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Modernization of bank communication network

ABSTRACT

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INTRODUCTION

Fast and smooth processing of significant information flows is one of the main tasks of any large financial institution. In accordance with this, it is obvious that it is necessary to have a computer network that allows you to process ever-increasing information flows. In addition, it is the banks that have enough financial resources to use the most modern technology. However, one should not assume that the average bank is willing to spend huge sums on computerization. The bank is primarily a financial institution designed to make a profit, so the costs of modernization should be comparable to the intended benefits of its implementation. In accordance with global practice, an average bank computer costs at least 17% of the total estimated annual expenditures.

Banking technologies today are one of the fastest growing areas of network. It should be noted that the bank system is an advantageous offer for any manufacturer of computers and software. Almost all large companies, developers of computer technology, offer systems based on their platforms on this market.

Chapter 1 reviewed the main characteristics of popular banking systems. The analysis of the protocols used for communication networks such as VPN, MGCP SIP, as well as recommendations of h.323 recommendations was carried out. Particular attention is paid to the consideration of the organization of IP-telephony in corporate banking networks

Chapter 2 analysis justification of technical requirements for the design of the bank's data transmission network.

In chapter 3 reviewed selection of the structure and equipment for the projected network. This network for the bank in Baghdad, and for branches in the city of Diwanya and the city of Baghdad. Estimated value of the selection of the block diagram of IP telephony for the projected network

Chapter 4 reviewed information protection methods in banking systems. The analysis of unauthorized access paths, the most popular data encryption technologies.

In chapter 5 calculated of bandwidth for the projected network and necessary for IP-telephony. And determining the number of network sections for head office in Bagdad and branches in Diwanya and Basrah.

GENERAL DESCRIPTION OF WORK

The relevance of the work is due to the optimization of banking technologies makes it possible to develop and create special local networks in the Republic of Iraq.

The purpose of this dissertation is to improve the quality and productivity of the existing banking communication system.

To achieve this goal in the thesis the following tasks are solved:

- analyze literary sources devoted to the issues of building local banking networks;
- assess the need for modernization of the existing banking network;
- consider issues of information security in banking networks;
- choose equipment for the banking network;
- build a banking network based on newly opened bank branches in other provinces of Iraq;
- calculate the main technical characteristics in the projected communication network and analyze the data obtained.

The object of the research dissertation work is a banking data network. The subject of the study is to measure the efficiency of the planned network.

THE BASIC CONTENT OF WORK

In the modern world, the bank is a sphere of diverse services for its clients, from traditional loan and settlement – cash operations, which determine the basis of banking, to the newest forms of monetary and financial instruments used by banking structures (leasing, factoring, trust, etc.).

The organizational structure of the bank is the internal organization of the work of the credit institution, through which the approaches and management methods are structured and formalized, the groups of performers are defined, control systems and intra-organizational relationships are developed.

The main task facing the service of automation of banks of Western countries is the selection of the optimal solution and support of the operability of the selected system. In our country the situation is somewhat different. In the conditions of the rapid emergence of a new banking sphere for Iraq in the field of automation, initially, insufficient attention was paid. Most banks have chosen to create their own systems and this approach has its advantages and disadvantages. The advantages include the lack of the need to invest large investments in the purchase of the BS, the fitness of the BS to the operating conditions, in particular to the existing communication lines, as well as the possibility of continuous modernization of the system. Disadvantages of this approach are: the need for the maintenance of a whole computer staff, the incompatibility of various systems, the inevitable backlog of modern technology and much more. However, there are examples of the acquisition and successful operation by Iraqi banks of expensive banking systems. The most popular today are mixed

solutions, in which part of the BS modules is developed by the computer department of the bank, and some are purchased from independent producers.

In the world market, there are many ready-made BSs.

The main platforms for the BS are currently:

- a) Local area networks (LANs) based on personal computers (PCs) (10.7%).
- b) Various models of specialized business computers of IBM (11.1%).
- c) Universal computers of various manufacturers, IBM, Compaq, HP (57.8%).

Corporate network (CN) – a communication system that provides information transfer between various applications used in the corporate system, and represents a network of a separate organization, as a rule, is territorially distributed, i.e. uniting offices, units and other structures located at a considerable distance from each other. A corporate network is any network operating under the standard protocol of global networks (TCP/IP), providing communication between various interoperable networks and service applications, providing delivery of data to users of the network within the corporate system.

Additional requirements when organizing a distributed corporate network(CN):

1 it is necessary to ensure the information productivity of the processes within the CN of the bank;

2 to ensure the qualitative parameters of the smooth operation and reliability of the network;

3 to ensure the required information security parameters (reliable operation, cryptographic protection of personal data, user identification, the operation of public key certificates and EDS, etc.);

4 to organize a sufficient level of controllability, monitoring the work of the CN on all layers of hierarchical subordination;

5 to provide for the possibility of redundancy on personal data, storage and processing;

6 general principles of the functioning of the CN should comply with international standards for the technologies applied;

7 to provide for the possibility of increasing the services of users of a bank's CN without further significant capital costs (for example, audio and video conferencing, web access, etc.);

8 to develop a technical solution for connecting to the network a service provider of employees of inspection organizations or bank customers in compliance with security requirements;

9 to justify the necessary bandwidth for this network and provide for the possibility of its subsequent expansion

10 to ensure long-term and short-term standards for the above quality indicators, etc.

The equipment on the corporate network will use switching equipment (switches, routers, hardware firewalls, etc.) from Cisco Systems. This equipment supports the standards described above, and also meets the requirements for reliability and ease of operation. The optimum temperature, ventilation mode for the operation of the devices must be provided, it is also necessary to provide for the installation of the necessary optical and copper cables.

Data on the number of subscribers in the branches of the bank are presented in table 1. These values will be required when choosing network equipment, calculating the bandwidth required for voice traffic and the total equipment cost.

Table 1 – Data on the departments of the Bank

Department:	Address:	Number of computers :
Head office	Baghdad	270
Branch	Basrah	20
Branch	Diwanya	15
Branch	Babel	5
Total:		310

This network for the bank is located in the city of Baghdad, and also has branches in the city of Diwanya and the city of Baghdad. Head office and branches should have two communication channels: main and backup. The choice of providers due to the following requirements:

- the provider must have access to the network of the National Bank of the Republic of Iraq. Today they are: earth link Baghdad and earth link max
- the provider must have a presence in all regional centers of the Republic of Iraq. Such an opportunity is provided by: earth link Baghdad and earth link max – the cost of providing services.

Map of communication "Al-Rafidain bank" is presented in Figure 1.

IP phones have two Ethernet – ports: one connects the user's personal computer, and the second connects to the access level switch. The power supply to the IP phone is provided using Power over Ethernet technology according to the IEEE 802.3af standard. This is possible due to the use of two free pairs that are not involved in the 100BASE - TX standard. 4 and 5 wires of the UTP-5 cable transmit a positive voltage, and 7 and 8 conductors are negative. Thanks to this technology there is no need to connect the IP phone to the power supply network.

On the port of the Cisco Catalyst 2960 switch, two LANs are configured: one for data in which PCs are running, the other for voice where IP telephones operate.

Also on these ports, authentication of connected devices is enabled through the EAP protocol in multi-domain authentication mode.

The CiscoCatalyst 3750 network layer switches are the core of the network at the distribution level. They perform the functions of routing and delimiting traffic in a local network, i.e. perform the role of a link. Therefore, communication with access level switches is carried out via fiber optic links at a speed of 1 Gbit / s. In addition, redundant links are introduced between them, which are controlled by the Spanning Tree Protocol (STP).



Figure 1– Map of communication Al-Rafidain bank

The STP protocol monitors the state of all switch ports and prevents loops, blocking traffic on the backup ports until the main link fails. On the Cisco 3750 Layer 3 switches, all LAN traffic is terminated. All necessary VLANs are created and routed here. Therefore, the performance and reliability of the Cisco 3750 directly affects the entire network infrastructure. Another essential element of the network is a high-performance failover cluster of two Cisco ASA 5510 hardware firewalls.

A cluster is a combination of two or more devices interconnected at a software level into a single system, so that if one of the cluster members fails, the others will continue to perform its functions. Thus, it makes it possible to avoid network downtime. The Cisco ASA Series devices support two cluster operating modes: Active / Active and Passive / Passive. In the first case, both devices function and balance the network load. In the second case, one of the devices is in standby mode, and if the active ASA fails, then the waiting one immediately starts performing its functions. We will use the second mode, since it has the ability to use VPN redundancy. All traffic that goes beyond the local network of the head office is redirected through a cluster in encrypted or open form.

CiscoASA 5510 will perform the following functions:

- secure IPsec connection with remote branches and bank partners;
- protection of the bank’s LAN resources from unauthorized access from outside;
- dynamic routing of OSPF over IPsec tunnels;
- checking for external traffic for malicious code and forbidden URL.

Cisco 2811 routers perform Internet gateway functions. Traffic belonging to the local networks of the bank is returned via static routes, and all other packets are redirected to the provider. Two devices are provided so that the occurrence of excessive loads, for example, in the case of a distributed denial of service attack (DDoS attack) on one of the providers, does not affect the performance of the other.

Cisco 2911 routers have great features and performance. Together with Cisco Callmanager PBX, they are the core of the IP telephony system. Voice routers convert analog or digital voice streams into IP packets.

Cisco Callmanager 8 PBX manages all IP phones using SIP, H.323 or Skinny Client Control Protocol (SCCP). In addition, voice gateways are managed using the MGCP protocol. There are two devices, one of which is master and the other slave. In case of failure or excessive load of the first, the second will help to balance the load, taking on some of the functions.

The IP - communicator is a special software installed in the user's operating system that performs the functions of an IP phone using a headset.

The Cisco AP 1130 Wireless Access Point using EAP provides authorized access to the network.

D-Link DMC-920T optical media converters perform optoelectronic signal conversion and transmit Ethernet packets to central switches.

The NIFTi4ES / 20 converter-multiplexer is used to connect E1 digital streams via an optical interface from the PSTN. They are then transmitted via UTP-5 cable to voice gateways, where the streams are converted to IP data [11].

To connect remote branches located within the city of Baghdad, a hardware firewall CiscoASA 5505 is used. Through the provider's channels (optics, Ethernet or DSL), a secure IPSec connection is created to the Cisco ASA 5510 head office cluster. In the IPSec connection settings, traffic is allowed for the required subnets, including voice. Cisco Catalyst 2960 switches, as well as at the head office, are used to connect terminal equipment and provide power to IP phones using Power over Ethernet.

Branches in Diwanya and Baghdad are connected to the provider via Cisco 2911 routers. This device serves several purposes:

- creation of secure IPSec connections to the head office;
- connection to the PSTN via analog telephone lines through which bank employees can make calls to telephone numbers;
- in case of breaking the connection with the head office, the router will register branch telephones using Cisco SRST technology (Survivable Remote Site Telephony – “survivable” telephony of remote sites). After the connection is restored, the phones are automatically registered with Cisco Callmanager.

CONCLUSION

In the thesis project, the principle of building banking local computer networks was considered, the architecture of the local computer network of bank staff with the choice of active network equipment and a structured cable system was developed.

A technical task for the transportation task of determining the shortest route along a given network. A program algorithm has been compiled and a router program has been written to select the shortest distance from the starting point to the end point of the data transmission network route. Written user manual for this software.

The technical and economic calculation of the economic effect of the introduction of the software was carried out, the capital costs of creating the software were estimated. Considered the necessary measures for labor protection and environmental safety of PC workers.

1 The corporate network of the bank is a complex multi-profile structure with a hierarchical management system. Therefore, when developing a project for system integration, it is important to properly design a network, from the reliable and correct

operation of which will depend subsequently the steady operation of the entire banking data network.

2 The projected network should ensure the exchange of data between the structural divisions of the bank, its branches and external organizations, the use of electronic mail. Connection to the Internet at workplaces of all users, the possibility of using an internal information portal.

3 The specifics of the work of the banking data network presupposes close cooperation of all structural divisions and services located in different branches of the bank, which means a sufficiently large amount of transmitted information and the need for stable and efficient operation of the projected network.

4 Protection of service information from unauthorized access is a prerequisite for network design.

5 Using VPN MPLS is an important condition in protecting the transmitted information.

6 The protocol proposed by the IETF MEGACO working group is best suited for managing key components of the VoIP network (management server and voice gateways), which greatly simplifies the administration and scalability of the network. But for signal exchange between IP phones and the management server, the protocol SIP version 2 is better suited. It is simpler to configure and use than H.323, but at the same time more flexible and no less functional.

PUBLICATION

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