High Availability In IP Networks Design

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ABSTRACT

There is a much need of high availability on IP networks on end user perspective. Business expects zero impact during any link/node down on networking – this can be achieved with implementation of high availability on each OSI layer. So application availability to the end users can be maintained during any unnoticed outages of MAN or MPLS or local links, with zero impact. There are wide open technologies to implement high availability for applications, servers, networking. The intent of this paper is to show how to maintain/design high availability in IP networks & the network high-end technologies of it. IP network used LAN Network Design, Spanning-tree topology design, VLAN Design, VTP Design, HSRP Design, Frame Relay Design.

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I. INTRODUCTION

High availableness may be a characteristic of a system, that aims to make sure associate in agreement level of operational performance, sometimes time period, for the next than traditional amount. There are three principles of systems style in dependability engineering which may facilitate come through high availableness.

High handiness could be a characteristic of a system, that aims to make sure Associate in Nursing united level of operational performance, sometimes up time, for the next than traditional amount. Modernization has resulted in Associate in Nursing accumulated reliance on these systems. as an example, hospitals and information centers need high handiness of their systems to perform routine daily activities.

Handiness refers to the power of the user community to get a service or sensible, access the

system, whether or not to submit new work, update or alter existing work, or collect the

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results of previous work. If a user cannot access the system, it's - from the users purpose of read - out of stock.[1] typically, the term period of time is employed to talk over with periods once a system is out of stock.

There are three principles of system design in reliability engineering which can help achieve high availability.

- ✓ Elimination of single points of failure. This suggests adding redundancy to the system in order that failure of a element doesn't mean failure of the whole system.
- ✓ Reliable crossover. In redundant systems, the crossover purpose itself tends to become one purpose of failure. Reliable systems should give for reliable crossover.
- ✓ Detection of failures as they occur. If the 2 principles higher than area unit discovered, then a user could ne'er see a failure.

2. LITERATURE REVIEW

Business continuity is that the capability of a business to resist outages and to control vital services commonly and while not interruption in accordance with predefined service-level agreements. to attain a given level of business continuity that you simply need, a set of services, software, hardware, and procedures should be elect, represented in an exceedingly documented arrange, enforced, and practiced frequently. The business continuity resolution should address the

information, the operational surroundings, the applications, the appliance hosting surroundings, and therefore the end-user interface. All should be on the market to deliver an honest, complete business continuity resolution.

Business continuity includes disaster recovery (DR) and high accessibility (HA), and might be outlined because the ability to resist all outages (planned, unplanned, and disasters) and to produce continuous process for all vital applications. the final word goal is for the outage time to be but .001% of total service time[2]. A high accessibility surroundings generally includes a lot of exacting recovery time objectives (seconds to minutes) and a lot of exacting recovery purpose objectives (zero user disruption) than a disaster recovery state of affairs.

High accessibility solutions offer totally automatic failover to a backup system so users and applications will continue operating while not disruption. Hour angle solutions should have the flexibility to produce an instantaneous recovery purpose. At constant time, they need to offer a recovery time capability that's considerably higher than the recovery time that you simply expertise in an exceedingly non-HA resolution topology.

High convenience is commonly related to fault-tolerant systems. The term faulttolerant suggests that a system will operate within the presence of hardware part failures. one part failure in an exceedingly fault-tolerant system won't cause a system interruption as a result of the alternate part can take over the task transparently.

3. ADVANTAGE OF HIGH AVAILABILITY

- ✓ Planned outages
- ✓ Unplanned outages
- ✓ Disaster recovery
- ✓ Backup window reduction
- ✓ Load balancing

4. DISADVANTAGE OF HIGH AVAILABILITY

- ✓ Reduced risk
- ✓ Improved operational accessibility
- ✓ Better recovery
- ✓ Expert recommendation
- ✓ Cost containment
- ✓ Industry ability

5. IP NETWORKS

The web Protocol (IP) is that the principal prescript within the Internet protocol suite for relaying datagram's across network boundaries. Its routing operate permits internetworking, and primarily establishes the web. The web protocol suite is thus usually mentioned as TCP/IP

Internet Protocol is used to identify the networking nodes on internet, it's a logical address which should be unique on internet to send & receive data on networking[1]

- ✓ **IPv4 (Internet Protocol Version 4)**
- ✓ **IPv6 (Internet Protocol Version 6)**

5.1 IPV4 (INTERNET PROTOCOL VERSION 4)

Internet Protocol version four (IPv4) is that the fourth version of the web Protocol (IP). it's one among the core protocols of standards-based internetworking ways within the web, and was the primary version deployed for production within the ARPANET in 1983.

IPv4 may be a connectionless protocol to be used on packet-switched networks. It operates on a best effort delivery model, therein it doesn't guarantee delivery, nor will it assure correct sequencing or dodging of duplicate delivery. These aspects, as well as information integrity, square measure self-addressed by associate degree higher layer transport protocol, like the Transmission management Protocol (TCP).[3]

5.2 IPV6 (INTERNET PROTOCOL VERSION 6)

IPv6 (Internet Protocol version 6) could be a set of specifications from the net Engineering Task Force (IETF) that is basically Associate in Nursing upgrade of scientific discipline version four (IPv4). web Protocol version six (IPv6) is that the most up-to-date version of the net Protocol (IP), the protocol that has Associate in Nursing identification and site system for computers on networks and routes traffic across the net. IPv6 was developed by the net Engineering Task Force (IETF) to influence the long-anticipated downside of IPv4 address exhaustion. IPv6 is meant to exchange IPv4.[4]

6. IP NETWORK DESIGN

A competent network style is that the foundation upon that all eminent network implementations area unit designed. this is often the primary of 4 articles that target the planning of IP-based networks, owing to the prevalence of informatics because the de-facto commonplace desktop protocol.

6.1 TYPES OF NETWORK DESIGN

- ✓ LAN (Local Area Network) Network design
- ✓ Spanning Tree Topology Design
- ✓ VLAN (Virtual Local Area Network) Design
- ✓ VTP (Virtual Trunking Protocol) Desgin
- ✓ HSRP (Hot Standby Router Protocol) Design
- ✓ Frame Relay Design

6.1.1 LAN (LOCAL AREA NETWORK) NETWORK DESIGN

A local space network (LAN) could be a devices network that connect with one another within the scope of a home, school, laboratory, or office. Usually, a local area network comprise computers and peripheral devices joined to a neighborhood domain server. Typically, local area network includes several wires and cables that demand a antecedently designed network diagram.
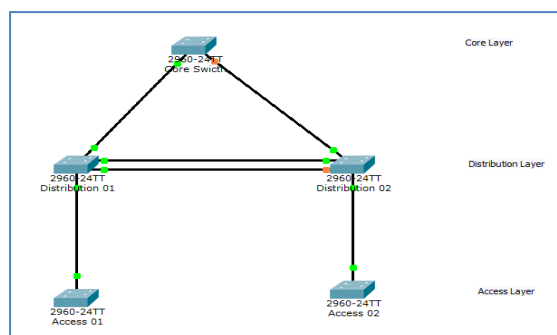

Fig.1 Local Area Network Design

6.1.2 SPANNING TREE TOPOLOGY DESIGN

Spanning-Tree Protocol (STP) prevents loops from being formed once switches or bridges are interconnected via multiple ways. Spanning-Tree Protocol implements the 802.1D IEEE algorithm by exchanging BPDU messages with totally different switches to sight loops, then removes the loop by motility down selected bridge interfaces. This algorithm guarantees that there is one and only one active path between two network devices.[5]

6.1.3. VLAN

(VIRTUAL LOCAL AREA NETWORK) DESIGN

A VLAN consists of hosts printed as members, human action as a logical network section. In distinction, a physical section consists
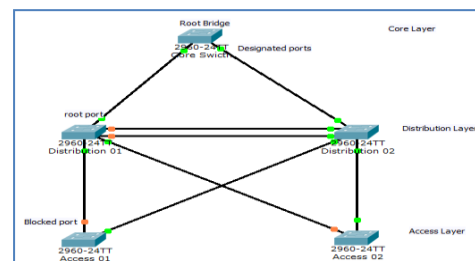
of devices that possesses to be connected to a physical cable section. A VLAN can have connected members set anywhere among the sphere network, as long as VLAN property is provided among all members. Layer a combine of switches are designed with a VLAN mapping and provide the logical property among the VLAN members [6]
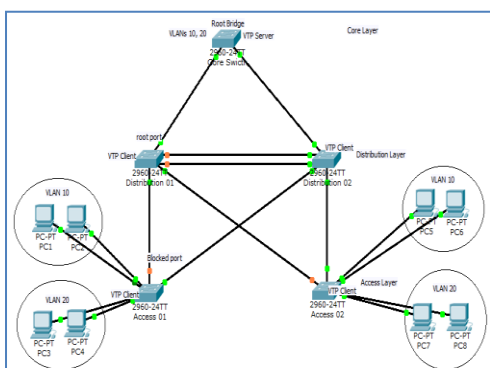

Fig.2 Virtual Local Area Network Design[6]

6.1.4. VTP (VIRTUAL TRUNKING PROTOCOL) DESIGN

Cisco has developed a method to manage VLANs across the campus network. The VLAN Trunking Protocol (VTP) uses Layer 2 trunk frames to communicate VLAN information among a group of switches. VTP manages the addition, deletion, and renaming of VLANs across the network from a central point of control. Any switch participating in a VTP exchange is aware of and can use any VLAN that VTP manages.[7]

6.1.5. HSRP (HOT STANDBY ROUTER PROTOCOL) DESIGN
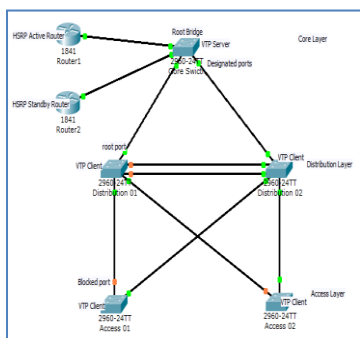
6.1.6. FRAME RELAY DESIGN

Frame Relay was originally planned as a protocol to be used over ISDN interfaces. Initial proposals to the current impact were submitted to the International Telecommunication Union Telecommunication Standardization Sector (ITU-T) (formerly the consolatory Committee for International Telegraph and phone [CCITT]) in 1984 .

In 1990, Cisco Systems, Northern telecommunication, and Digital instrumentality Corporation fashioned a syndicate to focus Frame Relay technology development and accelerate the introduction of put down operable Frame Relay product. They developed a specification conformist to the fundamental Frame Relay protocol being mentioned in T1S1 and ITU-T, however extended it with options that give extra capabilities for complicated internetworking environments.[9]

7. CONCLUSION

High accessibility and quicker Convergence square measure the 2 necessary factors that square measure taken into consideration whereas coming up with networks. There square measure varied techniques which will be accustomed improve accessibility and convergence time of information science based mostly networks per the necessities of services deployed within the network. High accessibility and quicker Convergence techniques square measure a requirement for a network to perform in best manner with prognostic nature.

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