

3.10 Operation and Maintenance (O/M)

O/M is not the key function of ETC as the Operation Company of the telecommunications network services. O/M is to maintain and operate the serviceable network paying attention on:

- a) Improvement of the “quality of services” and “network performance”
- b) Maximum use of the network facilities
- c) Deduction of the waiting telephone applicant
- d) Improvement of the Tele-access
- e) Following-up the new technology as well as trend of the new technology development.

The priority will be given on a), b) and c) above, however.

In order to successfully implement the over-all obligation of O/M, O/M is to closely cooperate with the planning and project implementation divisions providing the accurate data of O/M situation, especially of QOS (fault/ fault recovery data, call completion rate, etc.) and the network performance data (traffic data, distortion, etc.), and asking for the correction of the network imbalance as well as the replacement of the manufacturing facilities (such as RAX switch, paper-insulated lead sheath cables).

3.10.1 Current Framework of O/M

(1) Human Resource

- a) Task forces for the daily maintenance are allocated to the sites/regions (switch, transmission spur routes, lineman, etc.).
- b) Maintenance of trunk transmission/power is carried out by HQ.
- c) Repair work of the cable fault is to be done by “cable installation team” other than O/M division, which frequently causes the delayed recovery of cable faults in the regional areas.

(2) Materials (spare parts)

- a) Spare parts are generally managed by HQ, and the site storage is rather limited. Delivery of spare parts (Sw./Tr) to Regions is frequently delayed and causes the long duration of the fault status.
- b) Total quantities of the spare parts will not be sufficient for the immediate recovery of the faults.

This situation is assumed to be caused by:

- Less attention on the analysis/assessment to the experienced faults in the past years.
- Long procurement time duration from the order (or site requirement) until receiving the spare parts.

- c) Outside plant materials are procured through ICB, which will take the long procedure/time until receiving the materials.
- d) Tools/measuring equipment/vehicles
 - Shortage of vehicles in all of the technical maintenance sections
 - Tools/measuring equipment shortage in OSP sections.

(3) Budget Management

- a) O/M budget will not be exactly accumulated from the site requirements with the clear evidences such as fault records etc, but will be defined by HQ as the lump-sum amount.
- b) Delay of the budget implementation (procurement order, work order) will cause the delayed maintenance activities. The implementation schedule will not be given in the budgetary schedule.

3.10.2 O/M Activities

(1) Daily Maintenance Work

- a) Traffic measurement

Traffic measurement is periodically done, and the result is reported monthly to the meeting chaired by DGM Traffic participated by all regions. However, traffic data will not be so complete for the detailed Engineering.

- b) Transmission systems as well as the switching systems are maintained through the centralized supervisory system. The immediate recovery orders are managed by each central technical section. The TR sites are to be clean up so as to be free from the faults.
- c) OSP maintenance in Regions/sites is only responsible on the faults located forwards from DPs, i.e. drop-wire, internal wire and telephone sets. The repair works of cable faults are to be done by the cable installation team of the project division through the order from H.Q.

The repeated faults are frequently caused on the repaired liens by the OSP site maintenance, however.

(2) Management of “Quality of the services” Targets.

- a) The maintenance activities are not addressed to improve the “QOS” in each region/site. No target figure of “QOS” is declared (Annual target, seasonal target site/region target)
 - Fault rate/recovery time/call completion rate, etc.
- b) Fault data/fault clearance records are not systematically processed to find out the bottleneck and/or the field to concentrate the maintenance efforts.

(3) New Subscriber Connection

- a) Long lists of the waiting applicants are not periodically examined, but many potential demands are expected.

However, the current worldwide trend of the decreasing growth rate of the fixed-phone demand shall be taken into consideration.

- b) The coordination with the project division as well as planning division is not sufficient for enhancing the new subscriber connections.

Monthly and/or quarterly meeting is required for the preparation work of the new connection and for the action plans to enhance the new subscriber connections.

- c) Imbalance facilities

Due to the delay of the local access network installation the huge switching line capacity (230 k line units) are in the idle condition.

- d) Target of the new connection

Target of the new connections under the annual plan will not be broken down to each region/site.

(4) Plant Record

- a) Plant records, especially of the outside plant are not maintained, nor up-dated.
- b) Plant records are to be kept at Region/Zone office.

	Up-date	Maintain
OSP	each MDF	Region/Zone
SW/Tr	Supervisory center	Region/Zone
Power/ Building	Region/Zone	Region/Zone

- c) Plant records are very important as the evidence of the assets and are to be used for the planning purpose.

(5) Repair Centers and Workshop

- a) Repair center for switching system is able to repair the PCB of subscriber/ trunk cards to the some extent. (detailed productivity unknown)
- b) The project department at the project sites establishes workshops for the outside plant.

3.10.3 Existing Facilities

The details of the existing facilities have been given in the previous section of this chapter.

Considering the high fault rate and the long fault duration, the worst facilities are highlighted.

(1) Service Wires (drop wire/ internal wires)

Due to the poor installation standard by the lineman, many faults are concentrated on the service wires.

- Correct hanging accessories are not used.
- Repair work was done by improper wire connection.
- DP covers are opened.

(2) Obsolete Paper Insulated Lead Sheath Cables

The cables would be installed before the year 1970, and has been used much beyond those sound life-span. Most of these cables will be in the low insulation condition due to the moisture infiltration.

The replacements of these cables are to be programmed as early as possible.

(3) RAX

The digital exchange of type RAX is not soundly operated, but is to be replaced within the Eighth 5-Year Development plan.

(4) Telephone-set

Some types of the telephone sets are recorded with the very high fault rate (1.2/month/100 subscribers).

The keen attention is to be paid on the procedure of the “Type Approval”.

3.10.4 Preventive Maintenance

The preventive maintenance is not systematically applied to the daily maintenance procedure. The maintenance efforts are mainly paid on the corrective maintenance, but such efforts will not make the fruitful results, i.e. very high faults rate as well as very long fault recovery time duration.

The preventive maintenance shall be addressed on the major reasons of the fault at first, and will be extended/expanded to cover the maximum extent of the maintenance field in order to improve the QoS.

3.10.5 Manual Board Operation

- 1) The operator assisted call handling is applied to the international / long distance calls as usual.
- 2) In addition to the above standard manual board application, around 600 units of the manual boards are under operation with around 8,000 subscribers especially in the sub-urban area.

These services will be considered as a part of the universal services, but the service time is limited to 8:30~17:00

The limited channels coming through VSAT, DRAMASS, VHF, and pair-gain system are terminated to the manual boards. These manual boards will be gradually reduced in accordance with the expansion of the national transmission network.

3.11 Organization and Human Resources Development

(1) Current Legislation on Telecommunications

(a) Proclamation No. 49/1996

“Proclamation” is determined by the Parliament and promulgated by the President. Proclamation No. 49/1996 gives legal framework for the telecommunication sector.

With recognition that telecommunication service performs an essential role in economic and social development of the country, the Proclamation No. 49/1996, having been entered into force on November 28, 1996, established a separate regulatory organ, namely Ethiopian Telecommunications Agency (ETA), and provides necessary regulatory provisions to make telecommunication service more *efficient* and *reliable*. Before the establishment of ETA, the operator and the regulator were not separated and managed by Ethiopian Telecommunication Authority.

Part II of the proclamation established ETA as an autonomous federal agency with its objectives to promote the development of *high quality, efficient, reliable* and *affordable* telecommunication services. The part also provides stipulations on regulation by ETA.

Part III of the proclamation stipulates the following

- 1) *Licensing of telecommunication operators*: Operation of a telecommunication service shall be made after obtaining license from ETA, except the ones by the police, the armed forces and by the State for national security.

The Agency can require the following and other license conditions that ETA deems necessary. ETA also may modify the condition of license when public interests arise.

- a) Provisions of services to rural areas
 - b) Publishing a notice that states charges and other terms applicable to services provided by licensees
 - c) Priority provision of service to the Government or other specified organizations
 - d) Criteria for setting tariffs
 - e) Compliance with technical standards or requirements including service performance standards.
- 2) *Tariff*: Tariff of basic telecommunication services (i.e. telephone, telex and telegram service – mobile phone service is not included in basic telecommunication services according to ETA.) shall be studied by ETA and submitted to the Government for approval.

- 3) **Technical standards:** ETA may determine technical standards, including those for customer premises equipment, and determined standards shall be published in a manner as ETA deemed suitable.
- 4) **Approval of equipment:** ETA may, by public notice, specify any telecommunication equipment that requires ETA's approval before it may be connected to a telecommunication system. It is prohibited to manufacture, import or distribute, without prior approval, telecommunications equipment that ETA requires approval of the agency.
- 5) **Radio communication and assignment of frequency:** ETA shall be responsible for management and authorization of use of frequency, and no person shall, without permission from ETA, possess, install or operate radio communication apparatus except the police, the armed forces and by the State for national security. ETA shall coordinate and monitor the use of frequencies.
- 6) **Power of the Agency to inspect:** ETA may assign inspectors to ascertain that the requirement of the Proclamation and decisions under the Proclamation are complied.

(b) Council of Ministers Regulation No. 47/1999

The regulation provides regulations on the followings:

- Part I: *General* (short title and definitions)
- Part II: *Telecommunication Service License* (application; grant, refusal and contents of license; duties of licensee; amendment, duration, renewal, revocation and termination of license; and fees for license)
- Part III: *Telecommunication Service Price and Tariff* (scope of application; general principles; general pricing approach; telecommunication access service pricing; telecommunication call service pricing; other charges, tariff revision; books of accounts)
- Part IV: *Technical Standards* (applicable to new installation)
 - Chap. I: *General* (technology choice; system modularity; system configuration; reliability and performance; equipment dimensioning; signal systems; safety requirements; protection of telecommunication equipment; marking of telecommunication equipment; electromagnetic interference; environmental conditions; and power system)
 - Chap. II: *Technical Standards for Public Switched Telecommunication Network* (general-compliance of equipment to ITU's recommendations, regulations and standards; digital trunk and junction network; radio transmission equipment; antenna and antenna supporting structures; customer premises

equipment; cable network design; underground cable installation; aerial cable installation; cross connection cabinet installation; and drop wire installation)

Chap. III: *Cellular Mobile Network* (general-being digital and capability of service provision, and accordance with international standards; connection to the public switched telecommunication network; and frequency allocation)

Part V: *Telecommunication Service Standards and Roll-out Target* (service targets-number of line faults and faults clearance; customer support services; roll-out targets-penetration, waiting list, extension to rural area, new and enhanced service, modern and reliable national network and business plan of licensee; emergency call services; and directory service)

Part VI: *Management of Frequencies and Radio Regulations* (national frequency allocation plan; granting of permits for use of frequencies; registration of frequencies; and frequencies allocated for broadcasting services)

Part VII: *Miscellaneous* (interconnection; power to issue directives by ETA and the Ministry; transitory provisions; and effective date-April 27,1999)

The ETA, as the regulator, shall prepare and provide various types of directives and standards on the above according to the Regulations.

(c) Proclamation No. 116/1998

The Proclamation No. 116/1998 of June 11, 1998 with short title of “*Investment (Amendment Proclamation)*” amended parts of Investment Proclamation No. 37/1996. Related part to the telecommunications is that “investors shall be allowed in the area of telecommunication services only in partnership with the Government (Art. 5).”

(d) Amendments to Proclamation No. 49/1996

At the beginning of the Phase-2 Study, a proclamation to amend Proclamation No. 49/1996 was issued. One of the most important changes is stipulated in Article 7 (addition to Article 10 of the original proclamation), which says:

“Notwithstanding the provision of Article 5 (2) (b) of the Proclamation No. 37/1996 (as amended by the Proclamation No. 116/1998), the Agency shall issue license to individuals or companies participating in the following services:

- a. Telecenters or resale service;
- b. Outside cabling or Wireless Local Loop lines installation or maintenance;
- c. Telecommunication exchange installation or maintenance;
- d. In-house or building cable installation;
- e. Other similar activities to be designated by the Directives of the Ministry.”

This amendment renders possible for individuals or companies other than the Sole Operator (Ethiopian Telecommunications Corporation) to enter into telecommunication business although it is limited to non-core services. This article also can be a base for encouragement and control of the telecommunication industry.

Another important change is to establish a base for control importers of equipment. The amendment adds following (b) to Article 14 (3).

“14. Approval of Equipment

- 1) The Agency may, by public notice, specify any telecommunication equipment that requires the Agency’s approval before it may be connected to a telecommunication system;
- 2) Without prejudice to Sub-article (1) of this Article, the following equipment requires the approval of the Agency:
 - a) radio communication equipment;
 - b) TVRO
- 3) The Agency shall consider the following criteria in approving types of telecommunication equipment:
 - a) safety to life and health;
 - b) *If the equipment is imported for profit, the importer’s material, financial and human resource capability to supply spare parts and provide maintenance service for the equipment imported;*
 - c)

With the amendment, “the use or provision of voice communication or fax services through Internet is prohibited.” The amendment also add the amount of penalty against the telecommunication services without having a license or a valid license as “ fine equal to double of the revenue estimated to have been earned by the person during the period of the time the person operated the service and with imprisonment from three up to five years.

(2) Organizations Related to Telecommunication Sector

(a) Ministry of Infrastructure (MOI)

Powers and duties of the Ministry are defined in the Proclamation No. 4/1995 (at that time the name was Ministry of Transport and Communication), having been entered into force on August 23, 1995. Regarding telecommunications, the following powers and duties are stipulated:

- 1) to *cause the expansion of and supervise* telecommunications services
- 2) to *prepare draft laws* concerning the regulation of transport and communication services
- 3) to *facilitate* integrated development and effective and coordinated utilization of all modes of transport and communication of the country
- 4) (related to road transportation)

- 5) to *issue directives* concerning the registrations and inspection of communications equipment, the granting of operating permits and the licensing of operators
- 6) (related to ship registration)
- 7) (related to marine transportation accidents)
- 8) in cooperation with the appropriate organs, *cause the training of manpower* necessary for transport and communication sector

(b) Ethiopia Telecommunications Agency (ETA)

Proclamation No. 49/1996 established ETA as an autonomous federal regulatory agency with its objectives to promote the development of *high quality, efficient, reliable* and *affordable* telecommunication services. Powers and duties of ETA are as follows:

- 1) to ensure that telecommunication services are operated in a manner that will best serve and to contribute to economic and social development of the country
- 2) to specify technical standards and procedures for provisions of telecommunication services
- 3) to ensure that telecommunication services conform the specified standards of quality
- 4) to regulate tariffs relating to basic telecommunication services (i.e. fixed telephone, telegram or telex service)
- 5) to license and supervise operators of telecommunications services
- 6) to regulate types of telecommunication equipment which may be connected to a telecommunication system
- 7) to authorize and supervise use of frequencies allotted to Ethiopia
- 8) where authorized by the Minister, subject to the appropriate laws and government directives, to represent the Government in international conferences and international organizations concerned with telecommunications and to follow up the implementation of treaties dealing with telecommunications to which Ethiopia is a party
- 9) to collaborate with educational institutions in order to promote technical education in the field of telecommunications
- 10) to collect and license fees in accordance with the rate approved by the Ministry
... (continues up to 12 on general matters) ...

ETA is headed by a General Manager, who is appointed by the Government upon the recommendation of Minister.

The organization chart of ETA is shown below. ETA currently employs 43 persons, whose allocation to sections is also shown in the below chart.

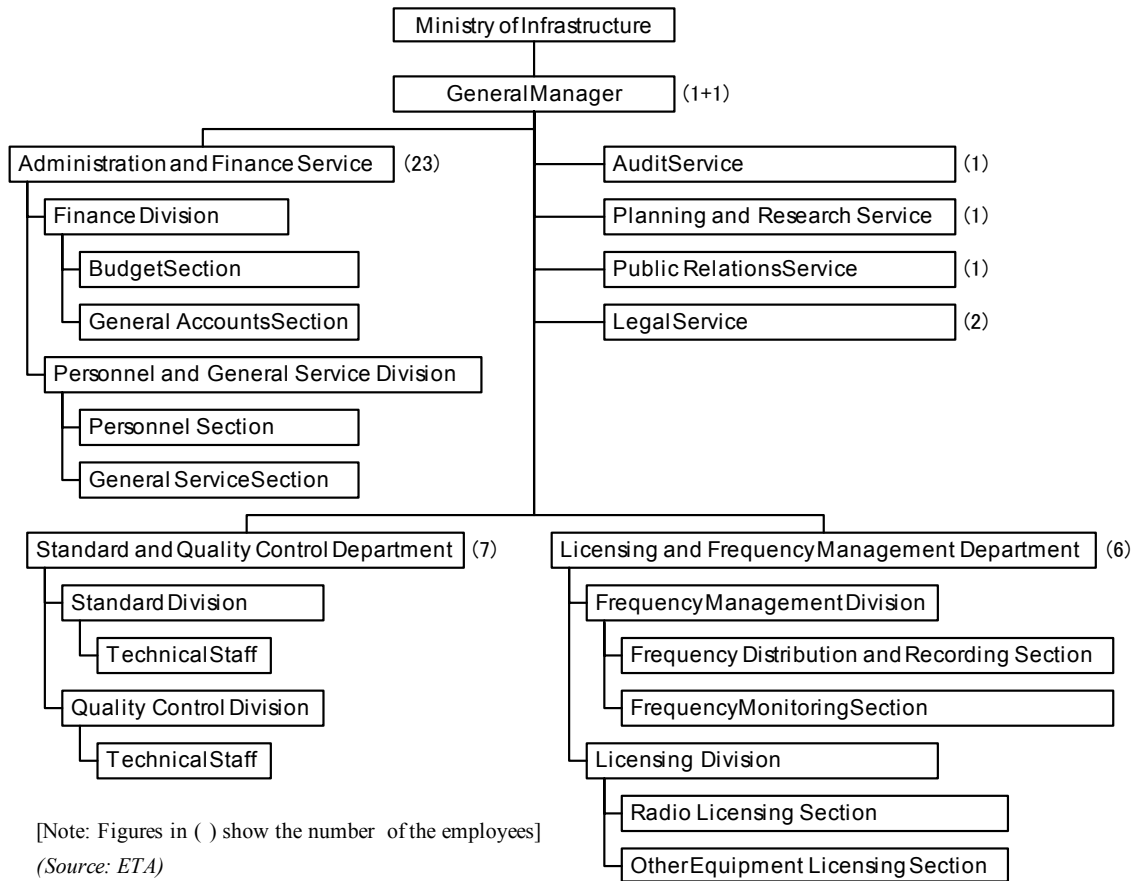


Figure 3.11-1 Organization Chart of ETA

To discharge the important duties ETA has a plan to enhance its organization as follows.

Table 3.11-1 Staff Enhancement Plan of ETA

(Unit: persons)

Office/Service/Department	Current	Planned
General Manager Office	2	2
Audit Service	1	3
Planning and Research Service	1	6
Public Relations Service	1	4
Legal Service	2	3
Administration and Finance Service	23	35
Standard and Quality Control Department	7	13
Licensing and Frequency Management Department	6	22
Total	43	88

(Source: ETA)

Revenue of ETA is composed of i) government subsidy, and ii) license fees. In recent years, actual expenditure has not reached approved budget as well as collected licensing fees.

Table 3.11-2 Recent Budget of ETA

(Unit: Birr)

Year	1998/99		1999/2000		2000/01	
	Amount	% to Total Expenditure	Amount	% to Total Expenditure	Amount	% to Total Expenditure
Revenue						
Various Licensing Fees	247,218	(27%)	3,916,072	(361%)	2,691,925	(118%)
Expenditure						
Salary	96,684	(11%)	270,869	(25%)	311,660	(14%)
Allowance	0	(0%)	0	(0%)	1,595	(0%)
Pension	5,801	(1%)	16,252	(1%)	18,689	(1%)
Communication, Electricity, Water, etc.	25,884	(3%)	92,543	(9%)	142,423	(6%)
Transport, Guest Service	148,916	(16%)	91,750	(8%)	76,049	(3%)
Advertisement	36,049	(4%)	30,259	(3%)	50,786	(2%)
Office Maintenance	20,453	(2%)	7,138	(1%)	6,794	(0%)
Vehicle Maintenance	4,905	(1%)	10,630	(1%)	5,658	(0%)
Office Rent	54,160	(6%)	216,642	(20%)	216,642	(10%)
Contracted Service	1,474	(0%)	35,391	(3%)	10,801	(0%)
Book, Periodical, News Paper, etc.	3,497	(0%)	6,033	(1%)	8,134	(0%)
Uniform, etc.	0	(0%)	2,747	(0%)	3,244	(0%)
Fuel, Lubricant	5,780	(1%)	10,593	(1%)	30,404	(1%)
Office Materials	37,856	(4%)	24,830	(2%)	48,197	(2%)
Other Materials	4,639	(1%)	5,464	(1%)	5,641	(0%)
Contribution to International Organs	243,492	(27%)	243,958	(23%)	795,093	(35%)
Purchase of Vehicle	0	(0%)	0	(0%)	371,877	(16%)
Purchase of Equipment, Assets	226,174	(25%)	18,372	(2%)	171,092	(8%)
Total Expenditure	915,770	(100%)	1,083,479	(100%)	2,274,786	(100%)
(percentage to approved budget)		(55%)		(71%)		(76%)
Approved Budget	1,675,100		1,534,300		3,003,000	

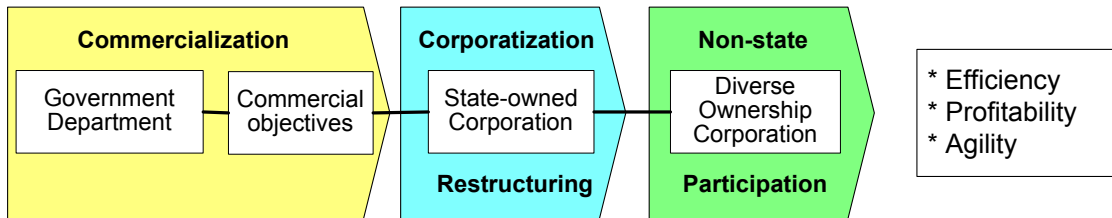
(Source: ETA)

(c) Ethiopian Telecommunications Corporation (ETC)

Ethiopian Telecommunications Corporation (ETC) is established by Council of Ministers Regulations No. 10/1996 on November 28, 1996 (the same date of the establishment of the separate regulator, i.e. ETA), as a *public enterprise*, with authorized capital of Birr 1,473,980,578 and paid capital of 480,459,578, with rights and obligations succeeded from Ethiopian Telecommunication Authority, and with the following purposes:

- 1) to engage, in accordance with development policies and priorities of the Government, in the construction, operation, maintenance and expansion of telecommunication services
- 2) to provide domestic and international telephone, telex, telefax and other communication services
- 3) to provide communication services using integrated information technology, including re-broadcasting of television broadcasts.
- 4) to repair, assemble and manufacture telecommunication equipment and ancillaries
- 5) to render training services to telecommunication personnel
- 6) to engage in other related activities necessary for the attainment of its purposes

General ways of development of public enterprises over the world are illustrated in the figure below. ETC can be located in the second stage in the figure, having transformed from the Authority. Transformation into the third stage is planned through introducing “Strategic Partner” in 2002, remaining monopoly of the operation of the sector.



(Source: *Improving State Enterprise Performance*, Russell Muir and Joseph P. Saba, the World Bank, Oct. 1995)

Figure 3.11-2 Trend of Development of Public Corporations

Organization structure is shown in the figure below. ETC has 7,348 employees whose breakdown to each Department and Divisions is also shown in the same chart.

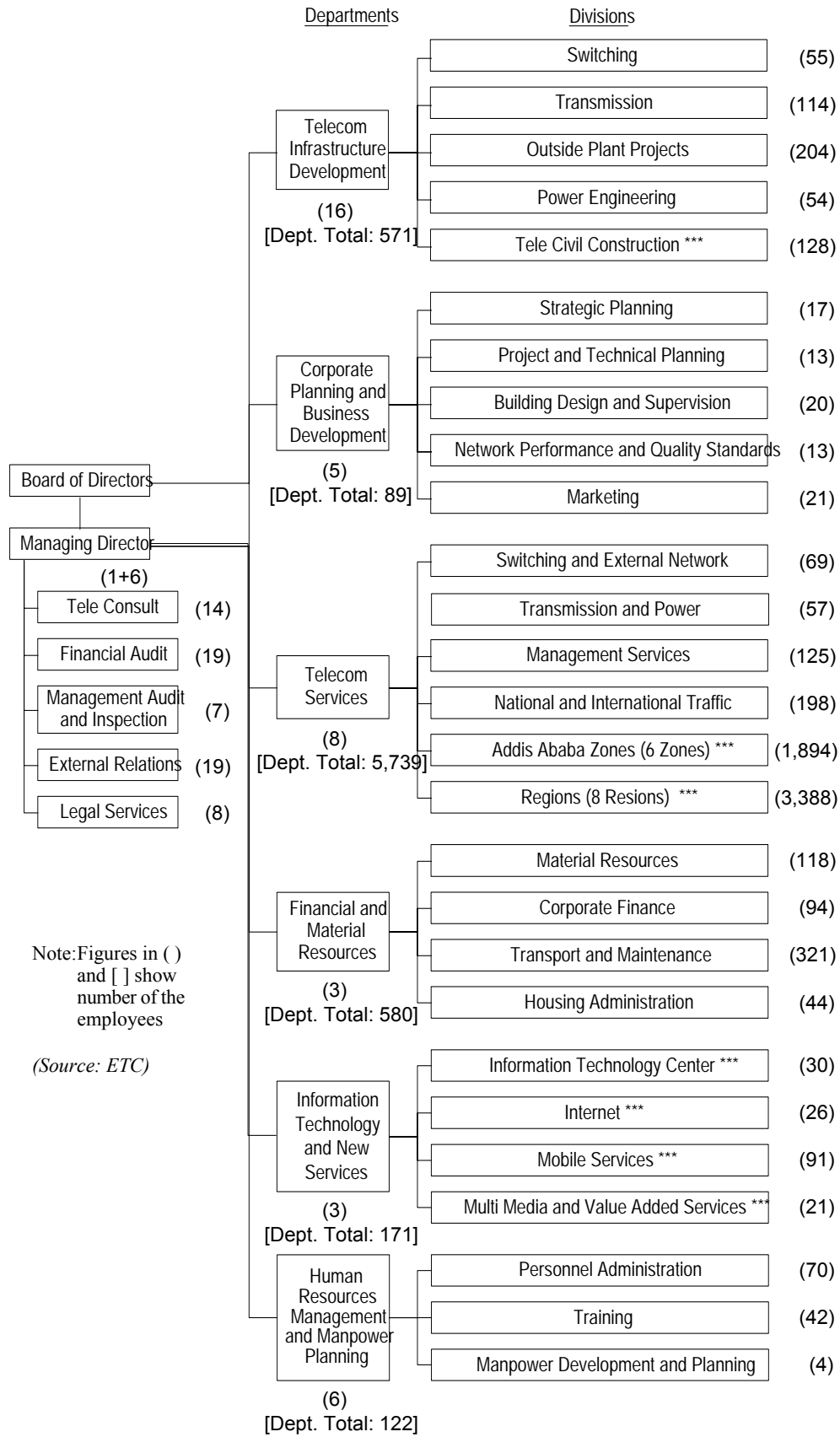


Figure 3.11-3 Organization Chart of ETC

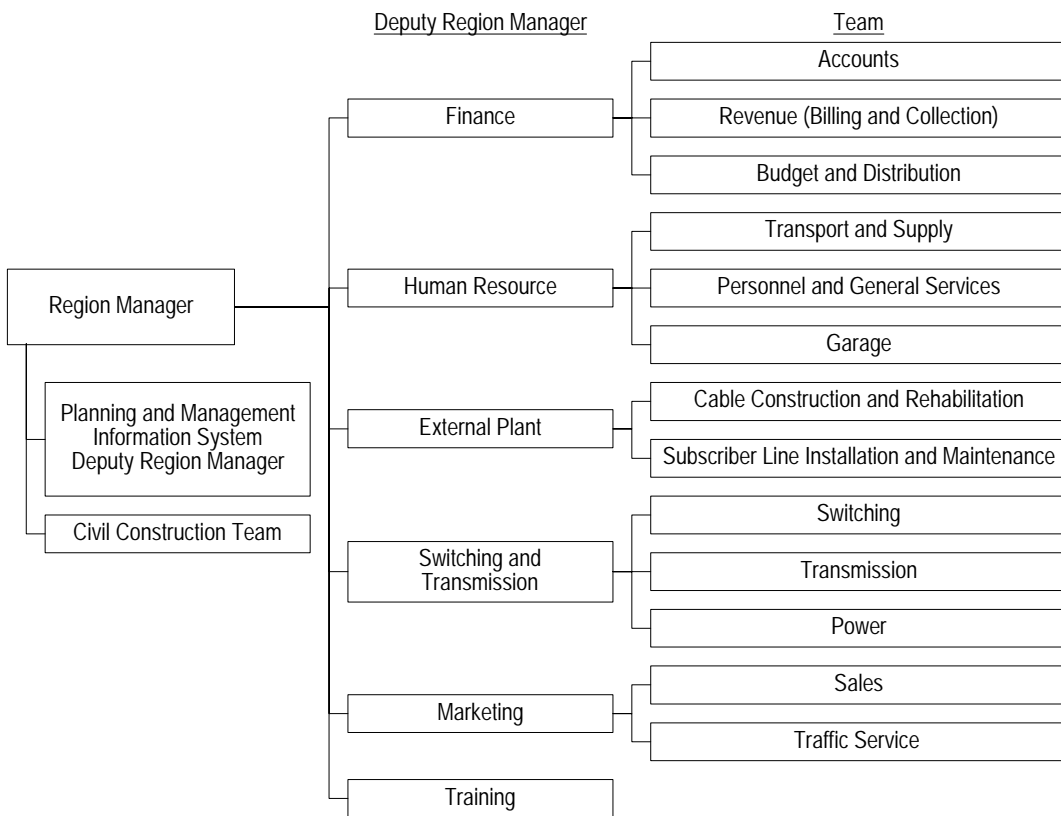


Figure 3.11-4 Organization Chart of ETC Region

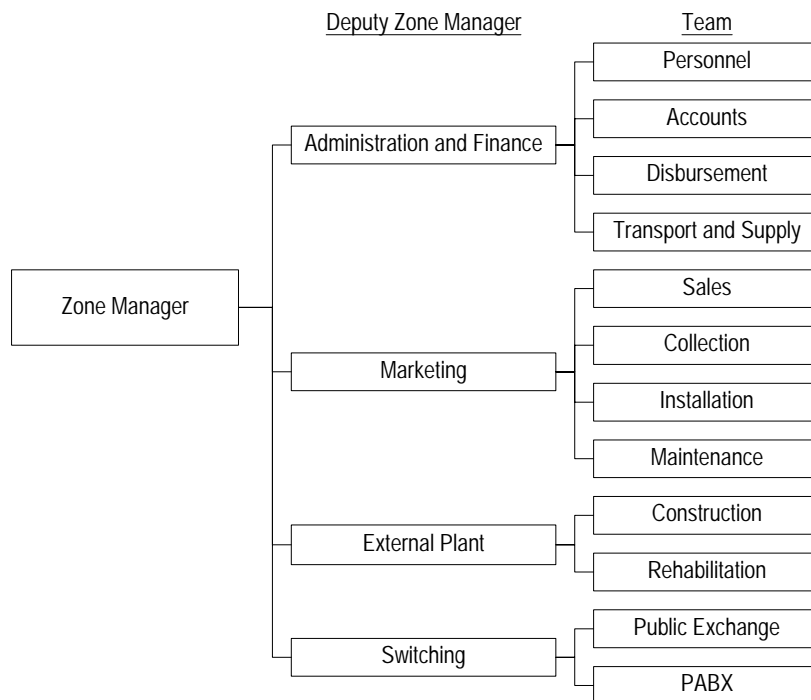


Figure 3.11-5 Organization Chart of an Addis Ababa Zone of ETC

Table 3.11-3 Number of Employees in ETC Regions and Addis Ababa Zones
(January 2002)

(Unit: persons)

ETC Regions	No. of Employees	ETC Addis Ababa Zones	No. of Employees
Southern	562	Central	320
Northern	442	Eastern	332
South Eastern	433	Northern	347
North Western	467	Southern	282
South Western	393	South Western	284
North Eastern	402	Western	329
Eastern	445	Total of Zones	1,894
Western	244	(%) to ETC Total	26%
Total of Regions	3,388	Total of Regions and Zones	5,282
(%) to ETC Total	46%	(%) to ETC Total	72%

(Source: ETC)

ETC has made substantial efforts in training. The training institutes currently place emphasis on training, mainly computer courses, inviting external persons with charging fees. Last year, the institute invited five persons for the training of cable jointing from a private company outside ETC.

Table 3.11-4 Training in Ethiopian Telecommunications Training Institute

Courses	Duration/Number of Trainee		2000/01	2001/02
	Duration (weeks)	Actual Trainee (persons)	Actual Trainee (persons)	Plan Trainee (persons)
1 Telecom Engineering				
1.1 Outside Plant	1-2	141	90	
1.2 Switching	2-6	75	36	
1.3 Transmission	1-2	59	54	
1.4 Data Communication	2	10	20	
1.5 Telecom Power Plant	1-2	30	30	
1.6 Up-grading	12-26	120	196	
2 Business Study				
2.1 Management	0.4-5	626	122	
2.2 Telecom Operation and Traffic	2	81	55	
3 Information System				
3.1 Computer (Internal)	0.8-1.5	429	448	
3.2 Internet (Introduction)	0.4-0.5	9	478	
4 Pre-service (Line-men)	2	125	64	
5 External				
5.1 PABX Operation	3	124	100	
5.2 Computer (External)	0.4-0.9	823	648	

ETC has a plan to evolve the training center to an independent agency for education and training for not only for the telecommunication sector but also for information technology sector over the nation.

(3) Problems/Issues

(a) ETA

The major issues on the regulator can be summarized as follows:

- There are many missing directives, standards and specifications for the enforcement of proclamations/regulations. Although the organization are planned to be strengthened and the staff will be doubled, the staff has not acquired sufficient capability to design, establish and maintain regulatory schemes/programs.
- One of the important functions, i.e., “to collaborate with educational institutions in order to promote technical education in the field of telecommunication” has not yet started.
- Although problems in equipment approval for mobile phones were found during the Phase-1 of the Study, the problems were solved before the beginning of Phase-2.

(c) ETC

Following major problems/issues were found.

- Efforts to satisfy customers or to offer services that customers think worth to pay appear insufficient. Many customers think the tariff of ETC is high. Many employees seem still bureaucratic as they grant services.
- Performance evaluation is not linked to rewarding. Incentive, such as to give salary to employees with level of evaluation, does not work.
- Coordination among departments and divisions looks weak. For example, increase of subscriber lines for fixed telephone does not take place as planned, causing long waiting list, while facilities for switching and transmission are developed ahead. Resource allocation might not be consistent and flexible.
- Junior managers, or future managers, do not have enough knowledge on jobs and situations of other divisions or teams. Since major tasks for managers are coordination with related divisions/teams, lack of capability for the coordination may cause fatal results for good management.
- Despite the great deal of efforts for training, it does not sufficiently cause expected improvements.
- Decision makings, even for small matters, often take many steps, causing late actions.
- Staff in the head office seems taking attitudes of guiding rather than trying to improve performance together with profit centers or than to serve to persons in regions and zones.
- Monitoring and evaluation seems weak to improve the project management.

3.12 Financial Status of ETC

3.12.1 Present Status

The Ethiopian telecommunications sector is run on a monopoly basis by ETC. Thus, a financial analysis of ETC was conducted using P/L, cash flow statements, and balance sheets.(refer to Table 3.12-6, 3.12-7, 3.12-8)

The ETC profit structure was also analyzed, based on billing data by subscriber category (supplied by the company) for the year ended March 2002. This analysis covered approx. 330,000 subscribers.

The ETC financial statements are subjected to internal and external audits every year, and published in the annual report. A financial analysis was conducted on financial statements published in these annual reports over the six years from 1995/96 to 2000/01 (estimated figures).

The telecommunications sector has generally been considered a profitable business, and certainly until around the mid-1990s this tended to be the case. However, developing countries were not necessarily part of this trend. Among the countries of sub-Saharan Africa, Zambia had a collection ratio of only 40% of the billing amount, with its neighbor Uganda in much the same position.

(1) Stability

The solvency ratio was calculated to ascertain ETC stability.

The ETC capital-to-assets ratio for total assets went from 51.6% in FY1995/96 to 57.5% in FY1997/98, and was over 55% in FY2000/01. The target ratio is 40%, indicating that there is room to boost the percentage of borrowed funding in the ETC capital structure in the form of borrowing and other liabilities. (ETC was injecting capital up until FY1998/99.)

A look at the ETC self-financing ratio for annual capital investment shows that reliance on borrowed funds has declined from initial levels, and that funding for investment has been derived mainly from profits and redemption. Meeting demand will require large-scale capital investment and, for this capital investment to proceed, an injection of borrowed funds in a well-balanced manner.

Turning next to the debt-to-equity ratio of interest-bearing loans to net worth: this was 0.46 in FY2000/01. These figures demonstrate the excellent stability of the operating entity and indicate a potential for even greater capital investment. When taking the interest coverage ratio of 6.95 for FY2000/01 also into account, ETC finances appear very stable with plenty of potential elasticity.

(2) Liquidity

The ETC liquidity ratio (current assets/current liabilities) for FY1998/99 was 2.23, and 3.01 for FY2000/01. Liquidity ratios should ideally settle at around 200%, and thus the figures given above indicate a favorable liquidity ratio for ETC.

(3) Profitability

Although a profit margin of 0.57 in FY1997/98 fell to 0.49 in FY1998/99, FY1999/2000 saw a recovery to 0.59, which represents a very high level of profitability.

(4) Growth Ratio

A result of the high profitability indicated in (3) above has been continuous growth up to FY2000/01 from 0.17 in FY1998. This suggests that ETC finances are sufficiently healthy to allow new investments in the future.

(5) Efficiency Ratios

The fixed asset turnover ratio indicates that investing 1 Birr produced 1.41 in FY1998/99, 1.07 in FY1999/2000, and 0.80 in FY2000/01. The gap between FY1998/99 and FY2000/01 may be attributed to a shift in investment to different areas, such as investment in mobile phones and the Internet.

The average collection period, which indicates the time taken to collect charges, has improved dramatically from 299 days in FY1998/99 to 152 days in FY2000/01. Since there is no evidence of ETC instituting any special measures to improve collection in FY1999/2000 or FY1999/2000, this figure must be analyzed.

As reported in 3.12-3, however, subscribers are paying their bills, though somewhat late, and analysis conducted by taking into account billing and collection amounts carried over indicates that around 90% of the billing amount is being collected.

(6) Overall Findings

A look at the fixed-asset turnover ratio, which indicates the efficiency of capital investment, shows that the 1.66 achieved in FY1996/97 fell to 0.80 in FY2000/01. This may be due to a delay in converting capital investment into profits. However, the impact of changes to the ETC profit structure, such as changes in the international settlement ratio, should not be ignored.

The return on capital employed, which reflects the overall impact of investment, has been in a state of gradual and ongoing decline from 0.21 in FY1995/96 to 0.11 in FY2000/01, due to facility investment. The marked deterioration in this figure in FY1995/96 may be attributed to the multiplying factor of facility investment. However, a figure of 0.11 is very good. Furthermore, the company's profit margin is 0.50 and its solvency ratio is 0.54 in FY2000/01. The figure of 6.95 for the interest coverage ratio also indicates potential for further injection of borrowed funds in FY2000/01. The conclusion is therefore that ETC operations are of a sufficiently stable level.

3.12.2 Analysis of Subscriber Attributes

The ETC profit structure may be summarized as follows:

In FY2000/01 international calls comprised 37.8% of total revenue, up approx. 10.0% from the

previous year. This was due to a decline in the international settlement rate, and a reduction in traffic.

Examining the characteristics of fixed phone subscribers from a turnover perspective, the simple average turnover per subscriber was USD215, with over 70% of all subscribers belonging to the group generating under USD100 in sales per annum, and the top 5% (key subscribers) sustaining over 60% of turnover. In international telecommunications, 1.5% of subscribers comprise 64% of turnover. In terms of unit sales per subscriber, key subscribers pay USD2,589 per annum, while the remaining 95% of subscribers pay USD 91 per annum. These figures suggest that future trends among key subscribers will have a critical impact on the future development of ETC. ETC must identify trends among these key subscribers and review its investment and management plans accordingly.

Meanwhile, turnover per mobile phone subscriber is now an average of USD459 per annum, which is about double the average figure for fixed phone subscribers. Here again there are key customers in the market, with the top 10% of subscribers accounting for 51% of total revenue from mobile phones. Focusing on international telecommunications only, the figures show that around 5% of mobile phone subscribers account for about 74% of international call revenue.

Table 3.12-1 Significant Financial Ratio

Item	1997/98	1998/99	1999/2000	2000/01
Stability ratio				
Debt/Equity	0.46	0.44	0.39	0.46
Interest Coverage ratio	5.57	6.39	6.22	6.95
Liquidity ratio				
Current ratio	2.58	2.23	2.43	3.01
Profitability ratio				
Profit margin	0.57	0.49	0.59	0.50
Growth ratio				
Sustainable growth ratio	0.17	0.13	0.12	0.09
Account Receivable (Days)	n.a.	299	150	152

Source: ETC and Study Team

3.12.3 Current Problem for Financial Matter

The P/L, Cash Flow Statement, Balance Sheet, and Financial Indicators presented by ETC indicate that ETC is being managed soundly. However, a number of problems were brought to light as a result of hearings conducted with ETC employees. These include problems relating to the collection rate and, as mentioned in the preceding section, problems relating to changes in the revenue structure. (Refer to Chapter 8)

(1) Account Receivable (days)

The term of accounts receivable stood at well beyond 150 days in 2001/02, presenting a far from comfortable operating environment. However, the collection rate (collected amount/billed amount) for the entire year remained at over 90% (Refer to Table 3.12-2).

Table 3.12-2 Current Status of Billing

	Billing	Collection	Ratio
1994/95	320,521,114	292,840,254	91.36%
1995/96	343,959,582	330,806,049	96.18%
1996/97	364,425,914	375,509,565	103.04%
1997/98	408,666,589	398,818,661	97.59%
1998/99	432,924,979	424,800,257	98.12%
1999/2000	503,753,513	512,631,296	101.76%
2000/01	532,802,093	507,295,132	95.21%
TTL	2,907,053,784	2,842,701,214	97.79%

Source: ETC and Study Team

(2) Total Amount of Long Term Loans

In evaluating ETC's financial statements, it was of concern that the total amount in loans was small in comparison to annual sales. The reason was that the government would not provide loan guaranties unless ETC raised its legal reserve.

However, the legal reserve was raised in 2001/02, and so in terms of implementing the Master Plan, low-interest soft loans can be arranged with a government guarantee. Table 3.12-3 shows ETC's current long-term liabilities.

Table 3.12-3 Long Term Loans for ETC

Name of Credit	Original Loan	Interest	Repayment Schedule			
			Instalments	Starting	Ending	
1509 OET	SDR 38,700,000	8	30	Semi-annual	1.3.1990	1.9.2004
ERRP	USD 4,000,000	7.5	30	Semi-annual	1.6.1977	1.12.2011
Japan	JY 119,343,000	0.75	80	Semi-annual	1.11.1989	1.5.2029
Italy	USD 25,000,000	4	26	Semi-annual	1.7.1990	1.7.2023
ADB						
ET/TL/84/005	UA 24,030,000	9.5	30	Semi-annual	1.1.1990	1.7.2004
ETH/TEL/2/92/10	BUA 32,400,000	7.5	30	Semi-annual	1.9.1998	31.7.2013
EIB 7-0884	ECU 6,000,000	5	15	Annual	30.9.1988	30.9.2012
EIB 0-7976	ECU 14,000,000	2	15	Annual	5.11.2000	5.11.2014
ADF Loan						
F/ETH/TEL-2/92/34	FUA 15,550,000	1 & 3	60	Semi-annual	1.7.2003	1.1.2043
NORDBANKEN	SEK 112,500,000	6.59	20	Semi-annual	30.9.1998	31.3.2008

(3) Existing Subscription Collection System

The assessment of problem from the point of view of ETC employees, which is the nucleus of the problem with the collection rate, is how to improve the existing subscription collection system.

Under the existing system, subscriber don't visit the collector's home to settle their outstanding bills rather they pay to the custodian in the office.

Table 3.12-4 shows the assignment of staff involved in the collection of subscriptions at Addis Ababa, and indicates that each collector is responsible for managing around 1,200 subscribers. Considering that, due to employment restrictions, it is difficult to increase the number of collectors, it is clear that the performance of the existing subscription collection system is beginning to drop. As a result, if the Master Plan were to be implemented, it would be impossible to maintain a collection rate of 90% under the existing collection system.

The easiest and least expensive way of improving this situation would be to encourage the use of automatic payments from bank accounts. The increase of subscription collection offices would offer temporary relief, but would not provide a permanent solution to this problem.

Table 3.12-4 Information of Collection Center

**BASED ON NOVEMBER 2001 BILL
ADDIS ABABA ZONES**

Zone office	Proposed collection Center	Number of Bills per month	Total amount per month	Number of collector
CAAZ	Kasseanchs	6634	780,187.34	6
	Bole(Olompiya)	3977	1,149,934.56	4
	Ledeta	7950	902,289.10	6
	Zone office	6628	1,352,740.94	6
	Total	25189	4,185,151.94	22
EAAZ	Yeka Micheal 1	5683	908,503.52	5
	Gerge	4168	465,798.62	3
	Bole	8044	2,221,837.53	6
	Gurde shola	4631	517,439.51	3
	Kotebe	7105	1,252,754.55	3
	Addisu Micheal 2	3973	881,027.03	3
	Total	33604	6,247,360.76	23
SAAZ	Gotera(Meskel flower)	2283	431,810.12	2
	Kirkos	6884	1,042,732.82	4
	Zone office	3899	568,968.01	4
	Hana mariam	2801	147,148.41	3
	Kaliti	37	9,099.16	out of town
	Gofa	3598	341,975.93	3
	Total	19502	2,541,734.45	16
WAAZ	Kolfe	4220	279,531.74	3
	Addis Ketema	10171	1,671,245.92	9
	Shegole	3561	371,854.61	3
	Mesalemiya	5800	532,758.73	5
	Asko	1045	85,863.68	1
	Abinet	4598	380,776.30	4
	Total	29395	3,322,030.98	25
NAAZ	Arat Killo	3451	344,541.32	3
	Addisu Gebeya	4311	313,704.74	3
	Ferensaye	1833	104,010.20	2
	Arada(Zone)	13184	1,439,486.21	13
	Sheromeda	1720	162,776.97	2
	6-Killo	2005	211,857.53	2
	T.Haimanot	1446	243,218.69	2
	Total	27950	2,819,595.66	27
SWAAZ	Zone office	5556	1,080,584.54	5
	Kirno	1794	68,221.55	2
	Ayer Tena	2927	143,686.99	2
	Mekanesa	1083	77,257.08	1
	Holamde (Ketena 2)	2226	194,065.57	2
	Vatican Embassy	2194	155,460.36	2
	Total	15780	1,719,276.09	14
	Grand Total	151420	20,835,149.88	127

Source: ETC HQ

(4) Foreign Aid

Over the last four years, the principal donor countries with regard to the Ethiopian telecommunications sector have been Japan, Sweden, ADB and Norway. Table 3.12-5 shows the names of the donor countries, the amount donated by each country and the aid projects concerned for the last four years. A total of Birr 162,344,000 (USD 18,965,000) of ODA has been invested in Ethiopia over this period. Aid from Japan was Birr 59,201,000 (USD 6,916,000), which represented 36.5% of the total for the period.

Table 3.12.5 PROJECTS FINANCED BY GRANT & LOAN

In 1,000 Birr

1992 E.F.Y						
Item no.	Name of projects	Source of fund			Funding agency	Total amount cost
		Grant	Loan			
			short term	long term		
1	Exchange					
	Filwoha	-	-	8,179	Swedish Government	8,179
	Kera	-	-	8,179	Swedish Government	8,179
	Bole	-	-	8,179	Swedish Government	8,179
	Arada	-	-	8,179	Swedish Government	8,179
	sub total	-	-	32,716		32,716
2	Customer service equipment					
	Telephone apparatus	-	-	6,395	African Development Bank	6,395
	sub total	-	-	6,395		6,395
3	International service					
	Dire Dawa -Djibouti	-	-	556	European Investment Bank	556
	sub total	-	-	556		556
4	Inter Urban telephone					
	Debre Berehan area	-	-	398	African Development Fund	398
	Nazrete area	-	-	438	African Development Fund	438
	Gimbi area	-	-	380	African Development Fund	380
	Sub total	-	-	1,216		1,216
5	Vehicles					
	Motor bicycle	-	-	113	African Development Bank	113
	Light track	-	-	810	African Development Bank	810
	Medium track	-	-	1,440	African Development Bank	1,440
	Dump track	-	-	360	African Development Bank	360
	Bus	-	-	180	African Development Bank	180
	Sub total	-	-	2,903		2,903
6	Training					
	Upgrading training	-	-	4,952	Norwegian trust fund	4,952
	sub total	-	-	4,952		4,952
	TOATAL	-	-	48,738		48,738
1993 E.F.Y						
1	Procurement for Outside plant project					
	Overhead cable	6,000	-	-	Japanese Government	6,000
	Drop wire	7,500	-	-	Japanese Government	7,500
	Sub total	13,500	-	-		13,500
	TOTAL	13,500	-	-		13,500
1994 E.F.Y						
1	Exchange					
	Filwoha	7,903	-	1,976	Swedish Government	9,879
	Kera	9,444	-	2,361	Swedish Government	11,805
	Bole	6,675	-	1,669	Swedish Government	8,344
	Arada	15,517	-	3,879	Swedish Government	19,396
	Old Air port	2,050	-	512	Swedish Government	2,562
	Akaki	614	-	154	Swedish Government	768
	Bahir Dar	820	-	205	Swedish Government	1,025
	Sebeta	410	-	102	Swedish Government	512
	sub total	43,433	-	10,858		54,291
2	Vehicles					
	Motor bicycle	-	-	114	African Development Bank	114
	sub total	-	-	114		114
	TOTAL	43,433	-	10,972		54,405
1995 E.F.Y						
1	Inter Urban Telephone					
	Nazret-Goba	22,675	-	-	Japanese Government	22,675
	Agre Mariame-Kibre Mengest-Negele Borena/Kurme-					
	Arba Menche	12,850	-	-	Japanese Government	12,850
	sub total	35,525	-	-		35,525
2	Power supplies & Air conditioners					
	Nazret-Goba	4,670	-	-	Japanese Government	4,670
	Agre Mariame-Kibre Mengest-Negele Borena/Kurme-					
	Arba Menche	2,398	-	-	Japanese Government	2,398
	sub total	7,068	-	-		7,068
3	Vehicles					
	Pick up	3,108	-	-	Japanese Government	3,108
	Damp truck	3,600	-	-	Japanese Government	3,600
	sub total	3,108	-	-		3,108
	TOTAL	45,701	-	-		45,701

Table 3.12-6 Profit and Loss

ETHIOPIAN TELECOMMUNICATIONS CORPORATION
PROFIT AND LOSS ACCOUNT
FOR THE YEARS ENDED JUNE 30, 1996,1997,1998,1999 & 2000

In Brr 1000

DESCRIPTION	1995/96	1996/97	1997/98	1998/99	1999/00	2000/01
	Actual	Actual	Actual	Actual	A. audited	A.unaudited
REVENUE FROM OPERATION						
URBAN TELEPHONE	143,987	158,579	184,937	207,587	251,238	301,571
INTER URBAN TELEPHONE	19,890	45,070	32,642	23,300	34,872	35,175
INTERNATIONAL TELEPHONE	310,418	322,188	373,545	336,581	316,598	297,963
INTERNET	-	-	-	11,592	20,201	35,935
MOBILE TELEPHONE	-	-	-	16,644	72,919	102,258
TELEGRAPH	5,811	4,381	4,671	6,409	8,335	13,771
TELEX	6,109	6,284	5,376	3,292	1,485	1,495
	486,215	536,502	601,171	605,405	705,648	788,168
OPERATING EXPENSES						
URBAN TELEPHONE	39,898	53,671	56,832	62,174	78,246	150,977
INTER URBAN TELEPHONE	22,748	31,088	36,516	35,460	47,431	68,230
MOBILE					25,767	15,820
TELEGRAPH	5,449	3,496	4,013	3,569	4,274	6,336
TELEX	3,106	5,320	5,738	4,430	5,225	7,785
	71,201	93,575	103,099	105,633	160,943	249,148
GROSS OPERATING SURPLUS	415,014	442,927	498,072	499,772	544,705	539,020
OTHER REVENUE	10,518	15,298	23,170	18,687	14,723	45,903
	425,532	458,225	521,242	518,459	559,428	584,923
EXPENSES						
ADMINISTRATIVE	36,044	45,146	61,329	77,314	88,435	97,288
INTEREST AND BANK CHARGES	44,282	41,125	75,075	62,842	66,865	69,543
AMORTIZATION OF DEFER. CHAGES	47,165	41,040	39,790	38,040	53,281	2,312
AUDIT FEES	53	58	60	70	111	120
PROVISION FOR DOUBTFUL DEBTS	1,233	1,353	1,509	1,742	1,489	1,946
	128,777	128,722	177,763	180,008	210,181	171,209
NET SURPLUS BEFORE TAXATION	296,755	329,503	343,479	338,451	349,247	241,438
PROVISION FOR TAXATION	108,586	121,553	124,714	131,245	128,204	56,847
NET SURPLUS AFTER TAXATION	188,169	207,950	218,765	207,206	221,043	184,591
TRANSFER TO LEGAL RESERVE	-	6,065	10,938	10,360	11,052	9,230
BALANCE BROUGHT FORWARD	188,169	201,885	207,827	196,846	209,991	175,361
	235,749	423,918	-	-	-	11,197
TRANSFER TO CAPITAL	423,918	625,803	207,827	196,846	209,991	186,558
	-	625,803	207,827	196,846	198,794	-
BALANCE CARRIED FORWARD	423,918	-	-	-	11,197	186,558

Source: ETC

Table 3.12-7 Cash Flow Statements
ETHIOPIAN TELECOMMUNICATION CORPORATION
CASH FLOW STATEMENTS
FOR THE YEAR ENDED JUNE 30, 1996....2000

IN Brr 1000

DESCRIPTION	1995/96	1996/97	1997/98	1998/99	1999/2000	2000/01
	Actual	Actual	Actual	Actual	A.audited	A.unaudited
NET CASH INFLOW FROM OPERATIONS	<u>347,048</u>	<u>308,304</u>	<u>376,594</u>	<u>469,247</u>	<u>564,714</u>	<u>409,828</u>
RETURN ON INVESTMENT AND SERVICING OF FINANCE						
Interest received	2,096	1,735	4,561	1,793	1,674	1,689
Dividend received	4,680	9,326	10,449	2,017	5,636	5,467
Interest paid	(38,136)	(34,825)	(73,218)	(60,832)	(63,658)	(66,871)
Residual surplus payable	(21,292)	-	-	-	-	-
Capital charge paid	-	(18,295)	-	-	-	(32,134)
	<u>(52,652)</u>	<u>(42,059)</u>	<u>(58,208)</u>	<u>(57,022)</u>	<u>(56,348)</u>	<u>(91,849)</u>
	<u>294,396</u>	<u>266,245</u>	<u>318,386</u>	<u>412,225</u>	<u>508,366</u>	<u>317,979</u>
TAXATION						
Profit tax paid	<u>(114,609)</u>	<u>(101,733)</u>	<u>(95,728)</u>	<u>(121,406)</u>	<u>(153,861)</u>	<u>(130,081)</u>
INVESTING ACTIVITIES						
Payments for capital WIP	(61,208)	(118,268)	(295,288)	(356,677)	(221,043)	(153,138)
Payments for fixed assets	(5,772)	(9,847)	(8,951)	(21,216)	(58,745)	(9,791)
Payments for acquiring investments	(3,265)	(1,288)	(1,950)	4,106	(566)	7,869
	<u>(70,245)</u>	<u>(129,403)</u>	<u>(306,189)</u>	<u>(373,787)</u>	<u>(280,354)</u>	<u>(155,060)</u>
NET CASH INFLOW (OUTFLOW) BEFORE FINANCING	<u>109,542</u>	<u>35,109</u>	<u>(83,531)</u>	<u>(82,968)</u>	<u>74,151</u>	<u>32,838</u>
FINANCING						
Long term loans received	31,149	99,519	123,329	86,683	87,448	16,122
Long term loans paid	(62,795)	(43,543)	(19,934)	(66,398)	(96,277)	(137,476)
Gain from foreign currency fluctuation	12,078	14,138	11,796	31,609	11,343	-
	<u>(19,568)</u>	<u>70,114</u>	<u>115,191</u>	<u>51,894</u>	<u>2,514</u>	<u>(121,354)</u>
INCREASE (DECREASE) IN CASH AND CASH EQUIVALENTS	<u>89,974</u>	<u>105,223</u>	<u>31,660</u>	<u>(31,074)</u>	<u>76,665</u>	<u>(88,516)</u>

Source: ETC

Table 3.12-8 Balance Sheet

**ETHIOPIAN TELECOMMUNICATION CORPORATION
BALANCE SHEET AS OF JUNE 30, 1996,1997,1998,1999 AND 2000**

Unit : Brr 1000

Description	1995/96 Actual	1996/97 Actual	1997/98 Actual	1998/99 Actual	1999/00 A. audited	2000/01 A.unaudited
Assets Employed						
Net plant in operation	318,993	323,093	394,845	428,075	674,203	979,497
Capital Works in Progress	76,582	198,233	491,183	813,692	820,738	598,160
Investments	30,614	31,902	33,852	29,746	30,312	22,443
Deferred Charges	336,283	296,974	249,958	321,009	278,647	24,241
Current Assets						
Stock	137,875	135,282	279,693	304,446	385,511	490,825
Debtors	266,115	408,769	474,505	496,618	400,556	327,267
Cash and bank bal.	260,151	365,374	397,034	365,961	442,627	431,172
	664,141	909,425	1,151,232	1,167,025	1,228,694	1,249,264
Current liabilities						
Creditors	61,308	75,808	182,088	219,729	244,601	165,865
Long-term loans current matu.	70,028	80,909	87,030	117,765	125,248	103,502
Provision for Taxation	128,019	147,839	176,825	186,664	161,007	87,772
Capital charge payable	18,295	-	-	-	-	-
	277,650	304,556	445,943	524,158	530,856	357,139
Net current assets	386,491	604,869	705,289	642,867	697,838	892,125
Net assets	1,148,963	1,455,071	1,875,127	2,235,389	2,501,738	2,516,466
Financed By						
Authorized capital (1,473,980,000)						
Paid up capital	593,310	870,515	1,078,341	1,275,187	1,473,980	1,473,981
Profit and loss	-	-	-	-	11,197	186,558
Grants	36,163	57,285	154,420	177,226	216,582	257,480
Legal reserve	-	6,065	17,003	27,364	38,416	47,645
Exchange fluctuation Reserve	76,949	26,216	38,012	69,622	80,965	0
Long term loan	442,541	494,990	587,351	685,990	680,598	550,802
	1,148,963	1,455,071	1,875,127	2,235,389	2,501,738	2,516,466

Source: ETC

(5) HRD, Developing Management Staff

Until now, staff training in the telecommunications sector has centered on the technical training of engineers. It may be true that few people questioned this approach when ETC was a state-owned company. However, now that the trend is towards privatization, staff training must focus on producing staff who are able to “manage ETC” by addressing such questions as (1) how to manage the business soundly, (2) how to run the business efficiently, and (3) how to develop business strategies.

In order for it to be able to revise the Master Plan on its own, ETC must hold management seminars for staff in the Strategic Planning, Finance, Marketing, and other sections involved in the preparation of business plans as well as provide these staff with opportunities to study management techniques in developed countries by sending them overseas to study. These measures are essential if ETC is to continue to be managed soundly. There will be no growth unless staff, not only higher level managers, learn about the necessary management techniques.

The Strategic Partnership to be entered into in 2003 is expected to result in the introduction of private capital as well as the transfer to ETC of new management techniques by private operators. However, unless staff at ETC, which is set to benefit from these new techniques, have a basic level of knowledge, the techniques are unlikely to amount to an effective technology transfer.

The Master Plan proposes implementing training for Managerial staff in addition to training for engineers.

3.13 Spectrum Management

(1) Preface

Radio wave is now being used not only for telecommunications, measurement of locations, broadcasting, navigation and aviation; but also for every part of political, economic transportation, cultural, educational, industrial and other activities. According to the socio-economic development and ICT technologies progress in recent years, the utilization of radio wave plays an active part in mobile telecommunications fields such as handy and mobile phones, PDC, GSM, TDMA, CDMA, specific small power radio communications systems which are popularized. Moreover, development in satellite communications has turned various types of telecommunications available, such as communications, broadcasting satellite systems, and their usage has been growing tremendously. Studies on stratosphere satellite, outer space, and satellite science are also developing, and the roles of radio waves occupying those are very huge.

Radio wave has a certain bandwidth to be transmitted in the common space and thus its availability is naturally limited. Therefore, the standardized regulation is required to use the radio waves properly.

(2) Quality Management of Radio Waves

Radio waves propagated from antennas should be stable in frequencies without any unwanted waves to be transmitted. Unstable frequencies, unwanted waves or over-powered waves cause interference to other radio facilities.

In order to avoid such troubles, radio regulations are usually enacted in each country.

The radio regulations standardize, in general, frequency allocation, limits of frequency deviation, occupied frequency bands, and spurious radiation.

(3) Status of Spectrum Management in Ethiopia

Spectrum management in Ethiopia is conducted by Ministry of Infrastructure and is managed by Frequency Management Division of ETA (Ethiopian Telecommunications Agency) within the said ministry.

Reference is given in FIG. 3.13-1, Ethiopian Telecommunications Agency Organization Chart, as per attached.

(a) Frequency Allocation

Out of the three regions defined by ITU (International Telecommunications Union) for frequency allocation in each country, Ethiopia belongs to the first region. ETA manages the frequency range from 40 kHz to 15 GHz and regulates them for the frequency assignment.

The core objectives of licensing and frequency management as indicated in the Telecommunication Proclamation are as follows:

- 1) To manage, assign, authorize, and register frequency allocated to Ethiopia in accordance with international conventions to be used for telecommunication, radio-communication services, broadcasting and others.
- 2) To coordinate the use of frequencies both locally and internationally, and monitor the proper use of the same.
- 3) To prepare a national frequency list (database)
- 4) To give permission to import, possess, install or operate radio communication and other telecommunication equipment.
- 5) To prepare draft directives on national radio regulation.

Reference is given in FIG. 3.13-2, Ethiopian Frequency Allocation (MHz), as per attached.

(b) Allowable Frequency Deviation

Allowable frequency deviation defines the maximum deviation which can be deviated from the center of occupied frequency band propagated, or from the standard value of specific frequency propagated and is designated in per million or Hz.

ETA does not monitor it at present.

(c) Allowance of Occupied Frequency Band

Allowance of occupied frequency band refers to the maximum permissible value, designated in Hz, and is radiated between the upper and lower limits of said occupied radio frequency band.

ETA does not monitor it at present.

(d) Allowance of Spurious Radiation Strength

Spurious radiated frequency, including higher and lower harmonic parasitic waves and products of inter-modulations, gives harmful disturbances such as jamming or interference for other telecommunications, and thus shall be regulated to minimize them as much as possible. Allowance of spurious radiation strength is designated in mean power of spurious radiated (in mW, micro W or dB).

ETA does not work on this yet.

(4) Management in ETA

(a) Organization

Frequency management division in ETA consists of Frequency Distribution and Recording Section and Frequency Monitoring Section, and manages as follows:

1) Frequency Distribution and Recording Section

There is one engineer who is assigned in this section and works on registration of the applied and assigned frequency to database

2) Frequency Monitoring Section

There is no assigned engineer in this section and the routine work is not functioning. The monitoring facility is not available, that is the subject for future.

The division concerned is placed in ETA organization. However, the routine work in frequency monitoring section is not sufficiently functioning as described previously. The reason is that ETA has become independent from Ministry of Transport and Communications by the proclamation No. 49/1996 and the authority of telecommunications concerned was transferred to ETA including the frequency allocation, licensing and monitoring. However, the preparation for frequency monitoring does not get ready under the new organization of ETA.

ETA is going to execute the following plan to obtain the facilities.

1) Fixed Monitoring Facility

The used facilities in former Ministry of Transport and Communications shall be transferred to ETA and managed under the Frequency Monitoring Section, Licensing and Frequency Management Division.

2) Mobile Monitoring Facility

ETA will apply a new budget to Ethiopian Government and purchase the monitoring system by ICB (International Competitive Bid). (Incidentally, ICB was conducted for such purpose last year but did not succeed due to a problem of the bidder.)

(b) Existing Facilities

In relation to item 1) above, the Study Team investigated with its counterpart a part of existing monitoring facilities stored in the old monitoring station, located near an old Sululta HF receiving station, and found out that they were carried into the store house about 15 years ago. The details of facilities are as follows:

1) VHF/UHF Monitoring Facilities

VHF Receiver (EDDYSTONE, made in England) 1 set

UHF Receiver (EDDYSTONE, made in England) 1 set

2) HF Monitoring Facilities

ISB Receiver (SIEMENS, made in Germany) 1 set

1 kHz to 30 MHz Receiver (SCHOMANDL, made in Italy) 1 set

0.1 to 30 MHz Field Strength Measuring Set 1 set

(RHODE & SCHWARZ, made in Germany)

Conical Monopole Antenna (at the top of the building) 1 set

None of them could possibly be used any more.

3) Other Monitoring Facilities

Signal Generator, LSG-11 (LEADER, made in Japan) 1 set

(ETC Plate No. 2042388)

Trans-Dipper, WB-200 (DELICA, made in Japan) 1 set

(ETC Plate No. 307299)

These are kept in store houses of ETC's Telecommunications Institute, but none of them could possibly stand to be used any more.

FIG. 3.13-1 ETHIOPIAN TELECOMMUNICATIONS AGENCY ORGANIZATION CHART

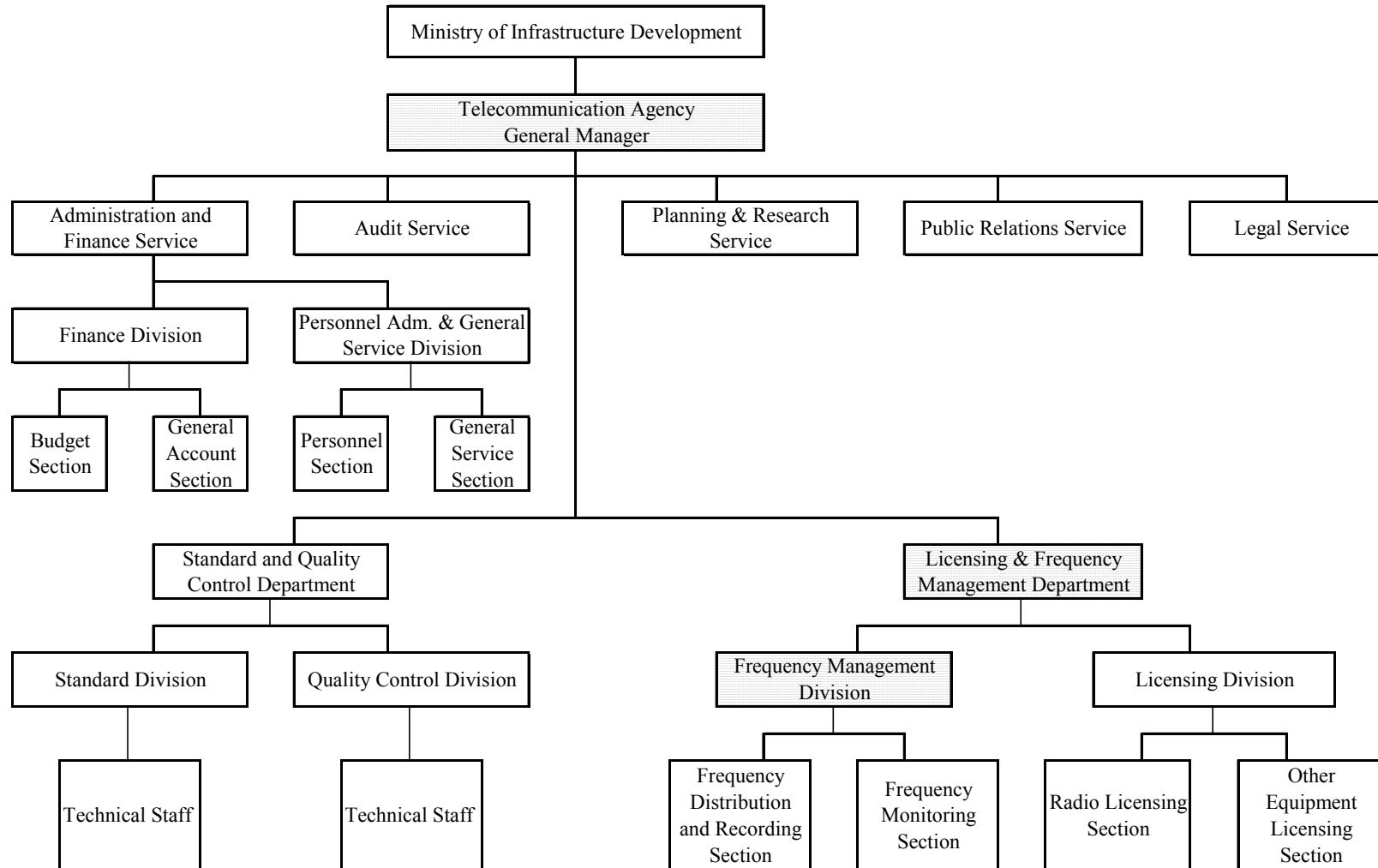


FIG. 3.13-2 **ETHIOPIAN FREQUENCY ALLOCATION (MHz)**

CORE OBJECTIVES OF THE LICENSING AND FREQUENCY MANAGEMENT AS INDICATED IN THE TELECOMMUNICATION PROCLAMATION (PROC. No. 49/1996 AND COUNCIL OF MINISTERS REGULATION ON TELECOMMUNICATION SERVICES (REG. No. 47/1999)

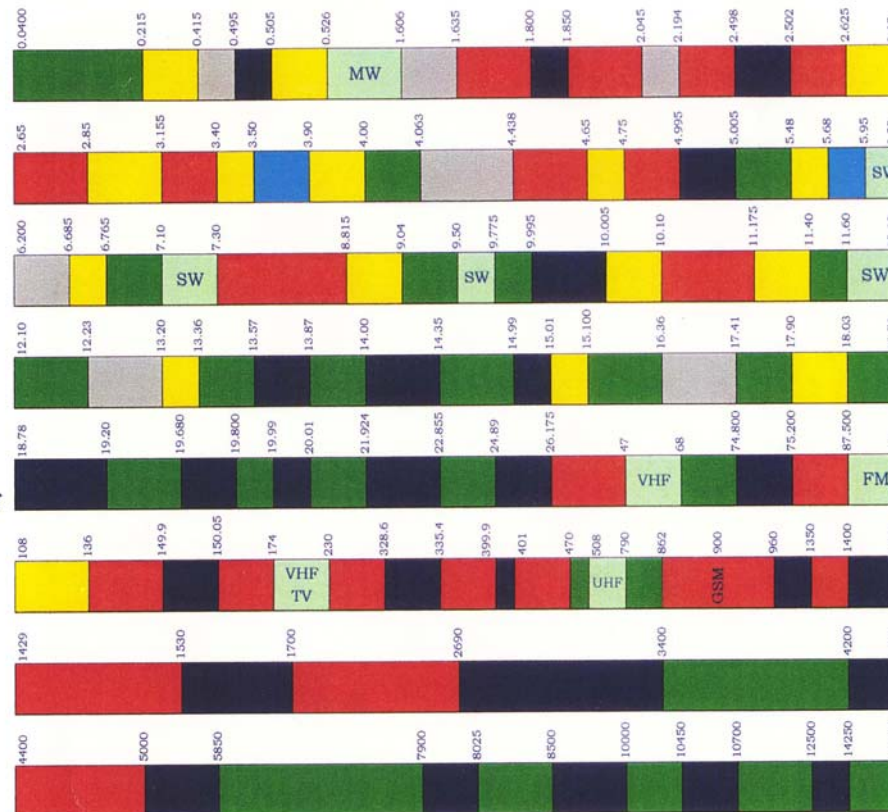
To manage, assign, authorize and register frequency allocated to Ethiopia in accordance with international conventions to be used for telecommunication, radio-communication services, broadcasting and others.

To coordinate the use of Frequencies both locally and internationally, and monitor the proper use of the same.

To prepare a national frequency list (database)

To give permission to import, possess, install or operate radiocommunication and other telecommunication equipment.

To prepare draft directives on national radio regulation.



ETHIOPIAN TELECOMMUNICATION AGENCY
July 2001

Tel: 251-1-53-00-86
Fax: 251-1-53-12-55
E-mail: tele.agency@telecom.net.et



Produced by Licensing and Frequency Management Department