## 7.4 Implementation Plan

### (1) Billing-center system

Considering the expected number of subscribers, inasmuch as the Bull billing-center system in Damascus will have insufficient performance for all of Syria in 1996, another new billing system should be implemented for one of the distributed areas in the country within 1996. This is the most urgent implementation on and after 1996. For the location of another billing center, Aleppo is appropriate because it is the second biggest city and the main city in the northern districts.
After implementation of Aleppo billing center, billing processing is done by two billing center according to provinces as follows.

Table 7.4-1 Billing Centers and Divided Area for Each Center (1996-2000)

| Billing center | Province |
|---|---|
| Damascus | Damascus (City), Damascus (Rural), Quennetra, Darra, Sweda |
| Aleppo | Aleppo, Homs, Hama, Idleb, Der Alzor, Alhasala, Rakkah, Lattakia, Tartous |

In this case, as subscribers of Aleppo center are rapidly increasing and will reach to more than 1,000,000 subscribers in the year of 2000, capacity of storage will run short. Before 2000, hard disk of 4 GB or so should be added.

### (2) Telephone-center system

The telephone-center system should be implemented in other telephone centers than 14 centers in Damascus within a few years to cope with increasing new subscribers. It is necessary to start to prepare for the order for implementation. Considering the necessary term needed for preparation, it is expected that in 1997 STE can begin implementation by some vendor.
Most of the implementation should be done in 1997 ideally. It will be difficult, however, to install the system in all target telephone centers (25) at once because it would need a great amount of equipment and many engineers or other personnel. Practically, the installation of systems would be done divided into several projects and in succession considering the number of subscribers, the network expansion investment, efficiency of installation, and so forth.
The installation for telephone centers in Damascus Rural and Aleppo should be done in 1997, and that in Homs, Hama and Lattakia in 1998.

(3) Management information system

As regards the management information system (MIS), because it is relatively small-scale and its application is not so complicated, it should be implemented in 1997.

(4) The installation schedule of 3 computer systems

The installation schedule of billing-center system, telephone-center system and management information system is described in Figure 7.4-1

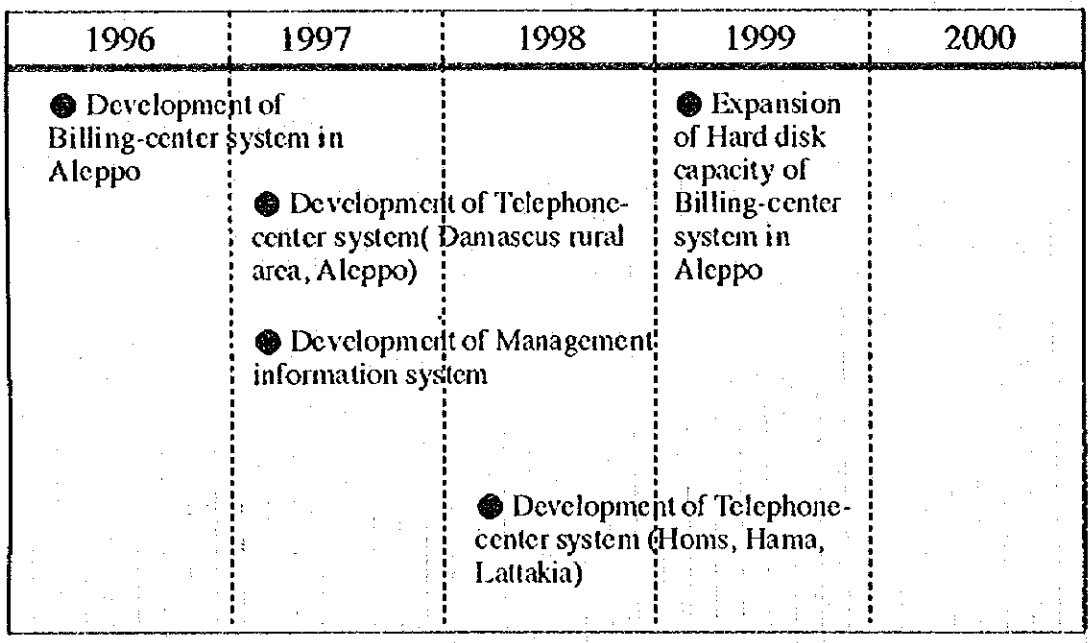



Figure 7.4-1 Installation Schedule

# CHAPTER 8 BUILDING PLAN

The building floor space required for this Project was estimated according to new establishment and expansion sizes of systems, taking account of future expansions within the final capacities of systems.
The required space for each system and the kinds of new space and/or modification are as follows:

## 8.1 Telephone Network

### (1) Switching System

| Office/Bldg. | Exchange Type | Existing space(m2) | Necessary space (m2) | | Required space (m2)(2000) | |
|---|---|---|---|---|---|---|
| | | | Initial(2000) | Ultimate | Modification | New |
| Al Nasser | NEAX61 | 282 | 282 | 150 | --- | --- |
| Al Thawra | EWSD | 160 | 160 | 160 | --- | --- |
| Kefr Souseh | EWSD | 119 | 140 | 150 | 21 | --- |
| Domar | EWSD | 120 | 130 | 150 | 10 | --- |
| Al Mohajrin | EWSD | 86 | 120 | 150 | 34 | --- |
| | E10A | 162 | 162 | 150 | --- | --- |
| Jallaa | EWSD | 147 | 147 | 147 | --- | --- |
| Bab Sharki | EWSD | 83 | 83 | 150 | --- | --- |
| | E10A | 189 | 189 | 150 | --- | --- |
| (Dewelaah) | --- | --- | 100 | 110 | --- | 100 |
| Mezzeh-1 | EMD | 289 | 70 | 150 | 70 | --- |
| | EWSD | 80 | 80 | 150 | --- | --- |
| Mezzeh-2 | EWSD | 135 | 135 | 150 | --- | --- |
| Al Miedan | EMD | 360 | 140 | 150 | 140 | --- |
| Al Yarmouk | EWSD | 116 | 116 | 116 | --- | --- |
| (Al Kadam) | --- | --- | 90 | 110 | --- | 90 |
| (Al Sebeyneh) | --- | --- | 90 | 110 | --- | 90 |
| Rokn Al Dien | EMD | 327 | 130 | 150 | 130 | --- |
| Barzeh | EWSD | 132 | 132 | 132 | --- | --- |
| (Ibn Alamied) | --- | --- | 80 | 110 | --- | 80 |
| Bagdad | EMD | 378 | 140 | 150 | 140 | --- |
| | NEAX61 | 156 | 156 | 150 | --- | --- |
| (Al Abbaseyen) | --- | --- | 100 | 110 | --- | 100 |
| (Jobar) | --- | --- | 100 | 110 | --- | 100 |
| Total | --- | --- | --- | --- | 545 | 560 |

(2) Transmission System

| | | SDH System equip. space | 140M System equip. space | TOTAL equip. space | Required Space [m2] (in 2000) ** | |
|---|---|---|---|---|---|---|
| | | [m2] | [m2]* | [m2] | Modification | New |
| A1 | Al Nasser | 0.801 | | 0.801 | 0 | 0 |
| A2 | Al Thawra | 0.483 | | 0.483 | 0 | 0 |
| B | Jaffar | 0.696 | | 0.696 | 0 | 0 |
| C | Bagdad | 0.75 | 2.42 | 3.17 | 30 | 0 |
| F | Al Miedan | 0.375 | | 0.375 | 0 | 0 |
| H1 | Bab Sharki | 0.483 | | 0.483 | 0 | 0 |
| K | Kerf Sousch | 0.267 | | 0.267 | 0 | 0 |
| L1 | Al Yarmouk | 0.321 | | 0.321 | 0 | 0 |
| N1 | Zamalka | 0.696 | | 0.696 | 0 | 0 |
| | JOBAR | 0.483 | | 0.483 | 0 | 30 |
| | DEWELAAH | 0.321 | | 0.321 | 0 | 30 |
| | KADAM | 0.267 | | 0.267 | 0 | 30 |
| | IBNALAMIED | | 2.42 | 2.42 | 0 | 30 |
| | ABBASEYEN | | 2.42 | 2.42 | 0 | 30 |
| | SEBEYNEH | | 2.42 | 2.42 | 0 | 30 |
| | Total | | | | 30 | 180 |

NOTE*: applied to Al Thawra equipment space

NOTE**: Minimum STE space for transmission

(3) Power Supply System

| Office/Bldg. | Required space (m2) (2000) | | | |
|---|---|---|---|---|
| | Engine Generator | Rectifier | Batteries | TOTAL |
| Al Nasser | --- | --- | --- | 0 |
| Al Thawra | --- | --- | --- | 0 |
| Kefr Souseh | --- | --- | --- | 0 |
| Domar | 20 | --- | --- | 20 |
| Al Mohajrin | 20 | --- | --- | 20 |
| | --- | --- | --- | 0 |
| Jallaa | --- | --- | --- | 0 |
| Bab Sharki | --- | --- | --- | 0 |
| | --- | --- | --- | 0 |
| (Dewelaah) | 20 | 32 | 40 | 92 |
| Mezzeh-1 | 20 | --- | --- | 20 |
| | --- | --- | --- | 0 |
| Mezzeh-2 | --- | --- | --- | 0 |
| Al Miedan | 20 | --- | --- | 20 |
| Al Yarmouk | --- | --- | --- | 0 |
| (Al Kadam) | 20 | 32 | 40 | 92 |
| (Al Sebeyneh) | 20 | 32 | 40 | 92 |
| Rokn Al Dien | 20 | --- | --- | 20 |
| Barzeh | --- | --- | --- | 0 |
| (Ibn Alamied) | 20 | 32 | 40 | 92 |
| Bagdad | 20 | --- | --- | 20 |
| | --- | --- | --- | 0 |
| (Al Abbaseyen) | 20 | 32 | 40 | 92 |
| (Jobar) | 20 | 32 | 40 | 92 |

(4) MDF Room

| Office/Bldg. | Necessary No. of Primary Pairs | Required space (m2) (2000) MDF |
|---|---|---|
| Al Nasser | 58,800 | --- |
| Al Thawra | 36,750 | --- |
| Kefr Souseh | 36,750 | --- |
| Domar | 30,750 | --- |
| Al Mohajrin | 37,950 | --- |
| Jallaa | 43,800 | --- |
| Bab Sharki | 34,500 | --- |
| (Dewelaah) | 34,500 | 32 |
| Mezzeh-1 | 36,750 | --- |
| Mezzeh-2 | 30,750 | --- |
| Al Miedan | 36,750 | --- |
| Al Yarmouk | 36,750 | --- |
| (Al Kadam) | 30,750 | 29 |
| (Al Sebeyneh) | 30,750 | 29 |
| Rokn Al Dien | 24,750 | --- |
| Barzeh | 36,750 | --- |
| (Ibn Alamied) | 18,750 | 20 |
| Bagdad | 64,200 | --- |
| (Al Abbaseyen) | 35,400 | 33 |
| (Jobar) | 35,400 | 33 |

## (5) Telephone Network Space Summary

| Office/Bldg. | Switching System | | Transmission System | | Power Supply system | | MDF Room | | Common Space (New Building) | | TOTAL (Telephone network) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mod. | New | Mod. | New | Mod. | New | Mod. | New | Mod. | New | Mod. | New |
| Al Nasser | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Al Thawra | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kefr Souseh | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 0 |
| Domar | 10 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 10 | 20 |
| Al Mohajrin | 34 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 34 | 20 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jallaa | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bab Sharki | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (Dewelaah) | 0 | 100 | 0 | 30 | 0 | 92 | 0 | 32 | 0 | 508 | 0 | 762 |
| Mezzeh-1 | 70 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 70 | 20 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mezzeh-2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Al Miedan | 140 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 140 | 20 |
| Al Yarmouk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (Al Kadam) | 0 | 90 | 0 | 30 | 0 | 92 | 0 | 29 | 0 | 482 | 0 | 723 |
| (Al Sebeyneh) | 0 | 90 | 0 | 30 | 0 | 92 | 0 | 29 | 0 | 482 | 0 | 723 |
| Rokn Al Dien | 130 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 130 | 20 |
| Barzeh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (Ibn Alamied) | 0 | 80 | 0 | 30 | 0 | 92 | 0 | 20 | 0 | 444 | 0 | 666 |
| Bagdad | 140 | 0 | 30 | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 170 | 20 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (Al Abbaseyen) | 0 | 100 | 0 | 30 | 0 | 92 | 0 | 33 | 0 | 510 | 0 | 765 |
| (Jobar) | 0 | 100 | 0 | 30 | 0 | 92 | 0 | 33 | 0 | 510 | 0 | 765 |
| Total | 545 | 560 | 30 | 180 | 0 | 672 | 0 | 176 | 0 | 2936 | 575 | 4524 |

Note : Common space for new buildings = Equipment space x 2

: Common space include Customer service windows and Office space.

## 8.2 Mobile Telephone System

The estimated required space for the mobile telephone system, which is assumed to be installed in 1998, is shown in the table below. The details of the system implementation plan are explained in Chapter 5.

| No. | Area | Name of Station | Required space ($m^2$) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | MSC BSC | OMC | Billing center | BTS | Trans-mission | Total |
| 1 | Damascus | Thawra | 108 | 144 | 144 | 10 | 10 | 416 |
| 2 | | Kefr Souseh | | | | 10 | 15 | 25 |
| 3 | | Bab Sharki | | | | 10 | 5 | 15 |
| 4 | | Miedan | | | | 10 | 5 | 15 |
| 5 | | New | | | | 10 | 10 | 20 |
| 6 | | Mezzeh I | | | | 10 | 5 | 15 |
| 7 | | Kadam | | | | 10 | 5 | 15 |
| 8 | | Jobar | | | | 10 | 5 | 15 |
| 9 | | Dumar | | | | 10 | 5 | 15 |
| 10 | | New | | | | 10 | 10 | 20 |
| 11 | | Kassioun | | | | 10 | 10 | 20 |
| | Aleppo | Aljamelcha | | | | | 5 | 5 |
| 12 | | Alsolymaneyeh | | | | 10 | 5 | 15 |
| 13 | | New | | | | 10 | 5 | 15 |
| 14 | | New | | | | 10 | 5 | 15 |
| 15 | | New | | | | 10 | 5 | 15 |
| 16 | | TV Station | | | | 10 | 10 | 20 |
| 17 | Highway | Saraqeb | | | | 10 | 10 | 20 |
| 18 | | New | | | | 10 | 10 | 20 |
| 19 | Hama | Hama | | | | 15 | 10 | 25 |
| 20 | Homs | City Center | | | | 10 | 10 | 20 |
| 21 | | Wadi Al Thahab | | | | 10 | 10 | 20 |
| 22 | | TV Station | | | | 10 | 10 | 20 |
| 23 | Highway | Sawan | | | | 10 | 10 | 20 |
| 24 | | Kaldown | | | | 10 | 10 | 20 |
| 25 | Zabadani | Zabadani | | | | 10 | 10 | 20 |
| 26 | | New | | | | 10 | 10 | 20 |
| 27 | | Kisweh | | | | 10 | 10 | 20 |
| 28 | | Saasa | | | | 10 | 10 | 20 |
| 29 | Damascus | New | | | | 10 | 10 | 20 |
| 30 | Southern | New | | | | 10 | 10 | 20 |
| 31 | Region | New | | | | 10 | 10 | 20 |
| 32 | | New | | | | 10 | 10 | 20 |
| 33 | | Shaikh Miskin | | | | 10 | 10 | 20 |
| 34 | Suweida | Suweida | | | | 10 | 10 | 20 |
| 35 | Daraa | Daraa | | | | 10 | 10 | 20 |
| 36 | Qunaytirah | Qunaytirah | | | | 10 | 10 | 20 |
| | | Total | 108 | 144 | 144 | 365 | 320 | 1,081 |

## 8.3 Packet Switched Data Network

Expanding the existing PSDN does not place any particular requirements on the building plan. The required additional space is minimal (a few $m^2$ max., depending on the devices) and should be available in all exchange offices. The required additional space for power supply (220 V, backed-up) is also minimal (compared with what is currently available in exchange offices). While no problems are foreseen, the requirements should be verified for each expansion project.

## 8.4 Computer System

Modifications are needed in the Aleppo billing-center building in order to install the billing-center system, in particular to the computer room and data-entry room.
To estimate the necessary space for the Aleppo billing center, the space used in the Damascus billing center was used for reference.

Table 8.4-1 Building Plan for Computer System

| Office/Bldg. | Room type | Necessary space(m2) | Required space | |
|---|---|---|---|---|
| | | | Modification | New |
| Aleppo billing center | computer room | 70 | 70 | --- |
| | Data-entry room | 70 | 70 | --- |

# CHAPTER 9 OPERATION AND MAINTENANCE

## 9.1 Policy of Operation and Maintenance

After the completion of the projects, operation and maintenance, which is to connect new subscribers in time and to keep good services to customers, is an important role of STE. Therefore, O/M organization, skill-upgrade of employees through training, enhancement of O/M facilities, appropriate stock/repair of spare parts and tools and so on should be considered.

## 9.2 Telephone Network System

### 9.2.1 Switching System

#### 9.2.1.1 Present state of O/M

(1) There are five (5) O/MCs (Operation and Maintenance Center) for EWSD switching system (1 O/MC in Damascus and 4 Sub-O/MC in other cities) and each exchange office is connected to the belonging O/MC by data circuits (9,600b/s, 4,800b/s), supervised and controlled by O/M personnel who are working 24 hours at 3-shift. The number of persons in Damascus O/MC is forty one (41).
O/M personnel in each exchange office are working during daytime and its average number is about eight (8) (in EWSD exchange office: four (4)). The configuration of O/MCs is shown in Figure 9.2.1.1-1.

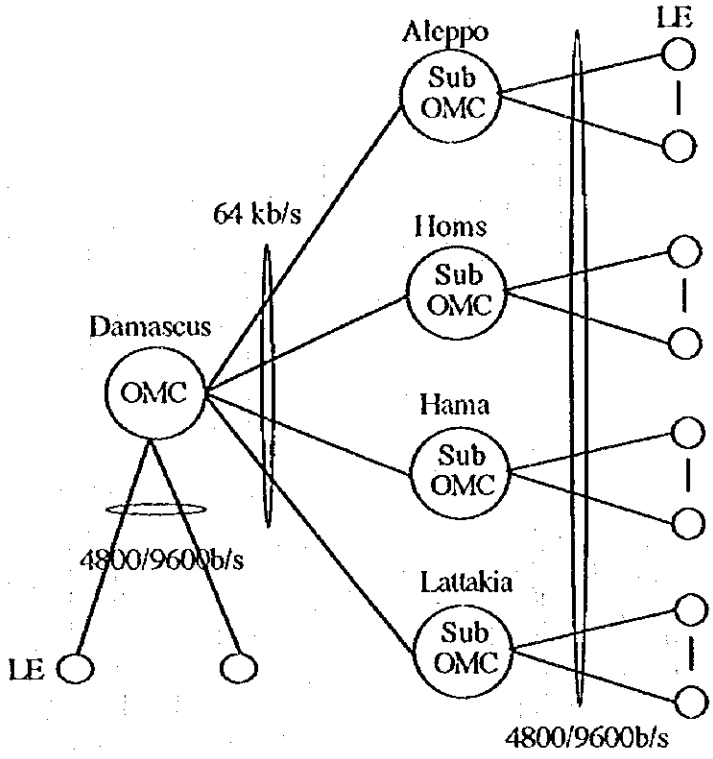



Figure 9.2.1.1-1 OMC Configuration for EWSD Exchanges

(2) The purchase of spare parts and tools are for five (5) years at the initial stage and it costs 5% to 10% of an exchange cost.

(3) Training for the digital switching system is for O/M and headquarters' personnel and the average number of trainees per exchange office are as follows:

| | | |
|---|---|---|
| In manufacturer's country | : | 2 persons |
| In Syria | : | 6 persons |

(4) Maintenance assistance system by manufacturers is employed and the number of assistants is about 1 person per big city. The duration of assistance is about for 1 year after the final completion of project, starting from the first completion of an exchange. The present O/M state is shown in Table 9.2.1.1-1.

Table 9.2.1.1-1 Present O/M State in Damascus city

| Office/Distr. name | Unit Name | Exchange type | Capacity (1995) | No. of O/M personnel | | | Training | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A Class | B Class | Total | Foreign | In-land | Total | |
| Al Nasser | --- | OMC | --- | | | 41 | | | | |
| Al Nasser | A1 | NEAX-61 | 40,000 | 5 | 9 | 14 | 5 | 0 | 5 | |
| Al Thawra | A2 | EWSD | 15,000 | 5 | 0 | 5 | 0 | 1 | 1 | |
| Kefr Souseh | K | EWSD | 25,000 | 2 | 1 | 3 | 2 | 1 | 3 | |
| Domar | O | EWSD | 15,000 | 2 | 1 | 3 | 1 | 0 | 1 | |
| Al Mohajrin | G1,2 | EWSD | 10,000 | 4 | 1 | 5 | 1 | 0 | 1 | |
| | G3 | E10-A | 11,000 | 10 | 2 | 12 | 5 | 2 | 7 | |
| Jaffaa | B2 | EWSD | 30,000 | 4 | 3 | 7 | 1 | 2 | 3 | |
| Bab Sharki | B2 | EWSD | 20,000 | 4 | 1 | 5 | 2 | 0 | 2 | |
| | B1 | E10-A | 10,000 | 12 | 2 | 14 | 3 | 0 | 3 | |
| (Dewetaah) | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Mezzeh-1 | D1 | EMD | 10,000 | 12 | 0 | 12 | 1 | 0 | 1 | |
| | D2 | EWSD | 15,000 | 3 | 2 | 5 | 2 | 0 | 2 | |
| Mezzeh-2 | D3 | EWSD | 25,000 | 2 | 1 | 3 | 1 | 0 | 1 | |
| Al Miedan | F1,2 | EMD | 17,000 | 15 | 0 | 15 | 3 | 0 | 3 | |
| Al Yarmouk | L1 | EWSD | 30,000 | 2 | 1 | 3 | 1 | 0 | 1 | |
| (Al Kadam) | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| (Al Sebeyneh) | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Rokn Al Dien | E | EMD | 10,000 | 9 | 4 | 13 | 0 | 0 | 0 | |
| Barzeh | M | EWSD | 30,000 | 3 | 0 | 3 | 1 | 2 | 3 | |
| (Ibn Alamied) | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Baedad | C1,2 | EMD | 20,000 | 15 | 1 | 16 | 2 | 8 | 10 | |
| | C3 | EWSD | 20,000 | 5 | 7 | 12 | 5 | 0 | 5 | |
| (Al Abbaseyen) | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| (Jobar) | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Total | | | 353,000 | 114 | 36 | 150 | 36 | 16 | 52 | |

(Al ....) : new exchange for year 2000

9.2.1.2 Operation and Maintenance for this Project

In principle, O/M for this project will be extended as the same system as the present O/M. The following O/M plan will be taken:

(1) Number of O/M personnel
24 persons (4 persons per new exchange office, 6x4=24)

(2) Spare parts and tools
For five (5) years at initial stage (the cost is estimated at about 5% of exchange cost)

(3) Training

| | | |
|---|---|---|
| Training in foreign countries | : | 15 persons (6 new exchange offices x 2 + headquarters 3) |
| Training in Syria | : | 12 persons (6 new exchange offices x 2) |

(4) Maintenance assistance
One (1) person in Damascus city to assist STE and resolve software/hardware problems for 1 year after the final completion of project, starting from the first completion of an exchange.

9.2.2 Transmission System

9.2.2.1 Current status of Operation and Maintenance in Damascus area

As for the fiber-optic transmission systems constructed under contract 4/A and 40/A, a central monitoring system has been accomplished in Damascus areas, although network management system has not yet been installed for Damascus areas. Faults are usually informed for exchange sectors, and fault localization is made remotely by maintenance staff in the Operation and Maintenance Center at Al Nasser telephone office. They are dispatched to faulty telephone offices for repairing and testing. Measurement of fault location on optical fiber cable is also conducted by them.

The Operation and Maintenance Center at Al Nasser has maintenance staff for transmission, who are on duty 24 hours, 365 days of the year. The shift rotation system is shown below:

- 8:00 - 14:00 10 technicians/ engineers, including a manager
- 14:00 - 20:00 2 technicians/ engineers
- 20:00 - 8:00 2 technicians

Circuits provisioning is handled by the maintenance staff during day time. Circuit provision order and design are made in the Operation and Maintenance Department.

9.2.2.2 Maintenance and Operation Plan for New SDH systems in Damascus

Monitoring, testing, and circuit provisioning are all conducted at 2 Mbps from a NMS (Network Management System) for STM-4 systems. The NMS is planned to locate in the Operation and Maintenance Center (or TMN center) at Al Nasser telephone office.

At this moment, no NMSs are so compatible each other as aimed in the concept of TMN (Telecommunication Management Network), although manufactures often call them TMN systems. Moreover, automatic protection switching works usually within systems supplied by one manufacture. It is not recommendable that STE uses SDH systems from many manufacturers.

Two sets of portable local monitoring equipment will be provided in the plan at Al Nasser for use in the other telephone offices.

No additional operation and maintenance staff are required for new SDH systems.

9.2.2.3 Training

Factory training (10 persons for 14 calendar days) and on-site training by the suppliers (15 persons for 30 calendar days) should be conducted, as new SDH systems are introduced.

9.2.2.4 Spare parts

Under the following conditions,

(1) Important common units such as a power supply unit, a clock supply unit are duplicated in a system.

(2) 50 % of circuits are always secured even in a major trouble by route diverting in a SDH ring.

(3) It may take from three months to six months to repair faulty units. (Urgent repair may need much less time.)

the plan provides, as spare parts, one unit per each active unit in each of the STM-4 loops (rings).

The spare parts are currently stored in Kerf Sousch telephone office. It is recommended that the Operation and Maintenance Center stores and uses the spare parts for quicker repair-work.

9.2.2.5 Measuring equipment

Special measuring equipment for STM-4 systems must be provided. General measuring equipment such as frequency counters must also be provided to comply with the higher bit rate. Measuring equipment are kept and maintained in the Operation and Maintenance Center.

The following is the list of the required measuring equipment. Note that measuring equipment required for fiber-optic cables are planned in the outside plant.

(1) Optical Multimeter (Light Source) to be provided in the outside plant plan
(2) Optical Variable Attenuater: 2 sets
(3) Optical Power Meter to be provided in the outside plant plan
(4) OTDR to be provided in the outside plant plan
(5) SDH Analyzer: 2 sets
(6) Multimeter: 2 sets
(7) Frequency counter: 2 sets
(8) portable local monitoring equipment: 2 sets

9.2.3 Power Plant

Each exchange office is supervised and controlled by O/M personnel who are working 24 hours at 2-shift . The average number of O/M persons for each exchange office is about five (5).

O/M for this project will be extended as the same system as the present O/M.
The following O/M plan will be taken:

(1) Number of O/M personnel

30 persons (5 persons per one new exchange office, 6x5=30)

(2) Spare parts and tools

For five (5) years at initial stage (the cost is estimated about at 5% of power plant cost)

(3) Training

Training in foreign countries : 15 persons (6 new exchange offices x 2 + headquarters 3)...1 month

Training in Syria : 18 persons (6 new exchange offices x 3) 1 month

9.2.4 Outside Plant

The operation and maintenance policy for subscriber cable lines should be decided in consideration of subscribers' needs and reliability of subscriber cable networks, in order to offer satisfactory telecommunications services.

9.2.4.1 Present State

With regard to outside plant, there are three (3) departments, Study (Planning) Dept., Executive Dept. and Operation/Maintenance (O&M) Dept. under the directorate for the city area of Damascus. The maintenance center which belongs to the O&M Department has been deployed in each individual exchange office except Al Thawra and Mazzeh [D3] exchanges. Moreover, each maintenance center has three (3) sections, Complaint Receiving Section, Service Line Section, and Cable Maintenance Section.

The deployment of the staff to each individual department is shown in Table 9.2.4.1-1.

Table 9.2.4.1-1 Deployment of Staff

| | Executive Dept. | Study Dept. | Maintenance Dept. | Total |
|---|---|---|---|---|
| Administrator | 10 | 1 | 14 | 25 |
| Engineer | 3 | 0 | 4 | 7 |
| Technician | 85 | 9 | 284 | 378 |
| Total | 98 | 10 | 302 | 410 |

The staff of maintenance centers is mainly engaged in subscriber connections and fault clearance and so forth.

The subscriber connections are performed in the following process:

- Connection of jumper wires at the MDF in each exchange.
- Connection of jumper wires in the CCCs.
- Installation of the service lines between DPs and subscribers' premises
- Installation of the in-house wires.
- Installation of the terminal plug sockets and the terminal equipment (telephone sets).

The subscriber fault clearance is performed in the following process:

- the complaint receiving section is first receiving the fault report, and next,
- the subscriber line testing section checks the faulty line between the switching equipment and the MDF in the exchange, and if the fault is not found in the tested section,
- the service line section is actuated via the complaint receiving section and the staff of this section inspects the service line between the DP and the subscriber terminal equipment, and if the fault is not found also in the tested section,
- the cable maintenance section is actuated and start finding the fault in primary cable and secondary cable sections.

If the fault is located in the primary or secondary cable section, a major effort is required for the fault repair work.

9.2.4.2 Operation of Subscriber Cable Networks

After the completion of the Project, it is significant for STE to operate the completed subscriber network in a good condition.

As mentioned in Paragraph 4.5.1.5 in Chapter 4, the unacceptable practices on the aerial cable, service line and interior wire installation seem to cause many subscriber line faults. Therefore, it is recommended to prepare technical and installation standards particularly for aerial cable lines, service lines and interior wires.

It is also indispensable that a regular acceptance procedure including testing methods is introduced and sound acceptance tests are performed before the installed subscriber cable

lines are integrated into the subscriber networks, in order to avoid accepting deficient subscriber cable lines which result from inferior quality in providing and installation and which may impose problems on maintenance later on.

9.2.4.3 Maintenance of Subscriber Cable Networks

Fast clearance of faults is very important; however, decreasing the number of faults is much more significant to offer satisfactory telecommunications services to subscribers. The following items should be considered for the maintenance of the subscriber cable network.

- The subscriber lines which are out of service never generate any revenue.
- The subscriber lines which are out of service for long time dissatisfy the subscribers and cause a negative image to network operators.

According to the statistical data obtained regarding eight (8) out of fourteen (14) exchanges, the number of subscriber line faults amounts to approximately 49/day in each exchange service area in average. It means that the existing subscriber cable networks have not been in a good condition and have required to be improved themselves.

If the newly installed subscriber cable lines be integrated into the existing subscriber networks which remain to be low quality, the newly integrated subscriber cable lines would not obtain high quality.

In considering the conditions mentioned above, it is recommended that the following matters should be achieved as an immediate action in order to decrease the number of line faults and to obtain reliability of the subscriber network before the Project planned in this study area is implemented.

- To grasp inferior facilities and the actual situation on the existing subscriber network.
- To find and list faulty cable lines by periodic and simple tests which consist of continuity test and insulation resistance test.
- To record the lines which are repaired by provisional ways.
- To repair completely the fault lines or to replace the cable sections timely in projects planned for the exchange service areas concerned
- To analyze the fault causes in individual cases.

As a long term solution, the following actions are recommended in order to manage and maintain the whole subscriber cable network.

- To establish the Outside Plant Record for each individual exchange.
- To train engineers to manage comprehensively the fault repair work.
- To establish the maintenance centers equipped with measuring equipment, vehicles and tools necessary for operation and maintenance work.

9.2.4.4 Organization of O&M for Outside Plant

In principle, the organization of the present maintenance centers for the outside plant will be expanded on completion of the Project to be implemented in this study area.

(1) Deployment of Maintenance Center

At present, the maintenance center has been deployed in each exchange office except Al Thawra and Mezzeh exchange offices. Al Thawra exchange service area is under construction, while Mezzeh [3] exchange service area has been covered by the maintenance center located in Mezzeh [1, 2] exchange office.

With regard to deployment of maintenance centers, the following matters should be examined to organize the maintenance centers for new exchange service areas to be established in this study area.

- Size of each individual exchange service area.
- Distance between a exchange office and the adjacent exchange offices.
- Amount of future telephone demand in each exchange service area.
- Strategic formation of the operation and maintenance organization

As a conclusion of considering the terms mentioned above, it is recommended that the maintenance center should be organized in the following exchange offices which will be located in the newly established exchange service areas.

- Al Kadam exchange office
- Al Sebeyneh exchange office
- Al Abbaseyen exchange office
- Jobar exchange office

With regard to other two (2) exchanges, Dewelaah and Ibn Alamied exchanges, the service area of Dewelaah exchange will be covered by the maintenance center deployed in Bab Sharki exchange because the distance between both exchanges is only within 0.5 km, while the service area of Ibn Alamied exchange will be covered by the maintenance center deployed in Barzeh exchange because the distance between both exchanges is only within 1.5 km, and because the future telephone demand is not so large.
Al Thawra exchange office is now under construction as mentioned above; however, this exchange office will be the most significant point in considering the future strategy on not only domestic telecommunications services but also international telecommunications services in Syria. Since Al Thawra exchange office is located in the center of Damascus city, the maintenance center located in this office should be a base station for the maintenance centers which should be deployed in the study area.

(2) Deployment of Staff

At present, approximately 25 persons in average have been deployed to the maintenance center located in each exchange office; however, to decrease the amount of staff must be possible by arrangement of appropriate testing equipment, tools and vehicles.

In principle, the amount of staff to be deployed into newly established maintenance centers will be approximately 80 persons (20 persons times four (4) maintenance center).

(3) Arrangement of Vehicles

The following vehicles will be provided so that maintenance center to perform the maintenance work efficiently. In addition, the allocation plan of vehicles should be formulated by STE, in consideration of the future states by the completion of this Project.

- Van type of vehicles for maintenance duties including fault repair, cable line patrol and management tasks.
- Truck type of vehicles for faulty cable replacement and light cable line extension work necessary for subscriber network operation and maintenance.

(4) Arrangement of Measuring equipment and tools

The following measuring equipment and tools will be provided for each maintenance center to complete maintenance work easily and effectively.

- Echo meter

- Bridge Megger testing set
- Insulation resistance meter
- Cable route detector
- Poisonous gas detector
- Cable testing kit
- Copper conductor jointing tool kit
- Cable laying tools
- Safety tools

The following optical fiber cable measuring equipment and tools will be provided for the maintenance center located in Al Thawra exchange office to have the feature as a base station.

- Optical fiber analyzer and OTDR 1.3 SM unit
- Optical power meter
- LED light source
- Optical fiber telephone set
- Optical fiber testing tool kit
- Fiber core splicer
- Fiber core splicing tool kit

(5) Training

The knowledge of STE' staff seems sufficient to supervise the Project implemented in this study area; however, key persons who manage and control the operation and maintenance work should be trained to acquire the subscriber network planning, project implementation and systematic operation/maintenance procedures in a foreign country advanced on the telecommunications field. The duration of the training will be two (2) months.

For the line men who are engaged in daily operation and maintenance works, it is recommended that they take part in On-the-Job-Training (OJT) as much as possible through the implementation of the Project. Each of them should participates in the training for two (2) month.

The number of trainees are as shown in Table 9.2.4.4-1.

Table 9.2.4.4-1 Number of Trainees

| | In Foreign | On-the-Job | Remark |
|---|---|---|---|
| Executive Dept. | 2 | | |
| Study Dept. | 2 | | |
| O&M Dept. | 2 | | |
| Maintenance centers | 4 | 51 | 4 new maintenance centers x 1 person<br>17 maintenance centers x 3 person |

## 9.3 Mobile Telephone System

The organization for the mobile telephone service, which is planned be newly established in STE, is explained in chapter 5.7, "Customer Service and Management." Here is the summarize of them.

The individual organization shall be established solely for mobile telephone service independent of the organization of the PSTN. The organization should take care of the individual billing system that should be established solely for the mobile telephone service. To provide a good service and to maintain the quality of the service, the persons newly assigned to the organization of the mobile telephone service need to be trained. The functions of sections in the organization is as follows:

(1) Administration section

This section handles the administrating matters of the mobile telephone organization, such as, personnel matters, account and finance matters, and contract matters.

(2) Engineering section

The mobile system is ever expanding system, same as PSTN. The engineering section is in charge of expanding the system.

The section shall analyze the traffic data and assess whether the present facilities at each station are enough or not. It shall analyze the sales condition and the demand for mobile service at each region/area. Based on the analysis it shall make a expansion plan, considering also the financial condition. Then it shall prepare for a tender and carry out the tender. After the conclusion of the tender, it supervise the installation work.

(3) Marketing/Sales section

The marketing and sales section sells the mobile telephone terminals as much as possible to make the service profitable. Nonetheless the mobile terminal can be sold not only by STE but also by the third parties consigned by STE. There are countries where the terminals are sold freely.

The new mobile terminals, or their subscriber identity module (SIM) that is mounted in the mobile terminal, should have their identity registered in the central equipment of the mobile telephone system so that the terminal can be identified as an authorized subscriber

of the system.

(4) Customer service and billing section

The customer service and billing section receives information of the new subscribers from the sales section, and register the new terminals (or subscriber identity module: SIM) into the central equipment so that the terminal shall be recognized as an authorized.

The section shall be also in charge of delivering the invoice bill to the customers and of collecting fee from them. They receive the bills from the billing center and distribute them to the subscribers. They shall monitor the payment of them and shall take warning action or penalty action to the subscribers who delay the payment exceeding to certain limit of time.

(5) Operation and Maintenance section

The function of the operation and maintenance section are mainly as follows:

| | |
|---|---|
| Equipment management | To monitor the equipment, to maintain the equipment, to recognize malfunctioning and to record it, to diagnose it and to locate the cause of it, to restore the function, and to execute periodical check up as preventive activity. |
| Network configuration management | To set up the connection among equipment and to set parameters, in order to maintain the equipment at the best condition |
| Billing management | To manage the data of subscribers regarding charging and billing. |
| Service quality management | To monitor the quality of the service, and to reconfigure the system in order to improve the quality. |
| Security management | To manage the parameters and algorithm in order to prevent unauthorized accesses to the mobile telephone network or unauthorized use of it. |

The operation and maintenance center (OMC) for the mobile telephone service should be established in Al Thawra telephone office, and a branch office at Aleppo for quick recovery from the failure at remote stations. . They work at OMC 24 hours a day, 7 days a week, 365 days a year, in shift working scheme. Thirty-five (35) staffs are estimated to be required including for the branch office.

## 9.4 Packet Switched Data Network

The operation and maintenance concept is based on the centralized Network Management System which is collocated with the switches Damas00 and Damas01. Hence the OMC (the PSDN-OMC) is centralized.

A minimal support of OM-personnel at the various other locations is required on demand. There is no need for training for these personal if locations host concentrators only. For locations which will host small switches (that is not yet the case) it is desirable to train about 4 people for the duration of max. 1 week at the PSDN-OMC location.

OMC should be operated in 1.5 shifts (e.g. from 8:00 to 19:00) but supervised 24 hours a day. In case of any serious problems the intervention of trained personnel is required.

Recommended PSDN-OMC staff:

- 2 engineers
- 4 technicians
- 2 secretaries

Training for engineers and technicians:

- 2 weeks (courses abroad and in Syria)

Taking into account that trained staff is partly already available and that fluctuation rate may not be very high it is assumed that 4 persons have to be trained abroad during this 5-year period.

The ISDN-PSDN interworking unit will not require extra staff. It is assumed that 3 persons have to be trained abroad. Duration of training will be 1 week.

### NGN/MBS

It is assumed that NGN/MBS will be in commercial operation at the end of this 5-year period.

Recommended NGN/MBS-OMC staff:

- 2 engineers
- 4 technicians
- 2 secretaries

6 persons (engineers and technicians) have to be trained abroad. Duration of training will be 3 weeks. It is assumed that these persons do already have basic knowledge in new technologies and data communications before the training starts.

## 9.5 Computer System

To operate the implemented system more effectively, professional staff is needed for the computers in telephone centers and billing centers, except for personnel who have already accumulated managerial experience in telephone or billing centers. Needed personnel for the computerized system are operators, maintenance personnel, and system engineers. The roles of each and necessary number for each system are listed below.

Table 9.5-1 Roles of Required Personnel and Necessary Number

| Needed personnel | Location | Role | Necessary Number of staff members |
|---|---|---|---|
| Maintenance person | Telephone center | Maintenance of telephone-center system | One member for each four telephone-center system |
| Operator | Billing center | Operating and managing billing-center system | Three members for a billing-center |
| System engineer | Billing center | Developing the application program | Two members for a billing-center |
| | Headquarters | Maintenance of MIS<br>Developing the application program | One member for the headquarters |

According to the implementation plan mentioned above, the number of computer systems is increasing as follows.

Table 9.5-2 Number of Implemented Systems

| Needed personnel / year | Number of system centers | | | | |
|---|---|---|---|---|---|
| | 1996 | 1997 | 1998 | 1999 | 2000 |
| Telephone-center system | 0 | 15 | 25 | 25 | 25 |
| Billing-center system | 1 | 1 | 1 | 1 | 1 |
| Management information system | 0 | 1 | 1 | 1 | 1 |

Consequently, the necessary number of staff members per year is indicated as follows.

Table 9.5-3 Number of Staff Members for the Computer System

| Needed personnel / year | Number of staff members | | | | |
|---|---|---|---|---|---|
| | 1996 | 1997 | 1998 | 1999 | 2000 |
| Maintenance person | 0 | 4 | 7 | 7 | 7 |
| Operator | 3 | 3 | 3 | 3 | 3 |
| System engineer (for billing center) | 2 | 2 | 2 | 2 | 2 |
| System engineer (for MIS) | 1 | 1 | 1 | 1 | 1 |
| Total | 6 | 10 | 13 | 13 | 13 |

# CHAPTER 10 IMPLEMENTATION PLAN

## 10.1 Policy of Implementation Plan

The objective of project implementation is that target projects are to be put into service as planned without any delays. In order to achieve this objective, it is important that the implementation plan is made from all over points of view;

- all network system elements such as telephone network (switching, transmission and outside plant), mobile telephone network, packet switching network and computer systems are designed correctly and interactively based on the fact,
- appropriate volumes/periods for installation works are estimated,
- the works are controlled/supervised periodically and necessary actions are taken.

The viewpoints for implementation plan are shown below:

### 10.1.1 Comprehensive Implementation Schedule

The following items and periods should be estimated and planned in the comprehensive schedule:

(1) Preparation of finance

(2) Preparation of tender specifications

(3) Tendering

(4) Evaluation of tender

(5) Contract negotiation

(6) Manufacturing of equipment and factory inspection

(7) Transportation of equipment

(8) Construction of buildings and Installation of systems

(9) Training

(10) Provisional and final acceptance test

10.1.2 Planning and Execution

Generally, the following organization and actions are needed to carry out the projects:

(1) To organize a project team to plan, control and execute the projects

The team members which consists of the STE staff and consultant, control the implementation and coordinate management between sections concerned in order to carry out the project works smoothly without any delay.

(2) To employ consultants to make technical specifications and supervise installation works, if necessary

(3) To enhance local contractors' capabilities for civil works, especially for subscriber network, in order to achieve a big amount of works without any delay

(4) To clarify the responsibilities between STE and contractors for procurement and installation works, taking into account local procurement and local contractors' capabilities

(5) To participate STEs' employees, who are operation and maintenance staff, in installation works to raise up the skill for advanced technologies such as digital exchanges, optical fiber transmission, mobile telephone, packet switching, etc.

(6) To control and supervise the installation works to promote the projects as scheduled

10.2 Project Implementation

10.2.1 Tasks of STE Project Team

The main tasks of the Project Team are shown below:

(1) Preparation of tender specifications

(2) Evaluation of tender

(3) Contract negotiation

(4) Factory inspection

(5) Supervision of installation works

(6) Management of training scheme

(7) Provisional and final acceptance test

(8) Inspection of plant records

10.2.2 Procurement Plan

Considering the actual market and quality of equipment and materials in Syria, main equipment and materials for the projects will be purchased as follows, separately in Syria and in foreign countries:

(1) Procurement in Syria

Materials for civil works such as cement, sand, steel and so on.

(2) Procurement in foreign countries

All equipment and materials for all system (Exchanges, transmission system, cables, mobile telephone system, packet switch system and computer system) except for the above are purchased from foreign countries.

10.2.3 Responsibility of Project Works

Responsibilities of projects, which are procurement of equipment/materials, installation work and supervision, are shown in Table 10.2.3-1.

| Items | Equipment and materials | Installation | Supervision | Maintenance assistance | Remarks |
|---|---|---|---|---|---|
| 1. Telephone exchange | ○ | ■ | ○ | ○ | |
| 2. Transmission system | ○ | ○ | ○ | ----- | |
| 3. Power plant | ○ | ■ | ○ | ----- | |
| 4. Outside plant | ○ | * ○ / ■ | ■ | ----- | |
| 5. Mobile telephone system | ○ | ■ | ○ | ○ | |
| 6. Packet switching system | ○ | * ○ / ■ | ○ | ----- | |
| 7. Computer system | ○ | ■ | ○ | ○ | |
| 8. Land/Building | ■ | ■ | ■ | ----- | |
| | | | | | |

Note : ■ STE Part　　* ○ / ■ Contractor & STE

○ Contractor Part

Figure 10.2.3-1 Responsibility of Project Works

## 10.3 Implementation Schedule

Taking into consideration the target year for this project, which is described in Chapter 2 and the time for preparation of making the projects, the comprehensive schedule for this project will be Figure 10.3-1.
Although the periods of events may be changeable according to each system, the typical detailed implementation schedule including all events is shown in Figure 10.3-2.

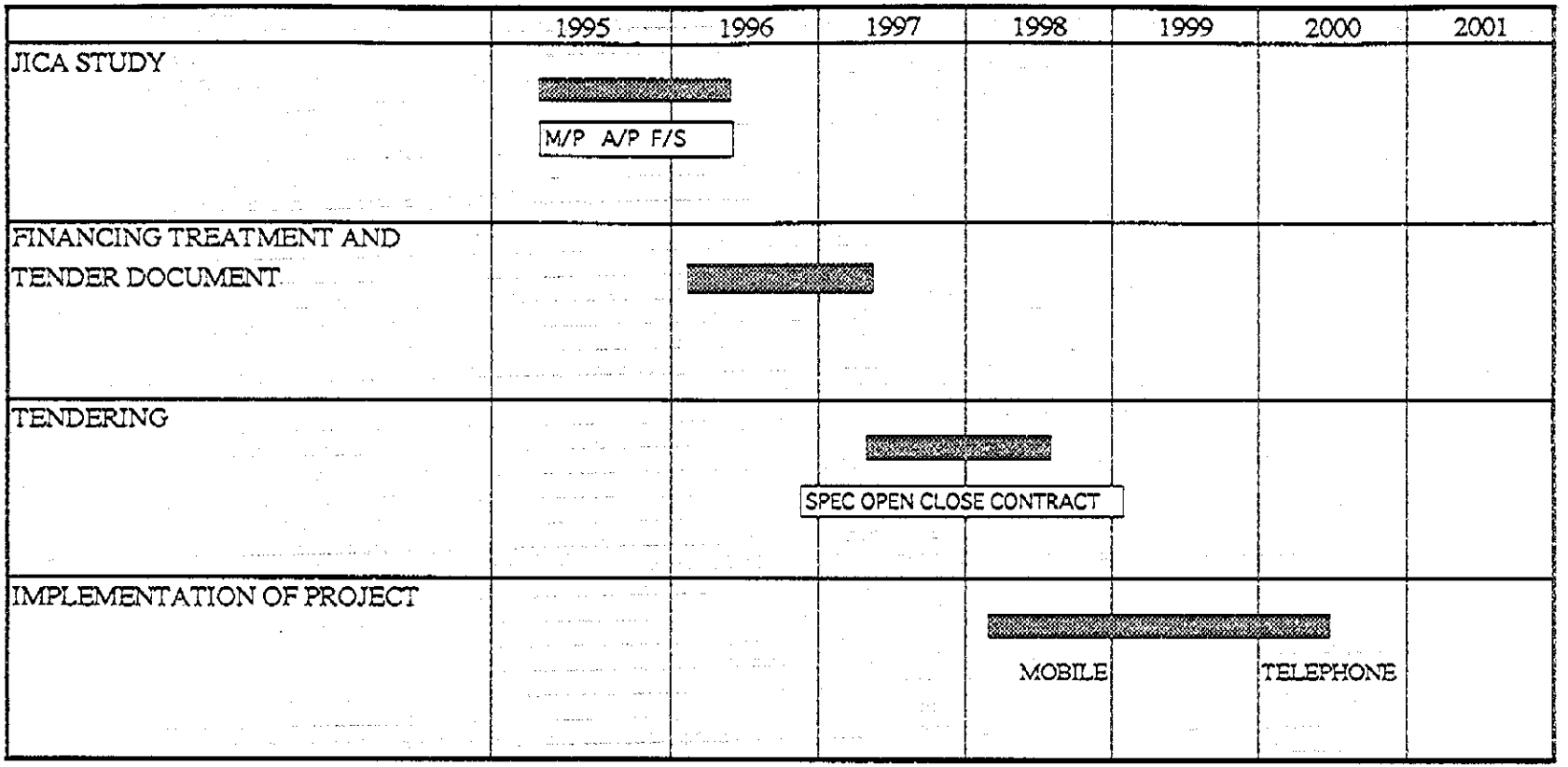



Figure 10.3-1 Comprehensive Schedule

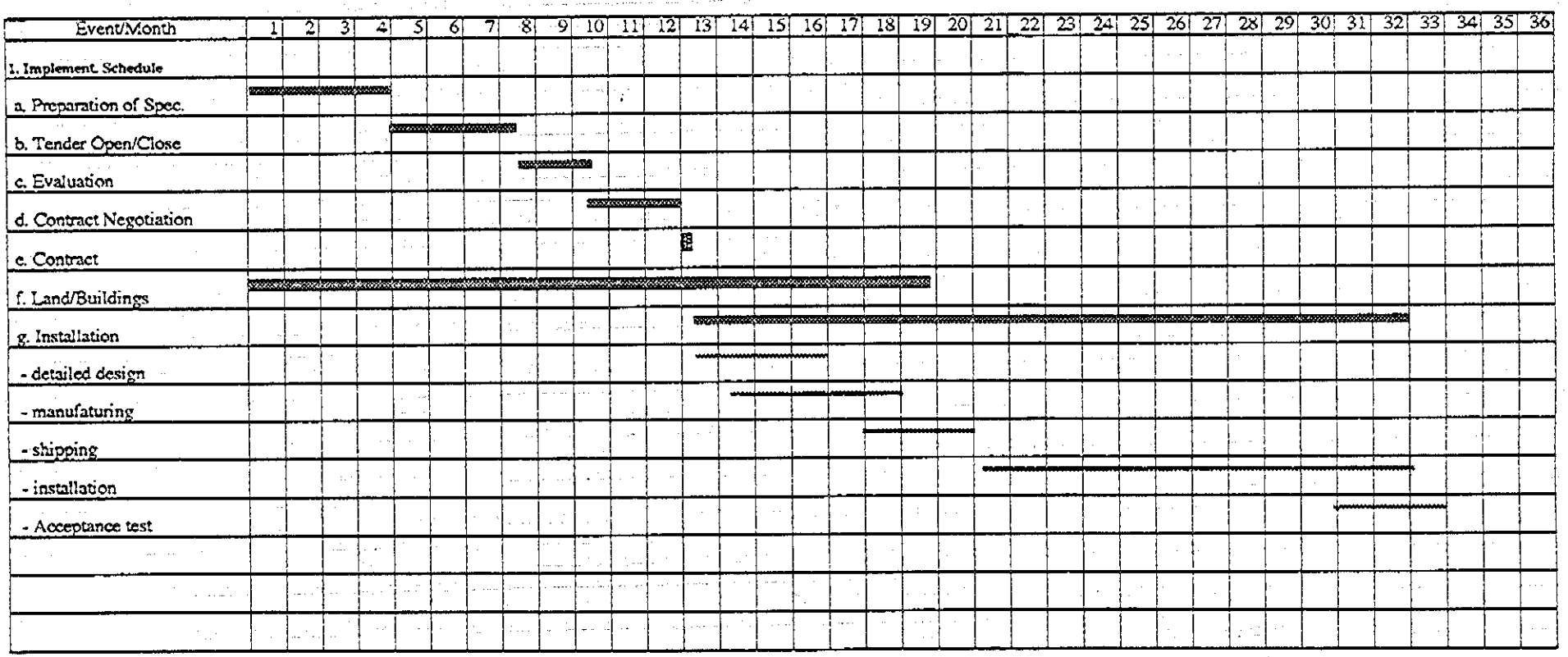



Figure 10.3.2 Typical Detailed Implementation Schedule

# CHAPTER 11 COST ESTIMATION

## 11.1 Conditions for Estimation

The investment cost for this project is estimated based on the scopes of the facility provision plan in Chapter 4 to Chapter 9 and classified into foreign currency and local currency as described in Chapter 10 "The Implementation Plan". The prices of equipment and wages may be changed according to the market situation, inflation and so on, however the costs is estimated referring to the world market and the STE's actual costs. The conditions for estimation are as follows:

(1) Foreign currency is US$.

(2) Local currency is Syrian Pounds.

(3) The costs for equipment and materials are based on C.I.F. (Cost, Insurance and Freight)

(4) The exchange rate except for Import Tax is 42 Syrian Pounds per US$.

(5) The import tax for telecommunication equipment and materials in Syria is on average 30% and the exchange rate for import tax is 23 Syrian Pounds per US$ for cable, 11.25 Syrian Pounds per US$ for other telecommunications equipment.

## 11.2 Cost Estimation for Each System

The cost components for each system are mainly considered as follows:

- Equipment and materials including spare parts
- Installation including supervision
- Building except for land(including also common space but negligible space for small requirements)
- Tools and measuring equipment
- Training including maintenance assistance(in foreign counties and / or in-land)

The currency of installation cost for each system is in accordance with the responsibility of project works in Chapter 10.

The estimated costs for each system are shown in Table 11.2.1-1 to Table 11.2.4-1.

## 11.2.1 Telephone Network

### (1) Switching System

Table 11.2.1-1 Cost for Switching System

| | Foreign Currency (US$) | Local Currency (Syrian Pounds) |
|---|---|---|
| **1. Equipment & Materials** | **32,469,764** | **119,385,452** |
| (1) Exchanges | 29,658,000 | 0 |
| (2) Power Plant | 2,811,764 | 9,800,000 |
| (3) Import tax | 0 | 109,585,452 |
| **2. Installation** | **419,750** | **1,680,000** |
| (1) Exchanges | 255,500 | 1,008,000 |
| (2) Power Plant | 164,250 | 672,000 |
| **3. Building *** | **0** | **48,412,500** |
| (1) Exchanges | 0 | 28,930,500 |
| (2) Power Plant | 0 | 19,482,000 |
| **4. Training** | **282,000** | **384,000** |
| Exchanges | 195,000 | 240,000 |
| Power Plant | 87,000 | 144,000 |
| **5. Total** | **33,171,514** | **169,861,952** |

Note: * High tension facility from PEE

* Building cost includes the cost for common space which means customer windows and miscellaneous uses in new buildings.

(2) Transmission System

Table 11.2.1-2 Cost for Transmission System

| | Foreign Currency (US$) | Local Currency (Syrian Pounds) |
|---|---|---|
| **1. Equipment & Material** | **2,930,213** | **9,889,470** |
| (1) Transmission | 2,705,697 | 0 |
| (2) Measuring Equipment | 224,516 | 0 |
| (3) Import tax | 0 | 9,889,470 |
| **2. Installation** | **405,855** | **0** |
| **3. Building *** | **0** | **4,725,000** |
| **4. Training** | **48,400** | **120,000** |
| **5. Total** | **3,384,468** | **14,734,470** |

Note: For transmission equipment installation, STE have two methods; one is STE installation with contractor supervision, and the other is contractor installation and supervision. The cost estimation above is for the latter case.

* Building cost includes the cost for common space which means customer windows and miscellaneous use in new buildings.

(3) Subscriber Network

The unit costs to be used for this project are estimated based on the information obtained from STE and based on the data obtained by analyzing the expenditures of the typical projects which were implemented in the city of Damascus before.

Table 11.2.1-3 Cost for Subscriber Network

| | Foreign Currency (US$) | Local Currency (Syrian Pound) |
|---|---|---|
| **1. Materials & Installation** | **25,481,700** | **1,142,225,310** |
| (1) Materials | 24,401,700 | 565,542,180 |
| (2) Import Tax | 0 | 168,371,730 |
| (3) Installation | 1,080,000 | 408,311,400 |
| **2. Measuring Equipment** | **254,320** | **858,330** |
| (1) Measuring Equipment | 254,320 | 0 |
| (2) Import Tax | 0 | 858,330 |
| **3. Tools** | **115,200** | **388,800** |
| (1) Tools | 115,200 | 0 |
| (2) Import Tax | 0 | 388,800 |
| **4. Training** | **94,000** | **717,000** |
| **5. Total** | **25,945,220** | **1,144,186,440** |

### 11.2.2 Mobile Telephone System

The cost estimation of the mobile telephone system, which is presumed to be installed in 1998, is shown in Table 11.2.2-1. The detail of the system implementation plan is explained in Chapter 5.

Table 11.2.2-1 Cost for Mobile Telephone System

| | Foreign Currency (US$) | Local Currency (Syrian Pound) |
|---|---|---|
| **1. Equipment & Material** | **29,073,300** | **114,292,700** |
| (1) Mobile Equipment | 25,591,600 | 0 |
| (2) Entrance transmission | 2,964,400 | 0 |
| (3) Power Plant | 517,300 | 16,170,000 |
| (4) Import Tax | 0 | 98,122,700 |
| **2. Installation** | **478,800** | **1,360,800** |
| **3. Building** | **0** | **8,796,000** |
| **4. Training** | **119,000** | **200,000** |
| **5. Total** | **29,671,100** | **124,649,500** |

Note: Besides using STE's own building, some base transceiver stations (BTs) in Damascus and Aleppo are planned to be installed in rented spaces. The total rental fee is estimated to be 102,000 Syrian Pound / month.

### 11.2.3 Packet Switched Data Network (PSDN)

Cost estimation is based on the assumption that the existing PSDN will be used for Packet Switched Data Services and that expansions of the network are necessary to meet the demand forecast contained in chapter 6. Cost estimations includes also equipment necessary for PSDN-ISDN interworking and a new generation network. Cost estimations do not include operational costs (e.g. power supply, room costs, repair costs).

The cost estimations for the PSDN expansions are provided in Table 11.2.3 - 1. Please note that the estimations only include equipment which is directly related to the PSDN, costs for the underlying networks (e.g. telephone switches, access lines and transmission equipment) are not included. These resources are included in the specific chapters.

PSDN upgrade (Ref. No 3) is specified in chapter 6.

Table 11.2.3-1 Cost Estimation for PSDN

| Ref. No | | 2000 |
|---|---|---|
| 1 | Delta* dedicated accesses (Qty) | 180 |
| 2 | Delta* dial-up accesses (Qty) | 200** |
| | **Costs (US$)** | |
| 3 | PSDN upgrade (switches, FEPs, Mux etc.) | 400,000 |
| 4 | Net Mgt Center upgrade | 20,000 |
| 5 | Site infrastructure | 15,000 |
| 6 | Auxiliary equipment (e.g. test facilities) | 40,000 |
| 7 | Miscellaneous | 40,000 |
| **8** | **Total Cost** | **515,000** |

Notes:

- * Delta = increase during five-year period
- ** Delta figures minus access via ISDN interworking
- The cost are estimated on a five-year basis according to the five-year planning adopted for the development of the telecommunications infrastructure.
- All tax included

- Cost for training (abroad) included in item 3 and 4 (for calculation reasons one can assume that 5% of these cost items are for training)
- Costs for local training are included in item 7 (for calculation reasons one can assume 10,000 US$ for training)
- Site infrastructure (Ref. No 5) covers power supply equipment, cable, filing cabinets and other material.
- Local currency portions are expressed in US$ (costs of Ref. No 5 and 50% of costs of Ref. No 7)

Table 11.2.3-2 Cost Estimation for PSDN-ISDN Interworking

| Ref. No | | 2000 |
|---|---|---|
| 1 | Total Cost PSDN-ISDN IW | 300,000 |

- All tax included
- Cost for training (abroad) included (for calculation reasons one can assume that 5% of this cost item is for training)
- Costs for site infrastructure and installation are included in PSDN infrastructure

Table 11.2.3-3 Cost Estimation for NGN and MBS Platform

| Ref. No | | 2000 |
|---|---|---|
| 1 | Total Cost NGN | 1,400,000 |

Notes:

- Investments mainly in networks based on ATM technology. Because ATM supports any kind of communications, a clear distinction between services (voice, data, video etc.) is not any longer possible.
- All tax included
- Cost for training (abroad) included (for calculation reasons one can assume that 5% of this cost item is for training)
- Costs for site infrastructure and installation are also included (100,000 US$)

Table 11.2.3-4 Cost Estimation: Equipment Cost Total
(Table 11.2.3-1, Table 11.2.3-2 and Table 11.2.3-3)

| Ref. No | | 2000 |
|---|---|---|
| 1 | Total Cost | 2,215,000 |

Table 11.2.3-5 Total Cost for Packet Switching Data Network

| | Foreign Currency (US$) | Local Currency (Syrian Pounds) |
|---|---|---|
| **1. Equipment & Materials** | **1,518,462** | **1,050,000** |
| (1) PSDN | 353,077 | 1,050,000 |
| (1) PSDN-ISDN Interwork | 219,231 | 0 |
| (1) NGN & MBS Platform | 946,154 | 0 |
| **2. Import tax** | **0** | 5,124,808 |
| **3. Installation** | **100,000** | **0** |
| **4. Building** | **0** | **0** |
| **5. Training** | **106,000** | **420,000** |
| **6. Total** | **1,724,462** | **6,594,808** |

### 11.2.4 Computer System

#### 11.2.4.1 General

In estimating the cost for the STE computerization the preconditions are as follows:

- To procure hardware in Syria.
- To utilize and customize packaged software.
- The cost of modification of buildings is necessary for the billing center (Aleppo) and not necessary for telephone-centers.
- Training cost for two years after system implementation is included in the cost of application software. And regarding to training after that, the cost is included in the maintenance cost assuming that it should be done by On the Job Training.
- To exclude communications expenses because the network facility is owned.

#### 11.2.4.2 Telephone-center System

(1) Hardware

According to the implementation plan in the year of 1997, 15 telephone-center systems in Damascus Rural and Aleppo are implemented. The next year, 1998, 10 telephone-center systems in Homs, Hama and Lattakia are implemented.

Table 11.2.4.2-1 Cost of Hardware (US$)

| Year | 1997 | 1998 | Total |
|---|---|---|---|
| Cost (Server, Terminal, Laser printer, Printer, Hub, MODEM, UPS) | 1,380,090 | 932,940 | 2,313,030 |

(2) Software

The cost of application software is especially variable because it depends on number of subscribers, requested specification, performance, reliability and other conditions. Therefore, the unit price for application software shown below is not definite. And it is assumed that an packaged application software should be purchased and customized in

1997 and the same one is used for the telephone-center systems implemented in 1998. Accordingly, the cost of an application software is not included in the cost for 1998.

Table 11.2.4.2-2 Cost of Software (US$)

| Year | 1997 | 1998 | Total |
|---|---|---|---|
| Cost (Operating system for server, Database, Network, Application software) | 2,461,955 | 148,560 | 2,610,515 |

Note*: The price of application software is considered to include training price for users.

(3) Installation Cost

Beside hardware cost and software cost, we need consider system installation cost. It is calculated according to this formula; Cost of hardware × 5% (including access control equipment, cables and other small devices). It is paid by local currency because installation is considered to be done by local staff of a vender.

Table 11.2.4.2-3 Installation Cost (S.P.)

| Year | 1997 | 1998 | Total |
|---|---|---|---|
| Cost | 2,898,189 | 1,959,174 | 4,857,363 |

(4) Total Cost of Telephone Center System

Table 11.2.4.2-4 Total Cost of Telephone Center System

| | Foreign Currency (US$) | Local Currency (S.P.) |
|---|---|---|
| 1. Hardware | 2,313,030 | |
| 2. Software | 2,610,515 | |
| 3. Import tax | | 16,616,964 |
| 4. Installation | | 4,857,363 |
| 5. Total | 4,923,545 | 21,474,327 |

11.2.4.3 Billing-center System

(1) Hardware

During the Eighth National Five-Year Plan (1996-2000), by the end of 1996 Aleppo billing-center system should be implemented in addition to Damascus billing-center system implemented in 1995.
Moreover, in accordance with the rapid increase of subscribers, hard disk should be added in the year of 1999, before the number of subscribers dealt with by Aleppo billing-center system reaches 1,000,000.

Table 11.2.4.3-1 Cost of Hardware (US$)

| Year | 1996 | 1999 | Total |
|---|---|---|---|
| Cost (Server, Terminal, Laser printer, Magnetic tape unit, Printer, Hub, Router, MODEM, UPS, Hard disk) | 396,958 | 5,600 | 402,558 |

Note*: When the system is implemented initially, the additional hard disk is not necessary.

(2) Software

The application software for Damascus billing-center system should be utilized for Aleppo, so the cost of application software is not included.

Table 11.2.4.3-2 Cost of Software (US$)

| Year | 1996 | 1999 | Total |
|---|---|---|---|
| Cost (Operating system for server, Database, Operating system for terminal, Compiler, Application software) | 29,178 | ---- | 29,178 |

Note*: The price of application software is considered to include training price for users.

(3) Installation Cost

Air-conditioners are needed to keep appropriate temperature and humidity for computers. And in the same way as for telephone-center system, system installation cost should be included in the cost of billing-center system; cost of hardware × 5% (including access control equipment, cables and other small devices). It is paid by local currency.

Table 11.2.4.3-3 Installation Cost

| Year | 1996 | 1999 | Total |
|---|---|---|---|
| Foreign Currency (US$) <air-conditioner> | 4,000 | --- | 4,000 |
| Local Currency (S.P.) | 833,612 | --- | 833,612 |

Note: The First implementation cost excluding additional hard disk

(4) Building Cost

The cost of modification of Aleppo billing-center building should be included as the initial cost.

Table 11.2.4.3-4 Building Cost (S.P.)

| Year | 1996 | 1999 | Total |
|---|---|---|---|
| Cost of building modification | 630,000 | --- | 630,000 |

(5) Total Cost of Billing Center System

Table 11.2.4.3-5 Total Cost of Billing Center System

| | Foreign Currency (US$) | Local Currency (S.P.) |
|---|---|---|
| 1. Hardware | 402,558 | |
| 2. Software | 29,178 | |
| 3. Import tax | | 1,470,609 |
| 4. Installation | 4,000 | 833,612 |
| 5. Building | | 630,000 |
| 6. Total | 435,736 | 2,934,221 |

11.2.4.4 Management Information System (MIS)

(1) Hardware

MIS for headquarters and 5 big cities (Damascus, Aleppo, Homs, Hama, Lattakia) is implemented in the year of 1997.

Table 11.2.4.4-1 Cost of Hardware (US$)

| Year | 1997 | 1998 | Total |
|---|---|---|---|
| Cost (Server, Terminal, Laser printer, Printer, Hub, MODEM, UPS) | 180,970 | --- | 180,970 |

(2) Software

Table 11.2.4.4-2 Cost of Software (US$)

| Year | 1997 | 1998 | Total |
|---|---|---|---|
| Cost (Operating system for server, Database, Network, Operating system for terminal, Application software) | 35,149 | ---- | 35,149 |

Note: The price of application software is considered to include training price for users.

(3) Installation Cost

System installation cost is calculated in the same manner; Cost of hardware x 5% (including access control equipment, cables and other small devices). It is paid by local currency.

Table 11.2.4.4-3 Installation Cost (S.P.)

| Year | 1997 | 1998 | Total |
|---|---|---|---|
| Cost | 380,037 | --- | 380,037 |

(4) Total Cost of Management Information System

Table 11.2.4.4-3 Total Cost of Management Information System

| | Foreign Currency (US$) | Local Currency (S.P.) |
|---|---|---|
| 1. Hardware | 180,970 | |
| 2. Software | 35,149 | |
| 3. Import tax | | 729,402 |
| 4. Installation | | 380,037 |
| 5. Total | 216,119 | 1,109,439 |

11.2.4.5 Total Cost of Computer System

Table 11.2.4.5-1 Total Cost of Computer System

| | Foreign Currency (US$) | Local Currency (S.P.) |
|---|---|---|
| 1. Telephone center | 4,923,545 | 21,474,327 |
| 2. Billing center | 435,736 | 2,934,221 |
| 3. Management Inf. Sys | 216,119 | 1,109,439 |
| 4. Total | 5,575,400 | 25,517,977 |

## 11.3 Summary of Cost Estimation

The total cost for all facilities is estimated as shown in Table 11.3-1

Table 11.3-1 Total Cost

| | Foreign Currency (US$) | Local Currency (Syrian Pounds) |
|---|---|---|
| **1. Telephone Network** | **62,501,202** | **1,328,782,862** |
| (1) Switching | 33,171,514 | 169,861,952 |
| (2) Transmission | 3,384,468 | 14,734,470 |
| (3) Subscriber Network | 25,945,220 | 1,144,186,440 |
| **2. Mobile Telephone System** | **29,671,100** | **124,649,500** |
| **3. Packet Switching System** | **1,724,462** | **6,594,808** |
| **4. Computer System** | **5,575,400** | **25,517,987** |
| (1) Billing Center System | 435,736 | 2,934,221 |
| (2) Telephone Center | 4,923,545 | 21,474,327 |
| (3) Management Information System | 216,119 | 1,109,439 |
| **5. Sub-Total ( 1 to 4)** | **99,472,164** | **1,485,545,157** |
| **6. Contingency(10% of Sub-Total)** | **9,947,216** | **148,554,516** |
| **7. Total** | **109,419,380** | **1,634,099,673** |

# CHAPTER 12 PROJECT EVALUATION

## 12.1 Financial Evaluation

### 12.1.1 Summary of Current Financial Position for STE

The operating results for STE from 1991-94 are summarized in Table 12.1.1-1.

Table 12.1.1-1 Comparative Income Statement (Unit:1000 US$)

| **Revenue** | **1990** | **1991** | **1992** | **1993** | **1994** |
|---|---|---|---|---|---|
| Local call | 8,048 | 8,667 | 12,786 | 14,286 | 15,714 |
| Long distance call | 4,500 | 4,571 | 6,333 | 6,571 | 8,857 |
| International call | 27,381 | 28,667 | 31,429 | 41,024 | 69,595 |
| Facsimile installation | 0 | 0 | 0 | 190 | 381 |
| Telex | 4,262 | 6,333 | 7,738 | 8,881 | 4,524 |
| Telegraph | 2,310 | 1,762 | 1,929 | 2,024 | 2,310 |
| Other telephone service | 12,881 | 16,357 | 13,905 | 27,476 | 51,310 |
| Other revenue | 1,214 | 1,048 | 1,333 | 1,738 | 1,881 |
| **Total** | **60,595** | **67,405** | **75,452** | **102,190** | **154,571** |
| | | | | | |
| Expenditure | 30,095 | 28,714 | 34,381 | 40,905 | 65,167 |
| Profits | 30,500 | 38,690 | 41,071 | 61,286 | 89,405 |
| Income Tax | 17,842 | 22,634 | 24,027 | 35,852 | 52,302 |
| **Profits after Tax** | **12,658** | **16,057** | **17,045** | **25,434** | **37,103** |

STE's return on Fixed assets had achieved as 18% in the year 1994 (calculated by dividing the profit after tax of US 37,103,000 dollars with the fixed assets of US 205,421,000 dollars). During the past four years, the revenue and expenses showed parallel movement. The ratio of profit on sales has remained unchanged. For future rapid development, the efforts for effective expense control seems necessary. One of such measures as early collection of accounts receivable would contribute significantly.

The operating expenditure during 1990-1994 are shown in Table 12.1.1-1. Total expenditure shares 44% of total revenues on average during the same period. This ratio had remained unchanged, though its growth rate shows an significant increases in Table 12.1.1-3. At the same time, the amounts of income taxes during the same period shows the constant shares in total revenues. Thus, the net income (profit after tax) to revenue had remained constant, around 23% on average, throughout the same period.

Table 12.1.1-2 Common-size Income Statement

| Revenue Share | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|
| Local call | 13.3% | 12.9% | 16.9% | 14.0% | 10.2% |
| Long distance call | 7.4% | 6.8% | 8.4% | 6.4% | 5.7% |
| International call | 45.2% | 42.5% | 41.7% | 40.1% | 45.0% |
| Facsimile installation | 0.0% | 0.0% | 0.0% | 0.2% | 0.2% |
| Telex | 7.0% | 9.4% | 10.3% | 8.7% | 2.9% |
| Telegraph | 3.8% | 2.6% | 2.6% | 2.0% | 1.5% |
| Other telephone service | 21.3% | 24.3% | 18.4% | 26.9% | 33.2% |
| Other revenue | 2.0% | 1.6% | 1.8% | 1.7% | 1.2% |
| **Total** | **100.0%** | **100.0%** | **100.0%** | **100.0%** | **100.0%** |
| | | | | | |
| Expenditure | 49.7% | 42.6% | 45.6% | 40.0% | 42.2% |
| Profits | 50.3% | 57.4% | 54.4% | 60.0% | 57.8% |
| Income Tax | 29.4% | 33.6% | 31.8% | 35.1% | 33.8% |
| **Profits after Tax** | **20.9%** | **23.8%** | **22.6%** | **24.9%** | **24.0%** |

Table 12.1.1-3 Comparative Growth Rates

| Revenue | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|
| Local call | 8,048 | 7.7% | 47.5% | 11.7% | 10.0% |
| Long distance call | 4,500 | 1.6% | 38.5% | 3.8% | 34.8% |
| International call | 27,381 | 4.7% | 9.6% | 30.5% | 69.6% |
| Facsimile installation | | | | | 100.0% |
| Telex | 4,262 | 48.6% | 22.2% | 14.8% | -49.1% |
| Telegraph | 2,310 | -23.7% | 9.5% | 4.9% | 14.1% |
| Other telephone service | 12,881 | 27.0% | -15.0% | 97.6% | 86.7% |
| Other revenue | 1,214 | -13.7% | 27.3% | 30.4% | 8.2% |
| **Total** | **60,595** | **11.2%** | **11.9%** | **35.4%** | **51.3%** |
| | | | | | |
| Expenditure | 30,095 | -4.6% | 19.7% | 19.0% | 59.3% |
| Profits | 30,500 | 26.9% | 6.2% | 49.2% | 45.9% |

### 12.1.2 Scope of Evaluation

(1) Tools for Evaluation

The following three financial statements will be forecasted and evaluation criteria indexes will be presented as the results of evaluation.

| | |
|---|---|
| -Forecast Cash flow statement. | Financial Internal rate of return (FIRR) |
| - Forecast Income statement. | Operating ratio |
| - Forecast Fund flow statement. | Debt service ratio |

a. Financial internal rate of return (FIRR)

This is, obtained from a cash flow statement, a discounting factor when total cost equal to revenue. This is usually compared with opportunity cost of capital, which combines returns on both invested capital and debt such as interest rate of lending fund from banks or the government. STE has several funding resources such as Kuwaiti fund, the government. When FIRR is larger than this cost of capital, the project is considered to be feasible.

b. Operating ratio

This figure is obtained from an income statement, dividing total expenditure by total revenue. This ratio should be less than 1.0, which means that total revenue must be larger than total expenditure.

The countries with high telephone penetration have relatively lower value around 30%. With telephone supply volume increased, the share of depreciation and interest payment increases. Thus, a measures must be taken to reduce the share of operating expenditure for expansion of supply volume.

c. Debt-service ratio

This is obtained from a fund flow statement, dividing Internal Reserve (Net Income plus Depreciation) by "Repayment of loan amount". This ratio should be, at least, more than one. The other criteria derived from this statement is "Accumulated Surplus" (total surplus amount in the ending balance), which must realize to be positive as early as possible. When this figure is negative, STE must procure a short-term loan, which will create a burden on profits.

(2) Premises and assumptions

The following premises and assumptions are adopted for this evaluation.

a. Evaluation periods of services rendering from each facilities plan are assumed to 10 years (until the year 2008), and 20 years (until the year 2018), on the basis of life time of major equipment's. Thus, system operation will be terminated in the year 2018. No salvage value should be allowed for.

b. No inflation should be taken into consideration. This means that the constant price at the year 1995 should be used as a basic price. Consequently, the tariff as of 1995 should be used for evaluation.

c. A foreign exchange rate of Syrian Pounds (SP) 42 = US dollar (US$) 1 will be used in this evaluation.

(3) Estimation of project revenue

Revenue of telecommunication project will be derived only on the condition that all the systems are equipped. However, most of projects will be taken up as a part of full system like this project. Thus, the revenue for this project will accrue only when other facilities are expanded at the same time and when other facilities that already exist can accommodate this project. This is one of the unique features of telecommunications project. Revenue accrued to this project can be calculated only through utilization of system component ratios in terms of this project cost sharing total system costs. Based on the STE's assets data, the following ratios have been adopted as the contribution of this project cost over the total cost to be incurred to meet the expansion required.

| | Telephone | Fax | ISDN | PSDN | Mobile | New Service |
|---|---|---|---|---|---|---|
| Installation &Subscription | 100% | 100% | 100% | 100% | 100% | 100% |
| Local Call | 100% | 100% | 100% | 100% | 100% | — |
| Long distance Call | 90% | 90% | 90% | 90% | 100% | — |
| International Call | 80% | 80% | 80% | 80% | — | |

During the period from the service-in of the projected system, the revenue is accrued to the expanded portion of the telecommunication system including the investment required for this project and other additional investment. Even though the current system naturally has the service capacity to accommodate new subscribers in and after the service-in, by

considering the all past investments which enables such services as a sunk cost, such services would not be deemed as a part derived from the past projects.

### 12.1.3 Project Costs

Total project cost amounted in US 134,842,000 dollars required to implement the project excluding contingency cost. Total project cost is summarized in Table 12.1.3-1. The project cost will be disbursed during the period of 1996-2000 along with the implementation plan described in Chapter 11. Expenditure plan in percentage share of each sub-project are shown in Table 12.1.3-2. It is assumed that the construction cost will spend more than 80% of total in the year 1998 and 1999. The ratio of foreign currency portion in total construction cost is 74%.

Table 12.1.3-1 Total Project Costs (US$ 1,000)

| | Total | 1996 | 1997 | 1998 | 1999 | 2000 |
|---|---|---|---|---|---|---|
| Foreign Portion | 99,472 | 430 | 4,623 | 50,172 | 31,658 | 12,589 |
| Local Portion | 35,370 | 69 | 454 | 12,651 | 15,855 | 6,341 |
| Equity | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **134,842** | **500** | **5,077** | **62,823** | **47,513** | **18,929** |

Table 12.1.3-2 Common-size Project Cost Disbursement

| | 1996 | 1997 | 1998 | 1999 | 2000 | Total |
|---|---|---|---|---|---|---|
| **Telephone Network** | | | **20.94%** | **34.91%** | **13.96%** | **69.81%** |
| Foreign Portion | | | 13.91% | 23.18% | 9.27% | 46.35% |
| Local Portion | | | 7.04% | 11.73% | 4.69% | 23.46% |
| **Mobile Telephone Network** | | | **24.21%** | **0.00%** | **0.00%** | **24.21%** |
| Foreign Portion | | | 22.00% | 0.00% | 0.00% | 22.00% |
| Local Portion | | | 2.20% | 0.00% | 0.00% | 2.20% |
| **PSDN** | | **0.46%** | **0.54%** | **0.33%** | **0.08%** | **1.40%** |
| Foreign Portion | | 0.42% | 0.50% | 0.30% | 0.07% | 1.28% |
| Local Portion | | 0.04% | 0.04% | 0.03% | 0.01% | 0.12% |
| **Computer System** | **0.37%** | **3.31%** | **0.90%** | **0.00%** | **0.00%** | **4.59%** |
| Foreign Portion | 0.32% | 3.01% | 0.80% | 0.00% | 0.00% | 4.13% |
| Local Portion | 0.05% | 0.30% | 0.10% | 0.00% | 0.00% | 0.45% |
| **Total** | **0.37%** | **3.77%** | **46.59%** | **35.24%** | **14.04%** | **100.00%** |
| Foreign Portion | 0.32% | 3.43% | 37.21% | 23.48% | 9.34% | 73.77% |
| Local Portion | 0.05% | 0.34% | 9.38% | 11.76% | 4.70% | 26.23% |

## 12.1.4 Operating Expenditure

### (1) Operation and Maintenance Costs

Table 12.1.4-1 shows the summary of maintenance cost estimation. The maintenance work will incur right after the completion of construction. The amounts of maintenance cost after 2001 continues to incur as much as that of 2001, that is, US 10,053,000 dollars every year. The maintenance cost for service and administration in Table 12.1.4-1 indicates the contribution of this project to the total common cost of STE such the general administration and operation costs as salaries, office supply, travel, printing directories, training, selling and marketing expenses incurring in the headquarters should be included as a project overhead to examine its feasibility costs. This amounts is assumed to be 10% of total project maintenance costs.

Table 12.1.4-1 Operation and Maintenance Costs (US$ 1,000)

| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|
| Telephone Network | | 76.4 | 64.6 | 5,642.7 | 5,937.2 | 5,937.2 |
| Switching System | | | 41.7 | 344.7 | 623.9 | 623.9 |
| Transmission System | | 76.4 | 22.9 | 61.1 | 76.4 | 76.4 |
| Subscriber Network | | | | 5,236.9 | 5,236.9 | 1,817.2 |
| Mobile Telephone Network | | | 916.0 | 2,577.0 | 2,930.0 | 2,930.0 |
| PSDN | | 3.2 | 7.3 | 10.8 | 14.0 | 8.6 |
| Computer System | 6.5 | 19.2 | 30.7 | 34.0 | 34.0 | 34.0 |
| Service & Administration | 0.6 | 17.5 | 108.3 | 1,390.7 | 1,485.2 | 1,142.7 |
| **Total** | **7.1** | **116.3** | **1,127.0** | **9,655.3** | **10,400.5** | **10,052.6** |

The share of maintenance cost in the year 2001 to total investment cost are shown as below. This ratios indicate the level of maintenance costs. On average, total maintenance cost shares 7.46% to the total investment cost. Mobile Telephone Network has the highest value while PSDN is the lowest.

| | |
|---|---|
| Telephone Network | 6.31% |
| Mobile Telephone Network | 8.98% |
| PSDN | 0.46% |
| Computer System | 0.55% |
| Total | 7.46% |

(2) Provisions for Depreciation

STE adopts the straight line method of depreciation by category of each assets. The service life and annual depreciation rate of each equipment's are as under determined on the basis of the current practice operating in STE. Net salvage value (salvage value at the service life termination) is assumed to set at nil in this analysis. Further, the value prior to the service life termination will be not considered for cost estimation at the time of project termination.

Table 12.1.4-2 Depreciation

| Category | | Life (year) | Annual Rate |
|---|---|---|---|
| Switch | EWSD | 16 | 6.25% |
| | EMD | 10 | 10.00% |
| Cable | Within cities | 16 | 6.25% |
| | Between cities | 20 | 5.00% |
| Power Generators | | 10 | 10.00% |
| Terminal Equipment | Telephone | 5 | 20.00% |
| Building | | 40 | 2.50% |
| Heating & Conditioning Equip. | | 20 | 5.00% |
| Office Machine | | 5 | 20.00% |
| Furniture | | 10 | 10.00% |
| Transportation Cars | | 5 | 20.00% |
| Motor Cycles | | 5 | 20.00% |
| Electronic Computers | | 5 | 20.00% |
| Garage & Workshop Equipment | | 10 | 10.00% |

(3) Provisions for Bad Debts

This is assumed at the 5% of the forecast subscription and call revenues for the Mobile Telephone Service.

(4) Working Capital

Working capital is definitely required for the project in view of smooth financial operation right after the construction. The following factors should be considered for estimating the required amounts of working capital:

a. the cost to be incurred due to the duration of time between call completion and the actual collection,
b. the available fund at hand due to the time lag between material purchase and the actual payments for those,

c. the cost by keeping maitenance materials and equipment in stock,
d. the necessary cash on hand.

This analysis assumes the working capital requirement as 30% of an annual operating revenue, by considering the average tariff charges collection period of 100 days. The amounts of working capital is apportioned in proportion to increase or decrease of a revenue size gained every year, and is recovered in the final year of the project termination.

12.1.5 Operating Revenues

(1) Current Operating Revenues

The current revenue level of STE has been indicated in Table 12.1.5-1. The average call revenue per subscriber in 1994 is US 137 dollars. This has increased 1.7 times from 1990. The share of international call revenue is 74% in 1994 while its share of long-distance (national) call is only 9% in 1994.

Table 12.1.5-2 shows the results of call revenues estimation for Damascus. Data is obtained from only EWSD switches and their telephone offices based on the fourth quarter of 1994 and the first quarter of 1995. These original 90 days data is converted into annual based data simply multiplying 4 times. The call revenue per subscriber for Damascus is twice as large as that of national average amounts in 1994. The share of international call revenue is 81% while its share of national call is 9%.

Table 12.1.5-1 Comparative Call Revenues per Subscriber in Syria (US$)

| | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|
| Telephone Main Subscribers | 496,360 | | 513,000 | 550,000 | 688,500 |
| Local call revenue per sub. | 16.2 | | 24.9 | 26.0 | 22.8 |
| Long distance call revenue per sub. | 9.1 | | 12.3 | 11.9 | 12.9 |
| International call revenue per sub. | 55.2 | | 61.3 | 74.6 | 101.1 |
| **Total call revenue per sub.** | **80.4** | | **98.5** | **112.5** | **136.8** |

Table 12.1.5-2 Call revenues per Subscriber in Damascus in 1994/5 (US$)

| | City | Rural | Total |
|---|---|---|---|
| Subscription Fee per Sub./Year | 28.70 | 27.25 | 28.51 |
| **Total Call Revenue per Sub./Year** | **301.53** | **151.19** | **281.67** |
| Local Call Revenue per Sub./Year | 31.75 | 12.50 | 29.21 |
| National Call Revenue per /Sub./Year | 21.24 | 45.56 | 24.46 |
| International Revenue /Sub./Year | 248.53 | 93.13 | 228.00 |

(2) Methods of Operating Revenue Forecast during the Project Evaluation Period

Revenue to accumulate from commissioning of the system constructed by the project is assumed to be of three categories, i.e., Installation Charge, Subscription Charge, and Call Charges. The tariff rate applied for this analysis is employed the current tariff rates in 1995.

a. Installation Charge

The main revenues from new subscriber installation charged is categorized as follows: new connection, internal extensions, transfers, etc. Installation Charges are categorized by type of services. However, its revenue is calculated as follows:

- Number of new subscribers by year x installation charge

b. Subscription Charge

The subscription charges varies with the class of services: business lines, residential lines, PBX equipment, and leased circuits. The subscription revenues are calculated as follows:

- Number of new accumulated subscribers by year x subscription charge

c. Call Charge

Call revenues are calculated on the basis of traffic forecast prepared in the foregoing chapters. The traffic conditions such as call mix, and traffic distribution for revenue forecast is summarized as follows:

**For Basic Telephone Service**

- Subscriber Traffic Intensity
  - Business user : 0.065 erl. per subscriber
  - Residential user : 0.040 erl. per subscriber
- Successful Call Ratio : 70%
- Busy Hour Concentration Ratio : 11.7%
  - Off peak Hour (22:00-7:00) ratio : 4%
- Annual Working Day : 300 Days
- Traffic Distribution

| | | Category 1 | Category 2&3 |
|---|---|---|---|
| Local Call | 88% | 90% | |
| National Call | 8% | 8% | |

International Call 4% 2%

| | National Call | International Call |
|---|---|---|
| Zone 0 | 1.04% | — |
| Zone 1 | 4.15% | 3.52% |
| Zone 2 | 17.5% | 5.23% |
| Zone 3 | 24.42% | 40.65% |
| Zone 4 | 17.32% | 9.29% |
| Zone 5 | 32.75% | 1.52% |
| Zone 6 | 2.82% | 18.63% |
| Zone 7 | — | 1.16% |
| Total | 100.00% | 100.00% |

- Business & Residential Subscriber's Ratio

| | Business | Residential |
|---|---|---|
| Category 1 | 40% | 60% |
| Category 2 | 35% | 65% |
| Category 3 | 30% | 70% |

- Local Call Revenue

  Paid Call Revenue = Local Call Revenue x 78.25%

  (This is based on the data obtained from Damascus.)

- International Call Revenue

  It is assumed that there is no settlements between outgoing and incoming call revenues.

- The calculation formula employed for this analysis is as follows:

  BT x 60 x 1/BCR x Annual working days x P x Tariff

  Where,

  BT : Traffic intensity of each category of call in Erlangs

  BCR: Busy hour concentration ratio

  P : Successful call ratio

**For PSDN service,**

- Traffic Intensity : 120 minuets per day
- User Distribution by Connection Type, and Speed

  By connection type

  Dedicated line, 56%, Public telephone : 44%

  By speed

  1200-4800 bps: 80%, 9600bps : 20%

• Traffic Distribution

National : 80%, International : 20%

For international, to Arab : 60%, Europe : 20%, Others : 20%

**For ISDN service,**

• Traffic Intensity : 0.096 erl. per subscriber

(3) Results of Forecast

The forecast operating revenues are given in Table 12.1.5-3.

Table 12.1.5-3 Revenues Forecast (US $1,000)

| | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|
| Telephone Revenue | 0 | 0 | 3,676 | 23,293 | 34,487 | 30,264 | 30,788 |
| Fax Revenue | 0 | 0 | 36 | 224 | 200 | 14 | 6 |
| PSDPN | 222 | 732 | 1,349 | 2,055 | 2,432 | 2,432 | 2,432 |
| ISDN | 0 | 169 | 832 | 1,859 | 2,392 | 2,392 | 2,392 |
| New Service | 0 | 0 | 12 | 107 | 194 | 204 | 210 |
| Mobile | 0 | 11,297 | 23,298 | 25,945 | 25,978 | 24,067 | 24,067 |
| **Total** | **222** | **12,198** | **29,202** | **53,483** | **65,682** | **59,373** | **59,895** |

12.1.6 Financial Evaluation

(1) Analysis of Cash Flow Statement

The prime objective of financial study is to evaluate financially worthwhile to implement the project for STE as a implementing body. This study will employed the criteria of financial internal rate of return (FIRR) for the feasibility of the project. Since FIRR is the discount rate to discount annual expenditure and revenue and to make their respective totaled present worth equal, the project is certified to be feasible for investors when FIRR is higher than total opportunity cost of capital. STE's return on fixed assets had achieved 18% in the year 1994 while STE can procure loans at the 9 % of interest rate from local loan (Government loan), and the 6.5% from Kuwaiti fund. Thus, financial leverage effect is realized from an procurement of loans from outside. Thus, the more than 7.75% of FIRR is considered to be a critical value for evaluation when this project will be financed from both for each 50% of construction cost.

Table 12.1.6-1 shows the cash flows from which 16.1% of FIRR is calculated for ten years project evaluation period, and 20.5% for twenty years project evaluation period.

The FIRR for the project is more than the currently prevailing interest rate for long-term lending in STE. Thus, this project is viable on the condition that STE will keep the same financial resources as that of currently deploying.

In analyzing FIRR, another type of FIRR is in due importance. That is an treatment of income tax. Since this project is to be implemented by STE, FIRR for the implementing body is just as important as the former FIRR (including tax). Under the case of FIRR excluding tax, it is assumed that the government as a member of financing group so that a tax from this project is a mere transfer of benefit.

The projects consisted of several sub-projects, such as basic telephone network project, PSDPN project, mobile telephone project, and computer system project. The FIRR for basic telephone network project including fax, ISDN, new services, were calculated as 8.5% for ten years project period, and 14.6% for twenty years. The FIRR for mobile telephone network project were calculated as 32.7%, and 34.6% respectively.

**Sensitivity Analysis**

The above analysis is made on the basis of 100% demand fulfillment, the present tariff unchanged and the cost unchanged. Sensitivity analysis is required to certify, even under the worsening situations for the financial feasibility in the following aspects.

- Revenue decrease due to demand decrease or tariff change
- Cost increase due to construction cost overrun or exchange rate change or inflation

The sensitivity chart of FIRR to cost or revenue fluctuation are seen as follows:

| Decrease/Increase | Decrease/Increase in Investment Cost | | | |
|---|---|---|---|---|
| in Revenue | 90% | 100% | 110% | 120% |
| 90% | 16.6 (%) | 13.8(%) | 11.4(%) | **9.3(%)** |
| 100% | 19.1 | 16.1 | 13.6 | 11.4 |
| 110% | 21.5 | 18.4 | 15.7 | 13.4 |

'100%' indicates the original amounts for both revenue and investment cost. Thus, '105%' means 5% increase of the original amounts.

Even in the event of 10% decrease of revenue and 20% of cost increase, FIRR stands at 13.8% and 11.4% respectively. However, FIRR stands at 9.3% in the combined case with 10% decrease of revenue, and 20% of cost increase. This results proved that the

sensitivity of cost change to FIRR is greater than that of revenue change. The bold letter of 9% in this chart indicate the critical border line, means the lower part of this line shows the feasibility zone, and the upper part be the infeasibilty zone.

(2) Analysis of Income Statement

The income statement is prepared in Table 12.1.6-2. It is seen that the net income turns into black as early as the full commencement year of the services. The operating ratios in total indicate 28% , and indicate that the sufficient profits are generated with the project.

(3) Analysis of Fund Flow Statement

The fund flow statement is prepared as an example of the following conditions. Total investment for the project amounts US 134,842,000 dollars of which the foreign currency portion will be financed by foreign soft loan (23 years maturity period with 5.2% p.a. interest with grace period of 10 years). The local currency portion is to be financed with the government (15 years maturity period with 9% p.a. interest with grace period of 5 years). The repayment method for both loans is to repay in equal amount during the remaining period after the grace period of principal repayment. The sort-term loan should be procured when an cash balance become negative, is assumed to be 10% p.a interest for this analysis.

The fund flow statement shown in Table 12.1.6-3 indicates that the total cash balance generated during the project periods is estimated about US 303,193,000 dollars, and the investment cost shares 44% of this amount. This means that this project can generate 2.2 times cash balance as large as the total investment amount, which is higher than currently achieved 18% of returns on fixed assets by STE.

By the year 2001, the cash balance turns surplus to cover the costs and keep its positive accounting position until the end of service life. Debt-service ratio shifting to 3.8 at the year end, indicates the stability of financial position of the project and well capability to repay the foreign loan. Therefore, the project provides a sound investment opportunity if the shortage of fund in the beginning of the project period will be covered by the smooth procurement of short-term loan with a good terms of procurement conditions, since the larger amount of loans make weaken its repayment capability.

Table 12.1.6-1 Cash Flow Statement

(Unit:1000 US$)

| | -3 1996 | -2 1997 | -1 1998 | 1 1999 | 2 2000 | 3 2001 | 4 2002 | 5 2003 | 6 2004 | 7 2005 | 8 2006 | 9 2007 | 10 2008 | 11 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cash Inflow | | 222 | 8,492 | 23,977 | 37,624 | 45,642 | 39,199 | 40,506 | 40,115 | 39,921 | 39,731 | 39,533 | 39,217 | 38,710 |
| Cash Outflow | 507 | 5,260 | 67,543 | 62,270 | 36,614 | 13,712 | 8,163 | 10,146 | 9,989 | 9,989 | 9,989 | 9,989 | 9,989 | 9,989 |
| Operating Expenses | 7 | 183 | 4,720 | 14,757 | 17,685 | 13,712 | 8,163 | 10,146 | 9,989 | 9,989 | 9,989 | 9,989 | 9,989 | 9,989 |
| Construction Costs | 500 | 5,077 | 62,823 | 47,513 | 18,929 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Net Cashflow | -507 | -5,038 | -59,051 | -38,293 | 1,009 | 31,930 | 31,036 | 30,360 | 30,126 | 29,931 | 29,741 | 29,543 | 29,228 | 28,720 |

F.I.R.R = 16.1% (Including Tax Payment)

| | 12 2010 | 13 2011 | 14 2012 | 15 2013 | 16 2014 | 17 2015 | 18 2016 | 19 2017 | 20 2018 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Cash Inflow | 38,182 | 37,719 | 37,303 | 36,954 | 36,667 | 34,322 | 32,506 | 31,643 | 20,898 | 739,081 |
| Cash Outflow | 9,989 | 9,989 | 9,989 | 9,989 | 9,989 | 9,989 | 9,989 | 9,989 | -7,979 | 336,088 |
| Operating Expenses | 9,989 | 9,989 | 9,989 | 9,989 | 9,989 | 9,989 | 9,989 | 9,989 | -7,979 | 201,246 |
| Construction Costs | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 134,842 |
| Net Cashflow | 28,192 | 27,730 | 27,314 | 26,964 | 26,678 | 24,332 | 22,516 | 21,653 | 28,877 | 402,993 |

Table 12.1.6-2 Income Statement (1/2)

(Unit:1000 US$)

| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Operating Revenue | | 222 | 12,198 | 29,202 | 53,483 | 65,682 | 59,373 | 59,895 | 59,895 | 59,895 | 59,895 | 59,895 | 59,895 | 59,895 |
| Operating Expenses | 7 | 277 | 5,741 | 19,906 | 25,839 | 23,063 | 16,529 | 18,512 | 18,105 | 18,091 | 18,086 | 18,086 | 18,086 | 17,884 |
| O&M Cost | 7 | 116 | 1,127 | 9,655 | 10,400 | 10,053 | 10,055 | 9,989 | 9,989 | 9,989 | 9,989 | 9,989 | 9,989 | 9,989 |
| Depreciation | | 94 | 1,021 | 5,150 | 8,154 | 9,350 | 8,366 | 8,366 | 8,115 | 8,102 | 8,097 | 8,097 | 8,097 | 7,895 |
| Working Capital | 0 | 67 | 3,593 | 5,101 | 7,284 | 3,660 | -1,893 | 156 | 0 | 0 | 0 | 0 | 0 | 0 |
| Operating Income | -7 | -55 | 6,457 | 9,296 | 27,645 | 42,619 | 42,844 | 41,383 | 41,790 | 41,803 | 41,808 | 41,808 | 41,808 | 42,010 |
| Non-Operating Income | -2 | -23 | -114 | -355 | -526 | -8,355 | -8,351 | -8,232 | -7,971 | -7,652 | -7,332 | -6,994 | -6,455 | -5,789 |
| Interest Receipt | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Interest Payment :Long-term | | | | | | 8,355 | 8,351 | 8,232 | 7,971 | 7,652 | 7,332 | 6,994 | 6,455 | 5,789 |
| :Short-term | 2 | 23 | 114 | 355 | 526 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Net Income | -9 | -78 | 6,344 | 8,941 | 27,119 | 34,264 | 34,494 | 33,151 | 33,819 | 34,151 | 34,476 | 34,815 | 35,354 | 36,222 |
| Income Tax | | | 3,706 | 5,226 | 15,860 | 20,040 | 20,174 | 19,389 | 19,779 | 19,974 | 20,164 | 20,362 | 20,677 | 21,185 |
| Income After Tax | -9 | -78 | 2,637 | 3,715 | 11,259 | 14,224 | 14,320 | 13,762 | 14,040 | 14,177 | 14,312 | 14,453 | 14,677 | 15,037 |
| Operating Ratio | | | 47.1% | 68.2% | 48.3% | 35.1% | 27.8% | 30.9% | 30.2% | 30.2% | 30.2% | 30.2% | 30.2% | 29.9% |
| Net Income to Revenue | | | 21.6% | 12.7% | 21.1% | 21.7% | 24.1% | 23.0% | 23.4% | 23.7% | 23.9% | 24.1% | 24.5% | 25.1% |

Table 12.1.6-2 Income Statement (2/2)

(Unit:1000 US$)

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Operating Revenue | 59,895 | 59,895 | 59,895 | 59,895 | 59,895 | 59,895 | 59,895 | 59,895 | 59,895 | 1,178,474 |
| Operating Expenses | 17,698 | 17,624 | 17,624 | 17,624 | 17,589 | 13,978 | 11,271 | 10,194 | -7,775 | 334,037 |
| O&M Cost | 9,989 | 9,989 | 9,989 | 9,989 | 9,989 | 9,989 | 9,989 | 9,989 | 9,989 | 201,246 |
| Depreciation | 7,709 | 7,634 | 7,634 | 7,634 | 7,599 | 3,988 | 1,282 | 204 | 204 | 132,791 |
| Working Capital | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -17,968 | 0 |
| Operating Income | 42,197 | 42,271 | 42,271 | 42,271 | 42,306 | 45,917 | 48,624 | 49,701 | 67,669 | 844,437 |
| Non-Operating Income | -5,072 | -4,357 | -3,645 | -3,048 | -2,593 | -2,195 | -1,797 | -1,399 | -1,001 | -93,257 |
| Interest Receipt | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Interest Payment :Long-term | 5,072 | 4,357 | 3,645 | 3,048 | 2,593 | 2,195 | 1,797 | 1,399 | 1,001 | 92,237 |
| :Short-term | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,020 |
| Net Income | 37,124 | 37,914 | 38,626 | 39,223 | 39,713 | 43,722 | 46,827 | 48,302 | 66,668 | 751,180 |
| Income Tax | 21,713 | 22,175 | 22,591 | 22,941 | 23,227 | 25,573 | 27,389 | 28,252 | 38,996 | 439,393 |
| Income After Tax | 15,411 | 15,739 | 16,034 | 16,282 | 16,486 | 18,149 | 19,438 | 20,050 | 27,672 | 311,787 |
| Operating Ratio | 29.5% | 29.4% | 29.4% | 29.4% | 29.4% | 23.3% | 18.8% | 17.0% | -13.0% | 28.3% |
| Net Income to Revenue | 25.7% | 26.3% | 26.8% | 27.2% | 27.5% | 30.3% | 32.5% | 33.5% | 46.2% | 26.5% |

Table 12.1.6-3 Fund Flow Statement (1/2)

(Unit: 1000 US$)

| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sources of Funds | 529 | 5,428 | 67,352 | 56,726 | 32,782 | 14,318 | 15,341 | 18,912 | 22,193 | 23,528 | 22,678 | 22,819 | 22,792 | 23,138 |
| Net Income | -9 | -78 | 2,637 | 3,715 | 11,259 | 14,224 | 14,320 | 13,762 | 14,040 | 14,177 | 14,312 | 14,453 | 14,677 | 15,037 |
| Depreciation | | | | | 0 | 94 | 1,021 | 5,150 | 8,154 | 9,350 | 8,366 | 8,366 | 8,115 | 8,102 |
| Long-term Debts | 500 | 5,077 | 62,823 | 47,513 | 18,929 | | | | | | | | | |
| Foreign Loan | 430 | 4,623 | 50,172 | 31,658 | 12,589 | | | | | | | | | |
| Local Loan | 69 | 454 | 12,651 | 15,855 | 6,341 | | | | | | | | | |
| Short-term Debts | 38 | 429 | 1,892 | 5,497 | 2,594 | | | | | | | | | |
| Equity | 0 | 0 | 0 | 0 | 0 | | | | | | | | | |
| Subsidy | | | | | | | | | | | | | | |
| Application of Funds | 528 | 5,429 | 67,352 | 56,725 | 32,782 | 2,601 | 52 | 1,317 | 2,903 | 3,537 | 3,570 | 3,926 | 7,785 | 10,220 |
| Investment | 500 | 5,077 | 62,823 | 47,513 | 18,929 | | | | | | | | | |
| Additional Investment | | | | | | | | | | | | | | |
| Repayment of Long-term Debts | | | | | | 7 | 52 | 1,317 | 2,903 | 3,537 | 3,570 | 3,926 | 7,785 | 10,220 |
| :Interest | 29 | 310 | 4,057 | 7,131 | 8,356 | | | | | | | | | |
| Repayment of Short-term Debts | | 42 | 472 | 2,081 | 5,497 | 2,594 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Net Surplus/Loss | -38 | -388 | -1,420 | -3,415 | 2,903 | 14,311 | 15,288 | 17,594 | 19,290 | 19,991 | 19,108 | 18,893 | 15,007 | 12,918 |
| Ending of Balance | 0 | -38 | -425 | -1,845 | -5,261 | -2,358 | 11,953 | 27,242 | 44,836 | 64,126 | 84,117 | 103,225 | 122,118 | 137,125 |
| (With Short-term Loan) | | | | | | | | | | | | | | |
| Net Surplus/Loss | 0 | 0 | 0 | 0 | 0 | 11,717 | 15,288 | 17,594 | 19,290 | 19,991 | 19,108 | 18,893 | 15,007 | 12,918 |
| Ending of Balance | 0 | 0 | 0 | 0 | 0 | 0 | 11,717 | 27,006 | 44,600 | 63,890 | 83,881 | 102,989 | 121,882 | 136,889 |
| Debts-service Coverage Ratio | | | | | | 2062.9 | 293.0 | 14.4 | 7.6 | 6.7 | 6.4 | 5.8 | 2.9 | 2.3 |

Table 12.1.6-3 Fund Flow Statement (2/2)

(Unit:1000 US$)

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Sources of Funds | 23,508 | 23,836 | 24,131 | 24,177 | 24,194 | 25,783 | 27,072 | 27,684 | 35,271 | 584,192 |
| Net Income | 15,411 | 15,739 | 16,034 | 16,282 | 16,486 | 18,149 | 19,438 | 20,050 | 27,672 | 311,787 |
| Depreciation | 8,097 | 8,097 | 8,097 | 7,895 | 7,709 | 7,634 | 7,634 | 7,634 | 7,599 | 127,113 |
| Long-term Debts | | | | | | | | | | 134,842 |
| Foreign Loan | | | | | | | | | | 99,472 |
| Local Loan | | | | | | | | | | 35,370 |
| Short-term Debts | | | | | | | | | | 10,450 |
| Equity | | | | | | | | | | 0 |
| Subsidy | | | | | | | | | | 0 |
| Application of Funds | 11,189 | 11,182 | 11,136 | 9,871 | 8,286 | 7,652 | 7,652 | 7,652 | 7,652 | 280,999 |
| Investment | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 134,842 |
| Additional Investment | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Repayment of Long-term Debts | 11,189 | 11,182 | 11,136 | 9,871 | 8,286 | 7,652 | 7,652 | 7,652 | 7,652 | 115,589 |
| :Interest | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19,882 |
| Repayment of Short-term Debts | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10,686 |
| Net Surplus/Loss | 12,319 | 12,654 | 12,995 | 14,306 | 15,908 | 18,132 | 19,420 | 20,032 | 27,620 | 303,429 |
| Ending of Balance | 150,043 | 162,362 | 175,016 | 188,011 | 202,317 | 218,225 | 236,357 | 255,777 | 275,809 | 303,429 |
| (With Short-term Loan) | | | | | | | | | | |
| Net Surplus/Loss | 12,319 | 12,654 | 12,995 | 14,306 | 15,908 | 18,132 | 19,420 | 20,032 | 27,620 | 303,193 |
| Ending of Balance | 149,807 | 162,126 | 174,780 | 187,775 | 202,081 | 217,989 | 236,121 | 255,541 | 275,573 | 303,193 |
| Debts-service Coverage Ratio | 2.1 | 2.1 | 2.2 | 2.4 | 2.9 | 3.4 | 3.5 | 3.6 | 4.6 | 3.8 |

## 12.2 Economic Evaluation

### 12.2.1 Objectives

Since the Telecom project is a profit-oriented venture, the basic objectives of financial appraisal is to provide decision makers with the information needed by them to judge the financial viability of a specific project they may wish to proceed. Thus, the purpose of the financial analysis is to determine whether the proposed investment would generate a stream of future income sufficient to meet the minimum financial return requirements of the investor (service provider) in a time frame acceptable to him. The financial viability of the project does not given an accurate indication of a project's net impact on a country's economy. The economic rate of return measure determines the economic merit of the project from country's viewpoint. An acceptable project should increase national income. Income by itself does not create welfare but leads to the consumption of goods and services which can serve as a proxy for increased welfare.

### 12.2.2 Classification of Economic Benefits

The cost and benefits to be incurred by the project implementation shall be classified as follows:

| | Cost | Benefits |
|---|---|---|
| User | Subscription Fees<br>Monthly Rental Fees<br>Call Charges | Economic Benefits<br>(Consumer Surplus) |
| Service Provider | Investment Costs<br>Maintenance Costs<br>Operation Costs<br>Taxes | Financial Revenue<br>Subsidy from the<br>Government |
| Society & Government | Subsidy<br>Investment Cost | Taxes from the and Users<br>Increases in GDP |

The economic benefits can be measured by paying our attentions for the aspects of either the users benefits , the society's income such as GDP, or the Government taxes increment due to the company's profit increases with Telecommunication investment.

### 12.2.3 Consumer Surplus Approach

This analysis is a convenient method to measure user's benefits by analyzing the user's willingness to pay for the telecommunication services. If we assume that the rational individual, household, office workers, and official workers shall behave to lower the amount of payment for the services than the benefits receiving from the services, the differences from the received benefits and the payment for the charges is called "Consumer Surplus".

According to the questionnaire survey conducted by the Team in March 1996, seven samples of business users, and forty one residential users were obtained from Damascus city. Business users answered that the costs reduction were realized due to telephone usage. This is estimated by around 1.3 times as large as telephone charges. Residential users answered that if telephone service is not available, 27% of total frequencies (No. of users x frequencies of monthly call) will be substitute to the travel to call destination or use alternative means such as car transportation, sending messengers by spending 48% of total forty one user' telephone charges. These means that consumer surplus for business user is 30%, and for residential users is 48%.

However, this approach still does not explain us how to aggregate total benefits for telecommunication developments, and does explain only one aspect at one moment since this is not discussed communication structure/behavior, and its real cause results relationship with economic activity.

### 12.2.4 Communication Structure Approach

Telecommunication is one of the communication media which can make available to communicate at direct dial line (at distant areas at once). Telephone is one of the telecommunication media and widely accepted as a both-ways personal communication media.

Information has been widely recognized as a fourth element of production following after capital, labor, and land. Its efficient utilization becomes one of key success factors to hold a dominant position in competition. Media are means of exchanging information. Its value should depend on the value of information, and usage cost. The advancement of the media itself increase the value of information through the sales or income increase. The sophisticated media can functions to deepen information contents, and expand number of nodes to networking society more closely. Impact on the telecommunication can be classified largely into the network (expansion) effect, and the efficiency improvement on the communication behavior through the transition of the media use (the cost saving effect).

Network Effect is that expanding communication nodes can be attained by Telecom projects, which means the increment of the accessibility to social services, business services, and etc., which we have not been able to communicate in the past. This effect include the 'Value Acceleration Effect' or 'Value Linkage Effect'. These effect can be measured with 'Time Value' only if we can clarify information flow from daily activities.

Cost Saving Effect is that more efficient utilization of media for the present communication matrix will be achieved through the media choice mechanism. This will results in the saving of communication expenses realized by the internalization of trading cost. We should measure this effect by the amount of cost savings if sales amount is the same as that 'Without the project' and by the increment of profits if communication expenses is the same as that 'Without the project'.

In short, the cause-effect relationship between economic activity and communication activity are summarized as follows;

| Activity Level | Effects |
|---|---|
| Economic Activity | Network Effect (Nodes and Traffic increases) |
| Information Activity | Cost Saving Effect (Media Choice) |
| Communication Activity | |

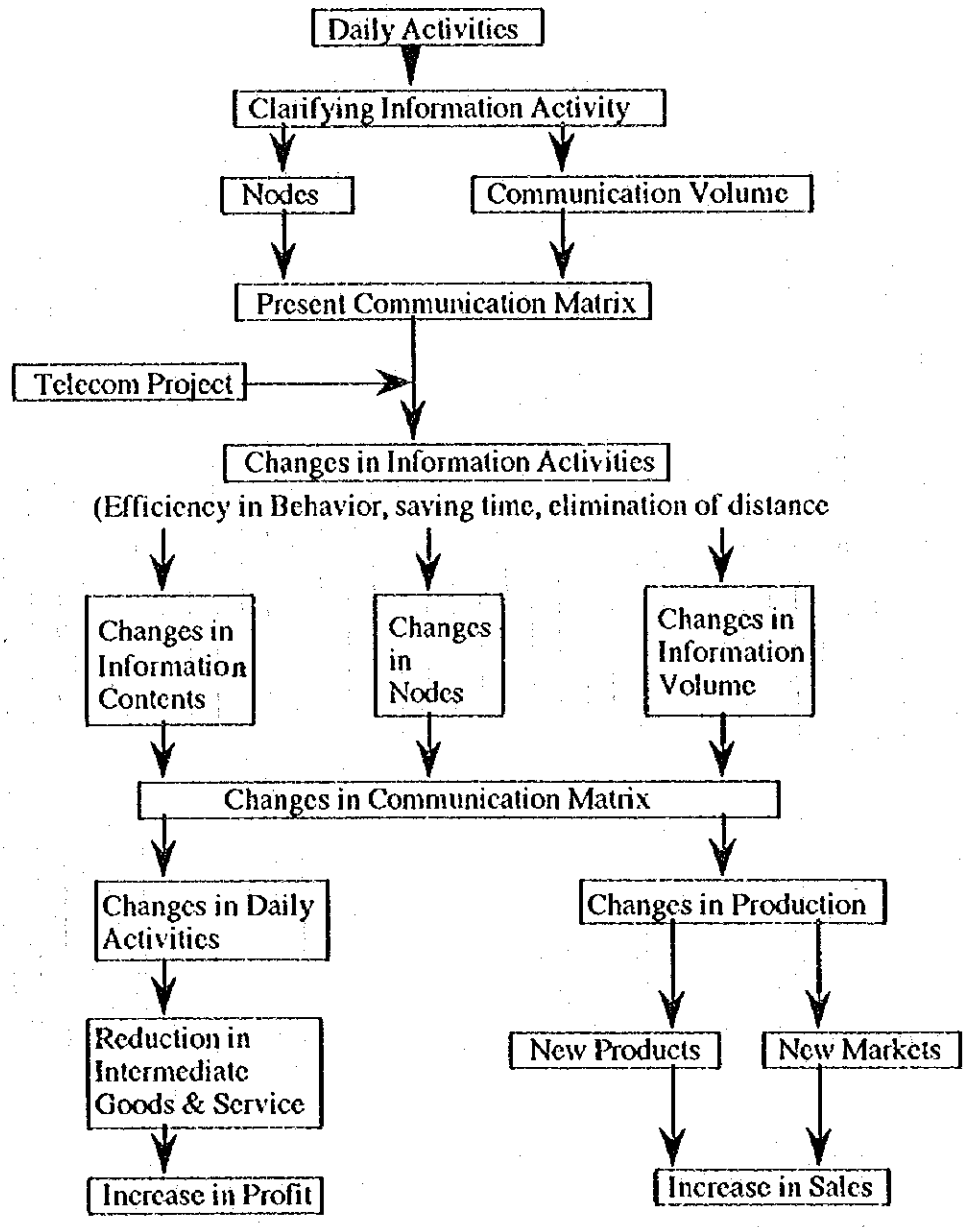
Information activity will be increased larger than economic activity since, in general, the economy will shift toward "information society" as the development is proceeded. An Increases of information activity will expand communication activity in its frequency, contents, and nodes. In its process, an efficient communication media such as telecommunication will be deployed more due to technology development. On the other hand, the advancement of telecommunication technology will bring backward to more efficient communication activity through the coordination of media deployment (media choice). As the results of it, economic activity will be in creased.

In the past years, Japan had experienced that the volume of foreign movement flow increased in human trip, and in goods, however, four times larger than those in information through telecommunication media. In particular, both human trip and information flow seems to be increased larger in movement frequencies than distance. The increment rate of telecommunication expenses in total household expenses increased 4% in 1987 from 1% in 1970, though others including travel expense was from 1% to 2%.

These facts indicates that the role of telecommunications had been changed a lot for both business and residential users.

Telecom projects promote the development of the media in volume and functions, which will change information activities. These changes can be assessed by the changed volume of the sales, or profits increase, as direct economic benefits, caused with Telecom projects through the production activities changes such as goods production and money flow.

The following shows the conceptual flow to measure benefits.




For understanding the relation between economic activity and communication activity, we should further clarify i) the relation between business working hours and its production,

ii) the relation between business working hours and communication, since communication and economic activity is not directly correlated with each other. This relation can be defined only through working hours.

Human activity is limited to 24 hours a day, and spend its time more for business to produce nation's wealth. If we classify working hours into in detail, Japan experienced that telephone call hours increases, instead of the reduction of trip out office hour for communication, which indicates the substitutional effect of telephone call among communication media (cost saving effect). And we may imagine that the reduced time for communication should be utilized more for productive activity.

As economy develop toward "information society", the share of tertiary sector increase in GDP as well as working population, and at the same time, office workers will shift their working hours from "direct work" hours to "thinking (brain) work" hours, or communication hours. Therefore, if we succeed to find proper cause-effect relationship between an change of working hours and communication level such as an change of nodes, contents, and frequencies, we can apply its results to national/regional level from corporate level very easily since it is easy task to clarify the relationship between office working hours and corporate profit level, and then, the relationship between corporate activity results and its industrial GDP by referring the past experiences of developed countries.

# CHAPTER 13 RECOMMENDATION

The Study Team conducted the Feasibility Study concerning the target projects, which mainly focus on the basic telephone network, in Damascus from February to August 1996.

In the course of the Feasibility Study, it has been recognized that regarding the "telecommunications network" various tasks must be regularly planned, executed, managed and organically linked to facilitate STE's implementation of the projects on schedule and without mishaps. To help STE successfully implement, the following three recommendations have been prepared:

## 13.1 Strengthening the Forecasting Section and Assigning Technically-trained Staff to the Forecasting Section.

It is recommended that STE's staff be re-trained and STE takes the appropriate measures listed below.

(1) It is important for the demand-forecasting section(s) to keep in close contact with the related staff of national administrative organizations, such as the Ministry of Communications, Ministry of Industry and so on, and to make consistent efforts to obtain the latest statistical data. It is also necessary for each telephone office staff to collect and analyze local development information.

(2) With regard to the staff, certain employees should be technically re-trained to undertake these important tasks and they should then be assigned to STE's H.Q. before being transferred to branch offices.in various regions. This should be carried out with the least possible delay since accurate demand forecasts come from a variety of circumstantial information in the field surveys made by experts at regional branch offices and its integrated regional information.

## 13.2 Facilities records are indispensable

The following recommendations should be taken into consideration:

(1) Facility records should be updated with each installation, including replacements and removals.

(2) Technical specifications for new projects should specify what kind of drawings are to be provided by contractors.

(3) Inspection of drawings should be carried out at the end of each project. No project should be finished without proper and accurate drawings.

(4) Drawings should accurately record the results of installations and removals once the project has been completed. Drawings made at the designing stage should not be maintained since projects are usually modified during their execution.

(5) STE should assigns staff to be responsible for the maintenance of facilities records and should organize section(s) for that purpose.

(6) Constructors can also borrow facilities records which related to their works and update or renew original drawings. Thus STE can prevent contractors from making drawings only for parts of their own installations.

## 13.3 Improvement of Project Management

There are various kinds of tasks related to telecommunications systems, such as building construction, civil works, cable installation, switching installation and transmission line installation.
A telecommunications network can have better function only after the various above-mentioned tasks are accomplished and linked to each other.
It is recommended that :

(1) STE organize a new project management department in its H.Q. to manage and supervise all ongoing projects in order to achieve "progress management".
In this department, a project team with members from the H.Q. and telephone offices, should be organized

(2) The project team should draw up a basic timetable for all projects, including building constructions to circuits. The project members should manage and control the projects concerned on schedule.

(3) Project members should hold regular meetings to discuss current issues.