List of incompleted messages	Detailed list of messages which are waiting for a host related subsystem to send 'Request of delivery'
List of undelivered messages	Detailed list of messages which are left in a network related subsystem without delivered to the addressed office of the commercial bank
List of error messages	Detailed list of data errors which are detected in the network related subsystems (c.f. Data validation by the network related subsystems)
List of system messages	To show any type of system-level messages, such as: - Notification of changing operational status of any subsystem on the network - Notification of events occurred on a processor or an equipment under monitoring - Communication among operators

10-3 Preliminary Design of Hardware

10-3-1 Overview

Prior to designing the outline of hardware, first of all, performance, reliability, and other conditions are examined, and the hardware system is divided and allocated to each subsystem. Hardware conditions are examined for each subsystem. An example of hardware formation will be shown.

According to the results of examination, hardware is installed on the following points or in the organizations.

- Payment system operation center in Bishkek : NBK-Net, Remittance operation system, Message switching system
- Regional payment center in Bishkek : Regional node system and Substituted input system
- Regional payment center in Osh : Regional node system and Substituted input system
- Regional payment center in Jalal-abad : Regional node system and Substituted input system
- Regional payment center in Kalakol : Regional node system and Substituted input system

- Regional payment center in Naryn : Regional node system and Substituted input system
- Regional payment center in Talas : Regional node system and Substituted input system
- Each head and branch office of commercial banks : Dedicated terminal system or Operation Day interface subsystem

Although the payment system in this Republic has a small number of accounts for payment, it may be accompanied by a rapidly increasing large volume of data depending on the environment for economic activities and the financial policies. In addition, according to the macroeconomics Plan B, a computer system which can process maximum 20 remittance messages per second will be necessary. Further, for implementing payment, a task which is critical to continuous processing, the construction of systems with fault tolerance at hardware and software levels becomes necessary. The platforms (a set of basic software based on hardware) satisfying these conditions shall be high-performance products with excellent functions.

10-3-2 Required Level for Hardware

10-3-2-1 Performance Conditions of Each Subsystem

This is to clarify the performance conditions of subsystems as the data for deciding the specifications of each component of hardware. Here, based on the macroeconomic plans A and B shown below, the loads in the years 1998 and 2000 are estimated. The system is expected to enter operation in 1998, and the year 2000 is the targeted year for this survey.

(1) Memory capacity

The first item to be examined is the data capacity of each subsystem required for normal operation. According to our calculation, the amount of business data to be provided by each subsystem is as follows.

		Plan A		Plan B	
		1998	2000	1998	2000
- NBK-Net		237	262	483	810
- Fund-transfer processing subsystem		660	774	1,325	1,712
- Message switching subsystem		288	386	556	853
- Regional node subsystem	Bishkek	125	167	241	369
	Osh	62	83	120	185
	Jalal-abad	23	32	45	70
	Kalakol	39	52	75	115
	Naryn	28	37	54	82
	Talas	11	15	21	33
- RCC substituted input system	Bishkek	62	131	130	320
	Osh	31	66	65	160
	Jalal-abad	12	25	25	60
	Kalakol	19	41	75	99
	Naryn	14	29	53	71
	Talas	11	15	21	28
- Remittance dedicated terminal system	Maximum	13.5	13.5	13.5	13.5
	Minimum	0.3	0.3	0.3	0.3
- "Operation Day" interface subsystem	Maximum	13.5	13.5	13.5	13.5
	Minimum	0.3	0.3	0.3	0.3

(Unit: MB)

The calculation shown above has been carried out under the following conditions.

- Length of a remittance message on the network	250 Bite
- Length of a transaction on the host system	500 Bite
- Range of immediate automatic responses to inquiries at the center	6 days including the value date
- Possible range of responses to inquiries at the center	20 days prior to the above said range
- Past records kept in bank & branch offices	6 days including the day of entry
- Using rate of terminal subsystems:	
* Remittance dedicated terminal system	25% of daytime data

* Operation Day interface subsystem	40% of daytime data
* RCC input substituting system	35% of daytime data 100% of nighttime data
- Number of data cases from the largest branch offices of commercial banks	max. 5,000 cases a day
- Number of data cases from the smallest branch offices of commercial banks	max. 100 cases a day

The parameters used for this calculation were obtained through calculation according to Tables 10-11, 10-12, 10-13 and 10-14 based on the description in Chapter 7.

(2) Response time

The response time of each system is targeted as follows.

- NBK-Net	3 seconds per transaction
- Fund-transfer processing system	3 seconds per transaction
- Message switching subsystem	2 seconds per transaction
- Regional node subsystem	3 seconds per transaction
- RCC substituted input system	5 seconds per input
- Remittance dedicated terminal system	5 seconds per input
- Interface subsystem "Operation Day"	N.A. (responses made by "Operation Day")

(3) Throughput

Peak amount of processing per minute required for each subsystem is estimated as shown below.

		Plan A		Plan B	
		1998	2000	1998	2000
- NBK-Net		162	199	322	463
- Fund-transfer processing subsystem		399	531	771	1,178
- Message switching subsystem		798	1,062	1,542	2,356
- Regional node subsystem	Bishkek	192	257	370	568
	Osh	96	128	185	284
	Jalal-abad	36	48	70	107
	Kalakol	60	80	115	177
	Naryn	43	57	82	126
	Talas	17	23	33	51
- RCC substituted input system	Bishkek	67	90	129	199
	Osh	34	45	65	99
	Jalal-abad	13	17	24	38
	Kalakol	21	28	40	62
	Naryn	15	20	29	44
	Talas	6	8	12	18
- Remittance dedicated terminal system	Maximum	25	25	25	25
	Minimum	1	1	1	1
- "Operation Day" interface subsystem	Maximum	25	25	25	25
	Minimum	1	1	1	1

Total amount of data and peak load are calculated as follows.

Estimated load on payment system Plan A

	1998		2000	
	Inter-bank	Intra-bank	Inter-bank	Intra-bank
Estimated number of cases processed per year	4,729,917	8,470,602	5,239,593	16,932,358
Number of cases processed in nighttime	513,900	1,176,000	67,995	6,688,800
Number of cases processed in daytime	4,216,017	7,294,602	5,171,598	10,243,558
Number of cases processed per day(daytime)				
Number of operating days per year	260	260	260	260
Average number of cases per day	16,215	28,056	19,891	39,398
Peak load				
Magnification on peak days	2	2	2	2
Number of cases on a peak day	32,431	56,112	39,782	78,797
Rate of concentration per hour	30%	25%	30%	25%
Number of cases processed per hour	9,729	14,028	11,934	19,699
Number of cases processed per second	2.70	3.90	3.32	5.47

Estimated load on payment system Plan B

	1998		2000	
	Inter-bank	Intra-bank	Inter-bank	Intra-bank
Estimated number of cases processed per year	9,649,570	16,845,751	16,202,637	32,702,798
Number of cases processed in nighttime	1,273,500	3,000,000	4,170,375	10,620,000
Number of cases processed in daytime	8,376,070	13,845,751	12,032,262	22,082,798
Number of cases processed per day(daytime)				
Number of operating days per year	260	260	260	260
Average number of cases per day	32,326	53,253	46,278	84,934
Peak load				
Magnification on peak days	2	2	2	2
Number of cases on a peak day	64,431	106,506	92,556	169,868
Rate of concentration per hour	30%	25%	30%	25%
Number of cases processed per hour	19,329	26,626	27,767	42,467
Number of cases processed per second	5.37	7.40	7.71	11.80

10-3-2-2 Reliability Conditions for Each Subsystem

(1) Reliability conditions for each subsystem

Hereafter, the following reliability conditions are checked per subsystem.

- NBK-Net : Any trouble occurring during transaction processing is critical. System obstacles occurred in on-line time zones require immediate restoration.
- Fund-transfer processing system : same as above
- Message switching subsystem : same as above
- Regional node subsystem : System breakdowns in on-line time zones require immediate restoration within the same day. During breakdown, replacement by other node systems should be examined.
- RCC substituted input system : same as above
- Remittance dedicated terminal system : Circumvention of obstacles should be carried out by each bank bearing responsibility for such circumvention. Replacing this system with the substituted input system and other terminals is possible.
- Interface subsystem "Operation Day" : same as above

(2) Normal methods for improving reliability

(A) Duplex devices

One of the most popular methods to maintain reliability is to prepare duplex devices. In general, the following devices can be duplexed.

- Direct access storage devices
- Input/output controllers
- Communication controllers
- Communication lines
- LAN facilities(in case of client/server architecture)

(B) Adoption of fault tolerance systems

If any one of the systems positioned at the center of the network such as NBK-Net, the Fund-transfer processing system, or the message switching system invites a system breakdown, it seriously affects the entire payment system. Therefore, it is recommendable that such systems be equipped with fault tolerance capabilities at one of the levels mentioned below.

- Hardware level
- Operating system level
- Middleware level

(C) Introduction of supervisory and control systems

In addition to the methods of improving reliability by means of hardware and basic software, there is a method of improving availability using application software. It is possible to introduce supervisory software for the purpose of accessing fault information instantly or in advance. However, this method requires correspondences from persons, so it would be reasonable to regard it as a secondary method in the payment system, as the payment system essentially needs promptness.

10-3-2-3 Other Conditions

(1) Operation supporting functions

According to the results of the survey implemented so far, this country is in need of the persons experienced in the operation of computer networks that covers wide areas of this country. Particularly, system operators and operation controllers are needed.

It is desirable that the central operation division will have the capacity to control the computer systems. To put it concretely, the following functions are expected.

* Remote maintenance
* Remote log-in
* Shut down of system operation by command scripts
* Start up and shut down of system operation by remote commands
* Security for users and data

10-3-3 Assignment of Hardware in a Computer System

Here, based on the above said conditions, the arrangement of a computer system, i.e., the assignment of its hardware to each subsystem is examined.

(1) Host subsystems

The following subsystems can be separated from the host subsystem

- NBK-Net
- Fund-transfer processing system
- Intra-bank payment system

As there is less data in the first phase, all the above subsystems are installed in one set of computer systems. (The backup system should be considered separately.)

In the second phase, it is proposed to operate NBK-Net by means of an isolated computer system for the following reasons.

- The volume of data in both inter and intra-bank payment which requires immediate processing will increase.
- Due to the introduction of the payment in foreign exchange rims, the volume of data will further increase.
- The number of terminals inside NBK will increase. (current account terminals, foreign exchange rim terminals and control terminals)
- NBK-Net and the Fund-transfer processing system/intra-bank system will handle different control objects. (NBK-Net handles current account that NBK will control, and others handle network messages and inter-office accounts inside banks.)

(2) Network related subsystem

In this group, all the following subsystems are installed on each isolated computer system.

- Message switching subsystem (hereinafter referred to as "MSS")
- Regional node subsystem in Bishkek (hereinafter referred to as "Bishek Node")
- Regional node subsystem in Osh (hereinafter referred to as "Osh Node")

- Regional node subsystem in Jalal-abad (hereinafter referred to as "Jalal-abad node")
- Regional node subsystem in Karakol (hereinafter referred to as "Karakol Node")
- Regional node subsystem in Naryn (hereinafter referred to as "Naryn Node")
- Regional node subsystem in Talas (hereinafter referred to as "Talas Node")

(3) Terminal related subsystems

RCC substituted input system is installed on node subsystems in the same area. For other subsystems, a computer system is arranged in each bank & branch office which requests connection to the network.

10-3-4 Hardware Conditions for Each Subsystem

Each subsystem involves different conditions for hardware due to the different functions and the contents of processing. In this clause, hardware conditions are checked for each subsystem. The data items are as follows.

- Overall processing ability
- Processors
- Main storage devices
- Input/output controllers
- Direct access storage devices
- Communication devices
- Other peripheral devices

10-3-4-1 NBK-Net (Second Phase)

(1) Overall processing ability

As described in the section on performance conditions, it is anticipated that the required processing ability at a similar level of the TPC-A benchmark tests will be 2.7 cases per second and 3.4 cases per second in 1998 and 2000, respectively. (These figures correspond to Plan A. According to Plan B, the required processing ability will reach 5.4 cases per second and 7.7 cases per second in 1998 and 2000, respectively.) However, as the number of banks is limited up to approx. 20, it is predicted that large-capacity database s will not be necessary. It will be enough to provide processing capacities to update the balance in two accounts and make journal

records within a certain period of time without fail. Therefore, the adoption of a system equipped with fault tolerance may improve of processing ability, by developing balance data in its main memory.

(2) Conditions required for each device

- Processors	In addition to the above said processing ability, fault tolerance is also required.
- Main memory devices	In addition to the system control functions, sufficient space is also necessary for local and remote terminal control, database control, transaction processing and instant processing of settlement account balance.
- Input/output controllers	If input/output controllers are separated from processors, fault tolerance ability is needed.
- Direct access storage devices	In addition to the areas related to systems, sufficient space is required also for business systems, databases, log information, backup areas, archive areas, etc. Duplex devices are desirable for secured data.
- Communication controllers	NBK-Net is operated by the hardware isolated in the second phase. In order to process 8 messages per second, the communication speed with the Fund-transfer processing system should be larger than 100 Kbps, as calculated below. 8 messages x 2 ways x 500 characters x 10 bits /0.8 = 100 Kbps As far as it is suggested on the basis of this amount of data, this system should be installed where connection by local cables is allowed.
- Other peripheral devices	Printers, data backup devices, etc. are necessary.

10-3-4-2 Fund-Transfer Processing System

(1) Primary system

This primary system coexists with NBK-Net on the same computer system. Therefore, the same conditions applicable to NBK-Net are also applied to this subsystem.

(A) Overall processing ability

This subsystem receives at maximum 20 messages per second from the message switching subsystem, and requests NBK-Net for processing or update of inter-office accounts. In the first phase, NBK-Net processes at maximum 8 transactions per second on the same computer. In all cases, the communication capacity must be twice as large in order to return messages after completing processing. Therefore, it would be desirable if the primary system could be linked with the message switching subsystem in the local network. In addition, as the in case of NBK-Net inter-bank processing, it is necessary to arrange a set of processors, main memory devices and direct access storage devices which is able to process inter-office accounts or accounts of participant banks within a certain period of time.

(B) Conditions required for each device

- Processors	In addition to the above said processing ability, fault tolerance is required.
- Main memory devices	In addition to the system control functions, sufficient space is also necessary for local and remote terminal control, database control, transaction processing and instant processing of payment account balance.
- Input/output controllers	If input/output controllers is separated from processors, fault tolerance ability is needed.
- Direct address storage devices	In addition to the areas related to the base systems, sufficient space is also required for business systems, databases, log information, backup areas, archive areas, etc. Duplex devices are desirable for secured data.
- Communication controllers	High-speed and stable communication functions are required to secure close communication with the message switching subsystem.
- Other peripheral devices	Printers, data backup devices, etc., are necessary.

(2) Secondary system

(A) Processing ability

As NBK-Net is transferred to isolated processors, critical transaction processing is scattered. However, the significance of controlling increasing transactions and communication functions becomes more serious.

(B) Conditions required for each device

- Direct access storage	The performance of simple put and get of data is regarded as more important than data updating.
- Communication controllers	High-speed communication with both the message switching subsystem and NBK-Net is necessary.
- Others	similar to those of the first phase

10-3-4-3 Message Switching Subsystem

(1) Processing ability

This subsystem needs close conversations with two host systems and six Regional node subsystems, as well as with the systems which are expected to be added in the future. This means that prompt responses to received messages and transfer of such messages is required. For this reason, this subsystem requires high-speed and stable communication devices and processors.

(2) Conditions required for each device

- Processors	same as those required for the Fund-transfer processing system
- Main storage devices	Large-capacity message storing areas are needed.
- Input/output controllers	High-speed and stable control of communication controllers is necessary.
- Direct access storage	It is necessary to support high-speed message devices logging functions.
- Communication controllers	Functions and performance to make conversations are necessary, connecting up to 15 high-speed

	lines, including backup channels. By 2000, it will be necessary for the system to receive at maximum 20 messages per second from the node side and to transmit them to host subsystems.
- Other peripheral devices	similar to those for the Fund-transfer processing system

10-3-4-4 Regional Node Subsystem

(1) Processing ability

This subsystem must satisfy two different performance conditions. They are, batch type transfer and input processing performance(throughput) such as RCC substituted input and the interface Operation Day, and the responses to the interactive communication with the message switching subsystem and other node subsystems. In particular, in the second phase, where inputs in lump form increase and net positions in the area are calculated, the introduction of auxiliary processors for batch processing should be examined.

(2) Conditions required for each device

- Processors	Processors should satisfy the above said performance conditions.
- Main storage devices	Sufficient capacity to simultaneously implement trunk communication, terminal communication and local input is necessary.
- Input/output controllers	The controllers must correspond to various communications and input/output.
- Direct access storage devices	High-speed and large-capacity direct access storage devices are necessary for securing data received from bank & branch offices and respond to medium-term and long-term inquiries.
- Communication controllers	In addition to the message switching system and trunk lines, telephone line interfaces and telex interfaces are also necessary for communication with the branch offices of banks.
- Other peripheral devices	For substituted input services, tape devices, diskette devices, local terminals and printers are necessary.

10-3-4-5 Remittance Dedicated Terminal System

(1) Processing ability

This subsystem receives source remittance information from the Regional node subsystem and advises the staff accordingly. Therefore, reliable input, printing and communication functions are required. As user interfaces are positioned as the core of the system, performance conditions required for on-line processing as required in other systems are not deeded in this system. Local response within 3 to 5 seconds to catch individual remittance transaction input is satisfactory.

(2) Conditions required for each device

The personal computers normally used in this country, such as those installed with Intel 486/DX or DX2 CPUs(or equivalent) will function adequately. (Refer to Chapter 5)

- Processors	Data conversion and data transfer ability within a specific period of time is needed. Fault tolerance shall be depend on the decision of each bank.
- Main storage devices	Capacity to perform system control, data input and data transfer will be sufficient.
- Input output controllers	according to processors
- Direct access storage	It will be sufficient if system control, devices input data and log information can be stored.
- Communication controllers	according to processors
- Other peripheral devices	Printers, data backup and recovery devices should be examined for use.

10-3-4-6 "Operation Day" Interface Subsystem

(1) Overall processing ability

As this subsystem mainly processes batch data conversion and batch file transfer, it does not require high-speed transaction processing ability. However, from the viewpoint of operation efficiency, the ability to convert remittance data per branch office per day(maximum 5,000 cases) is necessary. In addition, the requirements of

the hardware depends on whether the banking system and the interface subsystem are installed in the same hardware, or they are installed in different type of hardware.

(2) Conditions required for each device

Here, the conditions are established on the assumption that the banking system and the interface subsystem are installed in different hardware components.

- Processors	Data conversion and data transfer ability within a specific period of time is needed. Fault tolerance shall be depend on the decision of each bank.
- Main storage devices	Capacity to perform system control, data conversion and data transfer will be sufficient.
- Input/output controllers	according to processors
- Direct access storage devices	It will be sufficient if system control, input data and log information can be stored.
- Communication controllers	Ability to exchange remittance information to and from the regional node subsystem every day without fail will be sufficient.
- Other peripheral devices	Printers, data backup and recovery devices should be examined for use.

10-4 Preliminary Design of the Network Systems

10-4-1 Available Telecommunication Network Systems and Services for the Study Project

1. Use of Existing Systems and Services

As described in the telecommunication section in this chapter, the present status of telecommunications in terms of services and telecommunication equipment currently being used, faces several serious issues and problems. They are:

- Facilities and equipment are very old and these are not applicable to high speed computer network connections
- Quality of transmission lines is very low
- Over-capacity of the circuits connected to each terminal and repeater stations, in terms of capacity of the exchange systems versus actual connection

- No re-routing transmission circuit lines are available due to the hierarchical configuration of the network systems in contrast with the mesh type
- No back-up systems in the entire network configuration
- Few feasible rehabilitation and expansion plans by the Kyrgyz government
- Difficulties in construction of the entire network systems because of geographical aspects (over 90 % is mountainous area in entire country)
- Slow restructuring plans and action by the international organizations, using up the sources and funds from those organizations

In these circumstances, establishing an installation plan for a computerized payment system is facing many critical issues, particularly regarding the present status of the telecommunication systems and services. However, with the consideration of aforementioned conditions, the following telecommunication services currently available in the country are reviewed for the tools of network systems and services for the JICA Study Project.

(1) Telephone Network Systems

The earliest and the most convenient way at present for establishing computerized payment network systems in the country is to use available telecommunication networks by connecting all computer systems which will be installed in each node stations. However, many difficulties can be pointed out, because of the aforementioned conditions of the telecommunication in Kyrgyz, particularly the available number of telephone circuits in both intra- and inter-city network links, and the quality of these circuits. In addition, speed of telephone circuits is another critical issue for establishing new computer network systems. The maximum speed using existing telephone line is limited to 2.4 Kbps, in which it is only possible to send 110 to 120 alpha-numeric characters via circuit in 60 seconds logically. When reviewing the present volume of data transmission in inter-bank networking, the 2.4 Kbps speed is quite satisfactory. When looking at future trends of volume of both intra- and inter-bank transactions, the required speed should be minimum 9.6 Kbps depending on locations of the node systems.

The number of available telephone circuits is also another critical issue for installation of computer networks, both in Bishkek and other cities, and inter-city network systems. In general, the present status of telecommunication

circuit (public telephone network) in Kyrgyz is not able to meet the requirement for the future plans which the Study Team seeks to establish, and other alternative sources and ways in the use of telecommunication should be considered.

The following table is the price structure of the existing telephone network in each major city:

Cities	*Inst. cost	**Base fee	Access base
Bishkek	130/800 Som	1.0 Som	$5.00
Osh	130/800 Som	1.0 Som	$5.00
Talas	130/800 Som	1.0 Som	$5.00
Jalal-abad	130/800 Som	1.0 Som	$5.00
Cholponata	130/800 Som	1.0 Som	$5.00
Balykchi	130/800 Som	1.0 Som	$5.00
Karakol	130/800 Som	1.0 Som	$5.00
Naryn	130/800 Som	1.0 Som	$5.00

* Installation cost varies on the waiting time of the applicants for new telephone installation, for example, 130 Som for 20 years and 800 Som for 1 month from the application request.

** Base fee varies on the users of the telephone, for example 1.0 Som for households and US$5.0 for companies use.

** Source: Ministry of Communication

(2) Business Lines

As already described in section 5-4-4-7 of Chapter 5, business lines are telephone circuits which are available from the Ministry of Communication and have a relatively higher quality compared to the ones already furnished in the country. Use of the Business Lines for the establishment of computerized payment network systems for banks in the country (JICA Project) is the second alternative in view of the use of existing telecommunication circuits alongside the ordinary telephone network systems already described in this section.

Regarding the quality of the telephone circuit and of the exchanging capacity and circuit speed, functioning minimum 9.6 Kbps of transaction speed is more

feasible than 2.4 Kbps, and Business Lines and Iskla-I have more advantages to implement the computer networking plans. Figure 10-26 shows overall network configuration of using Business Lines by setting up a node station system in the major cities of each state and region. The trunk route of Business Line between Bishkek (hub center) and major cities in each state and region (nodes) has been installed already. These locations are overlapping with the places where each regional computer center will be planned. Presently the network structure of the Business Line has a hierarchical layer type of configuration (partly with triangle layer between Bishkek, Talas and Jalal-abad), and it is required to facilitate either triangle or mesh-type network layers, particularly in the east regions of the country such as Cholpon-Ata, Karakol, Balykchi and Naryn. Acceding to MOC, the pricing structure of the Business Line in major cities including Bishkek, Osh, Talas, Jalal-abad, Cholpon-ata, Balykchi, Karakol and Naryn are $50.0 for installation cost and $ 5.0 for base fee respectively.

(3) Iskla-I

When reviewing the conditions, especially from the view of availability of telephone circuit lines and of the quality of the circuit, use of Iskla-I for installation of the computer networks for the banking system is the most optimum and quickest way for completion of the computer networking in the country.

Figure 10-27 shows overall network configurations of using Iskla-I by setting up a node station system in major cities of each state and region. The trunk route of Iskla-I between Bishkek (center switching station, HUB center) and major cities in each state and region (nodes) has been installed already. These locations are overlapping with the places where each regional computer center will be planned in the Study Project. Presently, the network structure of Iskla-I comprises a hierarchical layer type of configuration (partly with triangle layer between Bishkek, Talas and Jalal-abad), and it is required to facilitate either triangle or mesh type network layers, particularly in the east regions of the country such as Cholpan ata, Karakol, Balykchi and Naryn. According to MOC, the pricing structure of Iskla-I in major cities are 3,000 Som for installation cost, 20 Som for base fee of monthly use per line, and 864 Som for monthly lease base per line.

10-4-2 Future Possibility of the Use of Telecommunication Circuit for the Study Project

(1) World Bank and EBRD Project

As already described in the previous section 5-4-4-8 of Chapter 5, the World Bank and EBRD project to establish (or rehabilitate) a telecommunication network is being undertaken. The World Bank already finished the implementation plan to undertake the first phase of the telecommunication review project. The Study Team is deeply concerned with this project, since the networking plan for the establishment of the payment system will be depend greatly upon the project that the World Bank and EBRD are planning to undertake.

(2) Satellite Network Links

Perhaps the most exciting and most rapidly evolving of all the developments in transmission as a mean of telecommunication is the use of a satellite and transmission method using satellite systems which have been used in various field not only in voice transmission, but also in data and image transmission. Data transmission refers to the sending of binary code of information between computers, and image transmitting includes radio and TV broadcasting services, TV conference services, and other multi-media types of communication services.

Satellite communication systems consists from three major physical components: the satellite itself, satellite earth stations and a transponders. A satellite is, in essence, a microwave relay which is launched to the sky. Satellite earth stations consist of a dish which points at the satellite in basically the same way that an earthbound microwave relay dish points at the next tower in the microwave transmission. A satellite receives microwave signals in a given frequency band and re-transmits them at a different frequency. It must use a different frequency for re-transmission; otherwise the powerful transmitted signal would interfere with the weak incoming signal. The equipment which receives a signal, amplifies it, changes its frequency, and re-transmits it, is called a transponder.

Satellite communication networking systems have various advantages and over other ordinary telecommunication transmission methods. These are:

1) A multi-access and synchronous ways of transmission --- By accessing a single circuit transmission line (transponder), an earth station or groups of earth stations are able to access the satellite from anywhere stations located and installed. And all these earth stations can access the satellite simultaneously or by an individual bases.

2) An easy way for network expansion and an enhancement --- By increasing the number of installation sites of earth stations, entire network systems are easily able to expand. In other words, each node stations for a computer network system using satellite telecommunication systems is able to expand by installing new earth station when the customers wish to set up new nodes for computers.

3) Flexibility of use of the system --- Depending upon the users requirements, particularly depending upon the number of transactions volumes they wish to transmit via a satellite telecommunication network system, the customers can select a bandwidth of the satellite ranging from 64, 192, 384, and 768 Kbps, and 1.5 Mbps and 6 Mbps. Also, the customers can select from various types of transaction methods by selecting half simplex, half duplex or full duplex transmission modes, depending on the amount of data and volume of transactions they wish to send through the satellite.

4) An easy way to manage entire network systems --- Basically, management of the network systems (Network Management Systems: NMS) consists of two major portions. One is to manage all routes of network circuit, including trunk lines and branch network lines. The other is to manage all peripheral equipment which are connected to the network systems, including the main body of the satellite itself, all earth stations, node computers which have interface to the network systems, and other peripheral equipment.

In Kyrgyz, as discussed in the first portion of this section, telecommunication transmissions already being used is as a method to access international voice network to have interface with international telephone network gateways. In comparison with ordinary telecommunication transmission systems, satellite communication network links are more advantageous in installing new network systems, particularly, in countries which have mountainous geographical characteristics and have wide-spread demographic distribution of population, such as Kyrgyz.

system is the most effective and optimum way in terms of time frame concerns, and running and operation cost, in comparison with other transmission means being used in the country.

Figure 10-28 shows overall configurations of network systems plan using satellite network links by constructing an earth station in each major city of the states and regions. In this configuration, all earth-stations are independently connected by transponder channel of the satellite.

(3) Review of Conditions in Telecommunication

When reviewing various conditions of the telecommunication network systems in the Kyrgyz Republic already described in this section, it is apparent that it is not very easy to set up a computer system based on the existing telecommunication network systems, due to many difficulties mentioned in 10-4-1. The use of existing telephone circuits for computer networking system is the quickest way to install the system, however, the entire telephone circuit systems do not meet the requirements because of its the exchanging and switching capability. Also, the speed of the telephone circuits will not match the data volume of transactions and speed of the data transmission in the future.

Use of the Business Line and Iskla-I, compare with the existing telephone circuit, will meet the requirement from the needs of computer networking systems for the bank payment system. However, when looking at the year of 2000 in Kyrgyz, particularly from the view of switching systems capacity, use of a satellite communication network system is the quickest and the most optimum way for establishment of computerized systems.

Also, the project which The World Bank and EBRD are intending to establish between Bishkek and Osh is not to be ignored by the project that JICA is involved in. Because overall telecommunication network systems for bank payment systems are highly dependent on the completion of the World Bank and EBRD telecommunication implementation Project.

	----------Time frame		
Available Circuits	1996	1998	2000
Existing Telephone Network	X	X	X
Business Line and Iskla-I	X	X	X
World Bank and EBRD Project	-	X	X
Satellite Network Systems	-	X	X

The telecommunication systems for the computer networking systems have to rely heavily on the existing network systems at present. In 1998, mixed use of telephone network systems circuit, Business Lines, Iskla-I, the network circuit that the World Bank and EBRD intending to implement and satellite networks is recommended. In the year of 2000, mixed use of the World Bank and EBRD and satellite network link-mixed covered the transmission of the entire network systems for the computerized bank payment system.

10-4-3 Design of the Network Systems

Total network systems, from its view of locations, can be divided by 5 major centers including Bishkek Communication Center Station (Center Station), Talas Regional Center, Jalal-abad Regional Center, Osh Regional Center, Karakol Regional Center and Naryn Regional Center. Between the Center Station in Bishkek and Regional Centers located in each major cities are connected by fully duplexed telephone network line "Iskla-I" directly, except via Cholpon-ata switching station between Bishkek and Karakol.

Figure 10-29 shows overall network configurations of the total system. As seen in the table, topology of the total communication network system consists from star type configurations. It is not ideal type of network architecture, however, due to the availability of the telecommunication network systems in the country, the optimum network systems that can be think of in Kyrgyz is to use the government owned telecommunication network systems called Iskla-I which has relatively fast speed of the line and has better quality compared with presently available public telephone lines. Iskla-I will be able to meet with the speed of 16 Kbps of which can cover present number of existing volume banking transactions at present time and for another several years in Kyrgyz. Overall specifications including quality and the speed of Iskla-I is discussed in the telecommunication section in Chapter 5.

(1) Bishkek Communication Center Station

Bishkek Communication Center Station has very important role in terms of its function. It is not only considered as the center station of the total bank payment system in the country but can be considered as having the network control function of the total system. Relatively large size of communication controller systems compare with the ones which are installed in other 5 Regional Center should be installed in the Center Station not only to monitor entire network systems but to functions as communication controller unit.

It should be recommended that the communication controller unit in the Center Station should have functions of not only to meet with the data transmission function but to transmit voice, images and also telex network circuit with it. To meet with the requirement of aforementioned functions and capabilities, the communication controller unit in Bishkek Center Station should have data compression, time division multiplexing, and packet switching functions.

(2) Regional Systems

As previously described, Regional Systems are located in the major cities of each region in the country namely Talas, Karakol, Osh, Jalal-abad, and Naryn. Each center should have communication controller installed at the site for connection of telecommunication circuit line, but the functions of these communication controller should not limited to the same size and functions as the one installed in Bishkek Center Station due to the main function of the controller can be taken by the Center Station. However, all telecommunication controllers to be installed in the regions should have data compression, time division multiplexing, and packet switching functions. Also these should have functions not only for data transmission functions but voice and telex transmission functions in it. Particularly, functions in each communication controller in the region should have functions of controlling telex network circuits due to the widely used functions in the local area in the country.

(3) Iskla-I

All centers including Bishkek Center Station and regional centers of each major cities are connected by duplexed high-speed with better quality telecommunication circuit Iskla-I. Since the country is facing serious problems in supplying better quality of and high speed of public telecommunication lines, Iskla-I is the best available

telecommunication circuit for data transmission connections of computer systems. Also it has relatively higher capability and function of sending voice and image (especially for fax transmissions). Installation of duplexed telecommunication circuits for the computerized payment systems in the country is to avoid from any hazards which are supposed to be occurred during the transmission including circuit shut down and echoes and noises. Iskla-I also functions as high speed telecommunication circuits (maximum 16 Kbps) in the country while other ordinary public telephone network can be calculated as 2.4 Kbps of its speed line.

Figure 10-21 MODEL OF COMPUTER NETWORK FOR THE ELECTRIC PAYMENT SYSTEM

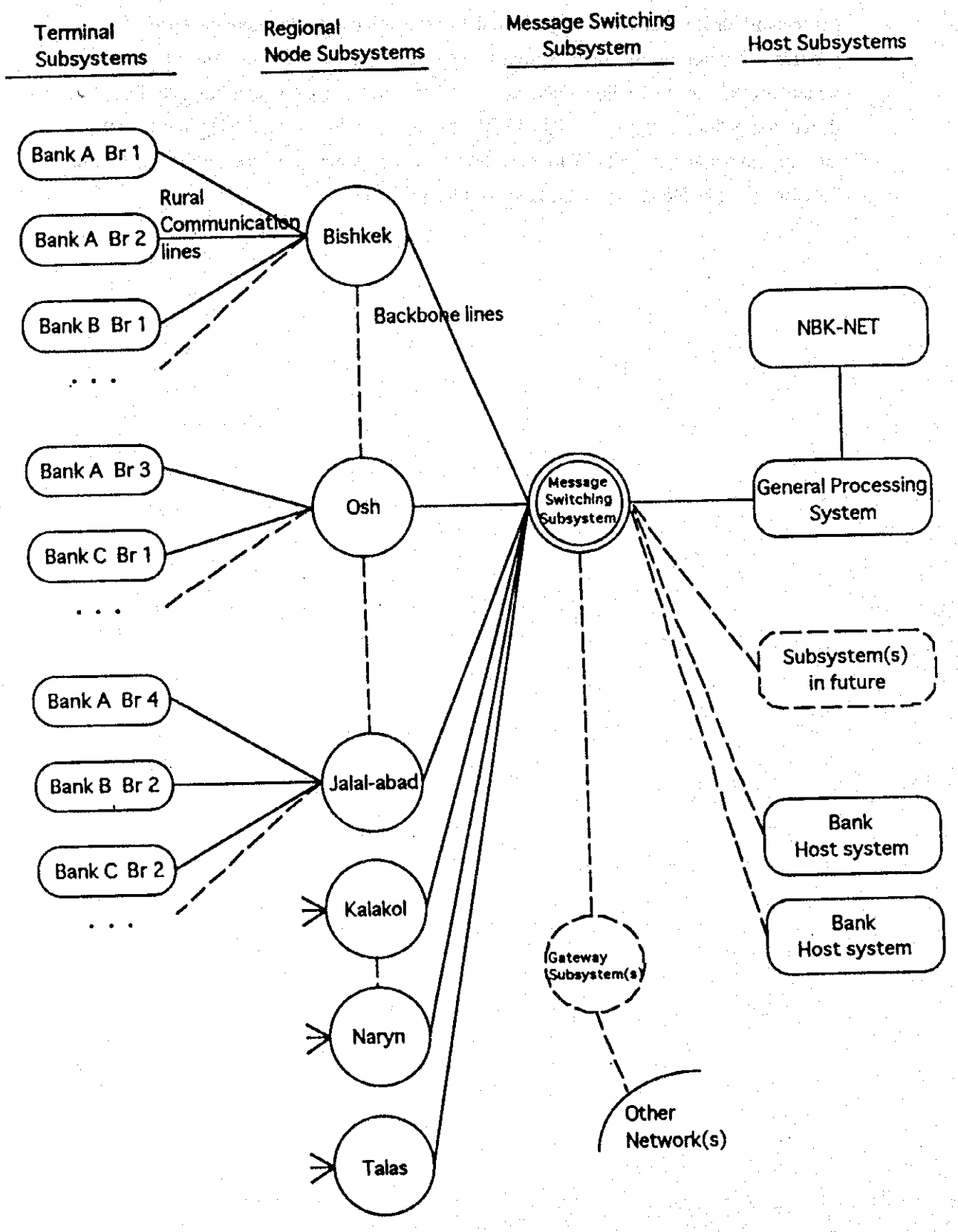


Figure 10–22 SHARED INFORMATION AND FUNCTION AMONG MESSAGE SWITCHING SYSTEM AND REGIONAL SYSTEMS

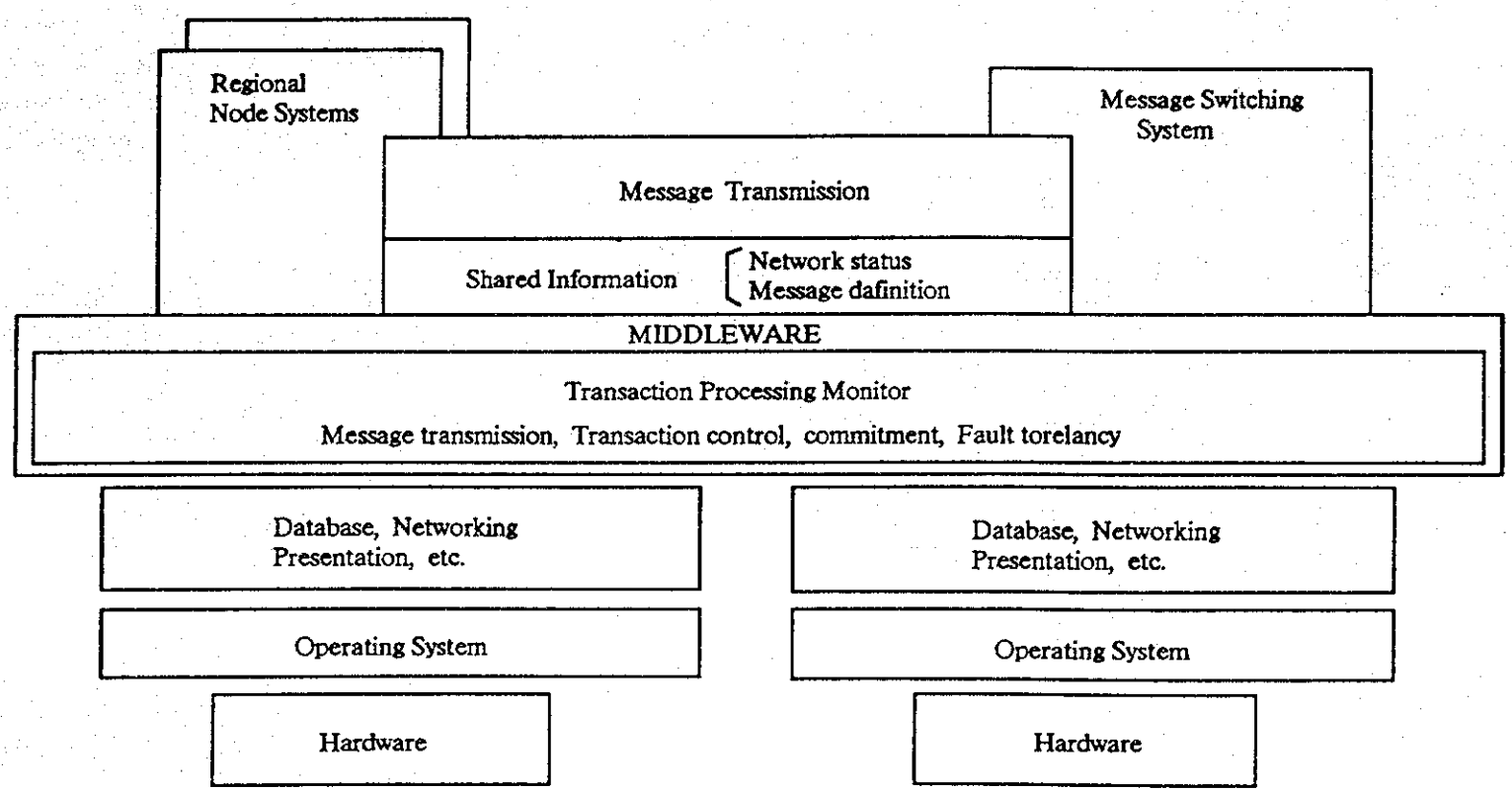


Figure 10-23 SAMPLE CONFIGURATION OF HARDWARE FOR THE ELECTRIC PAYMENT SYSTEM

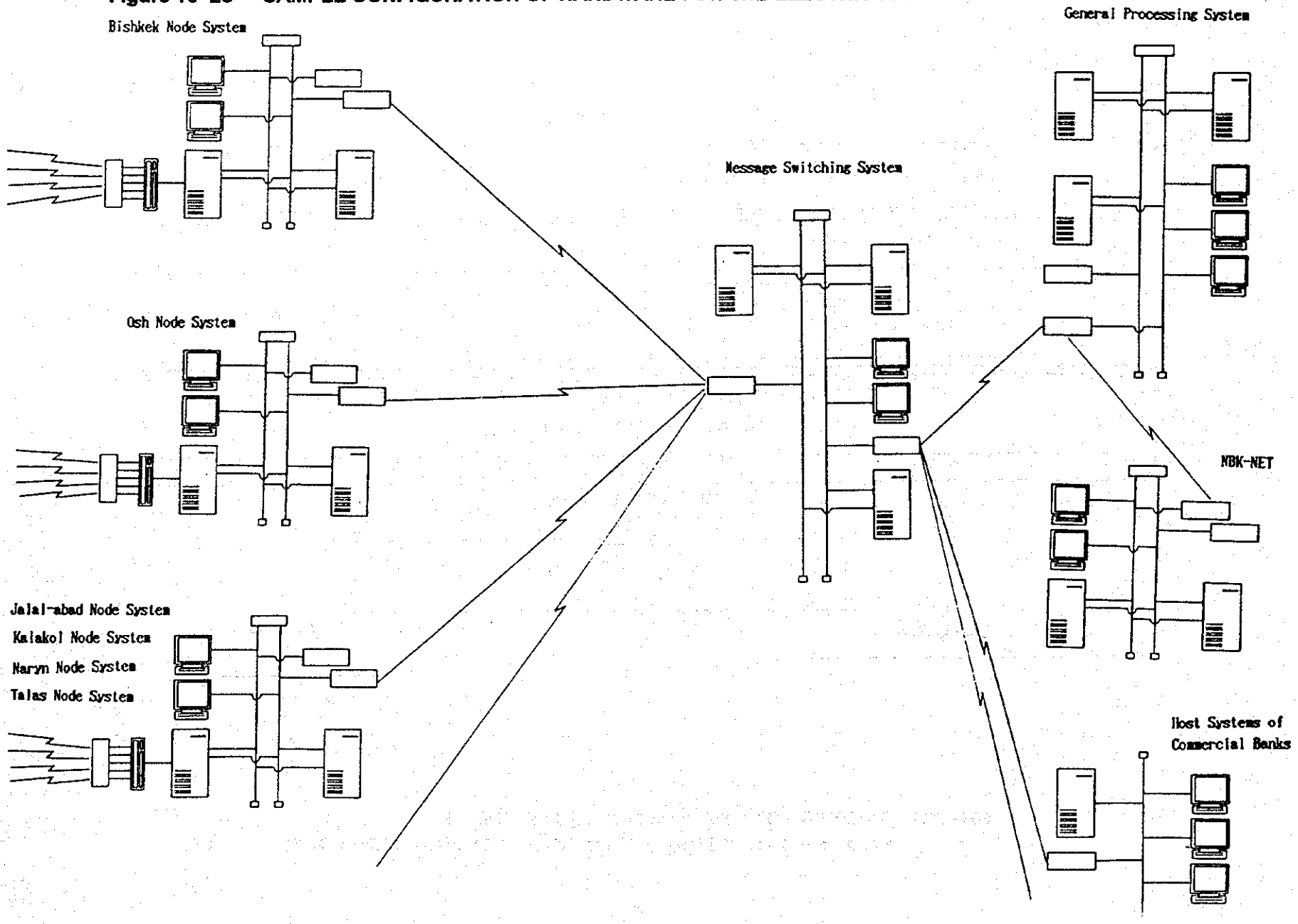
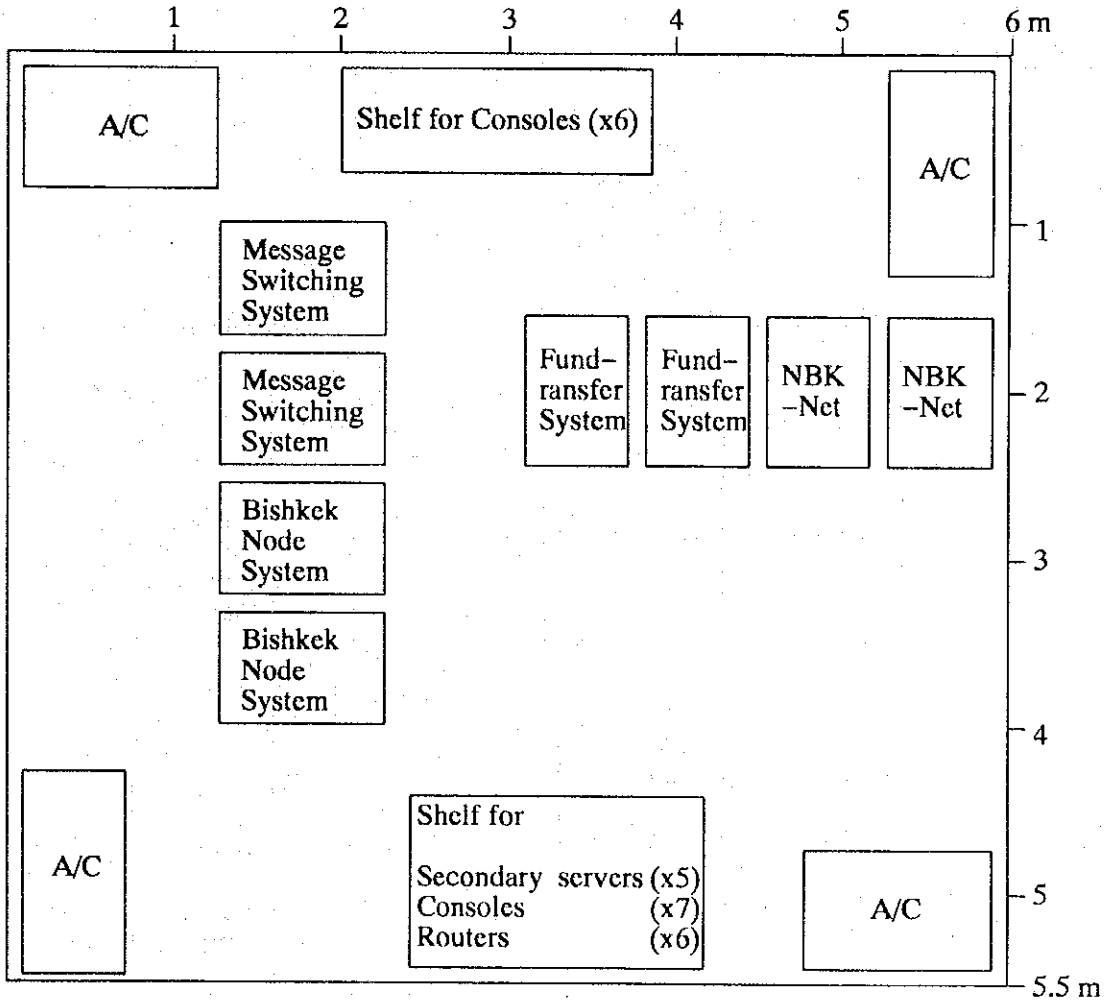


Figure 10-24 Sample Layout of Computer Room



Total: 6m x 5.5m = 33m²

Electricity power consumption: System itself

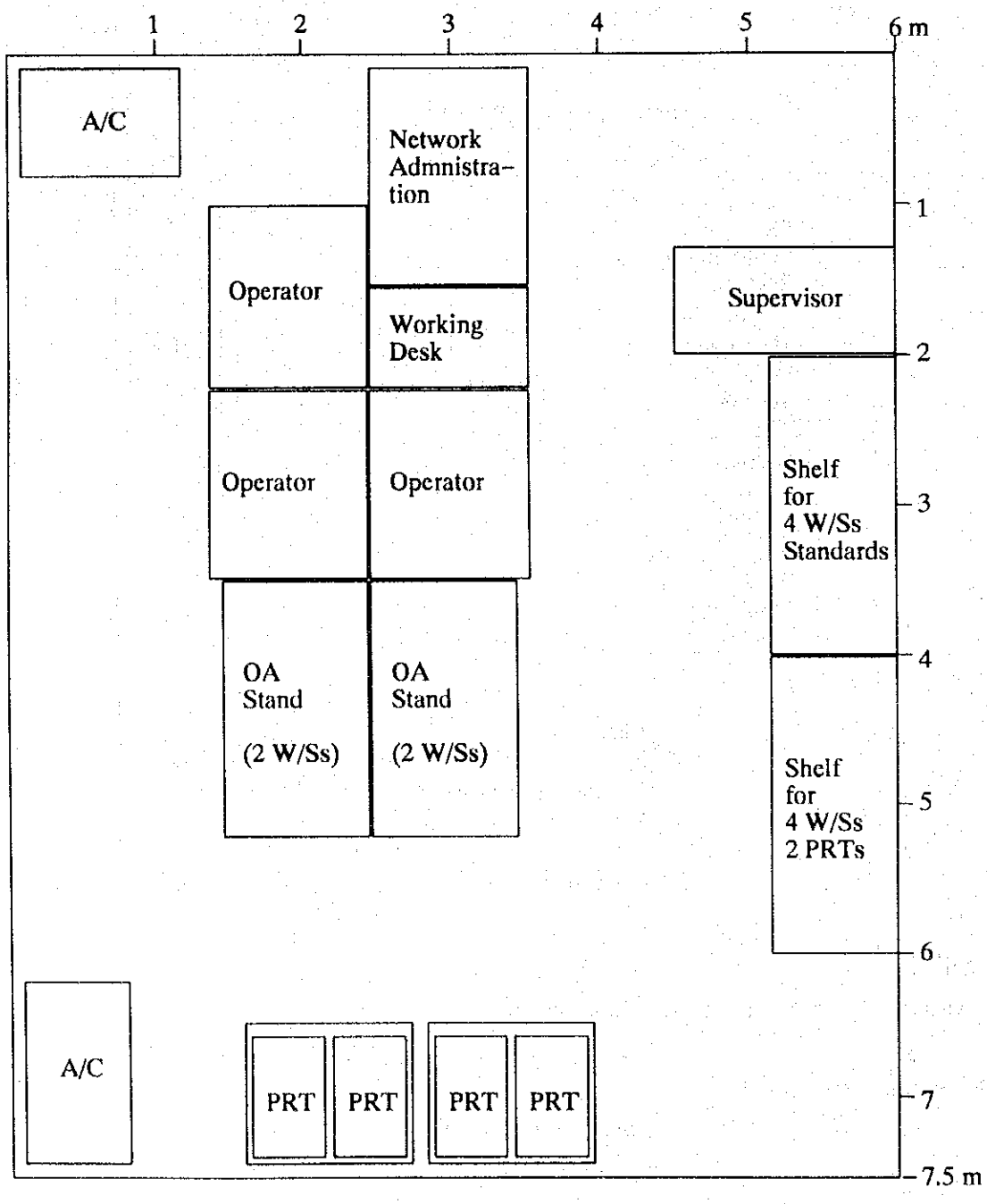
2.2 x 5 + 1.8 x 2 + 1.6 + 0.23 x 5 = 17.35 KVA/h

Thermal/heat consumption: System itself

1,790 x 5 + 750 x 2 + 660 + 200 x 5 =

12,110 Kcal/h

Figure 10-25 Sample Layout of Operations Department



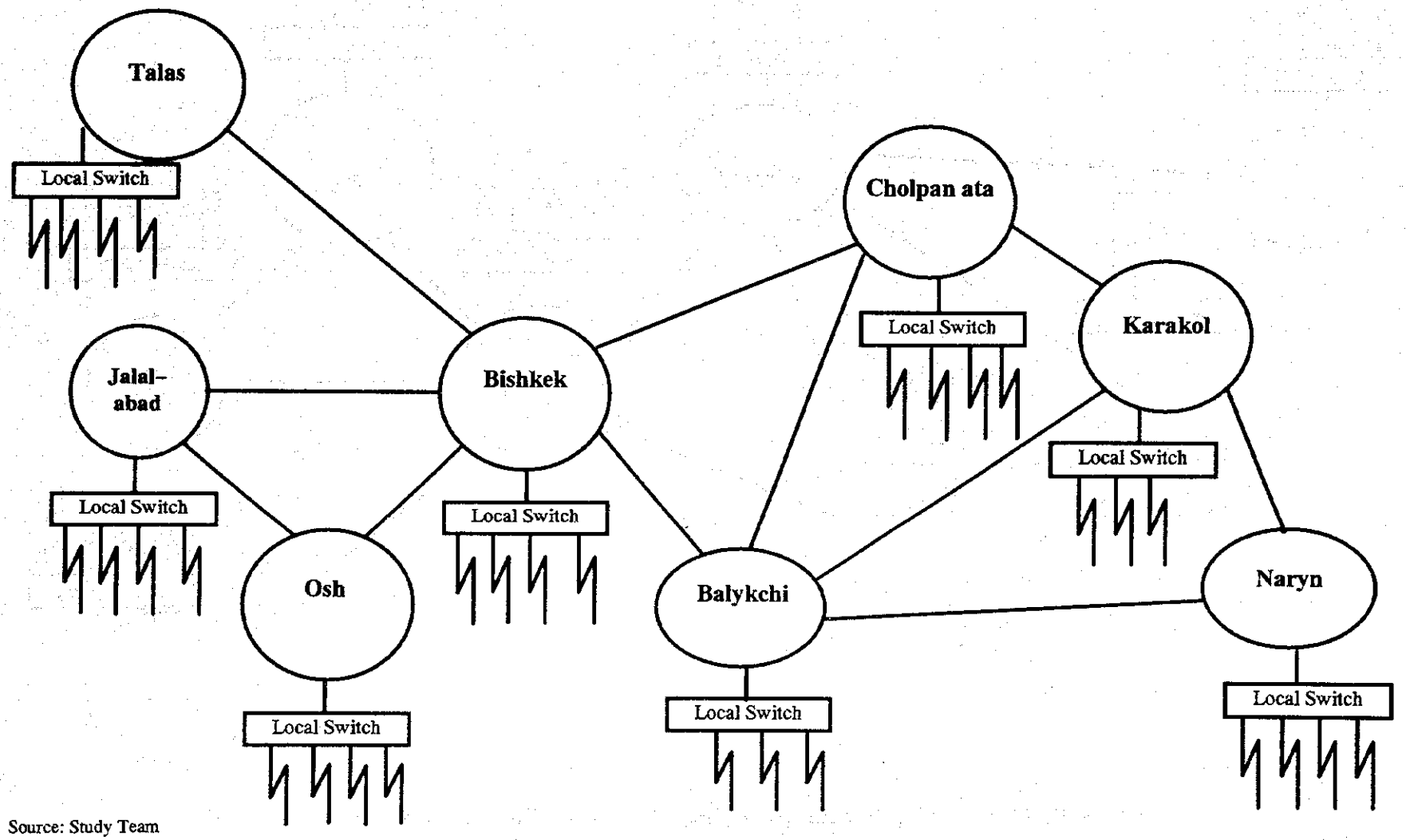
PRT: Printer
W/S: Workstatn

Total: 6m x 7.5m = 45m²

Electricity power consumption: PRT 1.2 x 6 + W/S 0.23 x 12 + A/C 2 x 2 = 13.96 KVA/h

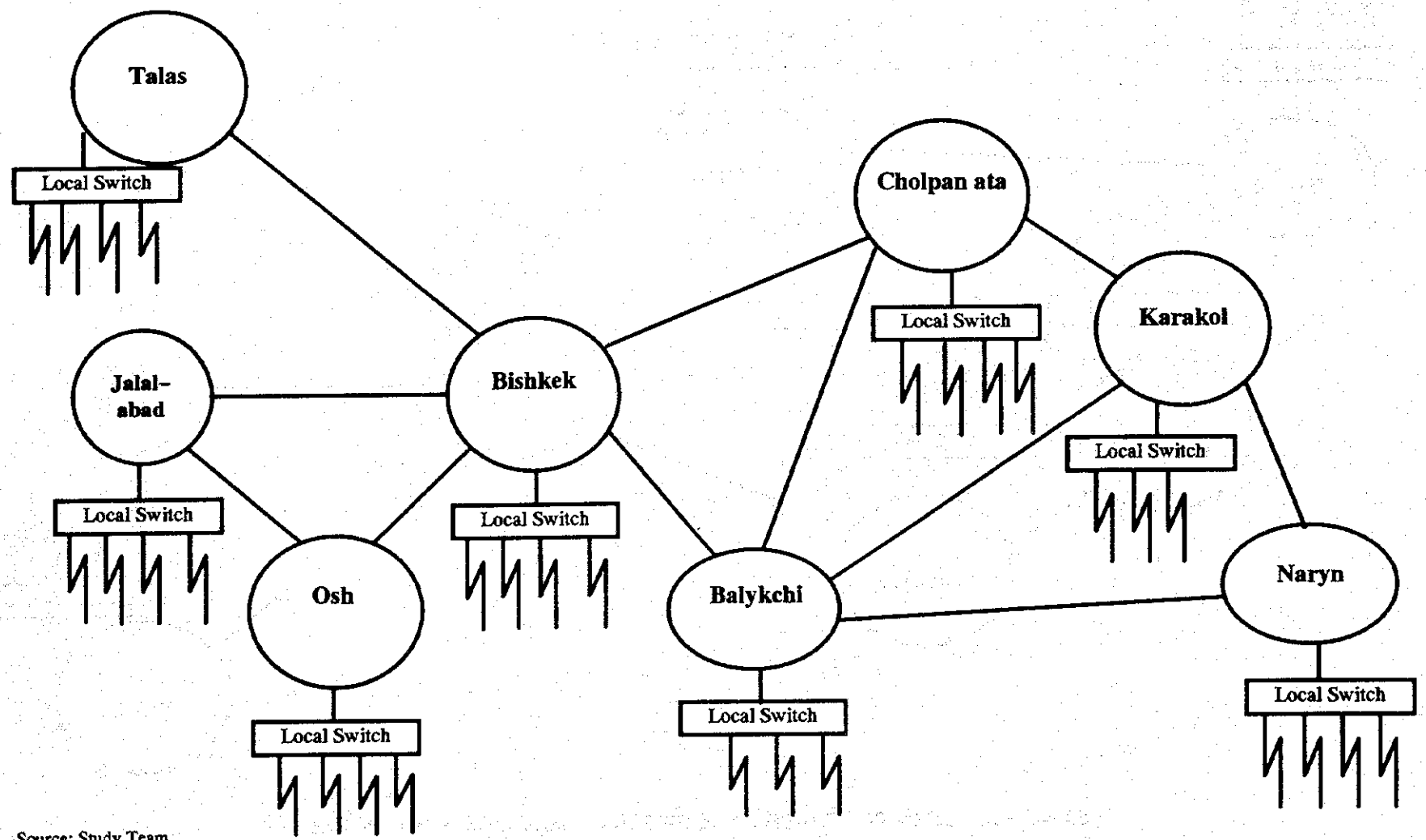
Thermal/heat consumption: 750 x6 + 20 x 12 = 7,080 Kcal/h

Figure 10–26 NETWORK SYSTEMS PLAN USING BUSINESS LINE LINKS



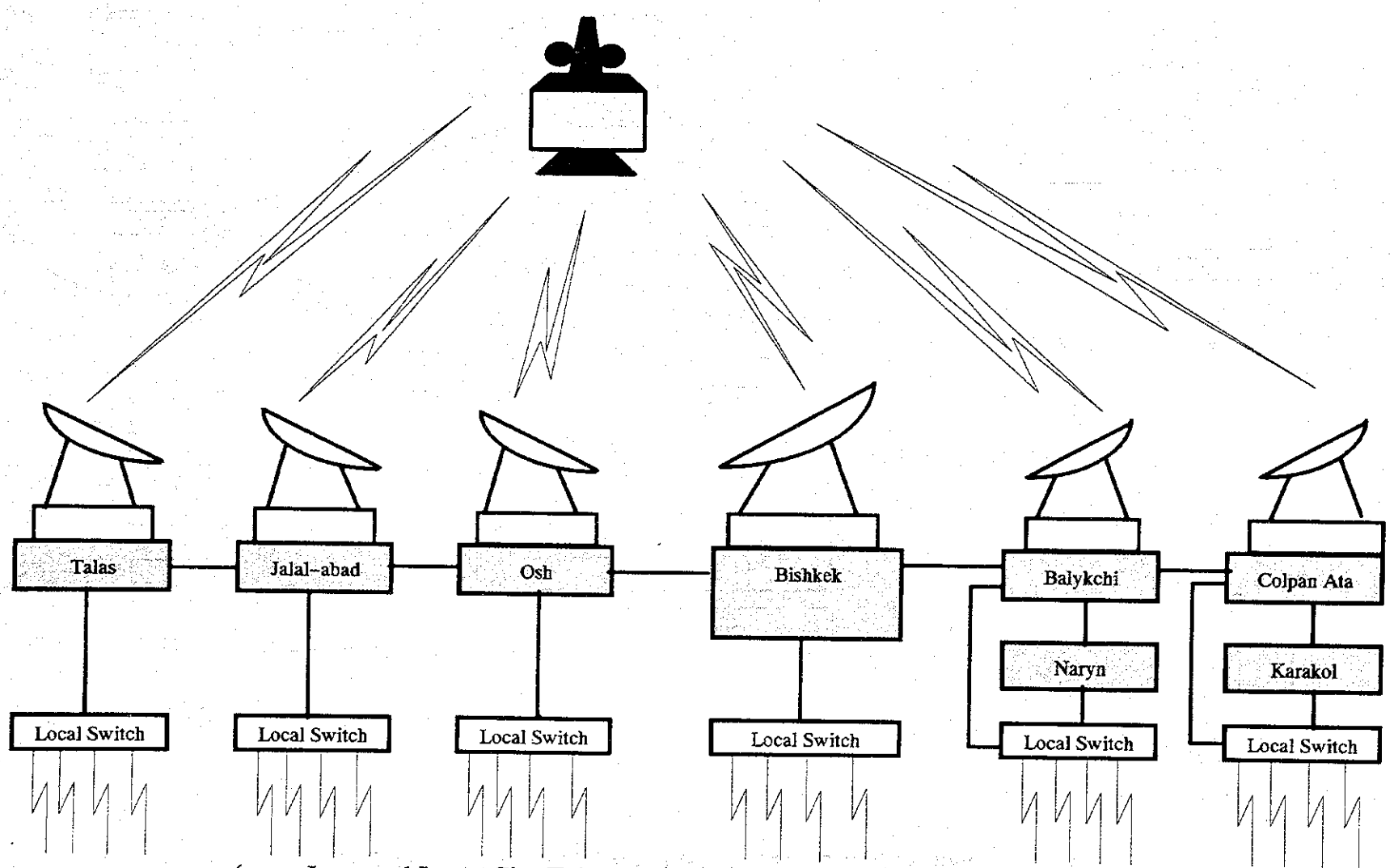
Source: Study Team

Figure 10-27 NETWORK SYSTEMS PLAN USING ISKLA-I LINE LINKS



Source: Study Team

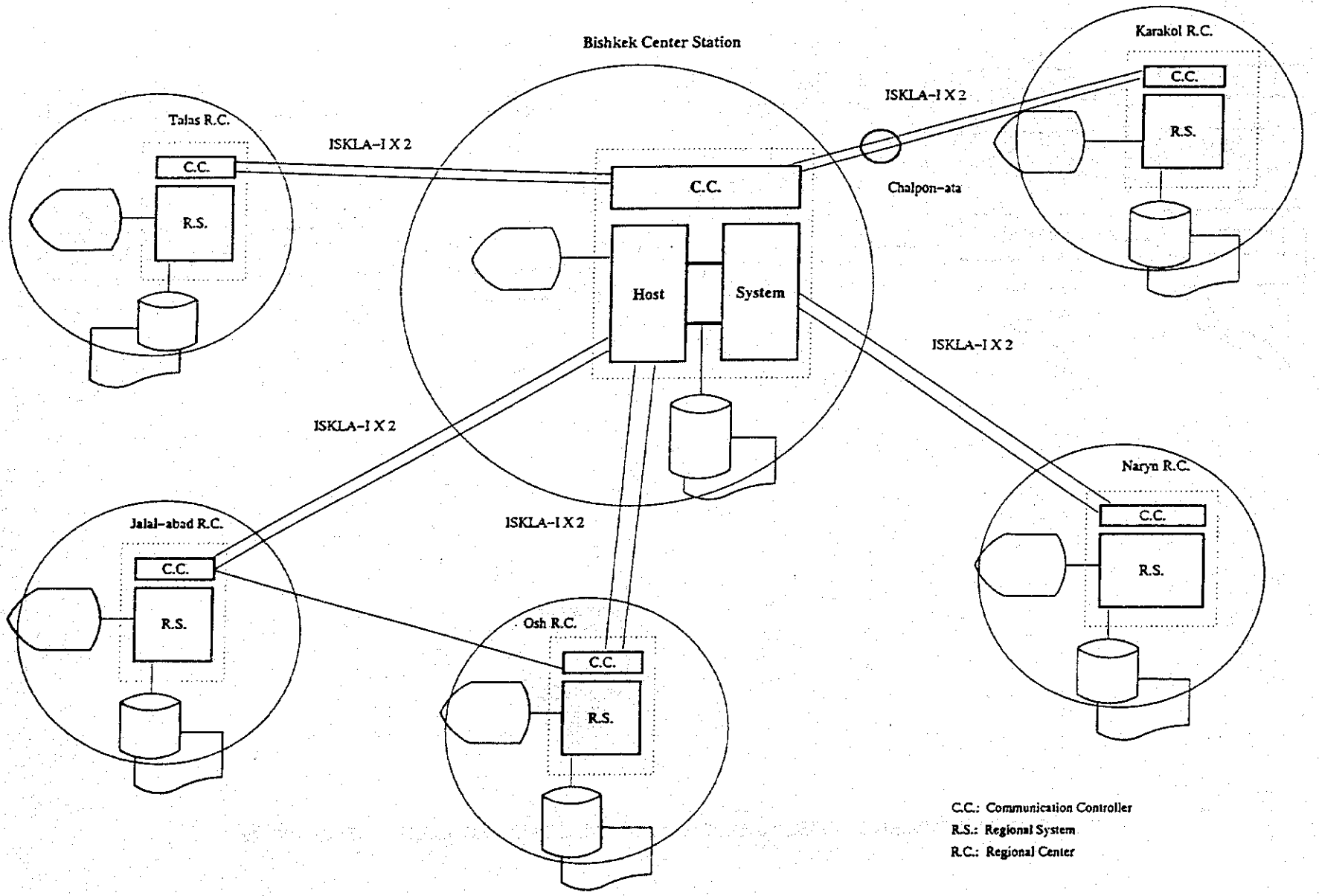
Figure 10-28 NETWORK SYSTEMS PLAN USING SATELLITE NETWORK LINKS



(Intra and Inter-City Telephone Network Systems)

Source: Study Team

Figure 10-29 PRELIMINARY OF THE NETWORK SYSTEMS



Chapter 11 Plan of Installation, Maintenance and Management Plan

Chapter 11 Plan of Installation, Maintenance and Management Plan

11-1 Policy for Procuring Hardware and Software Products

The products to be procured for this payment system are classified as follows:

(1) Computer platform (hardware and operating system)

(2) Resource manager not contained in the above-mentioned platform

  1) Database management system

  2) Network-related software

  3) Presentation manager

  4) Spool manager

(3) Programming language

(4) Middle ware products

In this chapter, the policy for procuring these products will be described.

11-1-1 Conditions Imposed on the Preliminary Design

The conditions imposed on the outlined design of the software, hardware and network are as follows:

(1) To have a storage capacity allowing large variation in data volume.

(2) To have a configuration that can be easily expanded from small-scale to large-scale.

(3) Functions can be added after installation.

(4) The core of this system shall not be subject to system failure. Therefore, for maintenance or in an emergency, service by the vendor around Bishkek is essential.

(5) The requirements for software vary depending upon the subsystem. For example, a subsystem of the host requires a guarantee of transaction processing and a system for a network requires measures for a variety of connections and changes of configuration. Therefore, optimum selection capability is required in the units of the subsystem.

(6) To be capable of operations among subsystems.

11-1-2 Conditions Imposed on the Present Status and Trends of the Kyrgyz Republic

The conditions peculiar to Kyrgyz are as follows:

(1) There are few system development experts. Therefore, a product which allows maintenance and operations by few persons after installation must be selected.

(2) Most of the experts of Kyrgyz have experienced only small-sized systems. A product which can be developed and maintained based on the techniques of small-sized systems must be selected.

(3) In areas outside of Bishkek and Osh, there are very few experienced system operation management personnel. In fact, it can be said that there are no such persons. Therefore, it is desirable that the computer systems in rural areas be controlled and maintained by the central computer center.

(4) It should be mentioned that the market of the country is severe for computer manufacturers in terms of the scale of the market and the competitive situation in computer-related fields. Therefore, when a product is selected, in addition to the possibility of survival of the product, the possibility of survival of the manufacturer in the country should be reviewed.

11-1-3 Policy of Procurement Fit to the Strategy for Developing the Financial and Payment System

(1) In 2000, there will be a difference of a little less than 30 million remittance transactions, equivalent to approx. 2.2 times, in the number of remittance transactions between Plans A and B. Software is little affected by the number of transactions, however, hardware configured to achieve the required number of transactions should be procured.

(2) There may be increases of the number of transactions. In that case, it must be possible to add the required units estimated in the required places.

(3) If the speed of increase of transactions is slower than estimated, phased expansion of the capacity should be accepted.

(4) When the most of the commercial banks have their own networks, the volume of transactions of the network in this system may decrease. In consideration of this, a product with architecture comprised partially of parts and components which can be used for other purpose or sold is desired.

11-2 Items to be Considered in Software Development

11-2-1 Choice of a Language for Users

In the Kyrgyz Republic, two languages are used at present. One is the present official language, Russian, and the other is Kyrgyz, which has been used from old times. Some people assert that Kyrgyz will be the official language in the future, and such a change may occur after installation of this system. Adoption of the following method is recommended to handle such a change if it occurs:

(1) To develop application products based upon English. This selection is appropriate in consideration of possibility of system development by developers overseas.

(2) The input part of the system, that is, the keyboards should be able to flexibly input in an arbitrary language; i.e., not be dedicated to any specific language. The basic software must correspond to Russian and input devices such as keyboards must be able to input and process English, Russian and Kyrgyz.

(3) The output part of the system should be independent from the products. That is, the data inside the system, not embedded in the programs but independently kept in the system, is prepared for display on a printing and display device of the system. It is designed so that the system displays all of its internal data, and an administrator can modify the internal data by use of a special program during installation or maintenance. Therefore, in this system, an individual user language can be selected for every installed place.

For example, the following setting is enabled by the above-mentioned measures:

(1) English is used for development and tests so that foreigners also can understand it.

(2) The users of subsystems of terminals in commercial banks can select Kyrgyz or Russian, and English.

(3) Kyrgyz is used for subsystems for Regional node subsystem and RCC dedicated input subsystem.

(4) The official language is used for the message switching system and the host related systems. When the official language is changed, the language used is also changed.

(5) If a gateway subsystem overseas is added, English is used for the system.

It is hoped that this method will bring considerable profit to operations of the system in this country.

11-2-2 Measures for the Trend toward Standardization

This is a very important item for the system development plan in the future. The computer industry is encountering great changes at present. Few years ago, even outstanding companies in this industry were showing losses and were forced to restructure their organizations. In the meantime, techniques which had attracted little attention before were rapidly popularized and the retraining of engineers was required. It is thought that this change was promoted by downsizing of computers, standardization of middle- and small-sized units, and popularization of client/server architecture by which middle- and small-sized systems can be connected.

As described in the item of the outlined design of hardware, the present is the age of 'open & standard'. Most of the leading manufacturers are involved in standardization more or less. Standardization in the following fields particularly is noteworthy:

(1) Operating systems

(2) Communication and networking technology

(3) Presentation and graphic user interface (GUI)

(4) Database query languages

(5) Programming languages

(6) Application development environments

(7) Transaction monitoring and control technology

(8) Network management

As a result of this standardization, the systems of many vendors are connected and group work under a client/server architecture is enabled. This technology may also be applied to the subsystems of the host and for the network in this payment system. The merits of such technology are as follows:

(1) The configuration comprising units of multiple manufacturers is enabled.

(2) Many products are available.

(3) Optimum subsystems in function can be selected.

(4) Leading manufacturers in this industry compete in development, and in the near future, the progress of the basic technology and shipment of new products can be expected.

(5) The coefficient of performance to price is being enhanced remarkably.

(6) The architecture is durable because rearrangement of every component is enabled.

(7) The load distribution, error resistance and presentation functions particularly required for an electronic payment system is being developed to a remarkable extent.

Such systems are also worth reviewing together with proprietary systems being offered by long-established manufacturers with past records.

11-2-3 Interface with Other Systems

As described in the item of the structure of the system, the addition of the following gateway systems to this computer network in the future is anticipated:

(1) Connection system to payment network among CIS

(2) Connection system to SWIFT

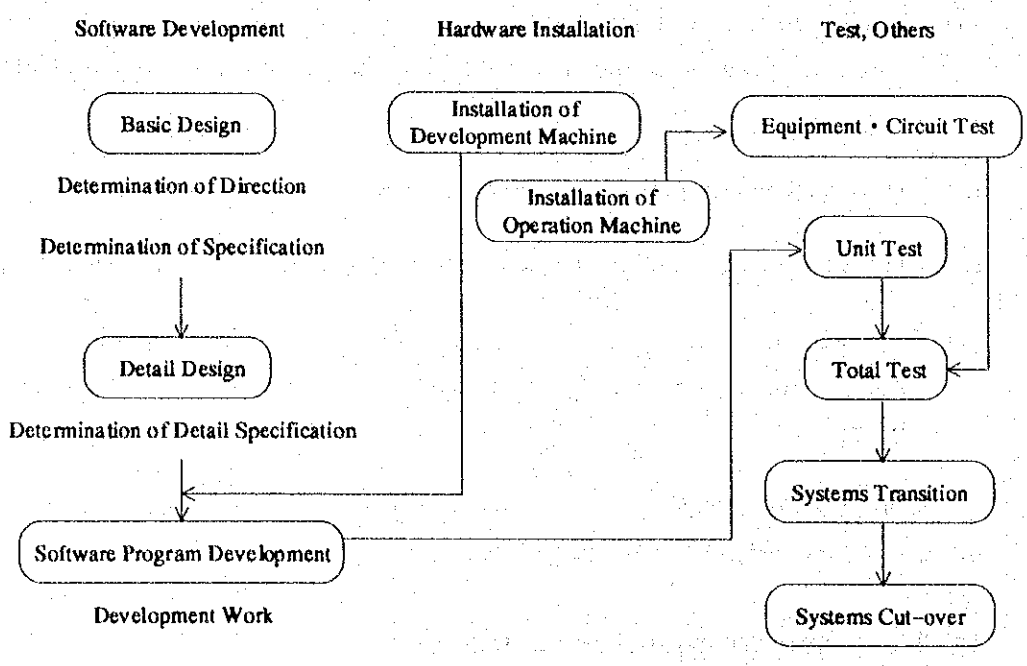
To allow the addition of these systems, procurement of products which are expandable, promising, and which can be widely supported is desired.

11-3 Plan for Installation, Maintenance and Management of the System

11-3-1 Procedure for Installation

In this section, the procedure from development of the computer system and network for the electronic payment system up to the installation and operation are shown below. The schedule and the setup of installation will be described in another section because consideration is required for the expenses (the amount of an estimate and procurement).

Systems Installation Plan



11-3-1-1 Designing work in the project

In designing for this project, the following work is performed without establishing a premises for the specific computing environment:

(1) Analyzing the model of a system

(2) Providing requirements of a system

(3) Functional design of application system

(4) Structural analysis

(5) Analysis of software structure for a subsystem

(6) Conceptual design of hardware for a subsystem

(7) Conceptual design of a network

To continue development work, it is necessary to select the real environment in which the software will actually be developed because the work performed for software comprises abstract description.

11-3-1-2 Implementation plan and selection of computing environment

As a process of the systems development, there are formulations of the implementation plan and selection of the real computing environment which are comprised from hardware and basic software products. For example, the following choices are anticipated:

(1) Large-scaled mainframe

(2) Minicomputer proprietary to a manufacturer

(3) Open & standard RISC workstation

(4) Open CISC small-sized unit

(5) Others

When the platform is decided, the premise conditions of system configuration and operations are clarified and the ordering conditions can be decided. At the same time, decisions are also made on the resources required for detailed design of the system such as database products, developing tools, and user interface. The relation among the outlined design of this project, the selection of computing environment and the detailed design is shown in Figure 11-1.

For an implementation plan, the development method, the composition of the project and the conditions of delivery are discussed in conjunction with the decisions on the plan and schedule for developing work.

11-3-1-3 Ordering and composition of the project

It consists of software development work and the ordering hardware. The group in charge of software development composes the organization for the project. To enhance the efficiency of the project in the downsized management unit, a composition comprising the following three development groups is thought to be efficient in this payment system:

(1) Development group of host related subsystems

(2) Development group of network related subsystems

(3) Development group of terminal related subsystems

In addition to the above-mentioned three groups, a staff to manage the overall project, make arrangements for procuring products and perform general affairs is also required.

11-3-1-4 Detailed design

The detailed design is made when the composition of the project is completed. At the same time, arrangement and ordering of hardware and communication lines are made.

In the detailed design, concrete and detailed design for the application software in the real environment is made based upon the results of the rough design. The detailed design is comprised of:

(1) Detailed database design

(2) Detailed input design

(3) Detailed output design

(4) Process design including design of process-to-process communication

(5) Operation design

The input, output and operation designs of the detailed design should be confirmed and agreed upon by the user.

11-3-1-5 Programming

Module design and programming are started with the user's approval. At the beginning of this phase, the database is defined and the screen format is generated. This phase also contains a module test by a programmer. The preparation for installation of hardware is initiated concurrently with this phase.

11-3-1-6 Test and acceptance of hardware

Linked modules are tested following the module test and finally, modules at the system level, that is, a program is tested. At this time, the matching of the system design is checked. In the latter half of this phase, a full set of hardware is delivered and the user checks the functions of the system with it.

11-3-1-7 Installation

When the check by the user is completed, installation is started. This work usually consists of:

(1) Installation of all units or devices at the user site

(2) Registration of the data required for starting the operations

(3) Instructions of the operations to users who have not participated in the test

(4) Distribution of the operating manuals

(5) Distribution of supplies

11-3-1-8 Operation

Operations are started through the above-mentioned process. The above-mentioned procedure is summarized in Figure 11-2.

11-3-2 Maintenance and Management Plans

Networks and systems of the following two groups are managed and maintained:

(1) The purchased group: Hardware and software products, Network related components and units

(2) The developed group: Application software

11-3-2-1 Maintenance and management of the purchased hardware and software

For managing purchased hardware products, software products, and network-related components and units, the user is required to decide their layout and configuration and understand the status of operations. Therefore, the maintenance administrator should be able to answer the following questions:

1) What are the individual units unit and where are they? How are the units connected each other?

2) In what status they are operating?

3) If a failure occurs in a unit of a network, how extensive is the effect?

4) If there is assumed to be a component in which a failure may occur, which component is it?

The user manages the units and devices with such information and the supplier provides maintenance service for delivered products.

(1) Understanding the configuration of the network

To understand the above-mentioned configuration and the status of operations, information must be collected using a management tool. The outline of the procedure for collecting information is as follows:

1) Obtaining information on the configuration from the network administrator:

Device number, Device name, Specification, Network address, Connection method, Communication method

2) Collecting information on the layout of devices at each site

Installed location of every device number, User name, User telephone number

3) Addition of inventory information

Manufacturer of every device number, Deliverer, Name of a person in charge, Telephone number, Obtained date, Life

Though this information may be communicated in written form, it can be also collected using a simple tool such as a spreadsheet for a personal computer.

(2) Understanding events on a network

If the configuration of the system, units/devices and components of a network has been understood, the next step is to understand the operating status of each component. A dedicated management system is required for understanding the dynamic status. For the management system, a ready-made system on the market can be used, depending upon the platform. The general functions are as follows:

1) Monitor of targets to be monitored. (Or a product provided with a monitoring function is selected.)

2) Installation of a management system in an operation center.

3) Registration of the configuration information of targets to be monitored to the management system. (The configuration data can be converted.)

4) Setup of necessary information such as the block diagram of the network and alarm generation rules in the management system.

5) Actuation of all components covered by the management system.

By operations of this management system, the events of a network are collected into an operation center automatically and an operator is informed about the status of the operations based on judgment of the status according to a given rule. A person in charge of maintenance and management can judge, the occurrence of a failure or possibility of a failure by checking this information. This judgment is a key to performing the on-demand maintenance service described later.

(3) Maintenance contract and execution of maintenance

Actual maintenance work for purchased units and devices is classified into the following types of work by the vendors. In the case of software products, a vendor sometimes requests a user to maintain a product with maintenance tools sent by the vendor, but the manufacturer of the software product upgrades or revises the product. A user must make a contract for maintenance service to upgrade or revise his product, to request inspection of his unit or device, and to request measures when a failure occurs. The vendor provides the following two types of service according to this contract:

1) Regular inspection: Units or devices are inspected and if there are any worn parts, they are replaced according to a predetermined schedule. Replacement is sometimes performed by a remote operation.

2) On-demand maintenance: When the possibility of a failure is found or a failure actually occurs, maintenance is generally performed according to a report by a user.

11-3-2-2 Maintenance and management of the developed software

The application software developed peculiarly for the payment system should be maintained and managed by the operational organization of the system itself.

(1) Software maintenance system

An expert is required for maintaining the software, irrespective of whether it is basic software or application software. As a system is enhanced, the expert area is subdivided. For this payment system, the following classifications of expert areas are anticipated:

1) An expert in charge of the platform for subsystems of the host: System configuration, Setup of communication software or database, Setup of middle ware

2) An expert in charge of the platform for subsystems for a network:

3) An expert in charge of the platform for terminal subsystems

4) An expert in charge of applications for subsystems of the host: Mainly a group of data processing programs

5) An expert in charge of applications for subsystems for a network: Mainly a group of message handling programs

6) An expert in charge of applications for terminal subsystems: Mainly a group of user interface programs

The work of the above-mentioned 1) to 3) (if the same or a similar platform is selected), 3 and 6 (if a system is small-sized and the expert is experienced) or 4) and 6) (if functions are similar) can all be performed by the same expert or experts. Groups should be organized and the number of required staff should be decided after completion of the detailed designs.

(2) Software maintenance method in a remote site via a network

The following considerations are required for software maintenance of a center in a region with no software experts usually, particularly if there are several of such regions:

1) Sometimes, different versions in different regions may be maintained.

2) A schedule must be adjusted to allow for replacement with a new version.

3) During replacement of versions, it must be judged whether communication between a system in which the program of a new version is running and another system in which the program of an old version is running should be allowed.

4) The method of installing a new version must be reviewed.

Remote software maintenance is performed to prevent communication incompatibilities between the programs of new and old versions, and to quickly replace old versions at a low cost. Also for this system, this method should be adopted for maintaining the software for the regional node system in the five locations other than Bishkek.

11-3-3 Required Capabilities of the Staff

The type of the staff required for development, operations and maintenance of this payment system and their corresponding capabilities are as follows:

(1) Staff in charge of system planning

Ascertains the needs of users, estimates required resources and plans a project after the payment system is operated.

(2) Software administrator

Manages the procedure and method for software development, instructs and manages development work.

(3) System Engineer (SE) of platform

System configuration, Setup of communication software and database, Setup of middle ware

(4) SE of application

Develops and maintains data processing programs.

(5) SE in charge of communication

Develops and maintains message handling programs.

(6) SE in charge of GUI

Develops and maintains user interface programs.

(7) Operation administrator

Trains operators and manages the schedule of operations.

(8) Network administrator

Manages the configuration of a network and information of the components.

(9) Operator

Operates a computer system.

At present, the staff in this country that have already been confirmed include the persons in charge of system planning, the application SEs and the operators. However, a sufficient number of qualified persons to maintain and operate the payment system is not considered to have been collected. The procurement and training of the staff is expected to be one of the future large problems.

In the future, operation and network administrators will be especially required. The procurement of these administrators will enable the stable operation of the system and prompt recovery from failures.

Expected organization for operating this system is as follows:

Bishkek Operation Center

General Management	General Manager
	Secretary
Software Development Dept.	Software Manager
	Platform engineers
	Application engineers

	Network software engineers
	User interface engineers
Operations Dept.	Operation manager
	Network administrator
	Systems operators
RKC Users' Dept.	RKC operators
Osh Regional Clearing Center	RKC supervisors
	RKC operators
Jalal-Abad node center	RKC supervisors
	RKC operators
Kalakol node center	RKC supervisors
	RKC operators
Naryn node center	RKC supervisors
	RKC operators
Talas node center	RKC supervisors
	RKC operators

11-3-4 Measures for Urgent Report on System Failure, etc.

Measures in an emergency can be classified according to the time zone, region and target, as follows. The system for reports according to place, cause and time zone of system failure will be described. The following table shows primary contact destinations.

Place	Target	Work hour	Overtime
Bishkek Center	Initial measure	(An operator executes the measure.)	(An operator executes the measure.)
	Application	Software develop-ment/maintenance SE	SE on duty
	Platform	Platform SE	SE on duty
	Line failure	Network administrator	———
Regional center	Initial measure	(An operator executes the measure.)	(An operator executes the measure.)
	Application	An operation administrator of Bishkek Center	SE on duty of Bishkek Center
	Platform	An operation administrator of Bishkek Center	SE on duty of Bishkek Center
	Line Failure	Network administrator	———
Branch of a bank	Initial measure	(A branch executes the measure.)	(A branch executes the measure.)
	Line failure	An operator in a regional center	———
	Others	(A bank executes the measure.)	(A bank executes the measure.)

In any case, the operator should perform the measure for an initial measure. After retry of the operation and confirmation of the event, the operator should separate the part with the failure and report the results to the reporter. When an SE in charge receives the report of the failure, the SE should restart or recover the unit or device with the failure at once. When operation and network administrators receive the report of failure, they should request the suitable staff, vendor or communication company for recovery or replacement after ascertaining the status.

After recovery work is completed, the administrator should leave the error log and pursue the cause. If a developed product has a problem, he should make a request for revision of the product, specifying the extent of emergency in accordance with the extent of the failure.

Chapter 12 Plan for Action Program, Organization and Management for Implementation Works

Chapter 12 Plan for Action Program, Organization and Management for Implementation Works

12-1 Plan for Implementation Program

12-1-1 Basic Thinking for the Implementation Program

(1) Staged Development

1) In order to resolve the problem of delay involved in present payment systems the first phase of the new system is to be in operation in 1998. The first phase system will make use of an Iskla line with the aim of constructing a payment system which can handle rapid and safe transfer transactions and carry out immediate gross settlement procedures.

2) In 2000 a digital network will be employed in order to reorganize backup lines and increase the volume of lines available so as to run the second phase system with the aim of providing the systems basis for development of banking activities.

(2) Development Systems

1) Development on commission

The level of technical expertise of local development engineers is high but development of the new system will involve more than 400 manpower months and expertise in creation of new systems on a very large scale for which local engineers have little experience. Moreover the number of local engineers is insufficient in absolute terms. It will therefore be necessary to commission a foreign software supplier to carry out systems development work.

2) Development Abroad

(a) In view of the socio-cultural differences (eating habits, accommodation available, etc.) it is envisaged that there will be difficulties involved in creating an adequate context for development locally in view of the import of hardware devices and equipment.

(b) In particular for development of new systems which will require more than one year it is considered more realistic to have the main stages of development carried out abroad with the exception of the review of the overall outline design, overall testing and the systems transfer period.

3) Participation of Users and Local Technicians

(a) It is considered important to set up a Development Team of 3 to 4 members consisting of local development technicians of the Kyrgyz Republic to take part in systems development. This will ensure the efficient system of development (especially of application development) and the smooth maintenance of systems after development.

(b) It is often emphasized that participation in systems building of the users who are destined to use the new systems is essential to successful development. Without their participation local conditions and needs will not be sufficiently reflected in the functional details of systems supplied and this may render the final systems inconvenient and/or inappropriate. Moreover without participation users tend to lack commitment and this weakens their ability and will to adopt a stance of active and efficient employment of the new systems.

(c) Users are expected to play the central role in defining the functional details of the new systems, in drawing up the work procedures of the new systems and in establishing the transfer procedures to be followed. Since the overall outline design has been established as part of the study mission the functional details of the system which will be required have not been rigorously defined. In view of the communication gap which will exist if development is carried out abroad it will be necessary for one or two representatives of the users to participate in overseas development activities.

(d) In order to ensure that technology transfer after the development stages is smooth and efficient it will be necessary for local technicians to participate in development. The problem of the shortage of systems engineers was voiced in hearings with local commercial

banks. Therefore it is strongly advised to have 2 or 3 technicians who will form the core of future systems development in the Kyrgyz Republic participate in overseas development activities.

4) Creation of Development Supporting Organizations in the Kyrgyz Republic

(a) If this option of systems development overseas is adopted it will be necessary to consider measures to ensure that the needs of users are reflected in a timely and efficient way despite the possible problems of physical distance and communication gap. Such problems can not be entirely resolved simply through the participation of the users in systems development.

(b) Therefore it is essential that an organization be set up in the Kyrgyz Republic which will be based in the NBK to support development works. This body will be responsible for formulating the opinions and views of the NBK and commercial banks, carrying out adjustments and making a timely response to inquiries, etc. received from the software supplier. The success of overall development will depend on the effective operation of this body.

(3) Transfer to Specific Sites

1) The system to be developed is to be of a fully national nature in its coverage. However, in view of the limits of availability relating to required personnel and translator/interpreters, the geographical conditions of the Kyrgyz Republic, and the nature of the transfer works (mostly for remittance systems), it is considered appropriate to stage implementation in three distinct steps corresponding to certain regions.

2) As concrete proposals for possible staging we have given the following two examples;

(Proposal 1)

In which transfer priority is given to regions where the volume of transactions is greatest so as to realize early benefits of the new system.

1. Chui, 2. Osh, Jalal-abad, 3. Karakol, Naryn, Talas.

(Proposal 2)

In which priority of transfer implementation is given to regions with the smaller volume of transactions in order to check and assure safety of operations.

1. Talas 2. Karakol, Naryn 3. Osh, Jalal-abad and Chui

A final conclusion cannot be given here but in view of the fact that the new system involves the development of the NBK Net and that the aim of improvement is to resolve the problem of settlement delay as soon as possible it would seem reasonable to consider the option to transfer first to Chui province (proposal 1).

(4) Documentation Aspects of Works to be Undertaken

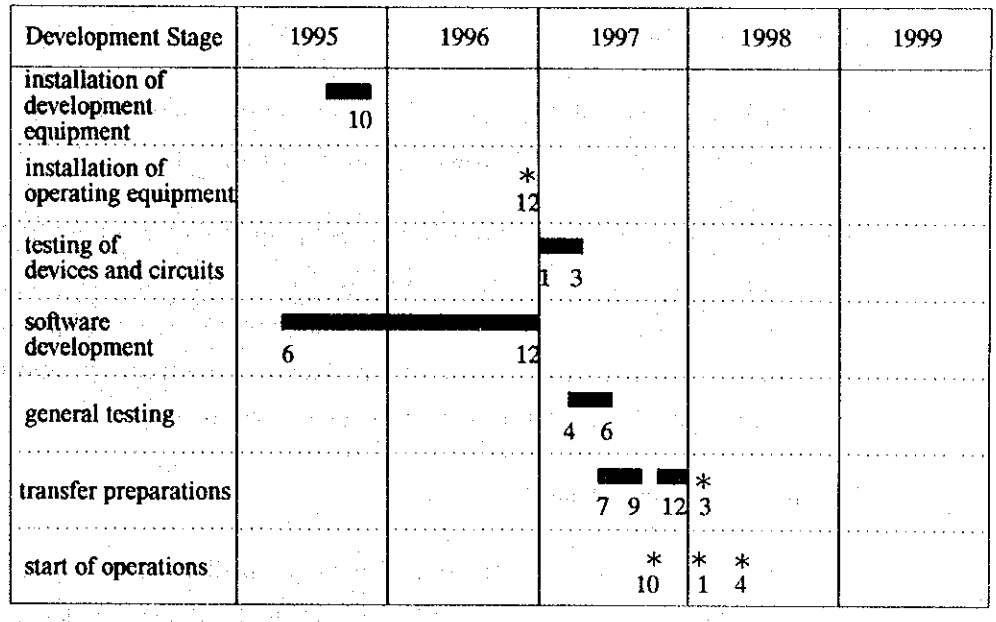
1) Among the written documents (such as systems specifications, operational manuals, transfer procedure guidelines, office working manuals etc,) to be handed over to the Kyrgyz counterparts it will be necessary to provide editions in the Kyrgyz language as well in Russian in some cases as for the transfer guidelines and office working manuals. It will be necessary to consider this aspect of the program since there are many personnel in the provinces who can not read Russian.

2) If development is carried out abroad then the costs relating to software development will be included but it will be necessary to promptly secure excellent translation staff, local users and technicians competent in handling Russian and Kyrgyz. It is also important to minimize the effect which these works and burdens will have on the duration of development.

12-1-2 Outline of the Implementation Program for Works

(1) Phase 1 Development of the System

Development scheduled to start in June, 1996 and operations to commence between October, 1997 and April, 1998 (refer to Table below).



(Numbers in the table indicate month).

1) Software Development Stage

(a) Assuming that development is begun from June, 1995 it is planned to finish development in December, 1996. Approximately one year and seven months are scheduled for this processing stage.

(b) Annex 13 gives a breakdown of the development processes involved in software development.

(c) Direct personnel requirements for software development would be about 20 staff on average per month.

(d) It is expected that design planning stages would need about 9 months while development stages (programming, unit testing, overall testing, etc.) would require about 10 months.

(e) Comparing network development and application development it is easy to include network development in the design processing carried out after the outline design has been drawn up. On the other hand, application development will require a period of about two months to allow for a local visit to confirm the basic conditions of users and establish functional details.

2) General Testing Stage

(a) Is planned to employ 12 personnel for 3 months and their duties will include testing the end terminals of users at local sites.

(b) The drafting of the general testing program and the drawing up of test implementation details will be included in the software development stage. Further, costs equivalent to 72 manpower months (12 personnel times 6 months) are to be earmarked when estimating costs and these will include the testing of devices and network lines.

3) Transfer Preparation Stages

(a) Since operations are to be staged over three distinct time schedules according to district the transfer preparations will also be staged over three distinct periods (with a total work involved of 12 personnel times 6 months).

(b) The transfer preparation stage will include training in the procedures for handling new systems and implementation guidance for new office works and functions in addition to the actual work of transferring the new systems.

(c) The drafting of the transfer preparation program, the drawing up of transfer work details and of a training program will all be included as part of the software development stage of the project.

(2) Phase II Development

Development works are planned to start as of June, 1998 and will be in operation sometime between January and May of 2000.

Development Stage	1998	1999	2000
installation of operating equipment		* 3	
upgrading network lines		7 9	
software development	6	9	
general testing		10 12	
transfer preparations		10 12	* 2 * 4
start of operations			* 1 * 3 * 5

(Numbers in the table indicate month.)

1) Introduction of Operating Equipment

Since most of the operating devices will already have been introduced in Phase I, the main element newly introduced will be additional client systems for reinforcing handling capacity.

2) Upgrading of Network Lines

It is still undetermined exactly when digital lines can be used but some sectors will be using such digital line from 1999 and by 2000 all lines are to be digital.

3) Software Development Stage

(a) On the assumption that development is begun from June 1998 this is planned to be completed by September, 1999. Approximately one year and four months are scheduled for this processing stage.

(b) Workload estimation;
(See Annex 13 for details)

(c) Direct personnel requirements for software development would be about 7 staff on average per month.

(d) It is expected that design planning stages would need about 6 months while development stages (programming, unit testing, overall testing, etc.) would require about 8 months.

4) General Testing Stage

(a) Is planned to employ 8 personnel for 3 months and their duties will include testing of the end terminals of users at local sites.

(b) The drafting of the general testing program and the drawing up of test implementation details are to be included in the software development stage. Further, costs equivalent to 48 manpower months (8 personnel times 6 months) are to be earmarked when estimating costs and these will include the testing of devices and upgrading network lines.

5) Transfer Preparation Stages

(a) Since operations are to be staged over three distinct time schedules according to district the transfer preparations will also be staged over three distinct periods (with a total work involved of 8 personnel times 6 months).

(b) The transfer preparation stage will include training in the procedures for handling new systems and implementation guidance for new office works and functions in addition to the actual transfer of the new system.

(c) The drafting of the transfer preparation program, the drawing up of transfer work details and of a training program will all be included as part of the software development stage of the project.

12-2 Plan for Organization and Management

12-2-1 Participants in and Owners of the Payment System

(1) Participants

1) Roughly speaking activities and works concerned in the new systems can be divided into those relating to the sector of inter-bank transfers, those

concerning intra-bank transfers and business operations involved by the current deposit account system of the NBK (the NBK Net).

2) The NBK which is responsible for running of the NBK-net is to be a participant of the new system.

3) The participation of all of the commercial banks (including the savings banks) is desirable in connection with inter-bank transfers in view of the importance of developing new systems aimed at establishing settlement procedures which are speedy, safe and have finality. If there are banks which do not wish to participate it will be necessary to carefully examine their reasons for not wishing to participate, for example they may declare that this is because at the present time they do not carry out any inter-bank transfers. A general policy for responses to such cases should be decided upon.

4) By 2000 it is possible that some more progressive banks will have already set up their own intra-bank transfer systems which enable them to provide safe and speedy remittance services to their customers. To force such banks to participate in the new system is not considered appropriate.

(2) Owners

1) It will be necessary to examine the question of ownership in relation to the burden of duties and costs which will be borne by different parties in order to make a decision on which parties should be allocated ownership rights.

2) In terms of duties and responsibilities it is beyond doubt that the NBK is the legitimate body to own the NBK current deposit accounts system (i.e. the NBK network).

Since the intra-bank transfer system is not directly related to the interests of the NBK the commercial banks should be made owner of this.

With regard to inter-bank transfers both the NBK and the commercial banks have vested interests and so ownership should be divided between these parties. However it is anticipated that it will be extremely difficult to decide which sections of the system are to be allocated to the NBK and which not.

3) In terms of cost burden the party which undertakes to meet the cost of investment in the new system is, in principle, taken to be the owner.

4) Ownership rights can also be considered in relation to the third factor of financial policy. In these terms for the period of the shift over to a market economy the role of the NBK in assuring the improvement of the payment system is central and the commercial banks keenly hope that the NBK will meet expectations placed on the NBK in this direction. In this context one possible approach to ownership is to have the NBK retain ownership rights for the time being and then pass part of these on to the commercial banks at a future date.

5) Even if the NBK is accorded ownership for the sake of capital supply and financial policy reasons it is vital to harness the creative commitment and practical contribution of the commercial banks if the system is to be developed and managed successfully.

12-2-2 Systems Operation Plan

Operation plan of network and computer systems in payment system is observed in this section. Items of description in project organization are included in "Proposition relating to organization operation" and operation schedule is in "Application design".

(1) Systems Operation Organization

Operation of organization in computer system and network are described in the following architecture.

1) Organization structure which responds to each phase from planning to inspection of new project plan and new project item

- Catching of users needs
- Development plan
- Test and inspection
- Delivery

2) Organization and function which is in charge of operation of delivered system and equipment

- Operation at each local site
- Network operation: maintain and control of remote operation and network route between sites

3) Organization and function which is in charge of maintenance and up-grade of systems and equipment in operation

- Maintenance and up-grade of hardware
- Version up and maintenance of software

4) Organization other than above

- Personnel, general affairs, etc.

Structuring of actual organization varies depending the size of systems and operation hours, however, one typical example can be sought as follows:

(a) Integrated operation and management center in Bishkek

Plan, network operation, software management, other functions

(b) Operation in each RCC

Site operation and hardware management at each site

12-3 Setting Remittance/Transfer Charges

(1) Basic Thinking

1) As is evident from the analysis of the economic benefits of the envisaged new systems, and on the assumption that the financial and economic benefits of the system are sufficient to justify the required investment then development should take place in view of the contribution to social overhead capital provision which will result even if the system participants are not able to fully meet the investment burdens involved.

2) Thinking along these lines if it is possible to cover the running costs and grant loans then there should be no problem. However, the view that parties benefiting from the system should bear the burden of running costs is very strong.

3) There are two main methods for setting charges in such cases, either a fixed standing charge can be placed according to the amount of deposit and capital assets held by a given bank or a variable charge based on the actual volume of service (in terms of time and/or traffic volume) can be billed. We have introduced below examples of charge setting levied on clients envisaged as the final beneficiaries of the services in question.

(2) Examples of Charge Setting under the New System

1) Remittance or Transfer Services

The following transfer services can be provided to clients;

type of transfer	details of the service
inter-bank funds transfer: urgent	* given high priority rating for transfer; * confirmation notice sent to sending bank of arrival of the transfer to receiving bank (automatically issued) * confirmation notice that transferred money has been deposited in payee account (issued by receiving bank)
customer requested transfer: normal	* given low priority rating for transfer
Inter-bank funds transfer: urgent	* given high priority rating for transfer * confirmation notice of payment into NBK current deposit account sent to sending bank (automatically issued) * confirmation notice of arrival at receiving bank terminal sent to the sending bank (automatically issued)

2) Examples of Charges set for Transfer Services

	sent to the bank's branches	sent to another bank's branch
customer requested transfer;		
urgent	6 Som (4)	8 Som (6)
normal	4 Som (3)	5 Som (4)
inter-bank funds transfer;		
urgent	–	10 Som (10)

(Note) Figures marked in ( ) show the income of the body responsible for running the new system. Wage payments, automatic transfers, CD, etc. are not included .for policy reasons in the income of the body managing the new system.

3) Estimate of Annual Income of the Organization running the New System (for 1998 assuming that one year of operations has been completed already)

customer requested	annual volume	charge/transfer	annual transfers income
urgent(10%)	935,309	4.9 Som	4,583,014 Som
normal(90%)	8,417,785	3.4 Som	28,620,469 Som
sub total	9,353,094	-	33,203,483 Som
inter-bank funds transfer	7,125	10 Som	71,250 Som
Grand total	9,360,219		33,274,733 Som

(3) Setting of Actual Charges

1) Even if it is decided that charges are to be set on the basis of having the final beneficiary bear the burden there will still remain a variety of opinions on what extent of the costs involved should be covered.

2) If all of the costs involved are to be borne by the final beneficiary there is a possibility that this will impede `or discourage use of the new system.

3) In the final analysis it is necessary to make a decision on the basis of a comprehensive view embracing aspects of the capital supply methods, fee policies of the clearing house, and the capital burden which the banks and the final beneficiary are able and prepared to bear.

12-4 Organization and Systems for Running and Supervision

(1) Organizational Structures

1) For efficient running and management a joint stock company with a self supporting payment system is generally considered the best organizational structure. If too much importance is given to profitability then there may be difficulties in balancing this with system security and there is a danger of clients being saddled with excessive burdens. If such a joint stock company with self supporting payment system is adopted then in addition to the NBK and banks providing personnel and capital outlay to establish the budgetary foundations it will be necessary to ensure that the resulting organization sufficiently reflects the views of both the NBK and the banks.

2) If emphasis is given to the public nature of the system and it is decided to have the NBK administer the system directly then a consultatory body consisting of members from the NBK, commercial banks and financial advisors will need to be set up so that the views of both industry and the banking spheres are adequately represented and reflected in running of the system. Moreover it will be necessary for the NBK to set up a special division to be responsible for planning and promotion activities to ensure the efficient running of the system.

3) Supervision and running could also be carried out by a body such as an Association of Banks. Alternatively, it would be possible to have the NBK responsible for planning department activities, the software supplier carry out development and then delegate the actual running of the system to a third party such as a company set up especially for this purpose.

4) Whatever the managerial system which is eventually adopted, it is important that the NBK play the leading role for some time after operations commence, in order to ensure the public nature, safety and efficiency of the system.

(2) Establishment of Training System

1) To have a smooth operation of the center, it is planned that both users and information systems engineers (4 to 5 persons) from Kyrgyz are to participate in the project. And at the time of new systems transfer, by preparing both operation manuals and office processing manuals, education and training for the systems operators (3 to 4 engineers for 2 weeks) and transfer processing personnel (1 to 2 persons from each bank for 2 to 3 days) are to be implemented along with the systems transfer process.

2) Regarding training of the systems operators after the systems cut-over, foreign engineers are to be commissioned to involve in the training for a certain period of time, then it is to be desired to transfer their technology not only to those Kyrgyz who are involved in the development but to other engineers. However, only these OJTs (on-the-job training) are not sufficient enough in total and structural point of view. Therefore, it should be covered by systems education held twice a year by software houses.

3) Regarding systems maintenance, it is planned that foreign engineers should be commissioned for a certain period of time and continue education by OJT and systems education twice a year by software houses. In a long-term view, it is considered for Kyrgyz people that software maintenance of network systems have some difficulties. However, both maintenance and enhancement of application software should be developed by Kyrgyz side. In Kyrgyz, there exists lack of experiences in large systems development, and lack of information systems engineers in banking business is quite serious. For example, even bank head offices planned sending engineers to their branches could not meet the requirement because of aforementioned reasons. These are becoming barriers to computerization of banks in Kyrgyz, and both NBK and commercial banks and NBK strongly desire education of engineers.

   For own systems development, it is required that not only to enhance number of information systems engineers but to obtain high-level knowledge of information systems technologies.

4) On the other hand, personnel involved in the new systems are principally to be educated by OJT programs within each bank. When looking at the future expansion of the systems like introduction of new accounting systems and connections to SWIFT, it is not enough only to obtain new systems manual but to enhance broad knowledge of financial systems. It is highly beneficial for Kyrgyz to improve financial systems by recognizing existence of banks under free economy, company evaluation methodology, collateral, bank accounting processing, knowledge on new financial products, international financial business, and introduction of computers in banking business.

5) In addition to operation education in the new systems, it is highly desired to establish training centers with the objectives of educating broad knowledge of finance and education of information systems engineers.

Chapter 13 Calculation of Project Costs

Chapter 13 Calculation of Project Costs

13-1 Basis of Calculations

The calculation of project costs is based on the following:

(1) The currency used is the U.S. Dollar (U.S.$) at the exchange rates indicated below (average for June 1994).

U.S. $1 = 10.0 Som
U.S. $1 = ¥ 100.0
1 Som = ¥ 10.0

(2) All of the prices use June 1994 as the base month.

(3) The price estimates assume that the selection of the suppliers and construction firms will be based on international tender or domestic tender.

(4) Imports of the equipment and materials will be exempt from all tariffs, duties, and other taxes within Kyrgyz.

(5) Due to the absence of suitable domestic-made hardware within Kyrgyz, the procurement of hardware will be done through the purchase of foreign-made goods.

(6) Since the engineers within Kyrgyz lack sufficient experience and numbers for the large-scale development of software, development shall be entrusted completely to foreign software developing companies.

(7) Hardware and software will be procured on a buy-out price basis, not on rental or lease basis.

(8) The calculation of project costs will be done in terms of local currency components, foreign currency components, and taxes necessary for economic and financial analysis.

13-2 Composition of Project Costs

The composition of project costs is indicated below.

(1) System equipment cost (hardware)

(2) Software development and implementation costs

Basic software purchase cost

Application software developmental costs/ System transition expenses

- Foreign specialist absence fees
- Foreign specialist travel expenses
- Foreign specialist lodging/perdiem expenses
- Other developmental equipment and materials costs

(3) Testing expenses

- Foreign engineer absence fees
- Foreign specialist travel expenses
- Foreign specialist living expenses

(4) Auxiliary equipment costs

- Air conditioning equipment costs
- Office equipment costs
- Fixtures and consumable costs
- Customs duties and transportation costs for imported equipment and materials

(5) Installation work costs

- Air conditioning work costs
- Electrical work costs
- Office renovation costs
- Other costs and expenses

(6) NBK Project Team cost

- Direct personnel costs
- General overhead and administration costs

(7) Contingencies

(8) Interest during construction

(9) Operating costs

13-3 Other Conditions of Estimate

(1) Procurement and delivery of equipment and materials

The hardware, peripheral equipment, air-conditioning equipment, electrical engineering equipment and materials, spare parts, consumable, office equipment, and so on will all be imported. In addition, in consideration of the difficulties and risks of land transportation (railroad), all goods are assumed to be shipped by air transportation to Bishkek Airport from where they will be transported by truck to the NBK headquarters and branch offices. Therefore, the cargo handling work, customs clearance, land transportation costs, and other costs and expenses at Bishkek Airport are payable in local currency. Also, the transportation of equipment and materials from Japan to Bishkek will be estimated assuming the use of a chartered aircraft on European routes.

(2) Software development

The software development costs and expenses include the purchase of application software which is general-purpose models available from overseas and the carrying out of software development work by foreign engineers in their own country. Therefore, the application software purchasing costs, foreign engineer absence fees, a portion of the per diem, insurance premiums, travel expenses, and so on will be paid in foreign currencies, while a portion of the per diem, lodging costs, transportation costs, and so on shall be in local currency. The system conversion work shall be carried out by foreign engineers with the cooperation of NBK engineers (Project Team Staff).

During the period of software development in overseas, 3 NBK engineers are to be involved in the development work along with the foreign software development engineers.

(3) NBK employee training

The NBK employee training shall be carried out by OJT (On-the-job training) through various stages of system building. However, the personnel and man-days for training shall be included in the software development expenses.

(4) Installation work

The hardware and equipment shall be installed by local companies under the supervision of the foreign engineers. The labor costs and office renovation costs for this work including the work materials shall all be in domestic currency.

(5) Responsibility for NBK employee personnel costs

The direct personnel cost for staff assigned by NBK as the employees of the Project Team for the carrying out of this project is indicated below. The general management costs, including the allotted management costs from the NBK headquarters and the corporation's payroll tax shall be 100% of direct personnel costs.

	Phase I (Person)	Phase II (Person)	Annual salary per person
Project Manager	1	0	US$ 3,000
Assistant PM	2	1	US$ 2,400
Systems Engineer	6	3	US$ 2,400
Operator	6	3	US$ 1,440
Clerk	3	1	US$ 720
Secretary	2	1	US$ 600
Total	20	9	

(6) Alternative proposal for raising funds

If this project is carried out under a loan to be repaid, then the interest on the loan during the implementation period shall be assumed in principle be carried over to the capital, but the amount shall differ with financing alternatives. The following two cases shall be examined as alternative proposals for the raising of funds.

Case I: Case where the amount of funds raised by equity financing
Case II: Case of financing by a long-term loan to be repaid

Loan conditions:

Ratio of loan:	Total investment X 70%
Grace period:	10 years
Repayment conditions:	30 years including the grace period, annual installments
Terms of interest:	3% per annum

(7) Calculation of tax portion (transferable cost)

The tax portion in the costs and expenses relating to this project are calculated as shown below.

1) Equipment and materials directly purchased

Value Added Tax (VAT)	20.00 %

2) Equipment and materials supplied by local contractors

Valued Added Tax (VAT)	12.82 %
Enterprise Profit Tax (EPT)	9.15 %
Total	21.97 %

3) Employee salaries for this project

Individual income tax (weighted average):	25.52 %

The payroll tax (37%) borne by the company is included in general management costs.

4) Contractor's labor cost

Individual income tax	8.73 %
Individual payroll tax	0.44 %
Subtotal	9.17 %
Enterprise payroll tax	16.15 %
Enterprise profit tax (EPT)	6.28 %
Subtotal	22.43 %
Total	31.60 %

(8) Conversion factor

Due to the difficulty of calculating the conversion factor for the various costs and expenses concerning Kyrgyz, adjustment based on the rate of the shadow wage estimating only labor shall be stopped at this point.

(9) Summary of computer centers

Besides the Bishkek headquarters, the computer centers are installed in the five local centers of Osh, Jalal-abad, Karakol, Naryn, and Talas. An equipment summary of each center is given below.

1) Bishkek center (headquarters)

Necessary space:

Computer room:	33 sq.meters
Operators' office:	45 sq.meters
RKC office:	18 sq.meters
Management office:	60 sq.meters
Total	156 sq.meters

Equipment details:

Computer equipment: one set

Air conditioning equipment: 30,000 Kcal

Office equipment: one set

Employees:

Position	Number	Yearly salary (U.S. $)
Manager	1	$3,000
System engineer	11	$2,400
Operator	8	$1,440
Secretary	1	$600
Total	21	

2) Regional centers (five cities)

Necessary space:

Computer room:	25	sq.meters
Operators' office:	25	sq.meters
Total :	50	sq.meters

Equipment details:

- Computer equipment: one set
- Air conditioning equipment: 10,000 Kcal
- (see separate sheet)
- Office equipment: one set

Employees (Total of five offices):

Position	Number
- System engineer	0
- Operator	17
- Secretary	0
- Total	17

(10) Man-months work by foreign specialists

The necessary man-months by foreign engineers and interpreters for the system building of this project is indicated below.

(Unit: man-month)

	Phase I	Phase II	Total
Software development	415	96	511
System transition	72	48	120
Testing	72	48	120
Sub-total	559	192	751
Interpreter	72	60	132
Total	631	252	883

(11) Foreign specialist living expenses

Living expenses consist of a per diem, lodging expenses, communication and transportation expenses, and an insurance fee each applied at the following unit costs.

	Domestic currency (U.S.$/MM)	Foreign currency (U.S.$/MM)	Total(U.S.$/MM)
Per diem ($60 per man-day):	900	900	1,800
Lodging expenses (renting of accommodations):	420	-	420
Communication and transportation expenses:	325	-	325
	-	250	250
Total:	1,645	1,150	2,795

(12) Absence fee (foreign currency)

The absence fee for foreign engineers and interpreters shall be at the following unit costs.

- Engineers: U.S.$ 12,000/man-month
- Interpreters: U.S.$ 16,000/man-month

(13) Frequency and expenses for passage of foreign specialists (foreign currency)

The software development company to be contracted for the carrying out of this project shall provisionally be assumed to be a Japanese corporation and the transportation route to be Tokyo–Moscow–Almaty. The frequency of passage shall be based on a long-term stay, and in consideration of leave to return home every 12 months and travel on business; it is estimated that there will be a passage every nine man-months.

Number of passages:

Phase I:	31 passages
Phase II:	33 passages
Total	64 passages

Unit cost passage: U.S.$6,000/passage

13–4 Calculation of Total Funds Raised

In the stages of this examination, although estimates were done with the types of equipment adopted for the hardware left undecided, many types of problems are foreseen with the work environment of the foreign engineers including the technical level of their engineering counterparts on the Kyrgyz side and communication problems, and for the estimate of the software development expenses, it is necessary to appropriate somewhat excessive reserve expenses to support suitable development. For the improvement of the accuracy of these estimates, it is necessary to go back and make revisions of the budget at each stage of the implementation of this project. The calculations of the project costs below are divided into Phase I (1998 scheduled work date) and Phase II (2000 scheduled work date).

(1) Hardware purchase costs

The total price estimate (FOB) of the standard price of the hardware considered appropriate for this project is indicated below.

Phase I:	U.S.$ 7,487,900
Phase II:	U.S.$ 295,000
Total:	U.S.$ 7,782,900

Note 1: The above amounts include instruments for system development and the scheduled loan of 300 terminals to commercial bank branches.

Note 2: The hardware is exempt from import duties and domestic consumption tax.

Note 3: The above amounts are all in foreign currency.

(2) Software purchase costs

The total amount of the basic software purchased and the application software is indicated below.

Phase I:	U.S.$ 2,643,600
Phase II:	U.S.$ 128,700
Total:	U.S.$ 2,772,300

Note 1: The above amounts are all in foreign currency.

(3) Software development expenses

1) Necessary man-months cost

The work to process the purchased application software and develop the appropriate software for use in the intended country shall be carried out on-site at Kyrgyz with some exceptions. For this reason, over a thirty-five month period about 25 foreign engineers will stay in Kyrgyz and will be engaged in this development. The total amount of man-days necessary calculated from examples of similar projects in Japan is indicated below.

	Engineers
Phase I:	415 man-months
Phase II:	96 man-months
Total:	511 man-months

2) Foreign engineer absence fee

	Engineers
Phase I:	U.S.$ 4,980,000
Phase II:	U.S.$ 1,152,000
Total:	U.S.$ 6,132,000

3) Foreign specialist passage expenses

Number of times of passage:

	Engineers
Phase I:	8 times
Phase II:	6 times
Total:	14 times

Passage expenses:

Phase I:	U.S.$ 48,000
Phase II:	U.S.$ 36,000
Total:	U.S.$ 84,000

4) Foreign specialist living expenses

The calculation of living expenses is as indicated below.

	Local currency	Foreign currency	Total
Phase I:	U.S.$ 7,000	U.S.$ 4,000	U.S.$ 11,000
Phase II:	U.S.$ 6,000	U.S.$ 3,000	U.S.$ 9,000
Total:	U.S.$ 13,000	U.S.$ 7,000	U.S.$ 20,000

5) System transition expenses

The work of transition the system currently in use at NBK to the newly introduced equipment shall be carried our jointly by the foreign software development engineers and the NBK engineers (Project Team Staff). The expenses for the NBK engineers (local currency) shall be estimated as a separate NBK Project Team expense.

Phase I:

Necessary man-days: Engineers 72 man-months

	Local currency	Foreign currency	Total
Foreign specialist absence fee:			
	US$ 0	US$ 864,000	US$ 864,000
Foreign specialist passage expenses:			
	US$ 0	US$ 48,000	US$ 48,000
Foreign specialist living expenses:			
	US$ 118,000	US$ 83,000	US$ 201,000
Total:	US$ 118,000	US$ 995,000	US$ 1,113,000

Phase II:

Necessary man-days: Engineers 48 man-months

	Local currency	Foreign currency	Total
Foreign specialist absence fee:			
	US$ 0	US$ 576,000	US$ 576,000
Foreign specialist passage expenses:			
	US$ 0	US$ 30,000	US$ 30,000
Foreign specialist living expenses:			
	US$ 79,000	US$ 55,000	US$ 134,000
Total:	US$ 79,000	US$ 661,000	US$ 740,000

6) Testing personnel costs

After software development, the foreign engineers shall conduct a system operation test. The necessary man-days is indicated below.

Phase I:

Necessary man-days:

Engineers 72 man-months

	Local currency	Foreign currency	Total
Absence fee:	US$ 0	US$ 864,000	US$ 864,000
Passage expenses:	US$ 0	US$ 48,000	US$ 48,000
Living expenses:	US$ 118,000	US$ 83,000	US$ 201,000
Total:	US$ 118,000	US$ 995,000	US$ 1,113,000

Phase II:

Necessary man-days:

Engineers 48 man-months

	Local currency	Foreign currency	Total
Absence fee:	US$ 0	US$ 576,000	US$ 576,000
Passage expenses:	US$ 0	US$ 30,000	US$ 30,000
Living expenses:	US$ 79,000	US$ 55,000	US$ 134,000
Total:	US$ 79,000	US$ 661,000	US$ 740,000

7) Interpreters Fee

Phase I

Man/month total 86

	Local currency	Foreign currency	Total
Absence fee:	US$ –	US$ 1,376,000	US$ 1,376,000
Passage expenses:	US$ –	US$ 18,000	US$ 18,000
Living expenses:	US$ 56,000	US$ 39,000	US$ 95,000
Total:	US$ 56,000	US$ 1,433,000	US$ 1,489,000

Phase II

Man/month total 46

	Local currency	Foreign currency	Total
Absence fee:	US$ –	US$ 736,000	US$ 736,000
Passage expenses:	US$ –	US$ 18,000	US$ 18,000
Living expenses:	US$ 36,000	US$ 26,000	US$ 62,000

Total:	US$ 36,000	US$ 780,000	US$ 816,000

(4) Auxiliary equipment expenses

Besides the hardware equipment, the various types of equipment and materials necessary for the setting up and operation of the Bishkek and the other five computer centers are indicated below.

- Air-conditioning equipment
  (5,000 Kcal x 8 machines, 2,500 Kcal x 20 machines)
- Office equipment (telephone, copier, fax, personal computer (PC), printer, and miscellaneous items)
- Office furniture (desks, chairs, shelves, and miscellaneous items)
- Supplies (office supplies, stationery, toner, and other items)

All of the above equipment and materials shall be imported. The purchase price for these items is indicated below.

Item	Local currency	Foreign currency	Total
Air-conditioning equipment:	U.S.$ 0	U.S.$ 131,000	U.S.$131,000
Office equipment:	U.S.$ 0	U.S.$ 184,000	U.S.$184,000
Office furniture:	U.S.$ 2,300	U.S.$ 17,100	U.S.$ 19,400
Supplies:	U.S.$ 0	U.S.$ 66,000	U.S.$ 66,000
Total:	U.S.$ 2,300	U.S.$ 398,100	U.S.$400,400

(5) Transportation and cargo handling expenses

The estimate of the transportation expenses of the imported equipment and material purchased, import duties, cargo handling expenses, and domestic transportation is indicated below.

1) Imported equipment and materials transportation expenses

(Japan–Kyrgyz, air transportation): U.S.$ 189,000

2) Cargo handling and customs duties for

imported equipment and materials: U.S.$ 2,800

3) Domestic transportation expenses: U.S.$ 4,800

Total U.S.$ 196,600

Phase I	U.S.$ 176,000
Phase II	U.S.$ 20,000
Total	U.S.$ 196,600

(6) Installation work expenses

The installation of the equipment shall be carried out by Kyrgyz work contractors under the guidance and supervision of hardware manufacturers and foreign software developing company engineers contracted for system development. Except for special parts and materials for installation belonging to the hardware, the general installation work equipment and materials will be done with Kyrgyz-made goods.

Item	Local currency	Foreign currency	Total
Air-conditioning work expenses:	U.S.$ 1,000	U.S.$ 18,000	U.S.$ 19,000
Electrical work expenses:	U.S.$ 80,000	U.S.$ 35,000	U.S.$ 115,000
Office renovation expenses:	U.S.$ 13,000	U.S.$ 0	U.S.$ 13,000
Miscellaneous work:	U.S.$ 9,000	U.S.$ 5,000	U.S.$ 14,000
Total	U.S.$ 103,000	U.S.$ 58,000	U.S.$ 161,000
Phase I:	U.S.$ 93,000	U.S.$ 52,000	U.S.$ 145,000
Phase II:	U.S.$ 10,000	U.S.$ 6,000	U.S.$ 16,000
Total:	U.S.$ 103,000	U.S.$ 58,000	U.S.$ 161,000

(7) NBK Project Team expenses

The NBK Project Team is as indicated below with administration conducted by the NBK headquarters organization. Therefore, the responsibility for expenses for this project is separated into the direct personnel costs for staff assigned to the project team and general management costs borne by the headquarters (NBK) together with the project team's various expenses, other expenses and overseas travel expenses of NBK engineers.

	Phase I	Phase II
Project manager:	1	0
Asst. project manager:	2	1
System engineer:	6	3
Operator:	6	3
Clerk:	3	1
Secretary:	2	1
Total	20	9

Note: 3 of above engineers in NBK are to be involved in software development work in the overseas software house.

Phase I

Item	Domestic currency	Foreign currency	Total
Direct personnel costs:	U.S.$ 34,200	U.S.$ 0	U.S.$ 34,200
General management costs:	U.S.$ 34,200	U.S.$ 18,000	U.S.$ 52,200
Other Expenses:	U.S.$ 6,800	U.S.$ 2,000	U.S.$ 8,800

Total annual expenses:	U.S.$ 75,200	U.S.$ 20,000	U.S.$ 95,200
Phase I (35 months) total:	U.S.$ 219,300	U.S.$ 58,300	U.S.$277,600
Passage expenses:	U.S.$ -	U.S.$ 96,000	U.S.$ 96,000
Living expenses:	U.S.$ -	U.S.$419,300	U.S.$419,000
Phase I Total:	U.S.$ 219,300	U.S.$573,300	U.S.$792,600

Phase II

Item	Local currency	Foreign currency	Total
Direct personnel costs:	U.S.$ 15,200	U.S.$ 0	U.S.$ 15,200
General management costs:	U.S.$ 15,200	U.S.$ 8,000	U.S.$ 23,200
Other Expenses:	U.S.$ 3,000	U.S.$ 900	U.S.$ 3,900
Total yearly expenses:	U.S.$ 33,400	U.S.$ 8,900	U.S.$ 42,300
Phase II (24 months) Total:	U.S.$ 66,800	U.S.$ 17,800	U.S.$ 84,600

After Phase I is completed in April 1998, a majority of the project team will be assigned as Phase I system operation personnel while also working partially as personnel of the Phase II project, reducing the personnel needed for the Phase II Project Team.

(8) Estimated contingencies

The calculation results of the project costs (1)-(7) above is shown below. In the detailed project estimate, the expense item projected to fluctuate the most in the future is software development expenses. That is to say that the above software development estimates have been based on examples in Japan. The special contingencies have allotted 35% of the reserve for the estimated man-days due to the development work of software to be installed in overseas and related language barriers compared to the domestic use. For other expense items a uniform 10% of the estimated reserve expenses are projected. The tax portion in the reserve expenses are calculated at the same rate of the tax in each of the corresponding expenses.

Item	Phase I	Phase II	Total
Hardware purchase expenses:	U.S.$ 749,000	U.S.$ 29,000	U.S.$ 778,000
Software purchase expenses:	U.S.$ 264,000	U.S.$ 13,000	U.S.$ 277,000
Software development expenses:	U.S.$ 1,743,000	U.S.$403,000	U.S.$2,146,000
System transition expenses:	U.S.$ 86,000	U.S.$ 58,000	U.S.$ 144,000
Testing expenses:	U.S.$ 86,000	U.S.$ 58,000	U.S.$ 144,000
Auxiliary equipment expenses:	U.S.$ 40,000	U.S.$ 0	U.S.$ 40,000
Transportation and cargo handling expenses:	U.S.$ 18,000	U.S.$ 2,000	U.S.$ 20,000
Equipment installation work expenses:	U.S.$ 14,000	U.S.$ 2,000	U.S.$ 16,000
NBK Project Team expenses:	U.S.$ 28,000	U.S.$ 8,000	U.S.$ 36,000
Interpreting expenses:	U.S.$ 118,000	U.S.$ 93,000	U.S.$ 211,000
Expenses for passage and stay:	U.S.$ 95,000	U.S.$ 98,000	U.S.$ 193,000
Total:	U.S.$ 3,241,000	U.S.$764,000	U.S.$4,005,000

13-5 Operating Expenses

This project shall be implemented by investment two stages. Phase I shall start financing from June 1995 and be completed in April 1998; Phase II shall start financing from June 1998 and be completed in May 2000. Operations will startup at the time of completion for each phase. Expenses after operation startup are shown below.

(1) Personnel costs

Besides the Bishkek headquarters, this project's computer center will be installed in five cities. The personnel and direct personnel costs are shown below.

Position	Bishkek	Regional center	Total	Yearly direct personnel costs Total ($)
Manager	1	0	1	3,000
System engineer	11	0	11	26,400
Operator	8	17	25	36,000
Secretary	1	0	1	600
Total	21	17	38	66,000

The weighted average tax rate of income tax is 25.52%.

(2) The general management costs, adding in the other payroll tax (37%) of the general management costs of the NBK headquarters and each center's indirect expenses (office rent, business trip expenses, conference costs, and other expenses) comes to 100% of direct personnel costs. Classifying the whole into payroll tax, personnel costs, supplies expenses, and other expenses, and then calculating each item's tax rate, the weighted average of the result calculated yields 50%.

(3) Cost for use of communication lines

The cost for use of the communication lines (this assumes the use of a duplex line for back-up purposes) linking each center is indicated below.

Phase I:	U.S.$13,000
Phase II and after:	U.S.$29,000

(4) Maintenance and management costs

The complete maintenance and management of the computer system including hardware and software shall be an expense paid to the computer's hardware manufacturers and software development companies. This shall be determined after discussions on the user and manufacturer sides. However, from the experience in Japan, the yearly maintenance and management costs are considered to be 10-15% of the total expenses of hardware introduction, software purchasing, and software development. For this project, in consideration of such things as the geographical conditions, the estimate is projected at 15%.

	Phase I	Phase II and after
Hardware purchasing cost:	U.S.$ 7,488,000	U.S.$ 7,783,000
Basic software purchasing cost:	U.S.$ 2,643,000	U.S.$ 2,772,000
Software development cost:	U.S.$ 4,980,000	U.S.$ 8,612,000
Total:	U.S.$ 15,111,000	U.S.$ 19,167,000
Maintenance and management costs (yearly):	U.S.$ 2,267,000	U.S. $2,503,000

(5) Utility costs

Of the necessary utilities, electric power will be the main expense. The yearly required electric power consumption and the power charge are shown below. The electric power charge in operation is 0.45 Som/KWH.

Electric power consumption electric power charge

Phase I:	278,000 KWH	U.S.$12,500
Phase II:	304,000KWH	U.S.$13,700

(6) Office rent

Office space:

Bishkek headquarters	156 sq.meters
Regional offices (five locations total)	250 sq.meters
Total	406 sq.meters

Rental charge:

Bishkek	U.S.$ 9,360/year
(at U.S.$5.00/ sq.meters' per month)	
Other citiesU.S.$	U.S.$10,500/year
(at U.S.$3.50/m2 per month)	
Total	U.S.$19,860/year

(7) Depreciation

The total capital investment will be depreciated as shown below.

1) Depreciation of tangible assets
   (A) Hardware purchasing cost
   (B) Auxiliary equipment cost
   (C) Equipment installation work cost
   (D) Transportation and cargo handling costs

(E) Contingencies (10% of the above amount)

Total U.S.$9,396,000

Depreciation method:

Depreciation period: 10 years
Depreciation method: fixed installment
Residual book value: 0%

2) Amortization of intangible assets

(A) Basic software purchasing cost
(B) Software development cost
(C) Testing expenses
(D) System transition cost
(E) Interpreters expenses
(F) Lodging and perdiem expenses
(G) Contingencies for (A)-(F)

Total U.S.$20,849,000

Amortization method:

Amortization period: 10 years
Amortization method: fixed installment
Residual book value: 0

3) Amortization of other assets

The investment items below shall be amortized as deferred assets.

(A) NBK Project Team expenses
(B) Contingencies ((A)x10%)
(C) Interest during construction

Amortization method:

Amortization period: 5 years
Amortization method: fixed installment
Residual book value: 0