ANVESHA-A Multidisciplinary E-Journal for all Researches Volume 2, Issue 1, june2021
Bi annual, Bi lingual, Peer reviewed, Referred Journal
Available online on: www.anveshaejournal.com e-ISSN 2582-6719

SCALABLE FAULT-TOLERANT NETWORK DESIGN

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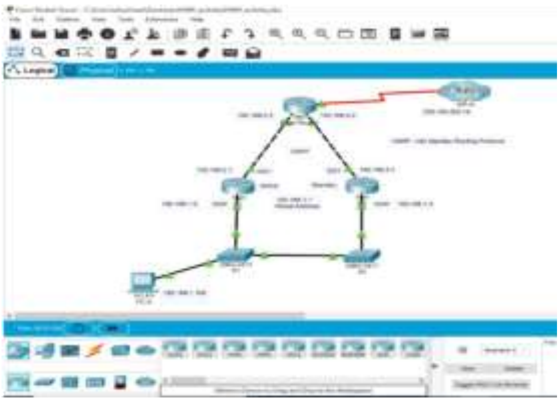
ABSTRACT

This paper addresses a scenario where the network connection within an organization fails due to some technical difficulties with one or more routers. The network has to be upgraded by having dual intermediate routers which would automatically failover, and provide high availability access to the internet. HSRP is to be used for the deployment. The project identifies the configurations required on Cisco routers to achieve the same.

I INTRODUCTION

Hot Standby Router Protocol (HSRP) is a CISCO proprietary protocol, which provides redundancy for a local subnet. In HSRP, two or more routers gives an illusion of a virtual router. HSRP allows you to configure two or more routers as standby routers and only a single router as active router at a time. All the routers in a single HSRP group share a single MAC address and IP address, which acts as a default gateway to the local network. The Active router is responsible for forwarding the traffic. If it fails, the Standby router takes up all the responsibilities of the active router and forwards the traffic. A virtual IP address is created which is configured as the default gateway of all the hosts in the local subnet and the active router is responsible for forwarding the traffic of local hosts.

II SCENARIO



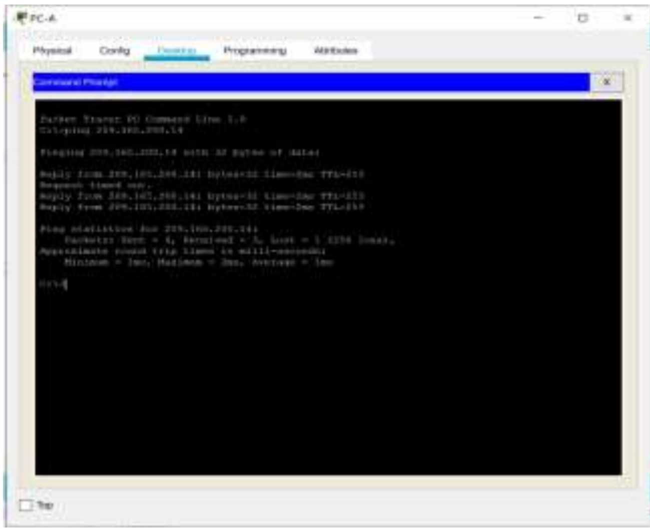
III SCENARIO

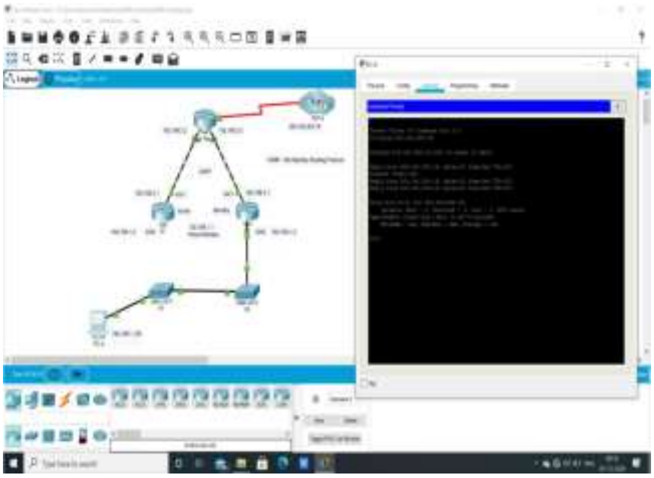
PC-A represents the organization, S1 and S2 are the switches. Routers R1 and R2 are part of HSRP connected to the main internet service provider.

Our goal here is to create a HSRP group with R3 as an active router and R2 as a standby router. We would further set the VIP to 192.168.1.100 and R1 to preempt (give it the capability to assume the active role should it go inaccessible and come back up). Further we would like to set a tracking on the interface between R1 and R4, so that if the serial interface goes down, R1 loses its active status to R2(note that if the serial interface goes down it's useless to keep R1 active as it has no way to route the packets to the core) . Also should R3 regain the serial interface it should switch back to active, we would use a preempt statement to do that.

IV TECHNICAL ARCHITECTURE AND CONSIDERATIONS

Let's begin by configuring R2 . Note that the virtual IP in this case is 192.168.1.1 and R2 is given a priority of 101, R2 kicks the active router off and assumes its role, should the priority of R2 increase to a better value. Let's move on to R1. The configuration is almost the same on R1 except for increasing the priority to 255 (thereby making it an active router in the group) and adding a statement to indicate that serial 1/0 to be a tracking interface, priority value is 101). R2 and R1 exchange the HSRP hellos between each other once every 3 seconds by default. A debug log on R1 below shows hello packets coming into R1 from R2 announcing that it's in standby mode and a hello packet leaving R1 announcing that it's active





V RESULT

As a first test, I would unplug the Ethernet cable on R1. As soon as this happens the router resigns itself to an active role and goes into an Init state because it detects the change in the eth interface. R2 does not know what happened until the next few seconds
until it's hello/dead timers get expired, as soon as that happens it assumes an active role. Note that the virtual MAC address remains unchanged during the switch; hence R1 need not change its arp cache.
That's the advantage of using a Virtual mac, rather than router's BIA. A router reboot or any other connectivity loss also results in a similar outcome as above. As soon as I plug the Ethernet cable back, R1 leaps back to active status.

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