

ADMINISTRATION AND MANAGEMENT OF WIRELESS NETWORK DECENTRALIZED GOVERNMENT INDEPENDENT (GADIP) CANTON CAYAMBE BASED ON THE FUNCTIONAL MODEL OF THE ISO FCAPS

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Abstract— This project is aimed at administering and managing network devices, resources and services for the wireless network of the Municipality of Cayambe GADIP by FCAPS management model ISO, in which a virtualization system is established with the XenServer Operating system, allowing to create virtual machines with different types of operating systems controlled through the XenCenter application that allows the management of physical resources of each server configured within the system virtualization..

In the system of Monitoring Server Virtualization in which the application software is installed The Dude is set, allowing the management and monitoring of all devices in the wireless network. The use of the mail server allows the network administrator to receive emails about failures caused by the virtualization system. For the firewall by applying the Captive Portal use the free internet service in Central Park is stable, allowing manage the resource in an optimal manner without saturation of users or misuse of the resource, it is focused for educational use and Tourist.

Through the creation of policies and procedures manuals, a guide to organization within the Department of Information Technology (ICT) it was established to maintain control and supervision of the wireless network and thus provide a service fully available.

Indexed terms — FCAPS, ISO, TIC'S.

I. INTRODUCTION

The municipal government has implemented Cayambe Canton wireless networks with internet service for 80 fiscal educational institutions located in both rural and urban areas, in addition to major sites like recreation parks.

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Wireless network Cayambe Canton Municipal Government, covers most of the city, this provides a free internet for rural communities, urban areas and Fiscal Educational Institutions. The current administration of the wireless network does not have control mechanisms and monitoring of the network causing poor performance. In educational institutions and major sites like Parks it has a large turnout of user access to the network so it greatly reduces bandwidth saturated leaving the network for several hours.

The Municipal Government of Guangzhou Cayambe to have their infrastructure wireless data network is more susceptible to technical damage, electromagnetic interference and bandwidth saturation, these are inconvenient for those responsible for the administration of the network, so the project aims provide solutions implemented management model and network management which will ensure greater availability and high performance network.

II. DEFINITION

A. Management and Administration

Technological progress in recent years has evolved into the techniques of network management data, allowing organizations to migrate their existing information systems architectures centralized to distributed architectures. Network management came up with the same networks as there was always a need to control, configure, etc., interconnection resources like communication networks have been changing and evolving over time.

B. Network Management

It is a set of processes to control a complex network data, to maximize efficiency and productivity encompasses management, organization and regulations are key to improving performance. The administration seeks perform four basic functions such as planning, organization, management and control aspects which are considered purely administrative. [13]

Network Management.

Network management is defined as the set of activities dedicated to the control, supervision and organization of

telecommunication resources to ensure an adequate level of service. Its main objective is to guarantee a level of service in managed funds at the lowest cost. The primary objective of network management is to improve the availability and performance also increase the effectiveness of the network. [13]



Figure 1 Network Management System.

Source: Molina, J. (s.f.). Obtenido de <http://www4.ujaen.es/~mdmolina/grr/Tema%201.pdf>

Basic elements of a system network management.

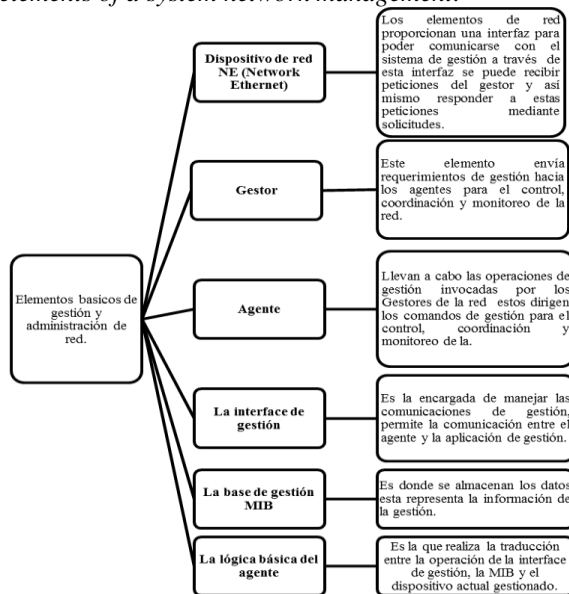


Figure 2. Elements of a network management system

Source: Tejedor, R. J. (8 de Abril de 2015). Obtenido de <http://www.ramonmillan.com/tutoriales/snmpv3.php>

Network Management Protocol:

It is responsible for communication between the manager and the agent; this in turn monitors the status of network devices.

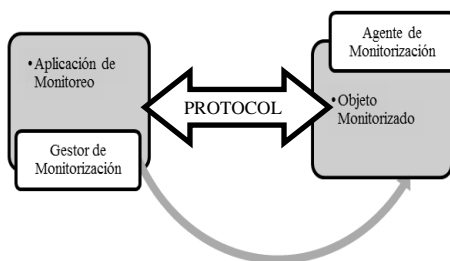


Figure 3. Network Management Protocol.

Source: Tejedor, R. J. (8 de Abril de 2015). Obtenido de <http://www.ramonmillan.com/tutoriales/snmpv3.php>

C. Network Management Architecture

The needs of systems management standards set forth three basic models for integrated management:

❖ **OSI Management.** - Open System Interconnection. Defined by OSI, it aims to achieve resource management following the OSI Reference Model.

❖ **Administration Internet.**- Based on the SNMP protocol and employs the manager-agent model.

❖ **TMN1 Architecture.** - Telecommunications Management Network, defined by UIT-T.2

D. Management model ISO FCAPS

Defines a series of standard functions described in M.3400 ITU-called functional areas of management systems or SMFA (Systems Management Functional Areas), more commonly known as FCAPS (Fault, Configuration, Accounting, Performance, Security), tasks management that makes this model are separated into five categories allowing for better organization. The most widely used protocols are SNMP (Simple Network Management Protocol) This protocol facilitates the exchange of management information between network devices and CMIP protocol which provides a transport mechanism in the form of question-answer service to 7 layers OSI. [16]

Fault Management.

The F FCAPS discussed in the areas of administration associated with the fault management. Fault Management's main purpose is the location and recovery of network problems. A fault is a damaging event that causes an abnormality in the service and impairs network performance; making detection and immediate correction are indispensable. [16]

Configuration Management

Configuration Management is the process of obtaining network data and using them to incorporate, maintain and remove the different components and resources within it. It consists in performing three main tasks:

- ✓ Collection of data on the state of the network
- ✓ Change in resource settings.
- ✓ Storage of configuration data

Accounting Management.

Accounting Management's mission is collecting statistics to generate billing reports that reflect the use of resources by users. It requires completion of the following tasks:

- ✓ Data collection on the use of resources.
- ✓ Establishment of fees.
- ✓ User fees for the use of resources.

¹ Telecommunications Management Network

² Telecommunication Sector Standardization.

Management features.

Provides information on the performance and quality of the operation of the current network collects and analyzes performance data in order to ensure that the benefits are commensurate with the needs of users. [15]

Management Security.

The objective of Security Management is to provide mechanisms to facilitate the maintenance of security policies and security services to each of the network elements as well as the network as a whole, creating strategies for the prevention and detection of attacks, and for responding to security incidents.

E. SNMP protocol.

It is responsible for communication between the manager and the agent; this in turn monitors the status of network devices. The evolution of the CMIP protocol, SNMP CMOT and Functional management model ISO FCAPS detailed. [13]

Management Information Bases (MIBs).

An SNMP MIB is a set of parameters that SNMP management station can query or set in the SNMP agent of a network device.

F. Wireless Networks

Wireless networks are wireless networks which are typically communicate by means not guided through electromagnetic waves. Transmission and reception are performed through antennas. Wireless networks are used not only for data connections, often used to broadcast television signals, telephony, for security (webcam) for sensors and automation. [4]

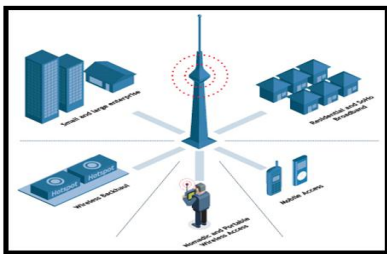


Figure 1. F. Wireless Networks.

Source: http Gálvis, Y. (30 de Noviembre de 2011). Obtenido de <http://rdessena.blogspot.com/>

G. Virtualization

Virtualization technology increases efficiency in your data center as it allows existing x86 servers run multiple applications and operating systems. Workloads are implemented faster, performance and availability increase, and operations are automated. All this makes IT management simpler and the operation property and less expensive. [3]

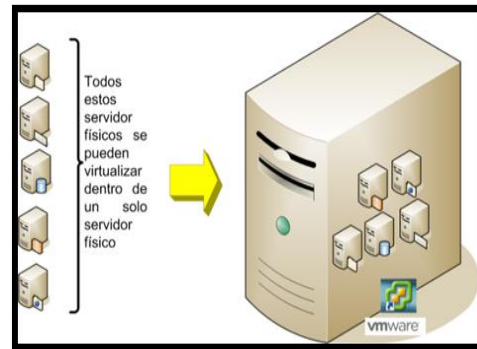


Figure 2. Server Virtualization.

Source: Ramírez, J. J. (5 de Julio de 2013). Obtenido de <http://osl.uc3m.es/citrix-con-xenserver-nueva-version-de-esta-plataforma-de-virtualizacion/>

H. Citrix XenServer

Optimized for server virtualization workloads all Citrix XenServer is a leading platform for managing server virtualization hypervisor and reducing total cost of ownership of server virtualization infrastructure, clouds and desks. Consolidation and containment of workloads on XenServer enables organizations of any size transform their enterprise computing infrastructure IT, facing the challenges of IT data centers of modern business today.

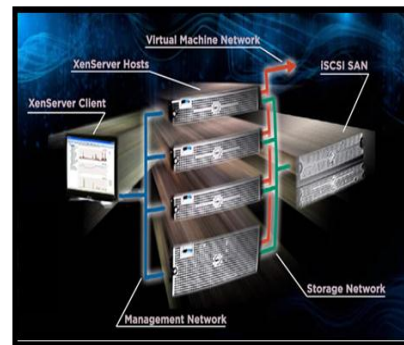


Figure 3. OS XenServer.

Source: Fuente: Ramírez, J. J. (5 de Julio de 2013). Obtenido de <http://osl.uc3m.es/citrix-con-xenserver-nueva-version-de-esta-plataforma-de-virtualizacion/>

III. CURRENT STATUS OF WIRELESS NETWORK OF THE MUNICIPALITY OF CAYAMBE GADIP

The Municipality of Cayambe GADIP has the ICT Department (Information Technology and Communication), where is located the administrative offices of the Local Network Wireless network and which also have space for your data center location where. They are the intercom equipment for its two networks.

IV. IMPLEMENTATION OF MANAGEMENT MODEL FCAPS

A. Establishment of Policy Management.

Management policies that cover the needs of the entity according to the requirements established, which was obtained is determined to make the collection of information from the wireless network.

Purpose

The purpose of this document aims to present management policies thereof which must be met by the manager and staff responsible for the wireless network of the Department of ICT of GADIP Canton Cayambe, in order to react to unexpected events within the wireless network, in order to maintain a fully available network and quality service to users.

Overview:

- a) This document is written in a technical manner for use by personnel in charge of the network whose minimum requirement is to have a mid-level computer.
- b) The policies described herein are references which are ready for change at any time, not pretending to be mandatory if the objectives of the management and network management are met.
- c) All staff responsible for the wireless network should take into account the important aspects of each policy to comply and run smoothly.
- d) The administrator and manager of the wireless network must make the effort to enforce policies in your environment to provide efficient service.

Organizational levels

Head of the Department of Information Technology (TIC)

The person or authority higher level under management is the acceptance of responsibility and management policies in relation to the charge of administration

Technology Infrastructure

The authority responsible for the part of telecommunications networks, management, handling and configuration of elements of the wireless network, where decisions may not be the authority of higher level in terms of events resulting in the wireless network, gives solutions to such events.

Technical support

Authority responsible for the software and hardware of the wired network GADIP of Cayambe. Decisions in the case of not being any of the authorities.

Users

Users are individuals who have full access to the services provided by the wireless network such as the Internet access.

Reference

With no defined management policies for standard herein is structured based on the ISO-IEC standard 27002: 2013 and the format of documents of the Technical Department of Information and Communication GADIP the Municipality of Cayambe, covering areas FCAPS functional model of ISO.

Policies to functional areas of ISO FCAPS model is determined based on the management of the wireless network and operating system virtualization and where each area is specified by process parameters in each management policy. Activities detailed in each policy meeting each.

1. Management Policy Wireless Network.
 - 1.1. eleven. Objective Management Policy.
 - 1.2. Commitment of the authorities.
2. Virtualization Management Policy.
 - 2.1. Virtual Machines
 - 2.2. Monitoring parameters
3. Fault Management
 - 3.1. Fault Management
 - 3.2. He sent notifications
4. Configuration Management
 - 4.1. Join Teams
 - 4.2. Equipment configuration
5. Management Accounting
 - 5.1. reports
6. Performance Management
 - 6.1. Monitoring parameters
 - 6.2. Statistical data collection
7. Security Management
 - 7.1. Access Monitoring software
 - 7.2. Access to network devices
 - 7.3. Captive Portal Security
 - 7.4. Security links

B. Comparison of the Types of Monitoring Software

The network monitoring software is an integrated network monitoring and analysis system and infrastructure, provides general monitoring of network devices (switches, routers, firewalls, access points, etc.), graphic representations and topological infrastructure and as consumption analysis of network traffic.

At present there are various types of software that are used for administration and management of networks where each has specific characteristics and parameters that are unique to each software then some of the management softwares out today that are very detailed used for wireless networks. The election monitoring software which is installed the XenServer server is analyzed as specified by the IEEE-STD-830-1998.

CACTIS

Cactis is a complete interface; stores all the information needed to create graphs and populate it with data in a MySQL database. The interface is completely driven by PHP. Besides being able to keep graphics, data sources and Round Robin

Archives in a database, cacti are responsible for data management. There is also SNMP support for those used to creating traffic graphs with MRTG.

THE DUDE

Mikrotik is well known manufacturer of wireless devices at international level, developing software for monitoring wireless networks The Dude is a software management and monitoring. Your license is free; however, its capabilities are comparable to commercial products. It focuses on the more technically oriented people who prefer ease of use and simple interface. One drawback is the lack of advanced warning and limited reporting capabilities

NAGIOS

Nagios software is one of the best known and most used for monitoring IT infrastructure open source. Nagios monitors end-user workstations, IT services and active network components. Its architecture is modular and suitable for deployment in networks based Multiplatform. There is a large and active community around Nagios that develops many additional modules or plug-ins.

Purpose

This document could define each of the proposed requirements to determine the best choice of the election monitoring software to be implemented to improve the administration and management of the wireless network.

This document is intended for network administrators Canton Municipal GAD Cayambe, where the document will serve as a guide for determining where monitoring software provide and meet the optimal requirements for improved performance and network performance.

Scope of the system

The software Monitoring wireless network used, provides monitoring network using the SNMP protocol, which will allow access remotely to access points of each educational institution, also for ease of administration and management, will generate a warning failure notification issued by the software, before a damage within the network is in active equipment configurations of each one of them, notifications or SNMP alarms determine the damage and establish a level this error to determine the severity notification. Upon issuance of this message will be sent to the network administrator via e-mail where he will give notice of any problems that detects the software. You will visualize the topology of the network and connections within them.

Besides primary wireless network parameters such as the speed of transmission and reception of data, bandwidth, protocol, if the computer is active or not, frequency, graphic also indicates where the radio spectrum bandwidth use of each of the access points, etc.

Reference

For each requirement that the monitoring software must meet is referenced: IEEE-STD-830-1998: Specifications Software Requirements.

Titling Project: ADMINISTRATION AND MANAGEMENT OF WIRELESS NETWORK DECENTRALIZED GOVERNMENT INDEPENDENT (GAD) CANTON CAYAMBE BASED ON THE FUNCTIONAL MODEL FCAPS ISO.TORRES, L. 2015.

Overview of the document

The written document is divided into two main parts where the first one describes all the factors that affect the product and its requirements. This will define in detail the requirements in the first half, making them easier to understand. Normally, this part contains the following parameters: product perspective, product functions, user characteristics and constraints, factors that are assumed and future requirements.

The second part contains requirements to a level of detail sufficient to enable designers to design a system that meets these requirements, and allows the test team to plan and perform tests to show whether the system meets or not the requirements.

GENERAL DESCRIPTION

The software Monitoring wireless networks can be used in any network is public or private institution or educational purposes. You want to implement a management system and management of data on which you can run the SNMP protocol, allowing remote access way to the access points. With this software you can get a real perspective of the network and its operation in order to improve the efficiency and effectiveness of the entire wireless network. In addition to meeting the requirements to improve the efficiency and effectiveness should generate fault notifications generated for these notifications are sent via e-mail to the network administrator. It must also identify key parameters such as SSID wireless networks, transmission speed, band width and functional graphics indicate where the operation of each of these parameters.

Product Features

The software used for the administration and management of the wireless network must comply with the following features as they are:

- ✓ Scalability.
- ✓ Availability.
- ✓ Security
- ✓ License.
- ✓ operating systems they support.
- ✓ Interoperability: manufacturers and protocols.
- ✓ MIB Manager
- ✓ alarm response
- ✓ e-mail notifications

- ✓ User Interface
- ✓ Identification of basic parameters of a wireless network: Transmission and Reception speed, bandwidth, frequency, etc.
- ✓ Design Network topology.

Choice of software used.

Based on the specific requirements of the IEEE 830 established and comparative table of the types of software made shows that the best software for use in the proposed budget for the administration and management of the wireless network GAD Cayambe Canton Township project the THE DUDE software as the infrastructure and equipment which manages the municipality is based on MIKROTIK where this will allow optimally use software also allows the easy handling of this tool by staff as it focuses on people with technical guidance but prefer the ease of use and simple interface.

C. Functional Model Implementation ISO FCAPS

The steps taken to implement the management model according to their functional areas indicated. It is detailed below each of the processes and tools used to arrive at an overall management system.

Operating System Citrix XenServer.

The Operating System is a platform XenServer virtualization open source, which allows the creation of virtual machines with different operating systems licensed and free. This server allows the administrator to have the monitoring of the physical server as the amount of memory, disk usage, virtual memory, plus the use of statistical graphics performance server and its virtual machines.

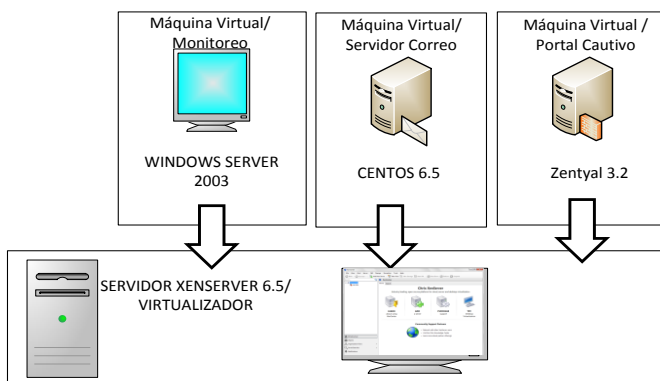


Figure 6. System Virtualization XenServer
Source: (Departamento de TIC's Municipio de Cayambe)

FCAPS model implementation of ISO management over the wireless network.

To implement the model ISO FCAPS management, the steps and tools used to implement the management model in the Project, in its first part determines the minimum requirements

and hardware used Citrix XenServer server, shown in virtual machines and software The Dude.

As second selection The Dude software used for detailed monitoring wireless network GADIP the Municipality of Cayambe, based on standard IEE830 for completion and implementation of each process performed in the functional areas outlined Model FCAPS such as Fault, Configuration, Accounting, Performance and Security.

Requirements for implementing the FCAPS model.

A key requirement for the implementation of model management FCAPS is to determine the requirements in hardware and software to run the operating system XenServer, virtual machines that are configured as Captive Portal Server Mail and and for the fundamental application monitoring Wireless Network by the Dude is determined for the control and supervision to ensure proper operation of the wireless network.

Requirements for hardware virtualization

SenXerver is a platform for open source virtualization, which allows the creation of virtual machines with different operating systems with Windows license and free as Ubuntu, CentOS, Debian, etc. Also allows a graphical interface using the XenCenter application, used as a monitoring tool and Configuration Server and XenServer virtual machines created.

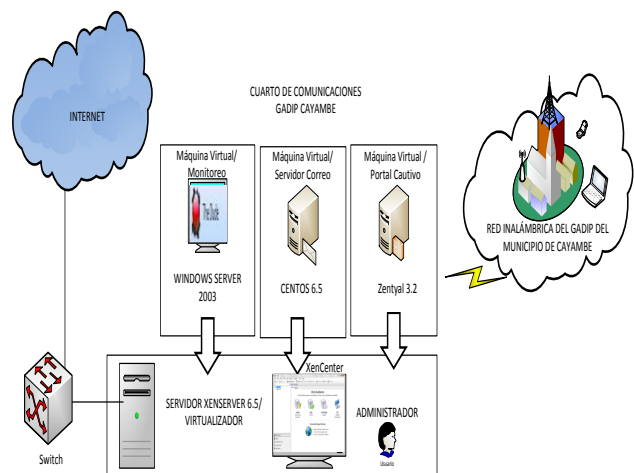


Figure 7. Wireless Network topology GADIP Cayambe
Source: (Departamento de TIC's Municipio de Cayambe)

Implementation of the model to management fault

Fault management allows the network administrator to have control of faults by detection, isolation, diagnosis and resolution of network failures caused to improve the availability and efficiency of the network. In this key area it is considered important factors in development of management fault management fault management of the wireless network and the handling of fault management in XenServer server

virtualization aspects, allowing the administrator to manage the total Wireless network GADIP the Municipality of Cayambe.

For the implementation of the management of network failure it is deemed to be implemented area configuration management across the wireless network. According to the criteria of the OSI model two functions for handling failures within the wireless network is detailed discussed below.

- ✓ When the fault has not happened it handled the management of preventive tests
- ✓ When the fault has happened reactive management (detection, isolation, diagnosis and solution) is handled

For handling system failures XenServer virtualization is handled only the criterion of reactive management.

To implement fault management is considered to

- Management of preventive tests when the fault has not happened.
 - PING
 - TRACEROUTE
 - TERMINAL
- Reactive Management: life cycle of incidents
 - - Fault detection.
 - - Insulation failure.
 - - Diagnosis of failure.
 - - Resolution of failure.

Implementation of the model to management configurations

In the area of configuration management allows the administrator of the wireless network to have full control of the network, identification, data collection devices in order to know the operation of each of the network elements. To accomplish this goal it is necessary that each of the tools applications and services in the network are configured as follows.

- Installation Process XenServer virtualized server
- Process Server installation E
- Server Installation Process Monitoring
- Installation Process The Dude MIKROTIK
- Configuration management tools
 - Remote access provided by the management application The Dude.
- Enable SNMP devices on the wireless network of the Municipality of Cayambe GADIP
- Process Captive Portal Server Installation.

Implementation of the model to management accounting.

In Management Accounting, gathering information on the use of network resources and services provided it is done. This enables the administrator to get reports and records of all physical and logical network resources.

Reports and records XenCenter

The XenCenter application is as a tool to monitor the physical and logical part of the network virtualization, which generates reports and records VMs XenServer server and reports generated can be printed or stored in the storage device or Storage.

Reports generated by XenCenter application allows the administrator to be informed of events, events and activities within the virtualization system, detailed below the process for generating reports.

- ✓ XenCenter / Toolbar / Tools / Server Status Report
- ✓ Selection of the server to generate the report
- ✓ Select the contents of the reports
- ✓ compilation report
- ✓ Location Report, Report Name
- ✓ Finish

Reports and Records The Dude

The Dude the application used to monitor wireless network GADIP the Municipality of Cayambe generates reports and records of the devices, links and activities that are performed when the software is monitoring, this software enables report generation and printing of them, so that the administrator of the wireless network can be informed of the events, faults and activities within the software.

Implementation of the model to management performance

Performance Management in the measurement information is performed to determine statistical bandwidth, interfaces, use, availability, the number of users on the wireless network, SSID, signal strength, channel in use, frequency that is being used , number of antennas, the signal to noise ratio, the transmission speed allowing verbatim reporting, statistics, records, through this process actual data for the current network status will be obtained at any time ensure efficiency, reliability, and network operation.

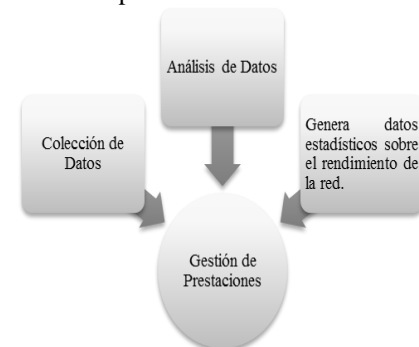


Figure 8. Performance Management.

Source: (Modelo de gestión OSI- Gestión de Prestaciones)

As part of the performance management system using the data generated within the XenCenter application allows visualization and generation of statistical charts on the physical

aspect (hardware) of the virtual machines and the XenServer server.

Implementation of the model to managing security

Security Management is responsible for ensuring the confidentiality, integrity and availability of data to prevent damage to the network. To implement security management is based on the cycle of active management security.



Figure 9. Security Management.
Source: (Modelo de Gestión OSI- Gestión de Seguridad)

Active Safety Management

It represents everything that has public organization, established for security inside and outside the company. Security is implemented in the user access to the physical resources of the wireless network and applications configured within them.

Security management is responsible for managing the entry monitoring system and all the tools that help manage the wireless network, for which the configuration of a user is determined as administrator to allow full access and management privileges each system configuration.

XenCenter

access manager

Select Server / right click / Connect

It allows the administrator to enter the IP address assigned by the server and the configuration parameters:

- ✓ Username: Allows entry through the root (administrator privileges), allows the system configuration
- ✓ Password: Enter the password set in the XenServer server.

XenServer

To configure the system from the XenServer server, the system prompts administrator permissions as the administrator login.

Access manager

Log in / Username/ Password

Mail server

For the mail server the user is set up as an assistant which allows you to check e-mail functions and root administrator allows you to modify, configure and upgrade the system.

Access manager

It allows root access mode for administrator privileges and facilitate installation and update files. It is configured in the operating system installation.

User Access.

Entrance to the user created in the configuration phase Centos parameters, indicating that no configuration privileges, you can only access applications and monitor.

Monitoring Server Windows Server 2008

Monitoring for the server administrator account is set up, use and having all system privilege. The configuration and application installation can only be done by the administrator.

Captive Portal

It has two types of settings users with a system that presents itself as the system administrator, allowing full service configuration.
access manager

Users access

In the user settings for the Captive Portal administrator he is the only person who can add users and generate passwords.

D. Study of Storage Devices

Using Storage Devices and Cloud Storage has been evolving with the passage of time and today the use and management of information in public institutions has dramatically increased on the grounds that the information is digitally generated also you can see that the use of conventional storage devices no longer allows the storage of information for a long time and is no longer enough storage capacity for all the information that is generated daily.

Storage

La definición general de Storage es la acción de guardar documentos o información en formatos ópticos o electromagnéticos en un ordenador, no obstante, esta acción dentro de las empresas implica una mayor responsabilidad debido al valor de lo que se almacena.

NAS (Network Attached Storage).- Son dispositivos de almacenamiento a los que se accede desde los equipos a través de protocolos de red (normalmente TCP/IP). También se podría considerar un sistema NAS a un servidor (Microsoft Windows, Linux) que comparte sus unidades por red.

SAN (Storage Area Network)

SAN used for the storage of low-level data via SCSI protocols with technologies like fiber channel or iSCSI. The devices connected to the SAN are not applying as files but are connected low concrete block request for a particular disc. The local machine will be connected to a SAN disk / SAN sharing like a disco / local file system rather than a remote one.

DAS (Direct Attached Storage)

DAS uses the same form of communication that SAN through SCSI, SAS and Fibre Channel protocols, although in this case is connected directly to the server via a "host bus adapter" (HBA). Data requests as in SAN are made directly to the file system.

Cloud Storage

It is a service model in which data of a computer system are stored, administered, and support remotely, typically on servers in the cloud and are managed by a service provider. These data are made available to users through a network, such as the Internet.

Recommendation NAS storage device

By comparative study between Cloud Storage and physical storage devices, he was ruled out acquiring Cloud Storage service because the service providers do not provide reliable guarantees against data loss, this being a key factor that manage public enterprises having a driveability of your information at all times.

E. Procedure Manuals

Procedures Manual is a guide that allows the administrator to have an immediate solution to any failure caused in the wireless network GADIP of Municipality of Cayambe in the procedures manual management processes of each area of Functional Model describes the FCAPS ISO, in order to manage and administer the network using system tools and virtualization monitoring application The Dude to deliver the user's Internet service available at all times.

Procedure Manual is considered a guide for the technical application or shortcut to help the administrator of the wireless network, used for the management processes of each functional area of the FCAPS model which tells the process to be performed and tools used to meet each. The following describes each of the processes, data and tools used for each manual management functional areas.

Procedures Manual fault management.

Objective: To establish the process that allows to solve the failures occurred within the wireless network in the shortest possible time, to ensure the availability and efficiency of service to users.

Scope.- This procedure applies to all computers that are part of the wireless network. This procedure involves giving solution to any failure occurred, using SNMP protocol implementation and management tools.

Attached to this procedure a database of faults that serves as a reference for future events in the wireless network. Within the

database failures occurred during monitoring (2 months) be annexed.

Manual procedures to configuration management

Procedures for manual configuration management of both sets of proceedings, the first consists of the configuration management Management of physical equipment and the second Management Configuration Management Virtual Machines is established. It then proceeds to detail each procedure manuals for configuration management.

Objective: To establish the procedure to add a physical network device to the wireless network to be part of the administration and management and to fulfill the function set by the network administrator.

Scope.- This procedure applies to all new equipment that will add to the wireless network. This process presents the data formats for storing or characteristics of the devices to be added in the future, besides the process for storing the data management system and administration and network devices is generated.

Manual procedures to management accounting

Objective: To establish the procedure for setting parameters and monitoring of resources and network services, to display the report or record of configuration parameters monitoring.

Scope.- This procedure applies to generate a report or history settings monitoring parameters, where The Dude XenCenter application and the application allows the administrator to submit records of configurations performed within the applications and alarms generated when issued a ruling.

Manual procedures to managing benefits

Objective: To establish the procedure for monitoring the network and the resources used, scanning of network traffic by using monitoring tools for generating reports or records and statistical data presented by the network.

Scope.- This procedure applies for use of monitoring tools where the scan network traffic is generated and allows the presentation by statistical analysis of resources, services and monitoring parameters within the network using XenCenter The Dude applications.

Manual procedures to managing security

Objective: To establish the procedure for access to devices on the wireless network system virtualization, system management and administration and all monitoring tools.

Scope.- This process presents the guidelines for access to the system and all devices and management tools as administrator

and access to technical personnel as wireless network GADIP the Municipality of Cayambe.

Functionality test.

Verify the operation of each of the functional areas of management model is done by running the tests, showing the proper functioning of server virtualization and XenCenter and The Dude applications.

V. COST BENEFIT

The GADIP the Municipality of Cayambe is a public institution not for profit that depends on the state budget and taxes that are generated throughout the year to citizens, it is in charge of providing the public services of quality, for this reason the institution in the projects carried out within the institution should be subject to economic analysis to determine its feasibility and viability, to avoid unnecessary costs or jeopardize the budget of the institution.

The equation that determines the cost-benefit ratio to determine the feasibility of the project is:

$$CB = \frac{\text{Beneficio} - \text{Contrabeneficios}}{\text{Costo}}$$

Equation 1: Cost benefit formula

Source: Leland Blank, Anthony T. (2006). Ingeniería Económica. McGrawHill. México.

Where:

Beneficiarie: IS A bien which it is made or received. The term is also used as a synonym for utilidad or advantage

Against benefit: They are disadvantages of the current project, in this case the value 0, being an undetermined variable, maintenance costs, installation and settings are made by the department staff Information Technologies of GADIP Township of Cayambe.

Costs: Fixed costs are those costs that the company must pay regardless of their level of operation, ie, produce or not produce must pay.

By the results of the equation Cost / Benefit made in the project indicated that won a 12,647 equivalent to a number greater than one in which the viability applied to this project is that it is economically feasible for both GADIP public entity of the Municipality of Cayambe to all citizens of the Canton and providing free Internet service with high availability and permanently to the use of this service by the educational institutions.

Beneficiaries

The implementation of the project entitled "ADMINISTRATION AND MANAGEMENT OF

WIRELESS NETWORK DECENTRALIZED GOVERNMENT INDEPENDENT (GADIP) CANTON CAYAMBE BASED FCAPS functional model of ISO" and the tools used to cover the functional areas of management FCAPS model It is a project that provides greater benefit to the GADIP the Municipality of Cayambe as a public entity for the technical staff responsible for managing the wireless network of the Municipality and for users who get the free internet in all educational institutions of the Canton Cayambe children and youth being the main beneficiaries as they improve and strengthen the knowledge acquired in class.

Indicating that the direct beneficiaries of the proposed project are the head of the Department of Information Technology and technical staff in charge of managing the wireless network of the Municipality and would facilitate them to perform maintenance processes and the resolution of any failure caused by the wireless network immediately, allowing the administrator to expedite the resolution of any failure and reducing the use of resources.

Being the main and direct beneficiaries are the educational institutions for all citizens would thus children, youth and adults the Canton Cayambe. Allowing access to the Internet for free to all students and staff of Educational Institutions. It states that an estimated 8701 daily users use the Internet service, available at all times and quality.

VI. CONCLUSIONES

By studying the current situation of the wireless network GADIP the Municipality of Cayambe, it was determined that the network had problems of insufficient bandwidth saturation on the links, electromagnetic interference in places away from the city and technical problems as damaged and burned by climatic situations where the wireless network administrator could not have control over the wireless network leaving several institutions without Internet service for several hours or even days, to implement the project teams the network administrator has total control of each of the devices on the wireless network, allowing you to manage and administer all resources, services and complying with each of the policies of Management maintains constant, uninterrupted service 24 hours a day, greatly improving service in Educational Institutions.

By obtaining the data generated by The Dude application monitoring wireless network GADIP Municipality of Cayambe, generating 800 notifications it was received for 30 working days of system operation where Priority 1 120 notifications were generated with solution time approximately 15 min each. Notifications 236 Priority 2 with a time resolution of about 5 min, 115 Notifications Priority 3 with a

time resolution of about 3 min and 329 notifications Priority 4 with a time resolution of about 1 min. Notable is the reduction of time to solve the failures caused because the staff responsible for network administration before the project implementation was delayed about 3 days to solve any kind of failure because it did not have a monitoring system for Wireless network

Through the collection of information on the current status of the wireless network, management policies that you cover the five functional areas of ISO FCAPS model, with which the manager and the coach of the wireless network can handle is determined and use process management policies to maintain proper operation of the network.

Technological progress in recent years has evolved into the techniques of network management data, allowing the use of the administration and management of the network planning, control, configure and monitor interconnection resources by which the functional model is developed ISO setting FCAPS functional areas, which is used for the development of this project.

Based on the IEEE Standard 830 election analysis and monitoring software for the wireless network of the Municipality of Cayambe GADIP it was determined, allowing the application The Dude monitor and control each device on the network, the configuration of SNMP protocol so remote, allowing the administrator to have a graphical monitoring application and friendly staff responsible for monitoring the network way.

Establishing a system of alarms via email messages, allows the administrator or staff responsible for the wireless network, check with failure time and remotely resolve optimizing time, physical and financial resources. The use of virtualization system reduces the use of physical and financial resources so that benefits the public institution economically, providing it an optimal service at a lower cost.

Performance tests were performed in each functional area of the FCAPS model which determined that the project works properly implemented, allowing us to offer free Internet service to educational institutions without interruptions and with high availability.

The main and direct beneficiaries are the educational institutions for all citizens would thus be children, youth and adults from Canton Cayambe. Allowing access to the Internet for free to all students and staff of Educational Institutions. States that approximately a total of 8701 users use the Internet service, available at all times and quality.

Use of FCAPS management model ISO allows the administration and management of the wireless network of the Municipality of Cayambe GADIP, providing the administrator of the wireless network to develop processes that allow planning, control and monitor physical and logical resources the wireless network.

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