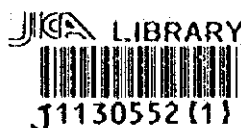


JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
MINISTRY OF INFRASTRUCTURE DEVELOPMENT (MOID)
MONGOLIAN COMMUNICATIONS ASSET COMPANY (MCAC)

THE STUDY
ON
TELECOMMUNICATIONS NETWORK
IN
ULAANBAATAR CITY

FINAL REPORT
VOLUME - V
DATA BOOK

JULY 1996



JAPAN TELECOMMUNICATIONS ENGINEERING
AND CONSULTING SERVICE (JTEC)

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CHAPTER 1

EXISTING FACILITIES AND ON-GOING PROJECTS

CHAPTER 1

EXISTING FACILITIES AND ON-GOING PROJECTS

1 Existing Exchange Facilities and On-Going Projects

Figure 1-1-1 Telephone Exchanges in Ulaanbaatar city (Existing as of 1995 & On-Going)

District	Area Name	Exchange	Type	Existing Capacity as of Oct. 1995				Subscriber Lines				Waiting Applicant (Sep.95)				Switch Expansion by On-Going Project				New Connection (end of 97)	SW Cap. Total (end of 97)
				Switching Capacity		Total		Total		Total		K/W		NDF		NORAD		OBCF			
				Div.	Area	Total	Dig.	Ana	Total	Applicant	(Sep.95)	K/W	ADR	NDF	NORAD	OBCF	OBCF				
1 Hara-Uul	120 Munggal	ATC34	RSU	3,328	3,328	3,278	3,278	1,191												3,328	
	Airport	ATC37 A	RSU	1,024	1,024	660	660	518												1,024	
	Yarmay	ATC37 Y	RSU																	0	
	Backerthiphat	ATC76	XP	200	200	145	145	0												200	
2 Songio Hairhan	Shurvaan Fabne	ATC	PRX	100	100	60	60	30												100	
	Tolgat	ATC33	RSU	4,864	4,864	2,249	2,249	965												965	
	1-R Horoolol	ATC38	RSU	4,608	4,608	3,970	3,970	2,314												4,608	
	Joyelant	ATC	XP	200	200	25	25	0												200	
3 Eravngel	Narvandal	ATC	PBX	32	32	30	30	20												32	
	3-R Horoolol	ATC36	RSU	11,000	11,000	8,671	8,671	6,961												11,000	
4 Subbaatar	Tuv Shuidar	ATC3	E10H0H	14,336	14,336	12,307	12,307	7,144												14,336	
		ATC2	SxS	4,800	4,800	1,586	1,586	0												0	
5 Chingelte	5 Buudal	MDF7A	No Switch			0		0												0	
6 Biyaanurh	14-R Horoolol	ATC35	RSU	1,024	1,024	857	857	3,855												1,024	
		ATC5	SxS	8,000	8,000	7,235	7,235													8,000	
Cachuur		N-ATC5	(H)																	8,500	
		ATC	XP	50	50	29	29	18												50	
Hombor		ATC	XB	50	50	50	50	100												50	
				40,316	13,400	55,616	32,082	9,070	41,152	23,116	8,500	0	0	0	0	0	0	0	0	3,185	
7 Nalaah		ATC	SxS	1,200	1,200	892	892	171												1,200	
		ATC	PRX	48	48	48	48													48	
		ATC	XP	3,000	3,000	1,863	1,863	655												3,000	
8 Baganuur		ATC	PRX	32	32	32	32													32	
		ATC	PBX	48	48	32	32													48	
		ATC	XP	200	200	63	63	0												200	
9 Bayanhangai		ATC	XP	128	4,400	4,528	112	2,818	2,930	826	0	0	0	0	0	0	0	0	0	4,528	
				40,444	17,700	58,144	32,194	11,888	44,082	23,942	8,500	0	0	0	0	0	0	0	0	53,844	
Subtotal (in the Ulaanbaatar city)																					
Subtotal (Excludes of Ulaanbaatar city)																					
Total																					

2. Existing Transmission Facilities on-Going Projects

Summary Of Existing National Transmission Network System

No.	Transmission Section	Links	Distance	Frequency	Capacity	System	Manufact	Installed	Remarks
1-0	Ulaanbaatar - Ulgii	37hops	1551km	4GHz	720ch	Analog	Russian	1978	
1-1	Ulaanbaatar - MW-106	5hops	174km	4GHz	720ch	Analog	Russian	1978	
1-2	MW-106 - Erdenet	3hops	164km	4GHz	720ch	Analog	Russian	1979	
1-3	MW-106 - Ulgii	27hops	1377km	4GHz	720ch	Analog	Russian	1985	
2-0	Ulaanbaatar - Choibalsan	17hops	692km	4/6GHz	720ch	Analog	Russian	1987	
3-0	Ulaanbaatar - Sukhbaatar	7hops	350km	4GHz	720ch	Analog	Russian	1990	
4-0	Ulaanbaatar - Dalanzadged	18hops	731km	4/6GHz	720ch	Analog	Russian	1990	
4-1	Ulaanbaatar - Choir	7hops	300km	4/6GHz	720ch	Analog	Russian	1990	
4-2	Choir - Sainhand	5hops	171km	4GHz	720ch	Analog	Russian	1990	
4-3	Choir - Dalanzadged	11hops	431km	4GHz	720ch	Analog	Russian	1991	
5-0	MTC - MTV - Naram	2hops	20km	7GHz	34Mb/s	Digital	Japan	1993	Satellite route

Summary Of On-going National Transmission Network Projects

No.	Transmission Section	Links	Frequency	No of Sys	Capacity	Finance	Manufact	Installed	Remarks
1	MTC - MTV - IK	3hops	6GHz	3+1s	34x3MB/s	NDF/NORA	Norway	1997	140Mb/s under study
2	IK - MW-106	4hops	6GHz	2+1s	34x2Mb/s	NDF/NORA	Norway	1997	140Mb/s under study
3	MW-106 - Erdenet	4hops	6GHz	1+1s	34Mb/s	NDF/NORA	Norway	1997	140Mb/s under study
4	IK - Darkhan	5hops	6GHz	1+1s	34Mb/s	NDF/NORA	Norway	1997	140Mb/s under study

3 Existing Outside Plant and On-going Project

Revised on April 30, 1996

No.	Switching Unit	Switch Capacity as of		Existing Subscribers at June.1995 (Sept.1995)	Waiting Applicants (Sept.1995)	OSP Cable		Terminals	New Connection 96/97	Remaining Applicants '97	External Pairs after ADB	External Pairs/ Switch Capacity
		1995	1997			MDF Pair.1995	Remaining after ADB					
1	ATC3 E10B	14,336	(14,336)	14,340	7,458	19,060	11,000	12,400	-----	7,144	23,400	1.68
	ATC2 SxS	4,800	-----									
2	ATC33 RSU	4,864	(4,864)	2,304	1,086	2,800	0	5,000	1,086	-----	5,000	1.03
3	ATC34 RSU	3,328	(3,328)	3,278	1,265	5,300	3,600	2,700		1,191	6,300	1.89
4	ATC35 RSU	1,024	(1,024)									
	ATC5 SxS	8,000	0	8,842	4,132	11,700	8,400	7,700	200	3,855	16,100	1.69
	New Digital SW	0	8,500									
5	ATC36 RSU	11,000	(11,000)	8,671	7,199	13,300	11,400	8,400	1,779	5,382	19,800	1.80
6	ATC37A RSU	512	(512)	660	518	1,000	0	1,200	312	217	1,200	2.34
7	ATC37Y RSU	512	(512)					1,200			1,200	2.34
8	ATC38 RSU	4,608	(4,608)	3,920	2,314	5,000	4,400	3,400	407	1,974	7,800	1.69
9	ATC76	300	(300)	178		(700+600)	0	1,400			1,400	
10	New Sub E10-B			766					-750	750		
	Ulaanbaatar	53,284	D48,684	42,959	24,105	60,160	38,800	43,400	3,034	20,513	82,200	1.68
	Total	A300										
11	Parizan NR	200	(200)	25		200					200	1.00
12	Nalnikh SxS	1,200	(1,200)	940	170	1,600					1,600	1.33
13	Gaisuurt NR	50	(50)	29		50					50	1.00
14	Baganuur NR	3,000	(3,000)	2,000		2,400					2,400	0.80
15	Baekhangai NR	200	(200)	63		90					90	0.45

CHAPTER 2

FINDINGS IN FIELD SURVEY

CHAPTER 2

FINDING ON FIELD SURVEY BY TECHNICAL GROUP

1 Outline of Field Survey

1.1 Objective of Survey

The technical group of JICA Study team carried out the field survey in the cooperation with MCAC staff on the following objectives:

- 1) To investigate the conditions of existing telecommunications facilities,
- 2) To find the problems on operation and maintenance in the field.]

To perform the above objectives, the team collected required information and data through interview to MCAC staffs, and the observation of the existing telecommunication facilities at the sites described in Supporting Document of Scope of Work.

1.2 Progress of Study

The field survey was carried out on 12 October through 26 October 1995. Members of technical survey team are shown in Table 2-1-1.

Table 2-1-1 Members of Technical Survey Team

Name	In-Charge
Y. Takahashi	Team leader
Y. Ito	Assistant team leader
N. Matsuda	Demand forecast / Traffic forecast
M. Satake	Transmission Network
K. Kushida	Switching facilities plan
Y. Oishi	Local Network / Outside plant facilities plan

The team visited all sites required the present Study on the time schedule shown below.

1.2.1 Survey of Enclaves of Ulaanbaatar City and Zuunmod

Table 2-1-2 Survey of Enclaves of Ulaanbaatar City and Zuunmod

(UB : Ulaanbaatar city)

No.	Date	Location Visited	Distance from UB
1	12 Oct.	Baganuur	140 km
2	13	Jargalant (Partisan)	40 km
3	13	International Children's Camp (Nairamdal)	15 km
4	13	Shuvuun Fabric (Chicken Factory)	40 km
5	16	Bagahangai	130 km
6	17	Nalaih	45 km
7	24	Gachuut	25 km
8	24	Honhor	25 km
9	25	Zuunmod	40 km

1.2.2 Survey of Existing Radio Stations

Table 2-1-3 Survey of Existing Radio Stations

(UB : Ulaanbaatar city)

No.	Date	Location Visited	Distance from UB
1	12 Oct.	Baganuur, MW-204	140 km
2	14	MTV	in UB
3	17	Nalaih, 3K	45 km
4	25	Zuunmod, 2K	40 km
5	26	1K	55 km

2 Survey Data of Switching System

Survey Data

Office Name & (Place)	Baganuur (<i>n</i>)		Date Surveyed	12 October, 1995		
Population	16,000		No. of Households	4,100		
Main Economic Activity	Coal Mining					
Future Plan	Aim to Industrial City					
Switch		No. 1	No. 2	No. 3		
	Capacity	3,000	32	48		
	Connections	1,927	32	32		
	Type	XB	D-PBX	D-PBX		
	Manufacturer	Russia	Panasonic	Montel		
	Installed Year	1986	1994.12	-		
	Waiters	No. of Waiters	655			
		Cause				
	Faults	No. of Faults				
		Period of Faults				
Subscriber Cable	No. of Pairs	2,400		Diameter of Conductor	0.5mm	
	Length of Cable	Primary Cable	13km			
		Secondary Cable	Not Available			
		Present Condition of Cables	Good, Partly Bad			
	Faults	No. of Faults	Not Available		No. of CCC	8 (300P.4 600P.2 1,200P.2)
Transmission	Lines	Open Wire	38ch to MW-204			
		Cable	-			
	Distance	140 km from Ulaanbaatar 110 km from MW-204				
	Perspective					
Operation & Maintenance			No. of Employers			
			Working Time			
Network Configuration						
Note:						

Survey Data

Office Name & (Place)	Jargalant (")	Date Surveyed	13, October, 1995		
Population	6,400	No. of Households	-		
Main Economic Activity	Small scale farming				
Future Plan					
Switch		No. 1	No. 2	No. 3	
	Capacity	200			
	Connections	25			
	Type	XB			
	Manufacturer	Russia			
	Installed Year	1990			
	Waiters	No. of Waiters	0		
	Cause				
Faults	No. of Faults				
	Period of Faults				
Subscriber Cable	No. of Pairs	200P		Diameter of Conductor	0.5 mm
	Length of Cable	Primary Cable		No. of CCC	Non
		Secondary Cable	Not Available		
	Present Condition of Cables	Bad			
	Faults	No. of Faults	Not Available		
Period of Faults		Not Available			
Transmission	Lines	Open Wire	2ch (Cap:10 ch)		
		Cable			
	Distance	40 km from ATC3			
Perspective					
Operation & Maintenance		No. of Employers	2		
		Working Time	8.00~20.00		
Network Configuration					
<pre> graph LR A[ATC-33 (Ulaanbaatar)] --- OW[OW] --- B[2 XB] B --- J[Jargalant] </pre>					
Note:					

Survey Data

Office Name & (Place)	International Children Camp (Nairandal)	Date Surveyed	13, October, 1995			
Population	800(Summer), 450(Winter)	No. of Households				
Main Economic Activity	Sight-Seeing, Education					
Future Plan						
Switch		No. 1	No. 2	No.3		
	Capacity	32				
	Connections	30				
	Type	D-PBX				
	Manufacturer	Panasonic				
	Installed Year	1995,8				
	Waiters	No. of Waiters	20			
	Cause	Insufficiency of Capacity				
Faults	No. of Faults					
	Period of Faults					
Subscriber Cable	No. of Pairs	100P		Diameter of Conductor	0.5 mm	
	Length of Cable	Primary Cable	200 m			
		Secondary Cable	Not Available			
	Present Condition of Cables	Bad			No. of CCC	Non
	Faults	No. of Faults	Not Available			
Period of Faults		Not Available				
Transmission	Lines	Open Wire	3 ch (Cap:12 ch)			
		Cable				
	Distance	15 km from ATC3				
Perspective						
Operation & Maintenance		No. of Employers	2			
		Working Time				
<u>Network Configuration</u>						
<pre> graph LR ATC32[ATC-32 (Ulaanbaatar)] --- O/W[O/W] --- D_PBX[D-PBX] subgraph "Under ground Today" ATC32 end subgraph "International Children Camp" D_PBX end </pre>						
<p>Note: 20 sets of 430 MHz transceiver are used as local telephone network, because of poor condition.</p>						

Survey Data

Office Name & (Place)	Shuvuun Fabric (Chichen Factory) (#)		Date Surveyed	13, October, 1995		
Population	3,000	No. of Households	650			
Main Economic Activity	Farming, Chichen Factory					
Future Plan						
Switch			No. 1	No. 2	No. 3	
	Capacity		100			
	Connections		60			
	Type		D-PBX			
	Manufacturer		PECNPOM			
	Installed Year		1992			
	Waiters	No. of Waiters	30			
		Cause				
Faults	No. of Faults	Non				
	Period of Faults	Non				
Subscriber Cable	No. of Pairs	200P		Diameter of Conductor	0.5 mm	
	Length of Cable	Primary Cable	Not Available			
		Secondary Cable	Not Available			
	Present Condition of Cables		Bad			
	Faults	No. of Faults	Not Available		No. of CCC	Non
		Period of Faults	Not Available			
Transmission	Lines	Open Wire	4 ch (ATC3)			
		Cable				
	Distance	40 km from Ulaanbaatar				
	Perspective					
Operation & Maintenance			No. of Employers	5		
			Working Time			
Network Configuration						
<pre> graph LR A[ATC-32 (Ulaanbaatar)] --- Under ground B[OW 22 km] B --- C[D-PBX] C --- D[Shuvuun Fabric] </pre>						
Note:						

Survey Data

Office Name & (Place)	Bagahangay (#)	Date Surveyed	16, October, 1995	
Population	5,500	No. of Households	870	
Main Economic Activity	Livestock & Meat Factory, Coal Mining			
Future Plan	Cattle-Breeding			
Switch		No. 1	No. 2	No. 3
	Capacity	200		
	Connections	63		
	Type	XB		
	Manufacturer	Russia		
	Installed Year	1980		
	Waiters	No. of Waiters		
		Cause		
Faults	No. of Faults	1~2/Year		
	Period of Faults			
Subscriber Cable	No. of Pairs	90P		Diameter of Conductor
	Length of Cable	Primary Cable	1.2 km	
		Secondary Cable	Not Available	
	Present Condition of Cables	Bad		
	Faults	No. of Faults	Not Available	
Period of Faults		Not Available		
Transmission	Lines	Open Wire	1 ch (Cap.6 ch) to MW-402	
		Cable		
	Distance	130 km from Ulaanbaatar, 25 km from MW-402		
Perspective				
Operation & Maintenance		No. of Employers	4	
		Working Time		
Network Configuration				
Note:				

Survey Data

Office Name & (Place)	Nalaih (")	Date Surveyed	17, October, 1995		
Population	21,430	No. of Households	4,964		
Main Economic Activity	Sight-Seeing, Cattle-Breeding				
Future Plan	Construction of thermoelectric steam power plant, Water purification plant				
Switch			No. 1	No. 2	No.3
	Capacity		1,200	48	
	Connections		940	48	
	Type		SxS	D-PBX	
	Manufacturer		Russia	Mongolia	
	Installed Year		1957	1994,12	
	Waiters	No. of Waiters	171		
	Cause				
Faults	No. of Faults	50/month			
	Period of Faults				
Subscriber Cable	No. of Pairs	1,600 P		Diameter of Conductor	0.5 mm
	Length of Cable	Primary Cable	Not Available		
		Secondary Cable	Not Available		
	Present Condition of Cables	Good, partly bad		No. of CCC	3
	Faults	No. of Faults	Not Available		
	Period of Faults	Not Available			
Transmission	Lines	Open Wire	24 ch (12 ch via MW-3K)		
		Cable			
	Distance	45 km from Ulaanbaatar, 15 km from MW-3K			
	Perspective				
Operation & Maintenance		No. of Employers	60		
		Working Time	8.00-20.00		
Network Configuration					
Note:					

Survey Data

Office Name & (Place)	Gachuurt (")		Date Surveyed	24, October, 1995	
Population	3,550		No. of Households	833	
Main Economic Activity	Farming				
Future Plan					
Switch			No. 1	No. 2	No.3
	Capacity		50		
	Connections		29		
	Type		XB		
	Manufacturer		Russia		
	Installed Year		1982		
	Waiters	No. of Waiters	18		
		Cause			
Faults	No. of Faults				
	Period of Faults				
Subscriber Cable	No. of Pairs	50 P		Diameter of Conductor	0.5 mm
	Length of Cable	Primary Cable	300 m		
		Secondary Cable	Not Available		
	Present Condition of Cables		Good, partly bad		
	Faults	No. of Faults		Not Available	
Period of Faults		Not Available			
Transmission	Lines	Open Wire	2 ch (ATC5)		
		Cable			
	Distance	25 km from ATC5			
Perspective					
Operation & Maintenance			No. of Employers	3	
			Working Time		
Network Configuration					
<pre> graph LR A[ATC-5 (Ulaanbaatar)] --- B[OW (2ch)] --- C[2 XB] C --- D[Gachuurt] </pre>					
Note:					

Survey Data

Office Name & (Place)	Honhol (")	Date Surveyed	24, October, 1995	
Population	2,400	No. of Households	520	
Main Economic Activity	Repair factory for Railway			
Future Plan				
Switch		No. 1	No. 2	No.3
	Capacity	50		
	Connections	50		
	Type	XB		
	Manufacturer	Russia		
	Installed Year	1989		
	Waiters	No. of Waiters	100	
	Cause			
Faults	No. of Faults			
	Period of Faults			
Subscriber Cable	No. of Pairs	50 P		Diameter of Conductor
	Length of Cable	Primary Cable	Not Available	
		Secondary Cable	Not Available	
	Present Condition of Cables	Bad		No. of CCC
	Faults	No. of Faults	Not Available	
	Period of Faults	Not Available		
Transmission	Lines	Open Wire	10 ch (ATC35)	
		Cable		
	Distance	25 km from Ulaanbaatar		
Perspective				
Operation & Maintenance		No. of Employers	3	
		Working Time		
Network Configuration				
<p>Note:</p> <p>Cable route from Ulaanbaatar is partial river, so condition is very bad.</p>				

Survey Data

Office Name & (Place)	Zuunmod (Capital of Tub AIMAG)	Date Surveyed	25, October, 1995	
Population	25,000	No. of Households	8,000	
Main Economic Activity	Cattle-Breeding, Farming			
Future Plan	Development of Gold-Mining, Sight-Seeing			
Switch		No. 1	No. 2	No. 3
	Capacity	2,000	48	
	Connections	1,016	48	
	Type	XB	D-PBX	
	Manufacturer	Russia	Montel	
	Installed Year	1983	1993	
	Waiters	No. of Waiters	2,000	
	Cause			
Faults	No. of Faults			
	Period of Faults			
Subscriber Cable	No. of Pairs	2,000 P		Diameter of Conductor
	Length of Cable	Primary Cable		0.5 mm
		Secondary Cable		
	Present Condition of Cables			
	Faults	No. of Faults	Not Available	
Period of Faults		Not Available		
Transmission	Lines	Open Wire	96 ch (Ulaanbaatar)	
		Cable		
	Distance	40 km from Ulaanbaatar		
Perspective				
Operation & Maintenance		No. of Employers		
		Working Time		
Network Configuration				
<p>ATC-32 (Ulaanbaatar)</p> <p style="text-align: center;">96ch (8 P)</p> <p style="text-align: right;">Zuunmod</p>				
<p>Note: New Radio System is to be installed between MW-2K and Zuunmod at end of 1995.</p>				

Site Inspection Data Sheet

1. Station Name : 1K (Rep)

2. Location : Log: 106°11'25"E Lat: 47°51'45"N
Height: 1722m

3. Existing Equipment

1) Antenna Tower

a) Tower Height : (Self Type) 8m x 2 towers

b) Number of Antenna : (Horn Ant) 4

2) Radio Equipment for MW-1, 2K, MW-103 and MW-303

a) Radio Frequency : 4G Hz band

b) Capacity : 720ch

c) Output Power : 0.5W

d) Manufacturer's Date : 1983 (Russia)

3) Mux Equipment

a) Type of Equipment : None

b) Manufacture's Date : None

4) Power Facilities

a) DEG Capacity : 16KVA x 4 sets. (2 for equipment)

b) Input/Output : 3P 380V

c) Rectifier Capacity : 24V, 200A x 2 sets

d) Present Capacity : -

e) Battery Capacity : GF-300 (200AH)

f) Number of Cells : 13 cells x 2 banks

g) Manufacturer's Date : 1983 (Russia) / 1995 (P.R. China)

4. Other's :

This station was drop/insert station, now no MUX is working.

Site Inspection Data Sheet

1. Station Name : 2K (Rep)

2. Location : Log: 106°38' E Lat: 47°40' N
Height: 1640 m
 (about 15km South from Zuummod city)

3. Existing Equipment

- 1) Antenna Tower
 - a) Tower Height : (Self Type) 10m
 - b) Number of Antenna : (Horn) 3
- 2) Radio Equipment
 - a) Radio Frequency : 4.6Hz band
 - b) Capacity : 120 ch
 - c) Output Power : 0.5 W
 - d) Manufacturer's Date : 1984 (Russia)
- 3) Mux Equipment
 - a) Type of Equipment : None
 - b) Manufacturer's Date : None
- 4) Power Facilities
 - a) DEG Capacity : 16KVA x 2 sets
 - b) Input/Output : 3P 380V
 - c) Rectifier Capacity : DC 24T 100A x 2 sets
 - d) Present Capacity : DC 24 48A
 - e) Battery Capacity : -
 - f) Number of Cells : 13 cells x 2 banks
 - g) Manufacturer's Date : 1984 (Russia, Hungary)

4. Other's :

The new radio system for Zuummod is under construction, the installation is to be completed at the end of 1995.

Site Inspection Data Sheet

1. Station Name : JK (Drop/Inscription)
 2. Location : Log: 107°15' E Lat: 47°43' N
Height: 1700 m
(about 12 km north from Nabikh city)

3. Existing Equipment

1) Antenna Tower

a) Tower Height : (Self Type) 20m
 b) Number of Antenna : (Horn Ant) 3 (Parabolic) 1

2) Radio Equipment

for MW-1, MW-203, MW-202 and 2K
 a) Radio Frequency : 4G, 7G Hz bands
 b) Capacity : 120 ch
 c) Output Power : 0.5 W
 d) Manufacturer's Date : 1980 (Russian)

3) Mux Equipment

a) Type of Equipment : existing
 b) Manufacture's Date : existing

4) Power Facilities

a) DEG Capacity : 16 KVA x 2 sets
 b) Input/Output : 3P 380V
 c) Rectifier Capacity : DC 240V x 2 sets, DC 60V x 2 sets
 d) Present Capacity : DC 24V 28A, DC 60V 12A
 e) Battery Capacity : existing
 f) Number of Cells : "
 g) Manufacturer's Date : 1980 (Russia)

4. Other's :

The detail information of the MUX is not given.

Site Inspection Data Sheet

1. Station Name : MW-1 (Rep)
2. Location : Log: 106° 53' 05" E Lat: 47° 54' 56" N
Height: 1345 m
3. Existing Equipment
- 1) Antenna Tower
- a) Tower Height : (Self Tower) 140m
- b) Number of Antenna : (Horn Ant) 1, (Parabolic) 3
- 2) Radio Equipment for JK, K, MTC and Earth Station.
- a) Radio Frequency : 4G, 7G, 8 GHz Bands
- b) Capacity : 720ch / 34MB/s
- c) Output Power : 0.5W / 1.0W
- d) Manufacturer's Date : 1979 (Russia) / 1992 (Japan)
- 3) Mux Equipment
- a) Type of Equipment : None
- b) Manufacturer's Date : None
- 4) Power Facilities
- a) DEG Capacity : 16KVA x 1
- b) Input/Output : 3P 380V
- c) Rectifier Capacity : 24V, 100A x 2 Sets
- d) Present Capacity : -
- e) Battery Capacity : Existing
- f) Number of Cells : "
- g) Manufacturer's Date : "
4. Other's :

*This station is TV broadcasting station.
All radio system is terminated, and conned to
MTV station by Cox cables.*

Site Inspection Data Sheet

1. Station Name : MW-204 (Drop/Insertion)
2. Location : Log: 108°03' E Lat: 49°52' N
Height: 1580 m
(about 10KM from Baganuur TP office)
3. Existing Equipment
- 1) Antenna Tower
- a) Tower Height : (Self type) 65m
- b) Number of Antenna : (Horn Ant) 2
- 2) Radio Equipment for MW-203 and 205
- a) Radio Frequency : 4GHz Band
- b) Capacity : 720ch
- c) Output Power : 0.5 W
- d) Manufacturer's Date : 1984 (Russia)
- 3) Mux Equipment
- a) Type of Equipment : K-60 (48ch)
- b) Manufacture's Date : 1984 (Russia)
- 4) Power Facilities
- a) DEG Capacity : 16KVA x 4 sets (2 for equipment)
- b) Input/Output : 3P 380V
- c) Rectifier Capacity : DC 2V 100A x 2 set (BYK-100)
- d) Present Capacity : -
- e) Battery Capacity : CH-180 type
- f) Number of Cells : -
- g) Manufacturer's Date : 1984 (Russia)

4. Other's :

48ch (4x G group) is connecting to/from Baganuur TP office by overhead cable.

Field Survey Results (DRCS Radio Route)

1. Existing ATC-3 Station(for Base Station)

Station Name: ATC-3 (Refer to Figure-1 Site Layout)
N47° 55' 03" , E106° 55' 00"
Altitude

Antenna and Feeder: (Refer to Figure-2 Antenna Mount at Rooftop)

- antenna height ; 35m above ground
- antenna mounting ; Pole mount

DRCS equipment : (Refer to Figure-3 Floor Layout)

- Equipment room , 6F floor (floor layout is attached drawings)

Power Facilities :

- DEG : Existing 200KVA/100KVA is available.
Manufacture : 1980. USSR
- Rectifier : Existing Rectifier is not liable.
New rectifier for this system will installed.
- Battery : E10B, and NEAX facilities have their own battery.
New battery will be required.

For the power supply to new DRCS system, ADB project is scheduled to install the battery and rectifier in the same equipment room, and installation of power facilities normally have some additional capacity, so it is to be possible to be provided from the ADB power facilities.

MDF Space ; Expansion space of MDF in E10B is confirmed at this moment.

2. Subscriber terminal

(1)

Ger area address ; Amaglan (Refer to MAP of Central Ulaanbaatar City)

N47° 54' 15" , E107° 01' 30"

Altitude

Population ; This location is about 8km from ATC-3.

There are some factories and storage-houses with Ger houses.

Line of Sight ; There is no nearby obstacles, only building near ATC-3.

(Refer to Picture ; under printing)

Obstruction building name ; Tall apartment near British Embassy

near telephone terminal ; None

Required number of telephone sets ;

(2)

Ger area address ; Shorhad (Refer to MAP of Central Ulaanbaatar City)

N47° 56' 06" , E107° 00' 32"

Altitude (1) + 7 0 m

Population ; Huge Ger area along the road (1 k m x 1 0 k m)

Line of sight ; Ger area is very large, so there are s few hills in the area.

This area located in high, most of area can get good line of sight to

ATC-3. (Refer to Picture under printing)

Obstruction building name ; only nearby obstacles.

near telephone terminal ; No telephone, preferable location is by shop in Ger area.

Required number of telephone sets ;

(3)

Ger area address ; Tsagaabdayaa (Refer to MAP of Central Ulaanbaatar City)

Population ; Not so large(1 m x 1 k m) Power station is inside Ger.

Line of sight ; The location is high, and most of Ger area can get good line of sight.

We can see the tower of ATC-3. (Refer to Picture)

Obstruction building name ; Tall apartments nearby American Embassy

near telephone terminal ; No telephone

Required number of telephone sets ;

(4)

Ger area address ; Dariekhinovoo(Refer to MAP of Central Ulaanbaatar City)

Population ; This area is no clear separation.(400mx1.6km)

Line of sight ; The location is east side of road, the road is low location.

There is no line of sight in road area, but east side is higher by 30-40m.

So same part can get line of sight. (Refer to Picture under printing)

Terminal should be installed in top side, and connect to telephone sets by cable.

Obstruction building name ; Tall apartment near American Embassy.

near telephone terminal ; None

Required telephone sets ;

(5)

Ger area address ; Boloonbuudol, Chingly(Refer to MAP of Central Ulaanbaatar City)

Population ; This Ger area is very large and extending to north direction.

There are a few hills in this area, the location of the hill is indicated white part in the Map.(5 k m x 2 — 3 km)

Line of sight ; To avoid the nearby hill, most of Ger area can be line of sight.

The northern part is located summary camp.

(Refer to Picture under printing)

Obstruction building name ;

near telephone terminal ; a few

Required telephone sets ;

(6)

Ger area address ; Tosgany Ovoo(Refer to MAP of Central Ulaanbaatar City)

Population ; The location is near MTC TV tower, and along the Khuvsgai road.

(1.5 km x 600m)

Line of sight ; To direction of ATC-3 is basically line of sight. There is low area in the Ger, it is impossible to get line of sight from the low area.

(Refer to Picture under printing)

Obstruction building name ; tall building near by ATC-3.

near telephone terminal ; None

Required telephone sets ;

(7)

Ger area address ; Bayanhoshuu (Refer to MAP of Central Ulaanbaatar City)

N47° 57' 19" , E106° 50(56)' 24"

Altitude

Population ; This location is about 4.5km from the above (6) area, and Tasganyn Ovoo hill is obstruction for this Ger area. (1.5 km x 1.5km)

Line of sight ; No line of sight, Repeater station is required in proper Poisson.

(Refer to Picture under printing)

Obstruction building name ; Tasganyn Ovoo hill
near telephone terminal ; None

Required telephone sets ;

(8)

Ger area address ; Tolgoit (Refer to MAP of Central Ulaanbaatar City)

N47° 55' 16" , E106° 48' 20"

Altitude

Population ; The location is about 7.5 km West r from ATC-3.

This area is not many Ger houses, while there are factories near by.

Line of sight ; The edge of the Tasganyn Ovoo hill is existing. so northern part is half line of sight. And nearby tall factories are also obstructions.

The repeater station is preferable. (Refer to Picture under printing)

Obstruction building name ; Tall building and Tasganyn Ovoo hill
near telephone terminal ; None

Required telephone sets ;

(9)

Ger area address ; Orbit (Refer to MAP of Central Ulaanbaatar City)

Population ; The location is about 2km far from above (8) area to west.

The Ger area is larger, (2-3 km x 2-3km)

Line of sight ; Only nearby tall buildings. (Refer to Picture)

Obstruction building name ;
near telephone terminal ; None

Required telephone sets ;

(10)

Ger area address ; Yarnag (Refer to MAP of Central Ulaanbaatar City)

N47° 52' 11" , E106° 48' 59"

Altitude

Population ; RSU-37Y of ATC-3 is located in this area. At present, Ger houses are very few. Instead, apartment is constructed.

Line of sight ; This location is higher than city center, so this area can get line of sight except nearby tall buildings. (Refer to Picture)

Obstruction building name ; Nearby buildings near telephone terminal ; There are some.

Required telephone sets ;

CHAPTER 3

DATA COLLECTED BY TECHNICAL GROUP

CHAPTER 3

DATA COLLECTED BY TECHNICAL GROUP

1 Switching System

1.1 Telephone Exchange Data Summary of MCAC

1.1.1 Ulaanbaatar city (Existing as of 1995)

Table 3-1-1 Telephone Data by Technical Group in Ulaanbaatar city (Existing of 1995)

District	Area Name	Manufacturer	Installed Year	Subscriber Lines		Trunk Circuits				
				Capacity	Working Lines	Direct	Op. Assist.	Semi-Auto	Total	
1	Hlan-Uul	120 Myangat	Alcatel	1992	3,328	3,278	720			720
		Airport	Alcatel	1992	1,024	660	360			360
		Yarmag	Alcatel	1992			60			60
		Diokombinat	Russia		200	145				0
		Shuyuuu Fabric	Peenpom	1992	100	60			4	4
2	Songio Hairhan	Telgoit	Alcatel	1992	4,864	2,249	810			810
		1-R Horoolol	Alcatel	1992	4,608	3,970	810			810
		Jargalant	Russia	1990	200	25			2	2
		Nairamdal	Panasonic	1995.8	32	30			1	1
3	Bayangol	3,4-R Horoolol	Alcatel	1992	11,000	8,671	1,920			1,920
4	Suhbaatar	Tuv Shuudan	Alcatel	1991	14,336	12,307	6,901			6,901
			Russia	1960	4,800	1,586	780			780
5	Chingeltei	5 Buudal	MDF	1993	0	0				0
6	Bayansurb	14-R Horoolol	Alcatel	1992	1,024	857	180			180
			Russia	1987	8,000	7,235	1,175			1,175
		Gachourt	Russia	1982	50	29			2	2
		Honhor	Russia	1989	50	50			10	10
Subtotal (in the Ulaanbaatar city)				53,616	41,152	13,776	0	19	13,795	
7	Nalaib	Nalaib	Russia	1957	1,200	892		8		8
			Mongolia	1991	48	48	16			16
8	Baganuur	Baganuur	Russia	1985	3,000	1,863		33	5	38
			Panasonic	1994.12	32	32	5			5
			Montel		48	32	5			5
9	Bagahangai	Bagahangai	Russia	1980	200	63		1		1
Subtotal (Enclaves of Ulaanbaatar city)				4,528	2,930	26	42	5	73	
Total				58,144	41,082	13,802	42	24	13,868	

1.1.2 Aimag/City (Existing as of 1994)

Table 3-1-2 Number of Subscribers in Aimag (Dec. 1994)

Aimag	Switching Capacity		Number of Subscribers									
	Aimag		Sommon		Aimag		Sommon		Total			
	Business	Residential	Total	Business	Residential	Total	Business	Residential	Total	Business	Residential	Total
1 CECERLEG	1,000	524	1,524	384	555	939	118	2	120	1,059		
2 ULGI	1,000	392	1,392	394	751	1,145	189	14	203	1,348		
3 BULGAN	1,000	1,042	2,042	283	730	1,013	269	210	479	1,492		
4 BAYANHONGOR	1,000	482	1,482	360	630	990	93	71	164	1,154		
5 ALTAI	1,000	834	1,834	284	816	1,100	92	167	259	1,359		
6 SAINSHAND	900	1,225	2,125	348	610	958	124	156	280	1,238		
7 CHOIBALSAN	1,800	844	2,644	510	1,050	1,560	139	35	174	1,734		
8 MANDALGOBI	1,000	528	1,528	412	630	1,042	152	186	338	1,380		
9 ULIASTAI	1,000	666	1,666	335	544	879	172	219	391	1,270		
10 ARVAIHEER	1,000	1,418	2,418	333	827	1,160	498	479	977	2,137		
11 DALANZADGAD	2,000	294	2,294	348	525	873	78	51	129	1,002		
12 BARUUN URT	800	660	1,460	340	334	674	105	30	135	809		
13 SUKHBAATAR	1,000	1,546	2,546	344	695	1,039	243	64	307	1,346		
14 ZUUN MOD	1,000	1,612	2,612	415	545	960	589	127	716	1,676		
15 ULAAAN GOM	2,000	890	2,890	700	300	1,000	265		265	1,265		
16 HOVD	1,200	680	1,880	370	720	1,090	142	54	196	1,286		
17 MUREN	2,700	784	3,484	489	479	968	272	38	310	1,278		
18 UNDER KHAAN	1,000	1,146	2,146	372	642	1,014	148	373	521	1,535		
19 DARKHAN	2,800	1,600	4,400	1,022	1,690	2,712	466	668	1,134	3,846		
20 ERDENET	2,000	500	2,500	1,260	1,075	2,335	121	179	300	2,635		
21 CHOIR	200	250	450	84	54	138	11	14	25	163		
TOTAL	27,400	17,917	45,317	9,387	14,202	23,589	4,286	3,137	7,423	31,012		

1.2 Network Configuration of MCAC in Ulaanbaatar city

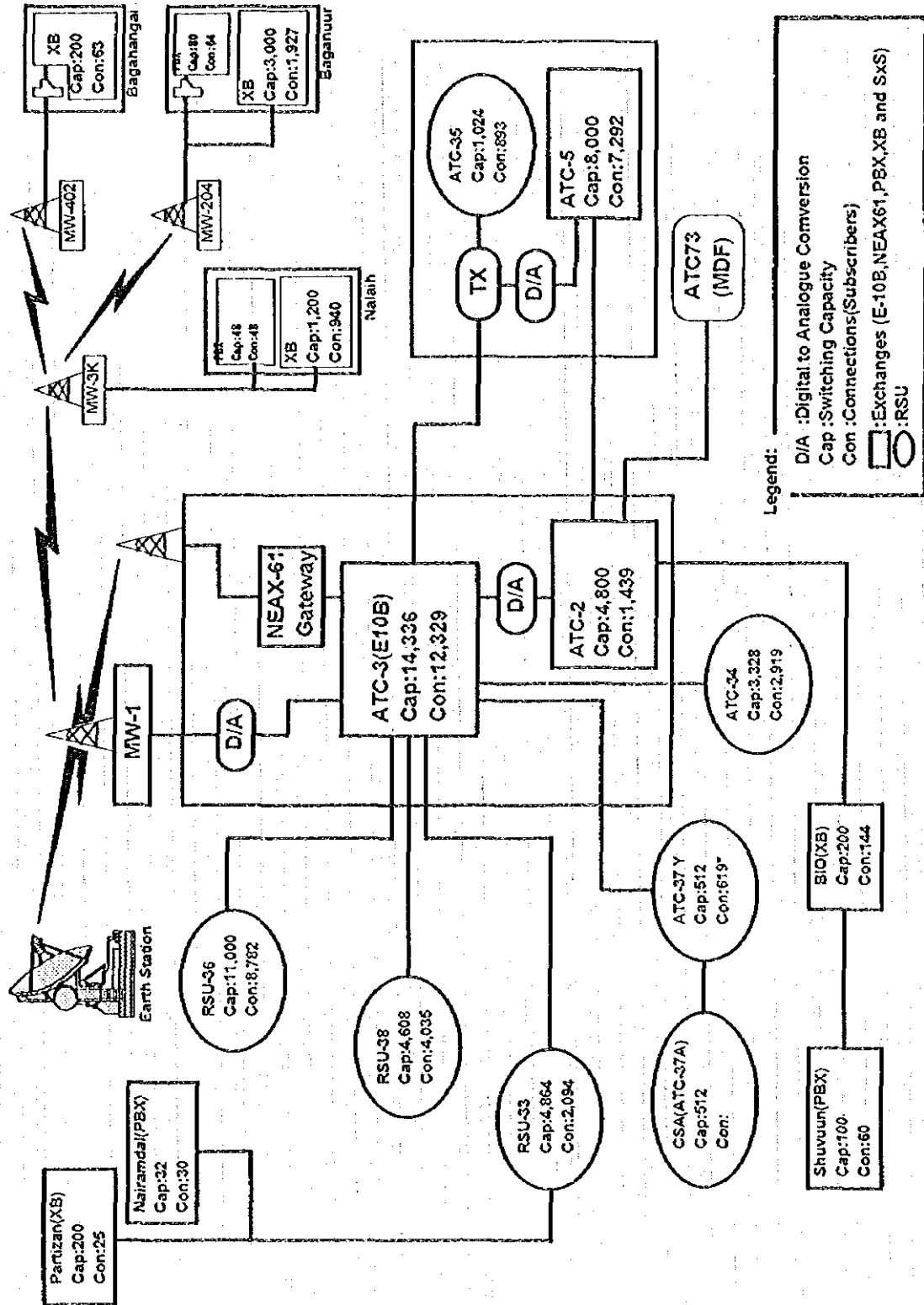


Figure 3-1-1 Network Configuration of MCAC in Ulaanbaatar City

1.3 Ulaanbaatar city Network

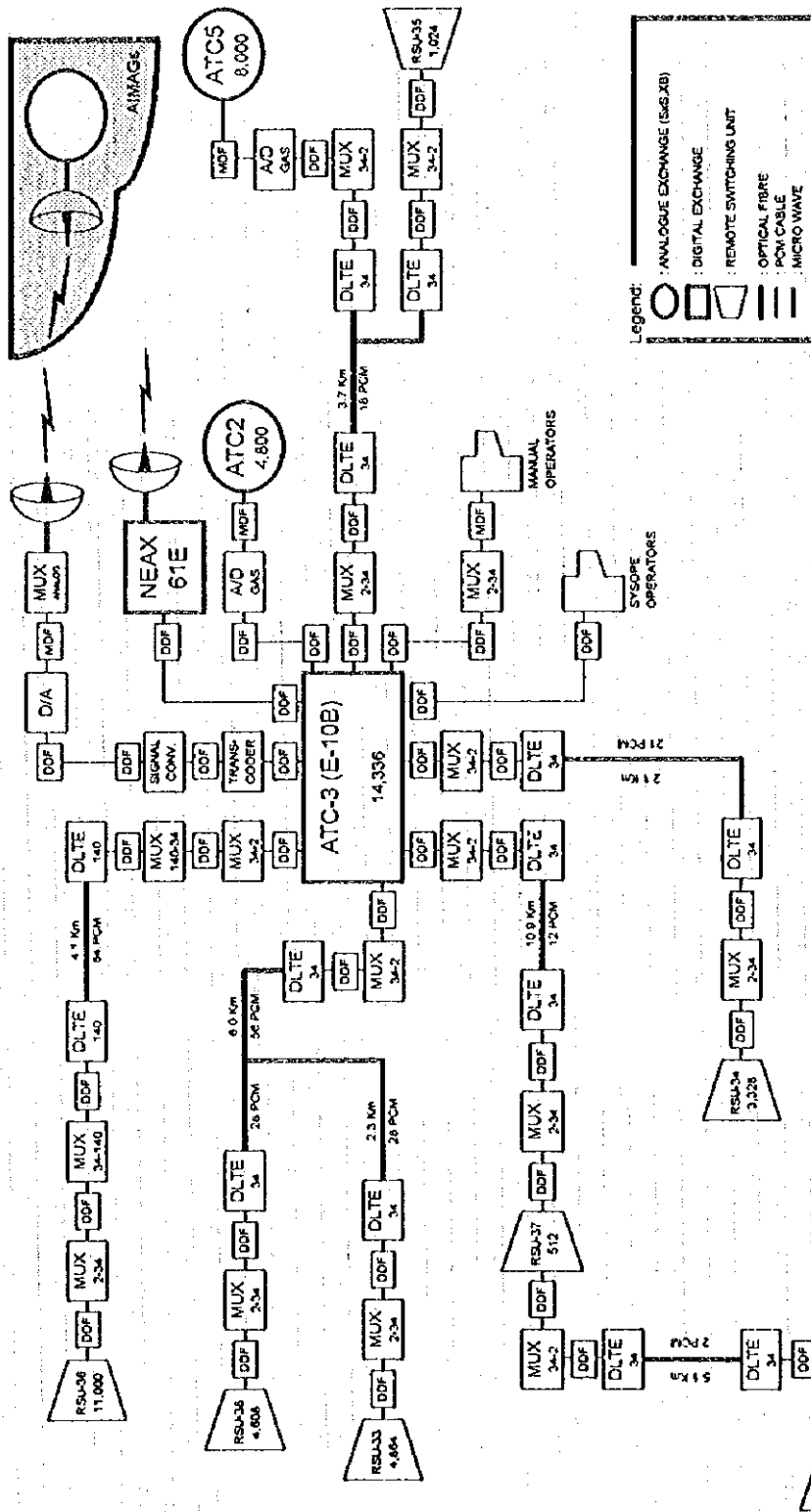


Figure 3-1-2 Ulaanbaatar city Network

KNF	1992	1995	2000	2005	2010
1. Population (millions)	2.2	2.45	3.03	3.76	4.48
2. Waiting List (thousands)	56.1	40	20	17	2
3. Exchange Capacity (E.C.)	85723	97616	133466	171000	198000
4. Exchange Capacity In Use	69000	80600	113400	147000	174000
5. Switch Utilisation ($\frac{\text{Line 1}}{\text{Line 2}}$ %)	80	82	84	86	88
6. Number of Staff	5232	4900	4200	4000	4000
7. Staff per/1000 ECs ($\frac{\text{Line 2}}{\text{Line 3}}$ %)	60	50	31	23	20
8. Penetration, EC/1000 population ($\frac{\text{Line 4}}{\text{Line 1}}$ %)	32	33	37	39	39
9. Public Telephones	445	600	1500	1760	2000
10. STD Availability ($\frac{\text{Digital EC}}{\text{Total EC}}$ %)	0	62	83	92	98
11. Faults/EC/annum	3	2.5	2	1.5	1
12. Call Completion (% failures due to MTC)	50	30	20	10	5
13. Customer Connection (% completed in 14 days line & EC available)		30	50	70	90

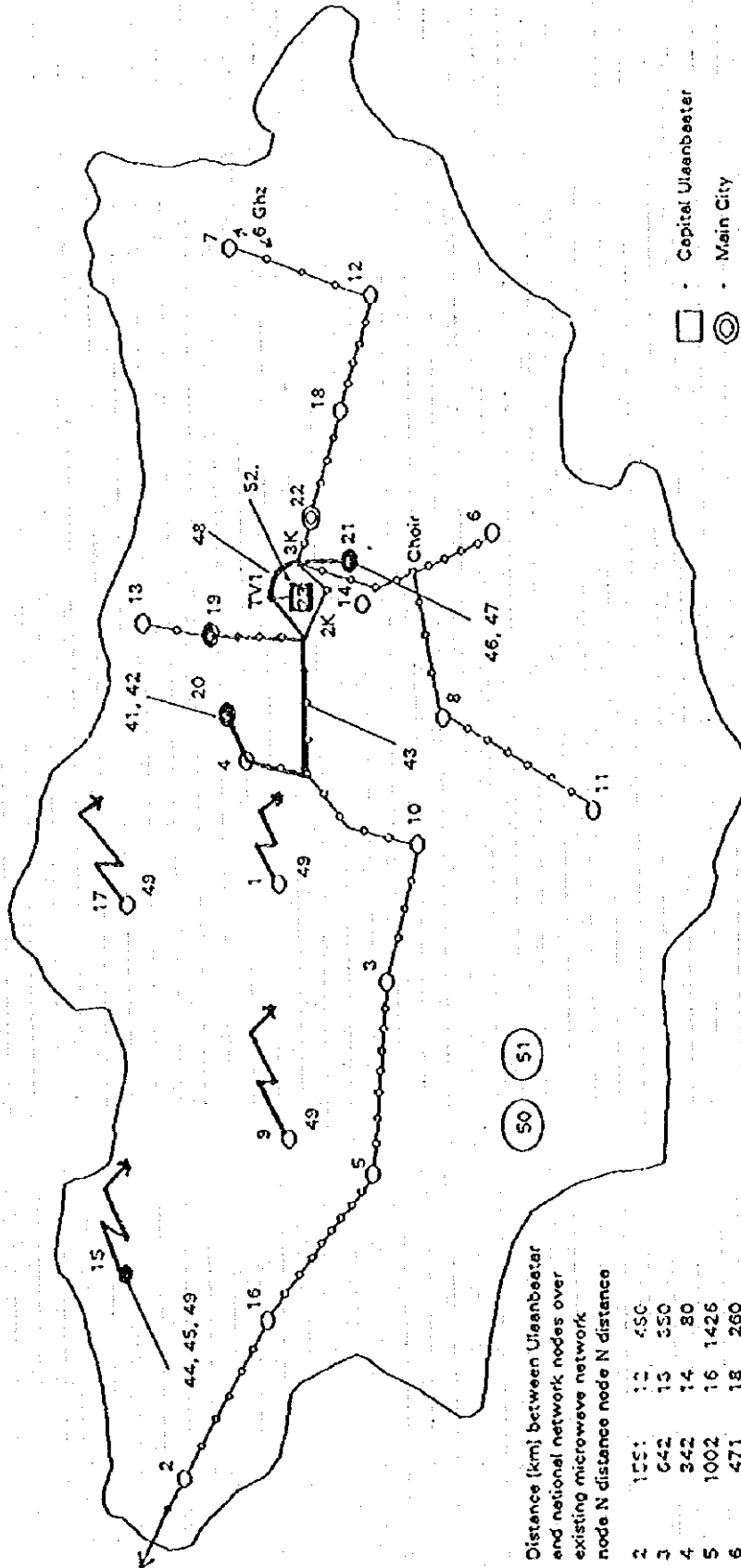
Network Element Costs, Funding and Notes (12/1995)

Element No. & Name	Priority	Cost \$M (US)	Funding	Notes, Consequences etc.
41. Digital replacement Erdenet	1	2.2	Possible ADB Project No. 6	Facilitates digital switching, and local call charging at Erdenet. Costed at replacement of 4063 connections at US\$550 each.
42. Cable growth, rehabilitation, and removal shared/illegal Erdenet	1	1.9	Possible ADB Project No. 6	Costed growth, US\$1.4M (2,800 x 500), rehabilitation US\$0.19M (2415 x 500) and removal US\$0.3M (2415/4 x 500)
42. Provide digital microwave route from Ulaanbaatar to Erdenet	1	2.7	Possible ADB Project No. 6	Costs include upgrade of power supply at radio stations (US\$0.2M). Microwave costed at US\$0.25M per station for 10 stations.
44. Digital replacement Ulaangom	3	1.2	?	Costed for replacement of 2129 connections at US\$550 each. Replaces poorest exchange.
45. Cable growth, rehabilitation and removal shared/illegal service at Ulaangom	3	1.2	?	Costed growth, US\$0.9M (2,600 x 350), rehabilitation US\$0.2M (929 x 80) and removal US\$0.1M (929/4 x 350)
46. Digital Replacement Nalaib	3	0.9	?	Costed for replacement of 1,713 connections at US\$550 each. Replaces poorest exchange
47. Cable growth, rehabilitation and removal shared/illegal service Nalaib	3	0.6	?	Costed growth, US\$0.4M (1,200 x 350), rehabilitation US\$0.1M (350 x 80), and removal US\$0.1M (350/4 x 350)
48. Provide digital microwave route from Ulaanbaatar to Nalaib	3	0.5	?	Costs include power upgrade and new link to Nalaib on new site, for 34 mb/sec overlay system, served direct from Ulaanbaatar 3K site.
49. Provide satellite services to the 4 Aimags not on microwave network	2	0.9	Possible ADB Project No. 4	Introduces direct links from Ulaanbaatar to the four remote Aimags not currently on the national microwave network. Utilises existing hub site.
50. Switch contingency	4	0.3	?	As per NE6
51. Transmission contingency	4	0.4	?	As per NES
52. Digital replacement of ATCS exchange at Ulaanbaatar	1	4.4	Possible ADB Project No. 8	Costed for replacement of 8,000 connections at \$550 each i.e. \$4.4M U.S. This completes digital replacement programme for Ulaanbaatar and facilitates full introduction of call charging. Note cable growth, refurbishment and removal of shared and illegal service for this exchange was included in network elements 4 and 23. TOTAL COST = US\$17.2M Funded - 0 COMPRISING, PRIORITY 1 = US\$11.2M 2 = US\$ 0.9M Possible 3 = US\$ 4.4M Funding - US\$12.1M* 4 = US\$ 0.7M 5 = 0 Unfunded - US\$ 5.1M

THE MONGOLIAN NATIONAL NETWORK (12/1995)

Processor Sites added in year:

- Eerdenet
- Ulaangom



Notes: * All links 4 Ghz Analogue - except final hop to Choibalsan, and TV1 - 3K link
 * Ulaanbaatar linked to microwave network by cable from TV1

Aimag Centre/Main city code

- 1. Ceeatag 2. Ulgii 3. Bayanhongor 4. Bulgan 5. Alrai 6. Sainshand 7. Choibalsan 8. Mandalgobi 9. Uliastai 10. Arbaiteer 11. Delzenzedged 12. SaruunUrt 13. Sukhbaatar 14. Zuurmod 15. Ulaangom 16. Hovd 17. Mursq 18. Underkhaan 19. Darhan 20. Eerdenet 21. Nalaib 22. Baganuur 23. Ulaanbaatar

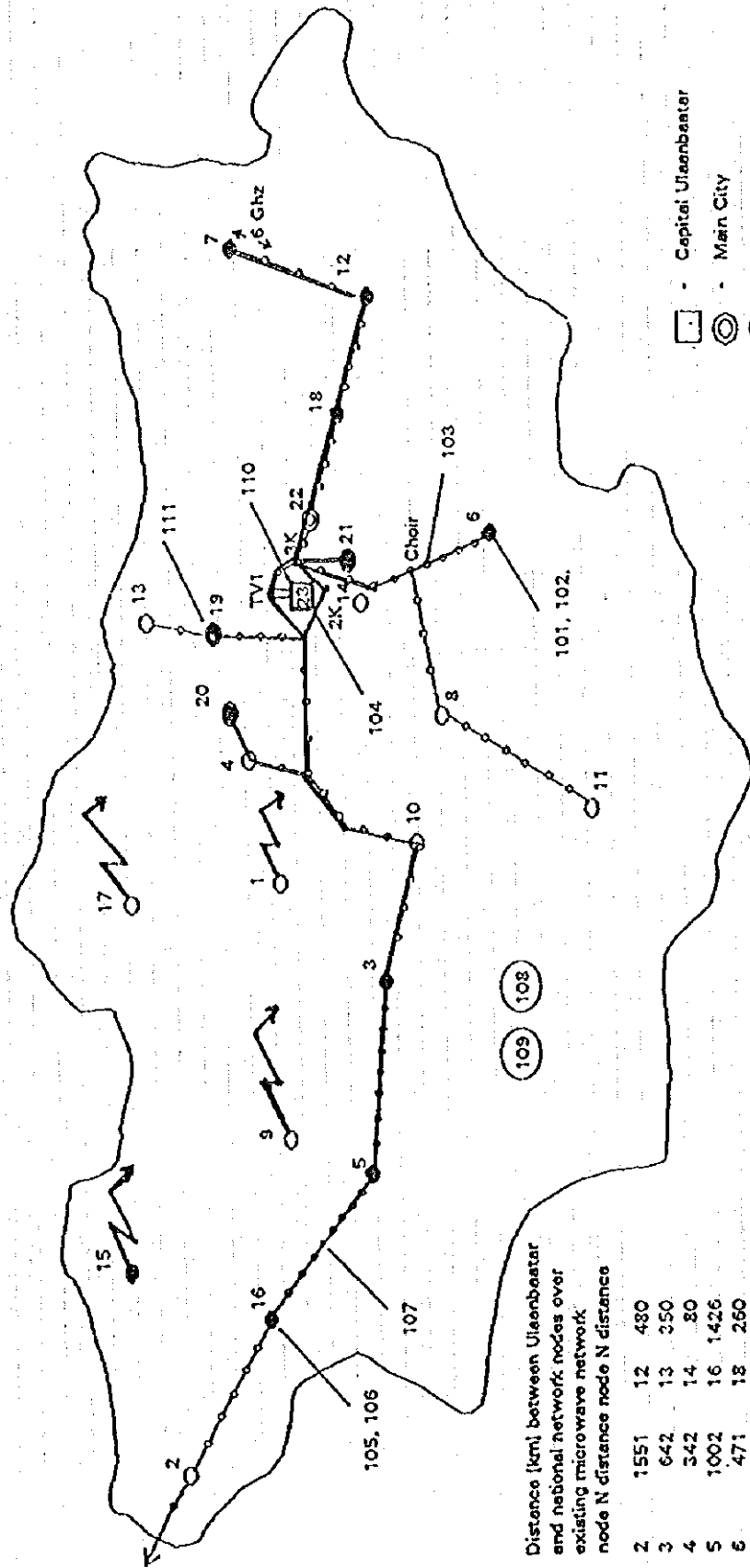
Network Element Costs, Funding and Notes (12/1998)

Element No. & Name	Priority	Cost \$M (US)	Funding	Notes, Consequences etc.
101. Digital replacement, Sainshand	1	1.1	7	Costed for 2,038 replacement digital connections at \$550 each. Dependant on NE103.
102. Cable growth, rehabilitation, and removal shared/illegal service, Sainshand	1	0.7	7	Costed, growth \$0.5M U.S. (1,300 x \$350), rehabilitation \$0.1M U.S. (1,320 x \$80), and removal of shared or illegal service \$0.1M U.S. (1,320/4 X \$350).
103. Provide digital microwave route from Ulaanbaatar to Sainshand	1	2.3	7	Costed for 10 stations at \$0.25M U.S. each, and power upgrade of \$0.025M U.S. per station.
104. Provide microwave security route (digital) at Ulaanbaatar	5	0.8	7	Costed for 3 stations at \$0.25M U.S. each with power upgrade costing \$0.025M U.S. per station. Provides complete digital security/resilience ring around Ulaanbaatar.
105. Digital replacement, Hovd	2	1.1	7	Costed for 2,045 replacement digital connections at \$550 each. Dependant on NE103.
106. Cable growth, rehabilitation, and removal shared/illegal, at Hovd	2	0.6	7	Costed, growth \$0.4M U.S. (1,100 x \$350), rehabilitation \$0.1M U.S. (1,355 x \$80), and removal of shared or illegal service \$0.1M U.S. (1,355/4 x \$350).
107. Provide digital microwave route from Altai to Hovd	2	2.3	7	Costed for 10 stations, as above, and including power upgrade (see NE102).
108. Transmission contingency	4	0.4	7	As per NES
109. Switch contingency	4	0.3	7	As per NES
110. Extend NOU and remote test facilities to all digital sites	5	0.1	7	Fourth phase of programme to include all digital units, earlier projects were NE30, NE70 and NE90.
111. Digital extension, Dornan	3	1.2	7	Dornan extension 1 is costed for replacement of 2,266 connections at \$550 each to satisfy demand until the design date of 2004. TOTAL COST = \$11.9M U.S. COMPRISING, PRIORITY 1 = \$4.6M Funded - 0 2 = \$4.5M Possible 3 = \$1.2M Funding - 0 4 = \$0.7M 5 = \$0.9M Unfunded - \$11.9M

THE MONGOLIAN NATIONAL NETWORK (12/1998)

Processor Sites added in year:

- Sainshand
- Hovd



Distance (km) between Ulaanbaatar and national network nodes over existing microwave network

node N	distance node N	distance
2	1551	12 480
3	642	13 350
4	342	14 80
5	1002	16 1426
6	471	18 260
7	692	19 270
8	430	20 382
10	442	21 80
11	731	22 90

Notes: • All links 4 Ghz. Analogue - except final hop to Chobalsan, and TV1 - 3K link
 • Ulaanbaatar linked to microwave network by cable from TV1

Aimag Centre/Main city code

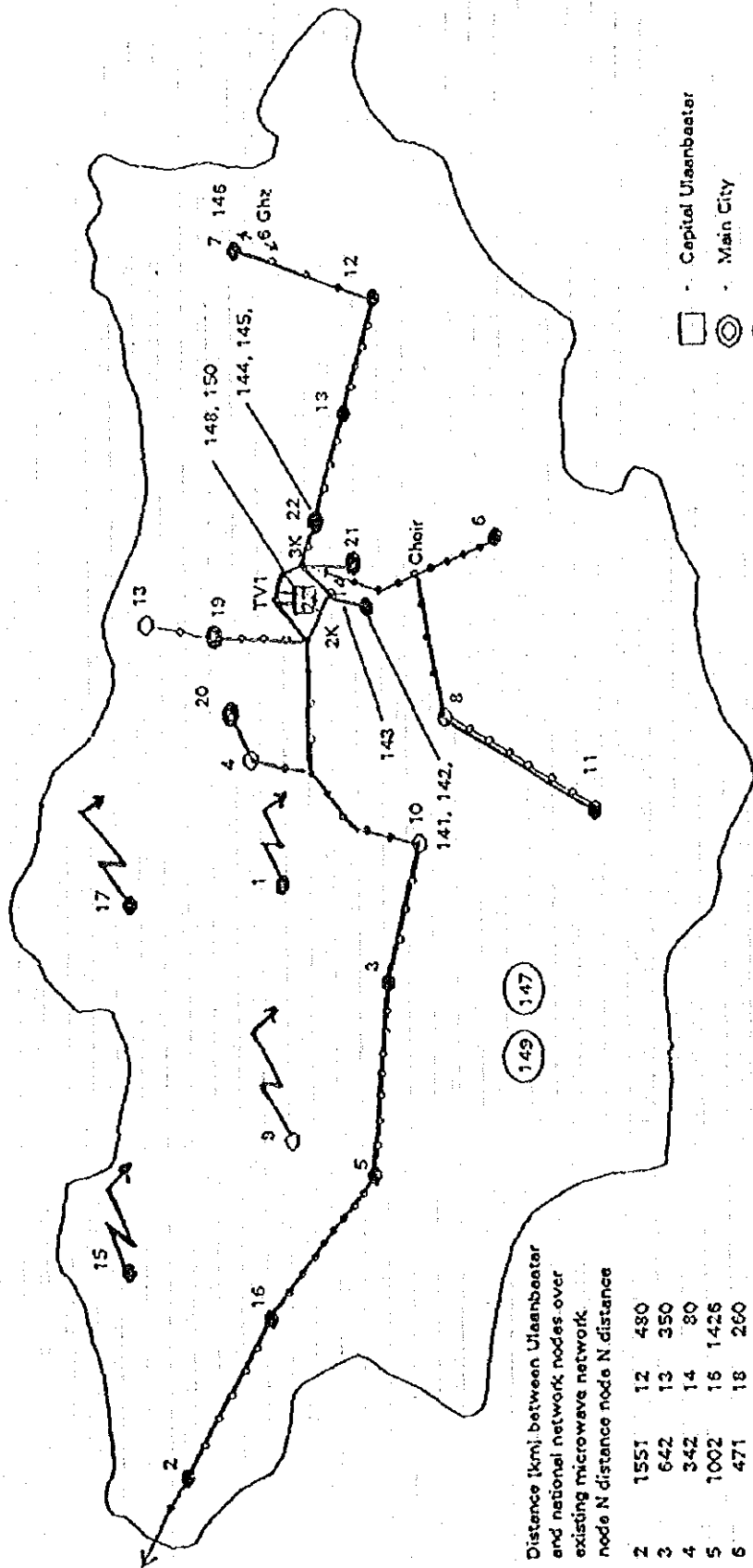
- 1. Cacerleg 2. Ulgii 3. Bayanhongor 4. Bulgan 5. Altai 6. Sainshand 7. Chobalsan 8. Mandalgobi 9. Uliastai 10. Arbaiheer 11. Delanzadged 12. BaruunUrt 13. Sukhbaatar 14. Zuurmod 15. Ulaangom 16. Hovd 17. Muren 18. Underkhean 19. Dorn 20. Erdenet 21. Nalaih 22. Baganuur 23. Ulaanbaatar

Network Element Costs, Funding and Implications (12/2000)

Element No./Name	Priority	Cost (\$M)	Funding	Notes and Comments and Implications
141. Zuummod digital replacement	2	1.9		Costed; 3382 digital connections at US\$550 each.
142. Zuummod cable growth, rehabilitation, removal of illegal/shared service	2	0.3		Costed; growth; rehabilitation; removal of illegal/shared service.
143. Digital microwave Zuummod to Uleanbeatar	2	0.5		Costed; 7 stations at US\$70.25 each
144. Baganuur digital replacement	3	2.0		Costed; 3606 digital connections at US\$550 each.
145. Baganuur cable growth, rehabilitation, removal of illegal/shared service	3	1.7		Costed; growth; rehabilitation; removal of illegal/shared service.
146. Choibalsan digital extension	3	1.3		Costed; 2326 digital connections at US\$550 each.
147. Switch contingency	4	0.3		See NES
148. International enhancement	1	0.5		Extension to 120 circuit capacity
149. Transmission contingency	4	0.4		See NES
150. Extend NOU facilities	5	0.1		See NES0
TOTAL COST		10.0		Priority 1 = US\$ 0.5M; Priority 2 = US\$ 3.7M; Priority 3 = US\$ 5.0M; Priority 4 = US\$ 0.7M; Priority 5 = US\$ 0.1M. UNFUNDED US\$ 10M.

THE MONGOLIAN NATIONAL NETWORK (12/2000)

Processor Sites added in year:



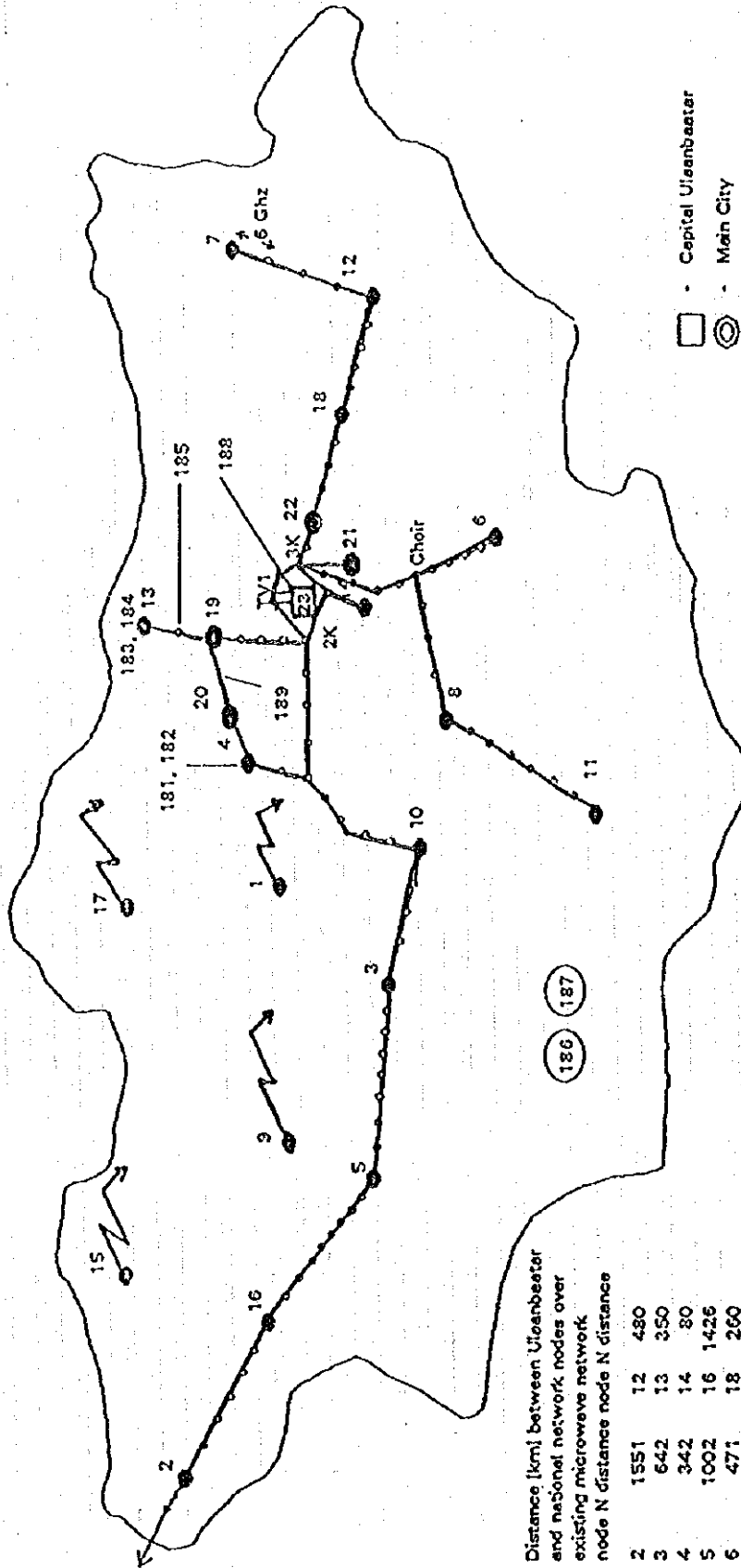
Notes: - All links 4 GHz Analogue - except final hop to Choibalsan, and TV1 - 3K link
 • Ulaanbaatar linked to microwave network by cable from TV1

Aimag Centre/Main city code

- 1. Ceerleg 2. Ugi 3. Bayanhongor 4. Bulgan 5. Altai 6. Sainshand 7. Choibalsan 8. Mandalgobi 9. Uliastai 10. Arbatheer 11. Dalanzadgad 12. BaruunUrt 13. Sukhbaatar 14. Zuunmod 15. Ulaangom 16. Hovd 17. Muren 18. Underkhaan 19. Darhan 20. Erdenet 21. Nalaib 22. Baganuur 23. Ulaanbaatar

THE MONGOLIAN NATIONAL NETWORK (12/2002)

Proposed Sites added in year:



Distance [km] between Ulaanbaatar and national network nodes over existing microwave network

node N	distance node N	N distance
2	1551	12 480
3	642	13 350
4	342	14 80
5	1002	16 1426
6	471	18 260
7	692	19 270
8	430	20 382
10	442	21 80
11	731	22 90

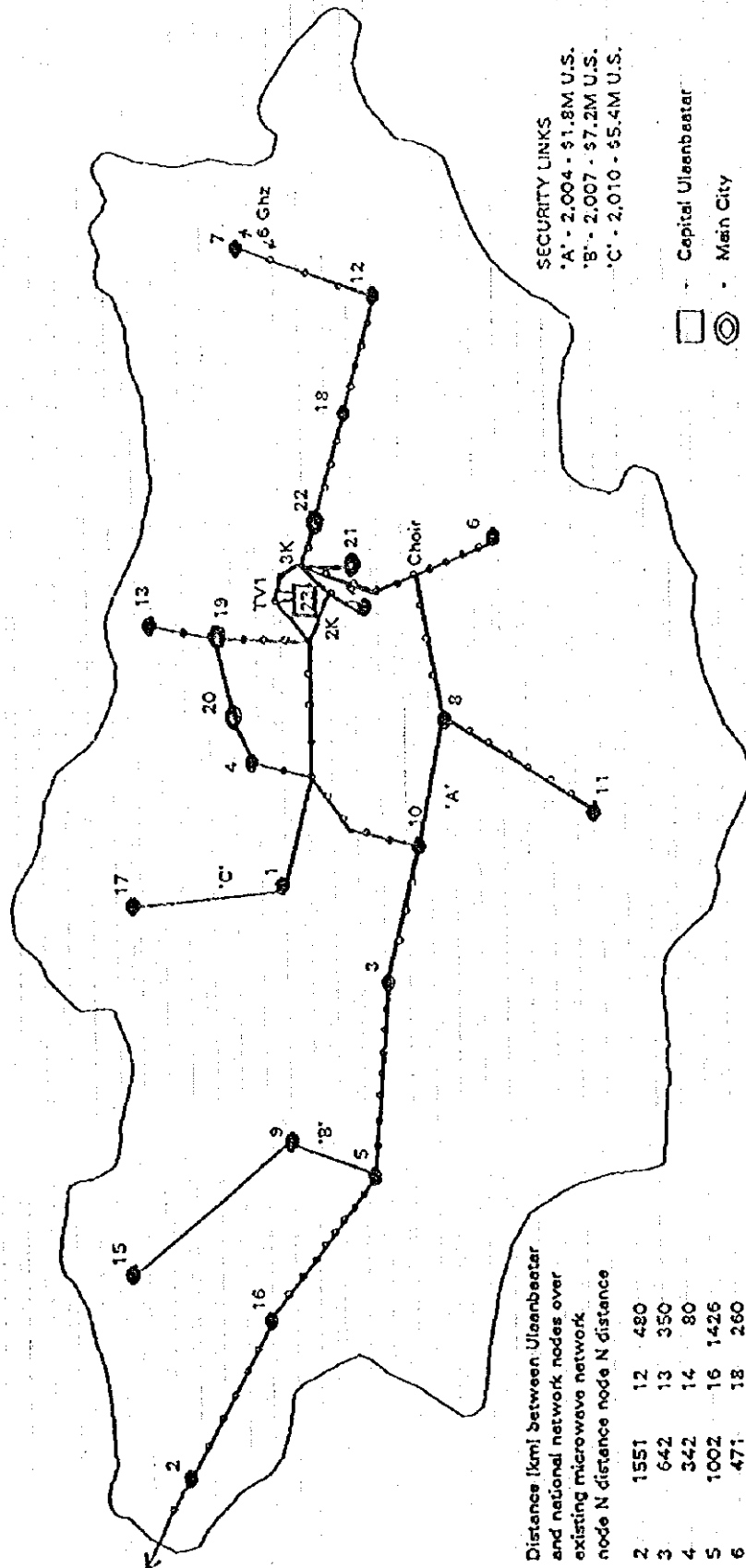
Notes:

- All links 4 Ghz Analogue - except final hop to Chobaisan, and TV1 - 3K link
- Ulaanbaatar linked to microwave network by cable from TV1

Aimag Centre/Main city code

- 1. Ceerleg 2. Ugi 3. Bayanhongor 4. Bulgan 5. Altai 6. Seinshand 7. Chobaisan 8. Mandalgobi 9. Uliastai 10. Arbaiheer 11. Delanzedged 12. BaruunUrt 13. Sukhbaatar 14. Zuunmod 15. Uvaangom 16. Hovd 17. Muren 18. Underkhaan 19. Darhan 20. Erdenet 21. Neeleh 22. Begenuur 23. Ulaanbaatar

THE MONGOLIAN NATIONAL NETWORK (AT 12/2010)



Distance [km] between Ulaanbaatar and national network nodes over existing microwave network

node N	distance node N
2	1551
3	642
4	342
5	1002
6	471
7	692
8	430
10	442
11	731
12	480
13	350
14	80
16	1426
18	260
19	270
20	382
21	80
22	90

Notes:

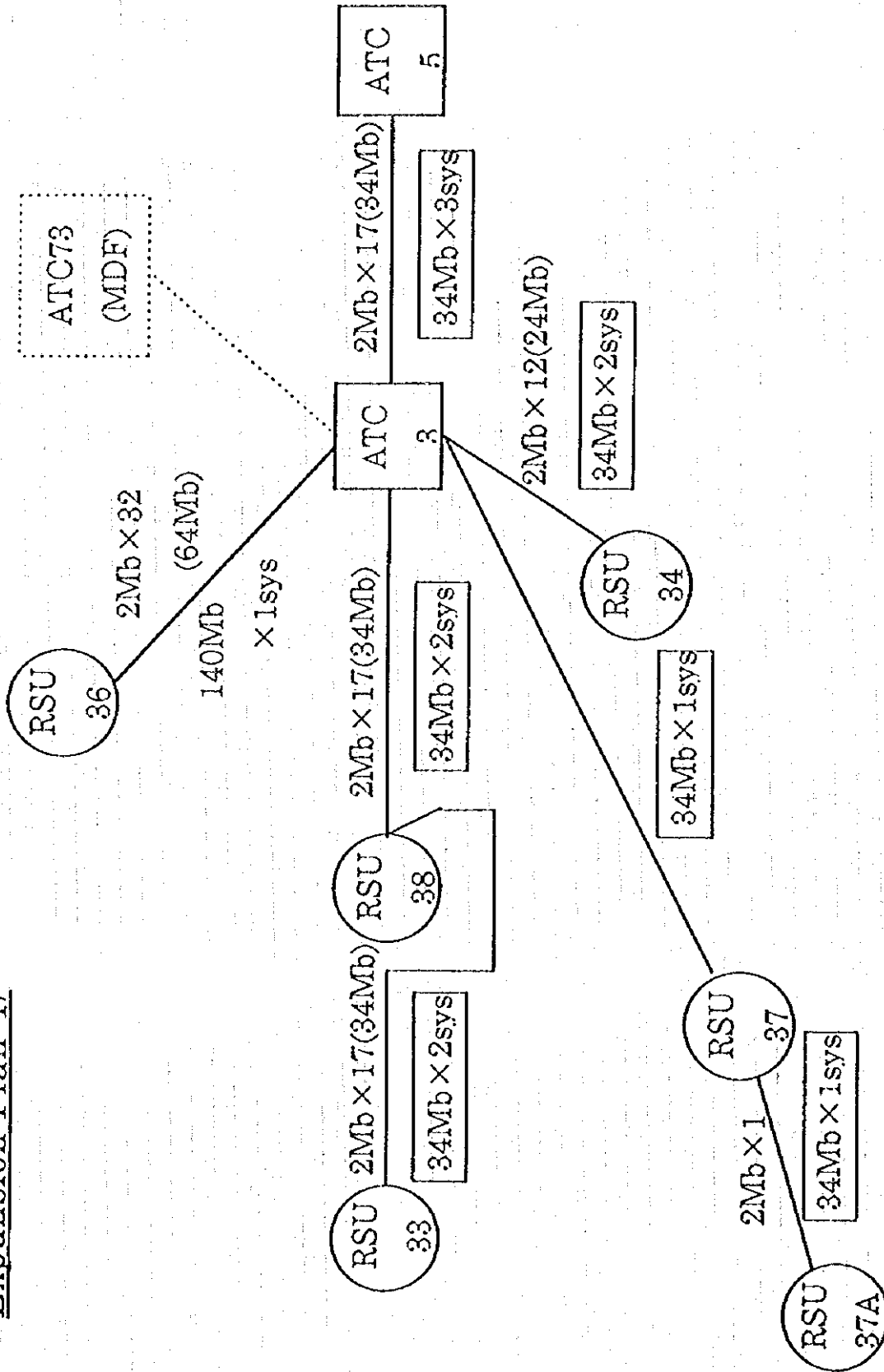
- All links 4-GHz Analogue - except final hop to Choirbaisan, and TV1 - 3K link
- Ulaanbaatar linked to microwave network by cable from TV1

SECURITY LINKS
 'A' - 2,004 - \$1.8M U.S.
 'B' - 2,007 - \$7.2M U.S.
 'C' - 2,010 - \$5.4M U.S.

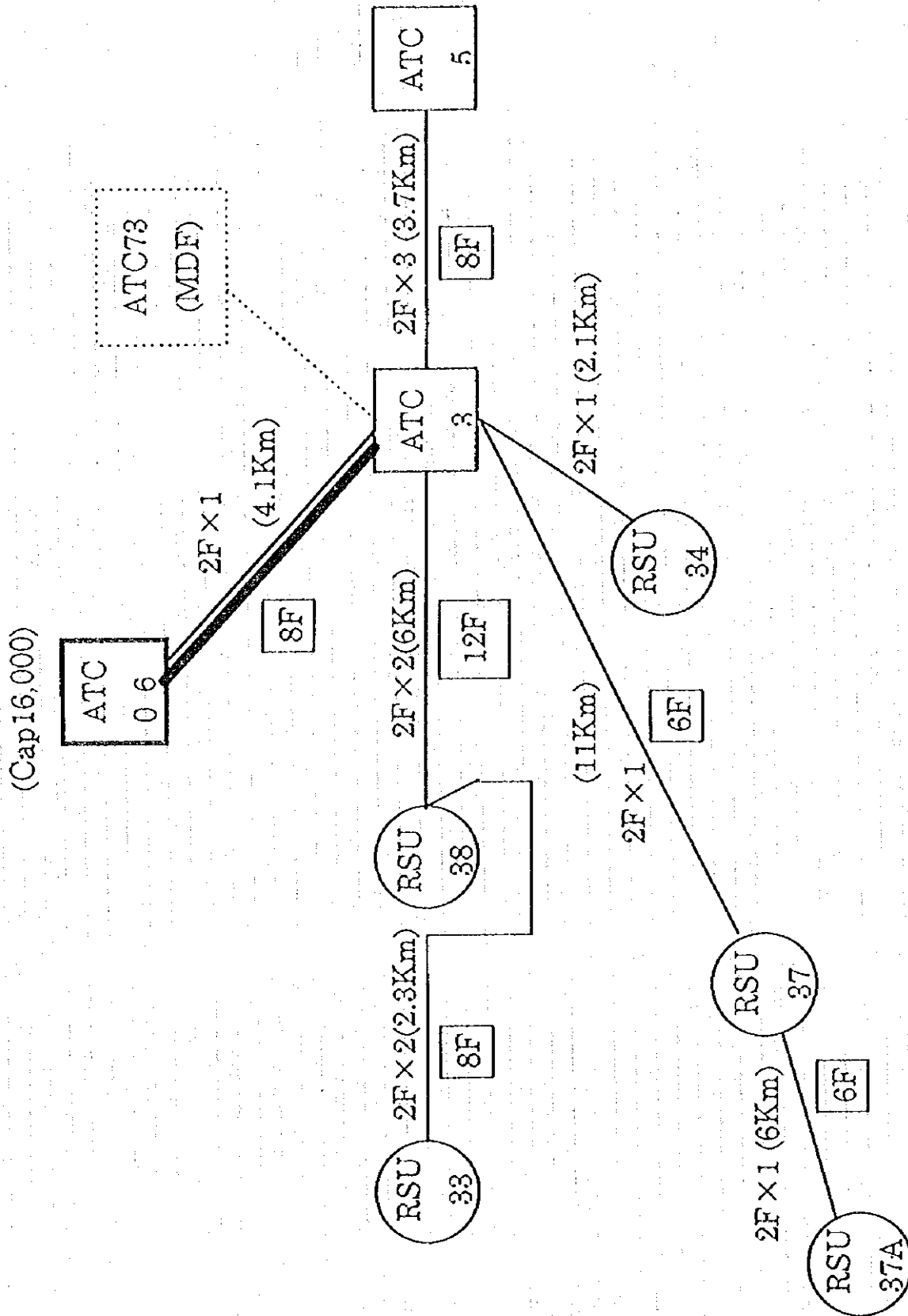
□ Capital Ulaanbaatar
 ⊙ Main City
 ○ Aimag Centre

Aimag Centre/Main city code
 1. Cacerleg 2. Uigi 3. Beyvenhonger 4. Bulgan 5. Altai 6. Seinshend 7. Choirbaisan 8. Mandalgobi 9. Uliastai 10. Arbatheer 11. Delanzedged 12. BeruunUrt 13. Sukhbaatar 14. Zuurmod 15. Ulaangom 16. Hovd 17. Muren 18. Underkhean 19. Darhan 20. Erdenet 21. Nalaib 22. Baganuur 23. Ulaanbaatar

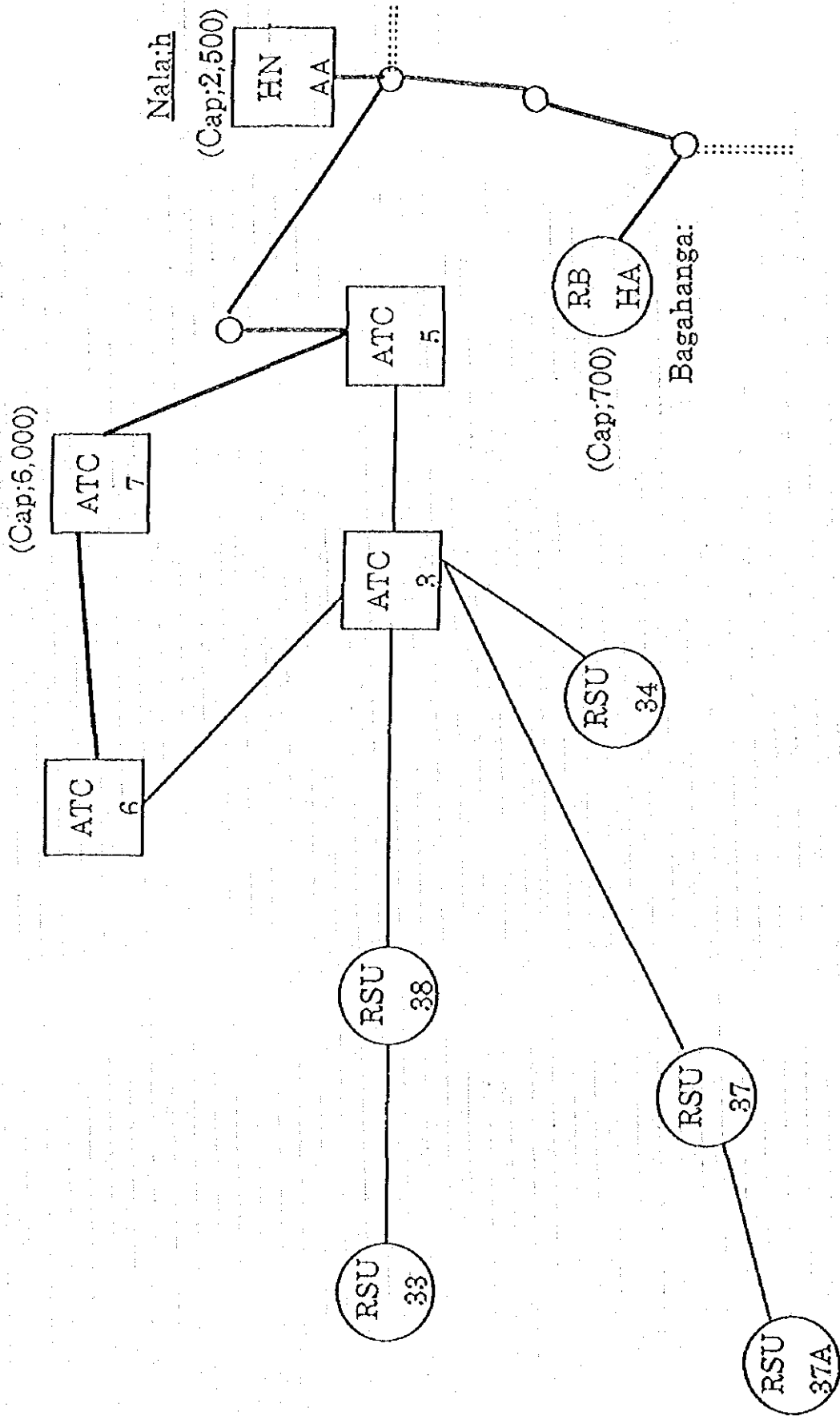
Expansion Plan-1/



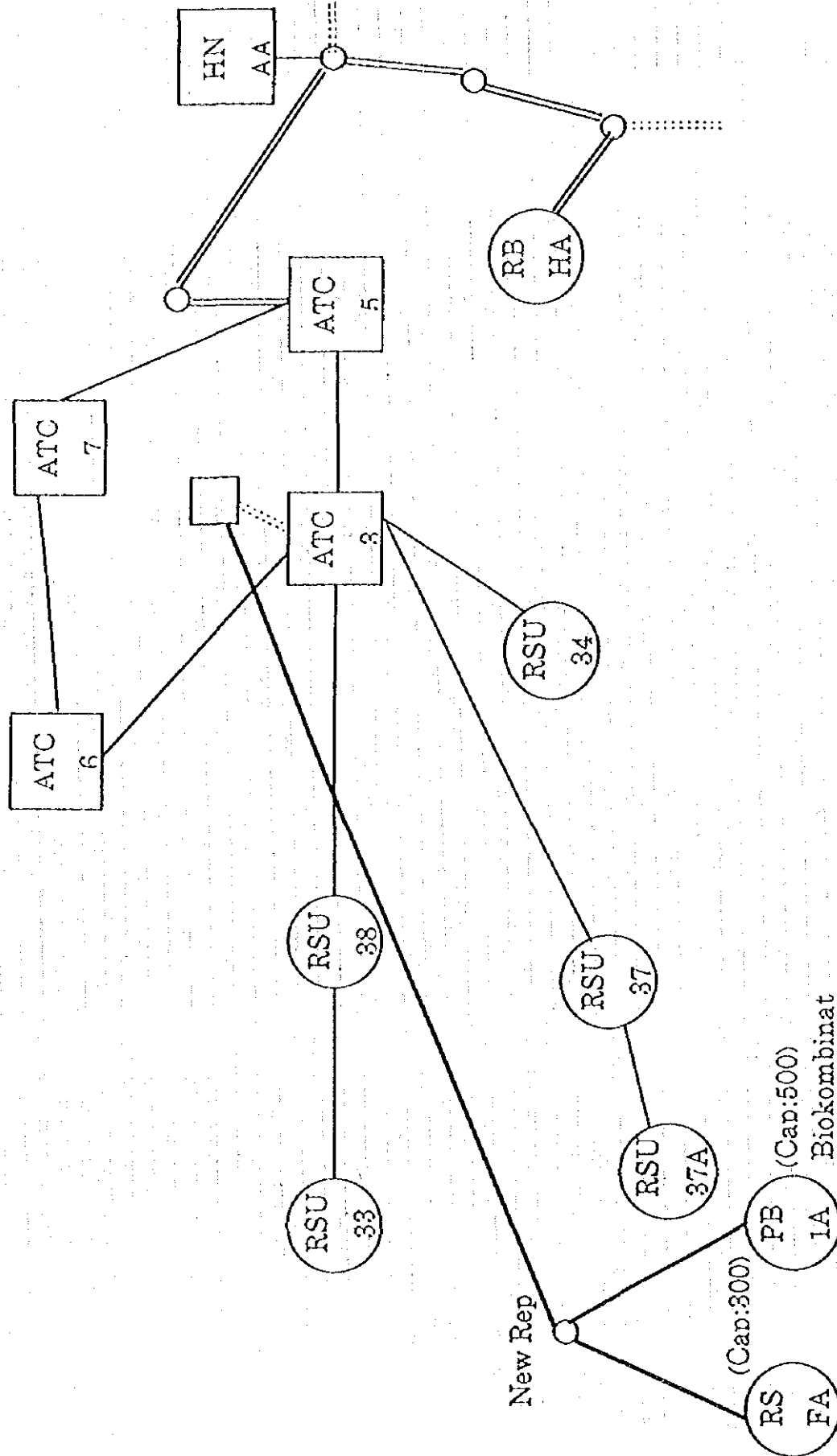
Ulaanbaatar Junction Network in 1997



Ulaanbaatar Junction Network in 1998

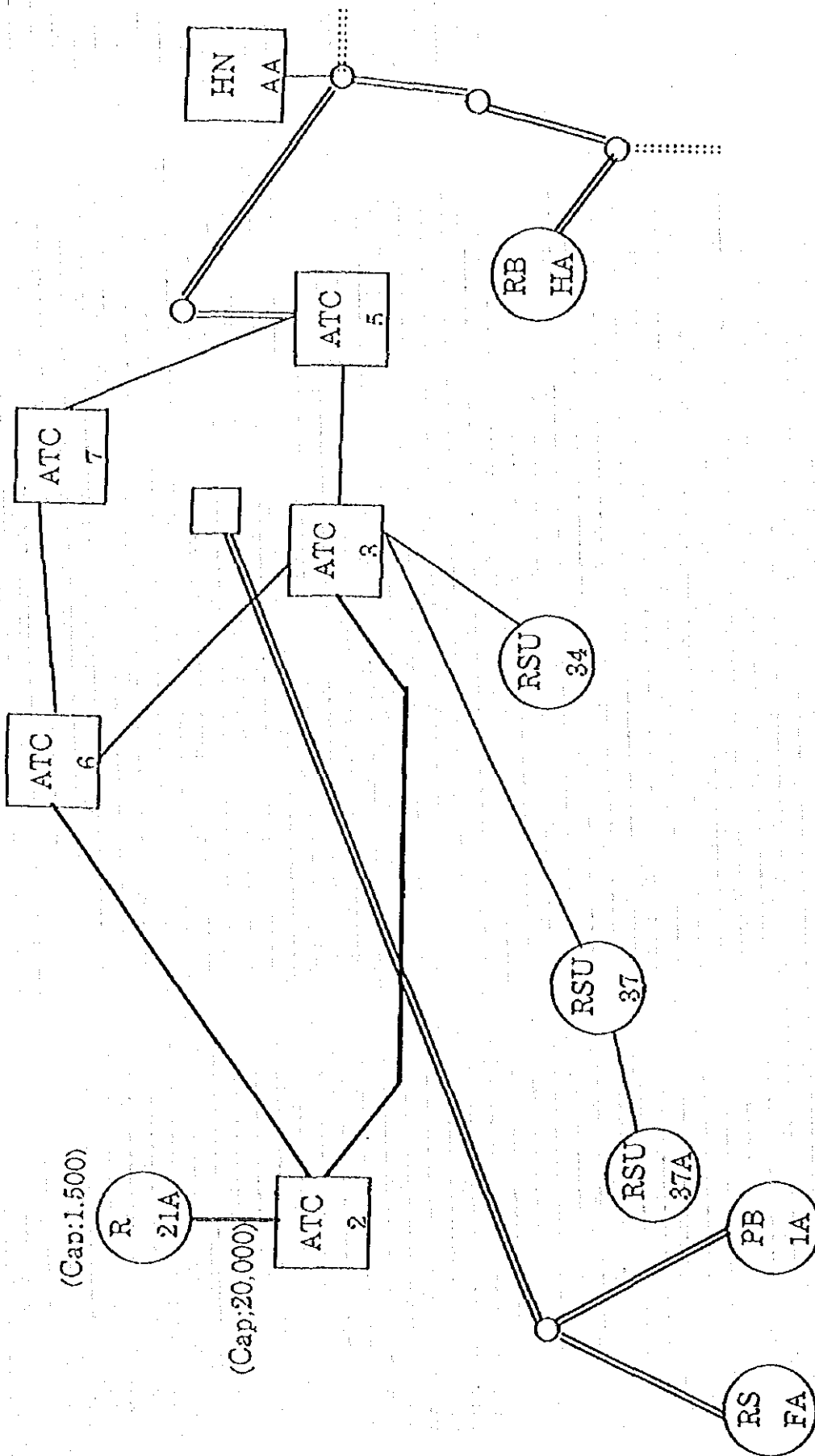


Ulaanbaatar Junction Network in 1999

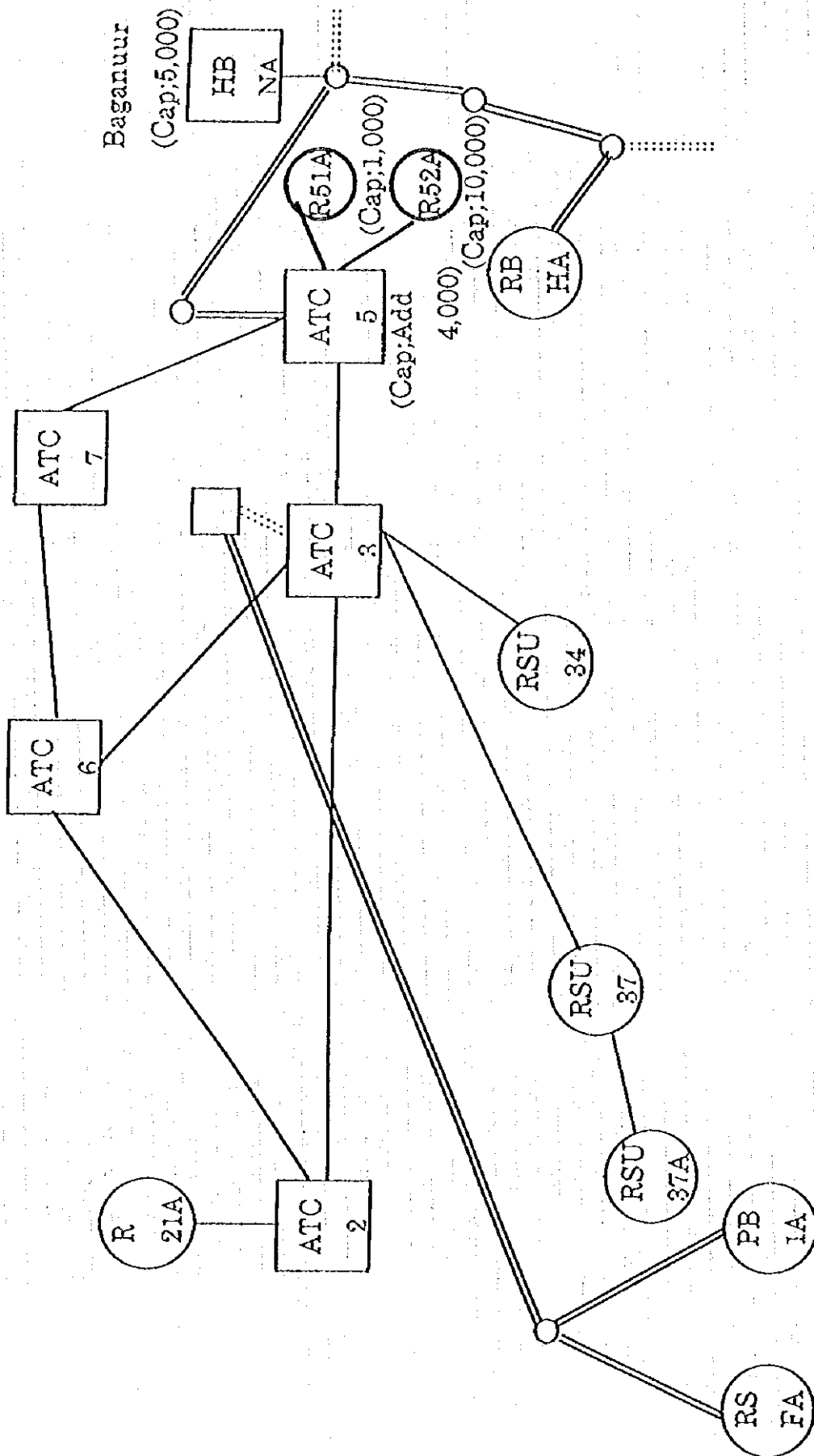


Ulaanbaatar Junction Network in 2000

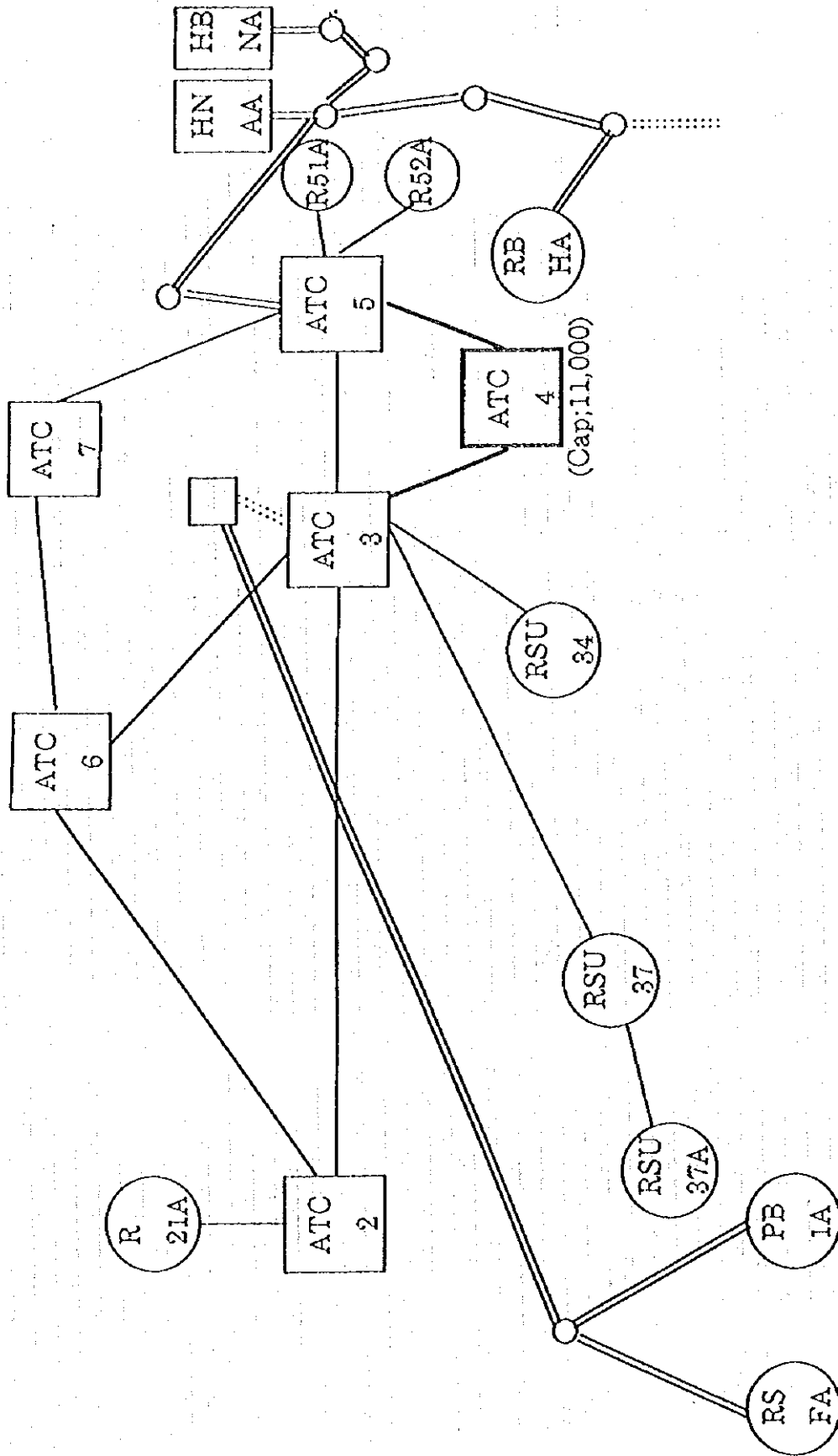
Shuvuun
Fabric



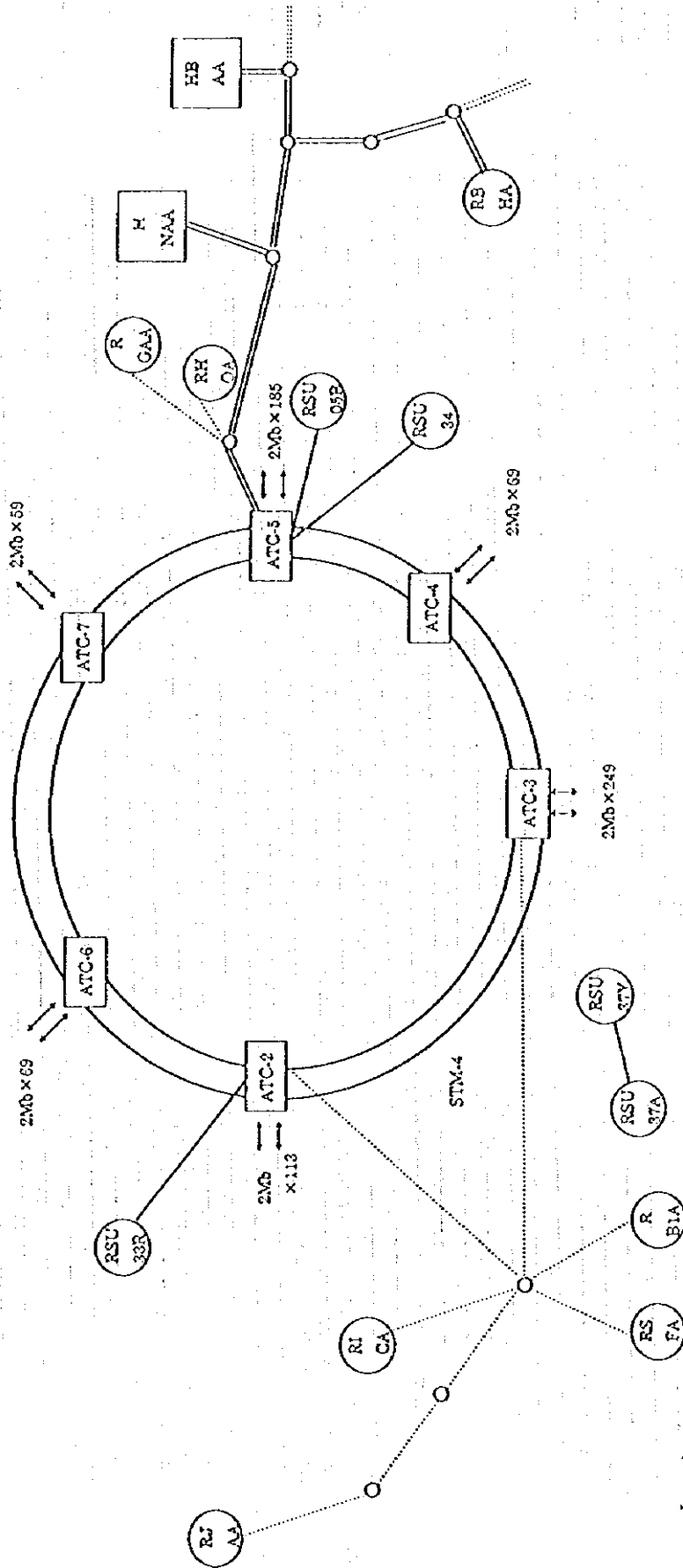
Ulaanbaatar Junction Network in 2001



Ulaanbaatar Junction Network in 2002

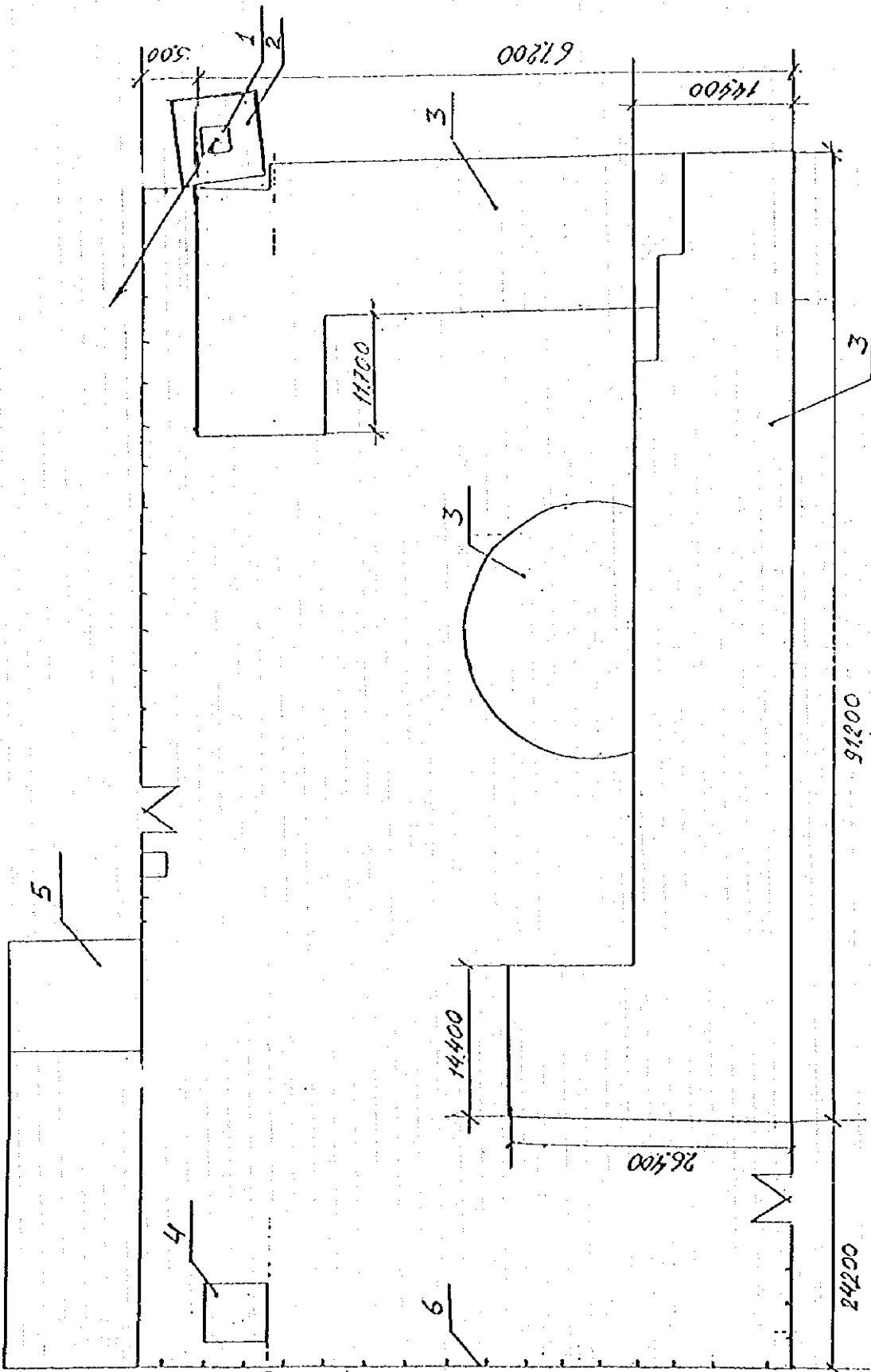


Ulaanbaatar Junction Network in 2005



Ulaanbaatar Junction network in 2010

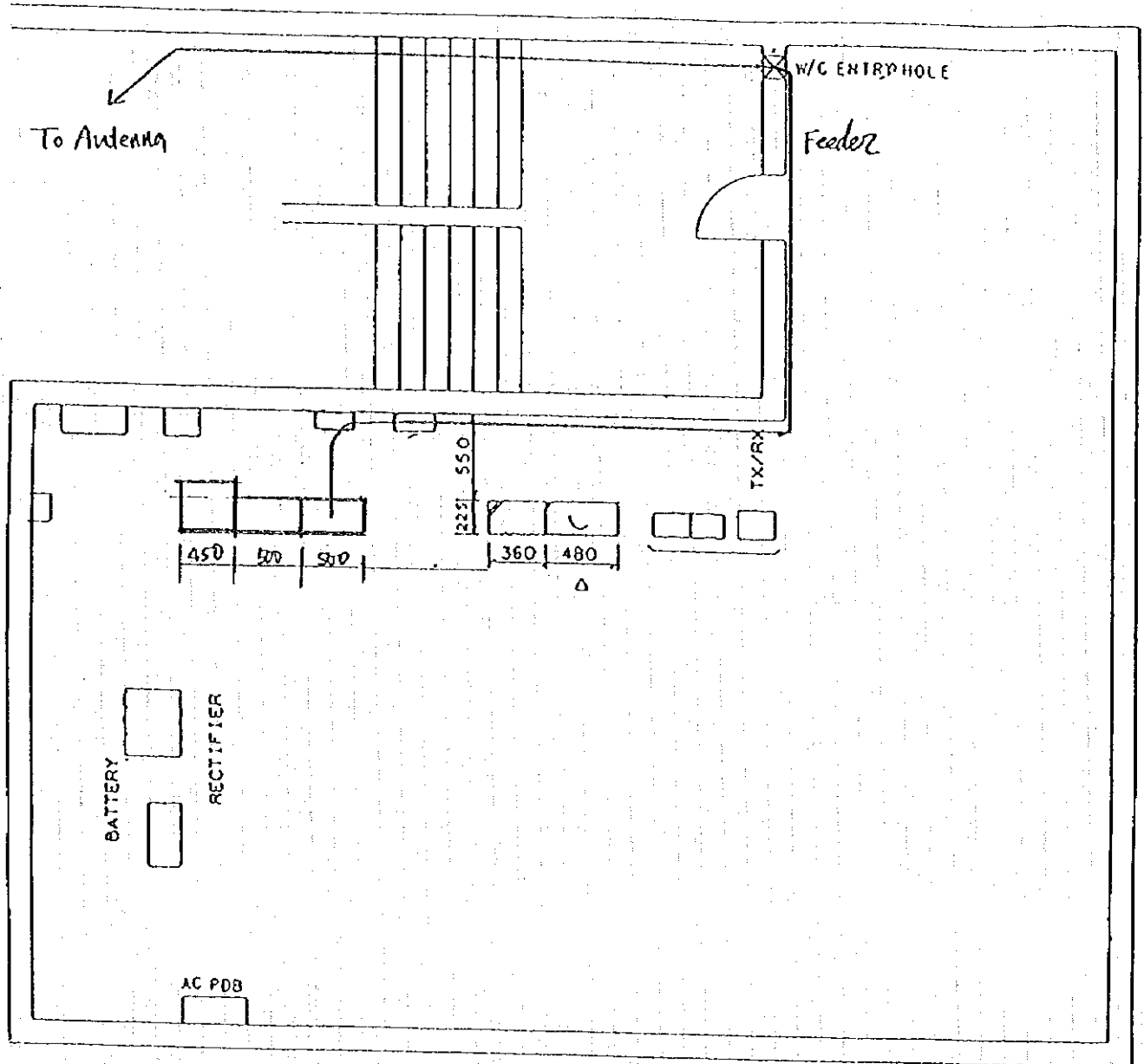
- Legend:
- Radio System
 - Optical Fiber System
 - DRCS/UHF Radio System
 - Host Switching Station
 - RSU Station
 - Repeater



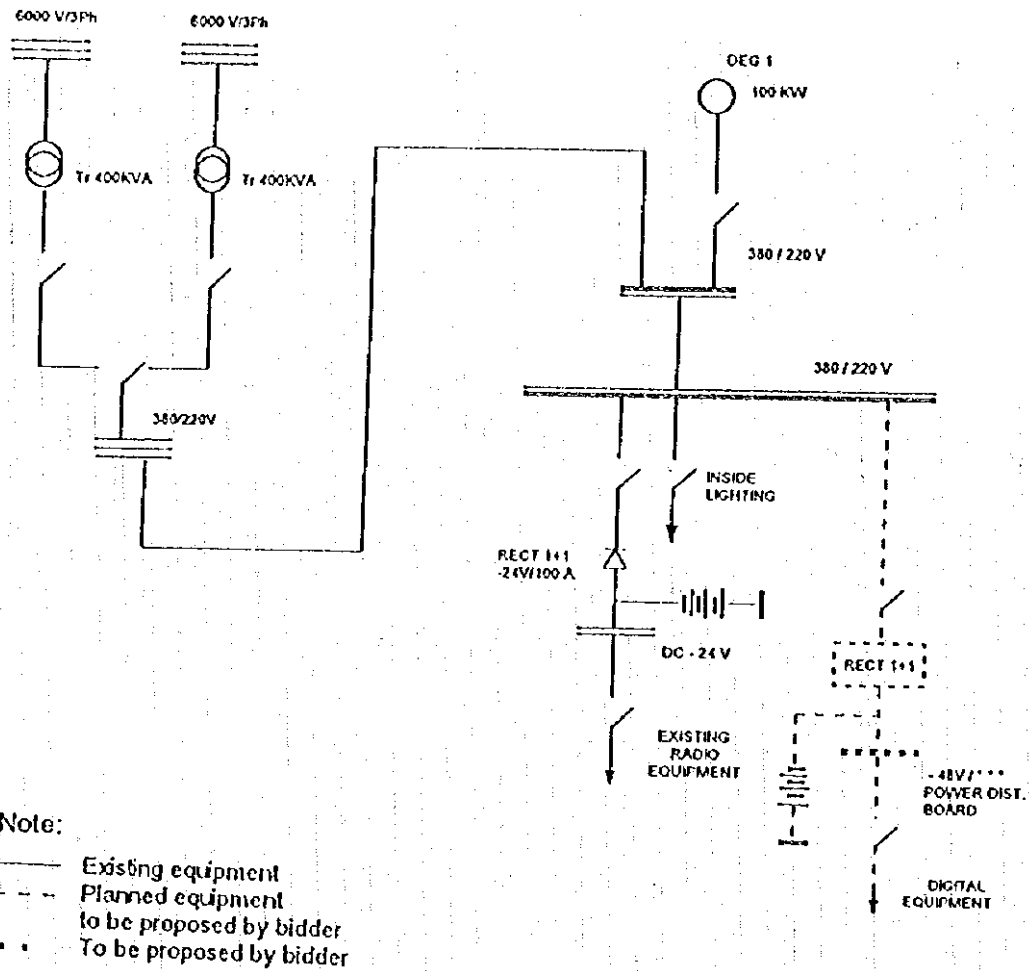
Note:

- 1 - Tower
- 2 - Equipment room
- 3 - Mtc building
- 4 - Power substation
- 5 - Dieselengine generator room
- 6 - Fence

Site Layout in ATC-3 Station



Equipment Room Floor Layout (6F) in ATC-3 Station



TERMINAL STATION

Single Line Diagram of Power Supply in ATC-3 Station

3. Outside Plant

Existing Primary Cable Length

as of June 1995

Cable pair	ATC32	ATC33	ATC34	ATC35	ATC36	ATC37	ATC38	ATC75	ATC76	Total
0.5-1200p					1120m					1120m
0.5-600p	6445m		540m	7570m	7690m					22245m
0.5-500p	680m			2007m			748m			3435m
0.5-400p	12178m	3650m	6462m	17450m	6150m		6602m			52492m
0.5-300p	8997m	4206m	920m	2600m	5278m		2991m	1450m		26442m
0.5-200p	12710m	7658m	8400m	15130m	22468m		1325m	12014m	75m	79760m
0.5-100p	20860m	22011m	8092m	29840m	11659m	6600m	5645m	9807m	53m	114547m
0.5- 50p	2600m	3550m		3200m						5950m
0.9- 52p	402m	3500m								7102m
Total	64872m	44355m	24414m	75790m	56372m	6600m	17311m	23271m	108m	313,093m

Existing Secondary Cable Length

as of June 1995

Cable Exchange	0.5-10p	0.5-20p	0.5-30p	0.5-50p	0.5-100p	0.5-200p	Total
ATC 32	22110m	18622m	16950m	34675m	5515m	620m	98492m
ATC 33	8542m	12494m	9800m	17991m	7237m	--	56064m
ATC 34	7540m	11450m	8100m	11888m	7266m	--	46244m
ATC 35	16677m	11420m	7247m	14840m	19784m	--	69968m
ATC 36	17401m	11657m	9170m	7870m	10288m	104m	56490m
ATC 37	6700m	1300m	800m	5600m	1300m	--	15700m
ATC 38	3760m	2020m	2520m	5669m	8616m	--	22585m
ATC 76	1550m	170m	105m	105m	112m	--	2708m
Total	92533m	72190m	58462m	102091m	61101m	724m	387101m

Existing Cross-Connection Cabinet and Distribution Box

as of June 1995

Exchange	Cross-Connection Cabinet			Total	Manhole	D.Box Building	D.Box Outside
	300p	600p	1200p				
ATC 32	1	18	39	58	1681	1823	91
ATC 33	--	15	6	21	403	412	52
ATC 34	1	12	11	24	402	384	4
ATC 35	--	6	40	46	782	1289	96
ATC 36	--	10	41	51	712	1739	53
ATC 37	--	1	1	2	21	15	28
ATC 38	--	1	18	19	461	860	--
ATC 73	--	3	--	3	89	8	75
ATC 76	--	1	--	1	4	14	5
Total	2	67	156	225	4555	6544	404

Existing Duct

(Unit:m) as of June 1995

ATC	Duct formation																		Total	
	1	2	3	4	5	6	7	8	9	10	12	13	16	18	20	24	25	40		48
ATC32	8720	10820	817	7150	350	4060		4093		4525		240		221						41003.2
ATC33	4315	6414	760	5680		1850		260												19279
ATC34	7381	6283	187	4819		1786		718		483		59					16			21732
ATC35	11580	8360	2147	6540	2087	8170	1070	3690		978	1070					50		9		45751
ATC36	3278	3938	827	5076	1560	3734	504	4283		1255	2021	1048		672	566	472			21	29275
ATC37	748	997		36											246	1121				1781
ATC38	1425	1783	1657	2590	975	1286		2534	864	1272	895									15639
ATC73	109	6051		18	6.4	3032		67												9283.4
ATC76		292																		292
Total	37556	44958	6395	51909	4978.4	23918	1574	15645	864	3505	8944	1048	299	672	1033	634	16	16.2	21	184035.6

LOCAL LOOP QoS in Ulaan Baatar, per ATC for August 1995

ATC (E10&RSU)	32	33	34	35	36	37	38	73	U.S.
Nb of faults	3592	1884	746	1442	5202	30	605	354	13,855
SLE %	28.5	78	31.1	22.4	60	11.2	17	64	39.02%
RFC2 %	0.08	20	2	0.13	9	0	0	0	6.2
Nb of faults in cables	2417	1538	235	470	4356	18	409	202	9,685
due to major cable failure)	1858	1373	164	303	4136	0	372	181	8,367
due to individual fault	559	165	71	167	260	18	37	21	1,298
SLFCA % (total faults in cables / total faults)	2417/3592 = 67.3%	1538/1884 = 81.6%	235/746 = 31.5%	470/1442 = 32.6%	4356/5202 = 84.5%	18/30 = 60%	409/605 = 67.6%	202/354 = 57.06%	9685/13855 = 69.90%
PCFDU % (idem in primary due to major failure)	37.9%	52.6%	21.3%	17.6	77.6	0%	19.8	21.5	50.65%
SCFDU % (idem in secondary due to major failure)	13.8%	19.21%	0.2%	3.4%	1.9%	0%	41.7	29.7	9.88%
SLFPC%(idem due to individual fault in cable)	559/3592 = 15.6%	165/1884 = 8.76%	71/746 = 9.5%	167/1442 = 11.58%	260/5202 = 4.99%	18/30 = 60%	37/605 = 6.1%	21/354 = 5.93%	1298/13855 = 9.37%
Unavailability in hour due to pair cable failures	31.2hrs	73.4hrs	6hrs	48	82.1	0	24	48.5	67.8
Waiting list	6,441	638	1590	3,551	5,527	390	1793		19,944

RFC2 = NSLFR2 x 100
 NSLFR2 : Number of subscriber line faults which are repeated twice within 1 month
 NSLF : Number of subscriber line faults at the end of the period

QoS in Ulaan Baatar, per ATC for august 1995

ATC	32	33	34	35	36	37	38	73	U.S.
SLF %	28.5	78	31.1	22.4	60	11.2	17	64	39.02
PCFDU %	37.8	53.6	18.4	17.6	77.6	0	19.8	21.5	50.5
PCFDB %			2.9						0.15
PCFOC %									0
SCFDU %	13.7	18.5	0	0	1.9	0	41.6	16.7	9.02
SCFDB %		0.5	0.2	0.3				9.4	0.13
SCFOC %	0.17			2.6					0.31
Waiting list	6,441	638	1590	3,551	5,527	390	1793		0

SLF = Nber of faults per 100 lines per month (standard figure = 1 to 1.5 per month)

PCFDU = % primary cables in duct having faults within the period

PCFDB = % primary buried cables having faults within the period

PCFOC = % primary overhead cables having faults within the period

SCFDU = % secondary cables in duct having faults within the period

SCFDB = % secondary buried cables having faults within the period

SCFOC = % secondary overhead cables having faults within the period

Local Loop QoS in Ulaanbaatar

as of February 1996

No	Code	Contents	Total
1	SLF	Number of Faults per 100 lines per month	10.91 %
2	FC1	Faults cleared within 1 day	57.84 %
3	FC3	Faults cleared within 3 days	15.8 %
4	FC8	Faults cleared within 8 days	3.7 %
5	FC8+	Faults cleared over 8 days	1.7 %
6	RFC2	Faults which are repeated 2 times	0.5 %
7	RFC3	Faults which are repeated 3 times	error
8	RFC3+	Faults which are repeated over 3 times	error

QoS of Cable

No	Code	Contents	per 100 pairs
1	PCF	Primary Cable Fault	0 %
2		Of the above,	
3	PCF DU	Primary Cable /Duct	0 %
4	PCF BC	Primary Cable /Buried	0 %
5	PCF OC	Primary Cable /Overhead	0 %
6	SCF	Secondary Cable Fault	1.17 %
7		Of the above,	
8	SCF DU	Secondary Cable /Duct	0.93 %
9	SCF BC	Secondary Cable /Buried	0.14 %
10	SCF OC	Secondary Cable /Overhead	0.1 %
11	SLFIW	Subscriber Line Fault /Internal Wire	0.65 %
12	SLFJB	Subscriber Line Fault /Joint Box	0.86 %
13	SLFDW	Subscriber Line Fault /Drop Wire	1.78 %
14	SLFJU	Subscriber Line Fault /MDF Jumper Wire	0 %
15	SLFFU	Subscriber Line Fault /Fuse	0 %
16	SLFOT	Subscriber Line Fault /Others	0.63 %

Local Network QoS Monthly Data by ATC

As of February 1996

No	Item	ATC	ATC	ATC	ATC	ATC	ATC	ATC	ATC	ATC	Total
		32	33	34	35	36	37	38	73	76	
1	Number of Total Faults	1756	263	370	963	953	6	147	262	84	4804
	(%)	(36.6)	(5.5)	(7.7)	(20.0)	(19.0)	(0.1)	(3.1)	(5.5)	(1.7)	(100%)
2	Number of Fault Complaint	1844	288	482	986	1173	6	224	256	80	5339
3	Number of Fault Cleared	1733	213	305	662	564	6	123	105	80	7931
	Total Clearance Time(m)	50515	4600	6019	18608	7417	21	2183	4600	6052	100015
	Faults Clearance Rate (%)	98.7	80.99	82.43	68.74	59.10	10.6	82.55	40.08	98.77	78.93
	By ATC (%)	45.7	5.6	8	17.5	14.9	1.2	3.2	2.8	2.1	100
4	Number of Complaint TOK	23	50	65	301	389	0	26	157	1	1012
	By ATC (%)	1.3	19.01	17.57	31.26	40.81	0	17.65	59.92	1.23	21.07
5	Average Clearance Time	29.1	21.6	19.7	28.1	13.2	3.5	17.7	43.5	75.7	26.4
6	Number of Cable Faults	20	0	0	0	0	0	0	0	0	20
	By ATC (%)	100	0	0	0	0	0	0	0	0	100
7	Number of Inquiry	41	0	0	6	0	0	0	7	0	54
	By ATC (%)	75.9	0	0	11.1	0	0	0	13.0	0	100
8	Repeated Faults	2	0	0	1	0	0	0	1	0	4
9	Action Level(Good) (%)	99.53	99.75	99.75	99.69	99.07	79.99	99.93	99.15	95.51	99.68
10	SLF (%)	11.72	10.27	11.27	11.55	10.41	2.03	3.32	35.03	43.32	10.91
11	FC1	1296	67	148	518	524	6	103	95	21	2778
	Fault Rate (%)	73.8	25.48	40.0	53.77	54.70	100.0	69.13	36.8	25.9	57.81
	By ATC (%)	46.7	2.4	5.3	10.6	10.9	0.2	3.7	3.4	0.8	100
12	FC3	262	144	137	97	36	0	20	2	59	757
	Fault Rate (%)	14.9	51.8	37	10.1	3.8	0	13.4	0.8	72.8	15.8
	By ATC (%)	34.6	19	18.1	12.8	4.0	0	2.6	0.3	7.8	100
13	FC8	115	2	20	35	4	0	0	0	0	176
	Fault Rate (%)	6.5	0.8	5.4	3.6	0.4	0	0	0	0	3.7
	By ATC (%)	65.3	1.1	11.4	19.9	2.3	0	0	0	0	100
14	FC8+	60	0	0	12	0	0	0	8	0	80
	Fault Rate (%)	3.4	0	0	1.2	0	0	0	3.1	0	1.7
	By ATC (%)	75	0	0	15	0	0	0	10	0	100
15	RFC2	10	0	13	2	0	0	0	0	0	25
	Fault Rate (%)	0.6	0	3.5	0.2	0	0	0	0	0	0.5
	By ATC (%)	40	0	52	8	0	0	0	0	0	100

No	Item	ATC	ATC	ATC	ATC	ATC	ATC	ATC	ATC	ATC	Total
		32	33	34	35	36	37	38	73	76	
16	RFC3	0	0	0	0	0	0	0	0	0	0
	Fault Rate (%)	0	0	0	0	0	0	0	0	0	0
	By ATC (%)	error	error	error	error	error	error	error	error	error	error
17	RFC3+	0	0	0	0	0	0	0	0	0	0
	Fault Rate (%)	0	0	0	0	0	0	0	0	0	0
	By ATC (%)	error	error	error	error	error	error	error	error	error	error

PRESENT SITUATION OF OSP

FAULTY CABLES

CITIES	EXISTING (Pair/km)	FAULTY (Pair/km)	Ratio
ULAANBAATAR	18760	7654	41%

LIST FAULTY CABLES OF ULAANBAATAR

Central - ATC 3. & 2

Order	Pairs	Length(M)	Location CCC No	Pair/km	Remarks
1	200	1,124	212 - 213	224.8	
2	100	395	219 - Apl N48	39.5	
	100	256	222 - Apl N48	25.8	
3	200	666	266 - 277	133.2	
	100	40	Entrance to 227	4.0	
4	200	1,042	207 - 208	208.4	
5	500	150	226	75.0	
	100	200	226	20.0	
6	200	1,315	Exchange - 230	263.0	
7	200	000	701	180.0	
8	100	1,400	703	280.0	
9	100	3,100	TV Station	310.0	
	100	3,100	TV Station	31.0	
	Total	13,688		1794.7	

West 1 - ATC 33

Order	Pairs	Length(M)	Location CCC No	Pair/km	Remarks
1	50	1,350	305	67.5	
2	200	1,320	306	264	
3	300	2,400	314a	720	
4	200	2,200	315a	440	
5	100	600	315b	60	
6	200	3,000	316	600	
7	50	1,220	321	61	
	Total	12,090		2212.5	

ATC 34

Order	Pairs	Length(M)	Location CCC No	Pair/km	Remarks
1	100	240	401	24.0	& 50 pairs to be replace
2	200	165	404	32.0	Behind Center District
3	100	350	405	35.0	White gate to CCC
4	100	150	406	15.0	Apartment
5	100	200	407	20.0	service Center to CCC
6	100	270	408	27.0	Road to CCC
7	100	120	413	12.0	New building to CCC
8	100	200	419	20.0	Road to VCVC
	Total	1,685		217.0	

East - ATC 35 & 5

Order	Pairs	Length(M)	Location CCC No	Pair/km	Remarks
1	600	970	516	582.0	
2	200	600	MHB - MHA	120.0	
	200	200		40.0	
3	600	460	503	276	
4	100	180	District 12, Apt 23	18.0	
5	100	120		12.0	
6	500	230	529	115.0	
7	300	1,270	529 - 538	381.0	
	Total	4,030		1544.0	

ATC 36

Order	Pairs	Length(M)	Location CCC No	Pair/km	Remarks
1	100	120	601	12.0	Apt N2
2	100	170	611	17.0	Road to CCC
3	100	2,000	617	200.0	Sport Building to CCC
4	400	110	625,626, 627a, 628	44.0	Apt N 8,9
5	200	110		12.0	Apt N 11
6	100	120	627b	12.0	
7	200	400	629	80.0	
	Total	3,030		377.0	

ATC 37

Order	Pairs	Length(M)	Location CCC No	Pair/km	Remarks
			//		Cables no faulty

West - ATC 38

Order	Pairs	Length(M)	Location CCC No	Pair/km	Remarks
1	400	1,134	820 - 822	543.6	
2	300	240	816	72	
3	300	812	822	243.6	
4	400	175	818 - 806	70	
5	200	867	Apartment N19	173.4	
6	100	205	803	20.5	
7	100	370	804	37	
8	300	409	807 - 808	300	
9	1400	100	Apartment 19,20	140	
	Total	4,312		1510.1	

Governmental Network

1. About ATC Traffic

The ATC traffic on October 26 showed that busy hours were at 11.00 and 16.00.

Traffic of this period was 0.021 Erlang. Now central governmental organizations have two telephone numbers in use: one telephone connected with the MTC network and one telephone connected with the Governmental Communications Board. We intend to connect in future the newly reforming station with E10 station by multiplexer and reduce the number of city telephones in the organizations except Government House. We also plan to connect the Ih Yenger sub-station with a new station with microwave equipment or optical cables via government exchange and further to connect to the national network. So it is necessary to reconsider the traffic of the station.

2. On Cables

All the cables in use are TG 10, 20, 30, 50, 100, 200, 300 paired cables produced in Russia. 18 of these cables were put into operation from 1974.5 - from 1977.12 - from 1982 and 1 in 1989. The maintenance of cables was planned and implemented in 1.2 years. As majority of the cables were easily encountered to minor damages maintenance(welding) took quite a long time.

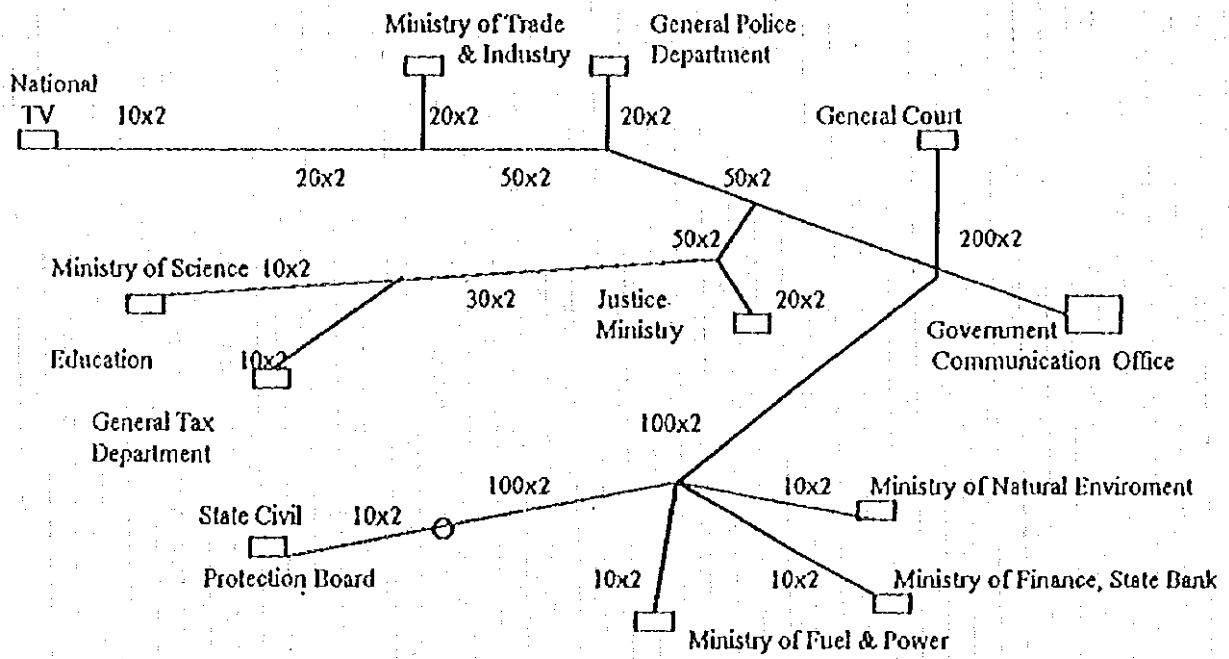
A signal of 1.5 Np was given at the input of the 2-meter cable(TG 50x2x0.5).

3. On Faults

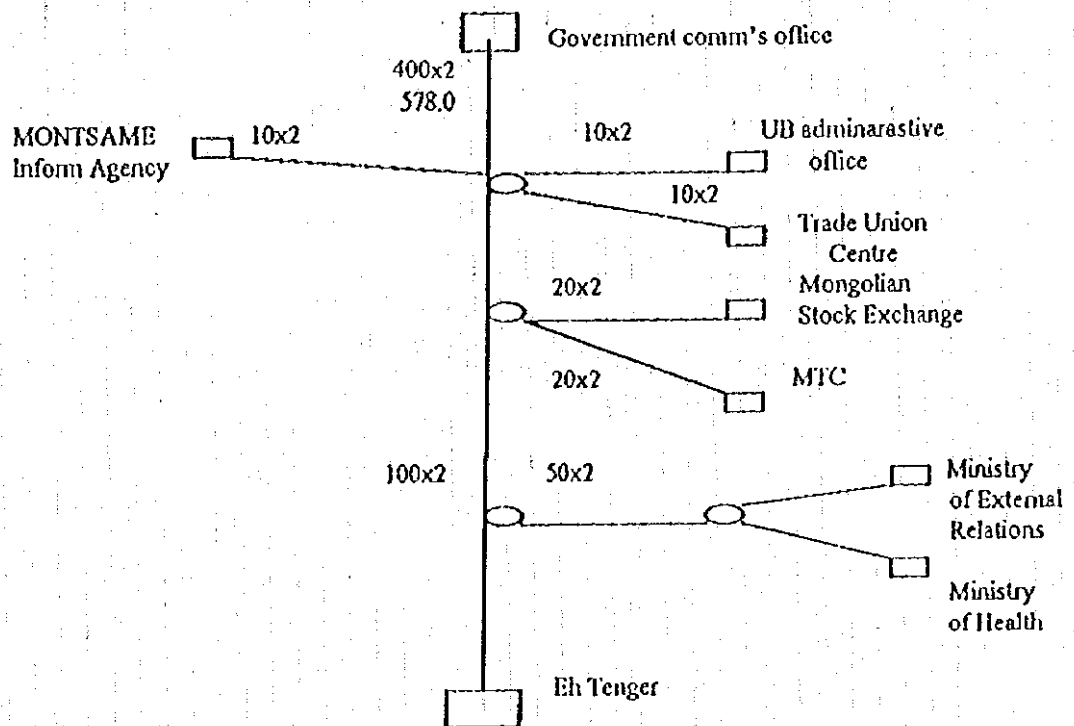
The quality of the telephone communications operation is estimated by the number of station, cable and final equipment faults/damages. The following table indicates the faults after 1987.

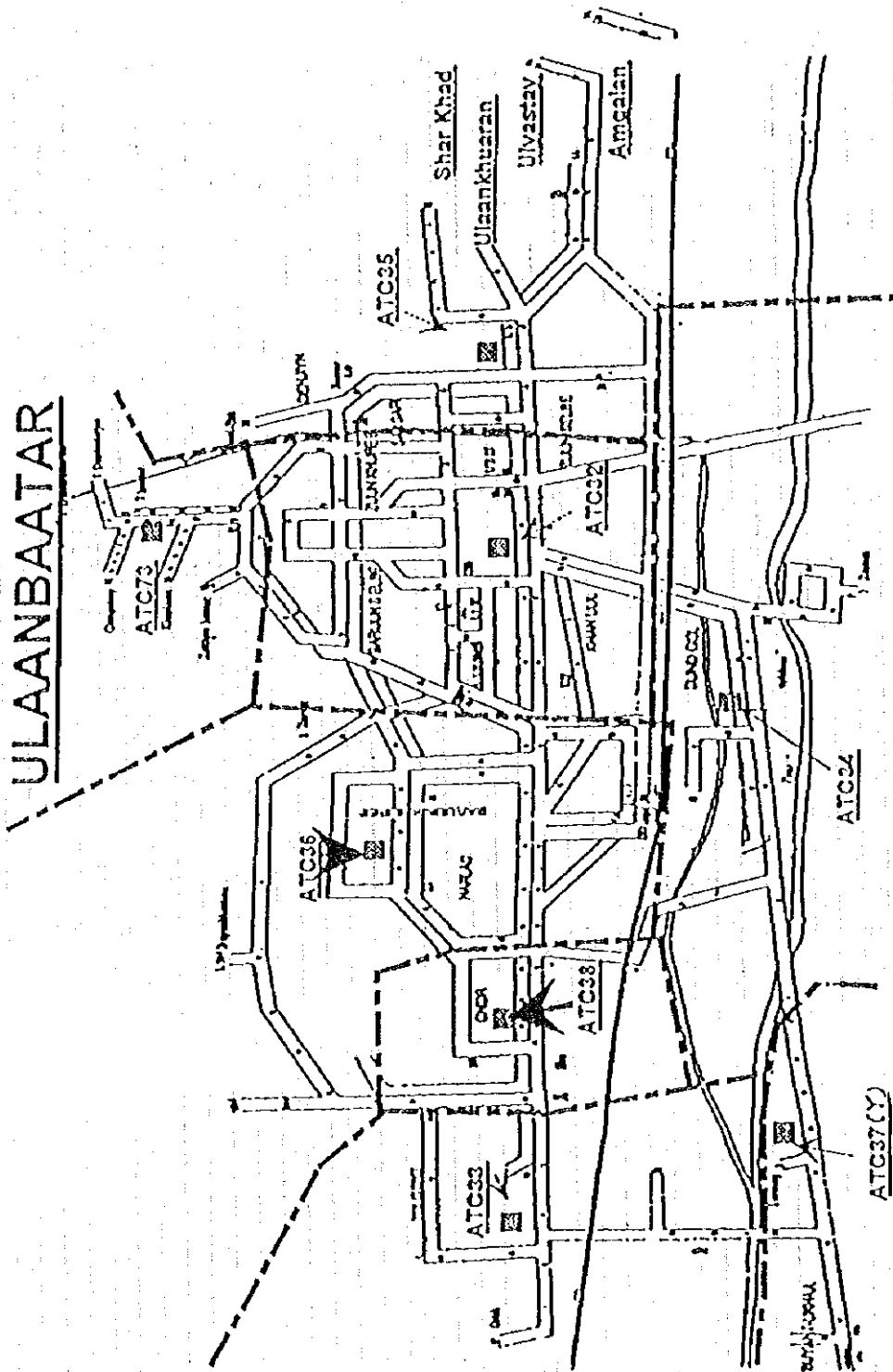
	1987	1988	1989	1990	1991	1992	1993	1994
Station	36	29	36	23	46	39	42	49
Apparatus	198	288	228	205	151	226	253	209
Cable	30	30	32	31	35	62	45	51

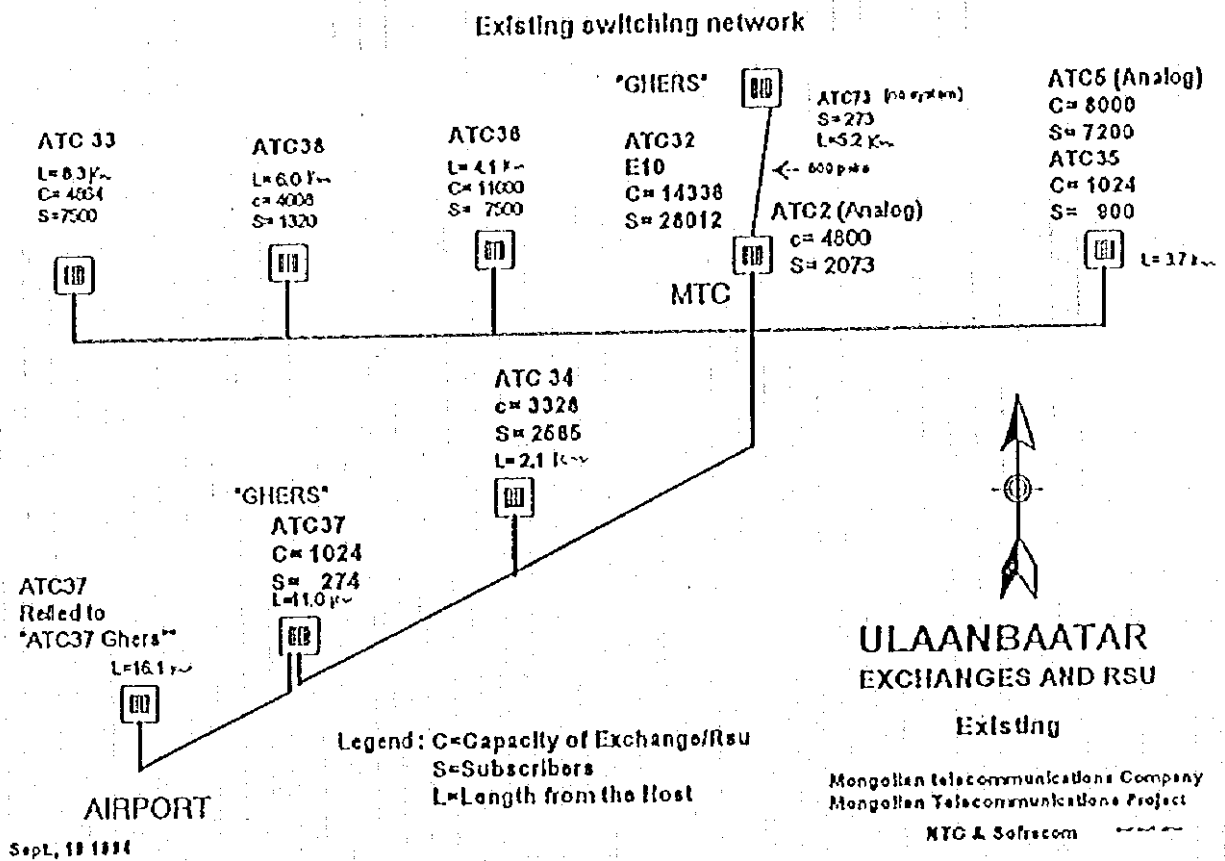
Government Network Cable Diagram (2)



Government Network Cable Diagram (3)







The diagram above illustrates the composition of the network.

The existing switching situation is as follows:

- 1 Host E10 Alcatel, named ATC32.
- 6 RSU are connected on this Host :

ATC33,

ATC36,

ATC38,

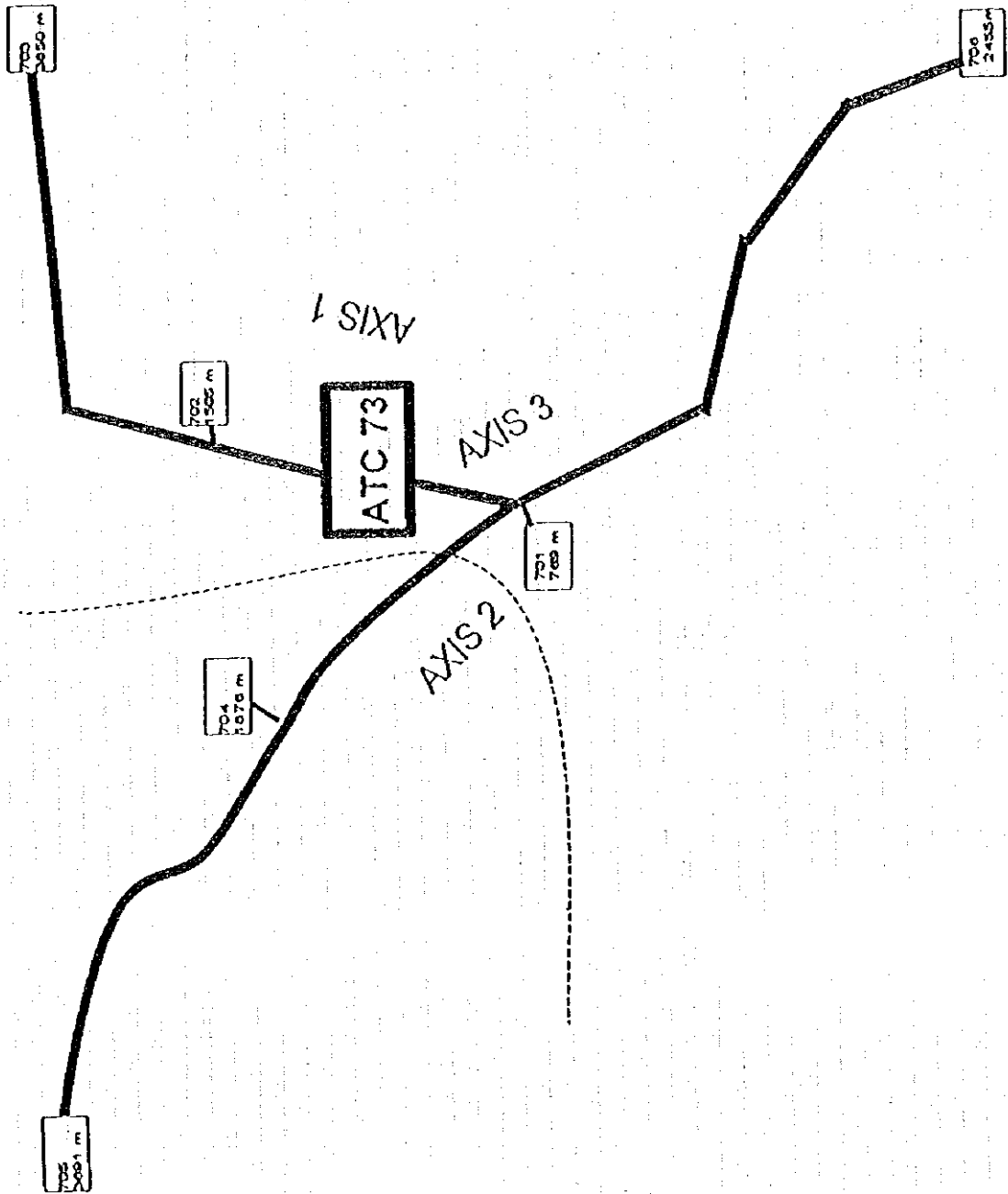
ATC35,

ATC37),

a CNE (Airport) is connected on the RSU ATC37.

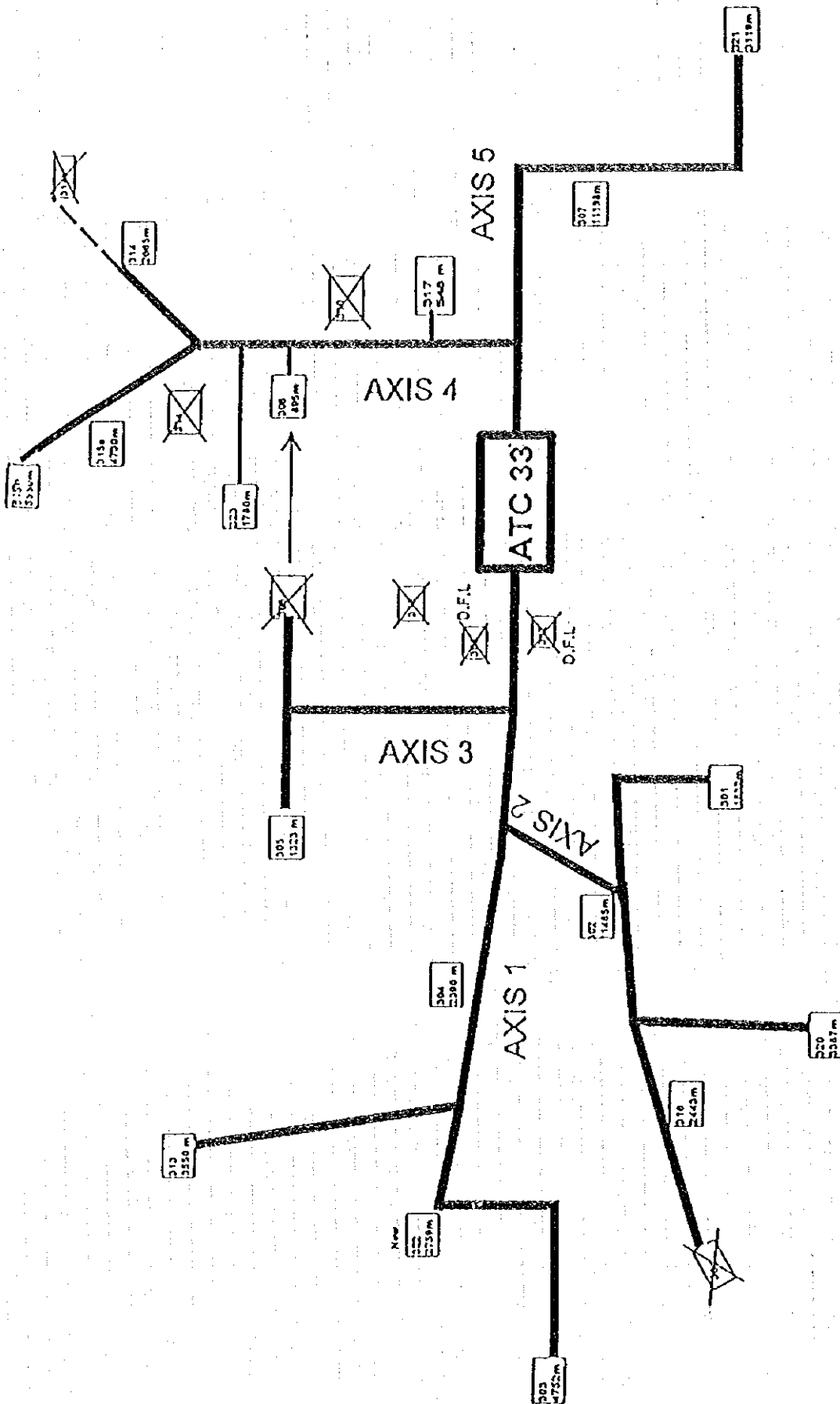
2 analogue exchanges ATC2 and ATC 5.

The ATC5 building shelters the ATC35, the ATC32 and the ATC2 are installed in the same building.



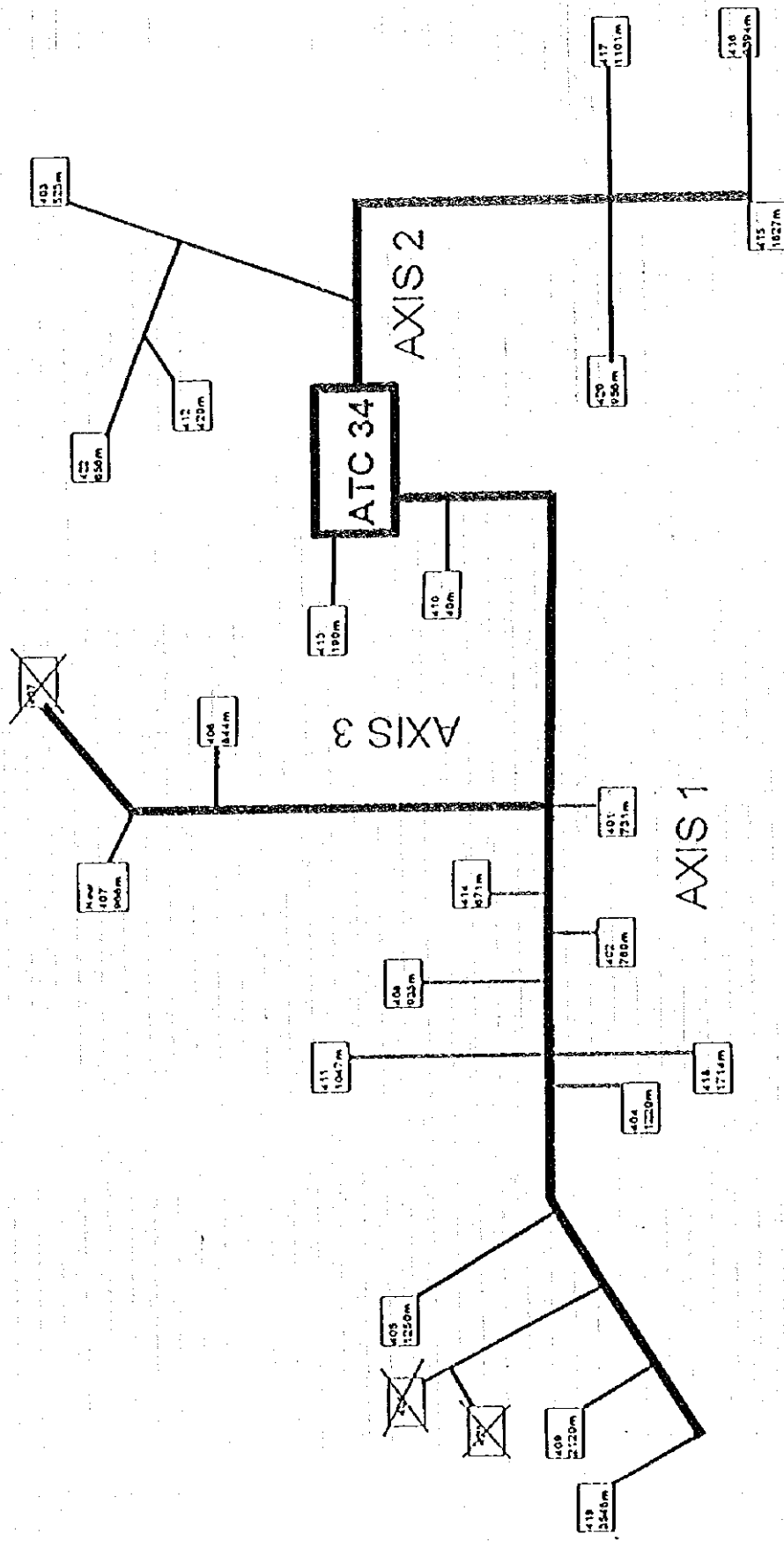
Optimization Plan - ATC 73 - Diagram of Cabinets and axis

NTC & Subsystem - rev 24, 11/04



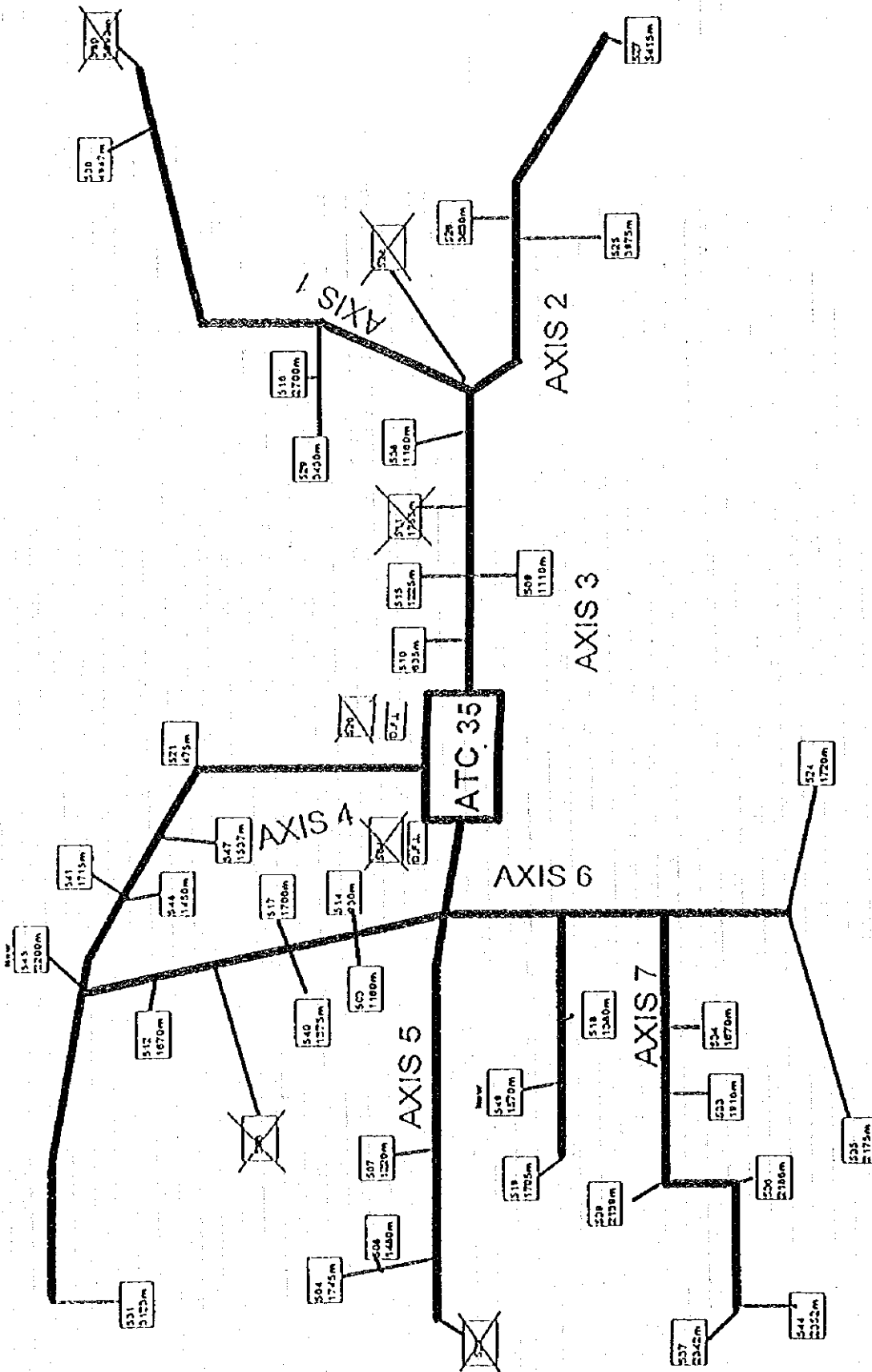
Optimization Plan - ATC 33 - Diagram of Cabinets and axis

NTC & Software, May, 2014

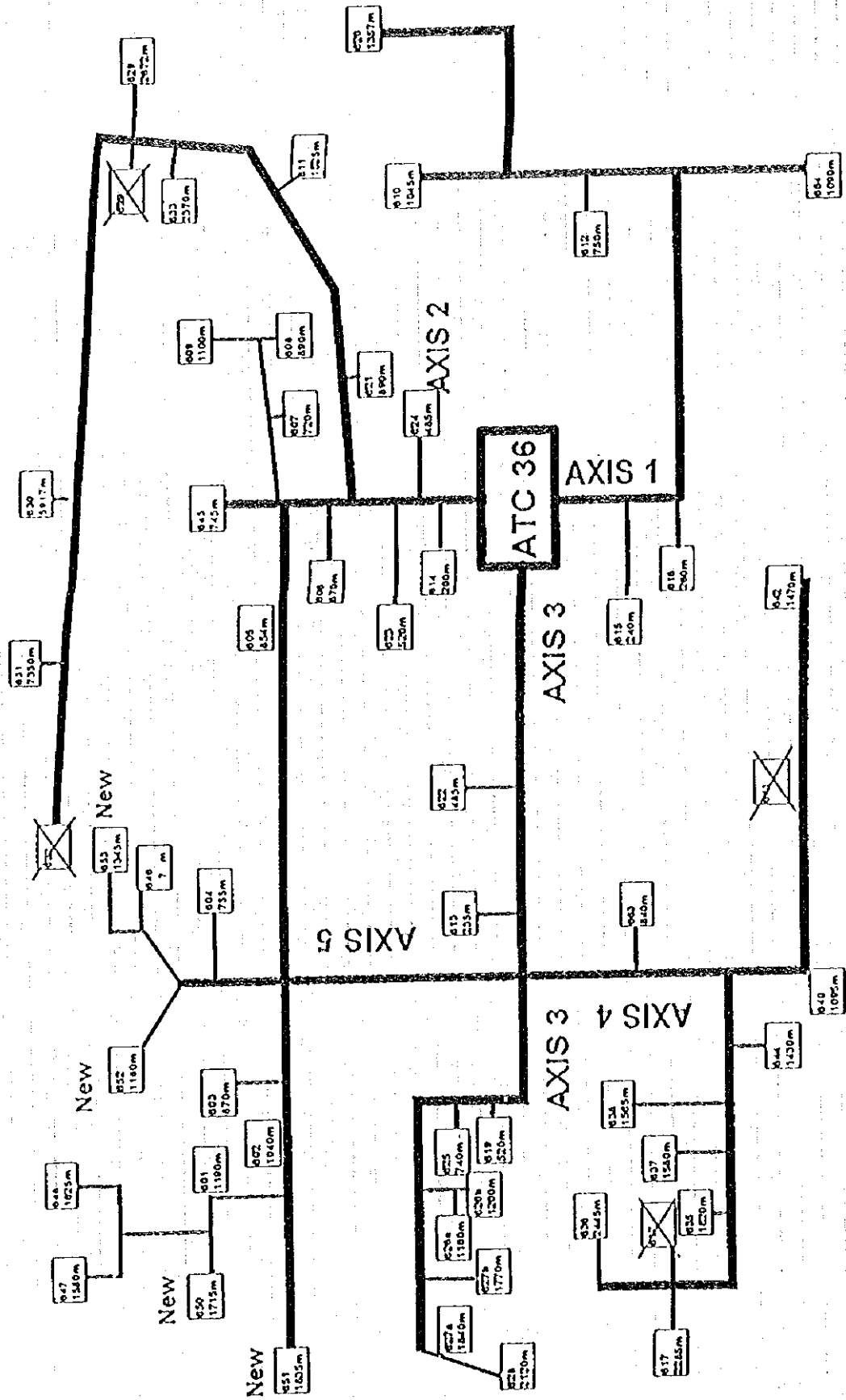


ATC 34 - Diagram of Cabinets and axis

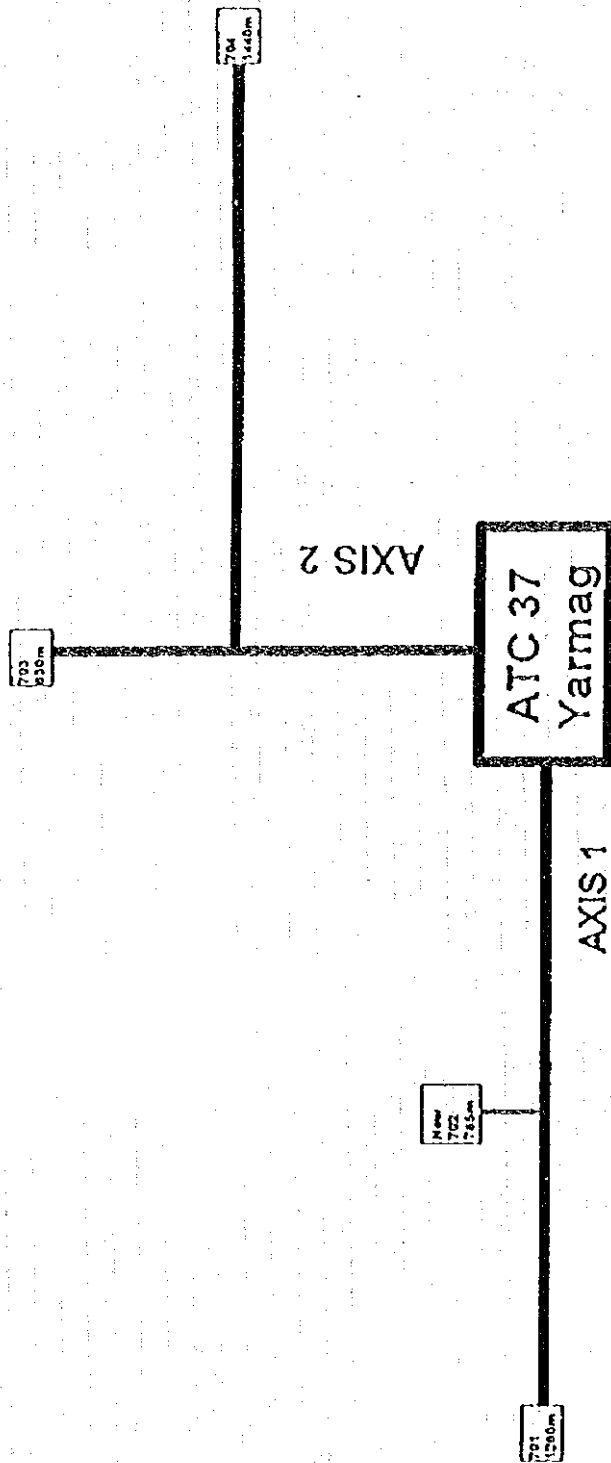
ATC 34 - Diagram of Cabinets and axis

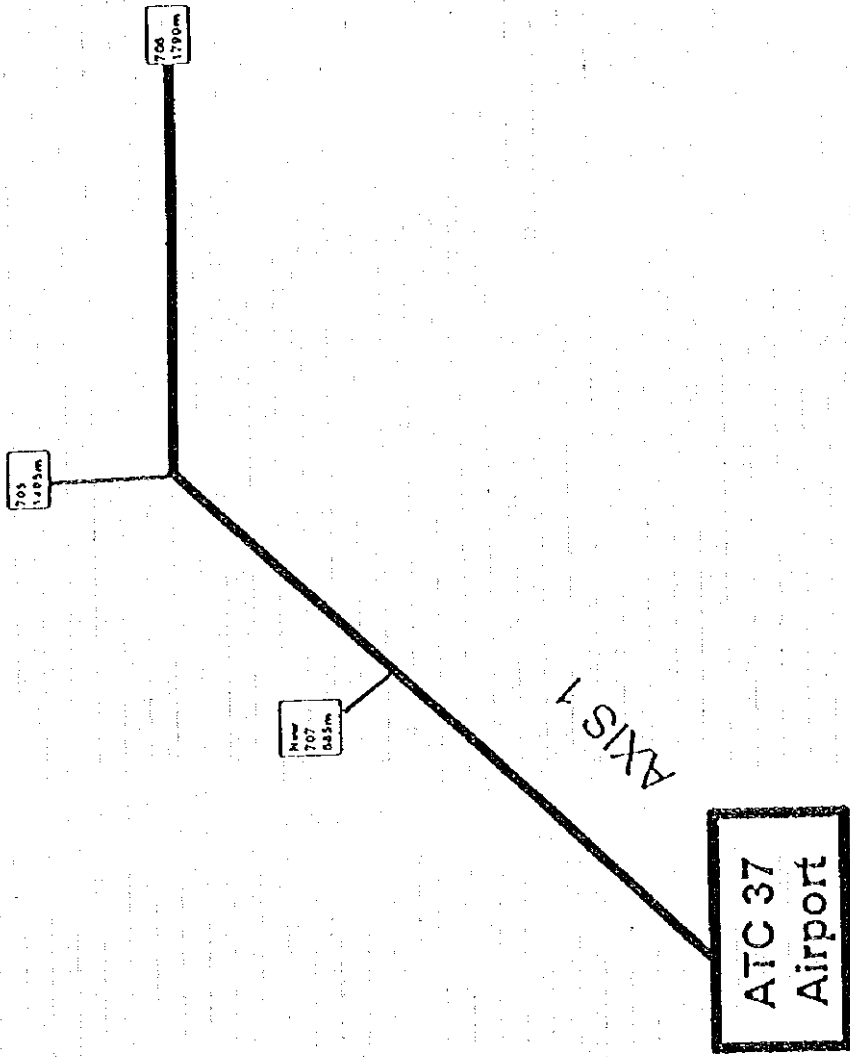


Optimization Plan - ATC 35 - Diagram of Cabinets and axis

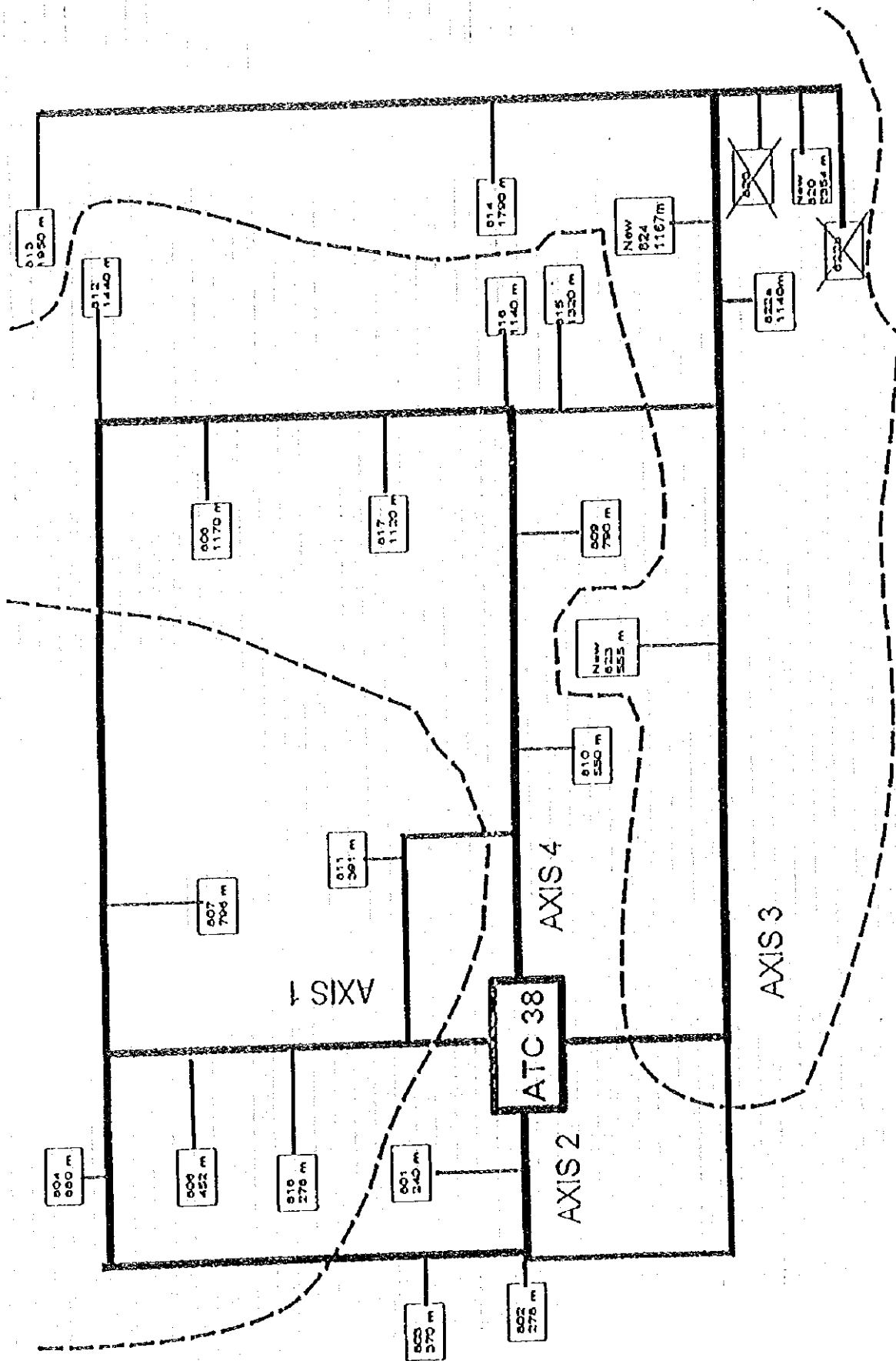


Optimization Plan - ATC 36 - Diagram of Cabinets and axis





Optimization Plan - ATC 37 Airport - Diagram of Cabinets and axIs



Optimization Plan - ATC 38 - Diagram of Cabinets and Axis

STRUCTURE OF CALL HANDLES E-10 ULAANBAATAR

INDICATORS	E-10'S FIGURES AS BY OCT. 1995
PERCENTAGE OF COMPLETED CALLS	42 %
PERCENTAGE OF UNSUCCESSFUL CALLS DUE TO BUSY NUMBER	24 %
PERCENTAGE OF UNSUCCESSFUL CALLS DUE TO CUSTOMER ERROR	32 %
PERCENTAGE OF UNSUCCESSFUL CALLS DUE TO FORWARD SYSTEM	1.1 %
PERCENTAGE OF UNSUCCESSFUL CALLS DUE TO ANSWER	0.66 %
PERCENTAGE OF UNSUCCESSFUL CALLS DUE TO EXCHANGE	0 %

Source :

1. Document Number ; DOC No 5
2. Meeting Name and Date ; User Supplier Meeting-E-10 SPC Switch
14 -17 November 1995
New Delhi, India
3. Title ; Mongolian Telecommunications Operating Company
Operation and Maintenance Features
4. Prepared by ; Sandagdorj Haraa Switching Engineer of E-10 MTOC