JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SYRIAN TELECOMMUNICATIONS ESTABLISHMENT (STE)
THE SYRIAN ARAB REPUBLIC

THE STUDY
ON
NATIONAL TELECOMMUNICATIONS NETWORK
EXPANSION PLAN
IN
THE SYRIAN ARAB REPUBLIC

FINAL REPORT

MAIN REPORT

VOLUME 3 ACTION PLAN

AUGUST, 1996

NTT INTERNATIONAL CORPORATION
NTT DATA INSTITUTE OF MANAGEMENT CONSULTING

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NATIONAL TELECOMMUNICATIONS NETWORK EXPANSION PLAN IN THE SYRIAN ARAB REPUBLIC (VOLUME 3: ACTION PLAN)

Study period: Jan. 1996 to Aug. 1996

Counterpart: Syrian Telecommunications Establishment

1. Background

In order to review the telecommunications part of the Eighth National Five-Year Plan, prepared by STE, in the course of the study for the Master Plan, it was proved to be essential to develop that part, which only concentrates on the accumulated number of waiting applicants and the number of exchange line units, further in detail (i.e. to forecast demand, to make facilities plan, and to estimate costs). Therefore, it was necessary to prepare the Action Plan as an action plan for the five years in order to increase the feasibility of its implementation.

2. Objectives

The objectives are to prepare an action plan for STE until the year 2000 in accordance with the STE's Eighth National Five-Year Plan and also to prepare a detailed plan which targets telephone network expansion in Damascus, introduction of mobile telephone system to Damascus and Aleppo, and introduction of packet switched data network and computer systems to five big cities as projects to be fulfilled urgently.

3. Part 1 "The Eighth National Five-Year Plan"

3.1 Outline of the Plan

The Plan set a goal to provisioning of transmission, exchange and subscriber network facilities and computerization in order to meet the demand of the more than 2 million waiting applicants by the year 2000.

3.2 Contents of the Plan and its cost

Table 1 Contents of plan and its cost (Unit: Millions of US Dollars)

Facilities/System	Contents of the Plan	Cost
Transmission	Approx.260 systems	108.4
Exchange	Approx.1,750 thousand subscriber lines etc.	292.0
Subscriber Network	Approx. 5 million cable pairs	505.7
Computer system	1 center, 48 Telephone-centers, 722 terminals	9.1
Total		915.2

Exchange rate (1995) : 1 US $= 42 Syrian Pounds

3.3 Evaluation

The number of forecasted demand in the STE's National Five-Year Plan, which is calculated simply by adding the number of waiting lists to the number of applicants in future, is approximately twice that forecasted in the Master Plan, of which method is based on the correlation between demand density and the level of GDP per capita, taking account of national economic growth, recommended by ITU. Therefore, in order to realize projects in the Action Plan successfully, it is considered to be premises that future economic growth is strong to create the demand forecasted by STE. When the projects in the Action Plan are put into practice, it is essential to review the demand and the facilities plans periodically.

4. Part 2. "Detailed Plan"

4.1 Outline of the Plan

The target systems are selected mainly focusing on telephone network expansion plans in Damascus city in accordance with "Part 1. The Eighth National Five-Year Plan".

4.2 Contents of the Plan

Table 2 Contents of the Plan

System	Area/Locations	Plan	Target year
1. Telephone Network	All Damascus city		2000
(1) Switching		Approx. 288 thousand units	
(2) Subscriber Network		Approx. 580 thousand pairs	
(3) Transmission		84 systems (Optical)	
2. Mobile Telephone	Damascus and Aleppo	Approx. 52 thousand subs.	1998
3. PSDN	Five big cities	380 lines	2000
4. Computer system	Five big cities, STE H.Q.	1 center, 35 telephone -centers, 539 terminals.	2000

4.3 Project Cost

Table 3 Investment cost

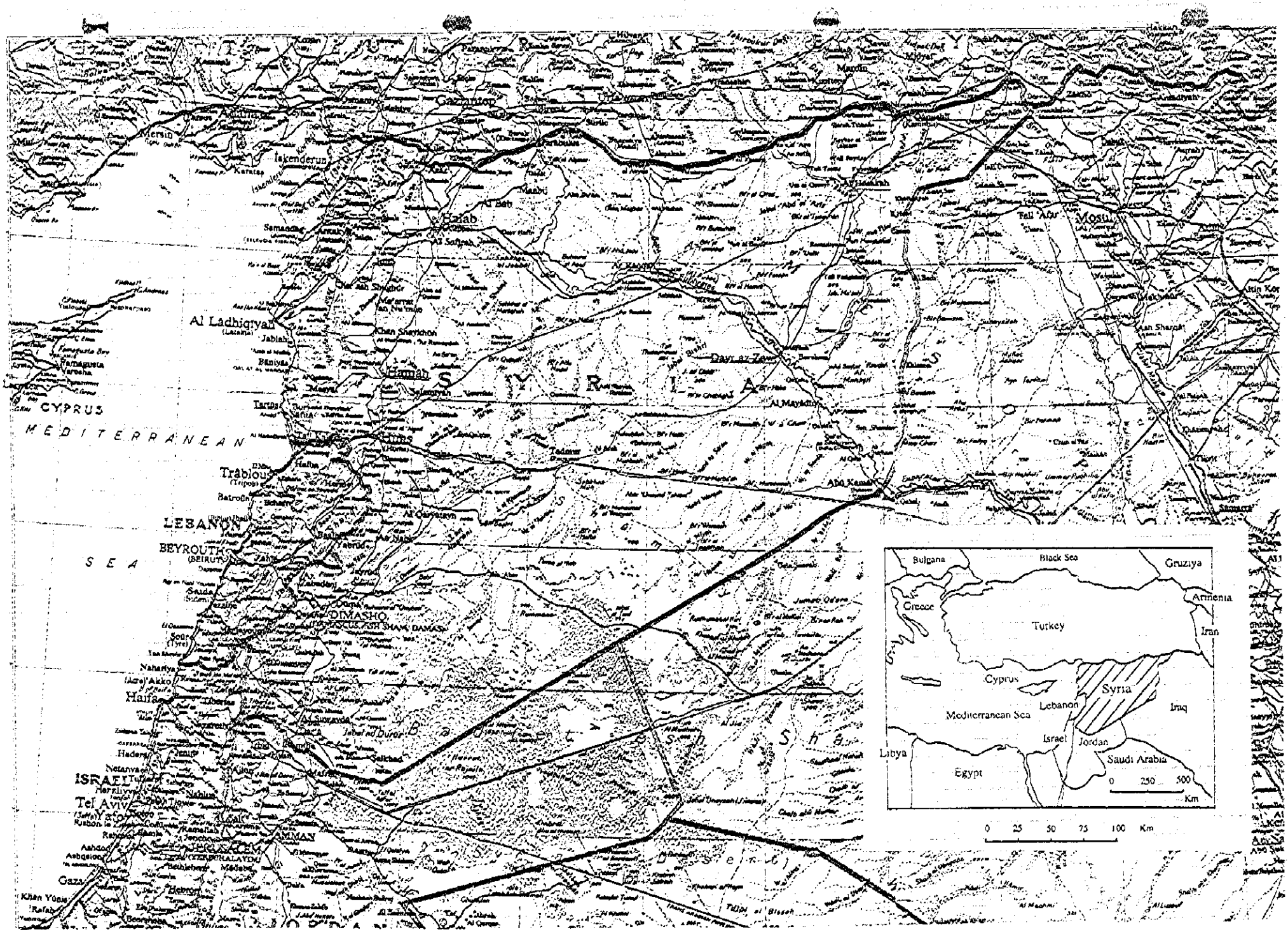
System	Foreign currency (MIL US$)	Local currency (MIL.S.P)
1. Telephone Network	106.5	2,764.9
2. Mobile Telephone	29.7	124.6
3. Packet Switched Data Network	1.7	6.6
4. Computer system	7.1	33.7
5. Contingency	14.5	293.0
Total	159.5	3222.8

Exchange rate (1995): 1 US$=42 Syrian Pounds

4.4 Financial Evaluation

According to the financial evaluation, this project has an FIRR of 12.4 percent for 10 years project evaluation period and 17.6 percent for 20 years.

Unless otherwise stated, the following exchange rate prevailing in 1995 has been used: USD 1.00 = S.P 42.00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Hamah
Tarabulus (Tripoli)
Dimashq (Damascus)
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Gaziantep
Iskenderun
Mersin
Aleppo
Bulgaria
Black Sea
Gruziya
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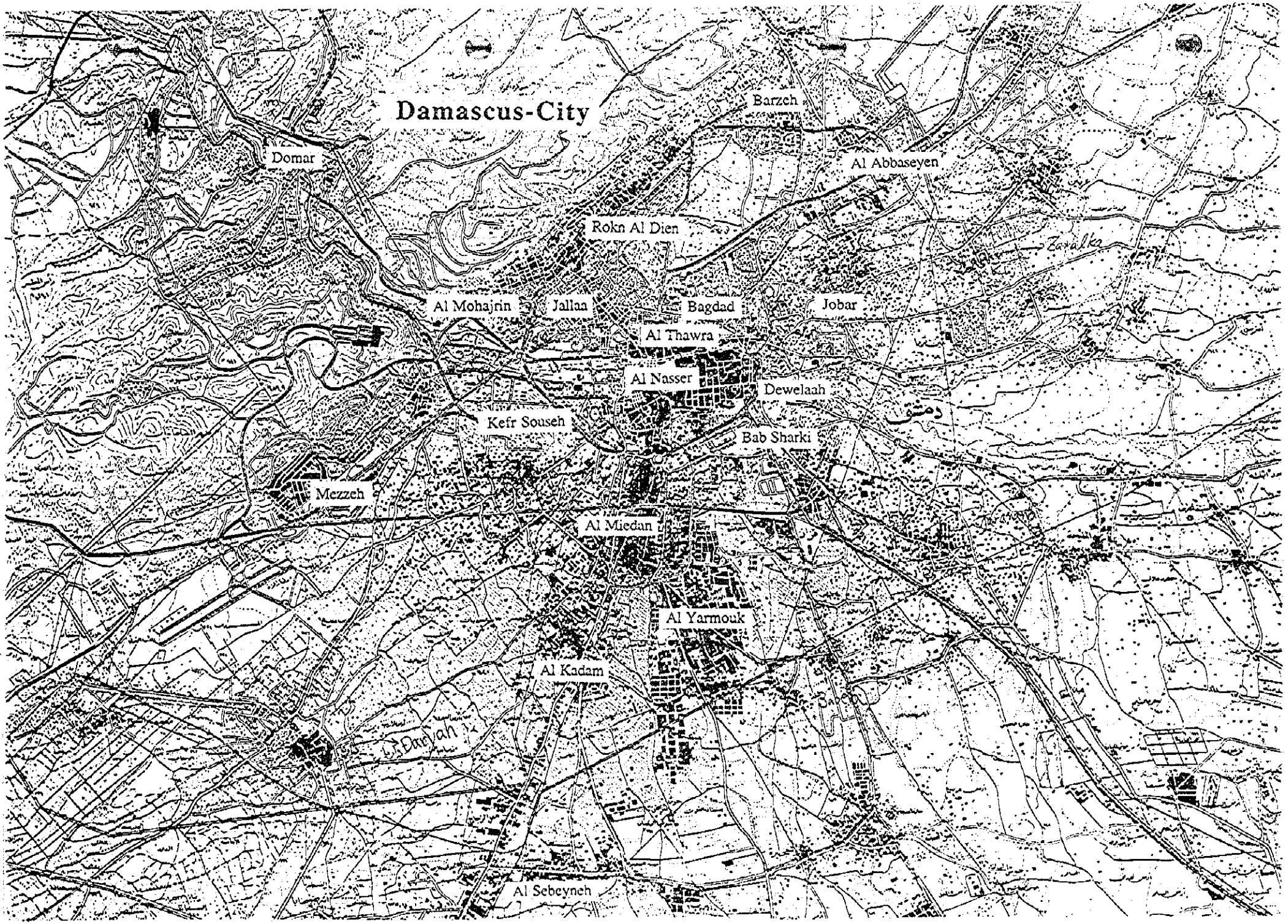
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Al Mohajrin
Jallaa
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Al Thawra
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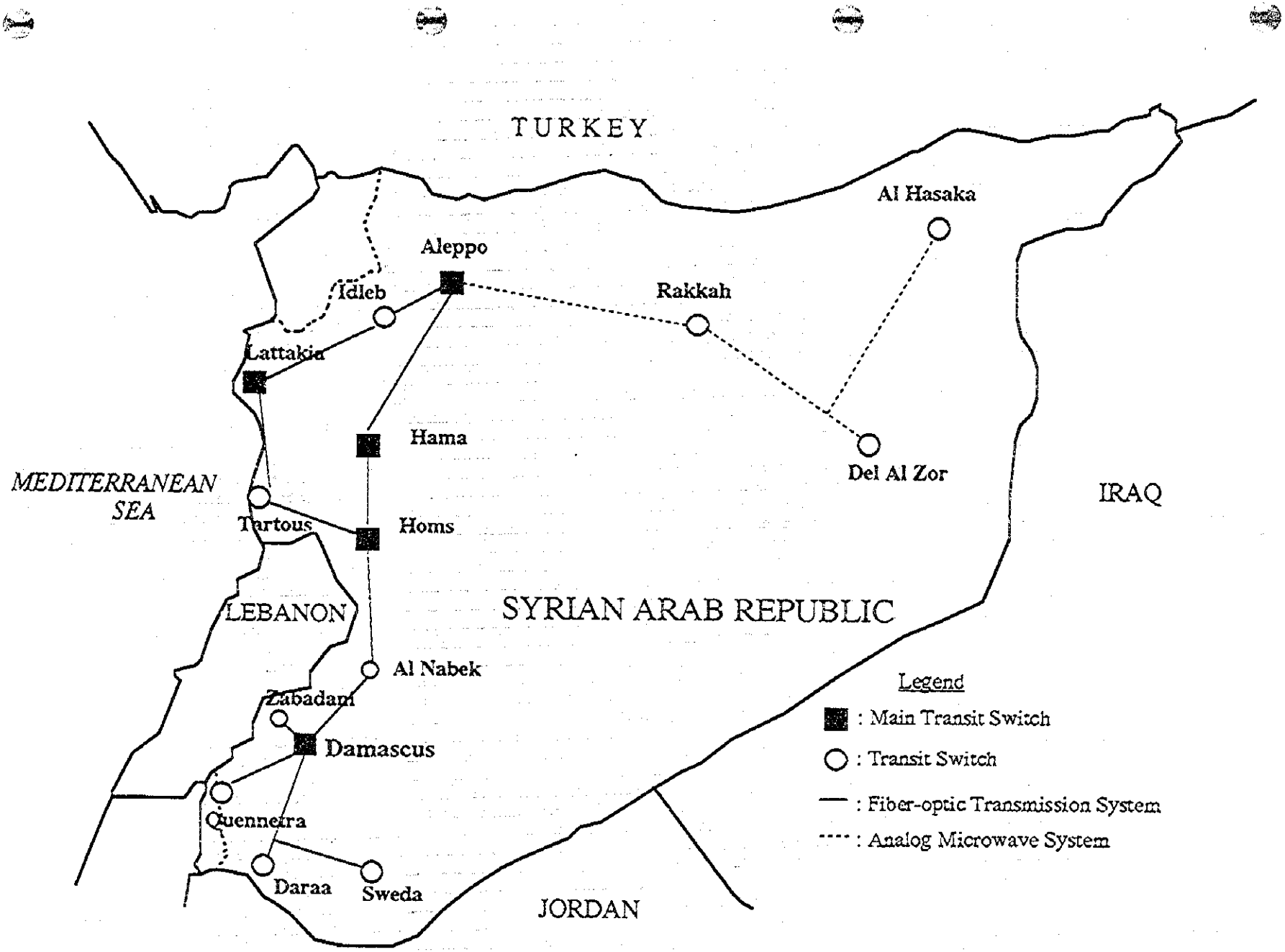

Route Map of STE National (Backbone) Telecommunication Network

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PART 2 DETAILED PLAN

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PART I THE EIGHTH NATIONAL FIVE-YEAR PLAN

PART 2 DETAILED PLAN

Abbreviation

PART 1 & PART 2

A	:	Ampere
ABR	:	Available Bit Rate
AC	:	Alternating Current
ADM	:	Add-Drop Multiplexer
AMA	:	Automatic Message Accounting system
APX76	:	(Name of Product/ Device)
ATM	:	Asynchronous Transfer Mode
ATMF	:	ATM Forum
B-channel	:	Basic-channel
B-ISDN	:	Broadband-ISDN
bps	:	bit per second
BRK	:	Breaker
BSC	:	Base Station Controller
BTS	:	Base Transceiver Station
BW	:	Both Way
C	:	(A kind of programming Language)
CBR	:	Constant Bit Rate
CCC	:	Cross Connection Cabinet
CCH	:	Control Channel
CCS	:	Common Channel Singnalling System
CCT	:	Circuit
CD-ROM	:	Compact Disc - Read Only Memory
ch	:	channel
CIH	:	City Information Highway
CIR	:	Committed Information Rate
CNM	:	Customer Network Management
D-channel	:	Data-channel
DB	:	Data Base
dB	:	deciBel
dBm	:	deciBels referred to a milliwatt
DC	:	Direct Current
DCC	:	Data Country Codes
DEG	:	Diesel Engine Generator
DOS	:	Disc Operating System
DP	:	Dial Pulse

DP	:	Distribution Point
DQ	:	Directory Inquiry
DTE	:	Data Terminal Equipment
DXC	:	Digital Data Connector
E-mail	:	Electronic mail
E1	:	(Original Hierarchy 2048kbit/s)
E10A	:	(Digital Switching System of Alcatel)
ECOM25L	:	(Name of Product/ Device)
ECOM25M	:	(Name of Product/Device)
EIR	:	Equipment Identity Register
EIRR	:	Economic Internal Rate of Return
EMD	:	Edelmetall Motor Drehwähler Switch System of Siemens
erl	:	erlang
ETSI	:	European Telecommunications Standards Institute
EWSD	:	Electronische Wahle System Digital (Digital Electronic Switching System) of Siemens
F/S	:	Feasibility Study
FDDI	:	Fiber Distributed Data Interface
FEP	:	Front End Processor
FH	:	Frame Handler
FIRR	:	Financial Internal Rate of Return
FR	:	Frame Relay
G4	:	Group Four facsimile
GB	:	Giga-Byte
GDP	:	Gross Domestic Product
GNP	:	Gross National Product
GSM	:	Global System for Mobile Communications
H.Q.	:	Headquarters
HDLC	:	High Level Data Link Control
HDSL	:	High Bit Rate Digital Subscriber Line
HLR	:	Home Location Register
Hz	:	Hertz
ID	:	Identification
IGE	:	International Gateway Exchange
INAP	:	Intelligent Network Application Part
INTS	:	International Switch
INV	:	Inverter
IP	:	Interworking Ports/Units
ISC	:	International Switching Center

ISDN	:	Integrated Services Digital Network
ITE	:	International Transit Exchange
ITU	:	International Telecommunication Union
ITU-T	:	International Telecommunication Union - Telecommunication Standardization Sector
JICA	:	Japan International Cooperation Agency
LAN	:	Local Area Network
LBP	:	Low Tension Branch Panel
LE	:	Local Exchange
LL	:	Leased Lines
LS	:	Local Switch
LT	:	Local Transit Switch
LTP	:	Low Tension Change-over Panel
LU	:	Line Units
MAN	:	Metropolitan Area Network
MB	:	Mobile Box
MBS	:	Managed Bandwidth Service
MDF	:	Main Distributing Frame
MDP	:	Main Distribution Panel
MFC	:	Multifrequency Code Signalling System
MFPB	:	Multifrequency Pushbutton
MIS	:	Management Information System
MP	:	Master Plan
MS	:	Mobile Station
MSC	:	Mobile Service Switching Center
MT	:	Magnetic Tape
MTR	:	Meter
MTS	:	Mobile Transfer Switch
MTU	:	Magnetic Tape Unit
MUX	:	Multiplexer
NEAX61	:	(Digital Switching System of NEC)
NGN	:	New Generation Network
NMC	:	Network Management Center
NMS	:	Network Management System
NTN	:	Network Terminal Number
nx64	:	n multiplied by 64
O&M	:	Operation and Maintenance
OMC	:	Operation and Maintenance Center
OECD	:	Organization for Economic Cooperation and Development

OJT	:	On the Job Training
OM	:	Operation and Maintenance
OMC	:	Operation and Maintenance Center
OTDR	:	Optical Time Domain Reflectometer
PABX	:	Private Automatic Branch Exchange
PAD	:	Packet Assembler/Disassembler
PBX	:	Private Branch Exchange
PC	:	Personal Computer
PCM	:	Pulse Code Modulation
PDH	:	Plesiochronous Digital Hierarchy
PE	:	Polyethylene
PEE	:	The Public Establishment for Electricity
PH	:	Packet Handler
PSDN	:	Packet Switched Data Network
PSTN	:	Public Switched Telephone Network
PVC	:	Permanent Virtual Circuit
PVC	:	Polyvinyl Chloride
R	:	Router
R2	:	R2 signalling
RDBMS	:	Relational Data Base Management System
RECT	:	Rectifier
REG	:	Regenerator
RF	:	Radio Frequency
RSU	:	Remote Switching Unit
RU	:	Remote Unit
S.L.U	:	Switching Line Unit
SDH	:	Synchronous Digital Hierarchy
SIM	:	Subscriber Identity Module
SM	:	Single Mode
SMDS	:	Switched Multi-Megabit Data Service
SMT	:	Synchronous Terminal Multiplexer
SP	:	Signal Point
SP	:	Syrian Pound
SS7	:	Signalling System No.7
STD	:	Subscriber Trunk Dialing
STE	:	Syrian Telecommunications Establishment
STM	:	Synchronous Transport Module
STM-1	:	Synchronous Transport Module - 1
STM-4	:	Synchronous Transport Module - 4

STP	:	Signal Transfer Point
SVC	:	Switched Virtual Circuit
SYRIAPAC	:	(Service Name X.25)
sys	:	system
T/C	:	Telephone Center
T1	:	(Original Hierarchy 1554kbit/s)
TA	:	Terminal Adapter
TCH	:	Traffic Channel
TDM	:	Time Division Multiplex
TE	:	Transit Exchange
TMN	:	Telecommunications Management Network
TR	:	Token Ring
TRM	:	Terminal Multiplexer
TRX	:	Transceiver
TX	:	Transmitting
UBR	:	Unspecified Bit Rate
UNI	:	User Network Interface
UNIX	:	(A kind of operating system developed for open system)
UPS	:	Uninterruptible Power Supply
US$	:	United States of America Dollar
V	:	Volt
VBR	:	Variable Bit Rate
WAN	:	Wide Area Network
WLL	:	Wireless Local Loop
XMUX	:	(Name of product/ device)

PART 1 THE EIGHTH NATIONAL FIVE-YEAR PLAN

CHAPTER 1 INTRODUCTION

1.1 Introduction

In order to review the telecommunications part of the Eighth National Five-Year Plan, prepared by STE, in the course of the study for the Master Plan, it was proved to be essential to develop that part, which only concentrates on the accumulated number of waiting applicants and the number of exchange line units, further in detail (i.e. to forecast demand, to make facilities plan, and to estimate costs). Therefore, it was necessary to prepare the Action Plan as an action plan for the five years in order to increase the feasibility of its implementation.
Based on the above-mentioned objectives, the Action Plan was prepared.

The Master Plan is described in "Volume 1" of the Main Report and the Feasibility Study is described in "Volume 2".

1.2 Objectives of the Study

The objectives are to prepare an action plan for STE until the year 2000 in accordance with the STE's Eighth National Five-Year Plan and also to prepare a detailed plan which targets telephone network expansion in Damascus, introduction of mobile telephone system to Damascus and Aleppo, and introduction of packet switched data network and computer systems to five big cities as projects to be fulfilled urgently.

1.3 Document Structure

This Action Plan which consists of two parts, i.e. "Part 1" for The Eighth National Five-Year Plan and "Part 2" for The Detailed Plan (a feasibility study based on the Action Plan).

CHAPTER 2 DEMAND FORECAST

2.1 Demand Forecasting Methods

It is generally known that telephone demands are influenced by national economic indices represented by the Gross Domestic Product (GDP) or GNP, tariff, service quality, customer profiles, and others. In particular, with regard to a national long-term demand forecast, the method, based on the correlation between demand density and the level of GDP per capita using world-wide data, is demonstrated by ITU's recommendation.
On the other hand, the forecasting method by logistic models also often provides reasonable solutions when it is difficult to apply for the relationship between density and GDP per capita, because sudden demands are expected to arise within a short period for various reasons.
Considerable surveys and studies on the country concerned must be conducted when deciding to apply the above methods.

In this study, demand is forecasted in two steps. The first step is a macroscopic level forecast throughout the country. This forecast is a top-down forecasting approach. The second step is a microscopic level forecast for each province and each individual telephone service area; i.e. a bottom-up approach.

2.2 Macroscopic Demand Forecast

2.2.1 Application to Syrian telecommunications forecast

The following fundamental data on Syria has been collected and studied during the PHASE 1 period :

Average of annual population growth rate : 3.34 %
Average of annual GDP growth rate : 5.4 %
Existing number of telephone subscribers in 1993 : 550 thousand
Cumulative number of waiting applicants in 1993 : 1.92 million

It could be characterized that there are larger number of waiting applicants compared to the number of telephone subscribers. Therefore, the selection of the two forecasting methods must depend on the results of detailed analyses of the waiting applicants list and on the estimated future trends of this list.

If the number is expected to be more than the forecasted, in other words, there is considered to be potential demand behind the applicants waiting currently, the forecasted number should be corrected upward. This is exemplified in the case of people resigning

themselves to having no telephone installed, because their desires have not been satisfied for a long period in spite of their frequent applications. In this case, a logistic model should be coordinated with the GDP per Capita method for a short-medium range term.

On the other hand, when it is assumed that the economic growth rate and national income will not change drastically and that the number is taken to include double-bookings, and when the relation between telephone density and GDP per Capita is expected to fit in with a regression model obtained by world-wide data, the GDP per Capita method - as a long-term common forecasting method - is said to be reasonable.

The figures forecasted by both methods will correspond at some time in the future, indicating different types of developments.

In conclusion, in the Master Plan, the relationship between GDP/Capita and telephone density has been selected to forecast, the method employed being a long-term forecast method. However, in the Action Plan, the logistic model forecast, as a short-medium *range method, has been applied to forecasting demands restricted to the period of the* Eighth National Five-Year Plan (1996-2000) only , taking into account expected strong growth in demand.

Thus, the development follows a logistic trend according to the following expression:

$$D = \frac{S}{1+e^{-k(t-t_0)}}$$

where D : Demand density per households
(related to the year 2020 <saturation point>)
S = Saturation value of the function D
(which means 88 lines per 100 households in 2020)
k = 0.11722 ; Constant
t_0= 1997.81 : Base year
t : year

This long-term demand forecast is based on the data in Table 2.2.1-1.

Figure 2.2.1-1 shows the national long-term demand forecast which is approximately twice as many as Master Plan's demand.

Table 2.2.1-1 Long-Term Demand Forecast

YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2002	2005
POPULATION (000)	12,120	12,530	12,960	13,393	13,840	14,303	14,780	15,274	15,784	16,311	16,856	18,001	19,865
PERSONS per HOUSEHOLD	4.25	4.24	4.23	4.22	4.21	4.20	4.19	4.18	4.17	4.16	4.15	4.13	4.1
HOUSEHOLDS (000)	2,852	2,955	3,064	3,174	3,287	3,405	3,527	3,654	3,785	3,921	4,062	4,359	4,845
EXISTING SUBSCRIBERS (000)	496	500	513	550	688								
WAITING LIST (000)	1,432	1,564	1,718	1,859	1,991								
DEMAND FORECAST	1,928	2,064	2,231	2,409	2,679	**2,876**	**3,074**	**3,274**	**3,475**	**3,677**	**3,876**	**4,265**	**4,806**
NEW APPLICANTS (000)		132	154	141	132	197	198	200	201	201	199	192	173
DEMAND DENSITY/100 Inhabitants	15.91	16.47	17.21	17.99	19.36	20.11	20.80	21.44	22.02	22.54	22.99	23.69	24.19
DEMAND DENSITY/100 Households	67.61	69.84	72.82	75.91	81.49	84.45	87.14	89.60	91.82	93.77	95.43	97.85	99.19
EXISTING DENSITY/100 Inhabitants	4.09	3.99	3.96	4.11	4.97								
EXISTING DENSITY/100 Households	17.39	16.92	16.74	17.33	20.93								

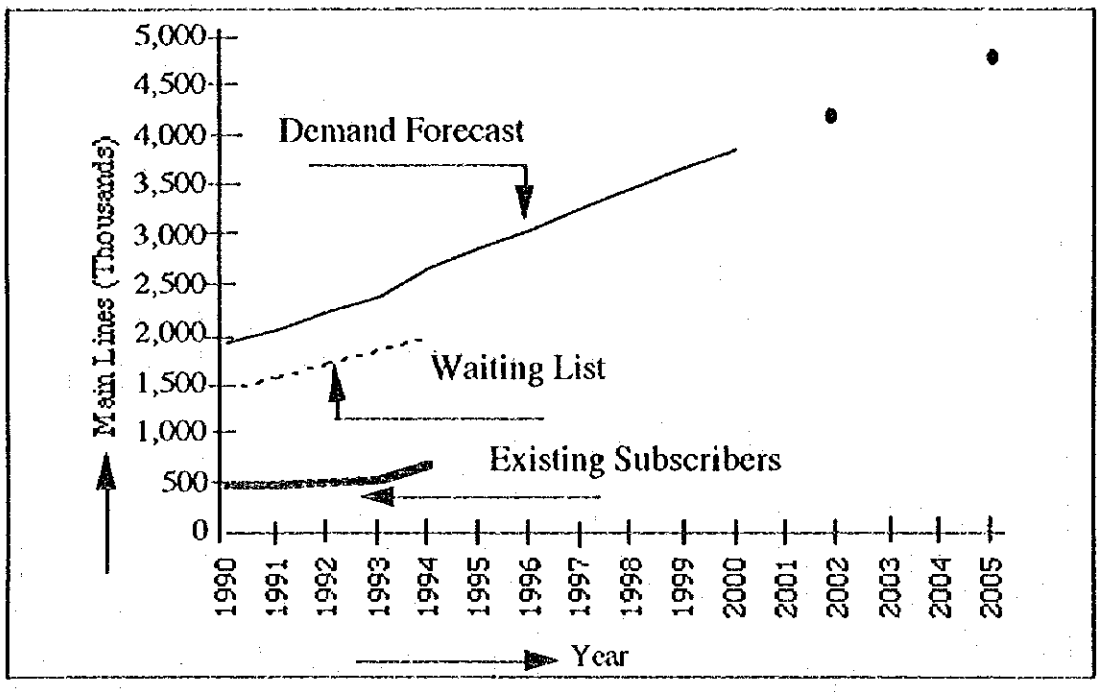


Figure 2.2.1-1 National Long Term Demand Forecast

2.2.2 Microscopic Demand Forecast

The microscopic demand forecast is generally classified into an overall survey for the demand forecast of a whole exchange area, and a block survey for the demand forecast of each distribution unit area of subscriber cables. The microscopic demand forecast is required for new or additional equipment installation designs such as cabling, civil engineering design, and exchange location planning.

However, in this study, the local unit demand in each exchange area is simply forecasted by using the number of existing subscribers and waiting list because it is not easy to obtain stable statistical data for small geographical areas.

Table 2.2.2-1 shows the calculated result of demand forecasts for each province, demand forecasts for individual exchange centers are shown in S3-1-2-1 in the Supporting Report.

Table 2.2.2-1 Demand Forecast in each provinces

(Unit : thousand persons)

PROVINCE/Year	1996	1997	1998	1999	2000	2002	2005
Damascus City	630.0	671.0	712.2	753.6	794.4	874.1	976.5
Damascus Rural	370.2	394.3	418.5	442.8	466.8	513.7	545.5
Aleppo	585.4	623.4	661.7	700.2	738.1	812.1	911.4
(City)	(460.2)	(490.0)	(520.1)	(550.4)	(580.2)	(638.4)	(716.4)
(Rural)	(125.2)	(133.4)	(141.6)	(149.8)	(157.9)	(173.7)	(195.0)
Homs	304.9	324.8	344.7	364.8	384.5	423.1	470.2
Hama	224.3	238.9	253.5	268.3	282.8	311.2	347.5
Lattakia	213.9	227.9	241.8	255.9	269.8	296.8	336.6
Daraa	108.7	115.7	122.8	130.0	137.0	150.8	174.5
Sweda	68.2	72.7	77.1	81.6	86.0	94.7	107.8
Tartous	143.5	152.9	162.3	171.7	181.0	199.1	227.2
Idleb	130.0	138.5	147.0	155.5	163.9	180.4	222.0
Der Al Zor	98.8	105.3	111.7	118.2	124.6	137.1	157.5
Al Hasaka	116.8	124.4	132.1	139.7	147.3	162.1	198.1
Quennetra	11.8	12.5	13.3	14.1	14.8	16.3	20.0
Rakkah	67.4	71.7	76.1	80.6	84.9	93.4	111.4
<TOTAL>	3074.0	3274.0	3475.0	3677.0	3876.0	4265.0	4806.0

CHAPTER 3 DEMAND FULFILLMENT PLAN AND TRAFFIC FORECAST

3.1 Demand Fulfillment Plan

This demand fulfillment plan is based on the demand forecasted by the Action Plan. The target planning term is mid-term, from the year 1996 to the year 2005, which is the necessary period for designing the facilities plan from 1996 to 2000. On the other hand, the demand fulfillment plan based on the demand forecast in the Master Plan (1996-2010) is described in the Volume 1.

The telephone facilities plan should meet the requirements for the forecasted demand and the elimination of waiting lists for the installation of new telephone mainlines. However, it is difficult to satisfy the demand in view of the present ability for finances and construction because the construction of the facility is required within a short period of time.

This plan regards the annual construction ability to be approximately 300 thousand lines under the circumstances. Therefore, this demand fulfillment plan is designed to satisfy the forecasted demand up to the year 2009.

Figure 3.1-1 shows the mid-term scope of the demand fulfillment plan .

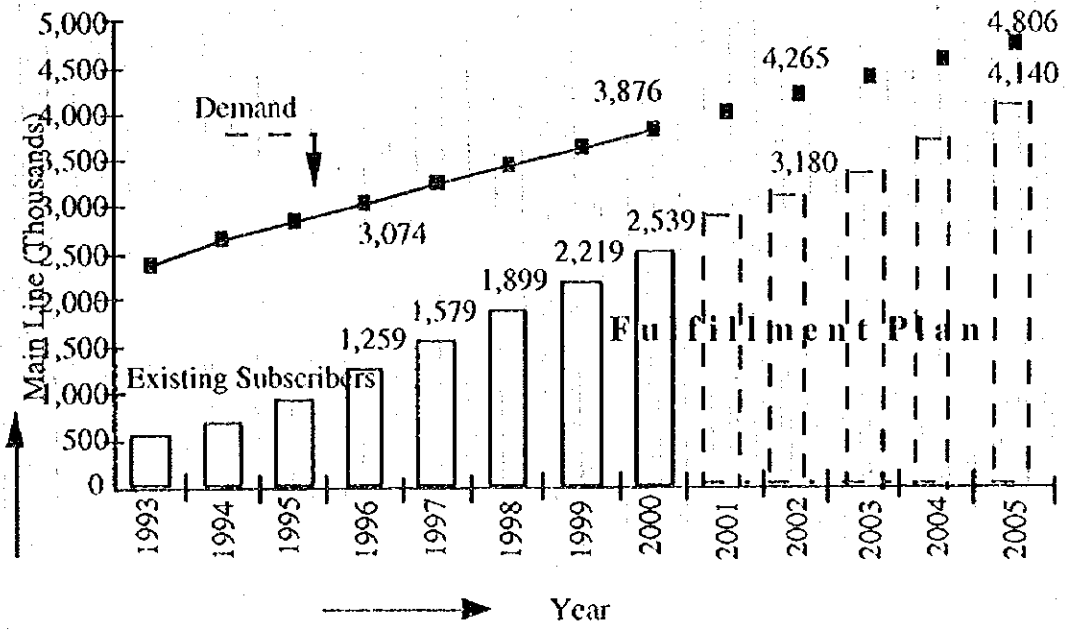


Figure 3.1-1 Mid-Term Scope of the Demand Fulfillment Plan

Tables 3.1-1 shows the demand fulfillment plan by province each year.

Table 3.1-1 Demand Fulfillment Plan by province

(Unit : thousands)

Province / Year	1996	1997	1998	1999	2000	2002	2005
Damascus City	312.5	366.8	421.1	475.4	529.7	638.5	833.1
Damascus Rural	175.9	211.0	246.2	281.3	316.4	386.8	470.3
Aleppo	191.2	260.6	330.0	399.4	468.8	607.8	786.2
(City)	(155.5)	(206.0)	(264.9)	(322.7)	(381.2)	(498.4)	(629.8)
(Rural)	(35.7)	(54.6)	(65.1)	(76.7)	(87.6)	(109.4)	(156.4)
Homs	111.7	145.8	180.0	214.1	248.3	316.7	405.4
Hama	73.0	99.6	126.3	152.9	179.6	232.9	299.7
Lattakia	100.4	120.7	141.0	161.3	181.5	222.2	290.5
Daraa	42.2	54.0	65.7	77.5	89.3	112.8	150.8
Sweda	27.7	34.9	42.1	49.3	56.5	70.9	93.1
Tartous	59.1	74.1	89.1	104.1	119.0	149.1	196.2
Idleb	56.1	69.2	82.4	95.5	108.7	135.0	192.5
Der Al Zor	34.2	45.8	57.4	69.0	80.6	103.8	136.7
Al Hasaka	46.5	59.0	71.4	83.9	96.4	121.3	171.7
Quennetra	3.7	5.1	6.5	8.0	9.4	12.2	17.3
Rakkah	24.8	32.3	39.8	47.4	54.9	69.9	96.4
<TOTAL>	1259.0	1579.0	1899.0	2219.0	2539.0	3180.0	4140.0

The demand fulfillment plans for individual exchange centers are listed in S3-1-3-1 in the Supporting Report.

The distribution of individual exchanges was calculated in consideration of existing subscribers, forecasted demand in this study, and the expansion plan in STE's Eighth National Five-Year Plan.

3.2 Traffic Forecast

This traffic forecast is based on the demand forecasted by the Action Plan. The target planning term is from the year 1996 to the year 2005. On the other hand, the traffic forecast based on the demand forecast in the Master Plan is described in the Master Plan.

3.2.1 Methods used in the Traffic Forecast Approach

(1) Determination of calling rates

An average traffic volume per subscriber including originating and terminating calls in busy hour is called as total calling rate, which is used for calculating traffic volumes for exchange units and specified trunk circuit routes. The calling rate in future should be estimated taking into account many factors, i.e. actual measured traffic, growth of telephone density, social-geographical conditions, etc.

- The traffic volume per subscriber applicable to this plan is estimated based on the present values for design in STE as follows:

Category	Total calling rate
Business	0.13 Erl.
Residential	0.08 Erl.

- The level of originating traffic is approximately equal to terminating traffic.

- Regarding the calling rate in future, as the number of waiting applicants is reduced, low-volume traffic subscribers will increase and the calling rate will go down. On the other hand, new network services to be offered by the STE are expected to increase the calling rate. Therefore, the calling rate in this plan will be as the same as the present one.

- The traffic volume for exchange units and specified trunk circuit routes varies according to the above category and the distribution ratio between business and residential subscribers. The calling rates and distribution ratio should be determined by each area and exchange center because of difference of social-geographical conditions.

Table 3.2.1-1 shows the distribution ratio between business and residential subscribers and originating calling rates by each area.

Table 3.2.1-1 The Distribution Ratio between Business and Residential Subscribers and Originating Calling Rates by Each Area

AREA	Business	Residential	Originating Calling Rate
Damascus city	30 %	70 %	0.048 erl./sub.
Damascus rural	20 %	80 %	0.045 erl./sub.
Aleppo city	30 %	70 %	0.048 erl./sub.
Aleppo rural	20 %	80 %	0.045 erl./sub.
Homs	20 %	80 %	0.045 erl./sub.
Hama	20 %	80 %	0.045 erl./sub.
Lattakia	20 %	80 %	0.045 erl./sub.
Daraa	10 %	90 %	0.043 erl./sub.
Sweda	10 %	90 %	0.043 erl./sub.
Tartous	20 %	80 %	0.045 erl./sub.
Idleb	10 %	90 %	0.043 erl./sub.
Der Al Zor	10 %	90 %	0.043 erl./sub.
Al Hasaka	10 %	90 %	0.043 erl./sub.
Quennetra	5 %	95 %	0.041 erl./sub.
Rakkah	10 %	90 %	0.043 erl./sub.

(2) Traffic Distribution by Route

The total traffic volume should be distributed according to the distribution ratio by route, which generally composes of routes for intra-office calls, local calls to other exchanges, national calls and international calls. Table 3.2.1-2 shows the distribution ratio of originating traffic by route in each area.

Figure 3.2.1-1 shows the distribution flow of originating traffic from a local exchange and Figure 3.2.1-2 shows the flow of international traffic in this plan.

Table 3.2.1-2 The Distribution Ratio of Originating Traffic by Route in Each Area

AREA	Intra-Office	Local	National	International
Damascus City	12 %	76 %	8 %	4 %
Aleppo City	33 %	55 %	9 %	3 %
Other Cities	40 %	51 %	7 %	2 %
Damascus Rural	38 %	56 %	5 %	1 %
Aleppo Rural	43 %	51 %	5 %	1 %
Other Rural	65 %	29 %	5 %	1 %
Zabadani, Al Nabek	59 %	29 %	11 %	1 %

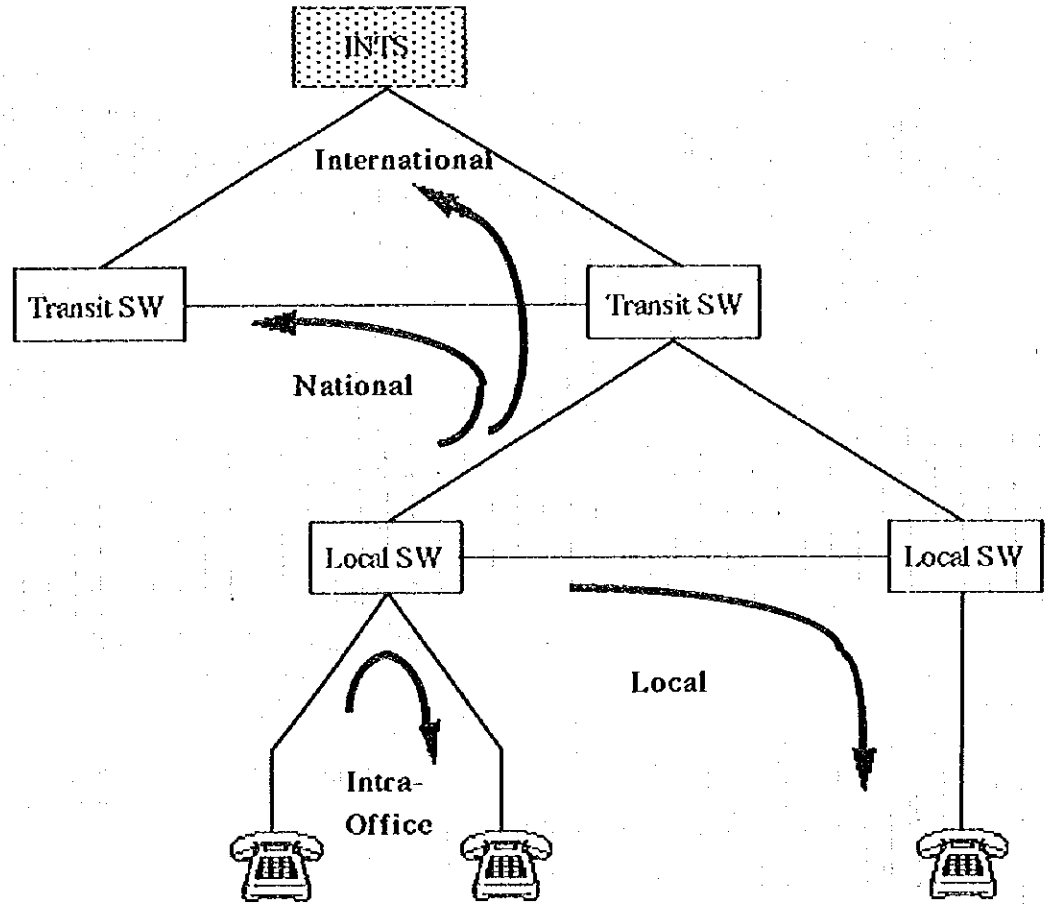


Figure 3.2.1-1 The Distribution Flow of Originating Traffic from a Local Exchange

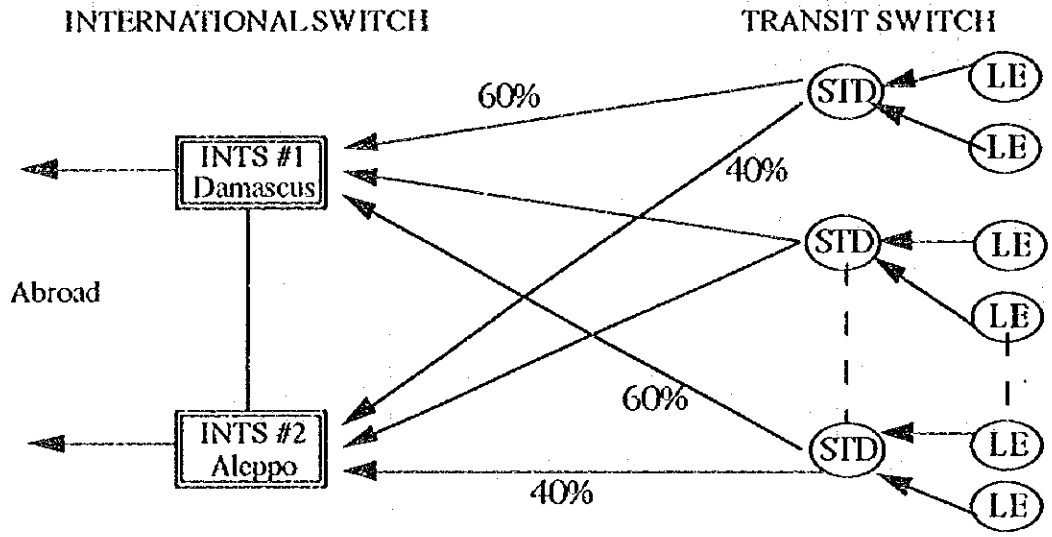


Fig. 3.2.1-2 Flow of International Traffic

3.2.2 Traffic Matrix

The traffic matrix is prepared according to the volume of originating traffic from each exchange centers. The traffic volume is normally calculated using the gravity model, which assumes an unequal affinity rate between telephone centers, and is affected by the distance between telephone centers. Matrix in the Study, however, was calculated on the assumption that the affinity rate among exchange centers is equal and is not affected by the distance between exchanges except for the Damascus local network area, Aleppo City and between transit exchanges. That is because actual traffic data and sufficient information about location on the map is not obtained concerning every exchange area. The traffic matrices are projected by applying the Kruithof Algorithm to the anticipated level of originating and terminating traffic for telephone centers.

S3-1-3-2 in the Supporting Report shows the calculated results for traffic volumes between transit exchanges and traffic volumes between local exchanges throughout the country as the forms of matrix for the year 1996 and 2000.

CHAPTER 4 FACILITY PLAN

The Facility Plan from 1996 to 2000 herein is based on the demand forecast in accordance with the Action Plan. The Facility Plan based on the Master Plan should be referred to the Volume 1.

4.1 Transmission

Based on the circuit-matrixes which forecast numbers of circuits between telephone switches at the end of 2000, shortage of transmission facilities have been checked, comparing existing digital circuits with the forecast circuits in number. For areas where shortages are anticipated, new facilities are planned that consider suitable network configurations. Taking into account of equipment transfer, new facilities are not planned for some areas. Note that transmission sections in the on-going 250 thousand telephone lines project are excluded in this plan.

4.1.1 Long Line Network

(1) Areas ranging from Damascus to Aleppo, including West Coast

Capacity surplus for digital circuits at the end of 2000 are summarized in Table 4.1.1-1, where figures with minus signs indicate shortages.

Table 4.1.1-1 Capacity Surplus[2MBPS]

STATION	DESTINATION	Existing		Required	
		2MBPS CCT (/2Mbps)	A/D CCT (/30 voice ch)	CCT IN 2000 (/2Mbps)	SURPLUS (/2Mbps)
ALEPPO STD	DAMAS STD	30	13	80	-37
ALEPPO STD	DAMAS STD (ITE)	18		0	18
ALEPPO STD	HAMA STD	11	5	14	2
ALEPPO STD	HOMS STD	21	6	16	11
ALEPPO STD	IDLEB B	4	2	20	-14
ALEPPO STD	LATTAKIA STD	15	5	22	-2
ALEPPO STD (ITE)	DAMAS STD (ITE)			28	-28
ALEPPO STD (ITE)	IDLEB			4	-4
AL NABEK	DAMAS STD (ITE)			4	-4
DAMAS STD	HAMA STD	9	6	14	1
DAMAS STD	HOMS STD	26	13	28	11
DAMAS STD	DER AL ZOR			8	-8
DAMAS STD	LATTAKIA STD	15	7	24	-2
DAMAS STD	NABEK	4	5	24	-15
DAMAS STD	TARTOUS B	5	6	0	11
DAMAS STD	ZABADANI			10	*-10
DAMAS STD (ITE)	HAMA STD			10	-10
DAMAS STD (ITE)	HOMS STD	12		14	-2
DAMAS STD (ITE)	LATTAKIA STD	6		16	-10
DAMAS STD (ITE)	TARTOUS			6	-6
HAMA STD	HOMS STD	16	6	6	16
HAMA STD	LATTAKIA STD	2		4	-2
HOMS STD	DER AL ZOR			2	-2
HOMS STD	LATTAKIA STD	14	6	6	14
HOMS STD	TARTOUS B	2	6	0	8
LATTAKIA STD	TARTOUS B	4	7	28	-17
TOTAL		214	93	388	**-81**

*note: under construction

The table above indicates that some shortages are anticipated for the year 2000 as a whole. In addition, when circuit transfer from the obsolete analog microwave systems and analog/ digital coaxial systems is considered, there will be many other shortages. TV

circuits and dedicated circuits used by governmental sectors and private sectors now run on the obsolete systems.

It is proposed here to introduce SDH-4 systems for circuits between main transits switches to relieve shortages in capacity and at the same time to increase security to 100% for the most important circuits. SDH switching functions are utilized for 100% circuit restoration (protection).
Circuits for main transits switches will be transferred from the existing 140Mbit/s systems to the SDH-4 systems to make free circuits in the existing 140Mbit/s systems. and the free circuits can be used for the TV circuits, the dedicated circuits, circuits linking Aleppo and Idleb, and other circuits.

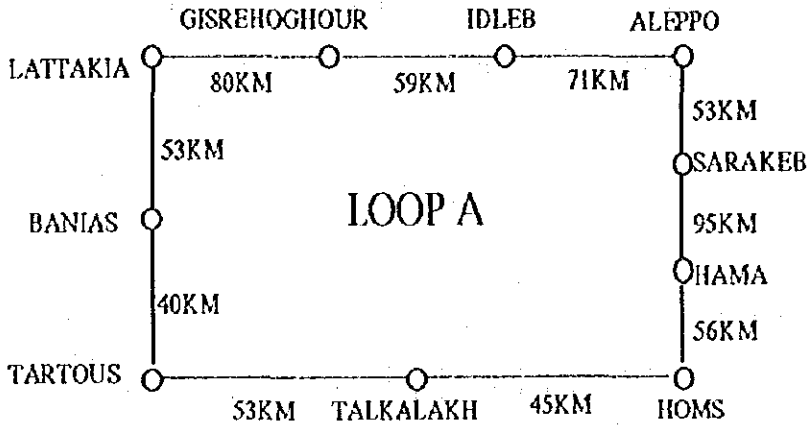
Two SDH-4 Rings, Loop A and Loop B are planed as shown in Figure 4.1.1-1(1/3) and (2/3). The Loop A is used for TS (Transit Switch) circuits. The Loop B is a ring which provides international circuits including circuits from transits switches to international switches with 100% route diversity protection. Tartous is not a transit switch, but included in the Loop B, because it is very important as a submarine cable landing station. Approximately two STM-1 capacities in the Loop B can be assigned to international circuits from Damascus international switch to Tartous submarine landing station.

As for the section between Damascus and Homs, two fiber-optic SDH-4 systems, System 1 and System 2, are planed with 100% microwave back-up, as shown in Figure 4.1.1-1 (3/3). The System 1 is used for TS (Transit Switch) circuits. The System 2 is a SDH-4 system for international circuits including circuits from transit switches to international switches. Approximately two STM-1 capacities in the System 2 can be assigned to international circuits from Damascus international switch to Tartous submarine landing station.

Circuits covered in the SDH-4 systems, Loop A, Loop B, System 1 and System 2, are shown in Table 4.1.1-2 which is based on the Long Line Network Circuit Matrix of 2000.

Please note that Loop A and System 1 have enough capacity for TS circuits and circuits from transits switches to international switches. STE could drop Loop B and System 2 from the plan and use existing 140M bit/s systems for international circuits, if STE would not want 100% route diversity protection for intentional circuits. The existing 140M bit/s systems already provide STE with 1 + 1 protection within a cable.

Note: In the case that STE installs a new STD (toll transit) exchange at Al Thawra, the microwave terminal station of System 1 and System 2 in Damascus shall be located at Al Thawra, and two ADMs (add-drop mutiplexers) shall be installed at Al Thawra for circuits from/ to the new STD exchange.



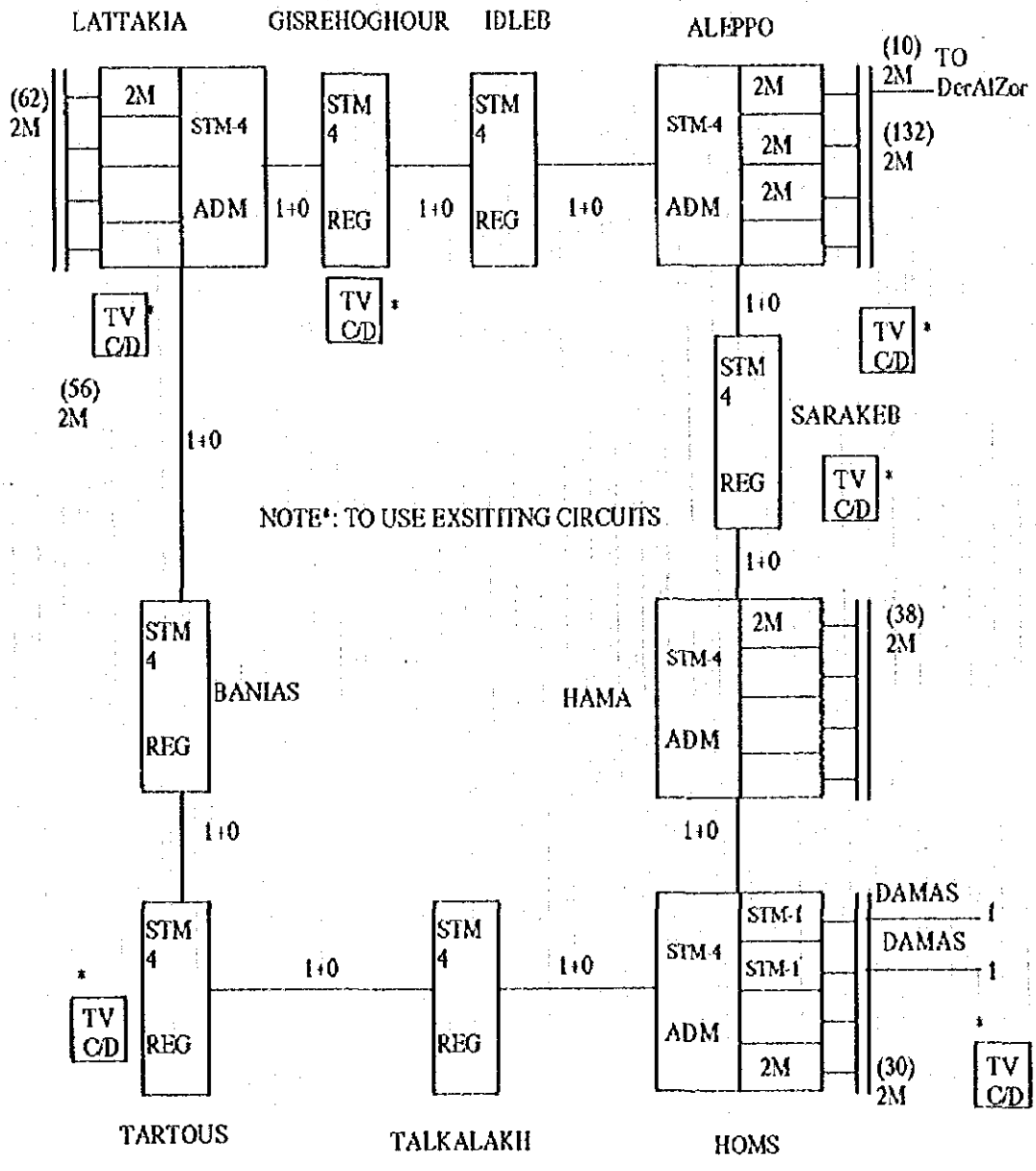
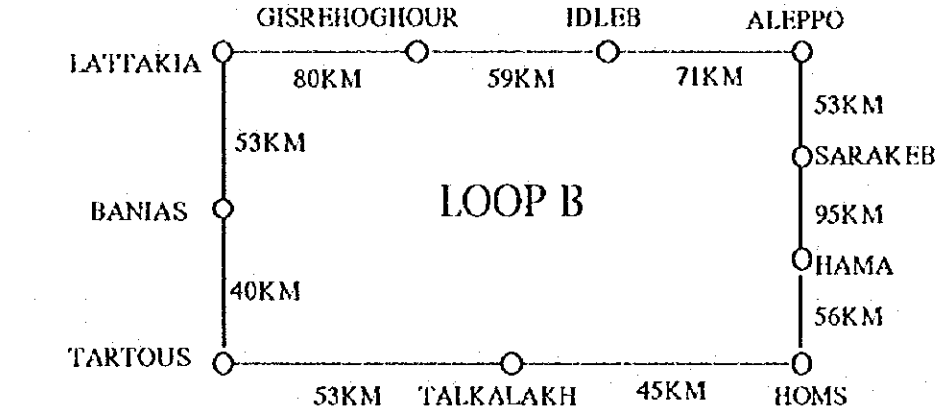


Fig. 4.1.1-1 Network Configuration for Main Transit Switches (1/3)



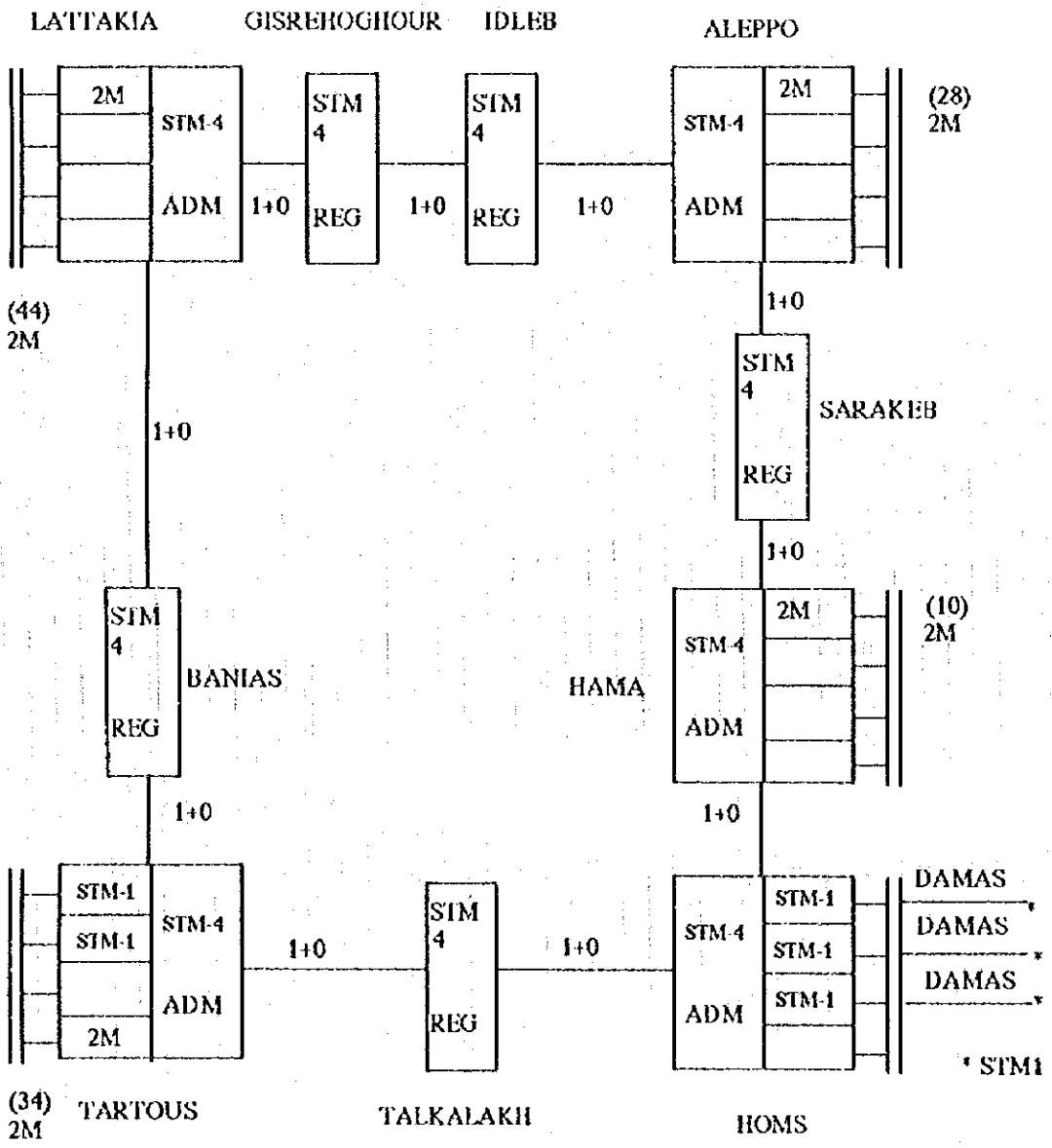
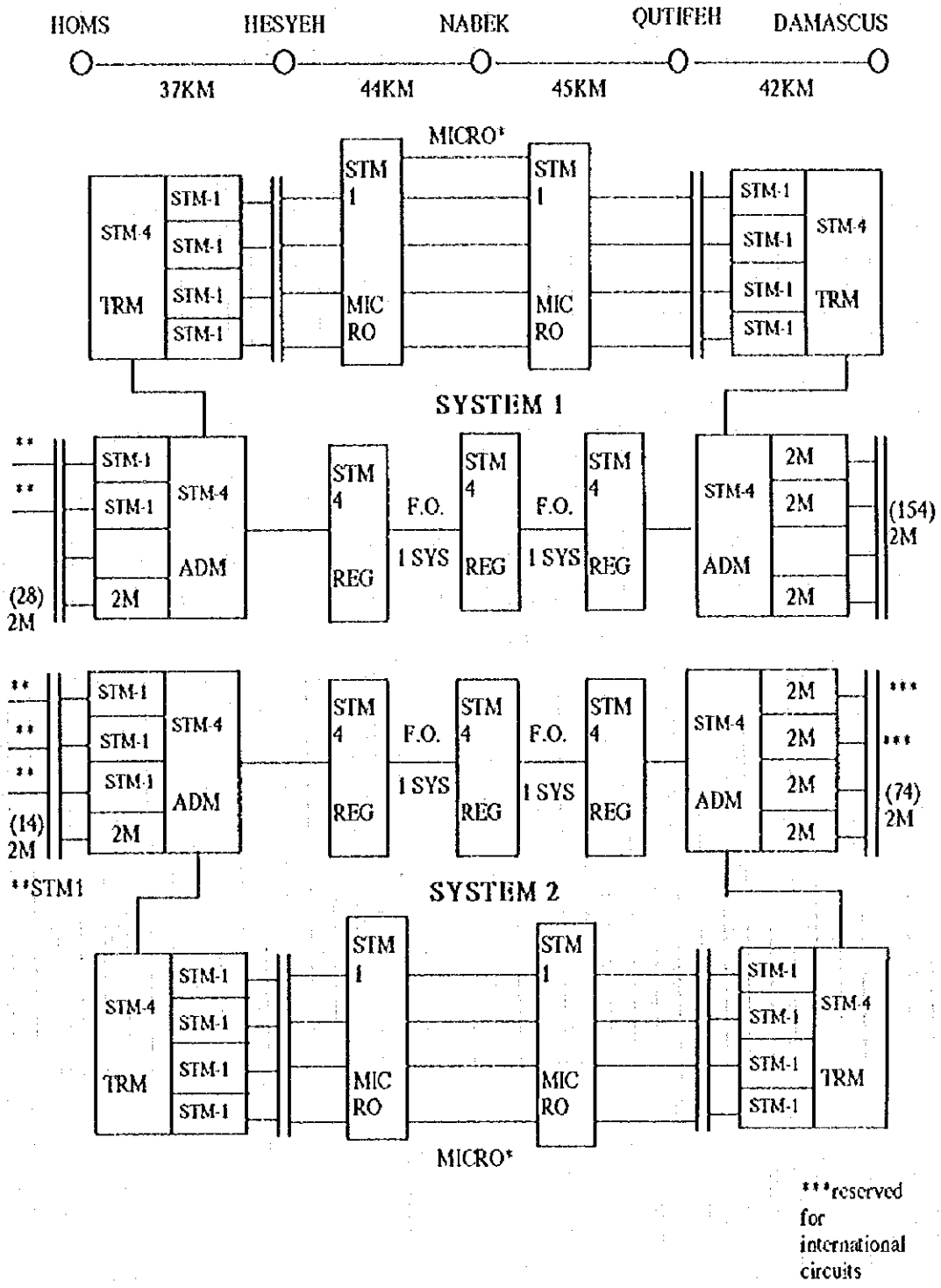


Fig. 4.1.1-1 Network Configuration for Main Transit Switches (2/3)



MICRO*: Micorwave (8+1) Systems with 3 repeator stataions, new towers, and new antennas

Fig. 4.1.1-1 Network Configuration for Main Transit Switches (3/3)

Table 4.1.1-2 Circuits on Main Transit Switches in 2000 (1/3)

(1) Circuits for Loop A + Loop B

	Transit Sw	Damascus	Aleppo	Der Al Zor	Homs	Hama	Lattakia	Tartous	INT (Damas)	INT (Alep.)	Total 2
1	Damascus		1,200	120		210	360	via 16		-	1,890
7	Aleppo	1,200			240	210	330	via 16	-		1,980
13	Der Al Zor	120			30	via 7	via 7	via 7	-		150
14	Homs		240	30		90	90	via 16		-	450
15	Hama	210	210	via 7	90		60	via 16	150	-	720
16	Lattakia	360	330	via 7	90	60		420	240	-	1,500
17	Tartous	via 16	via 16	via 16	via 16	via 16	420		90	-	510
18	INT (Damas)		-	-		150	240	90		420	900
19	INT (Aleppo)	-			-	-	-	-	420		420
	Total 1	1,890	1,980	150	450	720	1,500	510	900	420	8,520
	LOOP CAPA/2Mbps										284
	LOOP CAPA/2TM1										4.50794
	Total 1+Total 2	3,780	3,960	300	900	1,440	3,000	1,020	1,800	840	
	TERM CAPA/2Mbps	126	132	10	30	48	100	34	60	28	
	TERM CAPA/STM1	2	2.09524	0.15873	0.47619	0.76190	1.58730	0.53968	0.952381	0.44444	

(2) Circuits for System 1 + System 2

	Transit Sw	Damascus	Aleppo	Der Al Zor	Homs	Hama	Lattakia	Tartous	INT (Damas)	INT (Alep.)	Total 2
1	Damascus		1,200	120	420	210	360	via 16		-	2,310
7	Aleppo	1,200							-		1,200
13	Der Al Zor	120							-		120
14	Homs	420							210	-	630
15	Hama	210							150	-	360
16	Lattakia	360							240	-	600
17	Tartous	via 16							90	-	90
18	INT (Damas)				210	150	240	90		420	1,110
19	INT (Aleppo)	-							420		420
	Total 1	2,310	1,200	120	630	360	600	90	1,110	420	6,840
	SPAN CAPA/2Mbps										228
	SPAN CAPA/2TM1										3.61905
	Total 1+Total 2	4,620	2,400	240	1,260	720	1,200	180	2,220	840	
	TERM CAPA/2Mbps	154	80	8	42	24	40	6	74	28	
	TERM CAPA/STM1	2.44444	1.26984	0.12698	0.66667	0.38095	0.63492	0.09524	1.174603	0.44444	

Table 4.1.1-2 Circuits on Main Transit Switches in 2000 (2/3)

(3) Circuits for Loop A

	Transit Sw	Damascus	Aleppo	Der Al Zor	Homs	Hama	Lattakia	Total 2
1	Damascus		1,200	120		210	360	1,890
7	Aleppo	1,200			240	210	330	1,980
13	Der Al Zor	120			30	via 7	via 8	150
14	Homs		240	30		90	90	450
15	Hama	210	210	via 7	90		60	570
16	Lattakia	360	330	via 7	90	60		840
	Total 1	1,890	1,980	150	450	570	840	5,880
	LOOP CAPA/2Mbps							196
	LOOP CAPA/2TM1							3.11111
	Total 1+Total 2	3,780	3,960	300	900	1,140	1,680	
	TERM CAPA/2Mbps	126	132	10	30	38	56	
	TERM CAPA/STM1	2	2.09524	0.15873	0.47619	0.60317	0.88889	

(4) Circuits for Loop B

	Transit Sw	Hama	Lattakia	Tartous	INT (Damas)	INT (Alep.)	Total 2
15	Hama			via 16	150	-	150
16	Lattakia			420	240	-	660
17	Tartous	via 16	420		90	-	510
18	INT (Damas)	150	240	90		420	900
19	INT (Aleppo)	-	-	-	420		420
	Total 1	150	660	510	900	420	2,640
	LOOP CAPA/2Mbps						88
	LOOP CAPA/2TM1						1.39683
	Total 1+Total 2	300	1,320	1,020	1,800	840	
	TERM CAPA/2Mbps	10	44	34	60	28	
	TERM CAPA/STM1	0.15873	0.69841	0.53968	0.95238	0.44444	

Table 4.1.1-2 Circuits on Main Transit Switches in 2000 (3/3)

(5) Circuits for System 1

	Transit Sw	Damascus	Aleppo	Der Al Zor	Homs	Hama	Lattakia	Total 2
1	Damascus		1,200	120	420	210	360	2,310
7	Aleppo	1,200						1,200
13	Der Al Zor	120						120
14	Homs	420						420
15	Hama	210						210
16	Lattakia	360						360
	Total 1	2,310	1,200	120	420	210	360	4,620
	SPAN CAPA/2Mbps							154
	SPAN CAPA/2TM1							2.44444
	Total 1+Total 2	4,620	2,400	240	840	420	720	
	TERM CAPA/2Mbps	154	80	8	28	14	24	
	TERM CAPA/STM1	2.44444	1.26984	0.12698	0.44444	0.222222	0.38095	

(6) Circuits for System 2

	Transit Sw	Homs	Hama	Lattakia	Tartous	INT (Damas)	INT (Alep.)	Total 2
15	Homs					210	-	210
16	Hama					150	-	150
17	Lattakia					240	-	240
18	Tartous				0	90	0	90
19	INT (Damas)	210	150	240	90		420	1,110
	INT (Aleppo)					420		420
	Total 1	210	150	240	90	1,110	420	2,220
	SPAN CAPA/2Mbps				3	37	14	74
	SPAN CAPA/2TM1				0.04762	0.587302	0.22222	1.1746
	Total 1+Total 2	420	300	480	180	2,220	840	
	TERM CAPA/2Mbps	14	10	16	6	74	28	
	TERM CAPA/STM1	0.22222	0.15873	0.25397	0.0952	1.174603	0.44444	

(2) Areas ranging from Aleppo to Deir Elzor, and Kamichly

There are no digital transmission systems for these areas, so digitization is an urgent requirement for this part of the Long Line Network. SDH-4 (1+1) fiber-optic systems are proposed, as, in the interim, existing analog microwave systems can be relied on as back up systems for the fiber-optic systems. Both wire and wireless systems could be used to complement each other to strengthen circuit security. New digital microwave systems would have to be installed when traffic levels require them, perhaps after the year 2010.

Figure 4.1.1-2 shows the number of circuits that will be anticipated. In addition to TV circuits, the numbers of telephone circuits are increased by 20% for dedicated circuits. Figure 4.1.1-3 shows the network configuration for these areas.

note: Kamichly used to be a transit switch, but not any more. However it is still an important city in the area, so the plan treats Kamichly as a part of the long distance network.

(3) Areas ranging from Damascus to Sweda , and Daraa

No significant digital circuit shortage is anticipated at the end of 2000, though circuit rearrangement may be required. Moreover, STE has an on-going plan to replace 34Mbps fiber-optic systems with 140Mbps fiber-optic systems. Therefore, any new facilities plans for these areas have not been drawn up in the plan.

(4) Damascus - Deir Elzor private fiber- optic cable

STE holds two 34Mbps paths in the n private fiber-optic cable from Damascus to Deir Elzor. The capacity is so small that the paths have no substantial influence on the security plan for the long distance network described above. However the paths are very precious for the security of the long distance network, because they are on the route which bypasses Homs area. In the case of disasters in Homs area, the paths could be only one life line from Damascus to Aleppo.

Considering that the big disasters in Homs area will rarely happen, the paths could be usually used for live traffic from Damascus to Deer Elzor areas, and in the case of Homs disaster, STE could manually stop the live traffic and manually connect the paths with

very important circuits from Damascus to Aleppo which STE is expected to maintain even in big disasters.

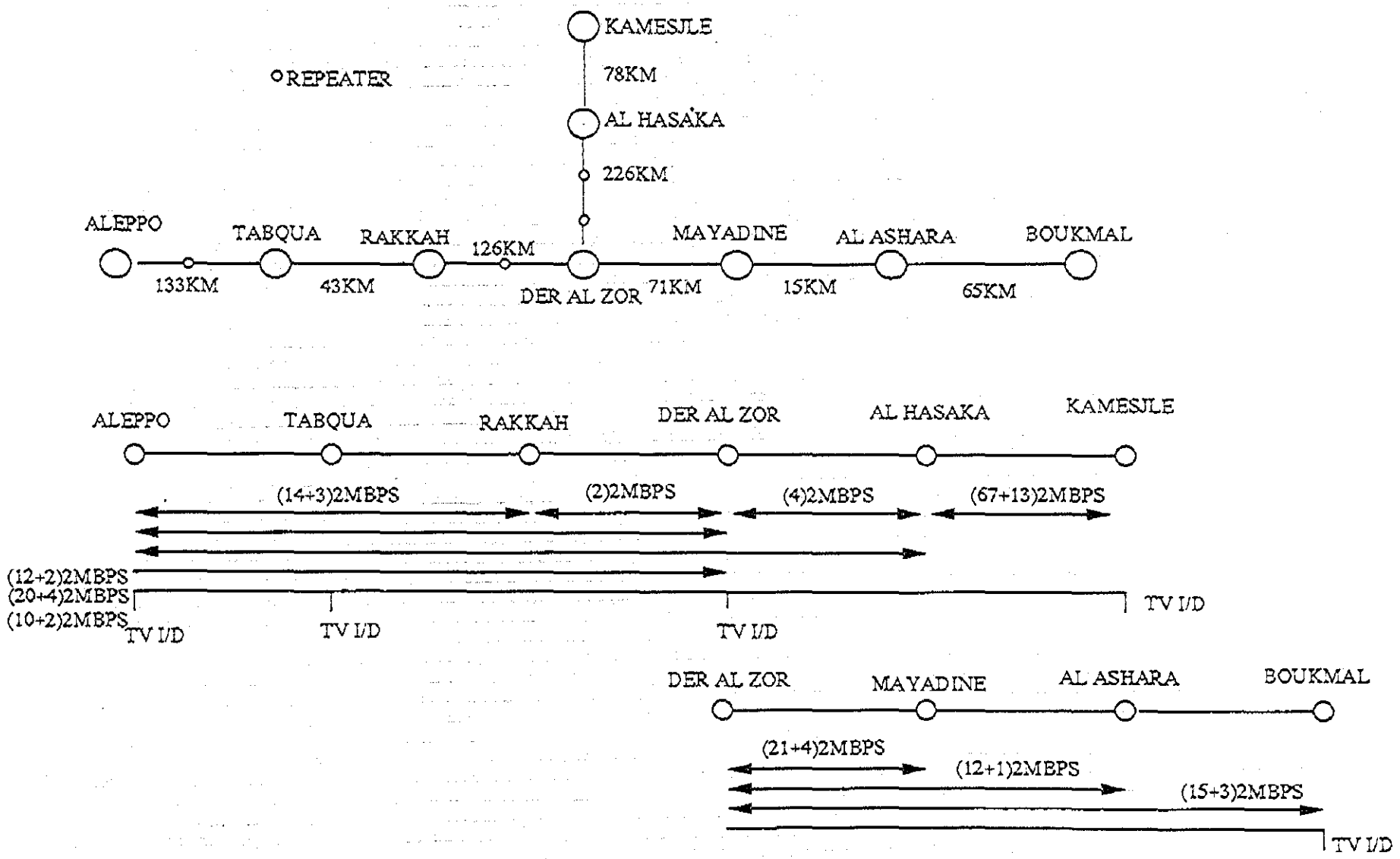


Fig.4.1.1-2 Required Circuits for Areas East of Aleppo (in 2000)

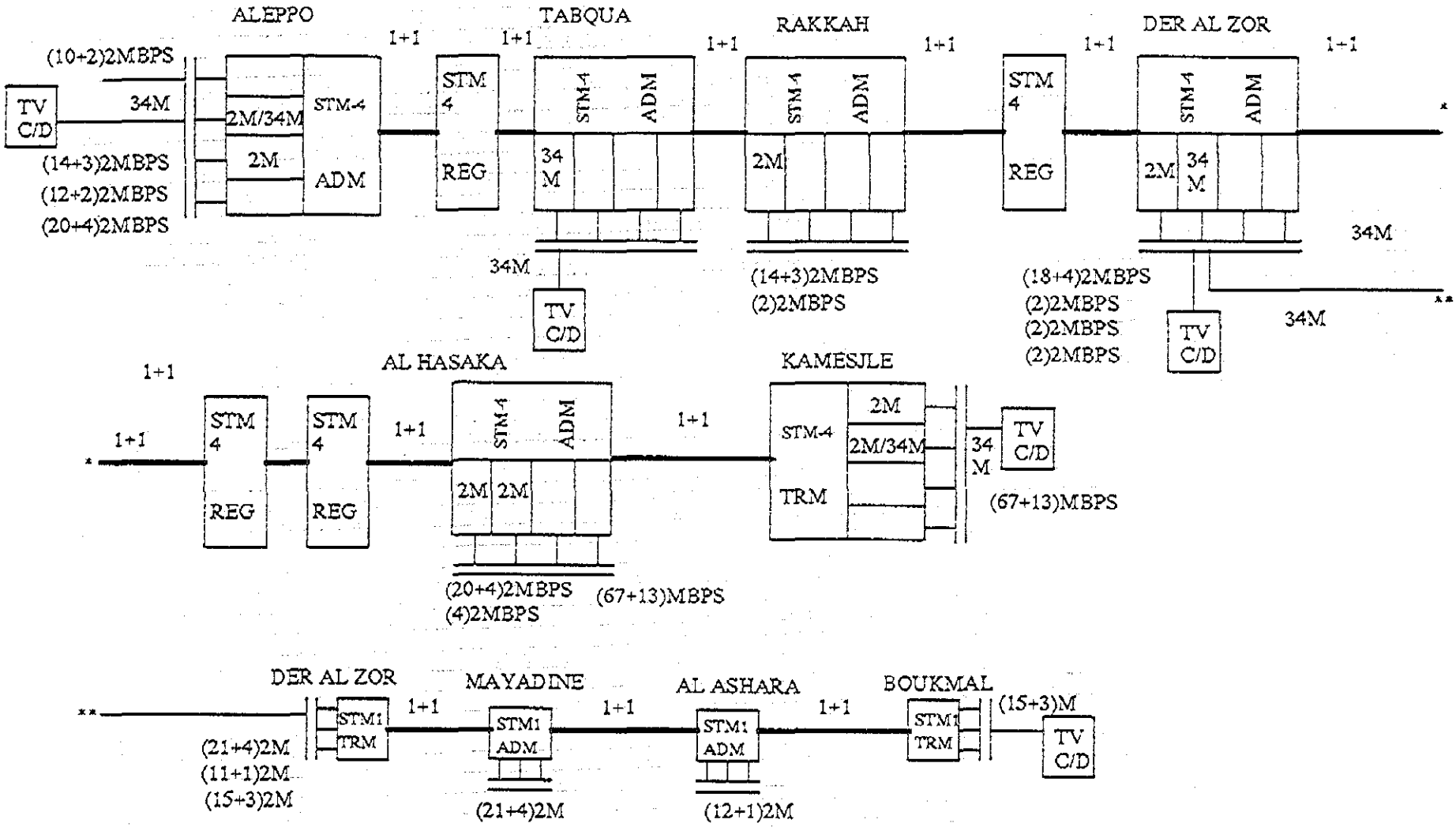


Fig. 4.1.1-3 Network Configuration for Areas East of Aleppo

4.1.2 Junction Networks

(1) Aleppo Junction Network

Sections with circuit shortages are shown in Figure 4.1.2 - 1. Our strategy for this area is to make two SDH-4 loops (Rings), Loop A1 and Loop A2, in the central part of Aleppo to provide additional circuits and better security, as shown in Figure 4.1.2 - 2. The rings will secure more than 50% protection with route diversity and protection switching functions. Figure 4.1.2 - 3 shows the ring Network configuration. Table 4.1.2 - 1 shows circuits which run over Loop A1 and Loop A2. Note that the LOOP CAPA STM1 (Loop Capacity in STM1) in the Table shows loop capacity required for 100% protection. In the case here of 50% protection , the half of the LOOP CAPA STM1 is required as loop capacity.

For Aleppo C - Aleppo G and Aleppo D - Aleppo F, STM-4 systems are introduced to increase circuit capacity, as shown in Figure 4.1.2 - 4.

Some existing 140Mbit/s systems will be moved and replaced in the sections related to new areas (NW-1, NW-2, NW-3, NW-4, NW-5, NW-6), where new fiber-optic cables are required by the plan.

(2) Damascus Junction Network

Sections with circuit shortages are shown in Figure 4.1.2-5. The four SDH-4 loops (Rings), LOOP 2, LOOP 3, LOOP 5, and LOOP9, shown in Figure 4.1.2-6 are planned to cover these circuits shortages in 2000. The other loops in the figure will be planned in future after the year 2000.

50%-50% route diversities are used for all loops to ensure a minimum 50% protection.

A STM-4 system also increases circuit capacitance for the section, Damascus I - Damascus M, as shown in Figure 4.1.2-7.

Some existing 140Mbit/s systems will be replaced with SDH-4 systems and transferred to the sections related to new telephone offices, Ibn Alamied, Al Abbaseyen, Al Sebeyneh, where new fiber-optic cables are required.

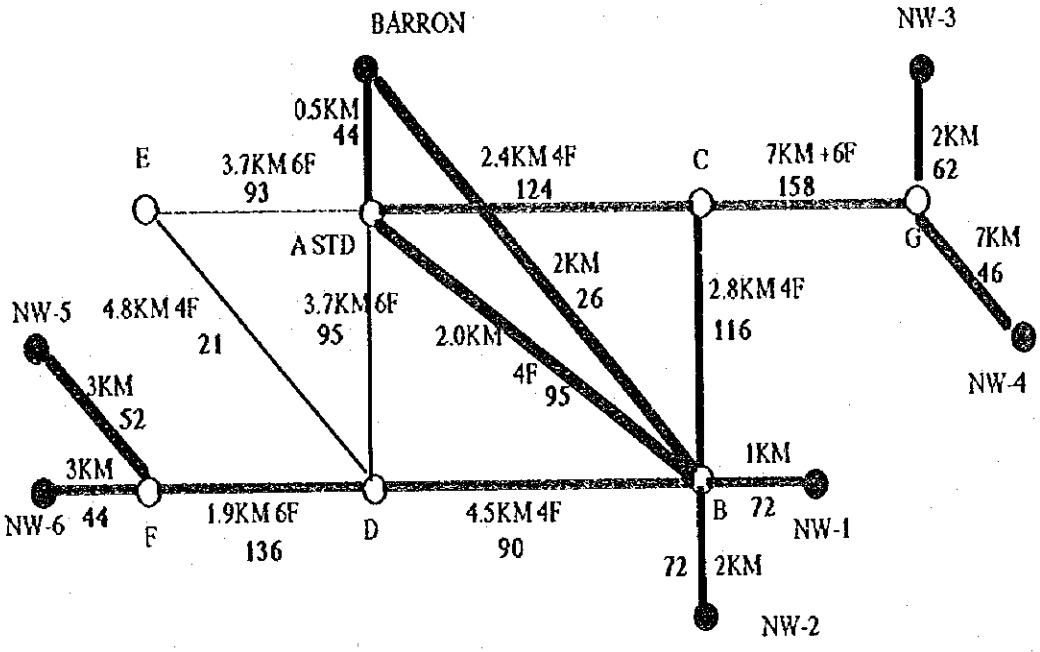
Not all shortage sections in Figure 4.1.2-5 are covered in the plan, because circuit rerouting resolves shortage. For example, the shortage in Section K-G is saved by circuit rerouting to Sections, K - A1, A1 - B, B - G.

The 25% Expansion Contract 40/A has recently increased the capacities for some sections in the Damascus Junction Network with conventional 140Mbps systems. The added systems have used up all fibers in some sections and have decreased security for the sections, because in the case of fiber failure, no stand-by fiber can be used in place of a failed fiber on the spot. It is recommended that the problem should be resolved in due course.

(3) Homs, Hama, Lattakia areas

Since new buildings and new telephone offices are planned, SDH systems are introduced in the junction networks of Homs, Hama and Lattakia.

Circuits required for the junction networks in those areas are illustrated in Figure 4.1.2-8. SDH system configuration is shown in Figure 4.1.2-9. New fiber-optic cables (minimum 4 fibers) must be installed to new buildings/ offices. As for Lattakia, a SDH-4 (1+1) system replace the existing 140Mbps system, and the replaced 140Mbps system is used for Lattakia-New building section.



NOTE: Bold figures show the number of 2MBPS circuits required at the end of 2000

: Sections with circuit shortage

Fig. 4.1.2-1 Circuits required in Aleppo Junction Network (in 2000)

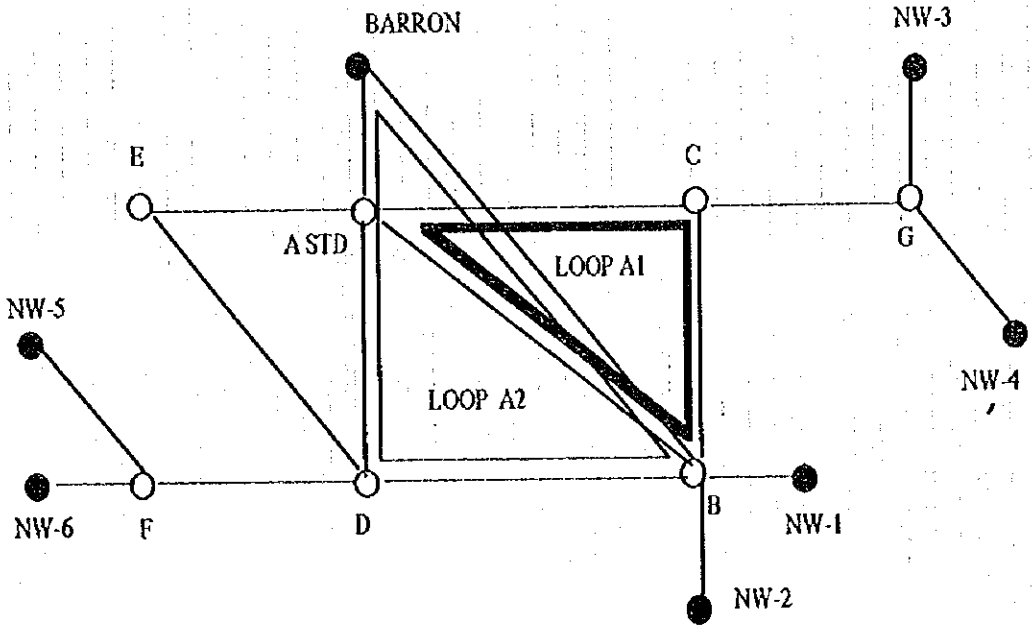


Fig. 4.1.2-2 Loops in Aleppo Junction Network

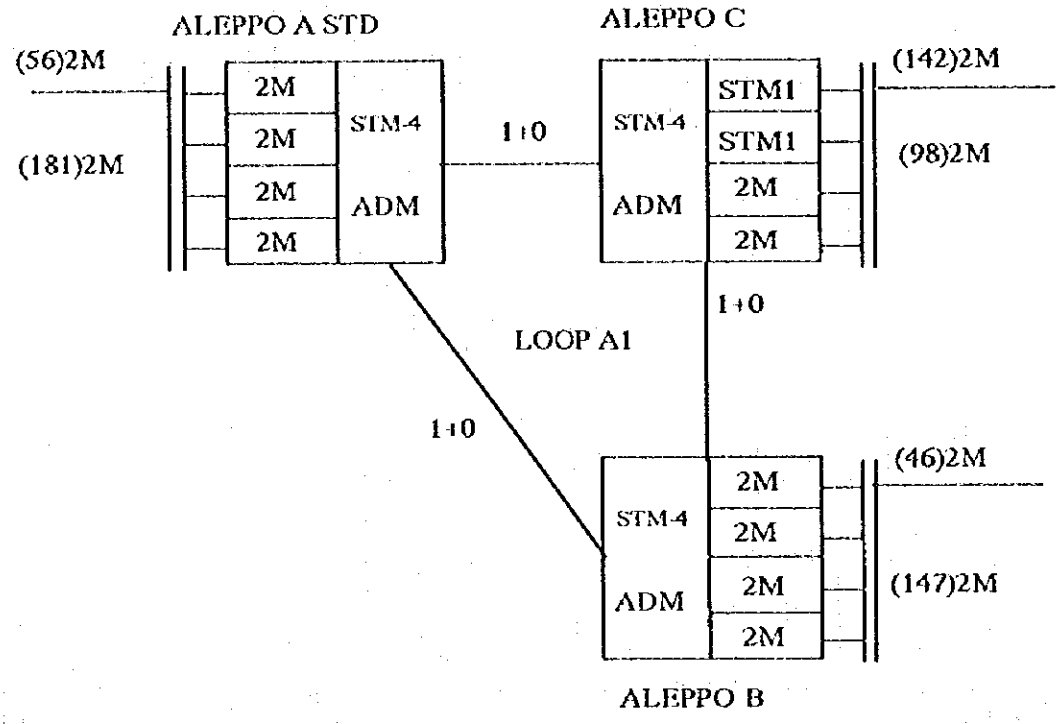


Fig. 4.1.2-3 Aleppo Junction Network Configuration (LOOP A1)

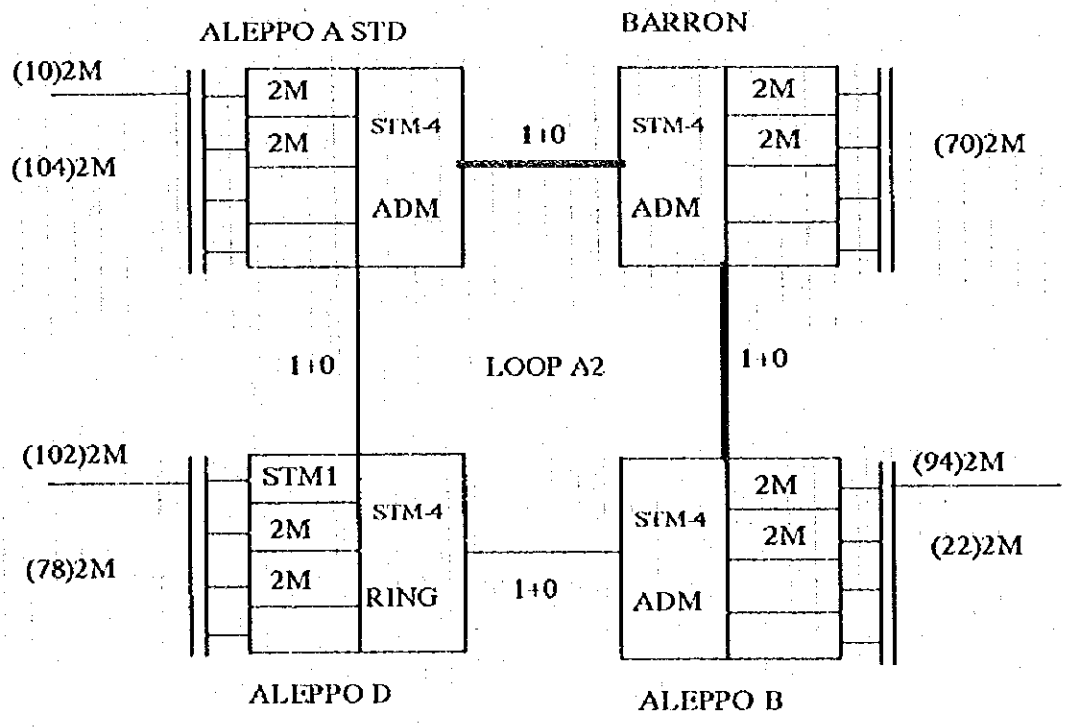


Fig. 4.1.2-3 Aleppo Junction Network Configuration (LOOP A2)

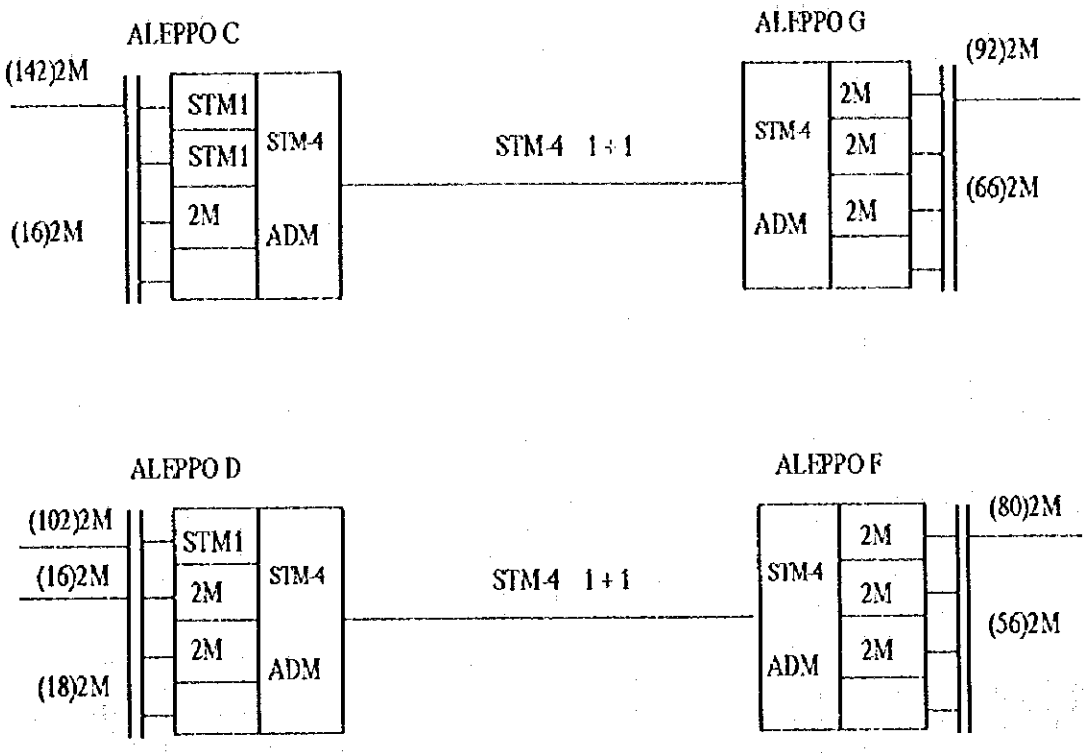


Fig. 4.1.2-4 Aleppo Junction Network Configuration

Table 4.1.2-1 Circuits for Loops in Aleppo Junction Network (in 2000) (1/2)

LOOP A1

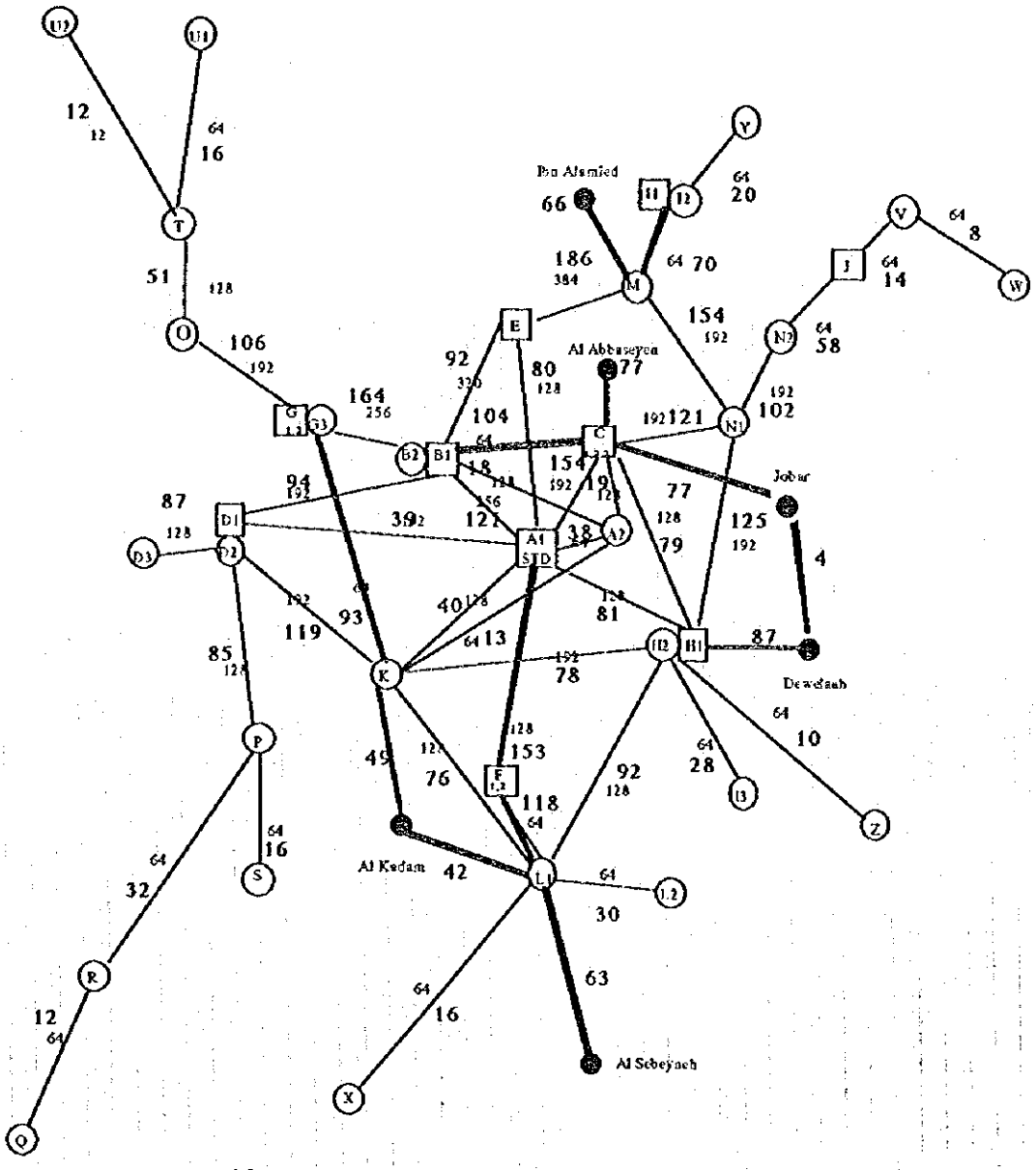
				4	5	6	7	8	9	10	11	12	13	14	15	16	17	
		Node Name	Aljameleha	Alsabele	Baron	Kan Alwazeer	NW-1	NW-2	Alsalymaneyeh	Hananow	NW-3	NW-4	Alassai	Alhamdaneyeh	NW-5	NW-6	TS	Total 2
			A	E		B			C	G			D	F				
1	A	Aljameleha				240	120	120	330	120	90	60						1,080
4	E	Alsabele		-		90	60	60	150	90	60	60						570
5		Baron			-				120	60	60	30						270
6	B	Kan Alwazeer	210	90		-			120	90	60	60					330	960
7		NW-1	120	60			-		90	90	60	30					210	660
8		NW-2	120	60				-	60	60	30	30					210	570
9	C	Alsalymaneyeh	330	150	120	120	90	60					90	60	60	30	360	1,470
10	G	Hananow	120	90	60	90	90	60					60	30	30	30	240	900
11		NW-3	90	60	60	60	60	30					60	30	30	30	180	690
12		NW-4	60	60	30	60	30	30					60	30	30	30	120	540
13	D	Alassai							90	60	60	60	-					270
14	F	Alhamdaneyeh							60	30	30	30		-				150
15		NW-5							60	30	30	30			-			150
16		NW-6							30	30	30	30				-		120
17		TS				330	210	210	360	240	180	120					-	1,650
		Total 1	1,050	570	270	990	660	570	1,470	900	690	540	270	150	150	120	1,650	10,050
		Total 2	1,080	570	270	960	660	570	1,470	900	690	540	270	150	150	120	1,650	335
		Total	2,130	1,140	540	1,950	1,320	1,140	2,940	1,800	1,380	1,080	540	300	300	240	3,300	5.317460317
TERM CAPA 2Mbps			71	38	18	65	44	38	98	60	46	36	18	10	10	8	110	
TERM CAPA STM1			1.12698	0.603175	0.28571	1.03175	0.69841	0.60317	1.55556	0.95238	0.73016	0.57143	0.28571	0.15873	0.15873	0.12698	1.74603	
connection point				A			B			C				B			A	

2Mbps
LOOP CAPA
LOOP CAPA
STM1

Table 4.1.2-1 Circuits for Loops in Aleppo Junction Network (in 2000) (2/2)

LOOP A2

		Center Name	Aljamelehe	Alsabele	Baron	Kan Alwazeer	NW-1	NW-2	Alsolymaneyeh	Hanasow	NW-3	NW-4	Alansari	Alhamdaneyeh	NW-5	NW-6	TS	Total 2	
			A	E		B			C	G			D	F					
1	A	Aljamelehe			150								210	90	60	60		570	
4	E	Alsabele		-	150													150	
5		Baron	150	150	-	60	30	30	120	60	60	30	60	30	30	30	210	1,050	
6	B	Kan Alwazeer			60	-							120	60	60	30		330	
7		NW-1			30		-						60	30	30	30		180	
8		NW-2			30			-					120	60	30	30		270	
9	C	Alsolymaneyeh			120								90	60	60	30		360	
10	G	Hanasow			60								60	30	30	30		210	
11		NW-3			60						-		60	30	30	30		210	
12		NW-4			30								60	30	30	30		180	
13	D	Alansari	210		60	120	60	120	90	60	60	60	-				330	1,170	
14	F	Alhamdaneyeh	90		30	60	30	60	60	30	30	30		-			180	600	
15		NW-5	60		30	60	30	30	60	30	30	30			-		150	510	
16		NW-6	60		30	30	30	30	30	30	30	30				-	120	420	
17		TS			210								330	180	150	120	-	990	
		Total 1	570	150	1,050	330	180	270	360	210	210	180	1,170	600	510	420	990	7,200	2Mbps
		Total 2	570	150	1,050	330	180	270	360	210	210	180	1,170	600	510	420	990	240	LOOP CAPA
		Total	1,140	300	2,100	660	360	540	720	420	420	360	2,340	1,200	1,020	840	1,980	3.809523810	LOOP CAPA
TERM CAPA 2Mbps			38	10	70	22	12	18	24	14	14	12	78	40	34	28	66		STM1
TERM CAPA STM1			0.60317	0.15873	1.11111	0.34921	0.19048	0.28571	0.38095	0.22222	0.22222	0.19048	1.2381	0.63492	0.53968	0.44444	1.04762		
CONNECTION POINT			A		Barron	B							D				A		



NOTE: Bold figures show the numbers of 2MBPS circuits required at the end of 2000.
Small figures show exisiting section capacities in 2MBPS.

: Sections with circuit shortages

Fig. 4.1.2-5 Circuits required in Damascus Junction Network (in 2000)

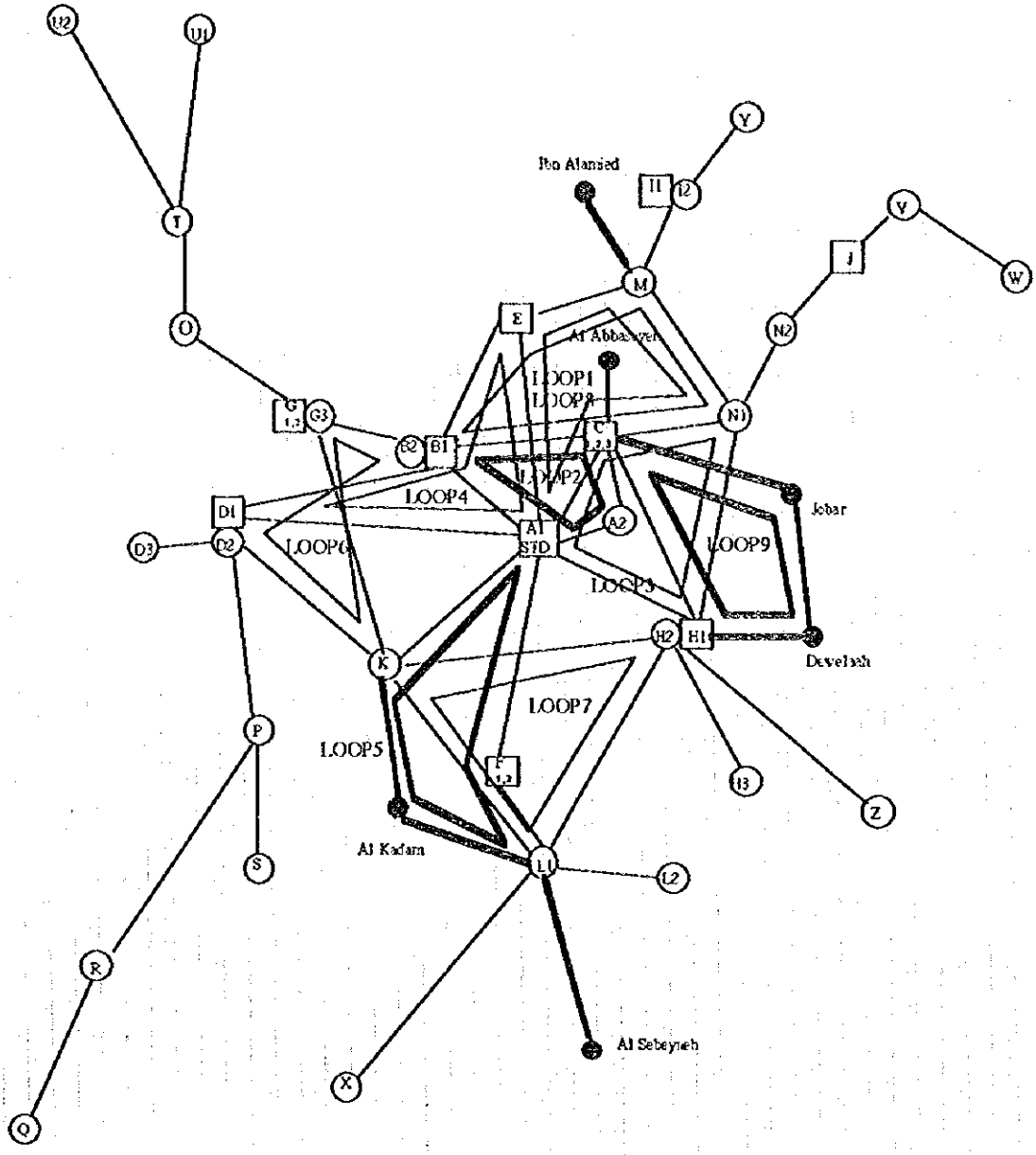


Fig. 4.1.2-6 Damascus Loops

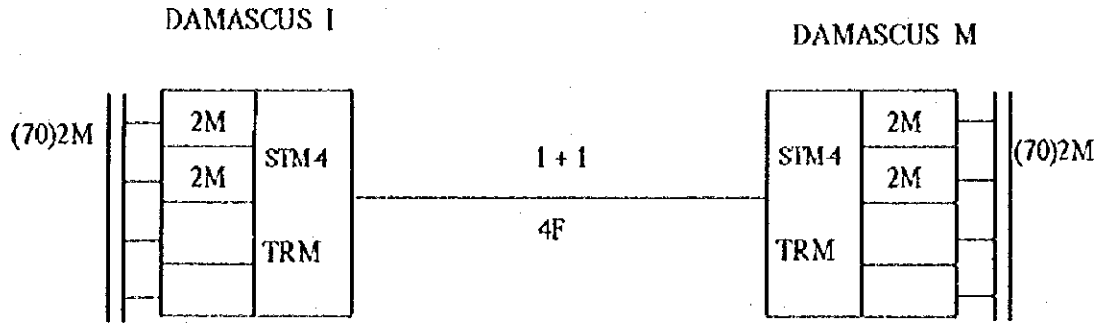
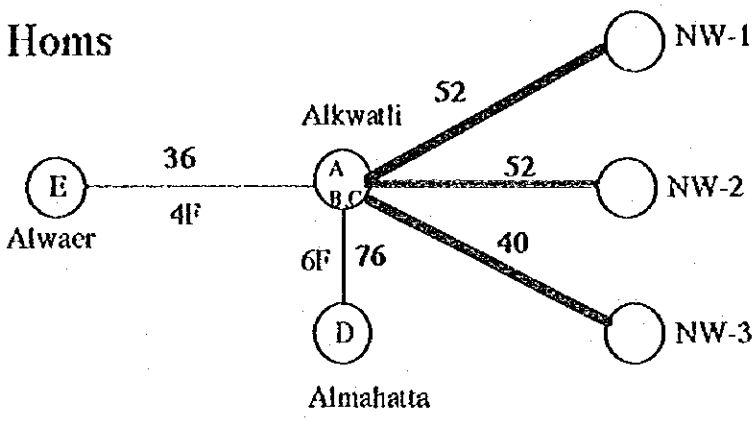
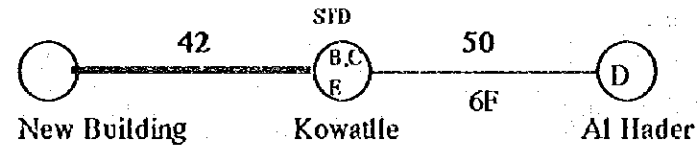
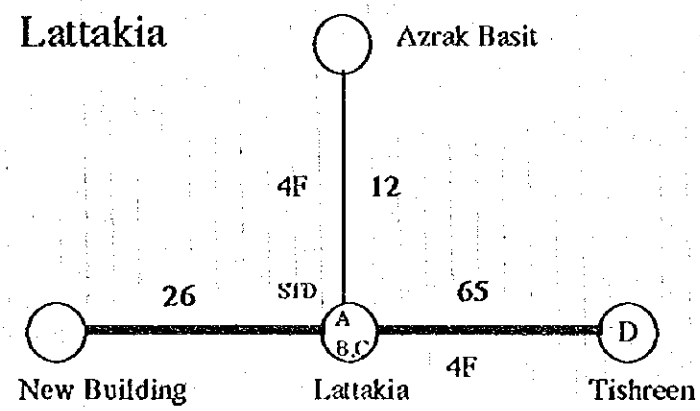


Fig. 4.1.2-7 Damscus Junction Network Configuration (Damasus I - M)







NOTE: Bold figures show the numbers of 2Mbps circuits required at the end of 2000.

: Sections with circuit shortage

Fig. 4.1.2-8 Circuits required in Homs, Hama, and Lattakia Junction Networks

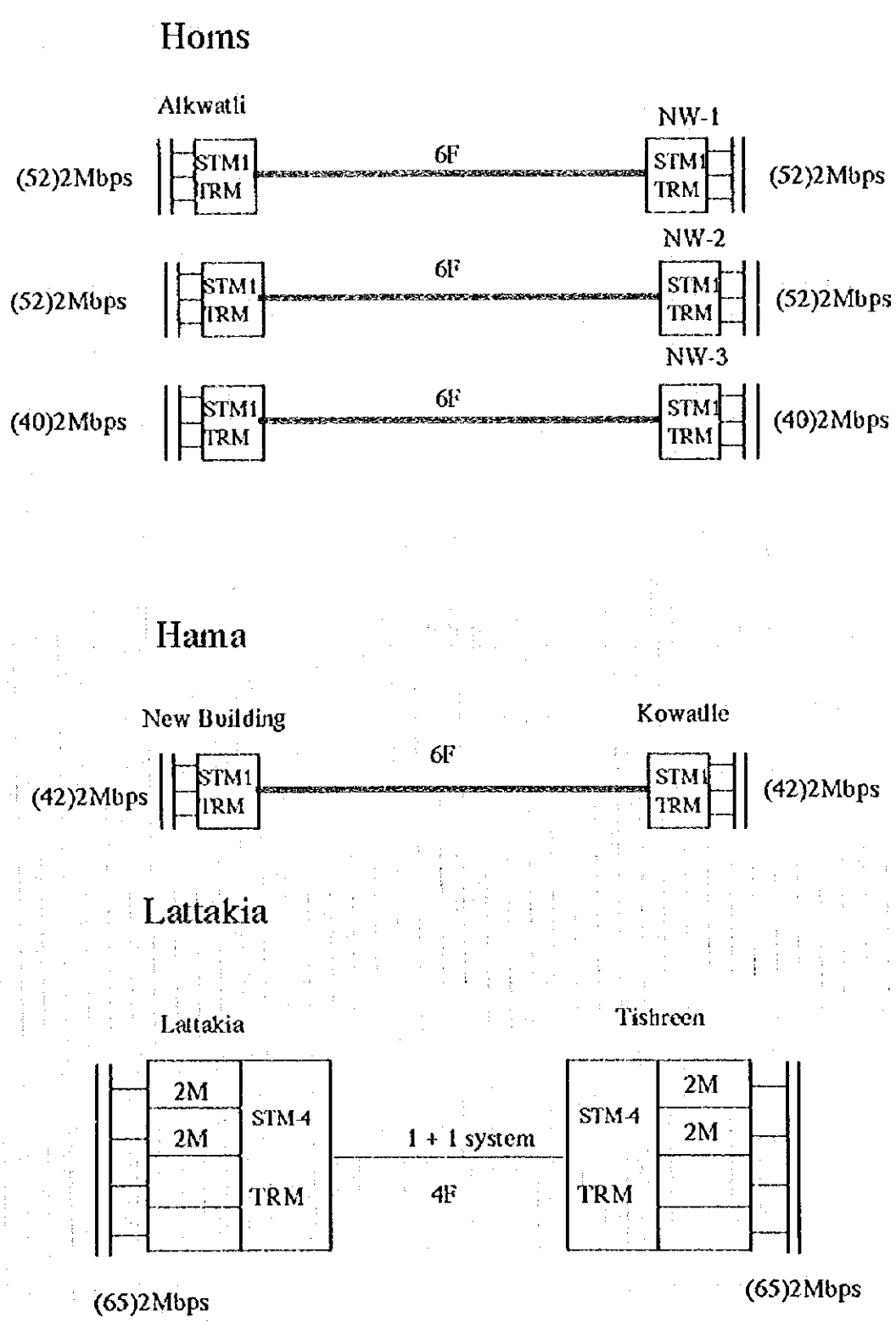


Fig. 4.1.2-9 Network Configurations in Homs, Hama, and Lattakia Junction NW

4.1.3 Long Local Sections

The following two long sections are ones that have not been digitized, but are required to be in the plan.

(1) Tartous - Safita 50km (see Figure 4.1.3-1)
(2) Deir Elzor - Myadin - Abukumal 151km (see Figure 4.1.1.-2, Figure 4.1.1-3)

They all use new fiber-optic SDH-1 (1+1) systems. The 150km Homs - Tadmore section is still analog, but not digitized by the end of 2000 in the plan, because of long distance and small capacity (14 x 2Mbps and TV).

4.1.4 Local Sections

A look at the circuit matrix tables reveals some sections which have not been digitized yet or which do not have enough circuits. Table 4.1.4-1 lists such sections. Transmission systems for these sections are not specified in the plan. Considering affinity with existing systems, use of 34Mbit/s microwave systems is assumed for the purposes of cost estimation.

4.1.5 Small Exchange Sections

Circuit demand on sections to small exchanges, new or replacement of manual switches, are listed in Figure 4.1.5-1, based on the circuit matrix tables. Transmission systems for these sections are not specified in the plan. Use of 8Mbps PDH fiber-optic system is assumed for cost estimation purposes. The cost estimation model of the PDH system is illustrated in Figure 4.1.5-1. STE should always consider possibility of STM-1 SDH system adoption for local networks. In the case that a ring configuration of SDH-1 system reduce total cable length a lot in a local network, the STM-1 SDH can be more economical than the conventional PDH system.

4.1.6 SDH Network Management Systems

For OMCs (Network Operation & Management Centers) which are proposed in STE, SDH NMSs (Network Management Systems) or SDH TMN (Telecommunication Management Network) systems are introduced. The OMCs will be at Damascus, Aleppo, Homs, Lattakia and Deir Elzor. Damascus NMC (Network Management Center) will also have a SDH NMS.

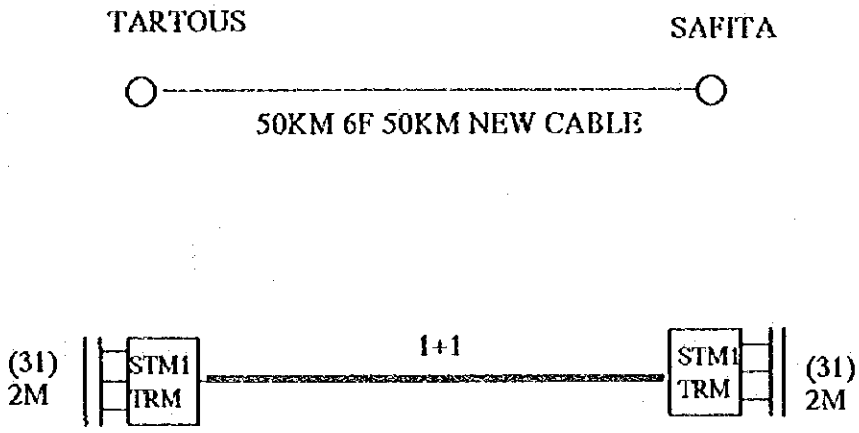


Fig. 4.1.3-1 Network Configuration for Safita

Table 4.1.4-1 Local Sections with Existing Systems

Daraa

	Section		Required circuits in 2000 [2Mbps]	Existing System	Plan	Note
1	Daraa	Dael	63	F.O. 140Mbps,34Mbps	No	TS cct +28
17	Dael	Shayke Maskeen	44	F.O. 140Mbps,34Mbps	No	TS cct +28
15	Shayke Maskeen	Sanamen	29	F.O. 140Mbps,34Mbps	No	TS cct +46
17	Dael	Taffas	5	F.O. 34Mbps	No	
17	Dael	Kazzaleh	21	F.O. 34Mbps	No	
20	Kazzaleh	Alhrak	5	F.O. 34Mbps	No	
15	Shayke Maskeen	Nawa	17	F.O. 34Mbps	No	
13	Nawa	Jassen	7	F.O. 34Mbps	No	
15	Shayke Maskeen	Ezrac	25	F.O. 34Mbps	No	TS cct +22
10	Ezrac	Bosra	6	F.O. 34Mbps	No	

Note: STE has an on-going plan to replace 34Mbps systems with 140Mbps systems.

Sweda

	Section		Required circuits in 2000 [2Mbps]	Existing System	Plan	Note
8	Shahaba	Sweda	7	6F 34Mbps 1+1 sys	No	
9	Salkad	Al Qraya	6	6F 34Mbps 1+1 sys	No	
10	Al Qraya	Sweda	11	12F 34Mbps 1+1 sys	No	

Table 4.1.4-1 Local Sections with Existing Systems (continued)

Aleppo Rural

	SECTION		Require Circuits in 2000 [2Mbps]	Existing system	Plan	Note
2	Manbeg	Tar Armane	22	2GHz 34Mbps 1+1	add one system	
	Tar Armane	Ein Alarab	12	2GHz 17Mbps 1+1	17Mbps->34Mbps 1+1	
	Tar Armane	Jarablos	10	2GHz 17Mbps 1+1	17Mbps->34Mbps 1+1	
67	TS	Aleppo tr.	84	4F 140Mbps 2	No	
	Aleppo tr.	Albab	46	2GHz 34Mbps 3+1	No	
1	Albab	Manbeg	32	2GHz 34Mbps 2+1	No	
	Aleppo tr.	Kathmeh	38	2GHz 34Mbps 2+1	add one ststem	
6	Efreen	Kathmeh	12	2GHz 34Mbps 1+1	No	
7	Aezaz	Kathmeh	10	2GHz 34Mbps 1+1	No	
4	Sfeira	TS	20	2GHz 34Mbps 1+1	add one system	
13	Tal Refaet	Kathmeh	16	2GHz 34Mbps 1+1	No	

Rakkah

	SECTION		Required Sections in 2000 [2Mbps]	Existing System	Plan	Note
8	Al Thaowrah	Rakkah	18	Trans MUX	2GHz 34Mbps 2+1	

Table 4.1.4-1 Local Sections with Existing Systems (continued)

Idleb

	SECTION		Required Circuits in 2000 [2Mbps]	Existing System	PLAN	Note
5	Jessr Shkour	Idleb	18	F.O. 140Mbps	No	
13	Maert Alneaman	Idleb	30	2GHz 34Mbps 1+1	add one system	
15	Srakeb	Maert Alneaman	14	2GHz 34Mbps 1+1	No	
12	Selkien	Idleb	6	2GHz 34Mbps 1+1	No	
10	Kofer Takariem	Taltita	4	2GHz 34Mbps 1+1	No	
8	Harem	Taltita	4	2GHz 34Mbps 1+1	No	
	Taltita	Idleb	8	2GHz 34Mbps 1+1	No	
11	Arieha	Idleb	12	2GHz 34Mbps 1+1	No	

Tabale 4.1.4-1 Local Sections with Existing Exchanges

Alhasaka

	SECTION		Required Circuits in 2000 [2Mbps]	Existing System	Plan	Note
1	Al Hasaka	Kamesjle	67	Analog Microwave		see Long Line Network
1	Al Hasaka	Ras Alein	6	2GHz 34Mbps 1+1	No	
5	Kamesjle	Malkiah	10	2GHz 34Mbps 1+1	No	
5	Kamesjle	Amodah	12	2GHz 34Mbps 1+1	No	
9	Amodah	Derbasieh	6	2GHz 34Mbps 1+1	No	

Table 4.1.4-1 Local Sections with Existing Systems (continued)

Der Al Zor

	SECTION		Required Circuits in 2000 [2Mbps]	Existing System	Plan	Note
1	Der Al Zor	Mayadine	36	analog micorwave		see Long Local Sections
8	Mayadine	Boukmal	15	analog micorwave		see Long Local Sections

Hama

	SECTION		Required Circuits in 2000 [2Mbps]	Existing System	Plan	Note
8	Salammeh	Kowatlle	30	2GHz 34Mbps 1	add one system	*
11	Mesyaf	Kowatlle	12	2GHz 34Mbps 0.5	add one system	*
12	Mhardeh	Kowatlle	14	2GHz 34Mbps 0.5	add one system	*
13	Skelbeyeh	Kowatlle	24	2GHz 34Mbps 0.5	add one system	*
13	Skelbeyeh	Tal Salhab	6	4F 140Mbps	No	
17	Kamhaneh	Kowatlle	4	13GHz 34Mbps 0.5	No	*

note*:Accurate system configuration is not available.

Table 4.1.4-1 Local Sections with Existing Systems (continued)

Homs

	SECTION		Required Circuits in 2000 [2Mbps]	Existing System	Plan	Note
10	Al Kseir	TS	14	2GHz 34Mbps 1+1	No	
12	Tadmor	TS	14	analog microwave		see Long Local Sections
13	Talkalakh	TS	3	F.O. 140Mbps	No	
14	Alrastan	Talbeseh	14	4F 140Mbps 1	No	
20	Talbeseh	TS	20	4F 140Mbps 1	No	
15	Al Mkaram	Sawane Mt.	6	2GHz 34Mbps 1+1	No	
17	Alkareyten	Sawane Mt.	8	2GHz 34Mbps 1+1	No	
57	TS	Sawane Mt.	14	2GHz 34Mbps 2+1	No	
18	Sheen	TS	30	2GHz 34Mbps 3+1	No	
21	Taldo	Sheen	8	2GHz 34Mbps 1+1	No	
25	Al Nasra	Sheen	16	2GHz 34Mbps 2+1	No	

Lattakia

	SECTION		Required Circuits in 2000 [2Mbps]	Existing System	Plan	Note
7	Al Hafeh	Lattakia	8	2GHz 34Mbps 1+1	No	
11	Kerdaha	Lattakia	28	analog microwave	2GHz 34Mbps 2+1	
16	Jableh	Lattakia	43	analog microwave	2GHz 34Mbps 3+1	
10	Slonfeh	Lattakia	4	2GHz 34Mbps 1+1	No	
15	Kasab	Lattakia	4	2GHz 17Mbps 1+1	No	
22	Al Daleah	Lattakia	6	2GHz 34Mbps 1+1	No	
23	Beat Yashot	Lattakia	6	2GHz 34Mbps 1+1	No	

Table 4.1.4-1 Local Sections with Existing Systems (continued)

Tartous

	SECTION		Required Circuits in 2000 [2Mbps]	Existing System	Plan	Note
2	Banyas	Tartous	15	F.O. 140Mbps	No	see Long Local Sections
3	Safetta	Tartous	31	analog microwave		
4	Dreakesh	Safetta	6	2GHz 34Mbps 1+1	No	
5	Sheakbadoer	Tartous	6	2GHz 34Mbps 1+1	No	
6	Erwad	Tartous	2	2GHz 34Mbps 1+1	No	
7	Mashta	Safetta	8	2GHz 34Mbps 1+1	No	

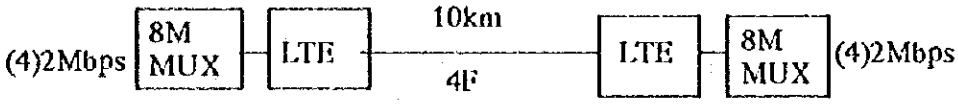


Fig. 4.1.5-1 Cost Estimation Model for Local Network

Table 4.1.5-1 Local Sections to Small Exhanges

Damascus

	STATION	CCT1	CCT2	total	2Mbps	Note	
50	Heneh	30	30	60	2		
52	Sassaa	60	60	120	4		
57	Kanaker	60	60	120	4		
58	Beatgen	60	60	120	4		
59	Kafar Haour	60	60	120	4		
60	Horjalleh	30	30	60	2		
61	Hosharab	30	30	60	2		
62	Abadi	30	30	60	2		
63	Hejanee	30	30	60	2		
64	Meshrfeh	30	30	60	2		
65	Derali	30	30	60	2		
66	Sahl	30	30	60	2		
67	Kastal	30	30	60	2		
68	Maaroneh	30	30	60	2		
69	Muadamieh	60	60	120	4		
71	Thayat Al Assad	90	90	180	6		
72	Basel Al Asad	60	60	120	4		
73	Dahiet Qudsaia	60	60	120	4		
74	Shufenia	30	30	60	2		
75	Gisrien	90	90	180	6		
76	Al Hemereh	30	30	60	2		
77	Gua'adien	30	30	60	2		
78	Al Kaklam	30	30	60	2		
53	Kozlanea	30	30	60	2	Bab Sharki	(Damas H)
70	Mlehaa	150	150	300	10	Bab Sharki	(Damas H)
26	Munin	150	150	300	10	Tall	(Damas I)
56	Zakeah	90	90	180	6	Keswa	(Damas x)
49	Tawani	60	60	120	4	Sydnaya	(Damas Y)
51	Rankus	90	90	180	6	Sydnaya	(Damas Y)
54	Esselalward	90	90	180	6	Sydnaya	(Damas Y)
55	Hafeer Foka	30	30	60	2	Sydnaya	(Damas Y)

Table 4.1.5-1 Local Sections to Small Exchanges (continued)

Quennetra

	STATION	CCT1	CCT2	total	2Mbps	Note
6	Alrafeed	30	30	60	2	
7	Beer Ajam	30	30	60	2	
8	Masara	30	30	60	2	
9	Seedah	30	30	60	2	
10	Magdal Shames	30	30	60	2	
11	Masada	30	30	60	2	
12	Ba'akat	30	30	60	2	
13	Ein Kineia	30	30	60	2	
14	Ghager	30	30	60	2	

Sweda

	STATION	CCT1	CCT2	total	2Mbps	Note
11	Alkarye	30	60	90	3	
12	Hazem	30	30	60	2	
13	Alsegen	30	60	90	3	
14	Shagah	60	60	120	4	
15	Mshanaf	30	30	60	2	
16	Ezra	60	90	150	5	
17	Imtan	30	30	60	2	
18	Arekah	30	60	90	3	
19	Alkafer	60	90	150	5	
20	Sawarah	30	60	90	3	
21	Namra	30	60	90	3	
22	Dibeen	30	30	60	2	
23	Kanawat	60	90	150	5	
24	Al Raha	30	60	90	3	
25	Orman	30	60	90	3	
26	Kferalhuhf	30	60	90	3	
27	Dama	30	30	60	2	
28	Al Hawaya	30	30	60	2	

Table 4 1 5-1 Local Sections to Small Exchanges (continued)

Aleppo Rural

	STATION	CCT1	CCT2	total	2Mbps	Note
17	Daret Ezza	90	90	180	6	
18	Nobbel	120	120	240	8	
20	Jendeares	90	90	180	6	
21	Atareb	90	90	180	6	
24	Shiekhadied	60	60	120	4	
25	Hadder	60	60	120	4	
26	Rajo	30	30	60	2	
27	Masbattle	30	30	60	2	
28	Alzareh	60	60	120	4	
29	Bolbul	30	30	60	2	
31	Sharan	30	30	60	2	
32	Ariemeh	30	30	60	2	
33	Rasm Hormol	30	30	60	2	
34	Koubersi Sharki	30	30	60	2	
35	Banan	30	30	60	2	
36	Abtieen	30	30	60	2	
37	Wadiehi	30	30	60	2	
38	Tal Shkieb	30	30	60	2	
39	Mesielmieh	30	30	60	2	
40	Absemou	30	30	60	2	
41	Abien	30	30	60	2	
42	Haeyyan	30	30	60	2	
43	Kofer Hamra	30	30	60	2	
44	Ahtiemiat	30	30	60	2	
45	Bzzaeah	60	60	120	4	
46	Kabasien	30	30	60	2	
47	Abou Jrien	30	30	60	2	
48	Tal Hassel	30	30	60	2	
49	Tal Iren	60	60	120	4	
50	Kofer Janeh	30	30	60	2	
51	Basouta	30	30	60	2	
52	Bablimon	30	30	60	2	
53	Sadteshreen	60	60	120	4	
54	Zammar	30	30	60	2	
55	Tal Hedyah	30	30	60	2	
56	Hajeb	30	30	60	2	
57	Tadef	30	30	60	2	
58	Abugebe	30	30	60	2	
59	Mitrakaumhosh	30	30	60	2	
60	Dudyan	30	30	60	2	
61	Umalkaramil	30	30	60	2	
62	Omamuda	30	30	60	2	
63	Kafer Aleppo	30	30	60	2	
64	Baatiwoorem	30	30	60	2	
65	Alkubra	30	30	60	2	

Table 4.1.5-1 Local Sections to Small Exchanges (continued)

Aleppo Rural (continued)

	STATION	CCT1	CCT2	total	2Mbps	Note
66	Angara	30	30	60	2	
19	Marea	90	90	180	6	Tal Refaet
22	Dier Hafer	60	60	120	4	Steira
23	Maskaneh	60	60	120	4	Steira
30	Kanaser	30	30	60	2	Steira

Rakkah

	STATION	CCT1	CCT2	total	2Mbps	Note
6	Tal Abyath	60	180	240	8	
10	Jornneah	30	30	60	2	
11	Alhamrat	30	60	90	3	
12	Salhabeah	30	30	60	2	
13	Talhamam	30	30	60	2	
14	Hamam	30	30	60	2	
15	Khas Owjeel	30	60	90	3	
16	Sofsaffeh	30	30	60	2	
17	Ejeedden	30	60	90	3	
18	Debsi Afnan	30	30	60	2	
19	Kanem Ali	30	60	90	3	
20	Okershi	30	60	90	3	
21	Debsi Farage	30	30	60	2	
22	Hattleh	30	60	90	3	
23	Keas Daakoor	30	60	90	3	
24	Ratleh	30	30	60	2	
25	Hazima	30	60	90	3	
26	Gadidat	30	60	90	3	

Table 4.1.5-1 Local Sections to Small Exchanges (continued)

IdTeb

	STATION	CCT1	CCT2	total	2Mbps	Note
9	Aldana	60	60	120	4	
14	Maert Misrien	150	150	300	10	
21	Bensh	90	90	180	6	
25	Kelly	30	30	60	2	
27	Korganiah	30	30	60	2	
28	Janodieah	30	30	60	2	
29	Assifes	30	30	60	2	
30	Maaret Nassan	30	30	60	2	
31	Khan Sobel	30	30	60	2	
32	Maardabseh	30	30	60	2	
33	Afrayah	30	30	60	2	
34	Barahe	30	30	60	2	
35	Rami	30	30	60	2	
36	Kinsfrah	30	30	60	2	
37	Almare Alakdar	30	30	60	2	
38	Temanien	30	30	60	2	
39	Armanaz	30	30	60	2	
40	Tal Mins	30	30	60	2	
41	Kafroumeh	30	30	60	2	
42	Maar Shourien	30	30	60	2	
43	Maasaran	30	30	60	2	
44	Habjet	30	30	60	2	
45	Kfor Ouiaed	30	30	60	2	
46	Maartahremeh	30	30	60	2	
47	Alitehe	30	30	60	2	
48	Kfor Signeeh	30	30	60	2	
49	Alaleyah	30	30	60	2	
50	Azmarien	30	30	60	2	
51	Atmeenh	30	30	60	2	
52	Tamanya	30	30	60	2	
53	Mogdlya	30	30	60	2	
54	Foua	60	60	120	4	
55	Marata	30	30	60	2	
19	Ahsem	30	30	60	2	Srakeb
20	Abou Althohour	30	30	60	2	Srakeb
23	Jarjanaz	30	30	60	2	Srakeb
24	Heash	30	30	60	2	Srakeb
17	Kan Shekhon	120	120	240	8	Maert Alneaman
18	Kofer Nobeel	60	60	120	4	Maert Alneaman
22	Alkenyah	30	30	60	2	Jessr Shkour
26	Darkoush	30	30	60	2	Jessr Shkour

Table 4.1.5-1 Local Sections to Small Exchanges (continued)

Al Hasaka

	STATION	CCT1	CCT2	total	2Mbps	Note
16	Al Arieshea	30	30	60	2	
17	Twieni	30	30	60	2	
18	Misheerfeh	30	30	60	2	
19	Ajajeh Sharki	30	30	60	2	
20	Safeh	30	30	60	2	
21	Manajcer	30	30	60	2	
22	Abou Raseen	30	30	60	2	
23	Al Houl	30	30	60	2	
24	Sfyah	30	30	60	2	
25	Tal Macrouf	30	30	60	2	
26	Tal Hormus	30	30	60	2	
27	Tal Adas	30	30	60	2	
28	Tal Sokarah	30	30	60	2	
29	Tal Alou	30	30	60	2	
37	Almare Alakdar	30	30	60	2	
38	Termanien	30	30	60	2	
39	Armanaz	30	30	60	2	
40	Tal Mirs	30	30	60	2	
41	Kafroumch	30	30	60	2	
42	Maar Shourien	30	30	60	2	
43	Maasaran	30	30	60	2	
44	Habjet	30	30	60	2	
45	Kfor Ouised	30	30	60	2	
46	Maartahremeh	30	30	60	2	
47	Altteh	30	30	60	2	
48	Kfor Signech	30	30	60	2	
49	Alaleyah	30	30	60	2	
50	Azmarien	30	30	60	2	
51	Atmeenh	30	30	60	2	
52	Tamanya	30	30	60	2	
53	Magdlya	30	30	60	2	
54	Foua	60	60	120	4	
55	Marata	30	30	60	2	
19	Ahsem	30	30	60	2	Srakeb
20	Abou Althohour	30	30	60	2	Srakeb
23	Jarjanaz	30	30	60	2	Srakeb
24	Heash	30	30	60	2	Srakeb
17	Kan Shekhon	120	120	240	8	Maart Alnoaman
18	Kofer Noboel	60	60	120	4	Maart Alnoaman
22	Alkenyah	30	30	60	2	Jessr Shkour
26	Darkoush	30	30	60	2	Jessr Shkour

Table 4.1.5-1 Local Sections to Small Exchanges (continued)

Der Al Zor

	STATION	CCT1	CCT2	total	2Mbps	Note
20	Kriettah	30	30	60	2	
21	Kataah	30	30	60	2	
22	Ksham	30	30	60	2	
23	Mrat	30	30	60	2	
24	Al Baluah	30	30	60	2	
25	Bagous	30	30	60	2	
26	Bokros	30	30	60	2	
27	Mahkan	30	30	60	2	
28	Thieban	60	30	90	3	
29	Jerthi Sharki	30	30	60	2	
30	Tayaneh	30	30	60	2	
31	Abou Hardoob	30	30	60	2	
32	Dablan	60	30	90	3	
33	Sbiekan	60	60	120	4	
34	Sfereh Fokani	30	30	60	2	
35	Al Satchyah	30	30	60	2	
36	Bakareh	30	30	60	2	
37	Al Sa'aweh	30	30	60	2	
38	Al Kier	30	30	60	2	
39	Gazrehabouhamra	30	30	60	2	
40	Al Heriejeh	30	30	60	2	
41	Al Meriéaeh	30	30	60	2	

Table 4.1.5-1 Local Sections to Small Exchanges (continued)

Hama

	STATION	CCT1	CCT2	totoal	2Mbps	Note
21	Teabtaleman	60	60	120	4	
23	Kefrzeta	60	60	120	4	
24	Latamnnaeh	30	30	60	2	
25	Mork	60	60	120	4	
26	Kattabe	30	30	60	2	
30	Hor Bnafsoh	30	30	60	2	
31	Ein Hlakeem	30	30	60	2	
33	Kale Madik	60	60	120	4	
34	Zeyara	30	30	60	2	
35	Asrreyah	30	30	60	2	
36	Mabougeh	30	30	60	2	
37	Akareb	30	30	60	2	
38	Asharneh	30	30	60	2	
39	Frekeh	30	30	60	2	
40	Jomasseh	30	30	60	2	
41	Jeed	30	30	60	2	
42	Treamseh	60	60	120	4	
43	Der Mama	30	30	60	2	
44	Der Shmeal	30	30	60	2	
45	Mahroseh	30	30	60	2	
46	Baereen	30	30	60	2	
47	Nessaf	30	30	60	2	
48	Meryamen	30	30	60	2	
49	Asseleh	30	30	60	2	
50	Barshen	30	30	60	2	
51	Der Al Saleep	30	30	60	2	
52	Ein Krom	30	30	60	2	
53	Merdash	30	30	60	2	
54	Hwayjeh	30	30	60	2	
55	Jowreen	30	30	60	2	
56	Mershhoor	30	30	60	2	
57	Bserien	30	30	60	2	
58	Taksis	30	30	60	2	
59	Tizin	30	30	60	2	
60	Um Tiur	30	30	60	2	
20	Karnaz	30	30	60	2	Skelbeyeh
22	Wadialeuone	60	60	120	4	Mesyaf
27	Ssborra	60	60	120	4	Salammeh
28	Bare Sbarke	30	30	60	2	Salammeh
29	Alsaan	30	30	60	2	Salammeh
32	Okerbat	30	30	60	2	Salammeh

Table 4.1.5-1 Local Sections to Small Exchanges (continued)

Homs

	STATION	CCT1	CCT2	total	2Mbps	Note
30	Kattene	60	60	120	4	
32	Sadad	60	60	120	4	
34	Mesherfeh	60	60	120	4	
35	Rkama	30	30	60	2	
37	Ein Nesser	30	30	60	2	
38	Feen Nor	30	30	60	2	
39	Kfman	30	30	60	2	
40	Eisson	30	30	60	2	
41	Taeabeh	30	30	60	2	
42	Alkom	30	30	60	2	
43	Khrbetal	30	30	60	2	
44	Breage	30	30	60	2	
45	Ghassaneh	30	30	60	2	
46	Abouhakfeh	30	30	60	2	
47	Karniah	30	30	60	2	
48	Beadeh	30	30	60	2	
49	Umhartien	30	30	60	2	
50	Al Magd	60	60	120	4	
51	Sakreh	30	30	60	2	
52	Rayan	30	30	60	2	
53	Hasour	30	30	60	2	
54	Tal Housh	30	30	60	2	
55	Dardara'a	30	30	60	2	
56	Akradesneh	30	30	60	2	
12	Alsoqneh	60	60	120	4	Tadmor
17	Maheen	30	30	60	2	Alkareyten
21	Alkabo	30	30	60	2	Taldo

Table 4.1.5-1 Local Sections to Small Exchanges (continued)

Tartous

	STATION	CCT1	CCT2	total	2Mbps	Note
8	Hossen	60	60	120	4	
9	Alkadoms	60	60	120	4	
10	Hemen	30	60	90	3	
11	Dower Rslan	60	60	120	4	
12	Sofsafeh	30	60	90	3	
13	Thaher Safra	30	60	90	3	
14	Alhamedeah	30	30	60	2	
15	Enazzeh	30	30	60	2	
16	Bhanceen	30	30	60	2	
17	Kerbtal Meazeh	30	60	90	3	
18	Brmana Mashyek	30	30	60	2	
19	Alremal	60	60	120	4	
20	Karemeh	30	30	60	2	
21	Dower Saaed	30	30	60	2	
22	Ein Zarkah	30	30	60	2	
23	Jenent Roslan	30	30	60	2	
24	Albeatha	30	30	60	2	
25	Taenetta	30	30	60	2	
26	Hresson Kamoea	30	30	60	2	
27	Taleen	30	30	60	2	
28	Altewaheen	30	30	60	2	
29	Hamam Wassel	30	30	60	2	
30	Kamsseh	30	30	60	2	
31	Raes Kashofeh	30	30	60	2	
32	Sesneah	30	30	60	2	
33	Alrakmeh	30	30	60	2	
34	Albarkeah	30	30	60	2	
35	Alsebeh	30	30	60	2	
36	Fajlect	30	30	60	2	
37	Alnaeamch	30	30	60	2	
38	Aljerweyah	30	30	60	2	
39	Ensash Al Reef	30	30	60	2	
40	Bluza	30	30	60	2	
41	Khurbafaras	30	30	60	2	
42	Kaf Gaa	30	30	60	2	
43	Zahed	30	30	60	2	
44	Zaher Ragab	30	30	60	2	
45	Wadi Adida	30	30	60	2	
46	Bermas	30	30	60	2	
47	Kabiaamar	30	30	60	2	

4.2 Switching for the PSTN / ISDN

This part of the Facilities Plan in the frame work of the Acrion Plan outlines the amount of switching equipment and the amount of junction and trunk lines to be deployed in STE's network during the Eighth National Five-Year Plan.

The Facilities Plan for switching shall not and can not substitute for detailed planning, which has to be performed at regular intervals as preparation for project implementation.

4.2.1 Relation with the Fulfillment Plan

The Facilities Plan for switching is based on the Demand Fulfillment plan and the Traffic Forecast as lined out in Chapter 3 of this Report.

The Fulfillment Plan as outlined in the Action Plan shall guide STE's network development by setting targets for the amount of subscriber lines to be in service in each of the next 5 years (Eighth National Five-Year Plan). It aims at the accelerated provision of telephone services in order to satisfy demand. Thus, the Fulfillment Plan is the co-ordinating instrument for provision of the particular telecommunications network components (transmission facilities, switching facilities and subscriber networks).

This Facilities Plan for switching strictly follows the Fulfillment Plan.

4.2.2 Regular Switching Equipment Expansion and Deployment

With the deployment of switching equipment in STE's network already at an advanced level, it is proposed to shift the expansion and deployment strategy from large project implementation to continuous provision based on demand-oriented continuous planning.

Continuous provision involves the introduction of a so-called "planning period" of n years. This means that in the year x provision for demand of the year x+n has to be implemented. The planning and commissioning of equipment, therefore has to be done in the year x-1.

To equalize planning, commissioning and implementation work load, the expansion for 1/n th of the exchanges is done each year in turn, so that after n years, the planning and provision cycle starts again.

The planning period is a compromise between planning and implementation overhead costs and interest costs for advanced investment. For networks growing at normal speed, a planning period of n = 2 years is usual.

However, the planning period for very slowly growing exchanges may be superseded by minimum provision requirements, which reflect the fact that if an expansion project becomes too small, the planning and commissioning overhead becomes unacceptably high. In such cases the minimum amount is provided and the planning period is expanded accordingly for these exchanges. The minimum provision requirements are given in the respective sub-sections in the following.

4.2.2.1 Local Exchanges

Strategically, the currently-valid final capacities for local exchanges should first of all be revised in accordance with the proposals in Section 6.11 of the Master Plan, and greater use of remote units (RU) should be made.

The exchange and remote unit sizes for the next 5 years in accordance with the Fulfillment Plan are shown in S3-1-4-1 in the Supporting Report.

The frame conditions have been set as follows:

- Planning period **2** years,
  Minimum expansion for local (host) exchanges **1000** line units,
  Minimum expansion for remote units (RU) **100** line units,

Note: The figures in the column "Existing" contain the remote unit project (125 000 line units as RDLU, planned and commissioned for implementation in 1996) and the small digital exchange project (125 000 line units (Samsung) planned for implementation in 1997), since financing of these projects is covered by the Seventh National Five-Year Plan. However, the envisaged "25% up-grade" for these projects is assumed as part of the Eighth National Five-Year Plan.

4.2.2.2 Junction Lines

An overview on the expected development of junction networks in the five year interval 1996 to 2000 is given for each local and regional network in S3-1-4-2 in the Supporting Report.

Junction networks are the lines between the local exchanges and between the local exchanges and their associated transit (STD) exchanges.

No planning period has been imposed, since the junction lines are normally connected on demand at yearly intervals. Necessary junction line ports in the exchanges must be

provided with the regular expansions of the respective exchanges, and the necessary transmission systems are provided in accordance with the provision of transmission.

However, the figures in S3-1-4-2 in the Supporting Report provide the basis for short-term local and regional transmission planning.

4.2.2.3 Long-Distance Exchanges

The long-distance (STD) exchange sizes for the next 5 years in accordance with the Fulfillment Plan are shown in S3-1-4-3 in the Supporting Report.

The frame conditions have been set as follows:

> Planning period **2** years,
> Minimum expansion for dedicated long distance (STD) exchanges **120** ports,
> Minimum expansion for combined local / long distance exchanges **30** ports,
> The expansion of the long distance portion of a combined exchange is always implemented together with the expansion of the subscriber portion of that exchange.

It should be noted that the position "INTERNATIONAL" includes only the national side of the International Gateway Exchanges (IGE) in Damascus and Aleppo.

4.2.2.4 Long-Distance Lines

An overview on the expected development of long-distance lines during the Eighth National Five-Year Plan is given in S3-1-4-4 in the Supporting Report.

No planning period has been imposed, since long-distance lines are normally connected on demand at yearly intervals. The necessary long-distance line ports in long-distance exchanges must be provided with the regular expansions of the respective exchange, and the necessary transmission systems are provided in accordance with the provision of transmission.

However, the figures in S3-1-4-4 in the Supporting Report provide the basis for long-distance transmission planning.

4.2.3 Replacement of the EMD Switching System

Even with the ambitious expansion targets set in this Action Plan, it is strongly recommended to replace that should be replaced during the Eighth National Five-Year Plan (1996 - 2000).

The equipment should be scrapped, and relocation to other sites should not be considered.

The replacement should be started with priority in the Damascus local network.

4.2.4 Five Year Plan Overview

As an extract from the Facilities Plan for switching, the following table gives a comprehensive overview for the Eighth National Five-Year Plan.

	1996	1997	1998	1999	2000
Regular Network Expansion (Line Units)	123,300	243,300	430,900	411,000	323,900
Replacement of EMD (Line Units)	10,000	82,000	0	61,000	68,000
Subscriber Line Units to be procured	133,300	325,300	430,900	472,000	391,900
Subscriber Line Units Five Year Plan					1,753,500
Trunk Line Units to be procured	6,160	7,560	6,360	7,340	9,330
Trunk Line Units Five Year Plan					36,750

4.3 Subscriber Network

The following Facilities Plan for subscriber lines gives the total number of lines to be available in the network on a year-by-year basis and on a per-exchange area basis. In addition, the number of subscriber lines to be installed every year are calculated on a per-exchange area basis to allow for an estimation of the investment needed.

The number of lines is shown separately in primary cable pairs and in secondary cable pairs since different flexibility factors are applied for the respective cable pairs, i.e. primary and secondary cable pairs.

Section 6.4. of the Interim Report (August 1995) describes a change in the subscriber network system, which is mainly from conventional subscriber networks with primary cables and Cross Connection Cabinets (CCCs) to hybrid subscriber networks with Remote Units (RUs) that replace the CCCs and are connected to the host exchange by optical fiber cables. Owing to the large number of Switching LU's already provided or ordered but not yet supplemented by associated subscriber networks, it is not exactly predictable at what point in time the transition in construction from conventional subscriber networks to hybrid subscriber networks will take place. Furthermore it may appear that this transition could be at very different points in time for each exchange area.

In fact, no new primary cables will be installed in the areas where hybrid subscriber network is introduced.

However, S3-1-4-6 and S3-1-4-8 in the Supporting Report still show primary cable pairs throughout all the time under consideration. Since the main purpose of this Facility Plan is to estimate the investments needed for the subscriber network installation and since it can be assumed that the investments needed for each subscriber line will not be higher for the new hybrid subscriber network than for the conventional subscriber network, the calculation is still based on primary copper pairs even for the time beyond the transition.

4.3.1 Determination of the total number of subscriber lines

S 3-1-4-6, 3-1-4-7, 3-1-4-8 and 3-1-4-9 in the Supporting Report will reflect the capacities of primary cable pairs as well as secondary cable pairs per exchange area based on the "Demand Fulfillment Plan" of this Report.

The actual layout of the primary and secondary network, i.e. type and capacity of the cables, has to be decided on a per case basis in the detailed design.

4.3.1.1 Determination of Primary Cable Pairs

The number of subscribers per exchange area depicted in the demand fulfillment plan represents the number of required line units in the exchange for the year Tx + 5 actually to be provided in Tx. Tx is defined as the completion date for the installation of an outside plant network.

In order to provide sufficient flexibility in the network, an average distribution factor (ratio between primary pairs terminated at the MDF and required line units) of 1.35 was proposed in the Interim Report (August 1995) to be used for the calculation of primary pairs per exchange area.

However, after intensive discussions with STE counterparts it was concluded to use the STE design standards, i.e. a distribution factor of 1.5.

S3-1-4-6 in the Supporting Report shows the figures of primary pairs per exchange area (in thousands), which have to be installed according to the Demand Fulfillment Plan, considering a provision period of five years. In this way the value for the year 1996 is of 1/5th of the total amount of additional primary pairs required for the year 2001 plus the amount of the required primary pairs for that year, which is the amount of subscribers multiplied by 1.5.
This calculation is based on the consideration that the expansion of an exchange area is split into five different groups of cabinet areas, and each group which will be extended in turn every five years.

4.3.1.2 Determination of Secondary Cable Pairs

For the calculation of the required secondary cable pairs, an average distribution factor (ratio between primary and secondary cable pairs) of 1.5 (STE design standard) is applied to provide the necessary flexibility in network arrangements. This factor already includes the deduction of direct feed cables, which are included in the primary cable pairs calculation.
S3-1-4-7 in the Supporting Report shows the figures of secondary cable pairs per exchange area (in thousands), which have to be installed according to the Demand Fulfillment Plan.

4.3.2 Determination of the Yearly Installation Volume for Subscriber Lines

The objective of the following calculations is to give an estimation of the number of subscriber lines in order to determine the required investment.

The numbers of necessary additional primary and secondary cable pairs are calculated based on S3-1-4-6 and S3-1-4-7 in the Supporting Report on an exchange area basis.

However, it must be assumed that several subscriber network construction projects are underway to be completed in 1995, 1996 and 1997. Since no data can yet be obtained on these projects, the figures for the years 1996 and 1997 are not adjusted in accordance with the ongoing projects. For the determination of the actual figures for the respective years, the adjustment has to be done by STE as soon as accurate data on the ongoing projects is available.

S3-1-4-8 in the Supporting Report shows the figures of primary pairs per exchange area (in thousands) to be installed additionally every year, which is the difference of the total amount between two adjacent years as per S3-1-4-6 in the Supporting Report.

S3-1-4-9 in the Supporting Report shows the figures of secondary pairs per exchange area (in thousands) to be installed additionally every year, which is the difference of the total amount between two adjacent years as per S3-1-4-7 in the Supporting Report.

4.3.3 Five-Year Plans

A summary of the additional numbers of primary and secondary cable pairs respectively to be installed until the year 2000 per region (province) is shown in S 3-1-4-10 and S 3-1-4-11 in the Supporting Report.
The total capacity of additional primary and secondary cable pairs to be provided for Syria in the Eighth National Five-Year Plan is shown in the table below:

Primary Pairs	2,051,400
Secondary Pairs	3,077,100
Total	5,128,500

4.4 Computerization

4.4.1 Computerization Policy

The Study Team has analyzed the necessity of computerization regarding service-order system including subscriber line management, and billing system. However, it is more appropriate that they are distinguished between a telephone-center system and a billing-center system in examining computer system configuration and implementation of the system. Because some part of billing function (mainly calculation of bills) is done in a billing center and the other part (mainly collecting bills) is done in a telephone center.

Table 4.4.1-1 Examined System for Implementation

Examined system for implementation	Main function
Telephone-center system	Service order
	Subscriber line management
	Bill collection, Bill printing
Billing-center System	Bill calculation

In addition, it is suggested that management information system (MIS) should be also examined and implemented.

Presently, STE is striving to introduce computerized systems that contain billing and telephone-center systems.
Regarding to a telephone-center system and a billing-center system, the systems that STE is developing is practically almost the same as those we propose from the viewpoint of the objectives, the target, and the scale. We have therefore decided to utilize the similar system configuration.
We also propose the client-server computer system for billing-center system, telephone-center systems and management information system from the following reasons:
- Client-server systems are becoming dominant in computer systems
- Client-server systems are relatively cost effective compared with host type computer systems

Features, backgrounds to be introduced and locations to be installed etc. for the these Systems are described in the following.

(1) Billing-center System

The delay of bill issue and bill collection is a major management problem to STE, and must be resolved as soon as possible.

In 1995, STE installed a new billing-center system (Bull system) in Damascus, but its processing capacity is inadequate considering the Fulfillment Plan from 1996 to 2000.

The capacity of the new billing-center system in Damascus is about 1 million subscribers, and the number of current subscribers has already exceeded its capacity. Therefore, the installation of another new billing-center system is urgently required in 1996.

In considering the configuration of the billing-center system, billing processing type (concentrated processing or distributed processing) must be decided. We recommend the distributed processing type for the billing-center system for the following reasons:

- Resistant to the system down or system trouble
- Difficult to expand the processing capability of billing application software

Therefore, it is suggested that a billing-center system is installed in Aleppo in 1996 in addition to the current Billing-center system in Damascus.

The Billing-center in Damascus will process the bills in the south area of Syria (Damascus City, Damascus Rural, Quennetra, Darra, Sweda), and the Billing-center in Aleppo will process the bills in the north (Aleppo, Idleb), coast (Lattakia, Tartous), middle (Homs, Hama) and east (Al Hasaka, Der Alzor, Rakka) areas of Syria.

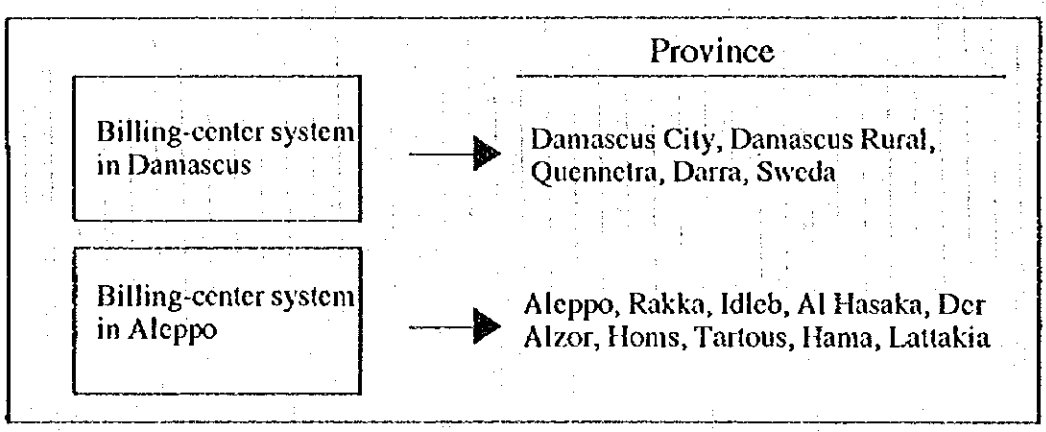


Figure 4.4.1-1 Processing Areas of Billing-center Systems

In 1998, the number of subscribers borne by the Billing-center in Aleppo will exceed its capacity, and the expansion of hard disk capacity for this system will be required.

(2) Telephone-center systems

STE installed 14 telephone-center systems in Damascus in 1995, and more Telephone-center systems are needed in other provinces in order to improve the efficiency of

telephone-center operations. Therefore, 48 telephone-centers, that have more than 10,000 subscribers for the new telephone-center system installation from 1996 to 2000 are selected.

The installation of the telephone-center systems requires many system engineers and much training for the system operators, therefore it is practical to divide the installation the telephone-center System into 2 phases.

(3) Management information system

The analysis of the information in the billing-center system and telephone-center system is indispensable for the STE's management improvement. Therefore, it is suggested that the management information system which enables STE to analyze many pieces of information from the both systems is installed. By using these systems, it is possible for directors in the STE to obtain and analyze the following data quickly by area and time(month and year).

- The number of subscribers by telephone center
- The volume of telephone usage (the number of calls and total duration of calls)
- The amount of issued bills
- The amount of paid bills
- The number of proposed telephone installation
- The number of the waiting lists for telephone installation

Gathering the summarized data from the both systems should be carried out by month.

4.4.2 Computer Systems Configuration

(1) Billing-center System

Billing-center System overview is shown in Figure 4.4.2-1.

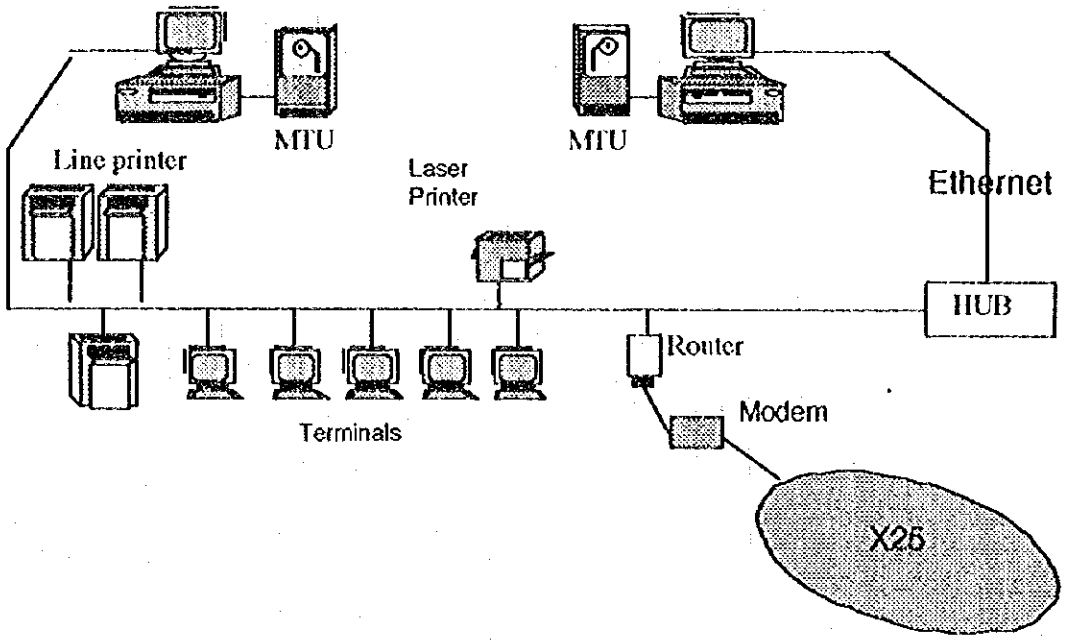


Figure 4.4.2-1 Billing-center System

A server, terminals, network equipment and other devices are necessary for the billing center.

The billing-center system requires high reliability, especially in the server that calculates and issues bill. If the server shuts down, damage could be severe. A duplex system is thus vital.

On the other hand, operating system for server, database software, compiler and application software are required for this system. Table 4.4.2-1 and Table 4.4.2-2 give the required Hardware and Software for the Billing-center System.

Table 4.4.2-1 Required Hardware for Billing-center System

Hardware		Quantity
Billing computer	Server (UNIX)	2
Line printer	Bill printing	2
Laser printer		1
Magnetic tape		2
Terminal	X-terminal	32
Hub		6
Router		1
Modem		1
UPS	10kVA	2

Table 4.4.2-2 Required Software for Billing-center System

Software		Quantity
Operating system for server	UNIX	2
Database software	Oracle	2
Compiler	C Compiler	1
Application software	Packaged software	1

(2) Telephone-center system

Telephone-center system overview is shown in Figure 4.4.2-2.

Terminals are available for each telephone center's contract section, technical section, construction section, exchange section, testing section, cable section, complaints section, and directory section. Besides, a chief of each telephone center uses one to manage the whole of work or service of the center. Moreover, another terminal is needed for a system administrator for system administration, operation, and maintenance. Cash registers similar to these terminals are available for cashiers and staff can treat cash for bills with them.

These terminals including cash registers must mutually communicate and thus are connected by a LAN (Local Area Network) and a file server. The customer information for each telephone center is utilized in a billing center, too. Accordingly, the file server in each telephone center is connected to a billing center by public network (X.25).

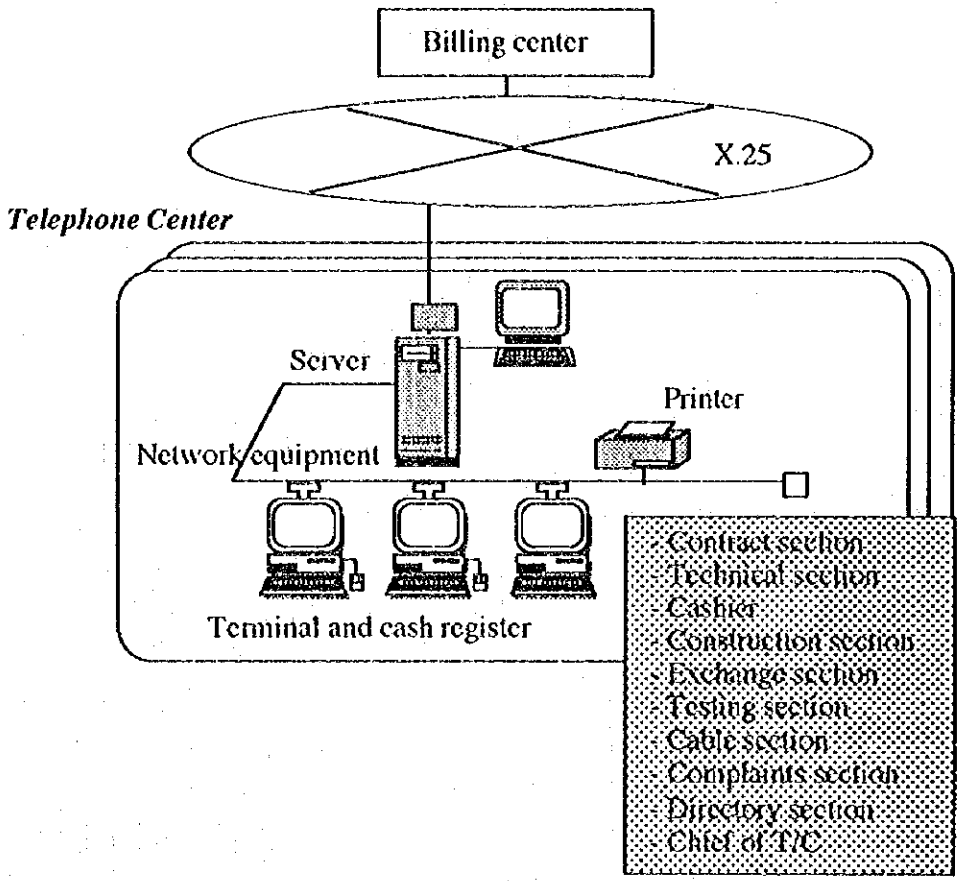


Figure 4.4.2-2 Telephone-center system overview

A server, terminals, network equipment and other devices are necessary for each telephone center.

The required Hardware and software is shown in Table 4.4.2-3 and Table 4.4.2-4.

Table 4.4.2-3 Required Hardware for each Telephone-center System

Hardware		Section	Quantity
Server	• CPU • Ethernet adapter • Floppy Drive • Hard disk • Streamer • CD-ROM drive		1
Terminal	• CPU • Ethernet adapter • Floppy drive • Hard disk	Chief of T/C	1
		System administration	1
		Contract	Formula A
		Technical	1
		Cashier	Formula B
		Construction	1
		Exchange	1
		Testing	1
		Cable	1
		Complaints	1
		Directory	1
Laser printer			1
Printer		Each section	11
	Bill printing	Cashier	Formula B
Router			1
Hub			Formula C
Modem			1
UPS			1

Formula A, Formula B, Formula C are calculated as follows,

$$\text{Formula A} = \frac{15 \text{ X Number of transactions of each center}}{6 \text{ X } 60}$$

Average job processing time = 15 minutes
Working hours = 6 hours

$$\text{Formula B} = \frac{\text{Number of subscribers of each center}}{10{,}000}$$

$$\text{Formula C} = \frac{\text{Number of devices connected to LAN - 1}}{7}$$

Table 4.4.2-4 Required Software for Telephone-center System

Software		Quantity
Operating system for server	UNIX	1
Operating system for terminal	Windows	Each terminal
Database management system	Oracle	1
Network soft	(D/B manipulation)	Each terminal
Application software	Packaged software	1

We have calculated the total quantity of system products for 48 telephone-centers except for those in Damascus city which had been already introduced, and the numbers are as follows:

Table.4.4.2-5 Total Quantity of Hardware for All Telephone-centers

Hardware	Total Quantity
Server	48
Terminal	654
Laser printer	528
Printer	163
Router	48
Hub	126
Modem	48
UPS	48

Table.4.4.2-6 Total Quantity of Software for All Telephone-centers

Software	Total Quantity
Operating system for server	48
Operating system for terminal	654
Data management system	48
Network software	654
Application software	1

(3) Management Information System

A server of MIS is to be installed in headquarters of STE and it is connected to telephone center systems and billing center systems to gather customer information and billing information owned by them. Client terminals are installed in headquarters and each province connected by public network (X.25) so that directors can utilize them.

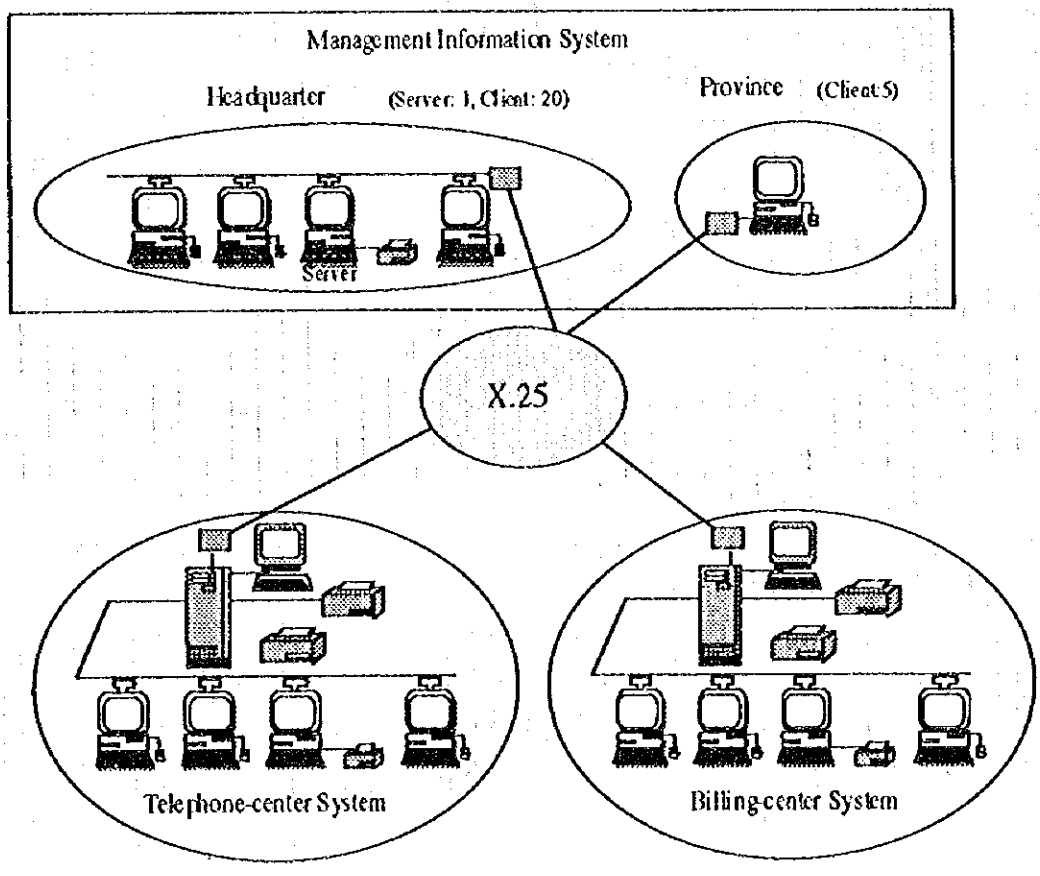


Figure 4.4.2-3 Management information system overview