The required Hardware and Software for Management Information System is as follows:

Table 4.4.2-7 Required Hardware for Management Information System

Product		Quantity
Server	UNIX machine	1
Terminal	Personal computer	36
Laser printer		37
Hub		3
Router		1
Modem		17
UPS		1

Table 4.4.2-8 Required Software for Management Information System

Product		Quantity
Operating system for server	UNIX	1
Operating system for terminal	Windows	36
Database software (server)	Oracle	1
Database software (client)		36
Application software		1

The server machine and 20 terminals are installed in the STE headquarters, and 16 terminals are installed in each Province office.

4.4.3 Implementation Plan

The development of new billing-center system is the most important management subject and STE should develop this system in 1996. The expansion of hard-disk capacity of the billing-center system in Aleppo will be required in 1998.
As for the telephone-center systems, we propose the installation of the systems in Damascus Rural, Quennetra, Darra and Sweda in 1997, and in Aleppo, Idleb Lattakia, Tartous, Homs, Hama, Al Hasaka, Der Alzor and Rakka in 1998.
With respect to the management information system, we propose the installation in 1997, in which year the billing-center system in Aleppo will start its operation.

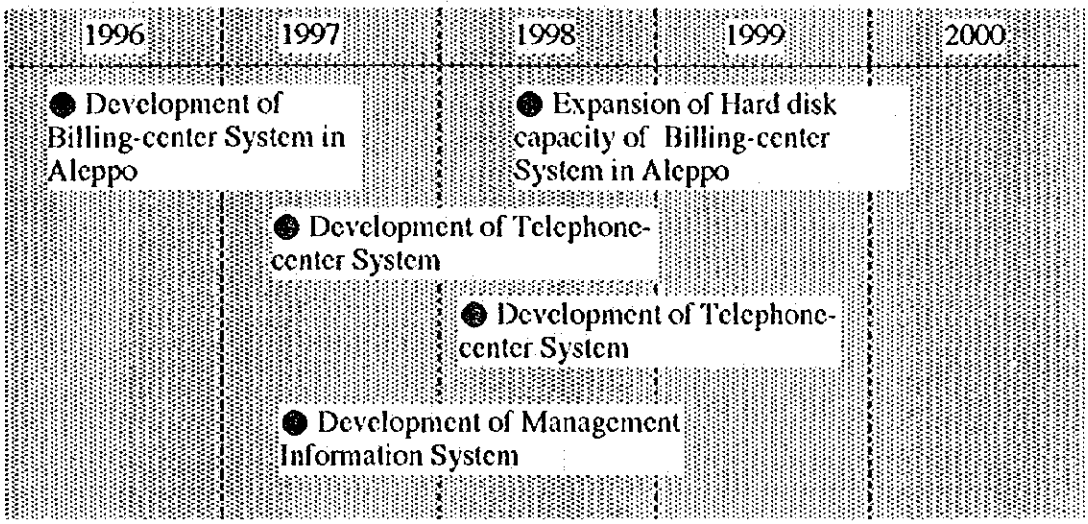


Figure 4.4.2-4 Implementation Plan of Billing-center System and Telephone-center Systems and Management Information Systems

CHAPTER 5 COST ESTIMATION

This chapter estimates cost for 1996-2000, based on the Facility Plan for the Action Plan. The cost estimates based on the Facility Plan of the Master Plan is described in the Volume 1.

5.1 Transmission

5.1.1 Methods of Cost Estimation

The following four methods are applied to each of the projects described in section 4.1.

(1) SDH systems

It is relatively difficult to accurately estimate costs of SDH systems, because they are new, and extensive field data on cost factors are not available. Therefore, this study has applied the microscopic method. First, network configurations are roughly designed. Second, necessary equipment units are selected. Then costs of the units are totaled. Note that there may be some errors in this method, because costs of equipment units obtained from manufactures are not the ones which are offered during tender and may be expensive. On the other hand, the roughness of the designs leave out some necessary equipment units, thus balancing the estimation. Overhead costs are neglected, because they are masked by the errors. In spite of the disadvantages mentioned above, it can be said that the method applied here is the best at this moment.

(2) 34Mbit/s Microwave System

Cost per (1+1) system is calculated based on the cost data provided by the 50/A project. First, the total cost of subsystems 1 to 7 , including cost of multiplexers, is calculated, then divided by the total number of 34Mbit/s multiplexers used in the subsystems. This result is a figure for one side of a 34Mbit/s microwave (1+1) system, so it is doubled and a 4.5% installation cost is added. The final figure is 365,211$ per (1+1) system.

Similarly, cost for one system addition is calculated and the result is $160,083 per one system.

(3) Cable Burying and Laying Cost

These costs are directly dependent on Labor costs in Syria, so cost data obtained from the STE has been applied. The costs are listed below.

(a) Burying cost (digging, laying, recovery, others) without optical fiber cable cost: 160,000 SP/ km

(b) PVC duct laying cost including costs of PVC duct materials and manholes (8 ducts) without fiber-optic cable cost: 1,200,000 SP/ km

(c) Cable laying cost in PVC duct: 15,000 SP/ km

(d) Cost for PVC ducts: 130 SP/ m

For long distance sections and local sections, 10% of the section lengths are assumed to be in PVC ducts and the other 90% to be directly buried. In Junction Networks, all new cables are assumed to be in PVC ducts. The Syrian Pound (SP) to US dollar exchange rate is based on 42 pounds to the dollar.

(4) 8Mbps PDH Fiber-optic System Cost

Based on the Cost Estimation Model in Figure 4.1.5-1, cost for 8Mbps PDH system with 10km new fiber-optic cable is estimated at $159,640. For the cost estimation, field data and the cable burying and laying cost in (3) are used.

5.1.2 Overview of Five Year Plan

The cost estimation methods explained in section 5.1.1 are applied to each of the projects in section 4.1. The final estimates are listed in the table below.

Table 5.1.2-1 Transmission Costs for 1996-2000

[US$]

Long Distance Network	25,000,000
Junction Networks	16,100,000
Long Local Sections	4,500,000
Local Sections with Existing Systems	2,300,000
Local Sections to small Exchanges	57,500,000
Network Management Systems	3,000,000
Total	**108,400,000**

5.2 Switching for the PSTN / ISDN

5.2.1 Cost Structure in Syria

In the switching sector, the following cost components are to be considered

- Costs to be borne in foreign currency (US $)
  - Equipment costs, (incl. Spare parts)
  - Installation supervision costs
- Costs to be borne in local currency (Syrian Pounds)
  - Planning costs,
  - General overhead costs (specification, contract negotiation, commissioning),
  - Installation costs,
  - Costs for buildings and land.

Due to the fact that installation is being fully performed by local staff, all feasible possibilities to increase the locally added-value portion seem to be exhausted.

5.2.2 System Cost Estimation

The contract 40 A was the last representative contract, which can be used to analyze the present cost for switching equipment in Syria. The newest contract on 125,000 line units comprises almost only of remote units, which make use of already existing host switches, and is therefore not representative for overall costs in switching.

However, the world market prices for switching equipment still show a downward trend, but with decreasing momentum.

Subsequently, estimated costs as expected for the Eighth National Five-Year Plan are given per line (unit) for the different types of exchanges. In the foreign cost portion are included: (M)DF, power supply, batteries, diesel, air-conditioning, raised floor spare parts and installation supervision. The local currency portion contains: planning, project overhead, installation, testing, buildings and land.

Not included in the switching cost here are costs for supporting functions such as OMC hard- and software, circuit board repair center, special training measures, etc.

The local currency portion is expressed in US $ based on an exchange rate of 42 Syrian Pounds per US $

Remote Units and Expansion of Existing Local Exchanges inside the Final Capacity

	US $	Syrian Pounds
Foreign currency portion	100	-
Local currency portion	30	1,260
Total per RU / LE line unit	130	-

New Local Exchanges and Expansion Beyond the Present Final Capacity

	US $	Syrian Pounds
Foreign currency portion	155	-
Local currency portion	33	1,386
Total per LE line unit	188	-

Long Distance (STD) Exchanges

	US $	Syrian Pounds
Foreign currency portion	158	-
Local currency portion	25	1,050
Total per STD line	183	-

International Exchanges (IGE)

	US $	Syrian Pounds
Foreign currency portion	300	-
Local currency portion	25	1,050
Total per IGE line	325	-

5.2.3 Cost Trend Estimation

Since the start of market availability, the prices for digital switching equipment have shown a very strong downward trend (80% price reduction in the last ten years). In general it is assumed that a downward trend will continue in the future. However, this trend will be much weaker than in the past. A price decrease is estimated at 1 - 2% per year.

For the local currency portion, an upward trend is estimated at approximate 6 - 8% per year due to increasing wages and inflation.

As a summary result we predict constant prices for switching equipment during the Eighth Natinoal Five-Year Plan in conjunction with increasing functionality (new subscriber features, service switching point functionality, SS7 INAP, TMN (Q) interfaces, management intelligence, etc.)

5.2.4 Unit Cost Estimation

If a telecommunications network is expanded continuously in a balanced way, i.e. all components are provided in accordance with the demand and no over-provision is made of particular network parts (e.g. IGE or STD exchanges), a simplified cost estimation is possible, based on unit cost.

Unit costs are obtained by calculating all system costs in basic units, in the context of switching the subscriber line unit in the local exchange.

For Syria the following unit cost per subscriber line unit (switching cost only) is estimated:

	US $
Local Switching	130
Long Distance Switching Portion	15
International Switching Portion	8
Buildings (portion utilized for switching)	15
Installation, Testing (local portion)	33
UNIT COST per Subscriber Line Unit	201

5.2.5 The Eighth National Five-Year Plan Overview

In the following table, the investment costs for switching equipment are estimated based on the figures indicated in the Facilities Plan (section 4.2) of this Report and on the cost estimations above.

For the calculations, system costs have been used in accordance with section 5.2.2, this is because owing to the relatively large portions for older system replacement, unit costs are not applicable. For the regular network expansion, 50% as remote units and expansion in existing local exchanges inside the present final capacity, and 50% in new local exchanges and expansion beyond the present final capacity have been assumed.

(Unit : US$)

	Amount	Price per Line	Total Cost
Regular Local Exchange Expansion	1,532,500	159.--	243,667,500
Replacement of EMD	221,000	188.--	41,548,000
Long Distance Exchange Expansion	36,750	183.--	6,725,250
International Exchange Expansion	-	-	-
TOTAL SWITCHING INVESTMENT			292,000,000

5.3 Subscriber Network

5.3.1 Unit Cost

In this section, cost estimations are given for the particular network components described in section 4.3 as a basis for the financial evaluations.

Based on information obtained from STE counterparts , the average costs for the physical subscriber network are estimated at US$ 370 per Switching Line Unit (S.L.U.).

In addition, the unit cost includes the civil works investment, and its breakdown is as follows:

Unit cost per primary cable pair : US$ 86 (86 x 1.5 = US$ 129 per S.L.U.)
Unit cost per secondary cable pair : US$ 107 (107 x 1.5 x 1.5 = US$ 241 per S.L.U.)

5.3.2 The Eighth National Five-Year Plan

A summary of the investment for primary and secondary cable pairs respectively to be installed until the year 2000 per region is shown in Table 5.3.2-1 and Table 5.3.2-.2
The investment necessary for the subscriber network to be installed until the year 2000 is shown in the following table.

(Unit: Millions of US Dollars)

Primary cable pairs	176.42
Secondary cable pairs	329.25
Total	505.67

Table 5.3.2-1 Cost Estimation: Additional Investment Required for Primary Cable Installation in US$

Province	Center Name	1997	1998	1999	2000
Damascus City	<TOTAL>	6,234,052	8,724,938	9,675,231	7,279,729
Damascus Rural	< TOTAL >	4,399,591	4,558,029	4,547,140	4,565,121
Quennetra	< TOTAL >	180,609	189,512	194,712	194,685
Daraa	< TOTAL >	1,518,869	1,541,476	1,541,476	1,541,476
Sweda	< TOTAL >	927,425	933,381	933,381	933,381
Alleppo	< TOTAL >	7,902,887	10,812,481	10,884,065	9,624,531
Rakkah	< TOTAL >	965,081	1,001,300	1,019,360	998,720
Idleb	< TOTAL >	1,662,183	1,945,193	1,853,507	1,853,507
Al Hasaka	< TOTAL >	1,608,486	1,720,199	1,720,199	1,720,199
Der Al Zor	< TOTAL >	1,493,405	1,481,070	1,478,490	1,483,650
Homs	< TOTAL >	3,928,476	5,854,427	5,250,631	4,282,748
Tartous	< TOTAL >	1,938,523	1,945,713	1,956,033	1,945,713
Hama	< TOTAL >	3,300,152	4,098,592	3,322,012	3,324,592
Lattakia	<TOTAL>	2,364,791	2,536,003	3,866,196	2,664,915
SYRIA	**< TOTAL >**	**38,424,532**	**47,342,313**	**48,242,433**	**42,412,966**
					176,422,244

Table 5.3.2-2 Cost Estimation: Additional Investment Required for Secondary Cable Installation in USS

Province	Center Name	1997	1998	1999	2000
Damascus City	<TOTAL>	11,634,480	16,283,169	18,056,682	13,586,006
Damascus Rural	< TOTAL >	8,210,865	8,506,555	8,486,233	8,519,789
Quennetra	< TOTAL >	337,068	353,682	363,387	363,337
Daraa	< TOTAL >	2,834,634	2,876,825	2,876,825	2,876,825
Sweda	< TOTAL >	1,730,834	1,741,949	1,741,949	1,741,949
Alleppo	< TOTAL >	14,748,993	20,179,107	20,312,703	17,962,060
Rakkah	< TOTAL >	1,801,110	1,868,706	1,902,411	1,863,891
Idleb	< TOTAL >	3,102,097	3,630,272	3,459,162	3,459,162
Al Hasaka	< TOTAL >	3,001,885	3,210,371	3,210,371	3,210,371
Der Al Zor	< TOTAL >	2,787,111	2,764,090	2,759,275	2,768,905
Homs	< TOTAL >	7,331,633	10,925,995	9,799,143	7,992,803
Tartous	< TOTAL >	3,617,824	3,631,243	3,650,503	3,631,243
Hama	< TOTAL >	6,159,005	7,649,116	6,199,801	6,204,616
Lattakia	<TOTAL>	4,413,361	4,732,889	7,215,401	4,973,476
SYRIA	**< TOTAL >**	**71,710,899**	**88,353,967**	**90,033,843**	**79,154,431**

329,253,141

5.4 Computerization

5.4.1 Costs for the Three Systems

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

- To procure hardware in Syria.
- To utilize and customize packaged software.
- To exclude construction costs for new builgings because it is possible all of the systems are installed in existing structures.
- To exclude communications expenses because the network facility is owned.

According to the facilities plan from 1996 to 2000, costs for the three Systems are shown in Table 5.4.1-1,Table 5.4.1-2 and Table 5.4.1-3.

Table 5.4.1-1 Necessary cost of Billing-center system (US$)

Hardware	283,700
Software	29,200
Total	312,900

(Note: In 1998, additional hard disk will be installed in order to expand the capacity which accommodate the increase of subscribers, and the cost of additional disk is $ 5,600.)

Table 5.4.1-2 Necessary cost of Telephone-center systems

Hardware	5,217,800
Software	2,952,500
Total	8,170,300

Table 5.4.1-3 Necessary Cost of Management information system

Hardware	252,500
Software	39,100
Total	291,600

5.4.2 Total Cost of the New Computer Systems

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). The total cost of new billing-center system,

telephone-center systems and management information system from 1996 to 2000 is about $ 9 million.

Table 5.4.2-1 Total cost of the new computer systems

System	Cost ($)
Billing-center system	318,500
Telephone-center system	8,170,300
Management Information system	291,600
Installation cost	287,700
Total	9,068,100

5.5 Cost Estimation Summary

The total investment cost for the Eighth National Five-Year Plan is listed in Table 5.5-1.

Table 5.5-1 Total Cost Estimation Summary for the Eighth National Five-Year Plan

(Unit: Millions of US Dollars)

Facilities / Systems	Estimated Cost
Transmission System	108.4
Switching System	292.0
Subscriber Network	505.7
Computerization	9.1
Total	915.2

CHAPTER 6 FINANCIAL ANALYSIS

The Financial Analysis for the Action Plan herein is based on the Facilities Plan and Cost Estimation in accordance with the Action Plan. Financial Analysis based on the Master Plan should be referred to the Volume 1.

6.1 Purpose

In this chapter the financial viability and potential profitability are evaluated, and financial analysis has conducted just for reference.

In the Detailed Plan, the Project, mainly on Damascus City, will be evaluated not only from financial point of view but also from economic point of view.

Refer to the Chapter 4.4 on computerization for evaluation of business process improvements offered by computerizing operations.

6.2 Procedure

Financial analysis of the project is based on a cost versus profit analysis using an internal rate of return. Since most of the STE's revenue and expenditure are settled in US dollars, all the revenues and costs concerning the project were calculated in US dollars. The project was evaluated using the following methods:

(1) Estimation of capital expenditure and operating expenditures (cash outflow)
(2) Estimating operating revenue (cash inflow)
(3) Creation of cash flow table and calculation of financial internal rate of return (FIRR).

6.3 Premises and Assumptions

The first step is to identify the premises and assumptions for each project. Realistic and simple assumptions make evaluation more reliable and accurate. The basic premises and assumptions of this evaluation are described in the following sections.

(1) The Duration of the Project's Revenues

The duration of the project revenues is longer than the duration of the project's investments. Though the project duration is until 2000, the duration of revenues was calculated until 2010. The reasons of it are as follows;

a) The lives of facilities are mainly 10 years and 20 years (e.g. EMD switches), so it is reasonable to settle the duration of revenues as 10 years after the end of investments.

b) From the worldwide points of view, it is general to settle the duration of revenues as about 10 years after the end of investments.

(2) Inflation

The effects of inflation were not considered. Although price changes affect both project costs and revenues, prices that increase at the same rate at home and abroad mean they maintain the same levels.

(3) Revenues and Costs Estimation

The present tariff rate (1995) was used to estimate the revenues in the project.

6.4 Estimation of the Project Revenues

The project revenues consist of telephone installation fees, basic yearly charges, local call charges, long distance call charges, international call charges, facsimile installation fees, telex charges, telegraph charges and others.

(1) Revenue per main line from 1992 to 1994

The number of main lines, revenues and revenue per main line from 1992 to 1994 according to STE statistics are shown in Table 6.4-2. OECD countries' revenue per main line are shown in Table 6.4-1.

Table 6.4-1 OECD Countries' Revenue Per Main Line (1992)

(US$)

Australia	1,088	Japan	947
Austria	942	Luxembourg	1,122
Belgium	754	Netherlands	807
Canada	847	New Zealand	877
Denmark	860	Norway	1,076
Finland	718	Portugal	684
France	770	Spain	845
Germany	976	Sweden	1,021
Greece	352	Switzerland	1,383
Iceland	736	Turkey	263
Ireland	1,243	United Kingdom	1,012
Italy	852	United States	1,114
OECD average			965
Syria			147

Source: Communications Outlook 1995 (OECD)\

Table 6.4-2 Revenue per Main Line (1992 - 1994)

Year	Number of Main Lines	Revenues (US$)	Revenue per Main Line (US$)	Increment (US$)
1994	688,500	154,600,000	224.5	38.7
1993	550,000	102,200,000	185.8	38.7
1992	513,000	75,480,000	147.1	-

(2) Revenues Estimate for the Eighth National Five-Year Plan

The annual project revenud is estimated as shown in Table 6.4-3, by forecasting the number of mainlines, the revenue per main line, traffic distribution, and depreciation of facilities.

Because the average life of facilities is considered 20 years, revenue will decrease as facilities wear down gradually.

Table 6.4-3 The Estimate of the Revenue

Year	Annual Increment	Number of Main Line	Revenue (US$)
1996	320,000	320,000	71,840,000
1997	320,000	640,000	143,680,000
1998	320,000	960,000	215,520,000
1999	320,000	1,280,000	287,360,000
2000	320,000	1,600,000	359,200,000
2001	--	--	341,240,000
2002	--	--	323,280,000
2003	--	--	305,320,000
2004	--	--	287,360,000
2005	--	--	269,400,000
2006	--	--	251,440,000
2007	--	--	233,480,000
2008	--	--	215,520,000
2009	--	--	197,560,000
2010	--	--	179,600,000

6.5 Cost Estimate for the Eighth National Five-Year Plan

In general, costs consist of investment costs, which include construction and procurement costs, consulting fees etc, operation and maintenance costs, working capital and taxes.

(1) Investment Costs

Investment costs examined and estimated in this report include the prices for facilities, equipment, land and buildings, vehicles, construction and installation fees, and consulting fees.

Investment costs for the project are shown in Table 6.5-1

Table 6.5-1 Investment Costs

(Thousands of US$)

Year	Transmission	Switching	Subscriber Network	Computerization	Total
1996 to 2000	108,400	292,000	505,674	9,068	915,142

(2) Operation and Maintenance Costs

Expenses for the operation and maintenance of telecommunications networks consist of personnel costs, administration costs, and repair costs.

Table 6.5-2 Cost per Main Line (1992 - 1994)

Year	Number of Main Lines	Expenses (US$)	Cost per Main Line (US$)	Increment (US$)
1994	688,500	65,640,000	95.34	32.83
1993	550,000	34,380,000	62.51	6.55
1992	513,000	28,710,000	55.96	-

Table 6.5-3 Operation and Maintenance Costs in 1994

Payment to International Operator	Personnel	Utilities	Others	Total
22,330,000	27,050,000	3,190,000	13,070,000	65,640,000

Generally speaking, "cost per main line" tends to decrease as telecommunication technology improves; however, in the case of Syria, "cost per main line" went up between 1992 and 1994.

6.6 Working Capital

Working capital can be recovered within a short time through business activities. The capital includes current deposits as cash on hand, and accounts receivable as funds necessary until call charges are collected. Although working capital is calculated as an annual expense, it should be recovered during the final year of each project.

6.7 Taxes

STE pays about 58.5% of annual profits to the government as a tax obligation. Because the STE is a government organization (public corporation), the FIRR should be calculated on the basis of pre-tax revenue.

6.8 Results of Financial Analysis

The FIRR is the discount rate that makes the total present value of investment costs equal to the total present value of annual profit.
Table 6.8-1 shows a tentative revenue and expenditure statement. The Eighth National Five-Year Plan Project will have the 10.46% tentative internal rate of return.

Table 6.8-1 Tentative Cash Flow Table

(US$)

Year	Total Revenue [A]	Investment	Operation & Maintenance Cost	Working Capital	Total Expense [B]	Net Inflow [A]-[B]
1996	71,840,000	183,028,400	30,508,800	14,368,000	227,905,200	-156,065,200
1997	143,680,000	183,028,400	61,017,600	28,736,000	272,782,000	-129,102,000
1998	215,520,000	183,028,400	91,526,400	43,104,000	317,658,800	-102,138,800
1999	287,360,000	183,028,400	122,035,200	57,472,000	362,535,600	-75,175,600
2000	359,200,000	183,028,400	152,544,000	64,656,000	440,228,400	-41,028,400
2001	341,240,000	-	144,916,800	61,423,200	206,340,000	134,900,000
2002	323,280,000	-	137,289,600	58,190,400	195,480,000	127,800,000
2003	305,320,000	-	129,662,400	54,957,600	184,620,000	120,700,000
2004	287,360,000	-	122,035,200	51,724,800	173,760,000	113,600,000
2005	269,400,000	-	114,408,000	48,492,000	162,900,000	106,500,000
2006	251,440,000	-	106,780,800	45,259,200	152,040,000	99,400,000
2007	233,480,000	-	99,153,600	42,026,400	141,180,000	92,300,000
2008	215,520,000	-	91,526,400	38,793,600	130,320,000	85,200,000
2009	197,560,000	-	83,899,200	35,560,800	119,460,000	78,100,000
2010	179,600,000	-	76,272,000	32,328,000	108,600,000	71,000,000

FIRR = 10.46% (tentative)

PART 2 DETAILED PLAN

CHAPTER 1 INTRODUCTION

1.1 Introduction

This Report describes the findings and results of the work in Syria on the Detailed Plan of the selected projects, which was carried out from February to August, 1996, based on the Eighth National Five-Year Plan as Part 1 in this Volume 3, which was formulated from December, 1995 to March, 1996 prior to this study.

1.2 Objectives of the Study

The objective is to study in detail the target projects based on the Action Plan.

The target projects are as follows:

(1) Expansion and improvement of the telephone network

(2) Introduction of Mobile Telephone system

(3) Introduction of Packet Switched Data Network system

(4) Introduction of three (3) Computerized systems

- Telephone-center System
- Billing System
- Management Information System

CHAPTER 2 SELECTION OF TARGET PROJECTS

2.1 Policy of Selection

2.1.1 Relation with the Master Plan and the Action Plan

The long-term plan covering up to the year 2010 for development and improvement of the telecommunications network in Syria was studied and made as the Master Plan by Japan International Cooperation Agency study team (hereinafter referred to as "the Study Team") in 1995. The Master Plan includes many telecommunications systems such as telephone network expansion and introduction of mobile telephone network, data transmission network and computerized system, which will provide a total telecommunication network that will meet customers' requests and keep up with the times and the national economic development.

On the other hand, the Action Plan was prepared to review the Eighth National Five-Year Plan (1996 to 2000), which was settled on by Syrian Telecommunications Establishment (hereinafter referred to as "STE").

The target projects for the Datailed Plan as a feasibility study in the Action Plan should be selected based on the Action Plan.

2.1.2 Criteria for Selection

Basic criteria for selection of telecommunication networks development should be as follows:

(1) To expand the telephone network to satisfy high demand

(2) To introduce new services with high urgent demand

(3) To replace/renew older facilities which are obstacle to service quality and O/M works

(4) To secure stable network services

(5) To improve productivity of daily work

(6) To improve productivity of administration and management

2.1.3 The Target Systems

The following systems should be selected as the target systems from viewpoints of urgent fulfillment of the telephone demand, earlier introduction of new services and improvement of customer services and management:

(1) Telephone network expansion

(2) Mobile telephone system

(3) Packet switched data network

(4) Computer system

2.1.4 Areas of Projects

Areas or locations for the project should be settled from viewpoints of the following subscriber categories:

- Administrative/Governmental group area
- Industrial/Business group area
- Commercial group area
- Residential group area

2.2 Selected Target Projects

Areas and locations of target projects for the Feasibility Study were selected based on the above policy:

2.2.1 Telephone Network Expansion

Expansion and replacement of telephone network systems in all Damascus city except for the rural area:

(1) Switching system (including replacement of older exchanges, expansion of STD and INTS)

(2) Subscriber network

(3) Transmission system

2.2.2 Mobile Telephone System

Damascus and Aleppo areas including main roads (main parts of the western Syria)

2.2.3 Packet Switched Data Network

The five big cities (Damascus, Aleppo, Homs, Hama, Lattakia)

2.2.4 Computer System

(1) Billing System

- **Center system : Aleppo**
- **Telephone center : The five big cities**

(2) Telephone Center System

The five big cities (except for Damascus)

(3) Management Information System

The five big cities and STE's headquarters

The target system projects are shown in Table 2.2.4-1.

Table 2.2.4-1 Selected Target System Projects

System	Area/locations	Remarks
1. Telephone Network (1) Switching (2) Subscriber Network (3) Transmission	All Damascus city (except for rural area)	Replacement of EMD and expansion of STD are included
2. Mobile Telephone	Damascus & Aleppo including main roads	Western part
3. Packet Switched Data Network	5 big cities	
4. Computer (1) Billing System * Center	Aleppo	
* Telephone Center	5 big cities	
(2) Telephone Center System	5 big cities (except for Damascus)	
(3) Management Information System	5 big cities, Headquarters	

5 big cities: Damascus, Aleppo, Hama, Homs, Lattakia(except for rural areas)

2.3 Target Year

The target year for this project should be decided by each system, taking into account the service commencement year as early as possible, which will be assumed on conditions of the urgency and the duration of finance, tendering and installation for each system.
As a result of the study, the target year for each system in this project is shown in Table 2.3-1.
The lead time for provisioning for each system is described in Chapters 4 - 7.

Table 2.3-1 Target Year for Each System

System	Target Year	Remarks
1. Telephone Network (1) Switching (2) Subscriber Network (3) Transmission	2000	
2. Mobile Telephone	1998	
3. Packet Switched Data Network	2000	
4. Computer (1) Billing System * Center	2000	
* Telephone Center		
(2) Telephone Center System		
(3) Management Information System		

CHAPTER 3 FUNDAMENTAL NETWORK PLAN

3.1 Network Structure

3.1.1 International Network

(1) Present Network

At present there are two (2) INTSs (International Switches) in Damascus and Aleppo, and each INTS has its own set of international destinations respectively. Low-traffic destinations, however, are reached only from a certain INTS, so inter-INTS circuits are established between the two INTSs. International calls from all STDs in Syria are routed to both INTSs, but because of the difference between the capacities of the Damascus and Aleppo INTSs, the traffic volumes from/to the geographically close STDs, and the number of destinations available from each of the two INTSs about 90% of the traffic is distributed to the Damascus INTS.

(2) Network Structure in Damascus city

International calls from/to LEs (Local Exchanges) in Damascus city are routed to the Damascus INTS and the Aleppo INTS via Damascus STD.
The traffic distribution ratio should be 60% to the Damascus INTS and 40% to the Aleppo INTS by the year 2000 step by step from the viewpoints of the security.
The international network structure and routing for year 2000 is shown in Figure 3.1.1-1

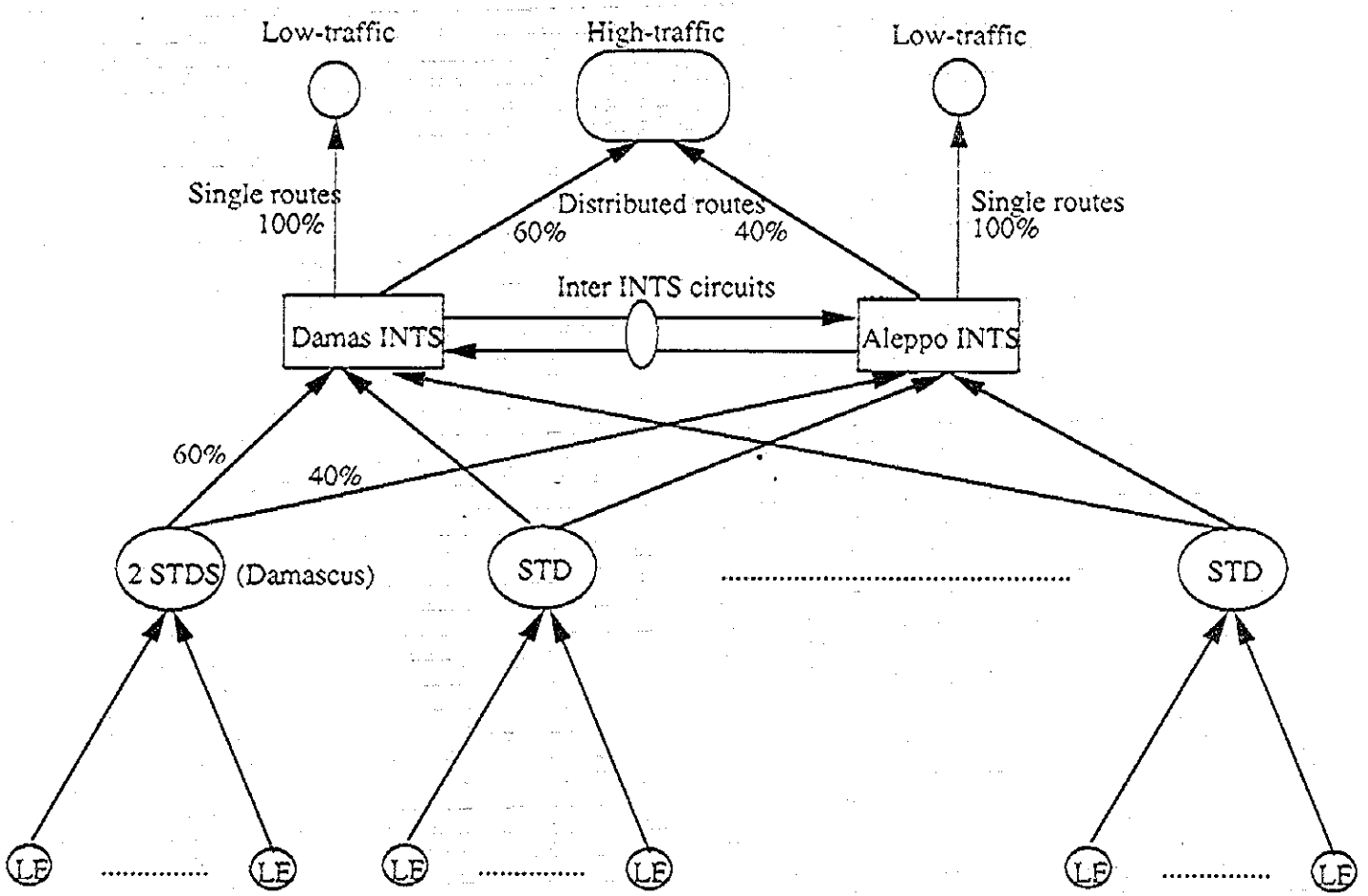


Figure 3.1.1-1 International Network Structure and Routing for the year 2000

3.1.2 Long Distance Network

(1) Existing National Telephone Network

The existing network structure has the four(4) level hierarchy, the forth level is divided into five(5) one-level areas in Syria as shown in Figure 3.1.2-1.
Digitalization of telecommunications system will promote a minimum hierarchy structure because of decreasing the circuit cost and simplifying the structure. In Syria transition from the four(4) level hierarchy to the three(3) level hierarchy is in progress in order to eliminate the 2-level stage of Nabek and Zabadani in Damascus region.

(2) Long Distance Network in Damascus Region

For long-distance call connection, the Damascus region is, as shown in Figure 3.1.2-2, divided into the following three areas:

- Damascus city area
- Damascus rural area
- Damascus region area

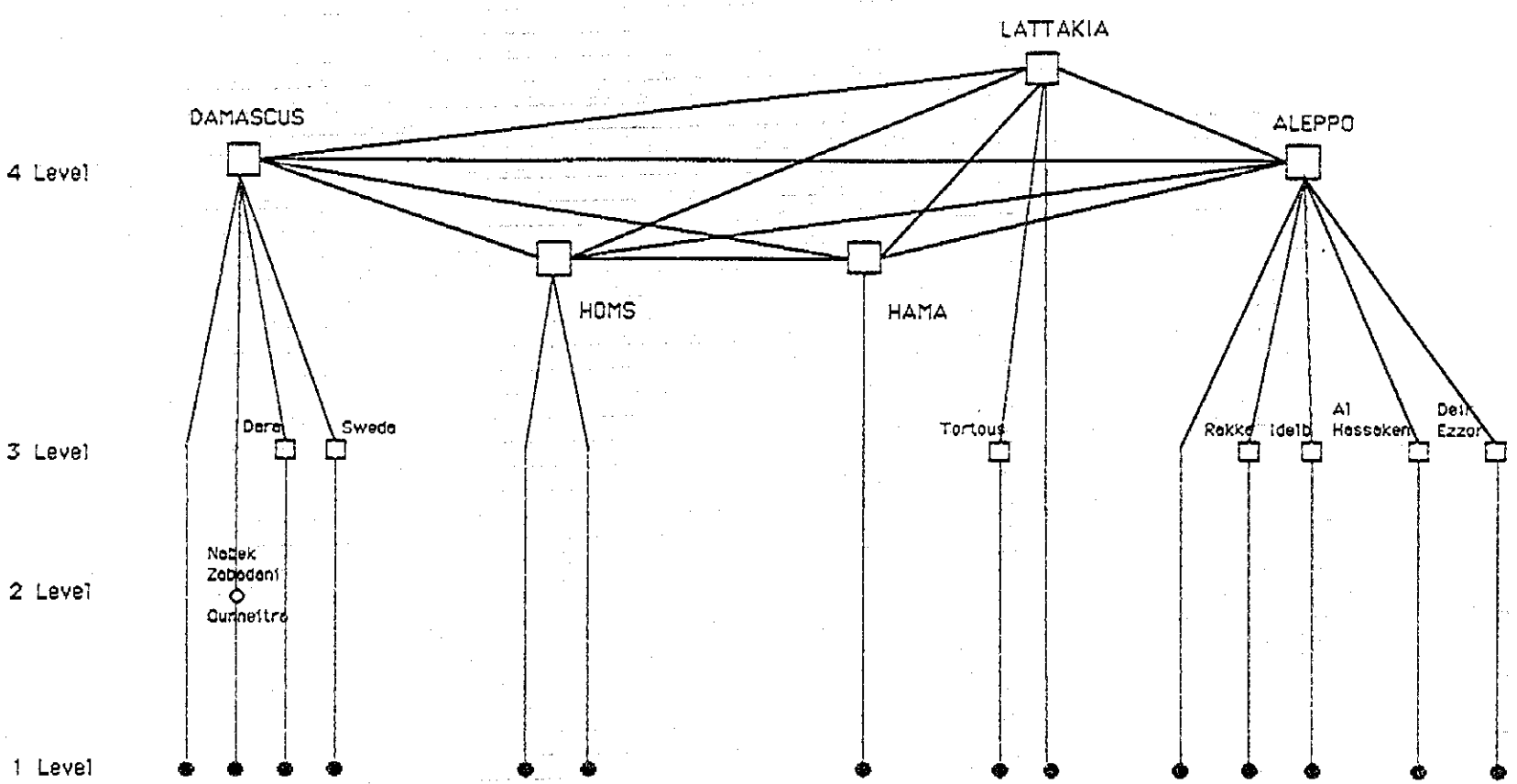


Figure 3.1.2-1 Existing Network Structure for National Telephone Network

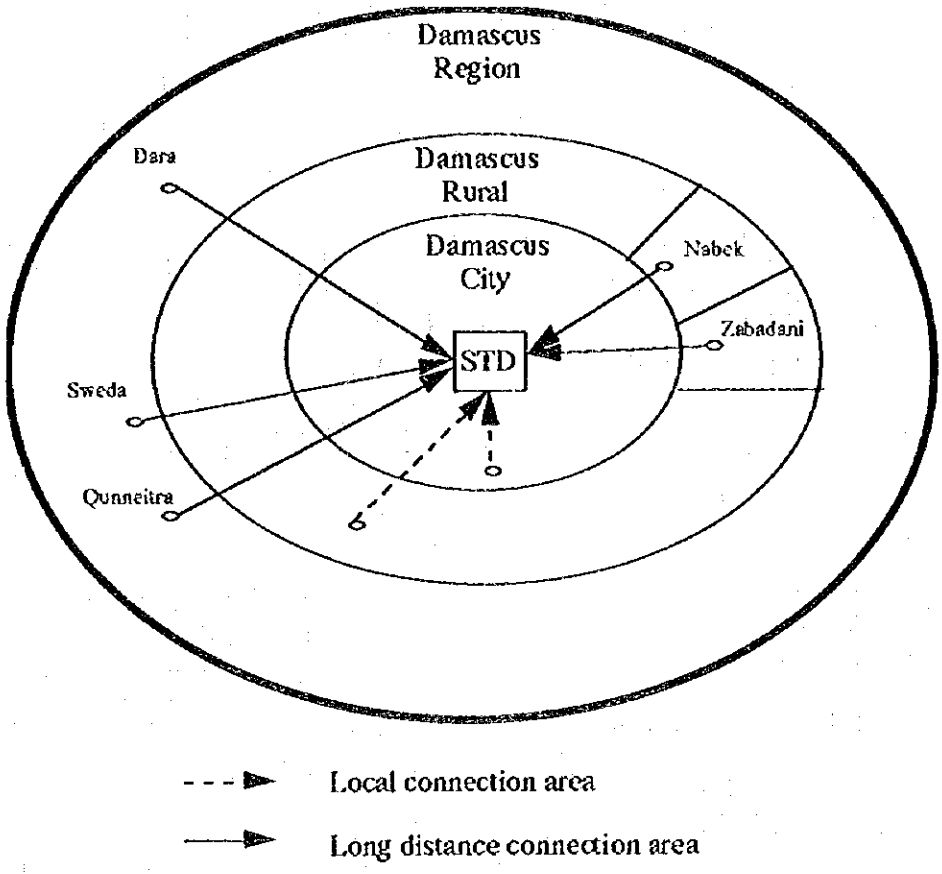


Figure 3.1.2-2 Damascus Region

To study the future network structure in Damascus region, the following considerations should be taken as basic conditions of the region:

- The existing routing is not simplified based on a certain logical routing method.
- Intensive increase of subscribers and traffic volume in Damascus city and its suburb in the rural area is foreseen in near future.
- Many small automatic exchanges including RSUs are planned to replace manual exchanges in the rural and region areas.

- The need for network security increases with network size, and security thus bec omes critical for a large network.
- The existing circuits and LT (local transit exchange) function should be utilized as effectively as possible from the viewpoints of maximum dimensioning of exchanges.
- The existing and future transmission routes for each district block should be taken into consideration for the security reason.

Taking into consideration the above, the new network structure and routing for Damascus region should be as follows:

- To establish a new STD at a new building separated from the existing Al Nasser STD from point of view of security and expansion of circuits.
- To distribute the traffic and routes to two(2) STDs at the ratio of 50% to 50% in principle.
- To divide the city and rural area into seven(7) blocks in the rural area according to the transmission routes.
- To centralize the small circuits groups from the small exchanges (about less than 10,000 subscribers) in a block to the exchange which has transit function (combined LE/LT) to minimize the circuits cost, and to carry the centralized traffic to STDs via this exchange.

The long distance network structure in Damascus region as a result of the above should be Figure 3.1.2-3.

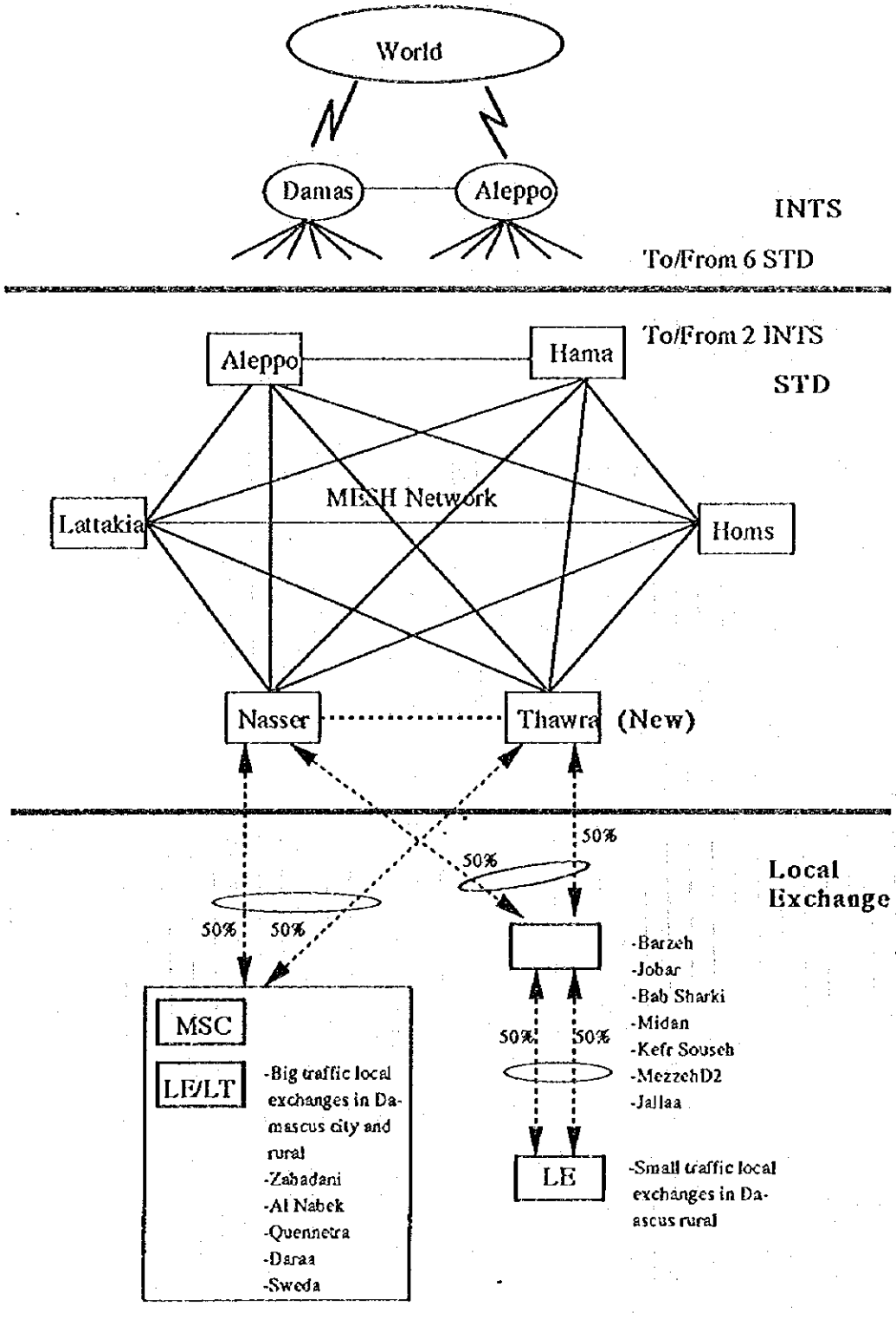


Figure 3.1.2-3 Long Distance Network Structure in Damascus Region

3.1.3 Local Network in Damascus City

(1) The Present Network

Damascus city has a large multi-exchange local network and at present the network will be classified as an unstructured network from the following reasons:

- New exchange and expansion plan not based on a certain fixed network plan
- New routes setting from viewpoints of the existing routes without the fixed routing standards

The present routing in Damascus local area is shown in Figure 3.1.3-1.

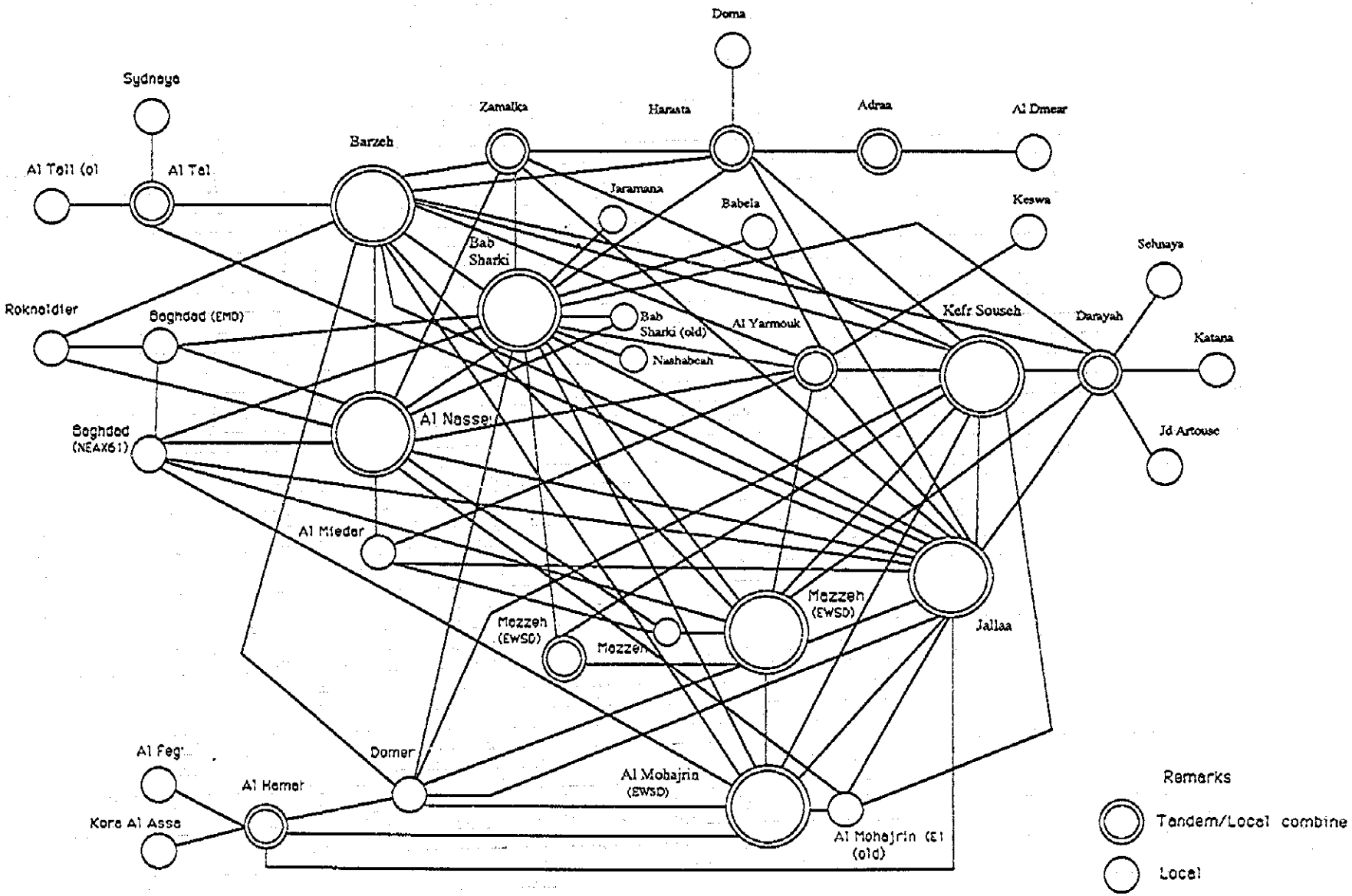


Figure 3.1.3-1 Routing in Damascus Local Area

(2) Considerations for the Future Network

The large expansion of the network and increase of big number of subscribers towards the year 2000 will need an optimum, i.e. a simple, effective and high security local network. For restructuring the existing network the following considerations should be taken:

- The local network for local connection calls will have a big number of automatic exchanges (about eighty) which are located over Damascus city and its rural.

- There will be a lot of big exchanges which have subscribers more than 20,000 in Damascus city and its suburb, and their traffic quantities may increase hugely.

- On the other hand, there will be a lot of small exchanges which have subscribers less than 3,000.

- The rural area is divided into several district blocks on the transmission routes and the security of the network, and there exists a gate way exchange as a node point in each block.

- The security of the network is absolutely needed according to becoming a huge network.

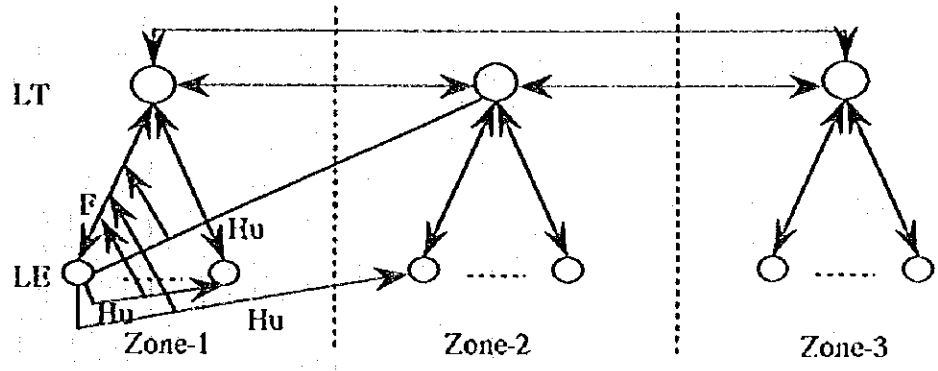
- The transition from the existing network to the restructured network should be able to carry out easily step by step.

(3) The Proposed Local Network Structure in Damascus

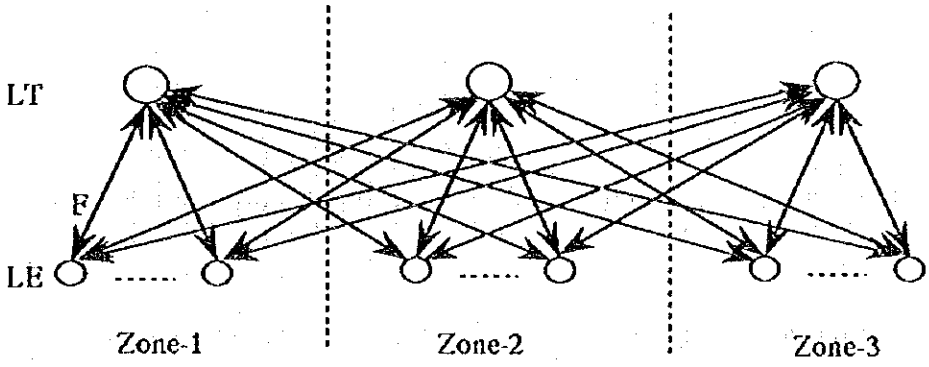
Generally the optimum network is to be studied to minimize basically both the switching and transmission costs, however, at the same time, other considerations such as easy planning, easy operation and maintenance, good security should be taken.
Here the following three models of local network structure were studied and simulated using estimated traffic data for Damascus area:

- Zone tandem model
- Multi-tandem model
- Combined Zone and Multi-tandem model

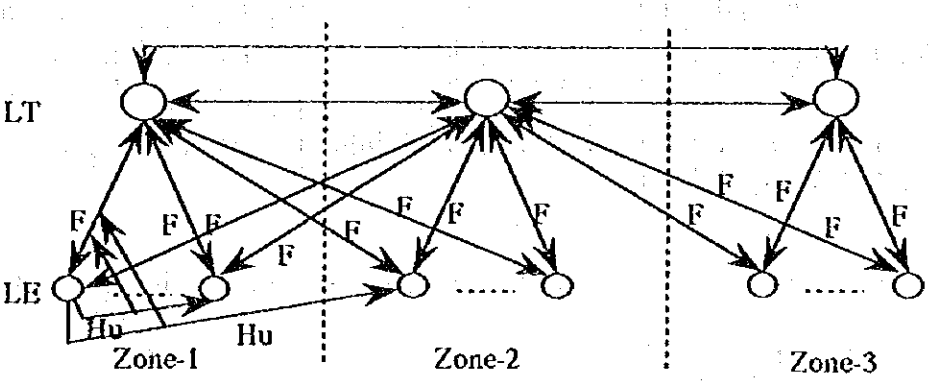
The three models are shown in Figure 3.1.3-2.



Zone Tandem Model



Multi-Tandem Model



Combined Zone and Multi-Tandem Model

Figure 3.1.3-2 Local Tandem Model

As a result of the study, the summary features for each model is shown in Table 3.1.3-1.

Table 3.1.3-1 Summary Features of Each Model

	Number of circuits	Security	Operation & maintenance	Combined LT & LE
a) Zone tandem model	less than b)	good	medium	possible
b) Multi-tandem model	too many	excellent	simple and easy	impossible(dedicated transit exchange)
c) Combined Zone and multi-tandem model	less than b) and more than a)	excellent	a little complicated	possible

Based on the above results and considerations for the future network described in (2), the proposed local network structure should be **"Combined Zone and Multi-Tandem"** model.

As a home exchange, the zone tandem (transit) exchange should have about twenty (20) LEs, each with two (2) home exchanges (a main home tandem and a sub home tandem) on final routiong path ways.

The Damascus city and its rural areas are divided into seven(7) blocks as tandem area according to geographical area, appropriate number of LEs and the transmission routes.

The tandem exchang switches long distance calls from the small exchanges in its own block area to 2 STDs.

The proposed restructured local network in Damascus area is shown in Figure 3.1.3-3.

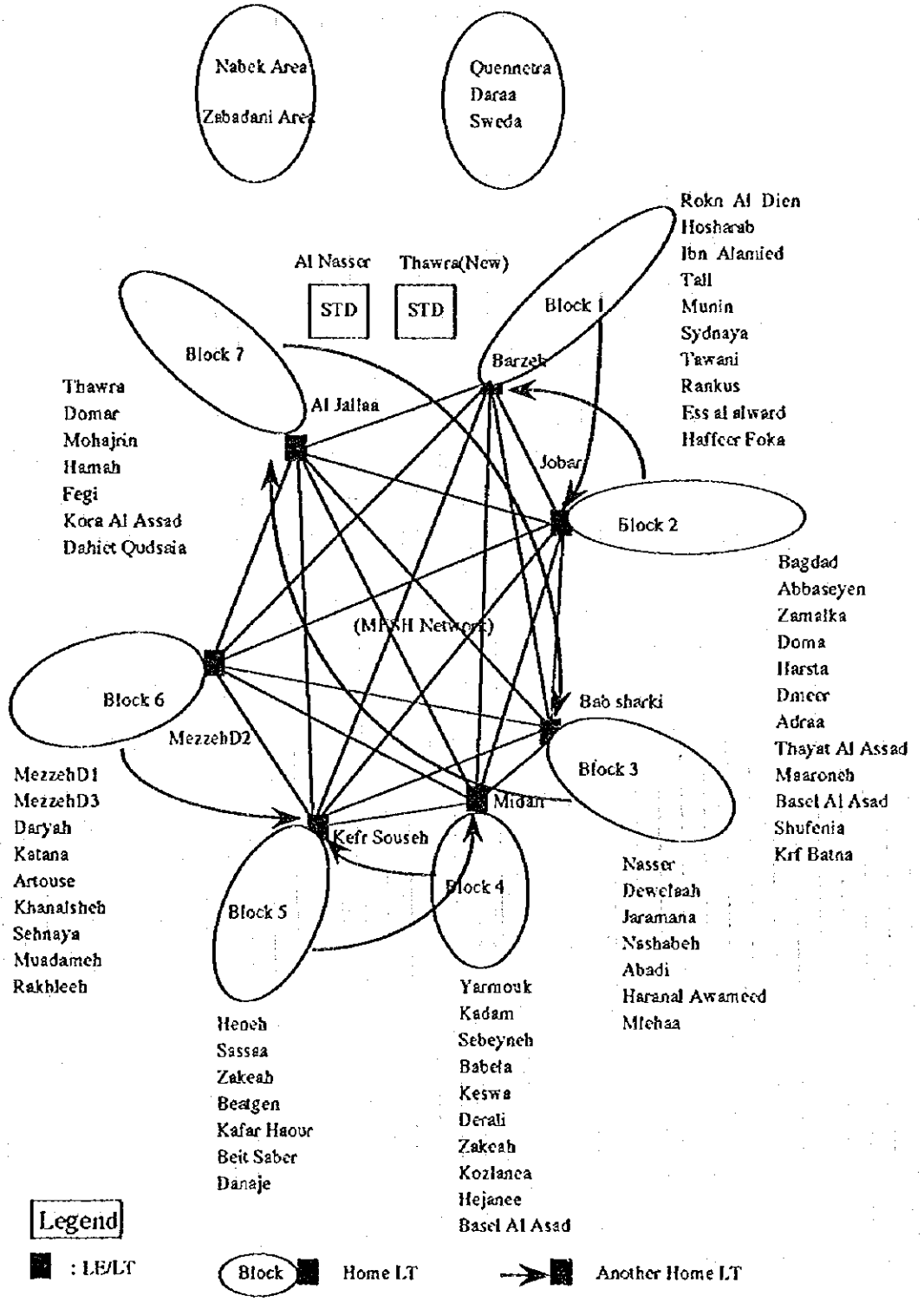


Figure 3.1.3-3 Proposed Local Network in Damascus Area

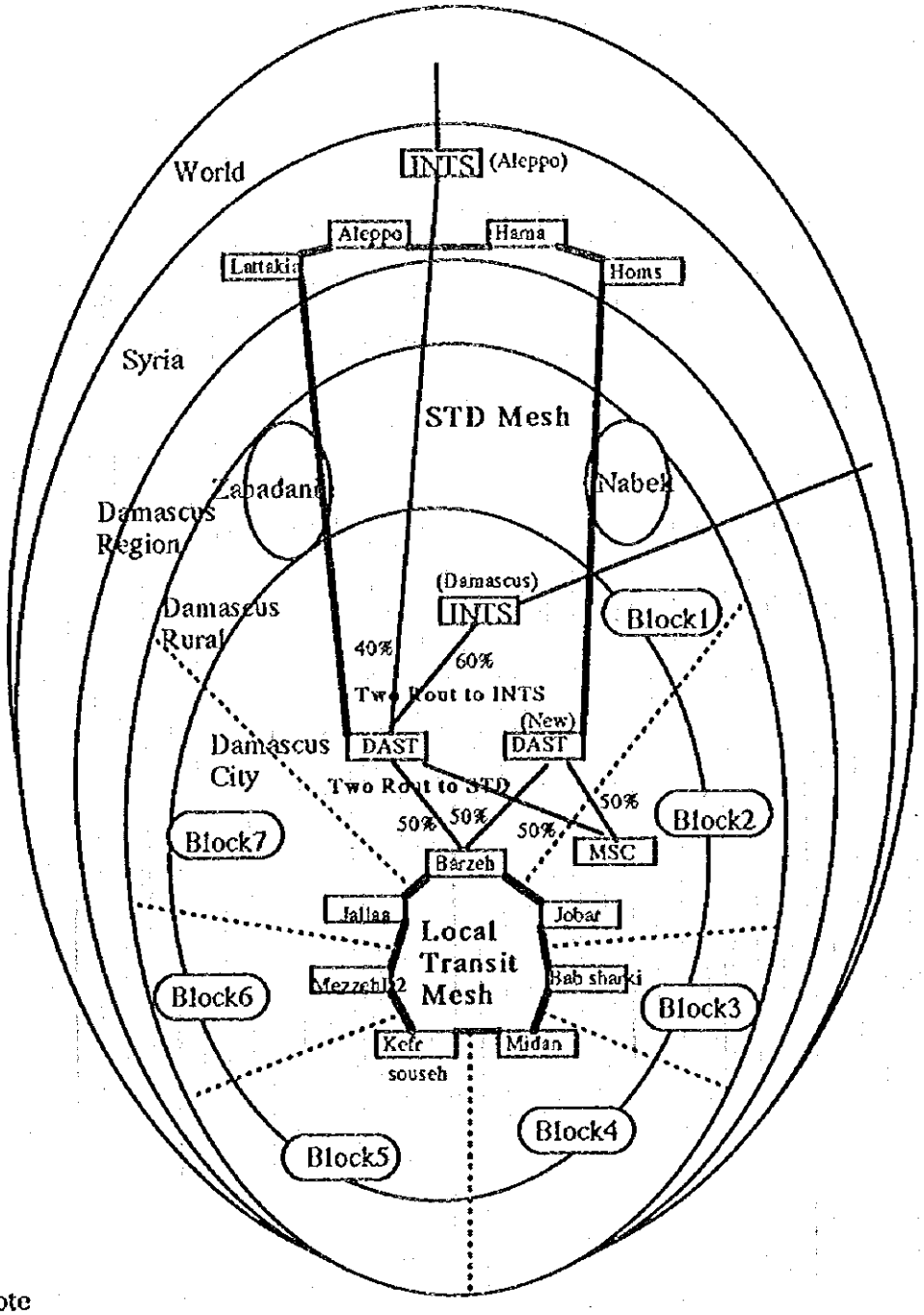
3.2 Routing Plan

The routing should be basically "far to near rotation method" and the routing criteria for traffic volume is as follows:

-	A direct high usage route between LE and LE	:	more than 20 erl.
-	A direct final route between LE and LE	:	more than 90 erl.
-	A final route between LE and 2 home LTs	:	all final traffic and over-flow traffic from high usage routes

3.3 Proposed Integrated Network in Syria

The proposed integrated network structure and routing in Syria as the summary of the study will be shown in Figure 3.3-1.



Note

1 Two(2) Routs Between seven(7) Local Tandems and two(2) DASTs
2 Two(2) Routs Between six(6) STDs and two(2) INTSs
3 Seven(7) Local Tandems are connected with Mesh Network
4 Six(6) STDs are connected with Mesh Network except between two(2) DASTs

Figure 3.3-1 Proposed Integrated Network in Syria

3.4 Numbering Plan

3.4.1 National Numbering Plan

The national numbering plan is as follows:

(1) Structure of numbering

Country Code + Area Code + Trunk Code + Subscriber Code
963 XX XX(X) XXXX

(2) Prefix code

0X : National, 09 : New services, 00 : International

(3) A/B Code Table for National Call

	B CODE									
A CODE	1	2	3	4	5	6	7	8	9	0
1	Damas-cus, its rural	Al Nabek	Zabadani	Quen-nctra	Dara	Sweda				
2	Aleppo	Rakka	Idleb							
3	Homs		Hama							
4	Lattakia		Tartous							
5	Deir Ezzar	Al Hasaka								
6										
7										
8										US Access
9										Cellular
0	International									

(4) 11X Code Table for Special Service

	C code									
AB code	1	2	3	4	5	6	7	8	9	0
11		Police	Fire		Military Police	Military Police	Military Police	Military Ambulance	Military Ambulance	Ambulance

(5) Numbering Plan for Mobile communication

From a domestic PSTN telephone to a mobile telephone:

090-XXXXXX (6 digits)

Note: One more digit shall be added when the number of subscribers increase to nearly 1,000,000.
The above mentioned subscriber code should contain the area identifier for administrative purposes.

From an overseas PSTN telephone to a mobile telephone:

Country Code + Mobile Code + Subscriber Code

+ 963 90 XXXXXX

From a mobile telephone to a domestic PSTN telephone

0 + Area Code + Trunk Code + Subscriber Code

0 XX XX(X) XXXX

From a mobile telephone to overseas PSTN

00 + Country Code + Area Code + Trunk Code + Subscriber Code

3.4.2 Numbering Plan in Damascus City

(1) The present numbering structure in Damascus city is as follows:

Area code:	011
Trunk code:	3 digits (XXX)
Subscriber code:	4 digits (XXXX)

(2) A trunk code table for Damascus local connection is shown in Table 3.4.2-1, and the full details are shown in S3-2-3-1 in the Supporting Report.

(3) Trunk codes for existing exchanges and proposed trunk codes for this project are shown in Table 3.4.2-2.

Table 3.4.2-1 A Trunk Code Table for Damascus Local Connection

ABX Code

	0	1	2	3	4	5	6	7	8	9
0										
1										
2		Kefr Souseh	Al Nasser	Al Thawra				Rokn Al Dien	Ibn Alamied	
3		Domar	Al Hamab	Al Jalla				Al Mohajrin	Al Fegi	Al Demas
4					Bagdad	Al Abbaseyen	Dowelaah	Jobar		
5		Barzeh	Zamarka	Harsta	Bab Sharki	Al Nashabeh	Jaramana	Doma	Adraa/Dmeer	Al Taal/Sydnay
6		Mezzeh 1	Daryah	Al Yarmouk	Babela		Mezzeh 2	Sehnayaa	Artouse/Katana	Keswa
7										
8		Al Kadam	Al Sebeyneh						Al Miedan	
9										

Existing Code New Code

Table 3.4.2-2 Proposed Trunk Codes

Office/Bldg. name	Unit Name	Capacity (1995)	Capacity (2000)	Proposed Trunk code
Al Nasser	A1	40,000	40,000	221-224
Al Thawra	A2	15,000	30,000	231-233
Kefr Sousch	K1	25,000	30,000	211-213
Domar	O1	15,000	25,000	311-313
Al Mohajrin	G3	10,000	20,000	371-373
	G1	11,000	11,000	376-377
Jallaa	B1	30,000	30,000	331-333
Bab Sharki	H1	20,000	20,000	541-542
	H2	10,000	10,000	543
(Dewelaah)		0	28,000	461-463
Mezzeh-1	D1	10,000	15,000	611-612
	D2	15,000	15,000	613-614
Mezzeh-2	D3	25,000	25,000	661-663
Al Miedan	F1	17,000	30,000	881-888
Al Yarmouk	L1	30,000	30,000	631-633
(Al Kadam)		0	25,000	811-813
(Al Sebeyneh)		0	25,000	821-823
Rokn Al Dien	E1	10,000	20,000	276-277
Barzeh	M1	30,000	30,000	511-513
(Ibn Alamied)		0	15,000	281-283
Bagdad	C1	20,000	30,000	441-445
	C2	20,000	20,000	446-447
(Al Abbaseyen)		0	30,000	451-453
(Jobar)		0	30,000	471-473

3.5 Signaling Plan in Damascus City

(1) The present signaling system

The current signaling systems between exchanges in Damascus area are employed as shown in Table 3.5-1.

Table 3.5-1 Signaling systems in Damascus area

	EWSD	NEAX61	E10A	EMD
EWSD	No.7 (BW)	MFC R2	MFC R2	DP 3W
NEAX61	MFC R2	MFC R2	MFC R2	DP 3W
E10A	MFC R2	MFC R2	MFC R2	DP 3W
EMD	DP 3W	DP 3W	DP 3W	DP 3W

(2) Signaling system in this project

In this project, new establishment of digital exchanges, replacement from EMD exchanges to new digital exchanges and expansion of existing digital exchanges are planned. Accordingly signalling systems to be introduced should be ITU CCS (Common Channel Signaling System) No.7, which has the following features:

- High speed signal transmission
- Signal transmission during conversation
- A wide variety of signals and a large signaling capacity
- Both way speech circuits operation

All circuit groups between digital exchanges where SS7 ISUP is applied should be operated as both way groups.

The present associated mode for signaling link will be employed until a quasi-associated mode is introduced in near future. These transfer modes are shown in Figure 3.5-1.

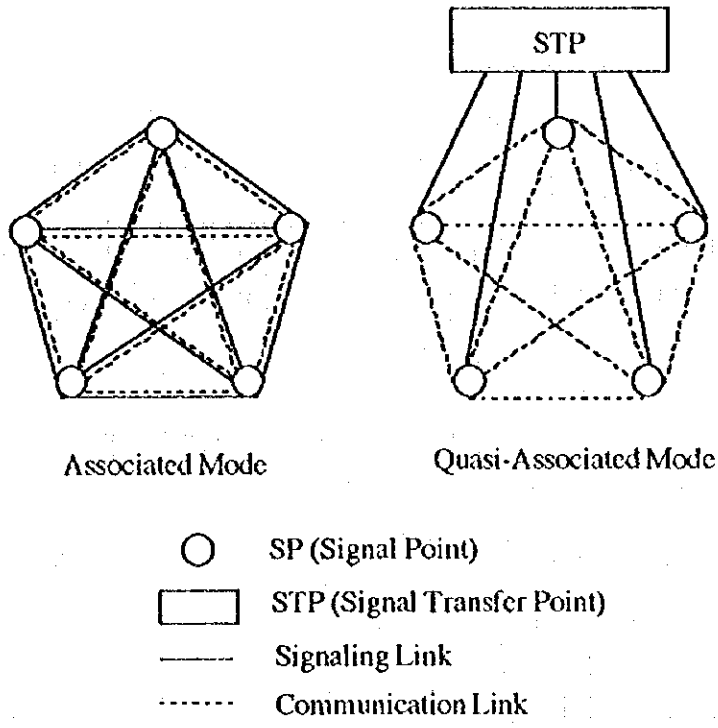


Figure 3.5-1 Signal Transfer Mode

3.6 Charging Plan

3.6.1 The Present Charging System

The present charging systems are as follows:

(1) International call

AMA (Automatic Message Accounting) system is applied at the STD exchanges (EWSD), to which ID (Identification) is transmitted from all local exchanges except from an EWSD type exchange, which has an AMA system itself.

Calls are charged by calculating call duration and destination according to the tariff.
From the exchanges which have the AMA system, MT (Magnetic Tape) is sent to the billing center once per month.

(2) Long distance call

The same AMA system as for international calls is applied to all STD exchanges.

(3) Local call

Electronic/mechanical meter system is applied to each local exchanges.
From the exchanges which have the electronic meter system, MT (Magnetic Tape) is sent to the billing center once every three(3) months.

The charging systems by each local exchange type are shown in Table 3.6.1-1.

Table 3.6.1-1 Charging System by Each Exchange

	International call	Long distance call	Local call
EWSD	AMA	AMA	Electronic meter
NEAX61	AMA(at STD)	AMA(at STD)	Electronic meter
E10A	AMA(at STD)	AMA(at STD)	Electronic meter
EMD	AMA(at STD)	AMA(at STD)	Mechanical meter

3.6.2 Charging Plan in This Project

In this project, new establishment of digital exchanges, replacement from EMD exchanges to new digital exchanges and expansion of existing digital exchanges are planned. Accordingly charging system to be introduced should be AMA system for international and long distance call, and electronic meter system for local call.

3.7 Synchronization Plan

3.7.1 Clock Distribution System

A master-slave synchronization system has been employed in the Syrian digital network.

3.7.2 Stability of Clock

The stability of the master clock and back-up oscillators in each hierarchy stage will be as follows:

Master clock (International switch)	10^{-12}
STD (Toll transit switch)	10^{-8}
LS (Local switch)	10^{-8}
RSU (Remote switch unit)	10^{-6}

3.7.3 Clock Distribution Network

The clock distribution network is shown in Figure 3.7.3-1.
In near future Aleppo INTS will have a submaster clock as a stand-by for the master-clock in Damascus INTS. In case of master-clock failure, the sub-master clock will distribute a clock signal to the entire Syrian digital network.

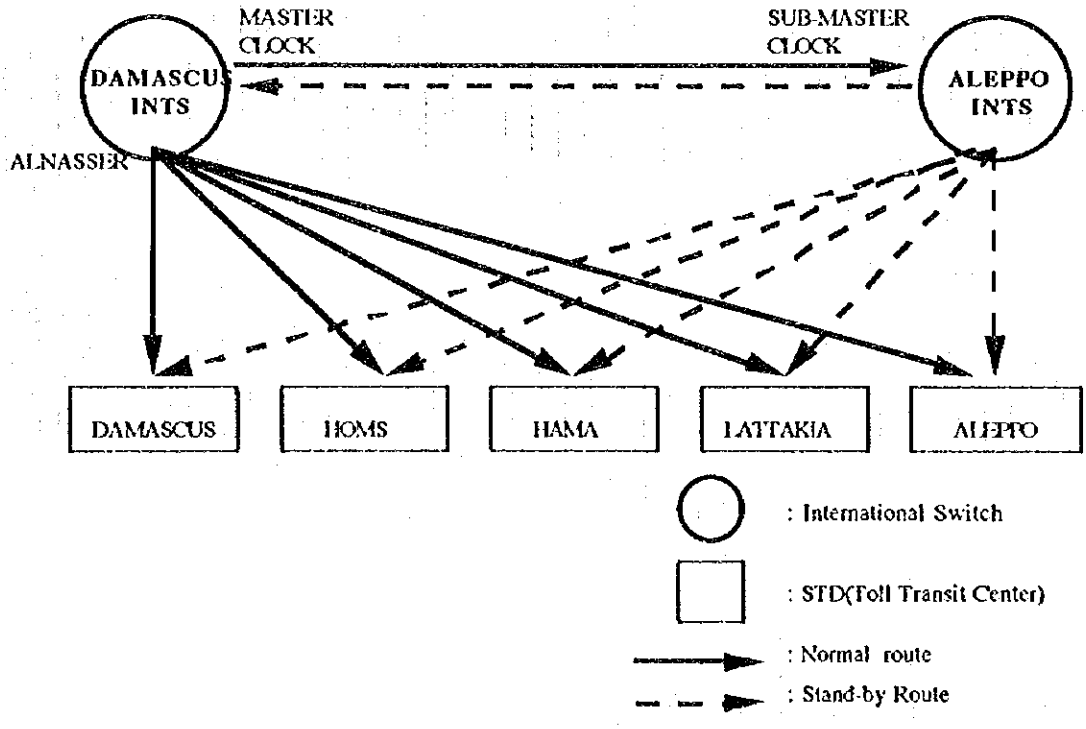


Figure 3.7.3-1 Clock Distribution Network

3.8 Technical Standards of Network

3.8.1 Connection Loss

The loss probability in circuit groups is allocated, as shown in Figure 3.8.1-1, on the basis of ITU-T Recommendation E.520.

Note:

1. Normal load: Mean of the 30 highest working days in a 12-month period.
2. High load: Mean of the five highest days in the same 12-month period.

If loss probability allocated to each connection of a digital transit exchange and terminating exchange is 0.001, the total loss probability between exchanges on both ends becomes 0.007, as shown in Figure 3.8.1-1.

The ITU-T recommends a loss probability of 0.05 (one side) for domestic data switching networks (Rec. X.131). This means that the end-to-end loss probability of digital switched networks should not exceed 0.1.

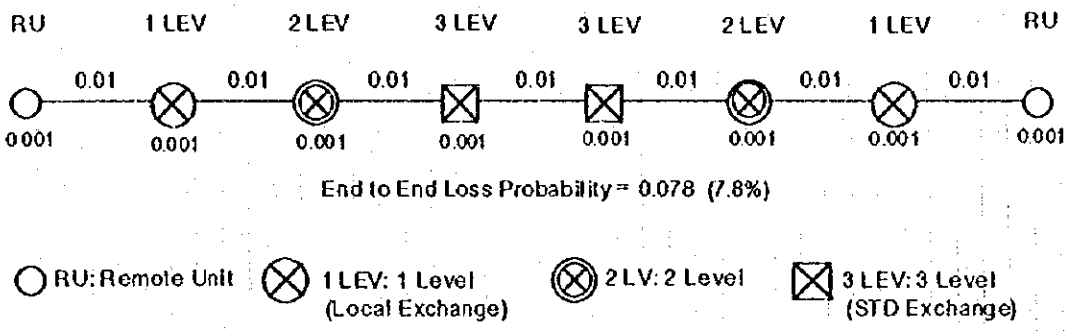


Figure 3.8.1-1 Connection Loss Allocation(Maximum)

3.8.2 National Transmission-Loss Allocation

Figure 3.8.2-1 shows the national transmission-loss allocation in the digital network in Syria.

The subscriber line loss does not exceed 8 dB at 800 Hz, and the maximum direct current loop resistance of the line is 1,500 to 1,700 ohms.

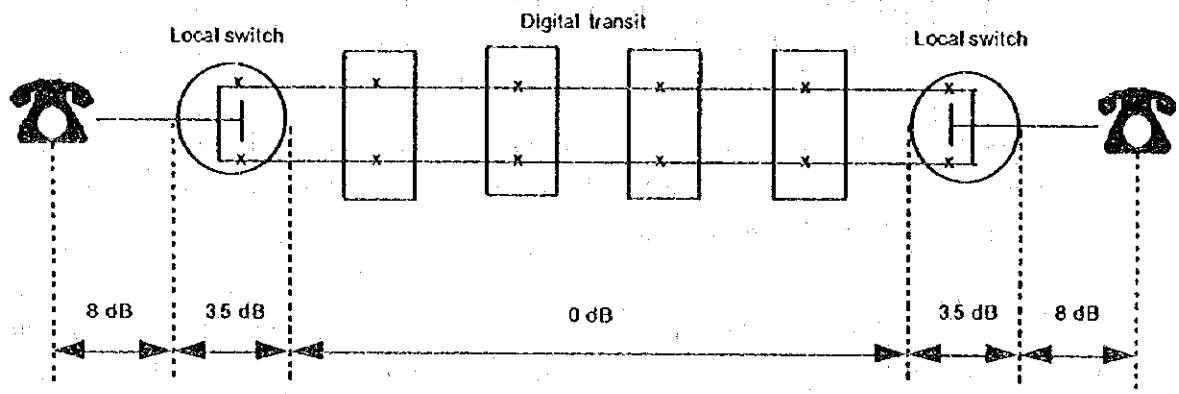


Figure 3.8.2-1 National Transmission Loss Allocation

3.8.3 Target Values of Network Quality

The target values for network quality are listed in Table 3.8.3-1.

Table 3.8.3-1 The Target Values for Network Quality

Network Quality	Grade of Service	Target Values	Related ITU-T Recommendations
Connection Performance	Initial address message delay (for signaling system No.7 netwowks)	Total delay 4 sec. International 1.5 sec. National 2.5 sec	E723
	Answer message delay (for signallingsl system No.7 network)	Total delay 2.5 sec. International 1.0 sec. National 1.5 sec.	E723
	Probability of end-end blocking	Local connection 2% Toll connection 3% Intenational connection 5%	E721
Transmission Performance	Transmission Loss for Digital Links	Total loss 0 dB	
	Bit Error Ratio for Severely Errored Seconds of Digital Network	Fewer than 0.2% of one second intervals to have a bit error ratio worse than 1×10^{-3}	G821

CHAPTER 4 TELEPHONE NETWORK EXPANSION PLAN

4.1 Demand Forecast and Fulfillment Plan

In this Study, the demand of Damascus city is forecasted and the fulfillment plan is made through the microscopic survey and study, referring to the demand forecast and fulfillment plan of the whole of Syria made in the Action Plan through macroscopic point of view.

Table 4.1-1 shows the demand forecast in the Action Plan.

Table 4.1-1 Demand Forecast in the Action Plan

(Unit : Thousands)

	1996	1997	1998	1999	2000		2002		2005
Damascus City	630.0	671.0	712.2	753.6	794.4	--	874.1	--	976.5
Whole Country	3074.0	3274.0	3475.0	3677.0	3876.0	--	4265.0	--	4806.0

4.1.1 Demand Forecast

4.1.1.1 The Result of the Detailed Study on Demand in Damascus City

We carried out the microscopic study on the telephone demand in Damascus City, in which we studied the characteristic of service area of each telephone office, such as, the number of present subscribers, boundary, population growth in the area, and proportion of the demand of business subscriber to residential subscriber. Table 4.1.1.1-1 shows the proportion of the demand of business subscriber to residential subscriber.

Table 4.1.1.1-1 The Proportion of the Demand of the Business to the Residential

Category	I	II	III
Subscriber's Ratio	Business user: 40% Residential user: 60%	Business user: 35% Residential user: 65%	Business user: 30% Residential user: 70%
Telephone Centers	Al Nasser Al Thawra	Bagdad Jallaa Al Mohajrin	Mazzeh 1 & 2 Kefr Souseh Domar Al Miedan Al Yarmouk Rokn Al Dien Barzeh Bab Sharki New Tel. offices

Through these studies, we found the followings:

- Large demand is emerging toward the suburban area and it grows rapidly. The reason is that suburban area is turning into residential areas because of scarcity of land and unavailability of buildings at the central area of the city.

- The existing telephone subscribers in suburban area are at present connected to the telephone offices located in city area near the suburban area.

- As a result, the boundary of the actual service areas becomes inadequate, and the number of subscribers connected to the existing telephone offices is becoming uneven in view of occupancy of capacity of telephone office.

In view of the above result, we concluded as follows:

- In order to satisfy the exploding new demand toward the year 2000, new telephone offices should be established, by dividing and reallocating the present service areas.

The reasons of the above conclusion are:

- Some large new demand is emerging far away from the location of the present offices. The telephone lines from new subscribers to the telephone office would be longer if a new telephone office at a suitable location is not established, which increases the investment expenditure for outside plant.

- At some telephone offices, the capacity is almost fully used and it cannot serve any more subscribers. If a new telephone office is established near the existing fully occupied telephone office, the new one will take the existing subscribers out from the existing one to reduce its burden. In this way, the existing one can serve new demand with the same capacity.

4.1.1.2 Demand Forecast of each Service Area

Following the conclusion of previous section, we planned the locations of new telephone offices and reallocated the boundary of areas, taking into account of subscriber density and size of the area, based on the forecasted demand in the year 2000. The demand of the year 2000 is allocated to each telephone office, including newly planned telephone offices. The result is shown in Table 4.1.1.2-1.

The table also shows the number of existing subscribers in 1995. Part of the present subscribers should be reallocated to the new telephone offices, and the numbers of present subscriber of the old telephone offices become reduced. The table shows the reallocation, too.

Table 4.1.1.2-1 The Demand Allocation to the New Telephone Offices

Telephone Office	Existing Subscribers in 1995	Reallocation to new offices in 1995	Demand Forecast in 2000
Al Nasser	39,580	35,600	49,300
(Al Thawra)		9,200	41,500
Kefr Souseh	8,937	8,900	41,500
Domar	8,662	8,700	34,500
Al Mohajrin	13,598	13,600	42,800
Jallaa	23,785	23,800	37,700
Bab Sharki	24,099	13,300	38,700
(Dewelaah)		9,400	38,700
Mazzeh 1	19,491	10,800	41,500
(Mazzeh 2)		8,700	34,400
Al Miedan	17,000	11,400	41,400
Al Yarmouk	25,813	10,900	41,500
(Al Kadam)		10,200	34,500
(Al Sebeyneh)		10,300	34,500
Rokn Al Dien	10,000	8,000	27,600
Barzeh	17,527	9,000	41,500
(Ibn Alamied)		3,500	20,800
Bagdad	39,930	31,900	69,000
(Al Abbaseyen)		7,000	41,500
(Jobar)		4,200	41,500
Total	248,422	248,400	794,400

The telephone offices in parentheses ( ) are new.
The telephone offices with **boldface** need new allocation.

Figure 4.1.1.2-1 shows the existing telephone offices, the planned new telephone offices, the present service areas, and the planned new boundary of the service areas.

On the basis of the result above, the demand of each telephone office was forecasted for each year, which is shown in Table 4.1.1.2-2.

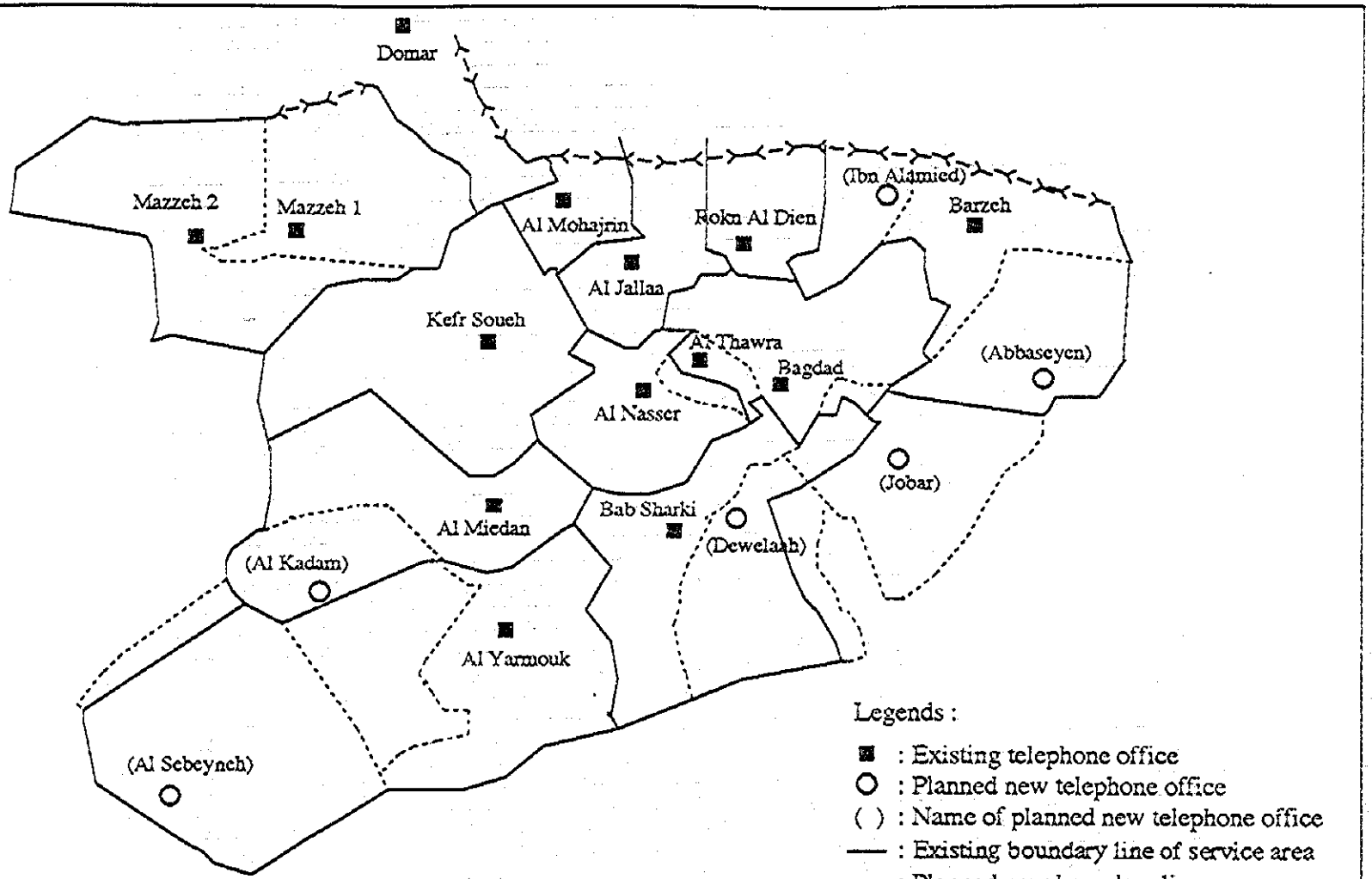


Figure 4.1.1.2-1 The Planned New Telephone Offices and Newly Allocated Service Areas in Damascus

Table 4.1.1.2-2 Demand Forecast in Damascus City

(Unit : No. of demand)

Center Name	1996	1997	1998	1999	2000	2002	2005
Al Nasser	42,100	44,000	45,900	47,500	49,300	52,800	57,400
Al Thawra	32,600	34,800	37,100	39,300	41,500	45,800	51,300
Kefr Souseh	32,600	34,800	37,000	39,300	41,500	45,800	51,300
Domar	27,100	29,000	30,900	32,700	34,500	38,100	42,700
Al Mohajrin	33,700	36,000	38,300	40,600	42,800	47,300	53,000
Jallaa	31,900	33,300	34,800	36,200	37,700	40,500	44,100
Bab Sharki	30,400	32,400	34,500	36,600	38,700	42,700	47,900
(Dewelaah)	30,400	32,400	34,500	36,600	38,700	42,700	47,900
Mazzeh[1]	32,600	34,800	37,100	39,300	41,500	45,800	51,300
Mazzeh[2]	27,100	29,000	30,800	32,600	34,400	38,100	42,700
Al Miedan	32,600	34,800	37,000	39,200	41,400	45,600	51,100
Al Yarmouk	32,600	34,800	37,000	39,300	41,500	45,800	51,300
(Al Kadam)	27,100	29,000	30,800	32,700	34,500	38,100	42,700
(Al Sebeyneh)	27,100	29,000	30,800	32,700	34,500	38,100	42,700
Rokn Al Dien	21,700	23,200	24,600	26,100	27,600	30,400	34,100
Barzeh	32,600	34,800	37,000	39,300	41,500	45,800	51,300
(Ibn Alamied)	16,300	17,400	18,500	19,700	20,800	23,000	25,800
Bagdad	54,300	57,900	61,600	65,300	69,000	76,100	85,300
(Al Abbaseyen)	32,600	34,800	37,000	39,300	41,500	45,800	51,300
(Jobar)	32,600	34,800	37,000	39,300	41,500	45,800	51,300
<TOTAL>	630,000	671,000	712,200	753,600	794,400	874,100	976,500

The names in parentheses ( ) are new telephone offices.

4.1.1.3 Demand forecast of Public Payphone

At present there are 304 public payphones in Damascus city, and the penetration ratio per 1,000 habitants is 0.2 phones. This figure is still low compared to the world average 0.7 according to ITU's "World Telecommunication Indicators" (94/95).

In the year 2000, it is estimated 850 phones are in service and the penetration ratio will exceed the world average in the year 2005.

Table 4.1.1.3-1 shows the result of the demand forecast of the public payphone in Damascus.

Table 4.1.1.3-1 The Demand Forecast of Public Payphones in Damascus

	1995	1996	1997	1998	1999	2000	2005
Forecasted Number of Inhabitants (000)	1,560	1,610	1,670	1,720	1,780	1,840	2,170
Forecasted Number of Payphone Lines	(304)	400	500	620	730	850	1,580
No. of Payphone Lines per 1,000 Inhabitants	0.20	0.25	0.30	0.36	0.41	0.46	0.73

The figure in parenthses ( ) is the number of existing public payphones.

4.1.2 Fulfillment Plan

The fulfillment plan in Damascus city was made, taking into account of the Fulfillment plan made in the Action Plan, the latest existing subscribers, and STE's Eighth National Five-Year Plan, following the newly allocated figure of 1995 and the demand of 2000 in Table 4.1.2-1.

The result is shown in the Table 4.1.2-1. Although some new telephone offices are not established in 1996, the figure of them shows the obligation that the new offices should undertake. Accordingly, the numbers of the subscribers of present existing offices are lightened.

This fulfillment plan shows the number of subscribers that should be served in the corresponding year. Therefore, the telecommunication facilities, such as switching equipment and outside plant, should be implemented previously.

Table 4.1.2-1 The Fulfillment Plan of Damascus City

(Unit : No. of subscribers)

Telephone Office	1996	1997	1998	1999	2000	2002	2005
Al Nasser	36,800	37,300	37,800	38,400	38,900	40,000	44,200
Al Thawra	10,700	12,100	13,600	15,000	21,000	30,000	39,500
Kefr Souseh	12,100	15,700	19,400	24,800	26,700	30,000	39,500
Domar	10,300	11,900	13,400	15,000	18,700	25,000	32,900
Al Mohajrin	15,500	17,300	19,200	21,000	23,300	31,000	40,800
Jallaa	25,500	26,500	27,500	28,400	29,000	30,000	34,000
Bab Sharki	15,600	18,000	20,400	23,300	25,100	28,000	36,900
(Dewelaah)	12,200	14,900	17,500	20,200	22,700	28,000	36,900
Mazzeh[1]	13,600	16,800	20,800	24,900	26,700	30,000	39,500
Mazzeh[2]	12,000	15,600	18,400	21,200	22,900	25,000	32,900
Al Miedan	12,800	14,200	15,600	17,000	21,500	30,000	39,400
Al Yarmouk	14,400	18,500	22,700	25,600	26,500	30,000	39,500
(Al Kadam)	12,400	14,500	16,500	18,600	20,600	25,000	32,900
(Al Sebeyneh)	12,500	14,500	16,500	18,500	20,600	25,000	32,900
Rokn Al Dien	8,500	9,000	9,500	10,000	14,500	20,000	26,300
Barzeh	13,000	17,200	21,700	24,900	26,800	30,000	39,500
(Ibn Alamied)	5,400	7,200	8,900	10,600	11,700	15,000	19,900
Bagdad	33,900	36,000	38,000	40,000	43,300	50,000	65,700
(Al Abbaseyen)	10,500	14,000	17,400	20,900	23,100	30,000	39,500
(Jobar)	8,400	12,500	16,600	20,700	23,100	30,000	39,500
<TOTAL>	296,100	343,700	391,400	439,000	486,700	582,000	752,200

<Notes>

1. The names in parenthses ( ) are the planned new telephone offices.
2. The plan is figured out on the presumption that new offices are established in 1996.

4.2 Traffic Forecast and Circuit Calculation

4.2.1 Traffic Forecast in Damascus Area

The traffic for local calls and long distance calls including international and mobile telephone calls is calculated based on the figures year 2002 of the fulfillment plan in the Action Plan, taking two(2) years provisioning time.

Damascus area is divided into three(3) areas, which are Damascus city, Damascus rural and Damascus region, and the new structures of the local and long distance networks are proposed as described in Chapter 3.

The calling rate per subscriber classified in business and residential subscriber on the basis of actual traffic trend as shown in Table 4.2.1-1. As a result of detailed study by each district and telephone offices, the ratio of business and residential subscribers by exchange office and the ratio of call kinds are categorized in four(4) parts in Damascus area as shown in Table 4.2.1-2 and Table 4.2.1-3.

The traffic matrices are calculated based on the above all factors and the gravity model methods. And the mobile telephone traffic from and to PSTN is added to the matrices as shown in Figure 4.2.1-1.

Table 4.2.1-1 Originating Calling Rate

Business user	0.065 erl. per subscriber
Residential user	0.040 erl. per subscriber

Table 4.2.1-2 Business and Residential Subscriber's Ratio

Category	1		2		3		4	
Subscriber's	Business	Residential	Business	Residential	Business	Residential	Business	Residential
Ratio	40%	60%	35%	65%	30%	70%	20%	80%
Damascus City	Al Nasser Al Thawra		Bagdad Jallaa Al Mohajrin		Mazzeh 1 Masseh 2 Kefr Souseh Domar Al Miedan Al Yarmouk Rokn Al Dien Barzeh Bab Sharki New telephone centers			
Damascus Rural					The telephone centers with the demand more than 10,000 in the year 2000		The telephone centers with the demand less than 10,000 in the year 2000	

Table 4.2.1-3 Traffic Distribution

Item	Category 1	Category 2,3	Category 4
Intra-office call	12%	13%	38%
Local call	76%	77%	56%
National call	8%	8%	5%
International call	4%	2%	1%

Note: The future traffic volume per subscriber is estimated at the following conditions;

1. The volume of originating traffic is approximately equal to terminating traffic.

2. The calling rate by the year 2002 will be the same as the following basic data.

3. The traffic flow of the international call is based on Figure 3.1.1-1.

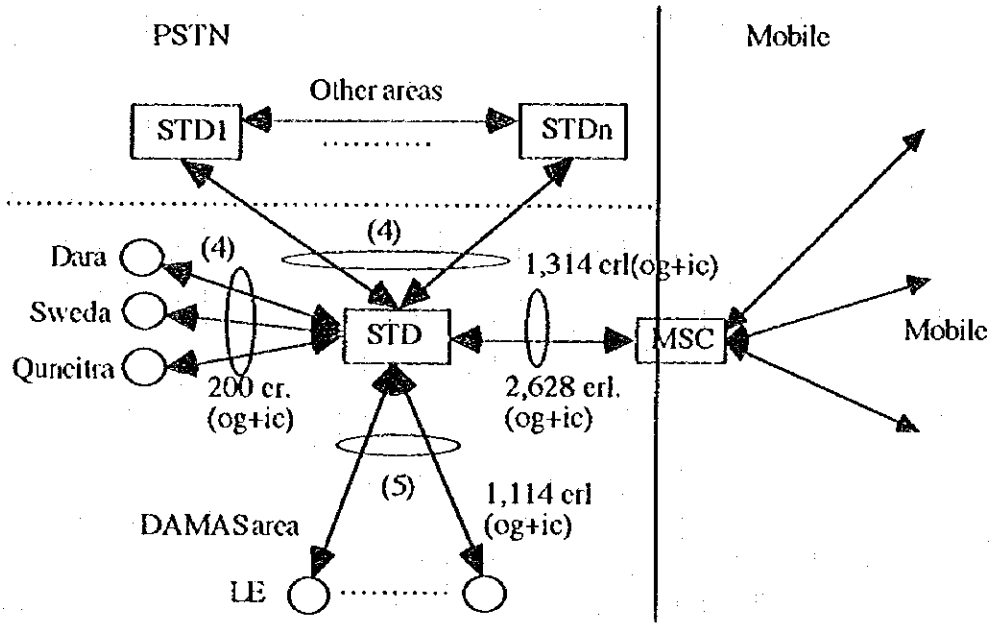


Figure 4.2.1-1 Mobile Telephone Traffic to and from PSTN

The outline of traffic matrix is shown in Table 4.2.1-4 and the details are shown in S3-2-4-1 to S3-2-4-8 in the Supporting Report.

The results of traffic calculation are shown in Table 4.2.1-5, Table 4.2.1-6 and Table 4.2.1-7.

Table 4.2.1-4 Traffic Quantity of Exchanges in Damascus City

Office/Bldg.	Unit Name	Category	Busin/Resid Ratio	No. of subscribers			Traffic quantity of originating calls(in erl.)					
				Business	Residence	Total	Intra-office	Local	National	International	Mobile	Total
Al Nasser	A1	I	40/60	16,000	24,000	40,000	240	1,520	160	80	18	2,018
Al Thawra	A2	I	40/60	12,000	18,000	30,000	180	1,140	120	60	14	1,514
Kefr Souseh	K	III	30/70	9,000	21,000	30,000	185	1,097	114	29	11	1,436
Domar	O	III	30/70	7,500	17,500	25,000	154	914	95	24	9	1,197
Al Mohajnn	G1,2	II	35/65	7,000	13,000	20,000	127	751	78	20	7	982
	G3	III	30/70	3,300	7,700	11,000	68	402	42	10	4	526
Jallaa	B2	II	35/65	10,500	19,500	30,000	190	1,126	117	29	11	1,474
Bab Sharki	H2	III	30/70	6,000	14,000	20,000	124	732	76	19	7	957
	H1	III	30/70	2,400	5,600	8,000	49	293	30	8	3	383
(Dewelaah)		III	30/70	8,400	19,600	28,000	173	1,024	106	27	10	1,340
Mezzeh-1	D1	III	30/70	4,500	10,500	15,000	93	549	57	14	5	718
	D2	III	30/70	4,500	10,500	15,000	93	549	57	14	5	718
Mezzeh-2	D3	III	30/70	7,500	17,500	25,000	154	914	95	24	9	1,197
Al Miedan	F1,2	III	30/70	9,000	21,000	30,000	185	1,097	114	29	11	1,436
Al Yarmouk	L1	III	30/70	9,000	21,000	30,000	185	1,097	114	29	11	1,436
(Al Kadam)		III	30/70	7,500	17,500	25,000	154	914	95	24	9	1,197
(Al Sebeyneh)		III	30/70	7,500	17,500	25,000	154	914	95	24	9	1,197
Rokn Al Dien	E	III	30/70	6,000	14,000	20,000	124	732	76	19	7	957
Barzeh	M	III	30/70	9,000	21,000	30,000	185	1,097	114	29	11	1,436
(Ibn Alamied)		III	30/70	4,500	10,500	15,000	93	549	57	14	5	718
Bagdad	C1,2	II	35/65	10,500	19,500	30,000	190	1,126	117	29	11	1,474
	C3	II	35/65	7,000	13,000	20,000	127	751	78	20	7	982
(Al Abbaseyen)		III	30/70	9,000	21,000	30,000	185	1,097	114	29	11	1,436
(Jobar)		III	30/70	9,000	21,000	30,000	185	1,097	114	29	11	1,436

Table 4.2.1-5 Result of Local Traffic Calculation

Office/Unit	Traffic (erl)
Barzeh	2,194.50
(Jobar)	2,194.50
Bab Sharki 1	1,463.00
AL Miedan	2,194.50
Kefr Souseh	2,194.50
Mezzeh D2	1,097.26
Jallaa	2,252.26
Rokn Al Dien	1,463.00
(Ibn Alamied)	1,097.26
Bagdad 1	2,252.26
Bagdad 2	1,501.50
(Al Abbaseyen)	2,194.50
Bab Sharki 2	585.20
AL Nasser	3,040.00
(Dewelaah)	2,048.20
Al Yarmouk	2,194.50
(Al Kadam)	1,828.76
(Al Sebeyneh)	1,828.74
Mezzeh D1	1,097.26
Mezzeh D3	1,828.76
Al Thawra	2,280.00
Domar	1,828.74
Al Mohajrin 1	1,501.50
Al Mohajrin 2	804.66
Damascus-Rural	16,779.34
Total	59,744.70

Table 4.2.1-6 Result of Long Distance Traffic Calculation

	Traffic(erl)			
Office/Unit	STD 1	STD 2	LE/LT-LE	Total
Barzeh	213.56	213.56	52.99	480.11
(Jobar)	212.29	212.29	51.72	476.30
Bab Sharki 1	141.80	141.80	34.75	318.35
AL Miedan	202.92	202.92	42.34	448.18
Kefr Souseh	189.47	189.47	28.88	407.82
Mezzeh D2	170.82	170.82	90.54	432.18
Jallaa	218.82	218.82	54.04	491.68
Rokn Al Dien	107.04	107.04		214.08
(Ibn Alamied)	80.28	80.28		160.56
Bagdad 1	164.79	164.79		329.58
Bagdad 2	109.86	109.86		219.72
(Al Abbaseyen)	160.57	160.57		321.14
Bab Sharki 2	42.82	42.82		85.64
AL Nasser	270.43	270.43		540.86
(Dewelaah)	149.86	149.86		299.72
Al Yarmouk	160.57	160.57		321.14
(Al Kadam)	133.81	133.81		267.62
(Al Sebeyneh)	133.81	133.81		267.62
Mezzeh D1	80.28	80.28		160.56
Mezzeh D3	133.81	133.81		267.62
Al Thawra	202.82	202.82		405.64
Domar	133.81	133.81		267.62
Al Mohajrin 1	109.86	109.86		219.72
Al Mohajrin 2	58.87	58.87		117.74
Damascus-Rural	797.04	797.04		1,594.08
Al Nabek	464.34	464.34		928.68
Zabadani	160.47	160.47		320.94
Quennetra	41.50	41.50		83.00
Darra	405.34	405.34		810.68
Sweda	274.04	274.04		548.08
Aleppo	1,795.80	1,795.80		3,591.60
Homs	552.87	552.87		1,105.74
Hama	294.39	294.39		588.78
Lattakia	664.94	664.94		1,329.88
MSC	1,327.32	1,327.32		2,654.64
Total	10,361.02	10,361.02	355.26	21,077.30

Table 4.2.1-7 Result of International Traffic Calculation

	Traffic(erl)		
Office/Unit	INTS(DAMAS)	INTS(Aleppo)	Total
STD 1	592.96	395.30	988.26
STD 2	592.96	395.30	988.26
Aleppo	614.40	409.60	1,024.00
Homs	280.62	187.08	467.70
Hama	179.69	119.79	299.48
Lattakia	294.05	196.03	490.08
Total	2,554.68	1,703.10	4,257.78

4.2.2 Circuit Calculation in Damascus Area

The circuits between exchanges are calculated based on the traffic matrices, the proposed network structures and the routing plan as described in Chapter 3.

In addition, the following detailed conditions are considered for the calculation.

(1) Routing for each exchange stage is Table 4.2.2-1.

Table 4.2.2-1 Routing for Each Exchange Stage

Stage of exchange	Traffic distribution ratio	No. of routes
INTS	INTS(Damascus) : 60% INTS(Aleppo) : 40%	2 INTSs in Syria 2 routes from/to each 6 STDs
STD	Al Nasser STD : 50% Thawra new STD : 50%	2 STDs in Damascus 2 routes from/to each INTS 2 routes from/to each LE Mesh network between STDs
LE/LT(combined)	Umbrella LE : 50% Sub-Umbrella LE : 50%	2 routes from/to 2 STDs 2 routes from/to each LE under umbrella and sub-umbrella Mesh network between LE/LTs
LE	Home LE/LT : 50% Sub-Home LE/LT : 50%	2 routes from/to 2 home LE/LTs
MS(Mobile Switch)	Al Nasser STD : 50% Thawra new STD : 50%	2 routes from/to 2 STDs

(2) Both way circuits are applied to the calculation because of No.7 CCS between exchanges.

(3) The connection loss probability per 1 link is 0.01.

The scope of circuit calculation in this project is as follows and shown in Figure 4.2.2-1:

- Long distance routes which are composed of international, long distance and mobile telephone calls.
- Local routes (high-usage and final) form/to LEs in Damascus city
- All routes including international and mobile telephone calls from/to STDs in Damascus.

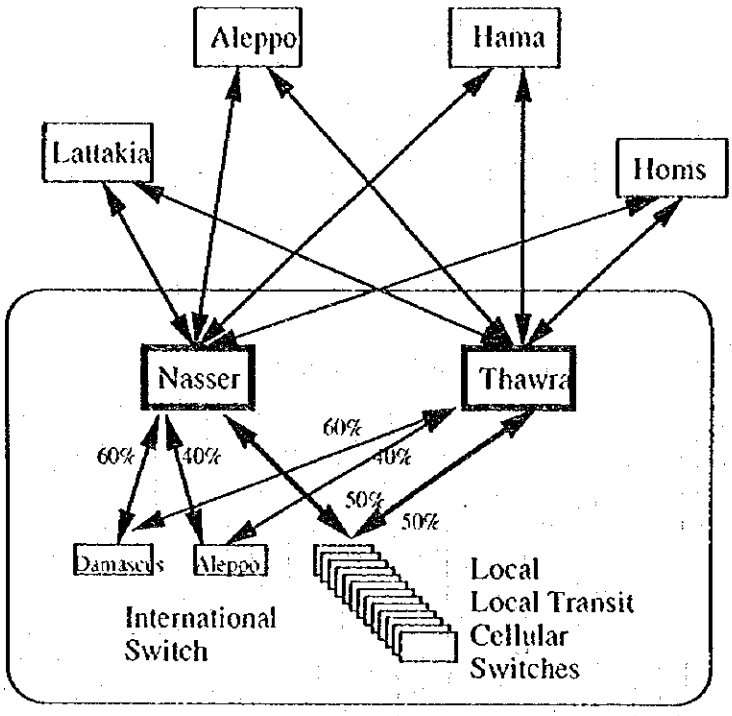


Figure 4.2.2-1 The Scope of Circuit Calculation

The calculation results are shown in Table 4.2.2-2, Table 4.2.2-3 and Table 4.2.2-4, and the details are shown in S3-2-4-9 to S3-2-4-14 in the Supporting Report.

Table 4.2.2-2 Result of Local Circuit Calculation

Office/Unit	No. of circuits(BW)
Barzeh	6,930
(Jobar)	7,140
Bab Sharki 1	4,620
AL Miedan	5,310
Kefr Sousch	6,300
Mezzeh D2	5,010
Jallaa	7,020
Rokn Al Dien	1,680
(Ibn Alamied)	1,260
Bagdad 1	2,670
Bagdad 2	1,800
(Al Abbaseyen)	2,490
Bab Sharki 2	630
AL Nasser	3,660
(Dewelaah)	2,430
Al Yarmouk	2,610
(Al Kadam)	2,220
(Al Sebeyneh)	2,220
Mezzeh D1	1,290
Mezzeh D3	2,250
Al Thawra	2,760
Domar	2,130
Al Mohajrin 1	1,770
Al Mohajrin 2	960
Damascus-Rural	20,700
Total	97,860

Table 4.2.2-3 Result of Long Distance Circuit Calculation

	No. of circuits(BW)			
Office/Unit	STD 1	STD 2	LE/LT-LE	Total
Barzeh	240	240	270	750
(Jobar)	240	240	240	720
Bab Sharki 1	180	180	150	510
AL Miedan	240	240	210	690
Kefr Souseh	240	240	210	690
Mezzeh D2	210	210	330	750
Jallaa	270	270	180	720
Rokn Al Dien	150	150		300
(Ibn Alamied)	120	120		240
Bagdad 1	210	210		420
Bagdad 2	150	150		300
(Al Abbaseyen)	210	210		420
Bab Sharki 2	60	60		120
AL Nasser	300	300		600
(Dewelaah)	180	180		360
Al Yarmouk	210	210		420
(Al Kadam)	180	180		360
(Al Sebeyneh)	180	180		360
Mezzeh D1	120	120		240
Mezzeh D3	180	180		360
Al Thawra	240	240		480
Domar	180	180		360
Al Mohajrin 1	150	150		300
Al Mohajrin 2	90	90		180
Damascus-Rural	1,110	1,110		2,220
Al Nabek	510	510		1,020
Zabadani	210	210		420
Quennetra	60	60		120
Darra	450	450		900
Sweda	300	300		600
Aleppo	1,830	1,830		3,660
Homs	600	600		1,200
Hama	330	330		660
Lattakia	720	720		1,440
MSC	1,380	1,380		2,760
Total	12,030	12,030	1,590	25,650

Table 4.2.2-4 Result of International Circuit Calculation

	No. of circuits(BW)		
Office/Unit	INTS(DAMAS)	INTS(Aleppo)	Total
STD 1	630	450	1,080
STD 2	630	450	1,080
Aleppo	660	450	1,110
Homs	330	210	540
Hama	210	150	360
Lattakia	330	240	570
Total	2,790	1,950	4,740

4.3 Switching System

4.3.1 Exchange Facilities

4.3.1.1 Present State of Exchanges

(1) Local Exchange

There are eighteen (18) working exchanges in Damascus city at present, which are listed in Table 4.3.1.1-1. Ten (10) of them are EWSD exchanges which were recently established. EWSD is an advanced digital exchange that is capable of introducing new services, and has centralized operation and maintenance functions. The other eight (8) exchanges are older types composed of four (4) EMDs, two (2) E10As and two (2) NEAX61s. In particular, the EMDs are worn-out step-by-step exchanges that were established over twenty years ago, and have problems such as difficulty in the introduction of new services and shortages of spare parts. Thus, EMD exchanges urgently needed to be replaced with new digital exchanges.

Regarding the Local Network hierarchy, two types of exchanges have already been established. One is of only local exchange function, the other is a combined type that has local and transit exchange function. The actual number of line units of the local exchange is limited to about 30,000 lines from security points of view.

Local exchanges that furnish ISDN services (Basic access) have already been introduced to four (4) big cities (five local exchanges) and have approximately 450 line units, but there are no actual ISDN users at present. However STE has a plan to start ISDN services in near future.

Exchange	No. of ISDN basic access
Damascus G3	150
Damascus B1	100
Lattakia D1	50
Aleppo B2	100
Homs D1	50
Total	450

Table 4.3.1.1-1 Number of Existing Subscribers

Office/Bldg. name	Exchange Type	Capacity (1995)	Existing Subscribers (Feb. 1996)
Al Nasser	NEAX61	40,000	39,580
Al Thawra	EWSD	15,000	0
Kefr Sousch	EWSD	25,000	8,937
Domar	EWSD	15,000	8,662
Al Mohajrin	EWSD	10,000	3,598
	E10A	11,000	10,000
Jallaa	EWSD	30,000	23,785
Bab Sharki	EWSD	20,000	16,599
	E10A	10,000	7,500
Mezzeh-1	EMD	10,000	9,491
	EWSD	15,000	10,000
Mezzeh-2	EWSD	25,000	0
Al Miedan	EMD	17,000	17,000
Al Yarmouk	EWSD	30,000	25,813
Rokn Al Dien	EMD	10,000	10,000
Barzeh	EWSD	30,000	17,527
Bagdad	EMD	20,000	19,965
	NEAX61	20,000	19,965
TOTAL		353,000	248,422

(2) Long Distance Transit Exchange (STD)

At present there is one (1) STD exchange at Al Nasser in Damascus city which has about 20,000 trunk circuits, 60% of which are working now. There is no established theory how to set up routes between STD and Local exchanges. In fact, twenty-five (25) local exchanges are connected to STD via direct routes and thirty-eight (38) local exchanges are connected via two (2) exchanges. Sixteen (16) out of thirty-eight (38) local exchanges in the Damascus area have a function for selecting the first route followed by the second route, the other twenty-two (22) local exchanges select two routes based on equal priority that are through two exchanges. As a result, planning, operation and maintenance is a little complicated.

(3) International Exchange (INTS)

At present there are two (2) INTSs, one in Damascus and one in Aleppo. International calls are connected to these INTSs via STD exchanges. However, the number of circuits between INTSs and STDs is not balanced. The Damascus INTS has about 10,000 trunk circuits, half of which are for STDs. The Damascus INTS is almost at full capacity, but the Aleppo INTS has room to expand circuits.

4.3.1.2 Facility Plan

(1) Local Exchange

(a) Basic Telephone

The expansion plan was decided in consideration of the following conditions.

- The number of line units for each local exchange was decided on basis of the fulfillment plan, taking into account a lead time of 2-years for provisioning i.e. employing the year 2002 fulfillment plan.

- Four (4) EMD exchanges shall be replaced with new digital exchanges by 2000.

- The actual maximum number of lines for an exchange are assumed to be 30,000 lines from security reason.

- The newest digital exchange with capability of new services such as ISDN, free call should be introduced.

Expansion, new establishment and replacement of exchanges in Damascus city are proposed based on the above all conditions as shown in Table 4.3.1.2-1.

Table 4.3.1.2-1 Proposed Number of Line Units

Office/Bldg.	Exchange Type		Capacity	Proposed expansion and replacement for 2000				Total
	(1995)	(2000)	(1995)	New	Expansion	Replacement	Sub-total	(2000)
Al Nasser	NEAX61	NEAX61	40,000	0	0	0	0	40,000
Al Thawra	EWSD	EWSD	15,000	0	15,000	0	15,000	30,000
Kefr Souseh	EWSD	EWSD	25,000	0	5,000	0	5,000	30,000
Domar	EWSD	EWSD	15,000	0	10,000	0	10,000	25,000
Al Mohajrin	EWSD	EWSD	10,000	0	10,000	0	10,000	20,000
	E10A	E10A	11,000	0	0	0	0	11,000
Jallaa	EWSD	EWSD	30,000	0	0	0	0	30,000
Bab Sharki	EWSD	EWSD	20,000	0	0	0	0	20,000
	E10A	E10A	10,000	0	0	0	0	10,000
(Dewelaah)	---	---	0	28,000	0	0	28,000	28,000
Mezzeh-1	EMD	---	10,000	15,000	0	10,000	5,000	15,000
	EWSD	EWSD	15,000	0	0	0	0	15,000
Mezzeh-2	EWSD	EWSD	25,000	0	0	0	0	25,000
Al Miedan	EMD	---	17,000	30,000	0	17,000	13,000	30,000
Al Yarmouk	EWSD	EWSD	30,000	0	0	0	0	30,000
(Al Kadam)	---	---	0	25,000	0	0	25,000	25,000
(Al Sebeyneh)	---	---	0	25,000	0	0	25,000	25,000
Rokn Al Dien	EMD	---	10,000	20,000	0	10,000	10,000	20,000
Barzeh	EWSD	EWSD	30,000	0	0	0	0	30,000
(Ibn Alamied)	---	---	0	15,000	0	0	15,000	15,000
Bagdad	EMD	---	20,000	30,000	0	20,000	10,000	30,000
	NEAX61	NEAX61	20,000	0	0	0	0	20,000
(Al Abbaseyen)	---	---	0	30,000	0	0	30,000	30,000
(Jobar)	---	---	0	30,000	0	0	30,000	30,000
TOTAL			353,000	248,000	40,000	57,000	231,000	584,000

(b) ISDN (Integrated Services Digital Network)

ISDN services will be introduced mainly to the governmental organization, company and business users for the G4 facsimile, data communication and so on. The STE has ambitious demand forecast for ISDN that is assumed to be 1% to 2.5% (80,000 ISDN sub.) of basic telephone line units all over the Syrian country by the year 2002, however it is difficult to fix ISDN demand at initial stage because that demand is deeply related to introducing strategy (mainly advertisement and tariff). In this report, the Study Team assumes the ISDN demand by the year 2000 is 1% of basic telephone line units (5,000 ISDN sub.) within Damascus city. It is important to reconsider the ISDN demand with the progress of increasing users.

(2) Long Distance Transit Exchange (STD)

Considering increase of subscribers and telecommunications security, one new STD should be established at the Thwara building separated from the existing STD at Al Nasser building as described in Chapter 3. For security reason, two routes will be required between STD and local exchanges as shown in Figure 4.3.1.2.-1.

The total number of circuits between two Damascus STDs and other area's STDs / INTSs / MSC is shown in Table 4.3.1.2-2.

(3) International Exchange (INTS)

To solve the imbalance between two INTSs the traffic distribution ratio will be 60% for Damascus INTS and 40% for Aleppo INTS step by step as shown in Figure 4.3.1.2.-1.

The total number of circuits between two INTSs and two Damascus STDs is shown in Table 4.3.1.2-2.

Table 4.3.1.2-2 Summary of the Total Number of Circuits for Long Distance, MSC and International Calls in this Project

Damascus STD	Damascus city+rural	Damascus other area	Other STD	MSC	INTS		Total
					Damas.	Aleppo	
Al Nasser	5,640	1,530	3,480	1,380	630	450	13,110
Al Thawra	5,640	1,530	3,480	1,380	630	450	13,110
Total	11,280	3,060	6,960	2,760	1,260	900	26,220

Note

Damascus other area : Zabadani, Al Nabek, Quennetra, Daraa, Sweda
Other STD : Aleppo, Hama, Homs, Lattakia

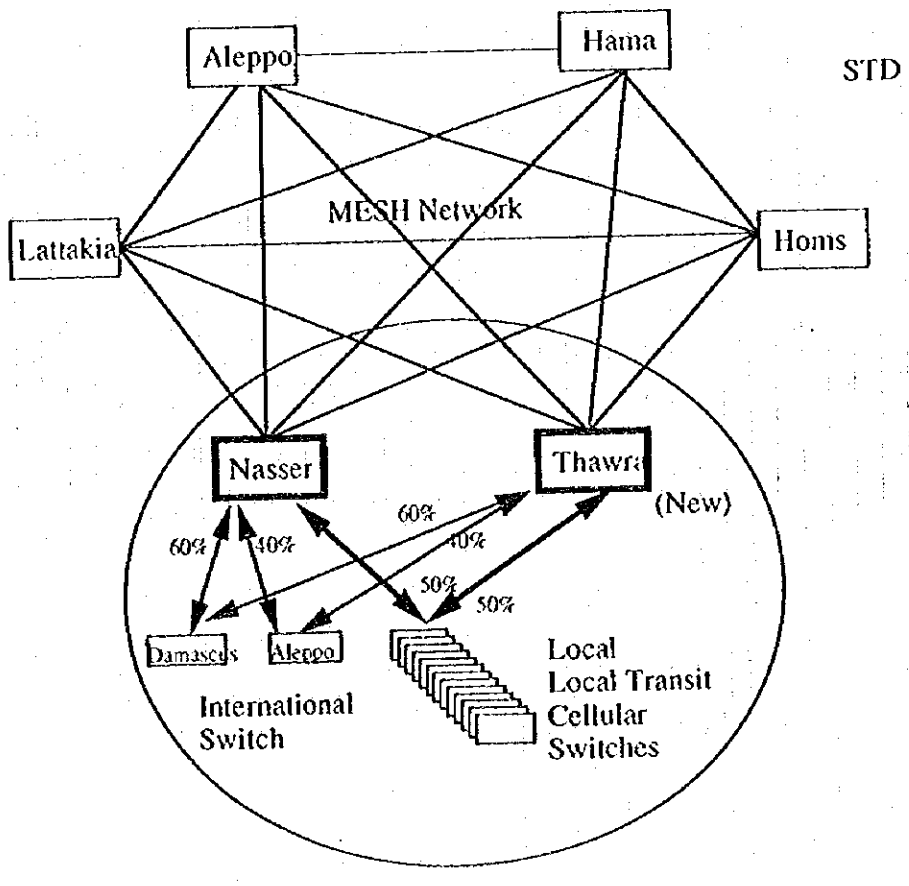


Figure 4.3.1.2.-1 Long Distance Network

4.3.2 Power Supply System

4.3.2.1 Design Criteria

The power supply systems in the objective exchange offices are designed in consideration of the present conditions of the commercial power and the future plan of the telecommunications facilities to be introduced.

(1) General

(a) Composition of Power Supply System

- AC Mains(Receiving/Distribution of AC commercial power)
- Engine Generator
- UPS (Uninterruptible Power Supply) or INV(Invertor)
- Rectifier
- Batteries

(b) Lead time for provisioning

The power supply systems are designed to correspond to the following periods:

-	AC Mains	:	Capacity at the ultimate stage (Capacity for the contract is to be the same as that at the initial stage.)
-	Engine Generator	:	Capacity at the ultimate stage
-	UPS/INV	:	Capacity at the ultimate stage
-	Rectifier	:	Capacity at the initial stage
-	Batteries	:	Capacity at the initial stage

Note: initial stage : year of service commencement (S + 0)
ultimate stage : year at the final capacity

(2) AC Mains

The AC commercial power:

High tension: 20KV, 50Hz, 3-phase (PBE facility)
Low tension: AC 380V/220V, 50 Hz, 3-phase/1-phase (STE facility)

(3) Engine Generator

(a) Type of Engine Generator

- Diesel engine
- Continuos operation type

- Cooling type : Air-Radiator or Water-cooling type
- Output : AC 380V/220V, 50 Hz, 3-phase/1-phase

(b) Capacity of Fuel Tank

Considering the condition of operation and maintenance, the fuel tank will be, in principle, capable of storing:

Main exchange offices/stations: 3 days(minimum)
Small exchange offices/stations: 4 to 10 days

(4) UPS/INV

In case of commercial power interruption, the engine generator requires a moment for start-up and stabilizing. Therefore, the UPS/INV should be provided to prevent power supply interruption.

- Holding time : 10 minutes
- Input voltage : AC 380V/220V, 50 Hz, 3-phase/1-phase or DC -48V
- Output voltage : AC 220 V, 50 Hz, 1-phase

(5) Rectifier

Most facilities and equipment work by providing DC power (DC-48V), so the following rectifier will be applied:

- Input voltage : AC 380V/220V, 50 Hz, 3-phase/1-phase
- Output voltage : DC-48 V
- Type : One stand-by (n+1), floating

(6) Batteries

In order to prevent a DC power supply interruption, sets of batteries will be provided. The back-up time of the batteries is established to be four(4) hours in consideration of the reliability of commercial power and the other power supply system.

- Back-up time : Four (4) hours
- Output voltage : DC-48 V
- Type : Maintenance type for main exchange offices/stations
  Maintenance free type for small exchange offices/stations

(7) Miscellaneous Equipment

As miscellaneous equipment, the following equipment will be provided:

- High tension facility (Line, transformer)
- MTR (Meter)
  Low tension commercial power (AC 380V/220V, 50 Hz, 3-phase/1-phase) is lead in through the MTR.
- BRK (Breaker)
  Low tension commercial power is connected with the BRK.
- MDP (Main Distribution Panel)
  MDP divides the commercial power into two streams, one is to directly supply AC power to the load, another is to be connected with engine generators, UPS and rectifier/batteries.
- LBP (Low tension branch panel)
  Low tension power is distributed to the various load through the LBPs.
- LTP (Low tension change-over panel)
  LTP has a function of change-over from commercial power source to output of engine generator, vice versa.
- MTS (Mobile transfer switch)
  MTS has a function of switch-over from internal power source such as commercial power or output of engine generator to external power source in case the internal power source fails.
- MB (Mobile box)
  The external power source is connected to the MB.

4.3.2.2 System Diagram

The power supply system at the exchange office is designed taking into account the accommodation plan of the telecommunications systems. The high tension facility is provided, owned and maintained by PEE (The Public Establishment for Electricity).
STE has to bear the full provisioning cost of it.
The typical system diagram of the powers supply system at the exchange offices is indicated in Figure 4.3.2.2-1.

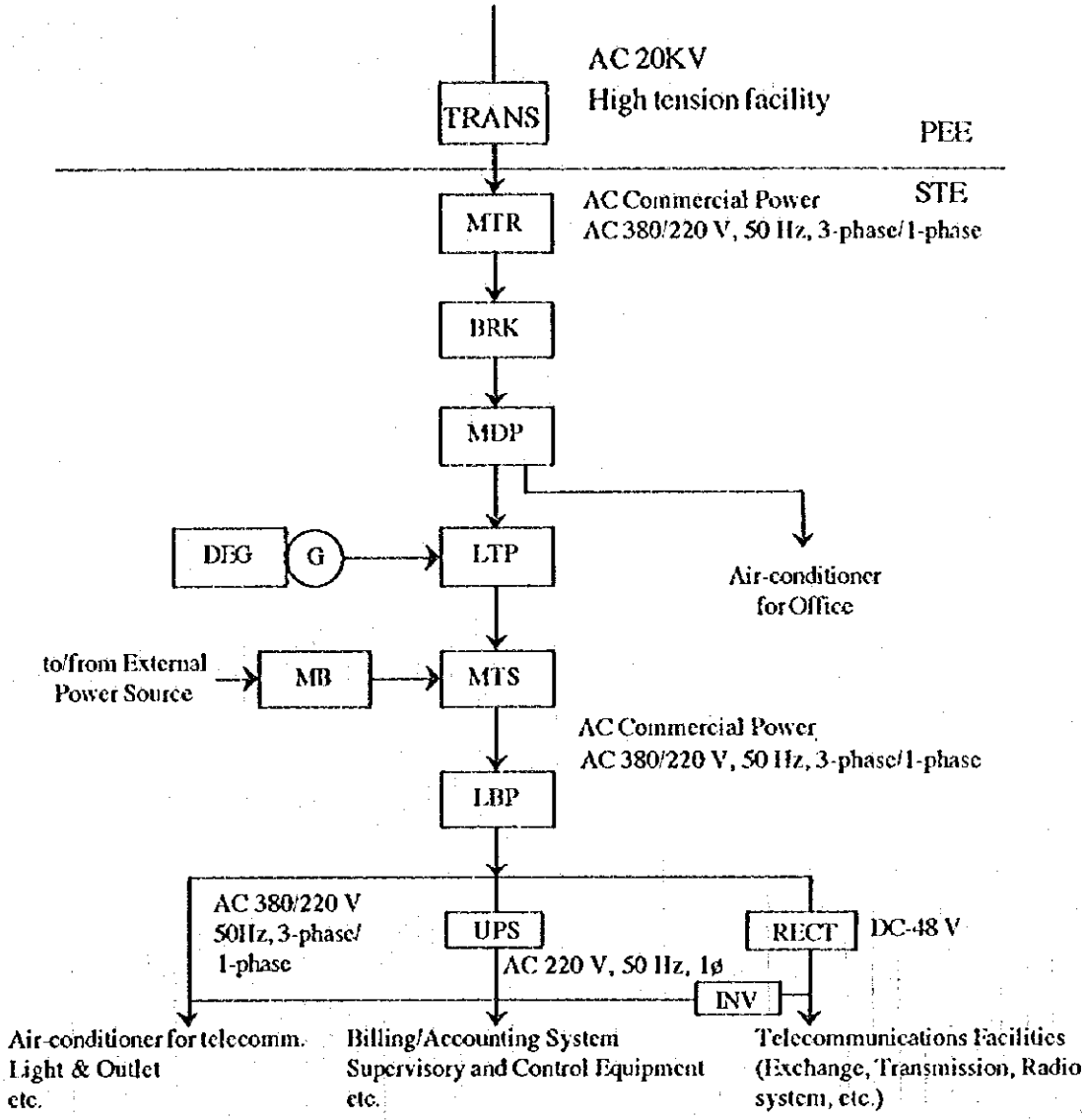


Figure 4.3.2.2-1 System Diagram of Power Supply System

4.3.2.3 Power Consumption

The power consumption at each exchange office is estimated based on expansion and new establishment sizes of exchanges as shown in Table 4.3.2.3-1.

Table 4.3.2.3-1 Power Consumption

Office/Bldg. name	Unit Name	Scope of expansion and replacement in 2000		Initial capacity	Ultimate capacity	Initial Stage(year 2000)					Ultimate Stage				
		New/Replace	Expansion	(2000)		AC direct (A)	EG direct (KVA)	Rectifier (A)	Batteries (AH)	UPS (KVA)	AC direct (A)	EG direct (KVA)	Rectifier (A)	Batteries (AH)	UPS (KVA)
Al Nasser	A1	0	0	40,000	40,000	1600	600	7200	2100	---	630	314	2500	8000	7.5
Al Thawra	A2	0	15,000	30,000	30,000	630	314	2500	5000	7.5	630	314	2500	8000	7.5
Kefr Souseh	K1	0	5,000	30,000	30,000	630	314	2500	5000	7.5	600	314	2500	8000	7.5
Domar	O1	0	10,000	25,000	30,000	630	314	2500	5000	7.5	630	314	2500	8000	7.5
Al Mohajrin	G3	0	10,000	20,000	30,000	600	314	2500	5000	7.5	630	314	2500	8000	7.5
	G1	0	0	11,000	30,000	250	200	2400	12000	---	630	314	2500	8000	7.5
Jaffar	B1	0	0	30,000	30,000	630	314	2500	5000	7.5	630	314	2500	8000	7.5
Bab Sharki	H1	0	0	10,000	30,000	630	170	1800	6000	---	630	314	2500	8000	7.5
	H2	0	0	20,000	30,000	630	314	2500	5000	7.5	630	314	2500	8000	7.5
(Dewelaah)		28,000	0	28,000	30,000	630	314	2500	5000	7.5	630	314	2500	8000	7.5
Mezzeh-1	D1	15,000	0	15,000	30,000	630	314	2000	4000	7.5	630	314	2500	8000	7.5
	D2	0	0	15,000	30,000	630	314	2000	4000	7.5	630	314	2500	8000	7.5
Mezzeh-2	D3	0	0	25,000	30,000	630	314	2500	5000	7.5	630	314	2500	8000	7.5
Al Miedan	F1	30,000	0	30,000	30,000	630	314	2500	5000	7.5	630	314	2500	8000	7.5
Al Yarmouk	L1	0	0	30,000	30,000	630	314	2500	5000	7.5	630	314	2500	8000	7.5
(Al Kadam)		25,000	0	25,000	30,000	630	314	2500	5000	7.5	630	314	2500	8000	7.5
(Al Sebeynch)		25,000	0	25,000	30,000	630	314	2500	5000	7.5	630	314	2500	8000	7.5
Rokn Al Dien	E1	20,000	0	20,000	30,000	630	314	2500	5000	7.5	630	314	2500	8000	7.5
Barzeh	M1	0	0	30,000	30,000	630	314	2500	5000	7.5	630	314	2500	8000	7.5
(Ibn Alamied)		15,000		15,000	30,000	630	314	2000	4000	7.5	630	314	2500	8000	7.5
Bagdad	C1	30,000	0	30,000	30,000	630	314	2500	5000	7.5	630	314	2500	8000	7.5
	C2	0	0	20,000	30,000	350	300	3600	8800	---	630	314	2500	8000	7.5
(Al Abbaseyen)		30,000	0	30,000	30,000	630	314	2500	5000	7.5	630	314	2500	8000	7.5
(Jobar)		30,000	0	30,000	30,000	630	314	2500	5000	7.5	630	314	2500	8000	7.5

4.3.2.4 Facility Provisioning Plan

Based on the power consumption at each exchange, the facility provisioning is planned as shown in Table 4.3.2.4-1.

Table 4.3.2.4-1 Facility Provisioning Plan of Power Supply System

Office/Bldg. name	Unit Name	AC mains (A)	Engine Generator (KVA)	Rectifier (A)	Batteries (AH)	UPS (KVA)
Al Nasser	A1	---	---	---	---	---
Al Thawra	A2	---	---	+1000	+2000	+2.5
Kefr Souseh	K1	+30	---	+500	---	---
Domar	O1	+230	+132	+1000	---	---
Al Mohajrin	G3	+230	+132	+1000	+2000	+2.5
	G1	---	---	---	---	---
Jallaa	B1	+30	---	---	---	---
Bab Sharki	H1	---	---	---	---	---
	H2	---	---	+500	---	---
(Dewelaah)		630	314	2500	5000	7.5
Mezzeh-1	D1	---	314	2000	4000	+2.5
	D2	---	---	---	+250	---
Mezzeh-2	D3	+30	---	+500	---	---
Al Miedan	F1	+330	314	2500	5000	7.5
Al Yarmouk	L1	---	---	---	---	---
(Al Kadam)		630	314	2500	5000	7.5
(Al Sebeyneh)		630	314	2500	5000	7.5
Rokn Al Dien	E1	+330	314	2500	5000	7.5
Barzeh	M1	---	---	---	---	---
(Ibn Alamied)		630	314	2000	4000	7.5
Bagdad	C1	630	314	2500	5000	7.5
	C2	---	---	---	---	---
(Al Abbaseyen)		630	314	2500	5000	7.5
(Jobar)		630	314	2500	5000	7.5

4.4 Transmission System

4.4.1 Transmission Facilities

4.4.1.1 Present Status of Transmission

Under the Contract 40/A and 3/A, Damascus junction network was renovated with 140Mbps fiber-optic transmission systems. Recently, the network has been enhanced its circuit capacity by installing more 140Mbps systems under the 25% Expansion Contract 40A. The number of 140Mbps systems for each route (or section) in the network is summarized in Table 4.5.1.2-1.

The network configuration is similar to physical mesh network and somewhat complicated with many 140Mbit systems. The installation under the 25% Expansion Contract relieves capacity shortages. The drawback to the capacity increase is that it endangers network security to a certain extent by using up all fibers in some sections which could be stand-bys for failed fibers.

4.4.1.2 Result of Survey

A field survey has been carried out to determine obstacles to transmission facility plan execution. No major obstacles were found.

Since the transmission rooms in telephone offices E (Rokn Al Dien) and C (Bagdad), have little space for new equipment, the field survey shall be carried out by contractor.

The floor-to-ceiling height is more than 4 meters and is sufficient for any transmission equipment. The floor is strong enough for loading equipment, based on existing equipment.

4.4.1.3 Facility Plan

The facility plan takes the following into account;

(1) The proposed logical mesh network at the center of Damascus (see Figure 3.1.3-3) must not complicate physical network much more.

(2) The existing systems are new ones and should be utilized.

(3) 50% circuits are secured even in the case of one route failure. (100% circuit protection is better from view point of security, but not economical. Since distances between two telephone offices are short in Damascus, route failure is rarely expected to happen.)

(4) One pair of spare fibers is maintained for as many sections as possible.

(5) According to the world technology trend, SDH transmission systems shall be introduced into the Damascus Junction Network as soon as possible.

The Master Plan proposes eight SDH rings (loops) in the network. Some of the eight loops are selected to satisfy the circuit demand in Damascus targeted area in the year 2002 (2000 + two years lead time). As Jobar become a Home LT in the plan as shown in Figure 3.1.3-3, the plan makes LOOP 9 as a SDH ring over Jobar, Dewelaah, Damascus C (Bagdad), and Damascus H1 (Bab Sharki). The other loops will be accomplished after the year 2000.

Based on the circuit calculation in Section 4.2.2, the number of circuits required for each section are summed and are shown in Figure 4.4.1.3-1. Circuits between STD1 and MSC (Mobile service switching center) are included, but long distance circuits from/ to STD1 and STD2 to/ from the other toll transit exchanges and INTSs are excluded. Circuits between MSC and each of BTSs(Base transceiver stations) are handled in Chapter 5.

Figure 4.4.1.3-1 illustrates sections where circuit shortages are anticipated in compare with existing numbers of circuits.

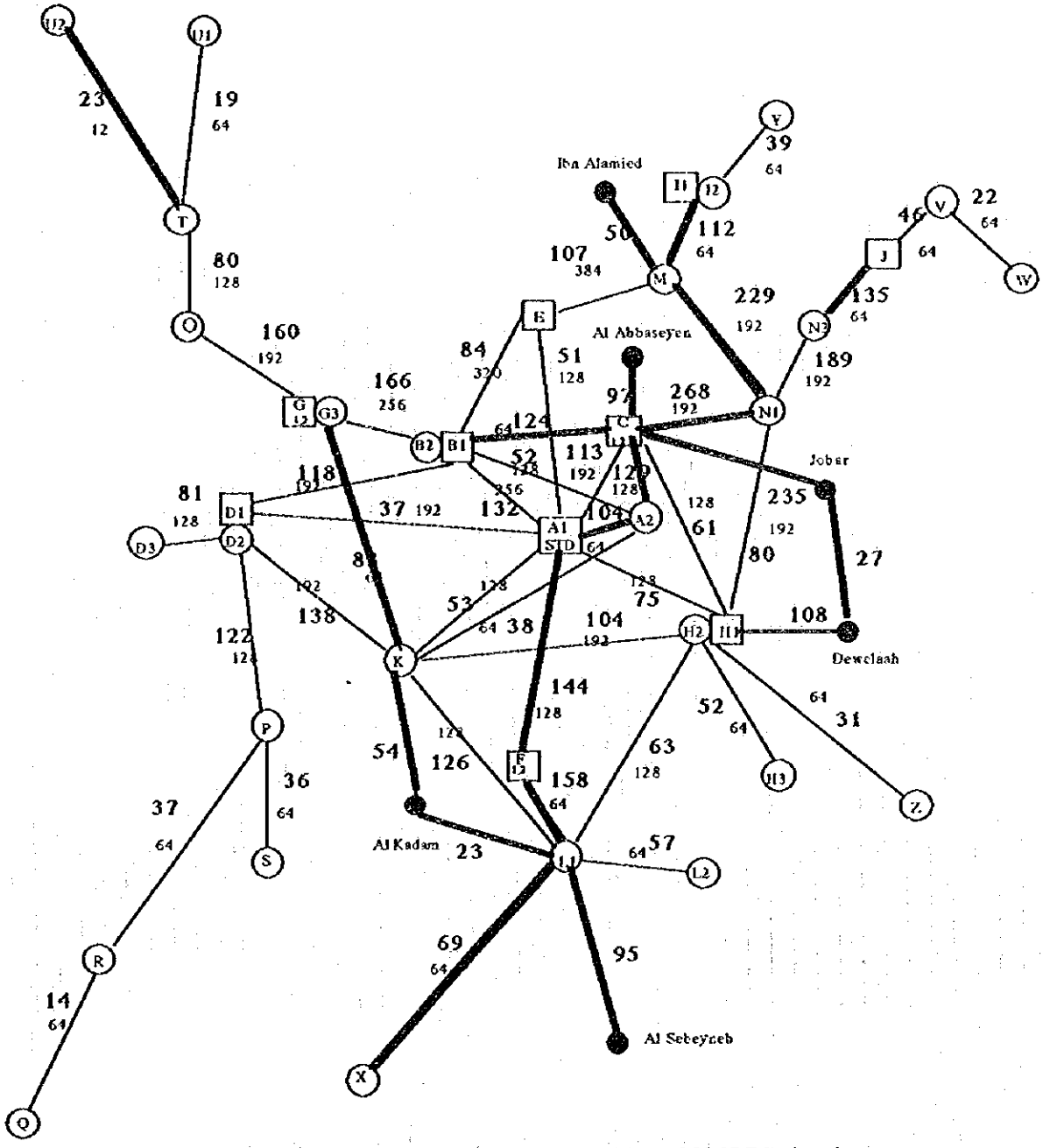
For the sections with circuit shortages, SDH rings, LOOP1, LOOP2, LOOP3, LOOP5, and LOOP9 are proposed as shown in Figure 4.4.1.3-2. Table 4.4.1.3-1 shows circuits related to each of the loops. The "CAPA" in the table means Loop Capacity required for SDH transmission systems in each of the loops. For the 50% circuit protection, the half of the "CAPA" is required as loop capacity. (For 100% circuit protection, full "CAPA" is required.) Therefore, SDH-4 systems are justified for each of the loops.

The section between Damascus K (Kefr Sousch) and Damascus G (Al Mohajirin) has a circuit shortage, but no new facility is planned there, because re-routing of circuits can solve the shortage.

Removed 140Mbps systems must be transferred to sections related to new telephone offices, Ibn Alamied, Al Abbaseyen, and Al Sebeynch, where also new optical fiber cables are required.

The usage of SDH-4 systems easily enable spare fibers to remain, as the SDH-4 systems have larger capacities.

Concept designs are made for the loops as shown in Figure 4.4.1.3-3, based on required circuits on Table 4.4.1.3-1. Estimates of power, space and cost required for the transmission facility have used the concept designs.



NOTE: Bold figures show the numbers of 2MBPS circuits required at the end of 2002.
Small figures show exisiting section capacities in 2MBPS.

: Sections with circuit shortage

Figure 4.4.1.3-1 Circuits required in Damascus Junction Network (in 2002)

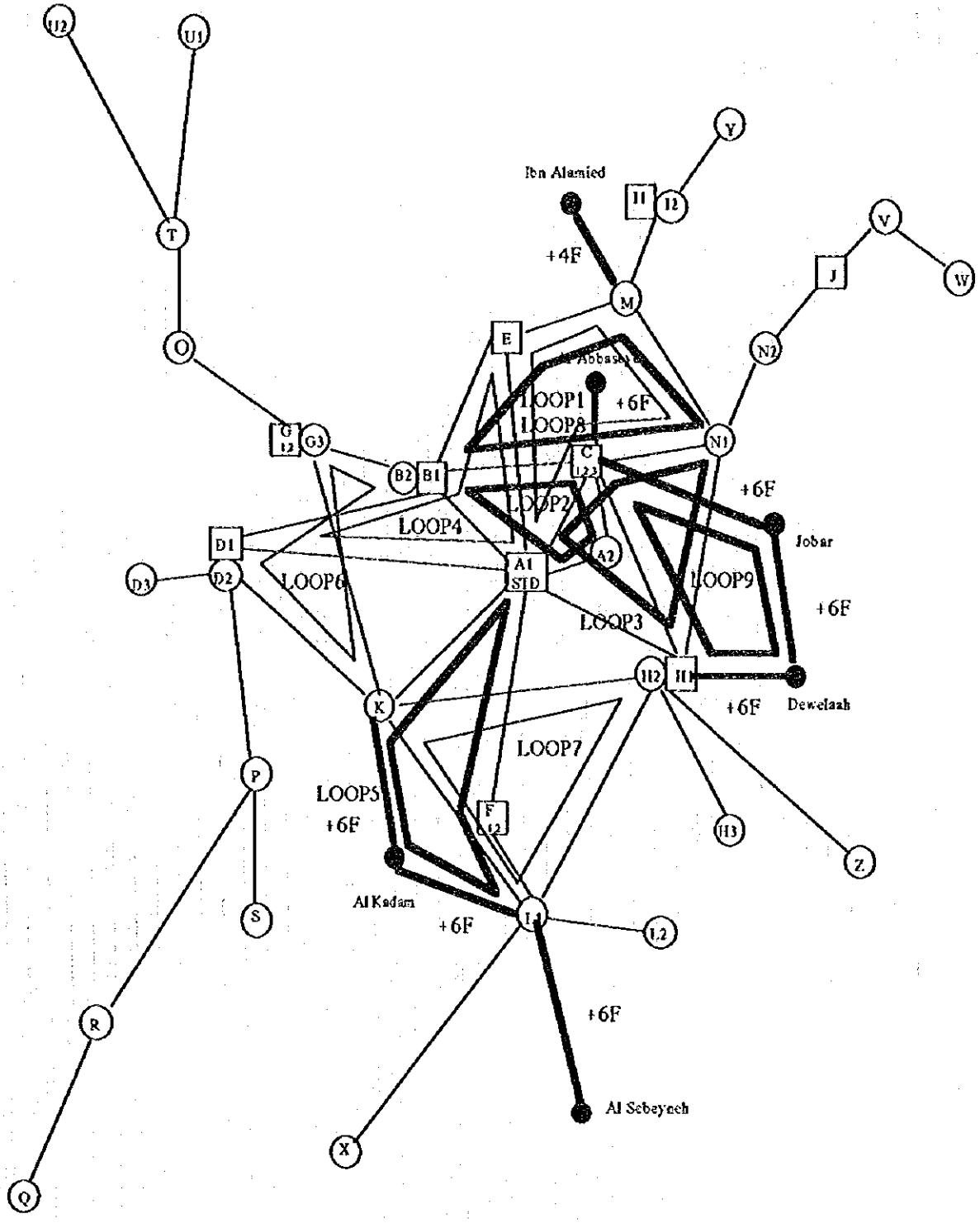


Figure 4.4.1.3-2 Damascus Loops

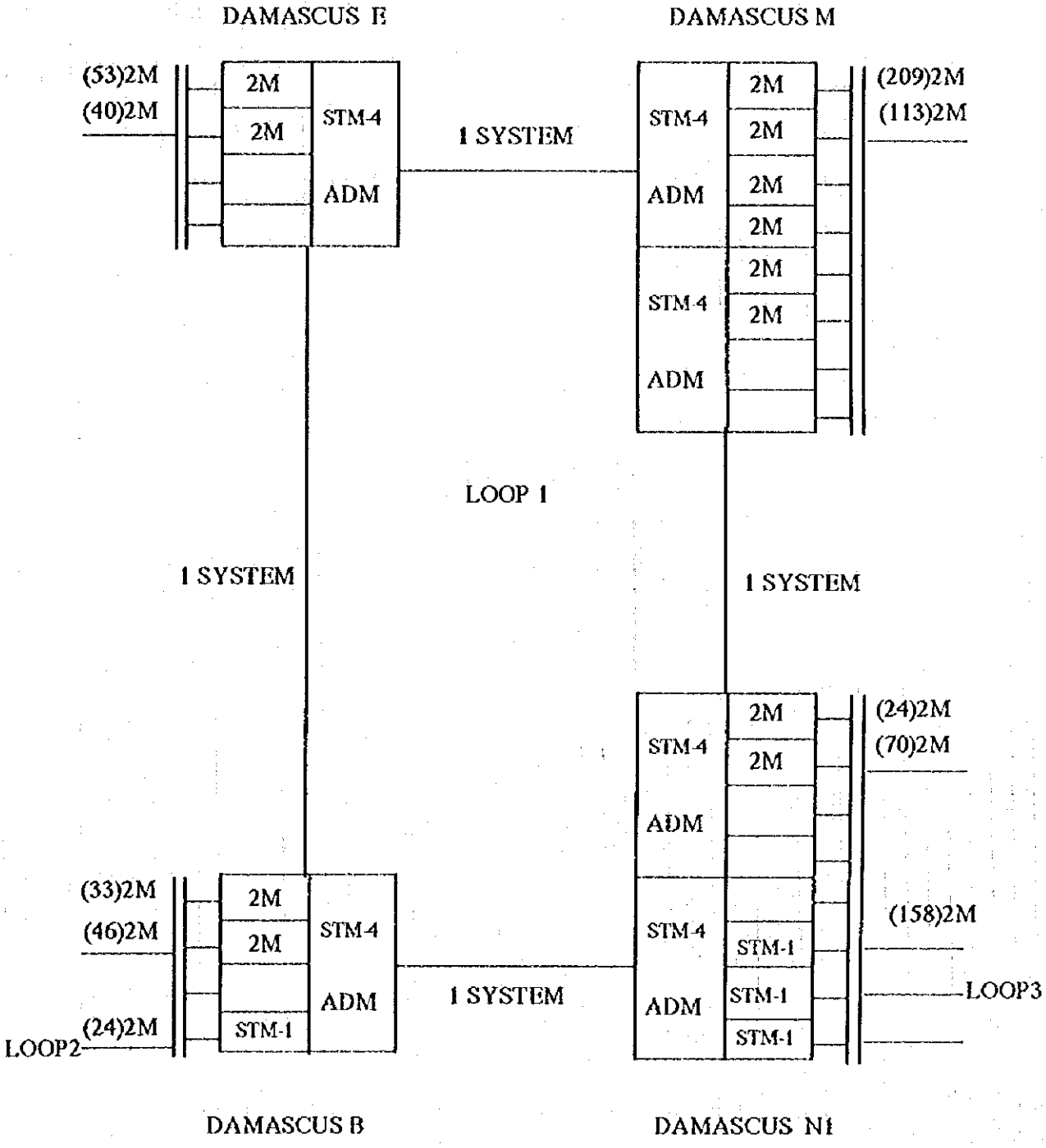


Figure 4.4.1.3-3 Damascus Junction Network Configuration (1/5)

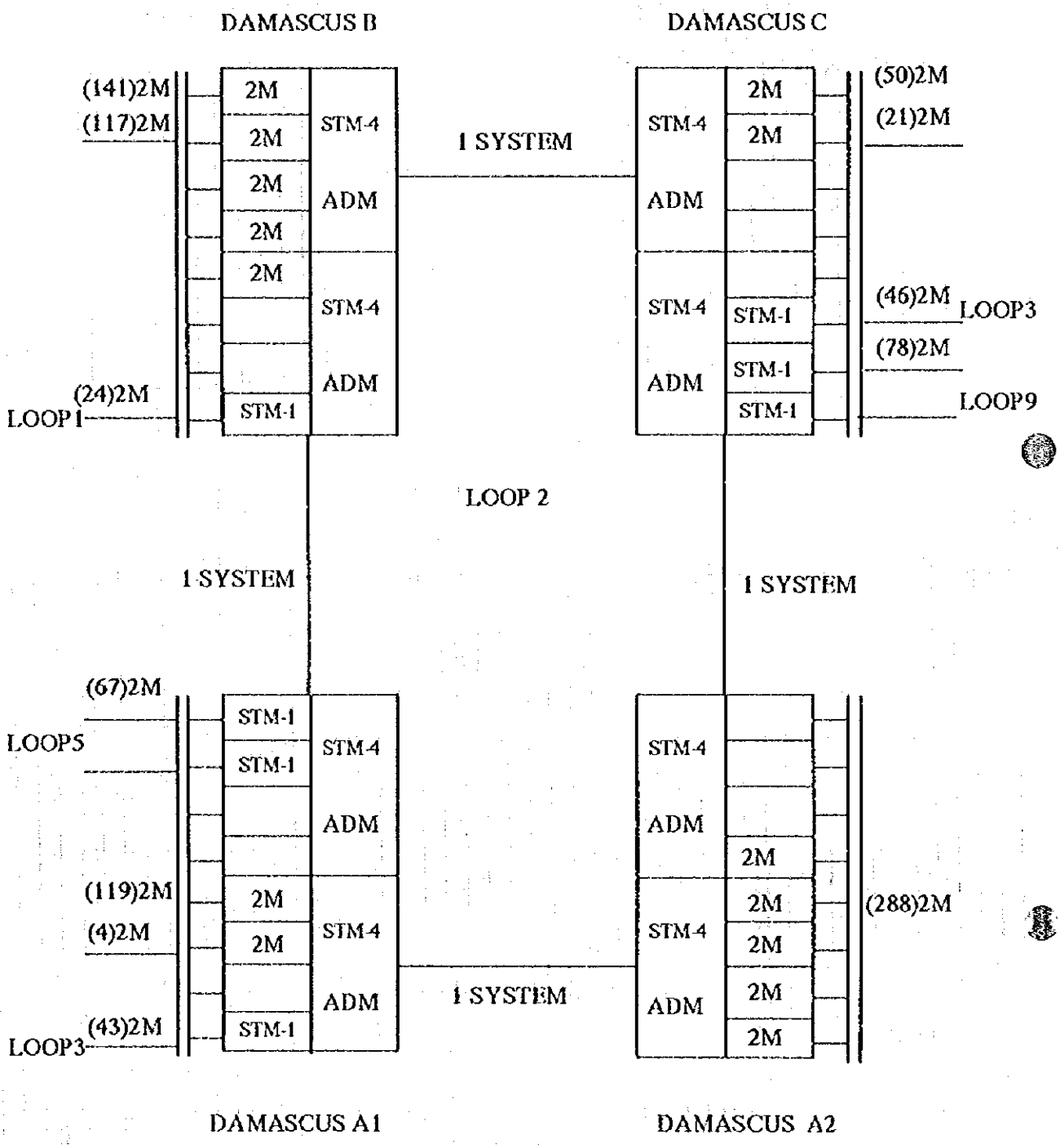


Figure 4.4.1.3-3 Damascus Junction Network Configuration (2/5)

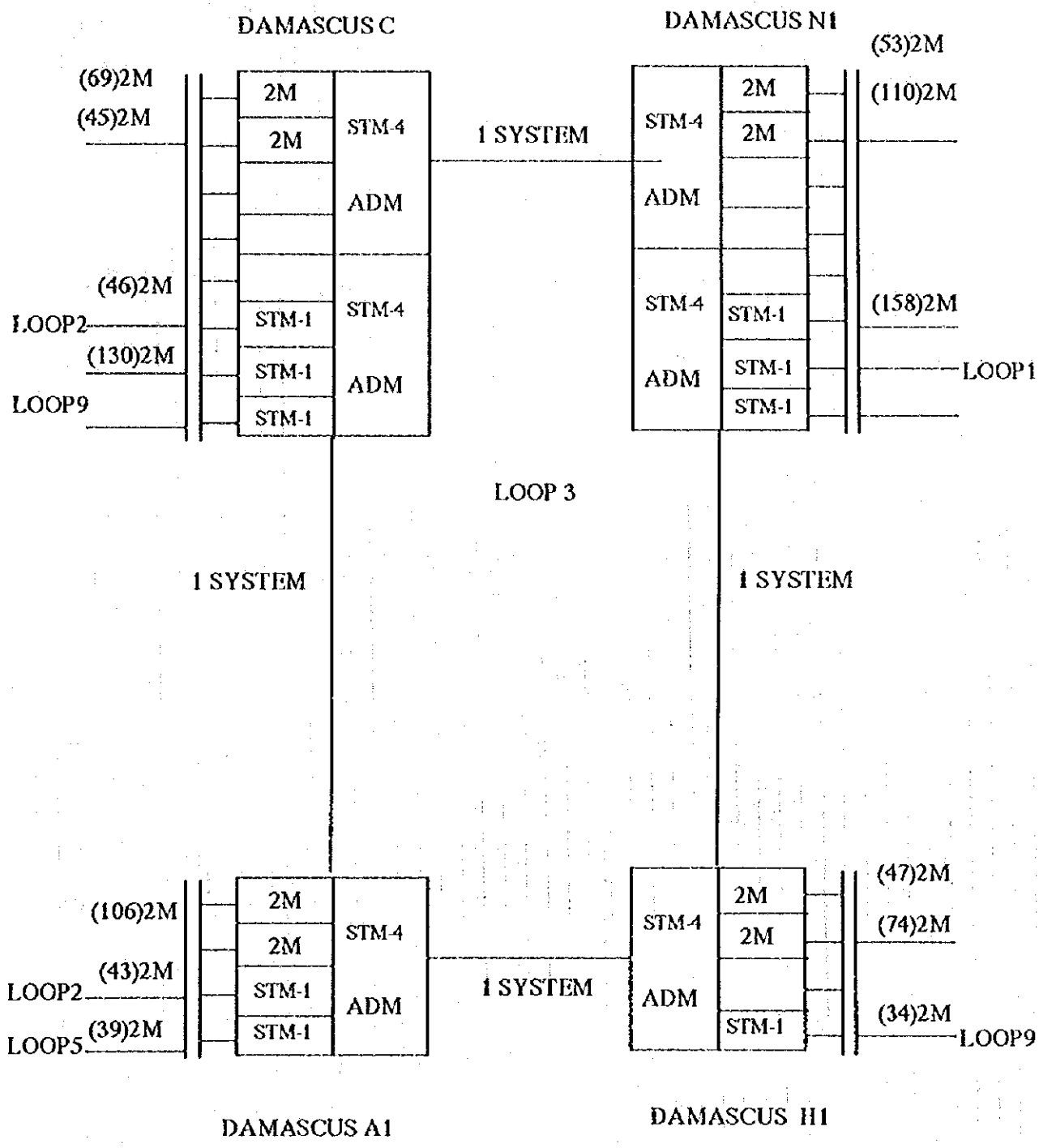


Figure 4.4.1.3-3 Damascus Junction Network Configuration (3/5)

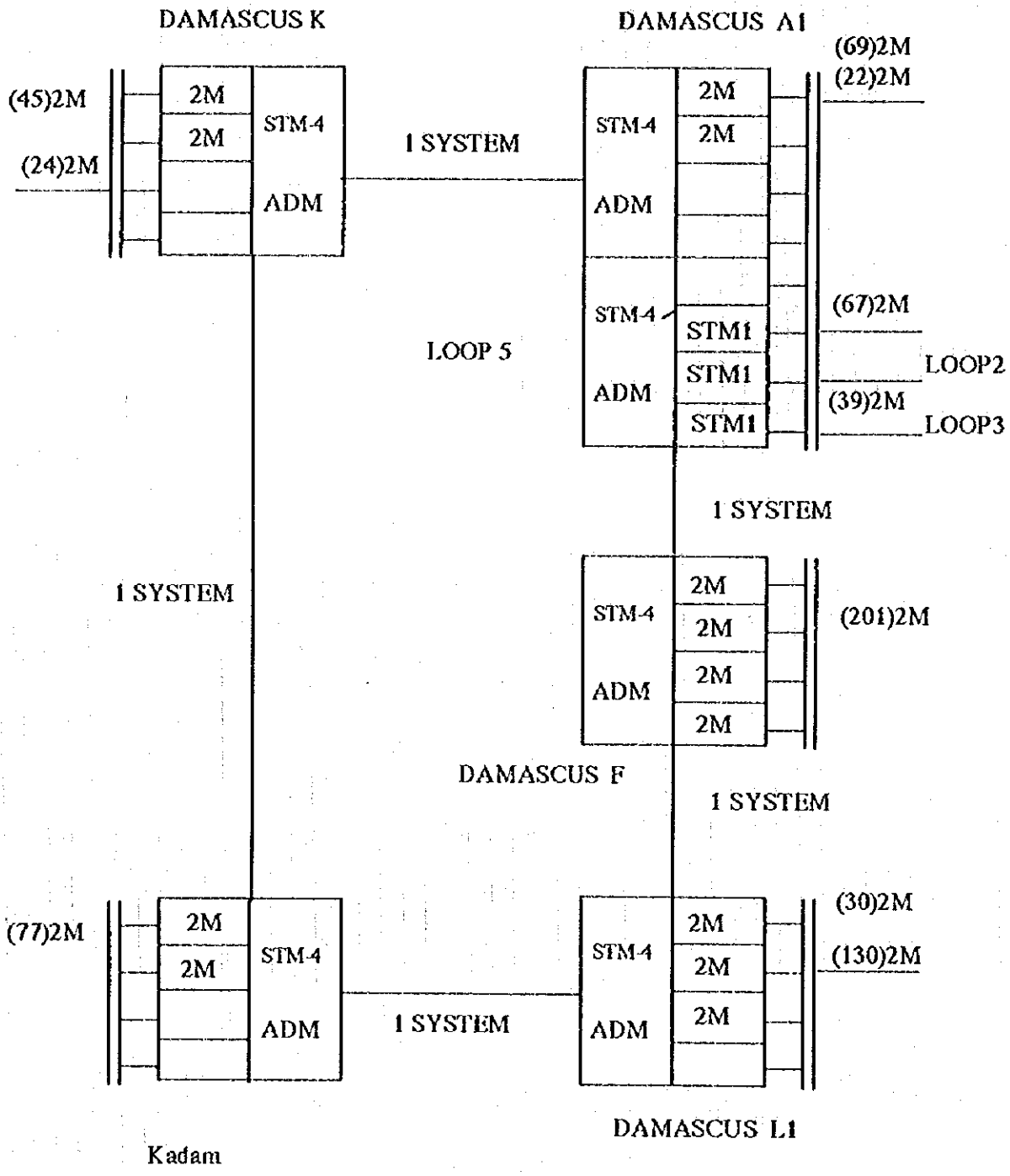


Figure 4.4.1.3-3 Damascus Junction Network Configuration (4/5)

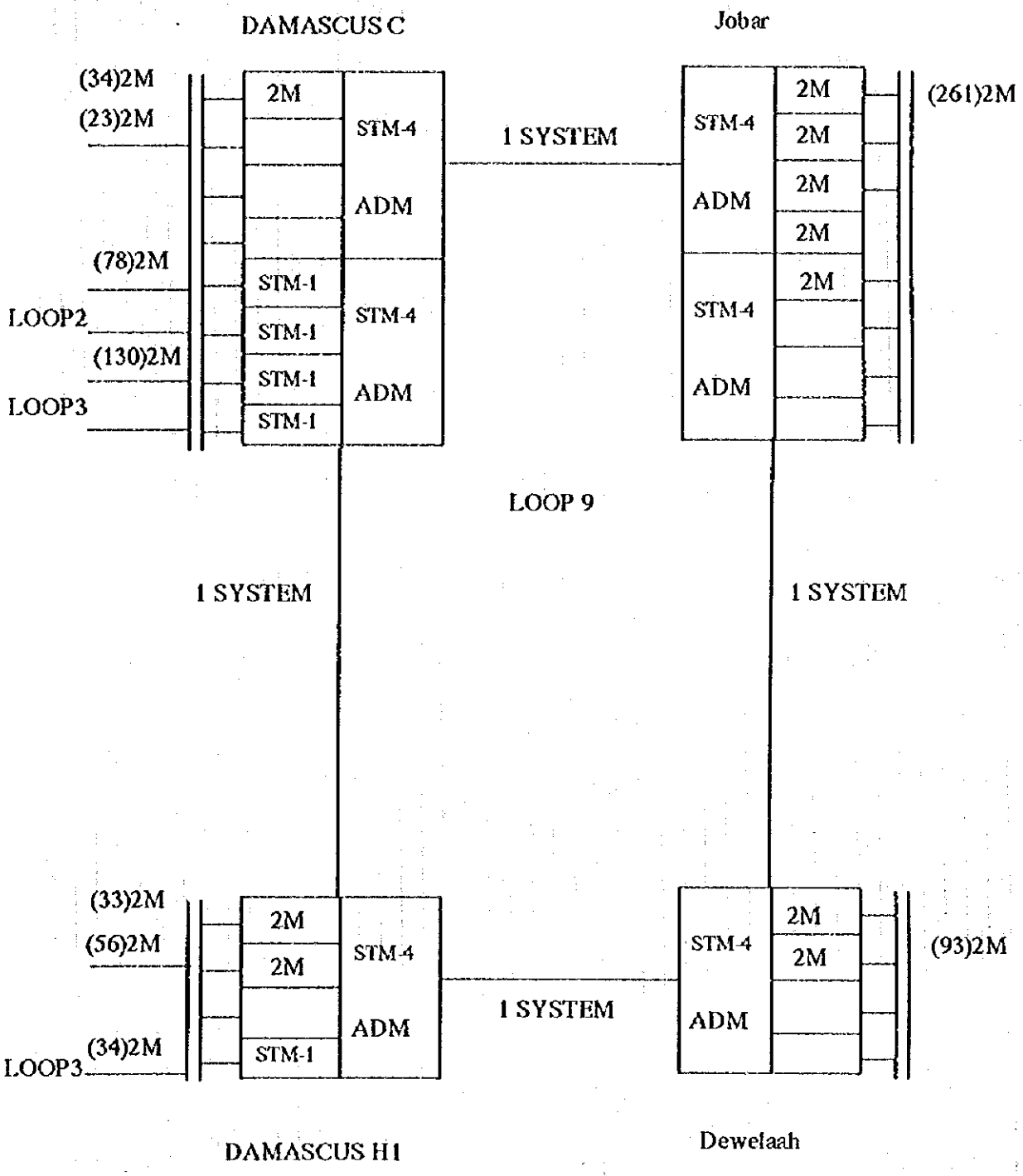


Figure 4.4.1.3-3 Damascus Junction Network Configuration (5/5)

Table 4.4.1.3-1 Circuits for Loops (LOOP1) (1/10)

	DP	LOOP	M1		H1	F1	K1	D1	B1	E1		I2		Y1						C1	C2		N1	J	N2	W1	V1
			Barze	Jobar	BabS1	Mieda	KelfS	Mezz1	Jalla	RoknA	IbnAl	Tall	Munin	Sydna	Tawan	Ranku	Essal	Hafee	Hosha	Bagd1	Bagd2	Abbas	Zamal	Doma	Harst	Dmeer	Adraa
1	M1	Barze								270										270	270	480	360	300	330	120	90
2		Jobar								270	300	270	120	120	60	60	90	60	60								
3	H1	BabS1	450																								
4	F1	Mieda	570																								
5	K1	KelfS	390																								
6	D1	Mezz1	570																								
7	B1	Jalla	450							150		120											150	120			
8		IbnAl								90																	
9	I2	Tall								30																	
10	C1	Bagd1								90	60	60															
11	C2	Bagd2								60	30	30															
12		Abbas								60	90	60															
13	N1	Zamal								30	30	60															
14	J	Doma								60	30	150		30													
15	N2	Harst								30	30	120															
16	A1	Nasse									60	60															
17		Dewel								60	30	30															
18	I3	Jaram										30															
19	L1	Yarmo									30	30															
20		Kadam										30															
21		Sebey										30															
22	L2	Babel										30															
23	D2	Mezz1																						30			
24	D3	Mezz2								30	30	30											30	60	30		
25	P1	Darya										30											30	30			
26	A2	Thawr								90	60	30															
27	O1	Domar								60	30	60											30	60	30		
28	G3	Moha2								30																	
29	T	Hamah								30		30												30	30		
30	U1	Fegi										30												30			
31		STD1	240								120	150															
32		STD2	240							150	120	150															
		total 1	2910	0	0	0	0	0	0	1590	1050	1620	120	150	60	60	90	60	60	270	270	480	600	660	420	120	90
		total 2	3360	1410	450	570	390	570	990		90	30	0	0						210	120	210	120	270	180		
		total	6270	1410	450	570	390	570	990	1590	1140	1650	120	150	60	60	90	60	60	480	390	690	720	930	600	120	90
		2Mbps	209	47	15	19	13	19	33	53	38	55	4	5	2	2	3	2	2	16	13	23	24	31	20	4	3
		SMD1	3.32	0.75	0.238	0.302	0.206	0.302	0.52	0.8413	0.6	0.9	0.063	0.079	0.032	0.032	0.05	0.03	0.03	0.254	0.206	0.365	0.381	0.49	0.317	0.063	0.048
		PORT	M1	B/9	N1	E	N1	B	B	E1	M1	M1	M1	M1	M1	M1	M1	M1	M1	N1/13	N1/11	N1/21	N1	N1	N1	N1	N1
				N1/38																B/3	B/2	B/2					

Table 4.4.1.3-1 Circuits for Loops (LOOP1) (2/10)

						A1		H3	L1			L2	D2	D3	P1	A2	O1	G1	G3	T	U1				
Maaro		Thaya	Basel	Shufe	KfrBa	Nasse	Dewel	Jaram	Yarmo	Kadam	Sebey	Babel	Mez11	Mezz2	Darya	Thawr	Domar	Moha1	Moha2	Hamah	Fegi	STD1	STD2	total 2	
60	1	90	60	60	90	150	120				120					120								3360	
	2																							1410	
	3																							450	
	4																							570	
	5																							390	
	6																							570	
	7																							990	
	8																							90	
	9																							30	
	10																							210	
	11																							120	
	12																							210	
	13																							120	
	14																							270	
	15																							180	
	16																							120	
	17																							120	
	18																							30	
	19																							60	
	20																							30	
	21																							30	
	22																							30	
	23																							30	
	24																							210	
	25																							90	
	26																							180	
	27																							270	
	28																							30	
	29																							120	
	30																							60	
	31																							510	
	32																							660	
60		90	60	60	90	150	120	0	0	0	120	0	0	0	0	120	0	0	0	0	0			11550	TOTAL
						120	120	30	60	30	30	30	30	210	90	180	270	0	30	120	60	510	660	385	2Mbps
60		90	60	60	90	270	240	30	60	30	150	30	30	210	90	300	270	0	30	120	60	510	660	6.111	STM1
2		3	2	2	3	9	8	1	2	1	5	1	1	7	3	10	9	0	1	4	2	17	22		CAPA
0.032		0.048	0.03	0.032	0.048	0.143	0.127	0.016	0.032	0.016	0.079	0.02	0.016	0.111	0.048	0.159	0.143	0	0.0159	0.063	0.03	0.27	0.349		
N1		N1	N1	N1	N1	N1/5	N1	N1	N1	N1	N1	N1	B	B	B	N1/7	B	B	B	B	B	E	N1/17		
						E/4										B/3							B/5		

Table 4.4.1.3-1 Circuits for Loops (LOOP2) (3/10)

	DP	LOOP2	M1		H1	F1	K1	D1	B1	E1		I2	C1	C2		N1	J	N2	H2	A1		H3		Z1		
			Barze	Jobar	BabS1	Mieda	KefrS	Mezz1	Jalla	RoknA	IbnAl	Tall	Bagd1	Bagd2	Abbas	Zamal	Doma	Harst	BabS2	Nasse	Dewel	Jaram		Nasha	Abadi	Mleha
1	M1	Barze																					1			
2		Jobar								270													2			
3	H1	BabS1																					3			
4	F1	Mieda							240														4			
5	K1	KefrS							120														5			
6	D1	Mezz1		570																			6			
7	B1	Jalla		450		360	360						150	150					210	210	210	210	7	150	60	150
8	C1	Bagd1								90													8			
9	C2	Bagd2								60													9			
10		Abbas								60													10			
11	D2	Mez11											30		30								11			
12	D3	Mezz2											60	30	30								12			
13	P1	Darya											30		30								13			
14	A2	Thawr								90	60	30	180	120	90	60	60	30		330	120	30	14			
15	O1	Domar											60	30	60					120			15			
16	G1	Moha1											60	30	60					120	60		16			
17	G3	Moha2											30		30					60			17			
18	T	Hamah											30		30					30			18			
19		STD1							270														19			
20		STD2	240	240	180	240		210	270	150	120	150	210	150	210	180	180	150	60	300	180	120	20			
21		MSC																					21			
		total1	240	1260	180	600	360	210	900	720	180	180	840	510	570	240	240	180	270	1170	570	360		150	60	150
		total2	120	390	240	360	120	570	3330		0	0	90	60	60	0	0	0	0	0	0	0		0		0
		total	360	1650	420	960	480	780	4230	720	180	180	930	570	630	240	240	180	270	1170	570	360		150	60	150
		2Mbps	12	55	14	32	16	26	141	24	6	6	31	19	21	8	8	6	9	39	19	12		5	2	5
		STM1	0.19	0.873	0.2222	0.508	0.254	0.413	2.24	0.381	0.095	0.1	0.492	0.302	0.333	0.127	0.127	0.095	0.1429	0.619	0.302	0.19		0.079	0.032	0.079
		PORT	C	C	A1/8	A1	A1	B	B	B	C	C	C	C	C	C	C	C	A1/7	A1	A1/9	A1/7		A1	A1	A1
					C/6														C/2		C/10	C/5				

Table 4.4.1.3-1 Circuits for Loops (LOOP2) (4/10)

L1			L2	D2	D3	P1	A2	O1	G1	G3	T					
Yarmo	Kadam	Sebey	Babel	Mez11	Mezz2	Darya	Thawr	Domar	Moha1	Moha2	Hamah	STD1	STD2	MSC	total2	
							120								120	
							120								390	
							240								240	
							120								360	
															120	
															570	
150	150	120					240								3330	
															90	
															60	
															60	
															60	
															120	
															60	
60		60	30	30	60	30									1470	
							60								330	
							90								420	
							60								180	
							30								120	
							240	180	150	90	90				1020	
				120	180	120		180	150	90	90				4470	
												1380			1380	
210	150	180	30	150	240	150	1320	360	300	180	180	1380	0	0	14970	TOTAL
0	0	0	0	60	120	60	1470	330	420	180	120	1020	4470	1380	499	2Mbps
210	150	180	30	210	360	210	2790	690	720	360	300	2400	4470	1380	7.921	STM1
7	5	6	1	7	12	7	93	23	24	12	10	80	149	46		CAPA
0.111	0.0794	0.095	0.016	0.111	0.19	0.111	1.476	0.3651	0.381	0.1905	0.1587	1.27	2.365	0.73		
A1	A1	A1	A1	A1/1	A1/2	A1/1	A2	B	B	B	B	A1	A2	A2		
				B/6	B/10	B/6										

Table 4.4.1.3-1 Circuits for Loops (LOOP3) (5/10)

	DP	LOOP3	M1		H1	F1	K1	B1	E1		I2		Y1						C1	C2		N1	J	N2	W1	V1
			Barze	Jobar	BabS1	Mieda	KefrS	Jalla	RoknA	IbnAl	Tall	Munin	Sydna	Tawan	Ranku	Essal	Hafec	Hosha	Bagd1	Bagd2	Abbas	Zamal	Doma	Harst	Dmeer	Adraa
1	M1	Barze																	270	270	480					
2		Jobar								300	270	120	120	60	60	90	60	60				360	300	330	120	90
3	H1	BabS1	450																							
4	F1	Mieda		570															120				120			
5	K1	KefrS	390																							
6	B1	Jalla																								
7	C1	Bagd1								60	60															
8	C2	Bagd2								30	30															
9		Abbas								90	60															
10	N1	Zamal																	90	60	120					
11	J	Doma																	60	30	90					
12	N2	Harst																	60	30	90					
13	H2	BabS2																				30				
14	A1	Nasse																	180	120	90	60	60	60		
15		Dewel							60	30	30											90	60	30		
16	H3	Jaraun									30											120	60	30		
17	Z1	Nasha																					30			
18		Micha																				30				
19	L1	Yarmo								30	30											60	60	30		
20		Kadam									30								60	30	30	30	60	30		
21		Sebey									30								60	30	60	60	60	30		
22	L2	Babel									30								30	30	30	60	30	30		
23	A2	Thawr								60	30											60	60	30		
24	G1	Mohal																								
25		STD1		240	180														210	150	210	180	180	150		
26		STD2	240							120	150											180	180	150		
27		Jobar(STD)																							60	30
		total1	1080	810	180	0	0	0	60	720	780	120	120	60	60	90	60	60	1140	750	1200	1320	1260	900	180	120
		total2	1530	2880	900	810	390	990		0	0	0	0						120	60	150	270	180	180		
		total	2610	3690	1080	810	390	990	60	720	780	120	120	60	60	90	60	60	1260	810	1350	1590	1440	1080	180	120
		2Mbps	87	123	36	27	13	33	2	24	26	4	4	2	2	3	2	2	42	27	45	53	48	36	6	4
		STM1	1.381	1.952	0.5714	0.429	0.206	0.524	0.0317	0.381	0.41	0.063	0.0635	0.0317	0.0317	0.048	0.032	0.0317	0.6667	0.4286	0.7143	0.8413	0.762	0.571	0.0952	0.0635
		PORT	N1	C	H	A1	H	A1	N1	N1	N1	N1	N1	N1	N1	N1	N1	N1	C	C	C	N1	N1	N1	N1	N1

Table 4.4.1.3-1 Circuits for Loops (LOOP3) (6/10)

						H2	A1		H3	Z1			L1			L2	A2	G1					
	Maaro	Thaya	Basel	Shufe	KfrBa	BabS2	Nasse	Dewel	Jaram	Nasha	Abadi	Mleha	Yarmo	Kadam	Sebey	Babel	Thawr	Mohal	STD1	STD2	Jobar(STD)	total2	
1							150	120							120		120					1530	
2	60	90	60	60	90		180															2880	
3							210										240					900	
4																						810	
5																						390	
6						210		210	210	150	60	150										990	
7																						120	
8																						60	
9																						150	
10																						270	
11																						180	
12																						180	
13																						30	
14						30																600	
15							150															450	
16							30															270	
17																						30	
18																						30	
19																						210	
20																						270	
21																						330	
22																						240	
23																						240	
24								60														60	
25						60		180	120													1860	
26																						1020	
27	30	30		30	30																	210	
	90	120	60	90	120	300	720	570	330	150	60	150	0	0	120	0	360	0	0	0	0	14310	TOTAL
						30	600	450	270	30		30	210	270	330	240	240	60	1860	1020	210	477	2Mbps
	90	120	60	90	120	330	1320	1020	600	180	60	180	210	270	450	240	600	60	1860	1020	210	7.57143	STM1
	3	4	2	3	4	11	44	34	20	6	2	6	7	9	15	8	20	2	62	34	7		CAPA
	0.0476	0.0635	0.032	0.0476	0.063	0.1746	0.6984	0.5397	0.3175	0.0952	0.0317	0.0952	0.1111	0.1429	0.2381	0.127	0.3175	0.0317	0.984	0.54	0.11111111		
	N1	N1	N1	N1	N1	H1	A1	H	H	H	H	H	H	A1/4	A1/5	A1/3	A1/8	A1	A1	C	C		
														H/5	H/10	H/5	C/12						

Table 4.4.1.3-1 Circuits for Loops (LOOP5) (7/10)

	DP	LOOP5	M1		H1	F1	K1	D1	B1	E1		I2	C1	C2		N1	J	N2		A1		H3	L1			L2	X1
			Barze	Jobar	BabS1	Mieda	KefrS	Mezz1	Jalla	RoknA	IbnAl	Tall	Bagd1	Bagd2	Abbas	Zamal	Doma	Harst	Basel	Nasse	Dewel	Jaram	Yarmo	Kadam	Sebey	Babel	Keswa
1	F1	Mieda	570	570	240				240				120				120			210	120		300	330	210	270	180
2	K1	KefrS							120											300				330			
3	D1	Mezz1				450																					
4	B1	Jalla				360	360																150	150	120		
5	L1	Yarmo								30										150							
6		Kadam								30		30	60	30	30	30	60	30		90	60	30					
7		Sebey								30			60	30	60					90				210			
8	L2	Babel											30	30	30					60				60			
9	D2	Mezz1																						60			
10	D3	Mezz2																						90			
11	P1	Darya																						60			
12	S1	Schna																						30			
13	A2	Thawr																					60	60	60	30	
14	O1	Domar																						60			
15	G1	Moha1																						30			
16	G3	Moha2																									
17	T	Hamah																									
18	U1	Fegi																									
19		STD1				240	240																210	180	180	120	
20		STD2				240																		180			
21	F	Mieda(STD)																	30								60
		total1	570	570	240	1290	600	0	360	90	0	30	270	90	120	30	180	30	30	900	180	30	720	1830	570	420	240
		total2	0	0	0	4500	750	450	1140		0	0	0	0	0	0	0	0		0	0	0	180	480	480	210	
		total	570	570	240	5790	1350	450	1500	90	0	30	270	90	120	30	180	30	30	900	180	30	900	2310	1050	630	240
		2Mbps	19	19	8	193	45	15	50	3	0	1	9	3	4	1	6	1	1	30	6	1	30	77	35	21	8
		STM1	0.3	0.3	0.127	3.063	0.714	0.238	0.79	0.0476	0	0	0.143	0.048	0.063	0.02	0.095	0.02	0.02	0.476	0.095	0.016	0.476	1.2222	0.556	0.33	0.127
		PORT	A1	A1	L1	F	K	L1	A1	A1		K	A1	A1	A1	K	A1/4	K	L1	A1	L1	L1	L1	kadam	L1	L1	L1
																	K/2										

Table 4.4.1.3-1 Circuits for Loops (LOOP5) (8/10)

													D2	D3	P1	S1	A2	O1	G1			F		
	Kozla	Zakea	Hejan	Deral	Basel	Heneh	Sassa	Kanak	Beatg	Kafar	Kakla	Danaj	Mez11	Mezz2	Darya	Sehna	Thawr	Domar	Mohal	STD1	STD2	Mieda(STD)	total2	
1	60	90	60	60	60	60	60	60	60	60	60	60		150			120						4500	
2																							750	
3																							450	
4																							1140	
5																							180	
6																							480	
7																							480	
8																							210	
9																							60	
10																							90	
11																							60	
12																							30	
13																							210	
14																							60	
15																							30	
16																							0	
17																							0	
18																							0	
19																							1170	
20																							420	
21	30	30	30	30	30																		240	
	90	120	90	90	90	60	60	60	60	60	60	60	0	150	0	0	120	0	0	0	0	0	10560	TOTAL
													60	90	60	30	210	60	30	1170	420	240	352	2Mbps
	90	120	90	90	90	60	60	60	60	60	60	60	60	240	60	30	330	60	30	1170	420	240	5.59	STM1
	3	4	3	3	3	2	2	2	2	2	2	2	2	8	2	1	11	2	1	39	14	8		CAPA
	0.05	0.06	0.05	0.05	0.05	0.032	0.032	0.032	0.03	0.03	0.03	0.03	0.032	0.127	0.032	0.016	0.175	0.032	0.016	0.62	0.22	0.12698413		
	L1	L1	L1	L1	L1	L1	L1	L1	L1	L1	L1	L1	K	L1/5	K	K	A1/9	K	K	A1	A1/8	L1		
														K/3			K/2				K/6			

Table 4.4.1.3-1 Circuits for Loops (LOOP9) (9/10)

	DP	LOOP9	M1		H1	F1	K1	D1	B1	E1		I2		Y1						C1	C2		N1	J	N2	W1	V1	
			Barze	Jobar	BabS1	Mieda	KefrS	Mezz1	Jalla	RoknA	IbnAl	Tall	Munin	Sydna	Tawan	Ranku	Essal	Hafee	Hosha	Bagd1	Bagd2	Abbas	Zamal	Doma	Harst	Dmeer	Adraa	Maaro
1	M1	Barze																										
2		Jobar								270	300	270	120	120	60	60	90	60	60	270	270	480	360	300	330	120	90	60
3	H1	BabS1		450																								
4	F1	Mieda		570																								
5	K1	KefrS		390																								
6	D1	Mezz1		570																								
7	B1	Jalla		450																								
8	H2	BabS2																		30								
9		Dewel								60	30	30								180	120	90	90	60	30			
10	H3	Jaram																		30	30	60						
11	L1	Yarmo																		60	30	60						
12		Kadam																										
13		Sebey																										
14	L2	Babel																										
15	D2	Mezz11																										
16	D3	Mezz2																										
17	P1	Darya																										
18	A2	Thawr																										
19	O1	Domar																										
20	G1	Moha1																										
21	G3	Moha2																										
22		STD1		240																								
23		STD2		240	180																							
24		Jobar(STD)																								60	30	30
		total1	0	2910	180	0	0	0	0	330	330	300	120	120	60	60	90	60	60	570	450	690	450	360	360	180	120	90
		total2	120	4710	660	690	390	570	660		0	0	0	0						0	0	0	0	0	0			
		total	120	7620	840	690	390	570	660	330	330	300	120	120	60	60	90	60	60	570	450	690	450	360	360	180	120	90
		2Mbps	4	254	28	23	13	19	22	11	11	10	4	4	2	2	3	2	2	19	15	23	15	12	12	6	4	3
		STM1	0.06	4.03	0.444	0.365	0.206	0.302	0.3	0.175	0.17	0.2	0.063	0.063	0.032	0.032	0.05	0.03	0.032	0.302	0.238	0.365	0.238	0.19	0.19	0.095	0.063	0.048
		PORT	H1	Jobar	H1	C/19	H1	C	C/15	C/9	C/10	C/9	C	C	C	C	C	C	C	C	C	C	C/12	C/10	C/11	C	C	C
						H1/4			H1/7	H1/2	H1/1	H1/1											H1/3	H1/2	H1/1			

Table 4.4.1.3-1 Circuits for Loops (LOOP9) (10/10)

					H2	A1		H3	L1			L2	D2	D3	P1	A2	O1	G1	G3					
	Thaya	Basel	Shufe	KfrBa	BabS2	Nasse	Dewel	Jaram	Yarmo	Kadam	Sebey	Babel	Mez11	Mez12	Darya	Thawr	Domar	Moha1	Moha2	STD1	STD2	Jobar(STD)	total2	
1							120																120	
2	90	60	60	90		180	180	120	120							120							4710	
3							210																660	
4							120																690	
5																							390	
6																							570	
7							210																660	
8																							30	
9					60	150																	900	
10							60																180	
11							90																240	
12							60																60	
13							60																60	
14							60																60	
15							30																30	
16							30																30	
17							30																30	
18							120	30															150	
19							60																60	
20							60																60	
21							30																30	
22							180																420	
23					60		180	120															780	
24	30		30	30																			210	
	120	60	90	120	120	330	1890	270	120	0	0	0	0	0	0	120	0	0	0	0	0	0	11130	TOTAL
					30	0	900	180	240	60	60	60	30	30	30	150	60	60	30	420	780	210	371	2Mbps
	120	60	90	120	150	330	2790	450	360	60	60	60	30	30	30	270	60	60	30	420	780	210	5.8889	STM1
	4	2	3	4	5	11	93	15	12	2	2	2	1	1	1	9	2	2	1	14	26	7		CAPA
	0.063	0.03	0.048	0.063	0.079	0.17	1.48	0.24	0.19	0.0317	0.032	0.03	0.016	0.016	0.02	0.143	0.032	0.032	0.016	0.222	0.413	0.1111111		
	C	C	C	C	H1	C/6	Dewel	H1	H1	H1	H1	H1	H1	H1	H1	C	H1	H1	H1	C/8	C	Jobar		
						H1/5														H1/6				

4.4.2 Power Supply System

Power required for the transmission facility in Section 4.4.1 is estimated from the concept designs of SDH systems as shown in Table 4.4.2-1. There is no standard power consumption for each equipment, so Table 4.4.2-1 only shows orders of power consumption.

Table 4.4.2-1 Estimated Power Consumption

		SDH system [W]	140M system [W]*	TOTAL [W]	Note Existing systems [w]
DAMASA1	Al Nasser	882		882	1250
DAMASA2	Al Thawra	382		382	350
DAMASB	Jallar	559		559	1400
DAMASC	Bagdad	1058	350	1408	1400
DAMASE	Rokn Al Dien	176		176	1000
DAMASF	Al Miedan	236		236	1200
DAMASH1	Bab Sharki	353		353	1000
DAMASK	Kerf Souseh	176		176	1000
DAMASL1	Al Yarmouk	206		206	900
DAMASM	Barzeh	412	350	762	1100
DAMASN1	Zamalka	705		705	1000
JOBAR		382		382	0
DEWELAAH		176		176	0
KADAM		176		176	0
IBNALAMIED		0	350	350	0
ABBASEYEN		0	350	350	0
SEBEYNEH		0	350	350	0

Note*: applied existing Al Thawara power consumption

Since no power supply facilities are exclusively used for transmission equipment in the Damascus targeted area, power required for transmission is covered by the Power Supply System for Switching system in Section 4.3.2.