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Smart Municipality

Using

Enterprise Network

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Chapter-1 Introduction

An enterprise network is a communication backbone that helps to connect computers and related devices across various departments in an organization. It helps to minimize the complexity through simplification of various communication protocols and simplifies IT operations and creates new possible business opportunities with a flexible end and programmable purpose to networking. This network will allow various users and their employees connect to the main server. All critical business traffic passing through the network and internet will be encrypted.

1.1. Problem Statement

Despite of advancement in IT sectors and Network Infrastructure, municipalities Offices still rely on the traditional filing system, traditional information infrastructure to serve common people. Thus people not only have to roam from one department to another for the simplest task but have to wait long hours for process that make use of another department paper work.

1.2. Objective of the Project

The main Objectives of this project are:

1. For Simplifying (through modification) networking operations done in a private or public network and increase in financial output of an organization.
2. To established relation between one department to another by connecting all department to main server and facilitate flow of related paper work from one department to another department with ease in no time by providing secure network

1.3. Scope of the Project

The scope of this project is to offers great value to municipality offices by creating End to End enterprise network solution so it can be integrated and improved in future if we need it.

Chapter-2 Literature Review

Enterprise network architecture refers to the specific setup and layout of enterprise networks. This type of system provides vital support for a business, from VoIP and telecommunications systems to data storage, data analysis, etc. All of these are served by a good enterprise network architecture

Here in Enterprise networks, network can also be distinguished in terms of spatial distance as local area networks (LANs), metropolitan area networks (MANs), and wide networks (WANs). We will use TCP/IP technology where it carries voice, data, or both kinds of signals; by the usual nature of its connections (dedicated or no switched, or virtual connections); and by the types of physical links for example, optical fiber, coaxial cable. Transmission of data is the main concern of this system.

The transmission of data among the resources occurs with the help of IP. An Internet Protocol address (IP) is a numerical label assigned to each device connected to a computer network that uses the Internet Protocol for communication. IPv6 was developed in the early ’90s to facilitate communication and to tackle the depletion of IPv4 addressing space

Routing protocol is used by routers to dynamically find all the networks in the internet work and to ensure that all routers have the routing table. Basically, a routing protocol determines the path of a packet through an internet work. Examples of routing protocols are RIP, EIGRP, and OSPF.

Enhanced Interior Gateway Routing Protocol (EIGRP) is an advanced distance-vector routing protocol that is used on a computer network for automating routing decisions and configuration. The protocol was designed by Cisco Systems as a proprietary protocol, available only on Cisco routers. Partial functionality of EIGRP was converted to an open standard in 2013[1] and was published with informational status as RFC 7868 in 2016.

LANs were very flat—all the workstations were connected to a single piece of coaxial cable. In the LAN, every packet that any device puts onto the wire would get sent to every other device connected on the LAN. As the number of workstation typically grew, they started to become hopelessly congested; there were just too many collisions, because most

of the time when a workstation tried to send a packet, it would find that the wire was already congested by packet sent by some other device. Hence to reduce the congestion on large LAN, the network was split into VLANs. Virtual LANs (VLANs) can be viewed as a group of devices on different physical LAN segments which can communicate with each other as if they were all on the same physical LAN segment. Switches using VLANs create the same division of the network into separate broadcast domains but do not have the latency problems of a router. Switches are also a more cost effective solution. [2]

For communication within the enterprise network we can use ISDN or VoIP. ISDN are the major communication services applied in enterprise network. Most of the works have switched over infrastructures that use modern cables and circuits like fiber and wireless. Most of municipality offices have been using traditional communication circuits till now that heavily increases separate cost for communication installation and maintenance. With ISDN telephony, there is always going to be high rental costs for equipment. In some case ISDN telephony faults can take up to 72 hours to repair. If ISDN is not favorable we can use VoIP. VoIP tends to have low rental costs for telephony equipment. With VoIP telephony, it can take up to 10 hours to fix the faults.

To provide more security enterprise network will use HTTPS enable web services with SSL/TSL security. An access control list (ACL), with respect to a computer file system, is a list of permissions attached to an object An ACL specifies which users or system processes are granted access to objects, as well as what operations are allowed on given objects[3]. Access Control List (ACL) is maintained at data center routers to avoid access to datacenter by external users and Port Security feature is enable to all switches to avoid MAC Flooding.

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Chapter-3 Methodology

IPv6 the successor of IPv4 provide faster data transfer and have better security we will be using IPv6 to connect devices and similarly some routing protocol will be used for routing purpose. VLAN will be used to reduce number of physical devices that are connected. To maintain proper authorization Access control list (ACL) will be used.

For communication purpose either VOIP or ISDN will be used.

3.1.Feasibility Study

3.1.1.Economic Feasibility

The cost of developing Enterprise network architecture depends upon what kind of architecture we want. For such, we will need physical devices. The required physical devices include:

1. Router, switch, hub
2. Connection cable
3. Dedicated Servers and data centers
4. Pc / Workstation

3.1.2.Technical Feasibility

For developing design of our project, we used Cisco packet tracer, a network topology simulation tool. Later on it can be implemented in real environment with similar devices designed in packet tracer. What we do in Cisco packet tracker is exactly same in real life Scenario too.

3.1.3.Operational Feasibility

Smart municipality using enterprise network is a network infrastructure for municipality offices. It uses the exiting technology to make us architecture and every component, devices required is easily available to us thus making it operationally feasible.

3.2.Algorithm Used

In this project we setup proper routing protocol (EIGRP)[1] on routers. It is a routing protocol based on Distance Vector technology that uses the diffusing update algorithm (DUAL) [3] . We use this algorithm because it improve the efficiency of the protocol, provide fast convergence and help prevent calculation errors when attempting to determine the best path to a remote network.

3.3. Working Schedule

Our projects will be carried out as per the schedule shown by following Gantt chart:

Task / Week	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th
Pre study	■											
Analysis		■										
Feasibility study			■									
Design				■	■	■	■					
Testing							■	■	■	■		
Documentation	■	■	■	■	■	■	■	■	■	■	■	■
Review											■	
Presentation												■

figure: working schedule

:

Chapter-4 Expected Outcome

By using this system, municipality offices will be digitalized with the use enterprise network there is certain level of ease in performing day to day offices works furthermore there will be no delay in any kind of papers work as information needed is available immediately. All the important data will be stored safely in digitalized format at data center and with the use of Access control list (ACL) maintained at data center only authorized user will be allowed to access that information so faster services will be provided to people.

High level protection to data is provided and isolated network infrastructure from outside make it secure.

Chapter-5 Reference

[1] Savage, D., Ng, J., Moore, S., Slice, D., Paluch, P., and R. White, "Cisco's Enhanced Interior Gateway Routing Protocol.

[2] Komal Sharma,Meenu Yadav,Megha Pundir, Isha Malhotra, Jaskaran Singh. VLAN & Its Implementation over ATM by using IP: a communication. Discovery Engineering, 2013, 2(8), 105 – 109.

[3] J. J. Garcia-Luna-Aceves, “Loop-free Routing using Diffusing Computations", IEEEE/ACM Transactions on Networking, Vol. 1, No. 1, Feb, 1993, pp.130-141