PROJECT FOR ACCESS TO BROADBAND AND ITS APPLICATION IN URBAN AND RURAL AREAS

Compañía Paraguaya de Comunicaciones (COPACO) - Paraguay

1. DESCRIPTION OF PROJECT

The project consists in the deployment of infrastructure to enable broadband access and use in urban and rural areas of Paraguay's Southern Region through the installation of some 750 km of optical fibre in the backbone network with DWDM transmission technology and wired/wireless last-mile access. This will enable the provision of a wide range of services to the inhabitants of three of the country's departments (Misiones, Itapuá and Ñeembucú) through multiservice nodes in localities with limited or poor communication conditions, with the aim of boosting their economic development and social presence and increasing the penetration rate for communications in Paraguay.

In addition to expanding COPACO's DWDM backbone transmission network with high capacities, the project will make for geographic protection in the south of Paraguay.

The project has two technical aspects:

a) Fibre-optic network infrastructure throughout the Departments of Misiones, Itapuá and Ñeembucú.

b) Last-mile network infrastructure to provide services to inhabitants.

1.1 Fibre-optic network infrastructure

The infrastructure work consists in the installation of some 750 km of optical fibre, including 200 km using the medium-voltage overhead power transport infrastructure operated by ANDE, Paraguay's electric-power supply company, and 250 km of underground infrastructure.

It is to be noted that the departments selected for the pilot plan are characterized by low-lying and humid terrain, and that the implementation schedule should take account of those characteristics.

The pilot plan foresees extension of the nodes using DWDM transmission equipment with at least two lambdas of 10 Gbps capacity providing add/drop in each location or locality. The project covers 18 large population centres (add/drop) in the three departments and the five cities of Asunción, Villeta, Villa Oliva, Cnel. Bogado and Santa Rosa to form part of COPACO's DWDM transmission backbone in the Eastern Region, thereby protecting the entire system in the event of failures or disasters, the system being fully self-manageable. Also provided for are multiservice access nodes through which, by means of wireless and wired access facilities, it will be possible to provide a wide variety of converging services (including Internet, VPN, broadband IPTV, digital cities and voice communications).

1.2 Last-mile network infrastructure for providing services to the public

The last-mile infrastructure enables wireless and wired connections through multiservice access nodes.

- Wireless access through the installation of 3G/4G radio bases with facilities and power supplies adequate to provide coverage in 18 localities or sites and the surrounding areas.
- Wired access through external plant using copper pairs.

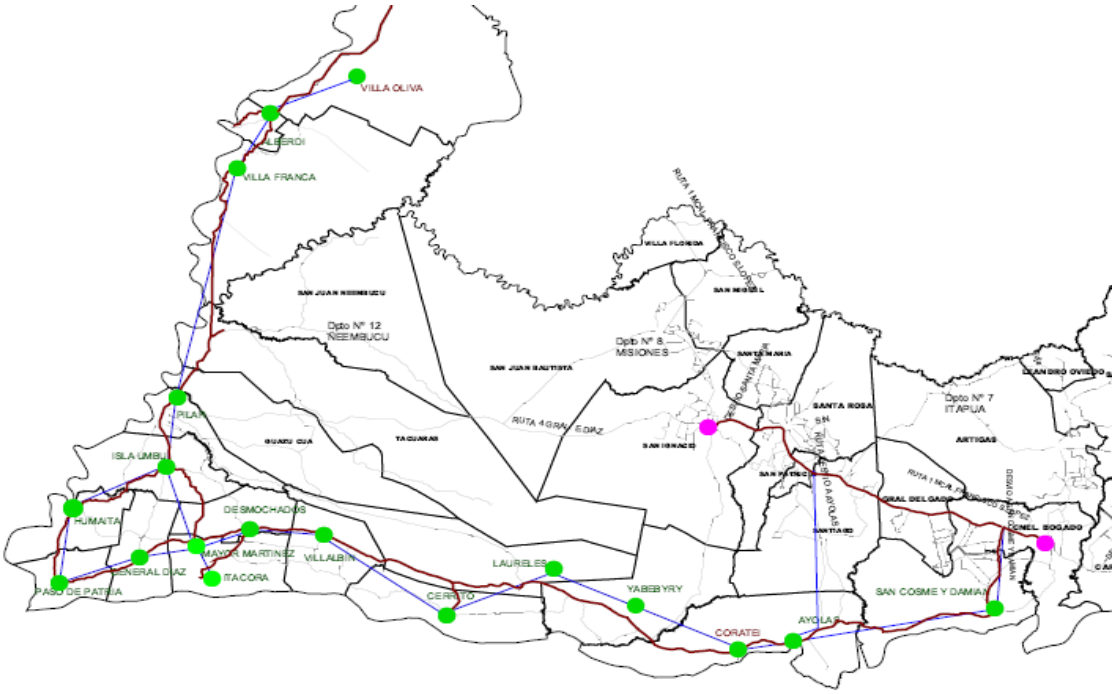
2. PROJECT OBJECTIVES

1. To offer the possibility of a wide range of services to locations with limited or poor communication conditions, thereby enabling them to boost their economic development and social presence.
2. Network unification and convergence.
3. Implementation, as part of the outside plant transmission medium, of 36-strand optical fibre sharing the overhead infrastructure operated by ANDE, thereby optimizing costs.
4. Expansion of COPACO's DWDM backbone transmission network with high capacities, thereby securing geographic protection in the south of the country.
5. Setting up locations with multiservice access nodes to enable the provision of convergent and next-generation services (including Internet, VPN and IPTV) and voice services in urban and rural areas of the country, thereby increasing the penetration rate.

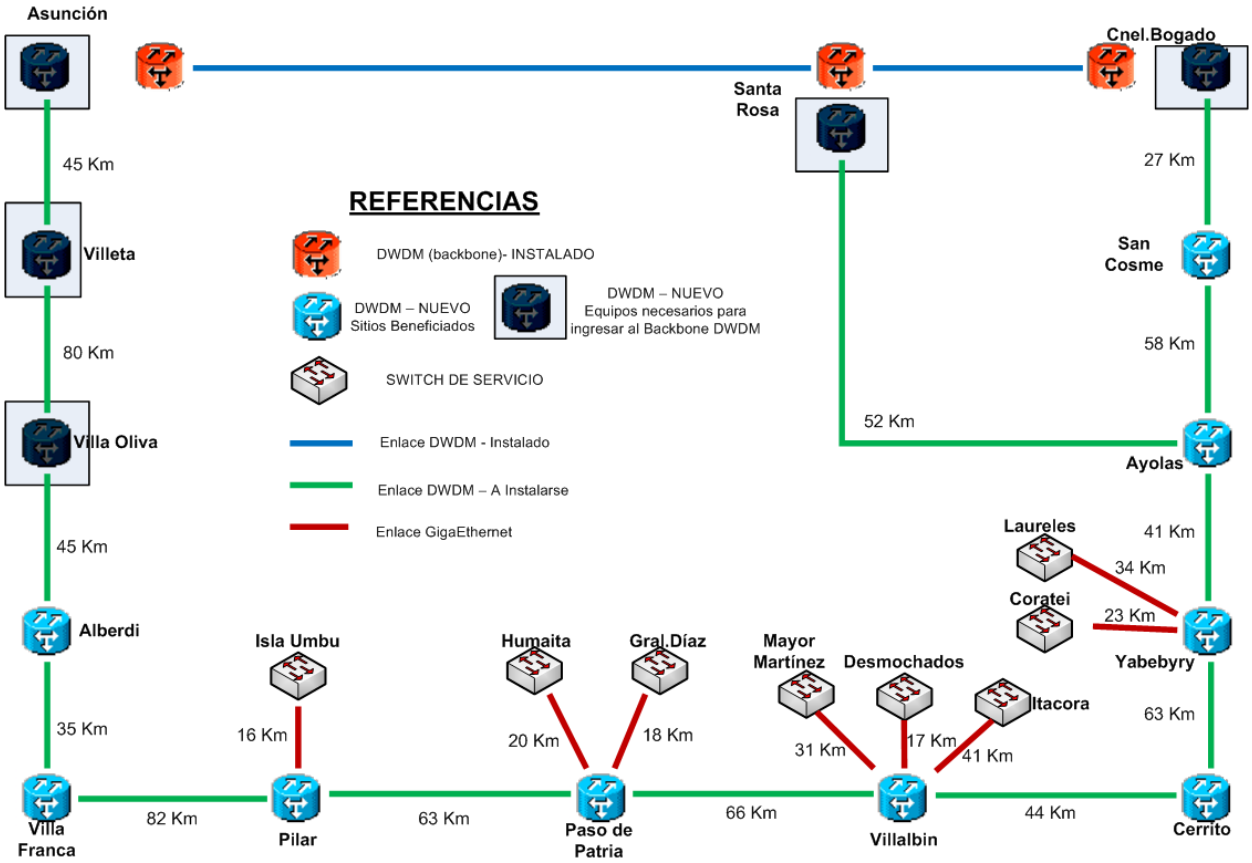
   The network will be designed to accommodate high capacities with a wide range of bandwidths and speeds, carrying voice, data and application traffic that niche markets within the region wish to exploit.

The following localities are under consideration for the fibre-optic infrastructure:

Nº	Localities
1	Alberdi
2	Ayolas
3	Cerrito
4	Coratei
5	Desmochados
6	Gral. Díaz
7	Humaitá
8	Isla Umbú
9	Laureles
10	Mayor Martínez
11	Paso de Patria
12	Pilar
13	Pto.Itacora
14	San Cosme
15	Villa Franca
16	Villa Oliva
17	Villalbín
18	Yabebyry



3. GENERAL LAYOUT OF THE PROJECT



4. PROJECT MODEL

Considering the Americas Regional Initiative of the World Telecommunication Development Conference (WTDC), together with the corresponding modifications and suggestions by CITEL, known as "Broadband access and uptake in urban and rural areas", we present the project model, which basically comprises a COUNTERPART MODEL.

A counterpart model involving the entity that would be responsible for financing the fibre-optic network infrastructure for the 18 locations or localities with approximately 750 km of optical fibre with the necessary DWDM transmission technology, and the COPACO counterpart that would be responsible for financing the access (wireless and wired) network infrastructure, with its various elements, multiservice nodes and external copper-pair plant deployed within the area.

ENTITY COUNTERPART	COPACO COUNTERPART
FIBRE-OPTIC NETWORK INFRASTRUCTURE **Implementation of a fibre-optic network of some 750 km** with latest-generation **DWDM technology** capable of accommodating the various advanced services using cutting-edge **voice and data** technologies with **guaranteed bandwidths**.	**ACCESS NETWORK INFRASTRUCTURE** **Implementation of wireless access infrastructure** using **3G/4G radio base installations**, **wireless access** through **outside plant (copper pairs),** installation of **multiservice nodes and data network equipment to enable the provision of voice and data services (telephony, Internet, broadband, IPTV).**

5. COSTS

5.1 ESTIMATED COST OF FIBRE-OPTIC NETWORK INFRASTRUCTURE	
ITEM	**APPROXIMATE COST (USD)**
Installation and setting up of optical fibre (approximately 750 km)	4 000 000
DWDM equipment	2 000 000
APPROXIMATE COST	**6 000 000**

5.2 ESTIMATED COST OF LAST-MILE ACCESS	
ITEM	**APPROXIMATE COST (USD)**
Wired access	1 500 000
Wireless access	1 000 000
Multiservice nodes	1 000 000
Data-network nodes	1 000 000
Infrastructure	1 000 000
APPROXIMATE COST	**5 500 000**

The project can be adapted and carried out in phases according to the investment costs for its execution. We present below a **three-phase** approach that can be modified according to the variables or criteria adopted.

For these phases, the aim is to specify the distances for the fibre-optic network as a basis for effecting the remaining equipment investment, it being important to emphasize that the rounded approximations for the fibre-optic lengths exceed the measurements worked out on paper.
It is also important to emphasize that by completing the three phases of the project we will have geographic protection of the fibre-optic backbone in the south of the country, this being one of the project's prime objectives in order to ensure continued connectivity in disaster situations.

Phase 1: From Route 1 to Cerrito – 274.74 km of optical fibre

FIBRE-OPTIC NETWORK	
Link between towns/cities	**Fibre-optic run (m)**
San Cosme - Ayolas	66 120
Ayolas - Coratei	20 520
Coratei - Yabebyry	26 220
Yabebyry - Laureles	38 760
Laureles - **Cerrito**	33 060
COST OF PHASE 1	**274 740** **Metres of fibre (Approx. 350 km)**

Phase 2: From Cerrito to Pilar – 208.62 km of optical fibre

FIBRE-OPTIC NETWORK	
Link between towns/cities	**Fibre-optic run (m)**
Cerrito - Villalbin	50.160
Villalbin - Desmochado	19.380
Desmochado - Mayor Martinez	15.960
Mayor Martínez - Pto. Itacora	11.400
Mayor Martínez - Gral. Díaz	19.380
Gral. Díaz - Paso de Patria	20.520
Paso de Patria - Humaitá	22.800
Humaitá - Isla Umbú	30.780
Isla Umbú - **Pilar**	18.240
COST OF PHASE 2	**208 620** **Metres of fibre (Approx. 300 km)**

Phase 3: From Pilar to Villa Oliva – 158.46 km of optical fibre

FIBRE-OPTIC NETWORK	
Link between towns/cities	**Fibre-optic run (m)**
Mayor Martinez - Isla Umbu	25 080
Pilar - Villa Franca	93 480
Villa Franca - **Alberdi**	39 900
COST OF PHASE 3	**158 460** **Metres of fibre (Approx. 200 km)**