



Computer Network Design for the teaching area of the Elvira Cape library

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Abstract

Interconnected devices have provided companies and individuals with the advantage that information travels from one place to another, making information processes more viable. The interconnection networks are responsible for providing everything necessary for the machine to have an adequate passage of messages and use of commutations. In this document a design of a LAN network is developed for the area of a library which needs to expand its communication network, thus forming a computer network to connect different types of computers sharing information links. These data links are established through means such as cable, optical cables, or wireless means such as WIFI.

Keywords interconnected network, LAN network

1. Introduction

The great growth of the Internet and along with it coupled with the vast advancement of information technologies, has provided institutions with a facility to share computing resources. Telecommunications and ICTs in turn show a data interconnection as a widely used term for any hardware that connects different network resources. The main resources that make up a network are understood with a network of switches, repeaters and gateways. These in turn become interconnection tools that allow data to be communicated between various networks to provide a better service, in a way that overcomes the physical limitations of basic elements of a network.[1], [1],[2].

The trend for the use of ICTs, or new information technologies, a tool that enables a better performance in the teaching process in basic and undergraduate educational institutions, the use of the internet, blogs, virtual classrooms, among others, we lead to better use of technology for education and knowledge management.

Therefore, a project is proposed that allows this educational institution to have an information network that allows it to be at the forefront of technology and to meet the needs of its entire educational community. The main objective of the design of the LAN network is to show the elements necessary for its infrastructure and its connectivity on the web. The educational institution is the main link in the development of teaching in society and its knowledge, creating a quality education for young people. In the institution, the library has old devices and an obsolete network that does not allow the traffic of information between the users who go there to search for information[3], [4].

Currently, the institution has a basic communication network, without there being a planning or design of the communication elements, nor of its data network, it does not have a LAN or intranet. The institution has an inadequate network that fulfills the main function of centralized storage of the information of all the procedures that are carried out on projects, catalogs and other shared documents and files; Likewise, making this change in the institutional

network allows the sharing of resources and equipment such as printers, and finally it provides Internet provisioning to the workstations in the administrative area.

For the implementation of this network, a design of a LAN network was made that allows interconnecting the infrastructure of the institution's network and its library in order to develop all the progress that the advancement of telecommunications and its technologies brings.[5], [6], [7].

The following stages were followed for the design of the network:

- Study stage
- Design stage
- Stage of preparation of the request for offer and selection of the seller.
- Installation and commissioning stage.
- Stage of analysis of the benefits and evaluation of the results.

2. Study stage

2.1 Determine the number of workstations and their future location.

The unit network is made up of several departments:

- ✓ Language lab.
- ✓ library
- ✓ Node

Table 1 shows a summary of the resources that will be shared on the network from the administration of the LAN:

Departments	Shared resources
Language lab	12 pcs
library	12 pcs
Node	2 servers

Table 1: Resources shared by the network

2.2 Define what the shared resources will be.

Depending on the information, it was decided to change the flow of information since having these 3 stations interconnected thus allows the information to travel safely, putting an analysis of its applications with the services in the educational institution.

2.3 Assess whether it is necessary to change the flow of information in the organization.

The tasks carried out in the institution will all remain interconnected, allowing the exchange of information allowing access to the main services of its intranet[8], [9].

2.4 Investment and operation study.

This step is the unification of 4 steps in the study of the network, they are:

- Determine which tasks will continue to be performed locally and which ones will go over the network.
- Know if minicomputers or mainframes are going to be connected to the network.
- Make an approximate calculation of the cost of the network from a knowledge of market prices.
- Study the benefits that the LAN would bring and based on this justify its cost.

Based on the devices used to interconnect the network, a market study was made with the different prices presented by the devices we needed to interconnect the new network, fundamentally analyzing the quality-price factor. After conducting this study, the equipment described in table 2 was purchased:

Devices	Quantity	Providers	Cost per unit	Price
Layer 2 switch	3	Cisco	\$ 221.00	\$ 663.00
Servers	2	HP	\$ 711.17	\$ 1422.34
Routers	2	Cisco	\$ 430.00	\$ 660.00
Total	12	-	\$ 1,362.17	\$ 2745.34

Table2: Device prices

As can be seen from the table described above, implementing a LAN network can be expensive, but given the problems that arise in the institution, such as some shortcomings within the institution, both computer science and

technology.[10]. The main problem is that there is no data information network. The causes that cause this problem are:

- There is no centralized administration system for information, nor for the use of the administrative, academic area.
- There is no functional documentation of: a. Physical network b. Protocols c. Service application
- Poor network infrastructure.
- Low availability of internet access.
- Lack of network planning and design.

3. Design stage

3.1 Select the type (s) and network standard (s) to be used

For the realization of this LAN network, the star topology was used in this typology, the cable segments of each equipment in the network are connected to a centralized component, or concentrator also known as a Hub. The function of the central node is to receive the signal sent by one computer and make it reach the others[eleven], [12]. The advantages of building a network with this typology are:

- It is very easy to add or remove a new computer on the network.
- Quick reconfiguration. Easy to prevent damage and / or conflict.
- Centralization of the network.

3.2 Select the transmission medium to use

Support for transmission in this design carries data in the form of signals between the network, simplifying its installation and speed on the network.

Figure 1 represents the resulting network:

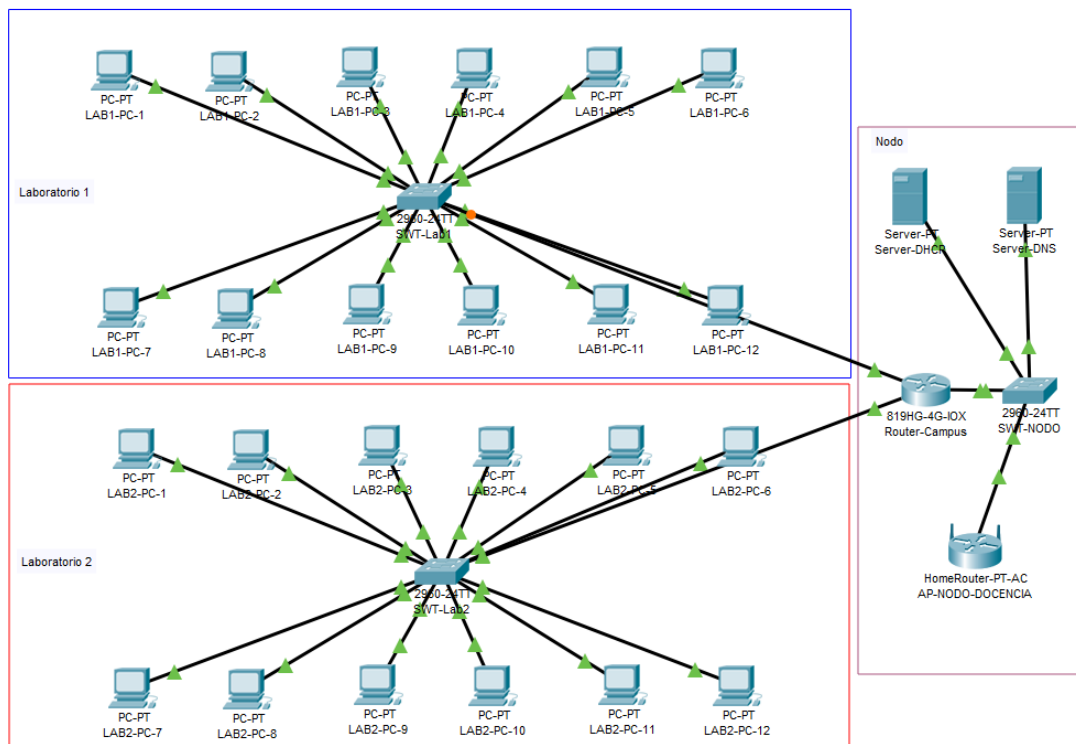


Figure 1: Implemented network

3.3 Select the network operating system to be used.

For the sake of contributing to the technological sovereignty of the country and looking for a viable and cheap variant of making the network work, the Nova Servers operating system was chosen. Its characteristics include easy

and intuitive configuration through the nova-manager tool, designed to the management of telematics services and compatibility with obsolete hardware in the business environment.

3.4 Analyze the need to use connectivity techniques[13], [14].

In order to improve the functionality of the network, as well as to provide a security contribution, the application of a captive portal was used as a connectivity technique, it will allow only its users to connect to the network, thus as only authorized equipment.

3.5 Consider future network expansions.

An analysis was carried out for the sake of a possible expansion of the network to other laboratories in order to improve interconnectivity within the institution and the development of technologies as a means of learning.

3.6 Conduct a primary traffic assessment.

To carry out a primary analysis of network traffic, Wireshark was used, which is a protocol analyzer used to perform analysis and solve problems in communication networks.

3.7 Consider the needs of the personnel involved in the network.

The personnel involved in the network will be the technicians who work at the node.

4. Stage of preparation of the request for offer and selection of the seller:

4.1 Specify technical characteristics of the items to be purchased.

4.2 Conduct an economic analysis.

4.3 Analyze the characteristics of the seller.

After analyzing the costs and the quality of the equipment to be acquired, it was decided to buy the equipment directly with the itprice.com offices where good discounts were obtained, which after a complete economic analysis of the project reached the conclusion that a 36.7% was saved. % taking advantage of the discounts offered by this provider leading to a viable investment.

5. Installation and commissioning stage:

4.4 Install and test the hardware.

4.5 Install and test the software.

4.6 Prepare the network registry.

4.7 Organize work on the network.

4.8 Perform the entire system test.

4.9 Train the personnel involved in the network.

4.10 Establish the rules and procedures.

4.11 Decide how the transition period to the new system will take place.

6. Stage of performance analysis and evaluation of results:

6.1 Preparation of the evaluation plan.

6.2 Determine what will be the tools to use and the procedures to follow for the analysis of the network.

6.3 Carry out the performance evaluation.

6.4 Make the necessary modifications.

7. Conclusions

Design a computer network that uses the Internet's own communication protocols, developed most of the time for internal and exclusive use of an organization. The use of these protocols allows to obtain two great benefits:

- ❖ Direct communication between the members of an organization.
- ❖ It can favor socialization processes that enable the exchange of tacit and explicit knowledge between these members.
- ❖ Articulated and ergonomic integration of all computer resources used in the implementation of a knowledge management program in an organization.
- ❖ Benefits of intranets for teachers.
- ❖ Ability to share resources (printers, scanner) and possibility of Internet connection (access to information on the Internet and its communication possibilities).

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