

## Attachment

**Attachment 1: Transmission System**

**F/S Result of PCO System in Rural Area**

**Residential Area Access Network Drawing**

**Attachment 2: VoIP Network Configuration**

**Attachment 3: Implementation Schedule**

**Attachment 4: Technical Specifications**

## Attachment 1

### Mekele

#### 1.1 Transmission System (PCO System)

Table 1:	Mekele Region Primary Center
Table 2:	Messobo Repeater Station
Table 3:	Ikotanba Repeater Station
Table 4:	PCO Subscriber Station No. 1
Table 5:	PCO Subscriber Station No. 2
Table 6:	PCO Subscriber Station No. 3
Table 7:	PCO Subscriber Station No. 4
Table 8:	PCO Subscriber Station No. 5
Table 9:	PCO Subscriber Station No. 6
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F/S Result of PCO system in Rural Area

Table 1 Mekele Region Primary Center (PC)

<i>Survey Item</i>	<i>Survey Result</i>	<i>Remarks</i>
Site Name	ETC Mekele/Region Primary Center	Region
Latitude	13°29'54"	
Longitude	39°28'53"	
Above Sea Level	2,085 m	
Site Photo	Photo-No. 1-1	
Station Building	Existing 3 storied Building	Photo-No. 1-2 Photo-No. 1-3 Photo-No. 1-4
Air Conditioning	Separate facility in the room	
Location of Equipment	Existing Micro Tower: at the top of Building Existing Self Supporting Tower : 42 m Microwave Equipment: Equipment Room (2F)	
Commercial Power Supply	380/220V 3/1 Phase 50Hz	
Facility Power Feeding	Battery Floating Rectifier System	RECT. : 90A,BATT: 700AH Actual Load : 13A
DC Power Supply	-48V,	
Car Access Road	OK	
Material Temporary Deposit	OK	
Car Parking	OK	
Opposite Rep. Station	Messobo Rep. Station : PDH, DRMASS	Existing
	Existing Frequencies: ALCATEL, Model 140HTGU-16, 140Mb/s  Tx: 6460 MHz (Working), 6540 MHz (Stand-by)  Rx: 6800 MHz (Working), 6880 MHz (Stand-by)  NEC DRMASS  Tx: 1529.50 MHz (Working), 1529.50 MHz (Stand-by)  Rx: 1464.00 MHz (Working), 1464.00 MHz (Stand-by)	
Line of Site Clearance	Good	
Antenna Mounting	To be newly installed	
Lightning Arrester	Available	
Space for New Equipment	OK	Fig 4.2.2.1 Lay-out of Mekele
Line Capacity (8xE1)	To be newly installed : Mekele- Messobo	
DDF	To be newly installed	

F/S Result of PCO system in Rural Area

Table 2 Messobo Repeater Station

<i>Survey Item</i>	<i>Survey Result</i>	<i>Remarks</i>
Site Name	Messobo Repeater Station	
Latitude	13°34'26"	
Longitude	39°31'37"	
Above Sea Level	2,389 m	
Site Photo	Photo-No. 2-1	
Station Building	Existing Building	
Air Conditioning	Not Applicable	
Location of Equipment	Existing Self Supporting Tower :10 m Microwave Equipment: Equipment Room	Photo-No. 2-2 Photo-No. 2-3
Commercial Power Supply	380/220V 3/1 Phase 50Hz	
Facility Power Feeding	Battery Floating Rectifier System	NFB Available
DC Power Supply	-48 V, 50 A	Actual Load : 17.5 A
Others	DEG: 33.5 KVA x 2	For Back up
Car Access Road	OK	
Material Temporary Deposit	OK	
Car Parking	OK	
Opposite Station	Opposite Stn. : PCO Base (Ikotamba Rep.) Existing Opposite Station & Frequencies : a) Mekele, 140Mb/s and DRMASS b) Addis Ababa, 34Mb/s ALCATEL, 34Mb/s Tx: 1980.00 MHz (Working), 1922.00 MHz (Stand-by) Rx: 2193.00 MHz (Working), 2135.00 MHz (Stand-by) c) Axum, 34Mb/s Tx: 2069.00 MHz (Working), 2009.00 MHz (Stand-by) Rx: 2280.00 MHz (Working), 2222.00 MHz (Stand-by) d) Ikotamba Rep. (DRMASS) Tx: 1512.00 MHz (Working), 1512.00 MHz (Stand-by) Rx: 1464.50 MHz (Working), 1464.50 MHz (Stand-by)	To be newly installed
Existing Microwave Tower	Existing but not available for new antenna	
New Microwave Tower	To be installed with the height of 22m	
New Antenna to be installed	2 Parabolic Antennas	For Ikotamba/For Mekele
Line of Site Clearance	Good	
Space for New Equipment	OK	Fig. 4.2.2.2, Lay-out in Messobo
Line Capacity (8xE1)	To be newly installed : Messobo-Ikotamba	
DDF	To be newly installed	

F/S Result of PCO system in Rural Area

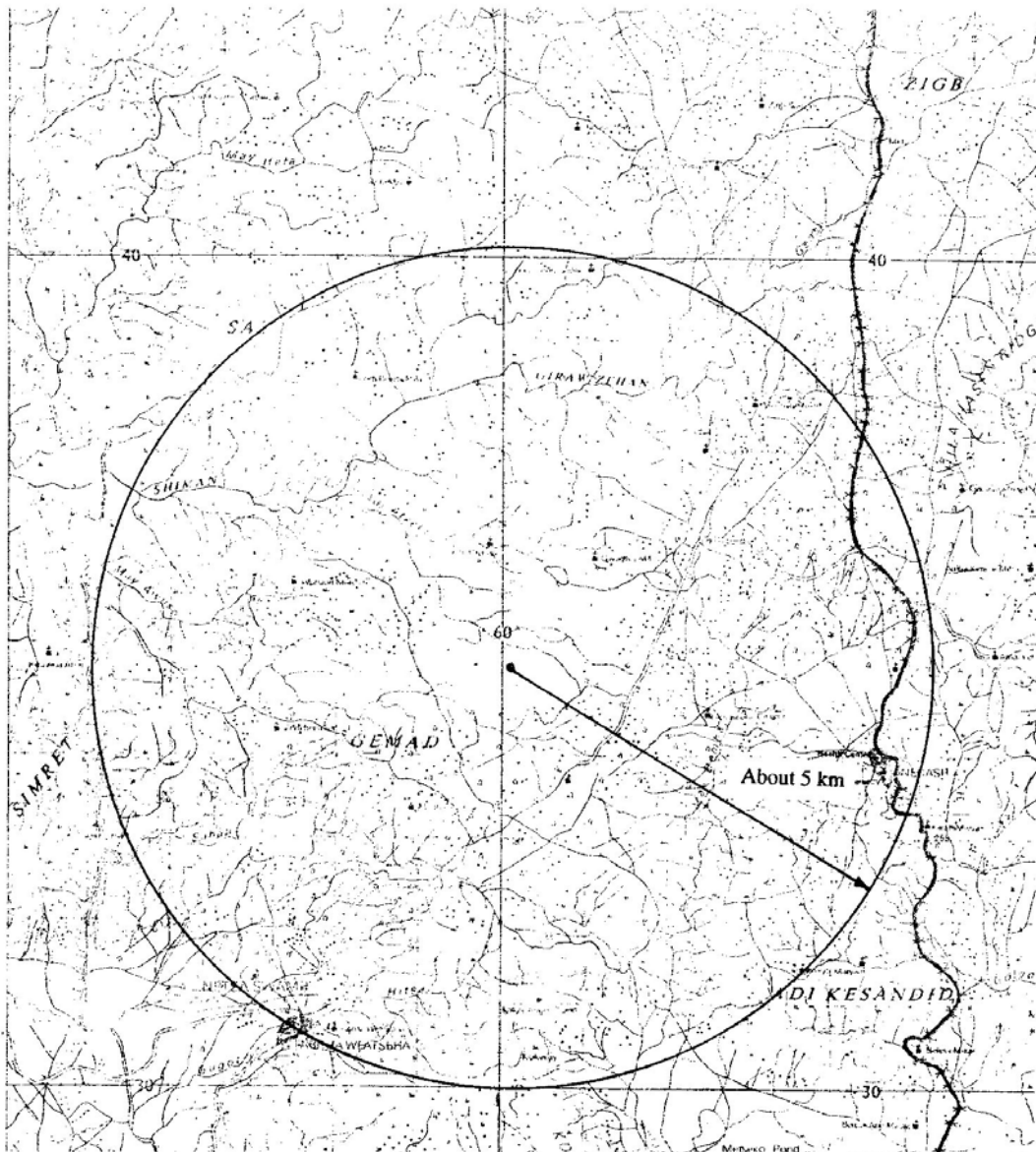
Table 3 Ikotamba Repeater Station (PCO Base Station)

<i>Survey Item</i>	<i>Survey Result</i>	<i>Remarks</i>
Site Name	Ikotamba Repeater Station	(PCO Base Station)
Latitude	13°46'15"	
Longitude	39°38'12"	
Above Sea Level	2,624 m	
Site Photo	Photo-No. 3-1	
Station Building	To be newly installed	Fig. 4.2.1.1, Lay-out Plan
Air Conditioning	Not Applicable	
Location of Equipment	Existing Tower: Self Supporting, 22 m	
Commercial Power Supply	Not Available	To be newly installed
Facility Power Feeding	Existing Solar Power System for DRMASS	
DC Power Supply	Solar Power System for PCO Base Station	
Car Access Road	Animal Road for about 500 m	Transportation by manpower Expose to Weather
Material Temporary Deposit	Available	
Car Parking	Not Available	
Opposite Station and PCO	To existing Messobo Rep. Station To existing Wukro Station (DRMASS) Tx: 1494.50 MHz (Working), 1494.50 MHz (Stand-by) Rx: 1429.00 MHz (Working), 1429.00 MHz (Stand-by)  To Wukro Area, 8 PCO s	(To be installed PCO Base Station)
Planned Antennas for PCO	Ikotamba Rep.	To be used  For Messobo/For Wukro
Existing Tower	22 m	
New Antennas to be installed	2 Parabolic Antennas Omni-directional Antenna for PCOs	
Line of Site Clearance	Good	
Ditto but for PCO	Good	
Ant. Supporting Structure	To be newly installed	
Lightning Arrester	Available	
Line Capacity (8xE1)	To be newly installed : Messobo-Ikotamba	
Line Capacity (4xE1)	To be newly installed : Ikotamba-Wukro	

F/S Result of PCO system in Rural Area

Table 4 PCO Subscriber Station (No.1)

<i>Survey Item</i>	<i>Survey Result</i>	<i>Remarks</i>
Site Name	Gemad	Map Survey Data
Latitude	14°53'17"	
Longitude	39°33'18"	
Above Sea Level	2,370m	
Site Photo	Photo-PCO-No.1-1	
Station Building	To be newly constructed	
Equipment Installation	Antenna and Pole, Solar Panel : Outdoor Radio Equipment, Solar Power Supply : Indoor	
Commercial Power Supply	Not Available	To be newly installed
Power Feeding to Facility	Solar Power System	
Car Access Road	OK	Expose to Weather
Material Temporary Deposit	OK	
Car Parking	OK	
Population of Gemad Area	11,000 (Wukro Administration Office in 2001)	
Gen. Condition of the Area	Road Distance : about 20km from Wukro city Schools : 3 Public Office : Agricultural Administration Health Station : plans to open in 2003	
No. of Channels	8	
Antenna	Yagi Antenna	
Antenna Height	5 m by pole	
Location of Pole	Outdoor	
Space for Equipment	New Shelter	
		Fig.4.2.1.2,Lay-out Plan for PCO



**Gemad PCO**

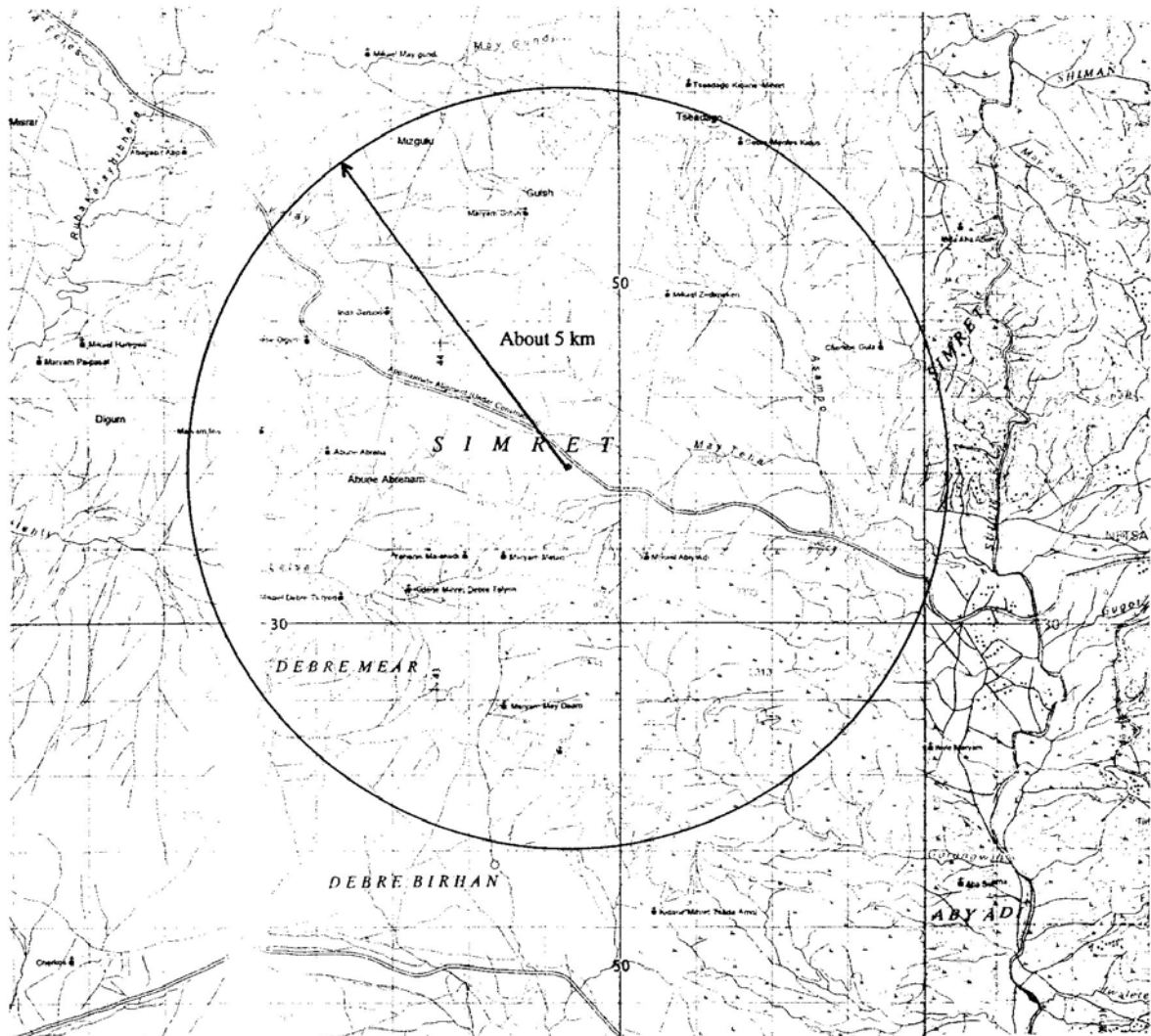
**Fig.-PCO-No.1-1, Expected Demand Area (Reference)**

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Table 5 PCO Subscriber Station (No.2)

<i>Survey Item</i>	<i>Survey Result</i>	<i>Remarks</i>
Site Name	Debre Tsion	Map Survey Data
Latitude	13°51'30"	
Longitude	39°27'22"	
Above Sea Level	2,152m	
Site Photo	Photo-PCO-No.2-1	
Station Building	To be newly constructed	
Equipment Installation	Antenna and Pole, Solar Panel : Outdoor Radio Equipment, Solar Power Supply : Indoor	
Commercial Power Supply	Not Available	To be newly installed
DC Power Supply	Solar Power System	
Car Access Road	OK	Expose to Weather
Material Temporary Deposit	OK	
Car Parking	OK	
Population of Debre Tsion Area	6,910 (Wukro Administration Office in 2001)	
Gen. Condition of the Area	Road Distance : about 23km from Wukro city Schools : 4 Public Office : Agricultural Extension Agent Cooperative Association : Stone and Agricultural Products Market Centers Nursery Area: Garden and Plants Health Post: 1 Tourist Area : Rock Church etc.	
No. of Channels	8	
Antenna	Grid Parabolic Antenna	
Antenna Height	5 m by pole	
Location of Pole	Outdoor	Fig.4.2.1.2,Lay-out Plan for PCO
Space for Equipment	New Shelter	





**Debre TSION PCO**

**Fig.-PCO-No.2-1, Expected Demand Area (Reference)**