3. CURRENT SITUATION OF TELECOMMUNICATIONS SERVICES IN THE RELEVANT AREAS

3.1 Present Condition of the Backbone Transmission Links

The digital microwave transmission links that make up the Ethiopian backbone transmission network in star configuration from the capital (Addis Ababa) into all directions all over the country, connecting the major cities point to point via repeater stations on mountain summits. The construction of backbone transmission links (abbreviated to "backbone" hereafter) using digital microwaves is widely adopted in Ethiopia, since it allows lower construction costs and shorter time needed for construction. However, when considering the trends in telecommunications services and transmission technologies in recent years as well as the digitization of network in Ethiopia, expansion plans using microwave transmission systems are limited in themselves with respect to the scalability of the transmission capacity, because the number of repeater stations is limited due to geographical conditions, and because they use only limited radio frequency sources. For this reason, optical transmission systems are suitable for these transmission links, which need to have a large capacity. Optical transmission systems are being gradually introduced in Ethiopia, too, but at the moment, limited to only a part of the metropolitan junction network of Addis Ababa, which requires large capacity. The current state of the microwave transmission links in Ethiopia is shown in Figure 3.1.1 "Outline of Backbone Network".

From the analysis of the demand forecast in the master plan, and from the above network configuration, it was pointed out that communications traffic on the Addis Ababa-Nazareth transmission link in the target area of the investigation will soon face congestion. In the field survey, the above area of the backbone was examined because the construction of a new backbone between Addis Ababa and Nazareth is expected to ease the congestion of traffic in Addis Ababa, in the microwave repeater stations nearby, as well as the traffic to the East, South-East and Southern regions, where the digital microwave transmission links face the highest congestion, and to bring route diversity to the system.

3.2 Current State of the Backbone Development Project

A diagram of transmission links in the capital (Addis Ababa) and the surrounding region is shown in Figure 3.2.1-1 "ETC's Main Radio Microwave Link in Addis Ababa (Existing)", and a diagram of the connections in Figure 3.2.1-2 (1/7-7/7) "Connection Diagram of Transmission Link". The transmission links that connect the Ethiopian capital (Addis Ababa) with the regions are concentrated on the microwave repeater station on Mt. Furi (connection to the North: Dessie and Mekele & Musali route, to the East: Dire Dawa route, to the South: Shashemene route, to the South-West: Jimma route, and to the West: Nekempte route) and the microwave repeater station on Mt. Entoto (connection to the North-West: Gondar route). Moreover, almost all transmission equipment in the Ethiopian telecommunications facilities

is well tired analogue transmission equipment or has become too old for use, and hinders the construction of well balanced communications systems that ETC is aiming for. Combinations of old small-capacity relay transmission equipment with large-capacity, up-to-date digital Local Switch (LS) equipment (in local stations) can also be found at places. It is because of this that the ETC, to solve these problems, intends to digitize the transmission equipment by replacing the old equipment with new SDH microwave transmission links in its Eighth Development Program. Detailed on-going transmission routes are shown in Figure 3.1.1 "Outline of Backbone Network", which includes the on-going projects. The summaries of these projects are as follows:

(1) Backbone route in the North-Western area (R1):

Addis Ababa- Debre Markos- Bahir Dar- Gondar Route

(2) Backbone route in the Western area (R2):

Nekempte- Assosa- Dembidollo Route

(3) Backbone route in the South-Western area (R3):

Jimma- Mettu- Gambella Route

(4) Backbone route in the Eastern area (R4):

Dire Dawa- Harar -Jijjiga Route

(5) Backbone route in the Northern area (R5):

Dessie-Musali Route

(6) Backbone route in the Eastern area (R6):

Addis Ababa- Dire Dawa Route

3.3 Current State of the Transmission Equipment in the Area of the Investigation

(1) IR/ITE Telecommunications Center (Addis Ababa) (Investigated in detail)

The IR-ITE station is the most important gateway that accommodates the microwave network connecting the capital Addis Ababa (population: 2,574,000) and major regional cities, and the international lines.

The existing layout of the IR/ITE station building is shown in Figure 3.3.1-1 (1/3) "Addis Ababa IR/ITE Center Building Layout", and the existing equipment layout in the radio and transmission multiplex equipment room are shown in Figure 3.3.1-1 (2/3) "Addis Ababa IR/ITE Radio Room" and Figure 3.3.1-1 (3/3) "Addis Ababa IR/ITE MUX Room".

(2) FILWOHA Telecommunications Center (Addis Ababa) (Investigated in detail)

The Filwoha station is one of the urban transit exchange gateways, which functions both as one of tandem transit exchanges of the capital Addis Ababa (population: 2,574,000) – Filwoha, Arada, Old Airport, Bole, Keira (Kirkos) and Addis Ketama – and also as an urban-area Local Switch (LS) accommodating the subscriber lines from the central core of

Addis Ababa city. The existing layout of the Filwoha station building is shown in Figure 3.3.1-2 (1/2) "Addis Ababa Filwoha Center Building Layout", and the existing equipment layout of the radio and transmission multiplex equipment room is shown in Figure 3.3.1-2 (2/2) "Addis Ababa Filwoha Radio/MUX Room". In addition, the current view of the Filwoha telecommunications center building is shown in following picture.

Photo No.5：Addis Ababa-Filwoha Telecommunications Center Building

(3) Nefas Silk Telecommunications Center (Addis Ababa) (Investigated in detail)

The Nefas Silk lies along the trunk road, in a suburb approximately 8 km away from the center of the capital Addis Ababa. Since the station building is relatively new, enough free space is secured for future expansions. The existing layout of the Nefas Silk station building is shown in Figure 3.3.1-3 (1/2) "Addis Ababa Nefas Silk Center Building Layout", and the existing equipment layout of the radio and transmission multiplex equipment room is shown in Figure 3.3.1-3 (2/2) "Addis Ababa Nefas Silk Radio/MUX Room". The current view of the Nefas Silk telecommunications center building is shown in following picture.

Photo No.6 : Addis Ababa--NEFAS Silk Telecommunications Center Building

Photo No.7 : The radio & Transmission Multiplex Equipment Room in Addis Ababa-NEFAS Silk Telecommunications Center Building. As Survey, F/S Team verified Enough Free Space.

(4) Debre Zeit Telecommunications Station (Investigated in detail)

The Debre Zeit station lies along the trunk road approximately 47 km away from the center of the capital Addis Ababa in the Nazareth direction. Building 1 is old and decrepit; but Building 2 has been built in the premises, which has also reserved space for additional equipment. The existing layout of Debre Zeit station building is shown in Figure 3.3.1-4

(1/2) "Debre Zeit Center Building Layout", and existing equipment layout in the radio and transmission multiplex equipment room is shown in Figure 3.3.1-4 (2/2) "Debre Zeit Radio/MUX Room". The current view of the Debre Zeit Telecommunications Station building is shown in following picture.

Photo No.8： Debre Zeit Telecommunications Station Building Main Gate

Photo No.9： Expansion Space of the Existing Radio & Transmission Multiplex Equipment Room in Debre Zeit Telecommunications Second Station Building

(5) Adama West M/W Repeater Station (Investigated in detail)

The Adama West M/W repeater station is located on the top of a hill, 2 km branch road with moderate up-slope from the trunk road to Nazareth, approximately 86 km away from the center of Addis Ababa. This station is relaying the existing microwave transmission links to the Dire Dawa (Djibouti) direction, Goba direction, and Nazareth direction. The Nazareth station is located 5 km away from here on a straight line. The existing layout of the Adama West M/W station building is shown in Figure 3.3.1-5 (1/2) "Adama West M/W Rep. Building Layout", and the existing equipment layouts in the radio and transmission multiplex equipment room and power room are shown in Figure 3.3.1-5 (2/2) "Adama West Radio/MUX/Power Room". The current view of the Adama West M/W repeater station building and microwave antennas are shown in following pictures.

Photo No.10： Adama West Micro Wave Repeater Station Sight View

Photo No.11 : The Existing Radio & Transmission Multiplex Equipment Room in the Adama West Micro Wave Repeater Station

(6) Nazareth Primary Center (Investigated in detail)

Nazareth Primary Center station is located approximately 98 km away from the center of Addis Ababa. The neighboring Adama West M/W repeater station is 5 km form here on a straight line.

Nazareth is a main regional city with a population of 346,890. In Nazareth city, the Nazareth P. C. (Primary Center) is located, which is in charge of Zone 2 (Southeast Region) of the ETC telecommunications network. The communications lines between Addis Ababa, Goba and the surrounding cities are also linked here.

The existing layout of the Nazareth Primary Center station building is shown in Figure 3.3.1-6 (1/2) "Nazareth Primary Center Building Layout", and the existing equipment layouts of the radio and transmission multiplex equipment room is shown in Figure 3.3.1-6 (2/2) "Nazareth Primary Center Radio/MUX Room". The current views of the Nazareth Primary Center and microwave antenna are shown in following picture.

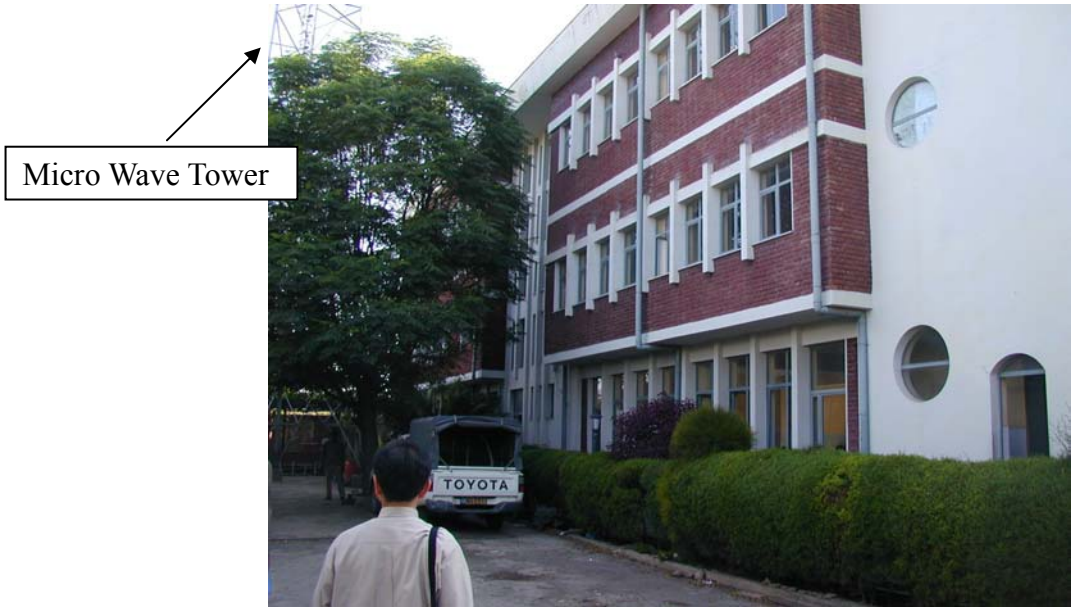


Photo No.12 : The Courtyard of Nazareth Primary Center

Photo No.13 : The Existing Radio & Transmission Multiplex Equipment Room of the Nazareth Primary Center

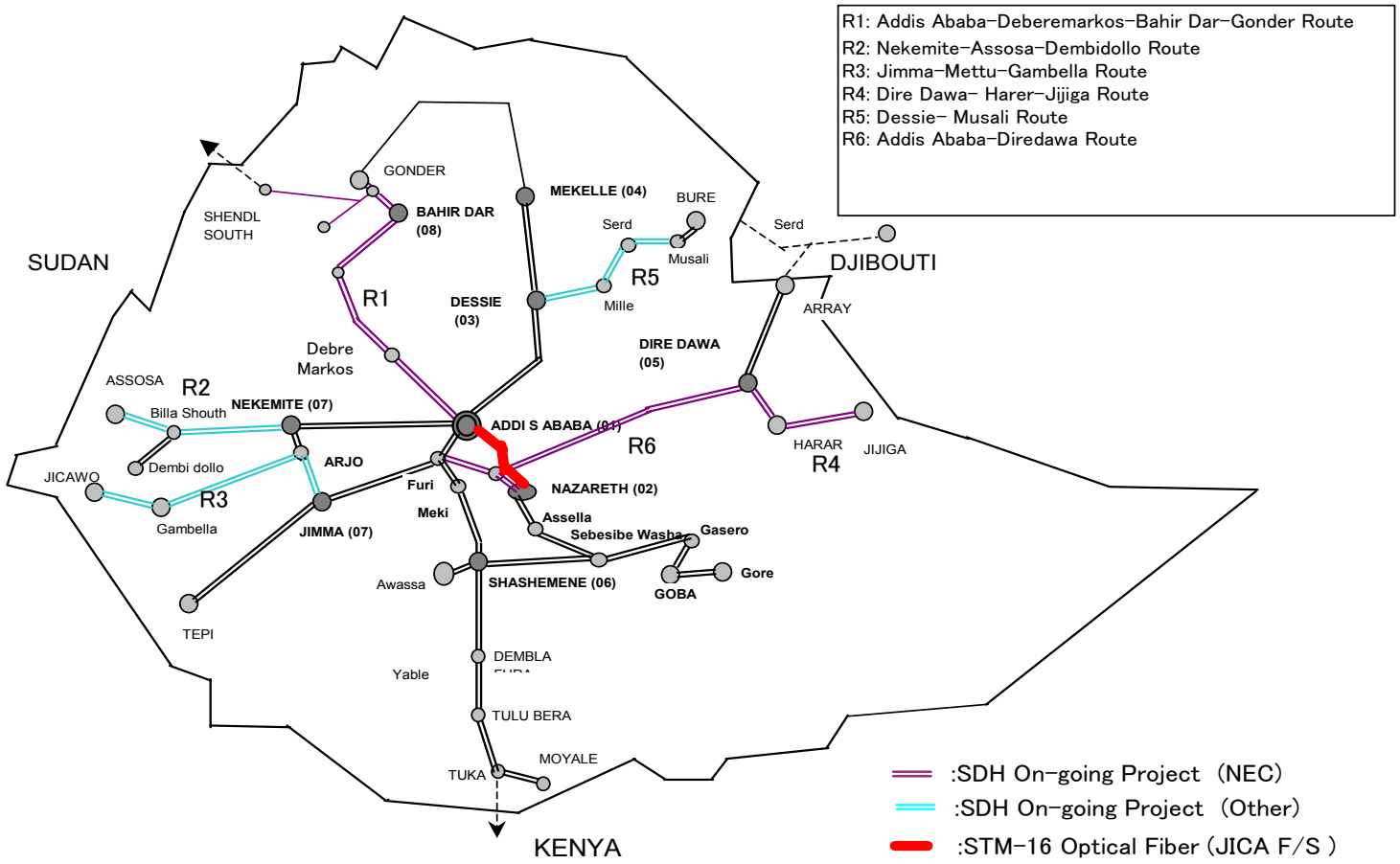
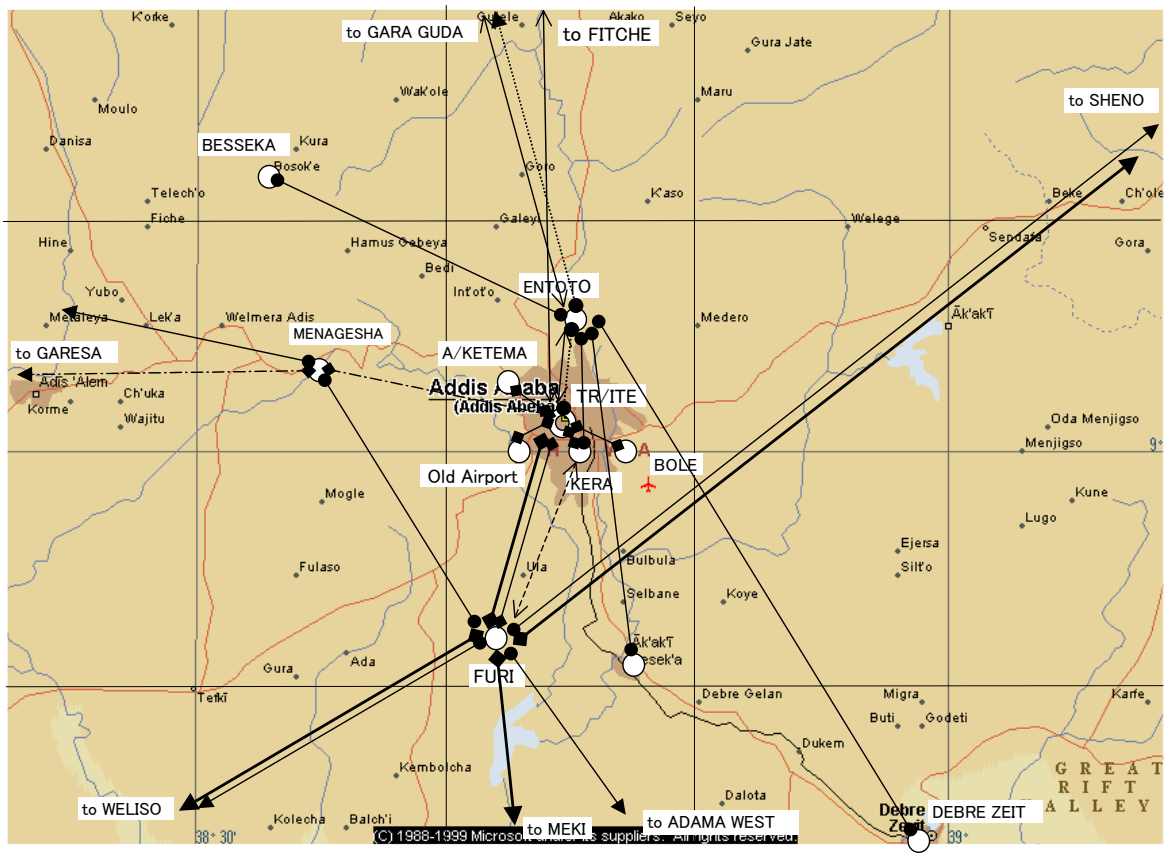


Figure-3.1.1 Outline of Backbone Network (incl. on-going Project)



ADDIS ABABA JUNCTION NETWORK (MICRO)
(Existing)

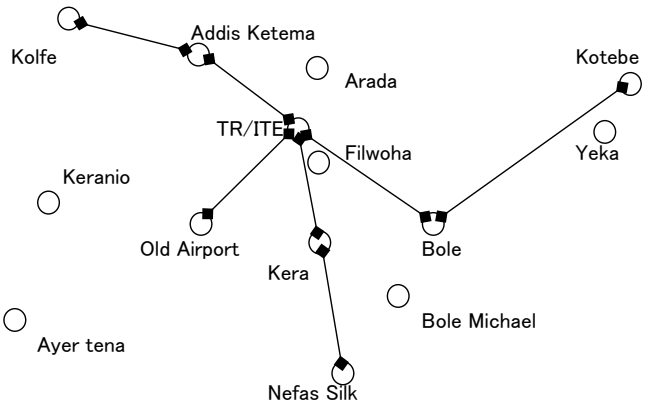


Figure 3.2.1-1 ETC's MAIN RADIO MICRO WAVE Link in ADDIS ABABA (EXISTING)