

## Designing a Smart Campus Area Network using Cisco Packet Tracer

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### • Abstract:

Hot Standby Router Protocol (HSRP) is a CISCO proprietary protocol, which provides redundancy for a local subnet. In HSRP, two or more routers give 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. IOT (Internet of Things) is where a few things can be associated together, sensed and furthermore remotely controlled over the system. This paper manages the execution of a smart home utilizing Cisco Packet Tracer simulator, because this feature includes different kinds of sensors and actuators and also having different types of smart devices used for automation.

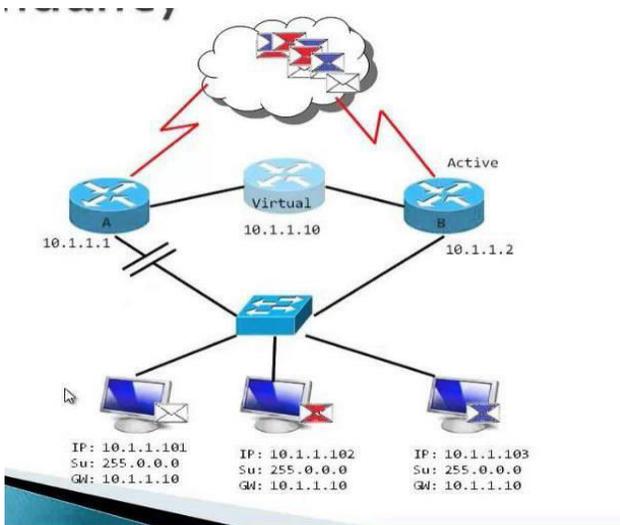
### • Key words used:

VLAN, SVI interfaces, HSRP IP Network, Routing protocols, Sensor, Smart home, Packet tracer simulator.

### • INTRODUCTION:

With the rapid development of Internet, network application has rapidly increased in colleges, and higher stability requirements have been put forward. In order to ensure mutual connections between terminal devices of internal network and external network based on TCP/IP protocol in campus network, and default route must be configured in these devices (setting static default gateway). If the default gateway router goes down, redundant communication has not been defined by Ethernet and TCP/IP protocol. If a default gateway appears a problem, but the host is unable to automatically switch gateway, which results in mutual disconnection between the internal network and external network terminal device. Even if a redundant router in the network can serve as the default gateway of network segments, any dynamic method can't make the equipment get a new default gateway address, and HSRP does not cause confusion in IP flow failure transfer and allow the host to use a single router, also router in the actual first hop failure conditions can maintain the connectivity between routers. When a host router is down, standby route equipment timely accepts transmitting work. It solves the problem of the router

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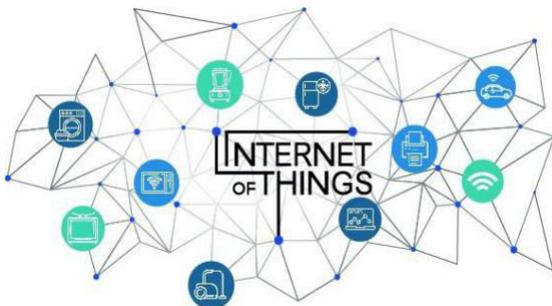


FIG -1. Internet of Things

The IOT(internet of things) is a system which is equipped for interfacing everything to the web through remote sensor networks.IOT(internet of things) is made out of two words :web and things. The IOT innovation usage made a change in new developments in the fields of horticulture, industry and vitality dispersion by including the significant data with the assistance of various kinds of sensors. As per Cisco organizing there are enormous number of organizations and research associations which gives the effects of Internet of things on the web and the economy in the following five to ten years.

• **OVERVIEW:**

HSRP is a router protocol of hot backup. In order to achieve redundancy of gateway and automatic switches, Cisco has developed redundancy protocol based on HSRP, which can provide a redundancy of gateway. When the network edge device or access link occurs error, the protocol ensures that the user can quickly and transparently restore communications and provide redundancy and fault tolerance, and enhance routing function for IP network. Condition of HSRP is that system has at least two routers, which forms a group, and main members of the group are as followed: active router, standby route and virtual router. At any given moment, a group has only one active router that transmits data packets. If the active router fails, it will choose a backup router to replace active router. Virtual router has its own IP address and MAC address, and this network within the host remains link, which is not affected by fault effects. So the problem of the router switch has been solved.

**HSRP VERSIONS**

The following are the Hot Standby Router Protocol (HSRP) versions:

- 1) **HSRP Version 1:-** HSRPv I is the first version of the HSRP and default version of HSRP. It has these features:-
  - (a) The HSRP group numbers are from 0 to 255.
  - (b) Sends traffic on port UDP.
  - (c) Priority is 0-255 with the default of value of 100.
  - (d) The multicast address 224.0.0.2 is used to send HSRP hello messages.
  - (e) To send hello packets, HSRPv I use the multicast address 224.0.0.2 which can conflict with Cisco Group Management Protocol (CGMP) leave processing. HSRPv1 and CGMP are not enabled at the same time because they are mutually exclusive.
- 2) **HSRP Version II: -** HSRP v.2 is the second version of the HSRP. It has following features: -
  - a) HSRP v.2 can use a group number from 0 to 4095.
  - b) Uses a new MAC address range 0000.0C9F.Fxxx, where xx is the group number in hexadecimal.
  - c) Sends traffic on UDP port.
  - d) Allow md5 authentication.

e) Uses a different packet format than version 1. The packet format uses a type-length-value (TLV) format. Version 2 packets received by an version 1 router will have the type field mapped to the version field by version 1 and subsequently ignored.

**3. IOT:**

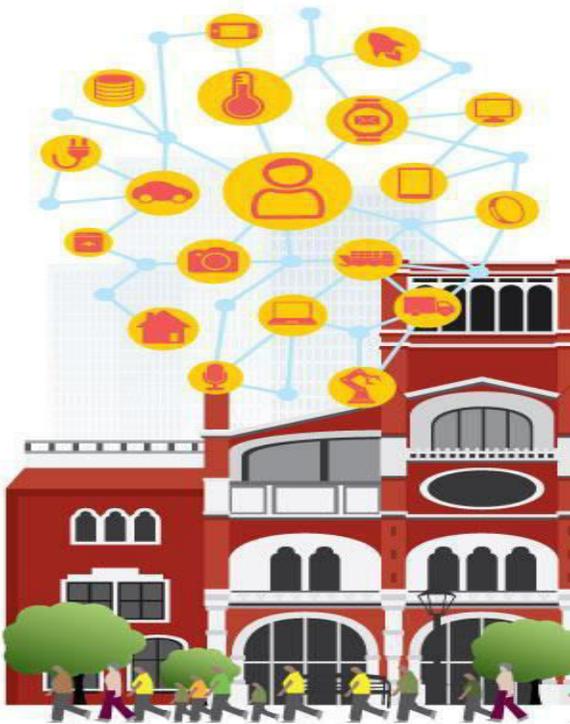


FIG -2. Smart Campus with IOT

The present internet of things(IOT) has a capacity to depict the various sorts articles, gadgets and sensors to interface with the web. As a result,IOT is commonly new idea, yet coordinating systems and PCs to oversee and control things had existed in this genuine world for around quite a few years. Internet of things (IOT) enables items and clients to speak with one another by utilizing of a novel IP address to each article to distinguish which clients are going to getting to what asset of the system effectively. IOT additionally depicts a universe of system wherein all items are associated with the system so information can be partaken in a system. Everyone as of now has an advanced cell, however a telephone isn't savvy rather it encourages its client to make more intelligent decisions.also depicts a universe of system wherein each article is

associated with the system so information can be shared. Everybody as of now has an advanced cell, however a telephone is certainly not a brilliant as opposed to it causes its client to settle on more astute choices.

**4. STATES OF HSRP**

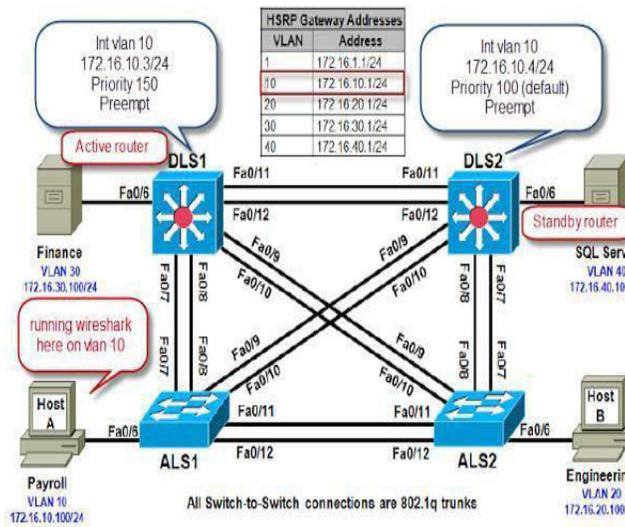
1. Initial: - It is the starting state of router and indicates that HSRP is not running. This state is entered via a configuration change or when an interface first comes up.
2. Learn: - The virtual IP address has not been determined by the router and not yet seen an authenticated Hello message from the active router. In this state the router is still waiting to hear from the active router.
3. Listen: - Since the router knows the virtual IP address, but is neither the active router nor the standby router. It listens for Hello messages from other routers.
4. Speak: - Hello messages are sent periodically by the router and are actively participating in the selection of the active or standby router. If a router does not have a virtual IP address, then it cannot enter Speak state.
5. Standby: - A router is in a queue of candidates to become the next active router and periodically sends Hello messages. There must be at most one router in the group in Standby state.
6. Active: - The router is currently forwarding packets that are sent to the group's virtual MAC address. The router periodically sends Hello messages. Excluding transient conditions, there MUST be at most one router in Active state in the group.

**5. FLAWS OF USING HSRP**

One major disadvantage of Hot Standby Router Protocol is that it is a Cisco proprietary protocol. The second disadvantage is that it has a large interval of 3 seconds for sending a hello message i.e. hello packets are exchanged between two routers for every 3 seconds. HSRP do provide redundant gateways for fault tolerance neither provide load balancing between those gateways.

• **CAMPUS SCENARIO:**

Topology



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• **CONCLUSION:**

Hot Standby Routing Protocol (HSRP) is a Cisco’s owned redundancy protocol for establishing a fault-tolerance default gateway. It allows several routers to appear as single gateway IP router. One Router is selected as Primary or active HSRP router. Another Router is selected as Standby HSRP Router and remaining routers are in the list of Listen HSRP state. With the help of this protocol we have created a HA i.e, High availability, campus area network which will continuously flows the traffic even there is failure in active router . This is the benefit of this protocol.This venture work is to examine the idea of the Internet of things and its pertinence in home robotization setting. Internet of things is another innovation that is utilized for the interconnection of the gadgets with the assistance of the web association.

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