

Supporting Report 9.3

(For Chapter 9.8)

9.3 Transmission Capacity based on Forecast Traffic

Forecast traffic used for calculation of transmission capacity is as follows.

- | | |
|--------------------------|----------------------------------|
| 1) Backbone traffic | Traffic shown in D.Table 9.8-1-a |
| 2) Region traffic | Traffic shown in D.Table 9.8-1-b |
| 3) Metropolitan traffic | Traffic shown in D.Table 9.8-1-c |
| 4) International traffic | Traffic shown in D.Table 9.8-1-e |
| 5) PCO traffic | Traffic shown in D.Table 9.8-1-f |

Traffic data of D.Table 9.8-1-a prevails over the other traffic data if duplicated. All backbone traffic from the region is connected to Addis Ababa TR-III or a substituted. Town traffic is linked with its host in the region. However, the traffic of some isolated towns with no direct link is connected to its host exceptionally via the other region's network. Necessary link capacity for PCO traffic is prepared in the portion between the connecting microwave station (an expected connecting point) and PC (primary center) of the region except the traffic through VSAT and the unallocated. VSAT for PCO is assumed to have a connection with the central hub of FaraWay system in Sululta. Necessary 2Mbit/s channels of microwave for PCO traffic is reserved on the following basis.

S. Table 9.8-1-1 2Mbit/s Channel of Microwave for PCO

Number of PCOs	Quantity of 2M
1 – 7	1
8 – 15	2
16 – 22	3
23 – 30	4
31 – 37	5
38 – 45	6
46 – 52	7
53 – 60	8

Necessary quantity of 2Mbit/s may be revised to decrease if the total traffic of PCO is calculated precisely in future, though there might be some increase when articulating the unallocated PCOs.

Those traffics are once projected on the ETC's network at the first step of network planning process in the master plan. Capacity calculation of 2Mbit/s was made for all links of the network in each region of Area-01 through Area-08. Necessary capacity of 2Mbit/s in the target years of 2005, 2010, 2015 and 2020 GC are shown in S.Table 9.8-1-a, -b, -c and -d respectively. S.Table 9.8-1-e shows the summary of whole target years.

New links are introduced for the towns where the existing ETC's network does not cover it. Such new links are indicated in S.Table 9.8-1-j.

For readers' convenience the reading method of the links in each S.Table 9.8-1 is shown in an additional paper "Supplement" attached to the table.

The second step to proceed the network designing is to check the necessary capacity of ETC's 8th Development Program. The results are shown in S.Table 9.8-1-f for such projects the capacity of which is not decided yet. Summary is described in Chapter 4.1.3. Here 8th Development Program is supposed to provide the necessary capacity by the year of 2010 GC.

In this check the traffic of around 100 stations of existing telephone service is missed and the traffic of 1,476 PCOs of 163 Woredas is also not counted. It is hoped to have further check taking those traffics into consideration before deciding the capacity.

The third step is calculation of necessary expansion of capacity at each target year of 2005, 2010, 2015 and 2020 GC. The expansion capacity is calculated by subtracting the capacity at the completion of 8th Development Program from the necessary capacities calculated in the first step.

Backbone network located in Area-01 consists of a central part of each backbone and accommodates the backbone traffic from each region and intra-area traffic of Area-01. And some backbone links convey the traffic of more than one region. All traffics on the backbone irrespective of regions are summarized in S.Table 9.8-1-g. and necessary expansion of the backbone is shown in S.Table 9.8-1-h.

Summary of this expansion is described in Chapter 9.8.2. Here introduction of OFC (optical fiber cable) system between Addis Ababa and Nazreth is recommended to ease the microwave congestion at Mt. Furi. Because the link of Addis Ababa-Nazreth is much useful for future expansion than the link of Mt.Furi-Addis Ababa is. The estimated traffic on new OFC system of Addis Ababa-Nazreth is shown in S.Table 9.8-1-i. There are three types of capacity expansion for backbone microwave network. One is newly SDH construction when no link or any existing PDH cannot accommodate the traffic. The others are A) an expansion using the new frequency band and B) an expansion in the same frequency band.

Quantity of the construction/expansion is estimated as follows.

S.Table 9.8-1-m Quantity of Backbone Construction/Expansion

Type	Total (link)	2005GC	2010GC	2015GC	2020GC
Construction	31	17	10		4
Expansion A	2	1			1
Expansion B	33	14	4	2	13

Expansion necessary for spur links is shown in S.Table 9.8-1-j and its summary is described in Chapter 9.8.5. Almost all the newly construction of spur link is required in 2005GC. The other expansion is to be held through the period of the master plan.

The ring traffic of Addis Ababa Junction Network is calculated in S.Table 9.8-1-k.

Three kind of traffics will be accommodated, first one, the biggest, is the inter-exchange traffic between every pair exchange stations in Addis Ababa, the second is transfer traffic of Area-01 from the exchange in outskirts town to the host exchange in Addis Ababa, and the last is the transfer traffic to AA TR-III from Nazreth via AA-Nazreth OFC system.

Necessary capacity of the ring for the inter-exchange traffic and Area-01 transfer traffic is estimated at 15 STM-1s as shown in S.Table 9.8-1-k. The capacity of the ring necessary for the traffic of 2005 GC is calculated as eight (8) STM-1s, in case each traffic between two stations is allocated into CW (clockwise) route and CCW (counter clockwise) route half by half.

A 4-fiber MSSP ring of STM-16 is recommended to construct to accommodate all three kinds of traffics. The transfer traffic to AA TR-III from Nazareth passes Nefas Silk – AA TR-III portion of the ring. Construction of the ring is urged as soon as possible.

The tables attached to this supporting report are listed as follows.

S.Table 9.8-1-a	Transmission Capacity in 2005 GC
S.Table 9.8-1-b	Transmission Capacity in 2010 GC
S.Table 9.8-1-c	Transmission Capacity in 2015 GC
S.Table 9.8-1-d	Transmission Capacity in 2020 GC
S.Table 9.8-1-e	Summary of Transmission Capacity
S.Table 9.8-1-f	Recommended Capacity of 8 th Development Program
S.Table 9.8-1-g	Estimated Traffic on National Backbone
S.Table 9.8-1-h	Expansion Plan of National Backbone
S.Table 9.8-1-i	Estimated Traffic on New OFC of Addis Ababa - Nazareth
S.Table 9.8-1-j	Expansion Plan of Spur Network
S.Table 9.8-1-k	Ring Traffic in Addis Ababa Junction Network
S.Figure 9.8-1-a	Addis Ababa Junction Network