default path over the protocol gateway. Virtual path IP address will be changed once the path is configured by HSRP. Every time the time is calculated and it's minimizing the transmitting time also failure will be rectified.

D. IP and MAC ADDRESS

IP address is an internet protocol address termed as 203.1.1.1 and 202.1.1.2 for each router in this project and the MAC Address is known as media access control provide information about the links which UP OR DOWN LINK and its VLAN value as 1 always since it is connected to IP. The genres PC1 which is connected with switch SW01 and another PC2 with SW02 using copper straight-through wires. The PCs IP Address is denoted as 172.16.1.10 which is active router. Another connection PCs denoted as 172.16.1.11 which is a stand by router and it works as a secondary as well as backup router.

IV. PERFORMANCE EVALAUTION

The research work setting the route first place the one or more host according to the requirement of the size or weightage of the network and then connect the terminals and finally configure the routers and switches and then define the host and IP address and set the path. Set a default gateway finally it takes the connectivity and using configuration it identify the problem path and recover the failure and then through virtual path address it transfer the packets without any loss .

In table 1 shows the computational time measures of control message (HELLO) passed through the network using proposed FHRP with existing HSRP, VRRP and GLB.

Table 1: COMPUTATIONAL TIME MEASURES

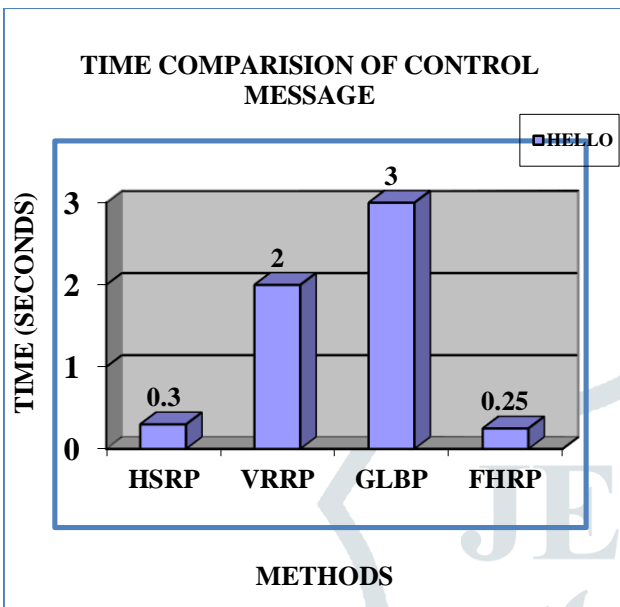| TIME	HSRP	VRRP	GLBP	FHRP
HELLO	0.3	2	3	0.25

Fig. 3: Computational Time Measures

In table 2 shows the control messaging time (hello message) delay time (hold message) passed through the network using proposed FHRP with existing HSRP, VRRP and GLB.

Table 2: TIME COMPARISION OF DELAY (HOLD)

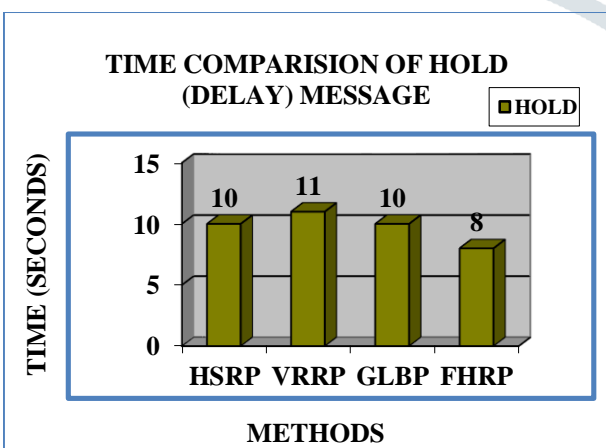| TIME	HSRP	VRRP	GLBP	FHRP
HELLO	10	11	10	8

Fig. 4: TIME COMPARISION OF DELAY (HOLD)

V. CONCLSUION

In this paper designed, implemented and evaluated implementation of first hop redundancy protocol (FHRP) IN CISCO packet tracer instructor simulation. The proposed FHRP set of routers work in concert to present illusion of distinct virtual router to the host on the LAN. A particular router from this collection is dependable for forwarding the packets that host send to virtual router. FHRP decreases network congestion and guarantees soft operation. Meanwhile proposed method performs two approaches to examination the redundancy in the network using FHRP protocols; the initial approach is in standard network process. The next approach is in crash of one of the ISP branches; these tests categorize to demonstrate the administrator allocation in redundant network. Even though various routers are available in HSRP cluster, only single router will promote packets and further router acts as standby router in order to decrease IP traffic. Without FHRP, when topology of network modifies packet loss is 100% and approximately zero possibility for packets to reach destination.

REFERENCES

[1] Microsoft, "TCP/IP Network Interface Configuration",7 January 2009. Retrieved 2 June 2013. "Updated: January 7, 2009.

[2] Shilpi Sharma, "Review of First Hop Redundancy Protocol", International Journal of Engineering Trends and Technology", (IJETT) Volume 4 Issue 5- May 2013 ISSN: 2231-5381.

[3] Er.Avtar Singh, "Review On High Availability And Faster Convergence In IP Networks", international Journal Of Advanced Research In Computer Science Volume 8, No. 7, July – August 2017 ISSN No. 0976-5697.

[4] Long, James, Storage Networking Protocol Fundamentals, Pearson Education India, 2006

[5] Nikhil Hemant, "Virtual Router Redundancy Protocol-A Best Open Standard Protocol in Maintaining Redundancy", International Conference on Web Services Computing (ICWSC) 02 jun2011.

[6] Pratik NK, Burnase RS (2012) New generation of Networking with OSPF, National Conference on Innovative Paradigms in Engineering & Technology, Proceedings International Journal of Computer Applications.

[7] Dharam Vir, Dr. SK Agarwal and Dr. S. A. Imam, Jan-Feb 2013 Power Management in optimal link state Routing (OLSR) protocol. Internal Journal of Modern Engineering Research (IJMER).

[8] Sathis Kumar, "IP Redundancy and Load Balancing With Gateway Load Balancing Protocol", International Journal of Scientific Engineering and Technology (ISSN: 2277-1581) Volume No.4 01 March. 2015.

[9] B.I.D. Kumar, "Performance Evaluation of HSRP based reliable Multi homed Network", International Journal of Innovations & Advancement in Computer Science IJIACS ISSN 2347 – 8616 Volume 6, Issue 8 August 2017.