



# **NATIVES COMMUNITIES OF PARAGUAY CONNECTED TO THE WORLD**

**PARAGUAYAN COMMUNICATIONS COMPANY S.A. – COPACO S.A. &  
HOLA PARAGUAY S.A. (VOX)**

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HOLA PARAGUAY S.A. - VOX (Paraguayan Communications  
Company)

National Telecommunications Commission - CONATEL – Paraguayan  
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## PRESENTATION

Since the National Constitution of Paraguay, recognized in 1992, indigenous people right's to "...*Preserve and develop their Ethnic Identity in their respective habitat...*", the debt of the national society with those groups that inhabit our territory has been increasing, long before the Paraguayan State will be constituted.

This entails the constant search for projects that have an impact in areas where indigenous communities are established in our country, which are of public and social interest. Therefore, on this occasion, the project aims to promote the development and empowerment of indigenous communities, through access to Information technologies, in rural areas far from the Urban Center and in some cases without access to basic services , neither electricity and drinking water.

For this purpose, the PARAGUAYAN COMMUNICATIONS COMPANY S.A. - COPACO S.A. through the VOX INGENIERIA consortium, in compliance of the commitment with the Public Bidding of Universal Services Funds - FSU N ° 1/2019, with the NATIONAL COMMISSION OF TELECOMMUNICATIONS - CONATEL, are developing, in consortium with LEXA Company, the infrastructure's expansion for telecommunications networks in many areas of Paraguayan territory and thus, encourage the importance of communication and ICT solutions, such as tools for the social, cultural and organizational strengthening of indigenous communities.

COPACO S.A., is the owner of the company HOLA PARAGUAY S.A. that markets the mobile phone service under the VOX brand, which for the deployment of this project has been associated with LEXA Company, giving rise to the VOX INGENIERIA Consortium.

## INTRODUCTION

The development of so-called Information and Communication Technologies (ICTs) has generated new spaces for interaction between different communities, giving access to new assets and services, both public and private, which in turn have allowed the theoretical generation of new rights. However, this technological advance has generated a particular digital divide, in which a considerable percentage of the population is still lagging behind in relation to accessing and taking advantage of technologies to achieve economic, social, cultural or political objectives.

Under the guidance of the Ministry of Information and Communication Technology (MITIC); The General Directorate of Statistics, Surveys and Censuses (DGEEC) obtained the statistical data on internet penetration at the national level, for 2020 year, where 65% of the Paraguayan population uses the internet and 48% of that population with internet access reside in rural areas.

Within this minority, there is one of the most vulnerable groups in the digital divide, the INDIGENOUS COMMUNITIES, which in order to preserve their identity, some of them prefer to isolate themselves into areas far removed from the urban area.

Therefore, the project aims to reduce this digital divide, promoting the use of mobile communication services, basic telephony, internet access and data transmission, with the expansion of the COPACO S.A. – HOLA PARAGUAY S.A. (VOX) telecommunication network infrastructure and so reaching 20 (twenty) communities.

## PROJECT DESCRIPTION



This Project consists of the expansion of the Telecommunications Network of COPACO S.A. – HOLA PARAGUAY S.A. (VOX), which serves as a platform for mobile phone services, internet access and data transmission service, in a efficiently manner; with the aim of expanding coverage to National level reaching rural areas wich are part of the public and social interest.

### **Project Scope**

The project aims to provide coverage to indigenous communities, and populations in neighboring areas that are geographically located mostly in the western region of the country, in rural areas. In this sense, there are 13 (thirteen) indigenous communities that will have the possibility of accessing the mobile telephone service, the service of internet access and data transmission with good quality.

The indigenous population in the areas covered by the project, reaches about 3.500 (Three thousand five hundred) people, which represents more than 586 (five hundred eighty six) families benefited from this expansion; in addition to other temporary beneficiaries, such as those who travel in the project's areas of influence.

### **Technical Outlines**

For the expansion of the Telecommunications Network, the installation of 13 (thirteen) Radio Base Stations was carried out, located at the coordinates indicated in Table 1, to cover the 20 (twenty) communities of Paraguay, through of 3G technology, with bandwidth capacities of up to 4Mbps.

The structure assembled at each site corresponds to mast-type towers (Figure 1), with heights of between 30 and 72 meters with all the established safety conditions (stairs, landings, etc.), and also have capacity to support radiant systems and Radio Frequency equipment installed and thus too, all the civil works necessary for the installation of the racks that house the equipment.

The radiant system used is composed of the waveguide, jumpers and antennas. The waveguide and jumpers are attached to the structures through hangers that fix and support it. The antennas are installed on masts suitable for their weight and length, by means of a special hardware system.

The antennas installed are omni-directional, sectorial and tri-sectorial, according to the geographical area and distance to be covered. In Table 2, the type of antenna used in each Radio Base Station is specified.

CELL ID	SITE NAME	LATITUDE	LONGITUDE
SITE 001	Comunidad indígena Laguna Negra Belén	22°20'1.77"S	60°29'15.77"W
SITE 002	Comunidad indígena Campo Loa	22°25'7.77"S	60°31'56.05"W
SITE 003	Comunidad indígena Campo Loro	22° 4'56.54"S	59°50'24.83"W
SITE 004	Carreros del Chaco Sur	23°53'0.69"S	59°25'59.15"W
SITE 005	Carreros del Chaco Norte	23°41'2.45"S	59°32'44.90"W
SITE 006	Comunidad Indígena La Esperanza – La Promesa	23°58'31.44"S	58°44'6.23"W
SITE 007	Comunidad indígena La Princesa	22°59'8.01"S	60°54'14.38"W
SITE 008	Santa María de los 12 apóstoles	23°17'44.47"S	61° 0'50.34"W
SITE 009	Km 193 – Gabaglio	23°48'31.88"S	59°10'21.37"W
SITE 010	Virgen de Fátima	23°20'17.07"S	60°48'30.70"W
SITE 011	Bioceánica 1	21°40'10.00"S	57°55'21.00"W
SITE 012	Hugua Ñandu	22°59'53.65"S	56°54'15.21"W
SITE 013	Kuruzú de Hierro	23°23'51.63"S	56°37'35.89"W

Table 1. Coordinates of installed Radio Base Stations

The base stations have a BBU (Base Band Unit) housed in the cabinet, at the foot of the tower, together with the transmission equipment and RRUs (Remote Radio Unit) installed in the tower, together with the antennas and filters. The equipment used, supports multi-antenna technologies with high performance and low energy consumption. Its low energy consumption makes possible an ecological power supply through solar, wind and biogas energy.

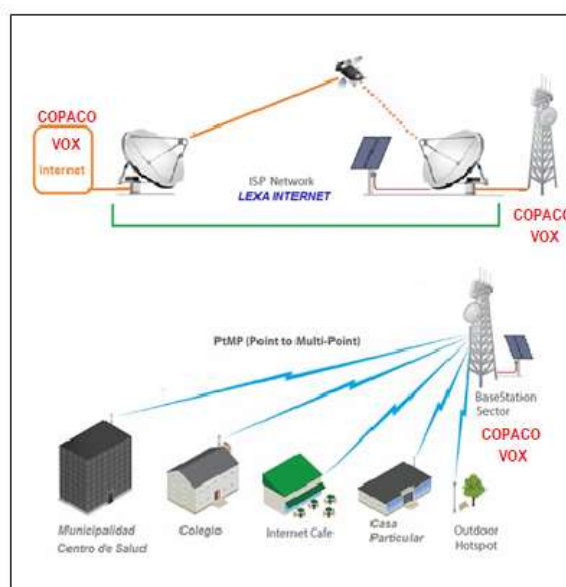
Regarding the Radio Base Station power system, commercial AC (Alternate Current) power is used in 9 (nine) Radio Base Station (Table 2), and rectified DC (Direct Current) power (-48 V) is delivered to the equipment; they also have a battery backup system , internal and a DC rectification system. For the remaining 4 (four) Radio Base Station, it was opted for the installation of solar panels, since they are remote sites, they do not have commercial AC power service connections. Motor generators are used for the AC power backup system. This guarantees response times in the event of an electrical power problem.



ITEM	SITE NAME	RBS MODEL	TOWER HEIGHT	TRANSMISSION MEDIA	Telephone service Capabilities	Data transmission capacity (Minimum)	ENERGY SYSTEM	GENERATOR	TYPES ANTENNAS	PERIMETER FACING
1	Comunidad indígena Laguna Negra Belén	DBS 5900	72	MW	5 Erlang	4 Mbps	COMERCIAL ELECTRICAL SUPPLY	12 KVA	OMNI	OK
2	Comunidad indígena Campo Loa	DBS 5900	72	MW	5 Erlang	4 Mbps	COMERCIAL ELECTRICAL SUPPLY	12 KVA	OMNI	OK
3	Comunidad indígena Campo Loro	DBS 5900	72	MW	5 Erlang	4 Mbps	COMERCIAL ELECTRICAL SUPPLY	12 KVA	OMNI	OK
4	Carreros del Chaco Sur	DBS 5900	72	SAT	5 Erlang	4 Mbps	SOLAR PANEL	12 KVA	TRI-SECTORIAL	OK
5	Carreros del Chaco Norte	DBS 5900	72	SAT	5 Erlang	4 Mbps	SOLAR PANEL	12 KVA	TRI-SECTORIAL	OK
6	Comunidad Indígena La Esperanza - La Promesa	DBS 5900	72	SAT	5 Erlang	4 Mbps	SOLAR PANEL	12 KVA	OMNI	OK
7	Comunidad indígena la Princesa	DBS 5900	30	SAT	5 Erlang	4 Mbps	COMERCIAL ELECTRICAL SUPPLY	12 KVA	OMNI	OK
8	Santa María de los 12 apóstoles	DBS 5900	72	SAT	5 Erlang	4 Mbps	COMERCIAL ELECTRICAL SUPPLY	12 KVA	OMNI	OK
9	Km 193 - Gabaglio	DBS 5900	30	SAT	5 Erlang	4 Mbps	PANEL SOLAR	12 KVA	OMNI	OK
10	Virgen de Fatima	DBS 5900	72	SAT	5 Erlang	4 Mbps	COMERCIAL ELECTRICAL SUPPLY	12 KVA	OMNI	OK
11	Bioceánica 1	DBS 5900	72	MW	5 Erlang	4 Mbps	COMERCIAL ELECTRICAL SUPPLY	12 KVA	SECTORIAL	OK
12	Hugua Nandu	DBS 5900	72	MW	5 Erlang	4 Mbps	COMERCIAL ELECTRICAL SUPPLY	12 KVA	OMNI	OK
13	Kuruzú de Hierro	DBS 5900	72	MW	5 Erlang	4 Mbps	COMERCIAL ELECTRICAL SUPPLY	12 KVA	OMNI	OK

Table 2. Main characteristics of the installed Radio Base Stations.

The transmission is carried out through by Microwave and Satellite. The satellite links are used in 7 (seven) Radio Base Stations, in the KU Band are routed to the central office NSS(Network Switching Subsystem)-VOX, in order to interconnect with the 3G Network of COPACO S.A. - HOLA PARAGUAY S.A. (VOX). On the other hand, The transmission of the other 6 (six) sites, is made up of an 8GHz Microwave link between the site and the nearest town, then to the COPACO S.A. Central Office of Asunción, capital of Paraguay (NSS-VOX) to through the Fiber Optic Backbone.

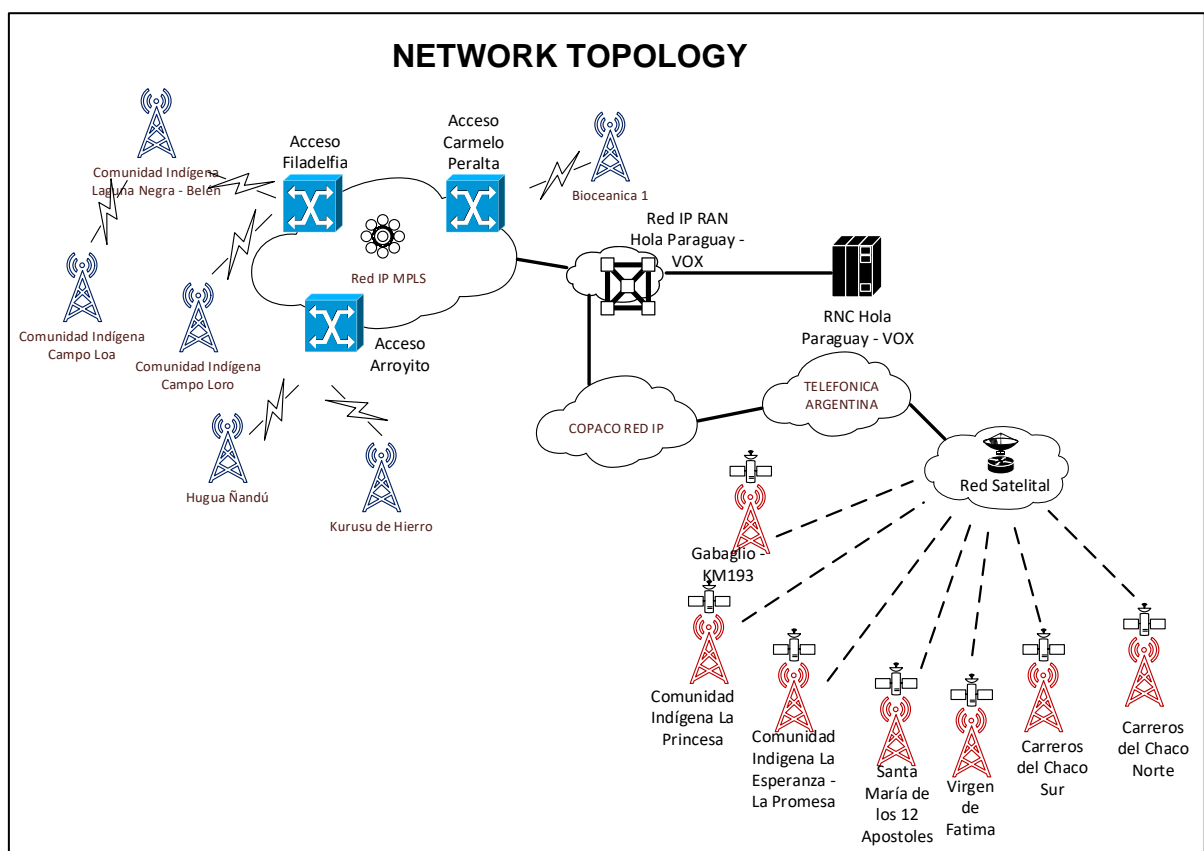


Graph 1. Connection diagram of Terrestrial Satellite Station and Radio Base Station energized with solar panels.



The Radiobases connected by Microwaves are integrated into the IP / MPLS (Internet Protocol / Multi-Protocol Label Switching) Network through the Accesses and IP Distribution Equipment, located in the Arroyito, Filadelfia and Carmelo Peralta Access centers; the Radio Bases connected by satellite link are integrated into the IP / MPLS NETWORK of COPACO S.A. through an international optical fiber link provided by the TELEFONICA - ARGENTINA Operator.

All Radio Base Stations are managed remotely, through an NMS (Network Management System) and locally through a maintenance terminal LMT (Local Management Terminal).



Graph 2. Network Topology.

## COVERAGE

The Republic of Paraguay is located in the center of South America, has an area of 406,752 km<sup>2</sup>, it is divided into two natural regions: The Western or Chaco region and the Eastern region. Also, its territory is politically divided into 17 (seventeen) departments.

The Project “NATIVE COMMUNITIES OF PARAGUAY CONNECTED TO THE WORLD” benefits 20 (twenty) communities (table 3), which of these, 13 (thirteen) are indigenous communities, by means of the installation of 13 (thirteen) Radio Base Stations (Illustration 1). The highest percentage of the communities benefited by the project, (90%) are located in the Occidental or Chaco region distributed in the departments of Boquerón, Presidente Hayes and Alto Paraguay and the remaining 10% or 2 (two) Communities are located in the department of Concepción, in the Eastern region.

Nº	COMMUNITIES NAMES
1	Comunidad Indígena Yishinachat
2	Comunidad Virgen de Fátima
3	Comunidad Indígena Campo Loa-Nasuc
4	Comunidad Indígena Campo Loa-Primavera
5	Comunidad Indígena Campo Loa - San Ramón
6	Comunidad Indígena Campo Loa - San Pio 10
7	Comunidad Indígena Laguna Negra Ko´e Pyahu
8	Comunidad Indígena Laguna Negra Nueva Estrella
9	Comunidad Indígena Campo Loro
10	Comunidad Indígena Tunucojai
11	Comunidad Indígena La esperanza – La Promesa
12	Comunidad Indígena La esperanza – La Esperanza
13	Comunidad Indígena La Esperanza – Tapiti
14	Comunidad Indígena La Princesa
15	Hugua Ñandu
16	Kurusú de Hierro
17	Santa María de los 12 apóstoles
18	Bioceánica 1 – Carmelo Peralta
19	Carreros del Chaco Sur
20	Carreros del Chaco Norte

Table 3. Communities Benefited from the project

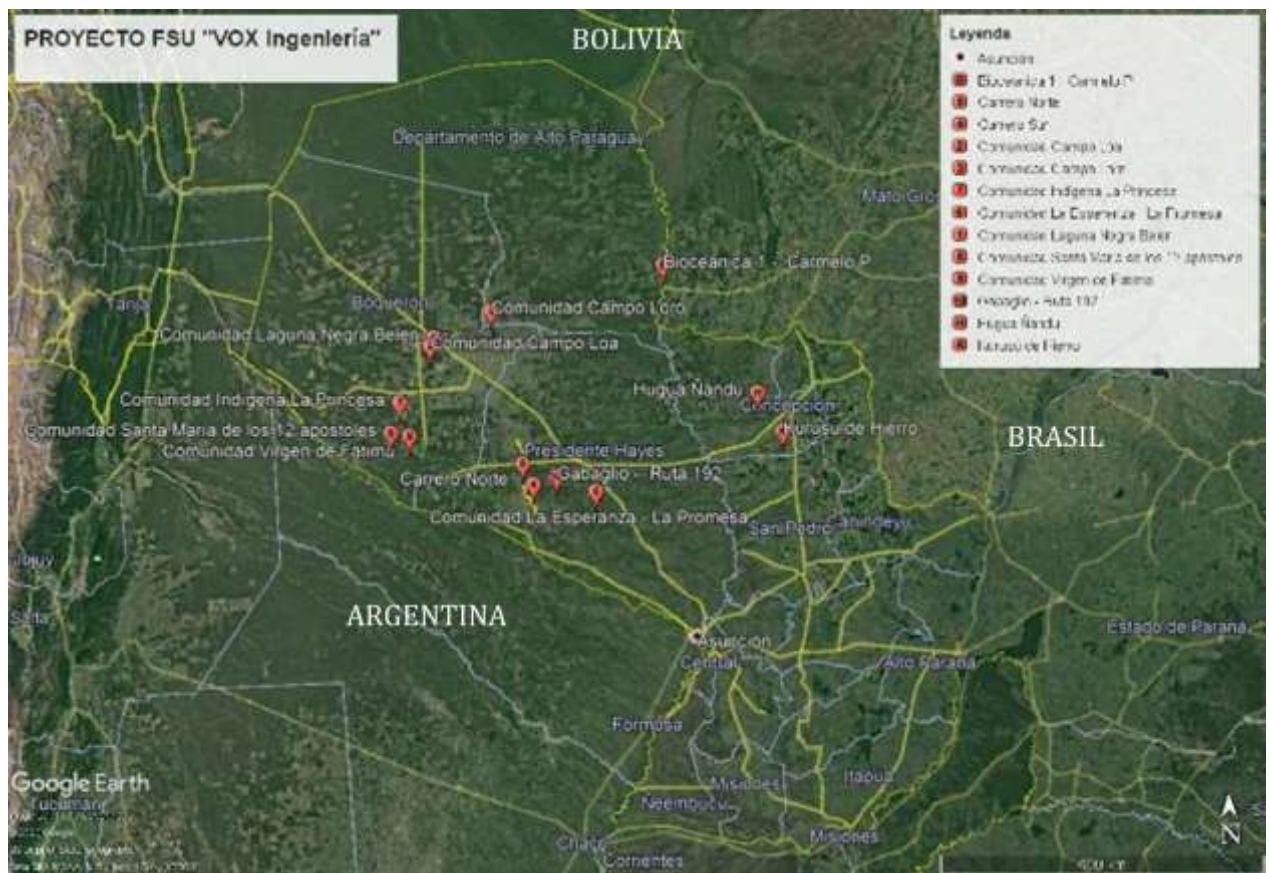


Illustration 1. Geolocated sites in Paraguayan territory.

The Radio Base Station coverage is shown by signal level.

#### UMTS: Coverage by Signal Level (DL) 0

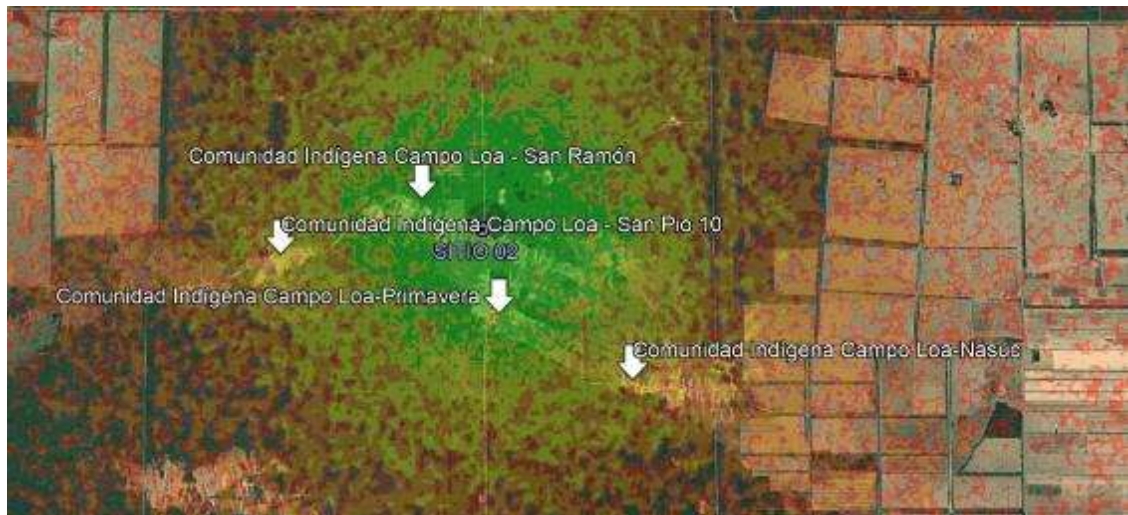
- -65 <= Best Signal Level (dBm) < 0
- -75 <= Best Signal Level (dBm) < -65
- -85 <= Best Signal Level (dBm) < -75
- -95 <= Best Signal Level (dBm) < -85
- -100 <= Best Signal Level (dBm) < -95



## SITE 01 – Laguna Negra Belén Indigenous Community



## SITE 02 - Campo Loa Indigenous Community

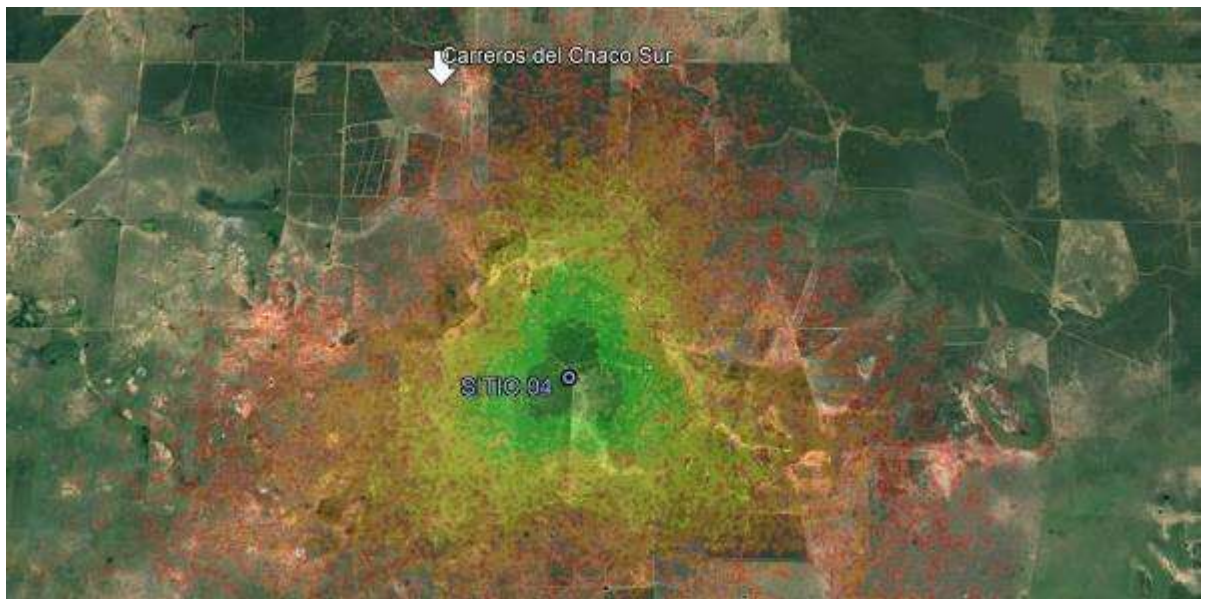


## SITE 03 - Campo Loro Indigenous Community





### SITE 04 - Carreros del Chaco Sur



### SITE 05 - Carreros del Chaco Norte



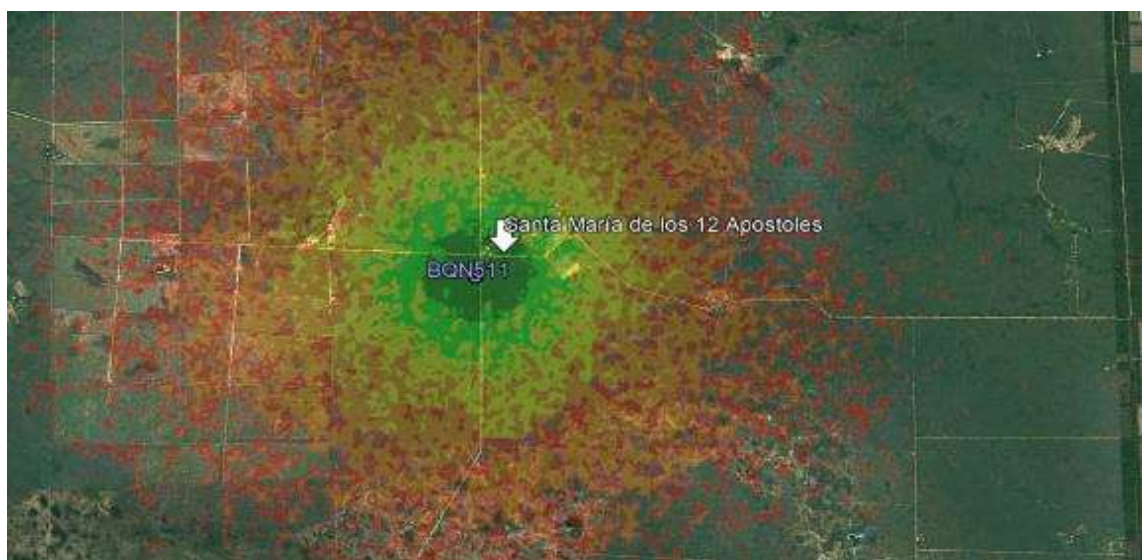
## SITE 06 - La Esperanza – La Promesa Indigenous Community



## SITE 07 - La Princesa Indigenous Community

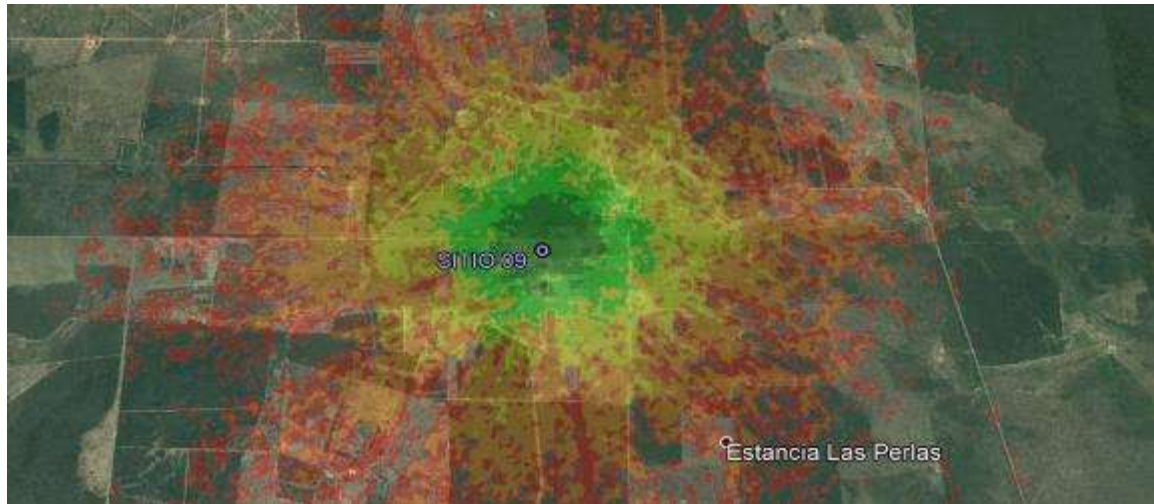


## SITE 08 - Santa María de los 12 apóstoles

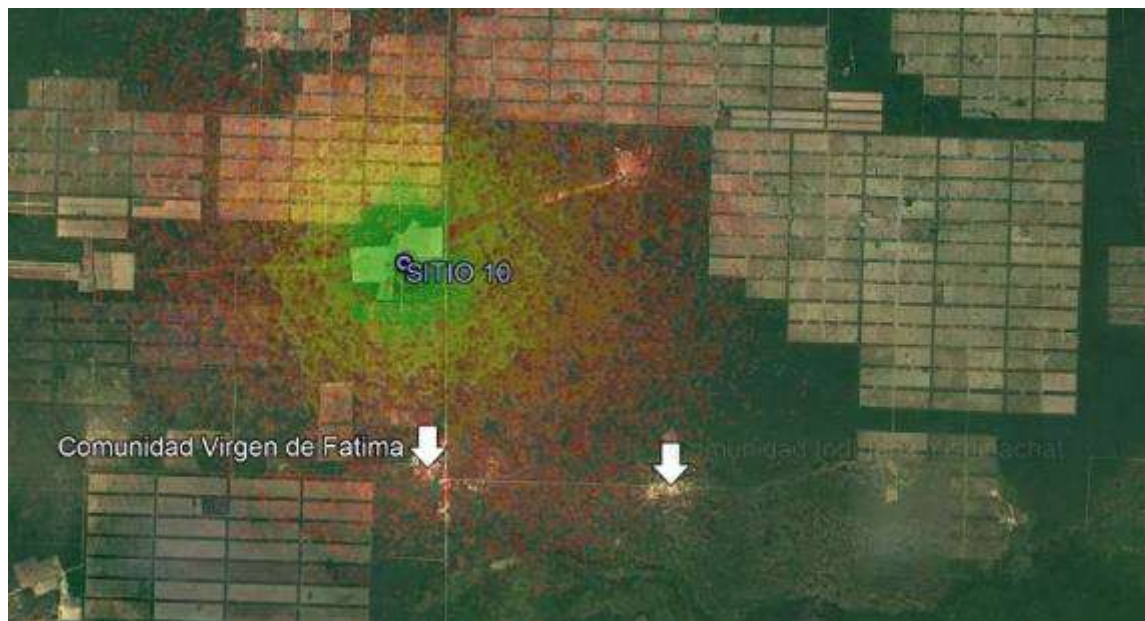




### SITE 09 – Km 193 – Gabaglio

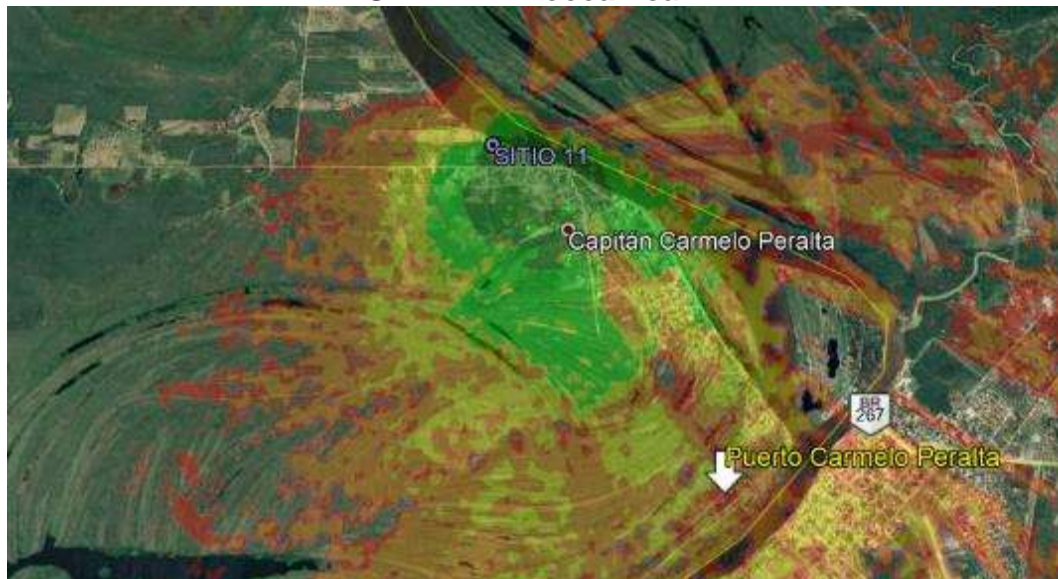


### SITE 10 – Virgen de Fátima





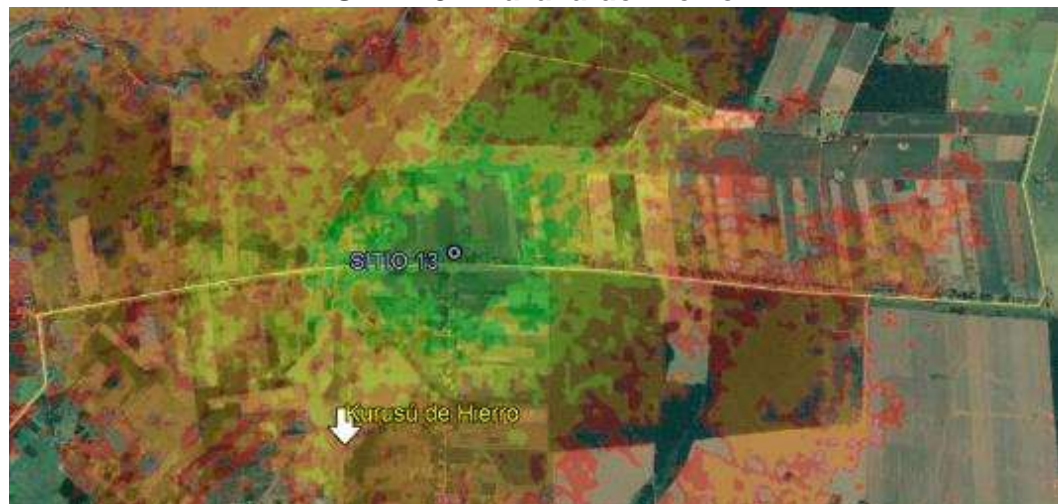
**SITE 11 - Bioceánica 1**



**SITE 12 - Hugua Ñandu**



**SITE 13 - Kuruzú de Hierro**



## IMPACT

Through the Expansion of telecommunications networks, it was possible to cover remote rural areas, where some of our indigenous communities live and with this it is expected to promote the development and empowerment of the native communities of our country.

In this way, the population located in the contemplated communities will be able to access telecommunications services (mobile telephony, basic telephony and access to the Internet and data transmission, thus having greater opportunities thanks to ICTs.

The main problem found in some sites has been the lack of electrical energy, so, in order to supply energy to the Radio Base Station located at the CAMPO LOA community, has been deployed an electrical network of 3800 meters of longitude, this work benefits to the whole Community, cause besides the service of telecommunication, now, they access to the electrical energy services.



*Photograph 1. Delivery of Notebook to the community leader*



*Photograph 2. Campo Loa Community School*

The Campo Loa Indigenous Community, belonging to the Nivaclé ethnic group, is settled and located in the District of Mcal. Estigarribia of the Department of Boquerón, of the Occidental region, of the Republic of Paraguay. This community is one of the most organized due to the quality of its leaders, which is why a computer equipment (Notebook) was donated for community use.

On the other hand, taking into account the NEW ADHESIONS TO THE ALLIANCE OF RURAL WOMEN: EMPOWERING RURAL WOMEN THROUGH ICTs, which took place on October 1, 2019 in Asunción, Paraguay, with the Member States of the Inter-American Commission of Telecommunications (CITEL), the Associate Members of the Permanent Consultative Committee I (PCCI), ICT Organizations, where it is stated that:

- COPACO S.A. promote and offer connectivity, infrastructure and training programs for Paraguayan girls and women, in relation to ICTs; for the benefit and contribution to the role of women in their jobs and trades in 6 (six) localities of the country: Yatayty, Department of Guairá, San Miguel and Yabebyry, Department of Misiones, and **3 (three) Indigenous communities in the Paraguayan Chaco**

However, with this project, COPACO S.A. will provide connectivity not only to 3 (three) Indigenous Communities in the Paraguayan Chaco, but 13 (Thirteen) communities, in order to continue complying with the commitment assumed by the company, with the ALIANZA DE MUJERES RURALES for which he has made a MEMORANDUM OF UNDERSTANDING BETWEEN COMPAÑÍA PARAGUAYA DE TELECOMUNICACIONES SA- COPACO S.A. AND HUAWEI TECHNOLOGIES PARAGUAY S.A. "FOR THE ACHIEVEMENT OF THE OBJECTIVES OF THE ALLIANCE OF RURAL WOMEN" end of efforts, making a donation to the secretary of the First Lady of the Republic of Paraguay access equipment (Table3) for indigenous communities with the aim of achieving connectivity.

N°	Description	Quantity	Brand	Model
1	WiFi LTE CPE	26	Huawei	B310
2	Tablets	20	Huawei	MediaPad 10.1"

Table 3.



## CHALLENGES

The deployment, operation and maintenance of telecommunications networks in remote areas, with difficult terrain, low population density or low-income population, without paved roads, without basic services such as electricity and drinking water, undoubtedly become the biggest challenges of this project.

To solve this problem, the infrastructures in the COPACO S.A. – HOLA PARAGUAY S.A. (VOX) central offices that served as ends of the trunk links to the different Radio Base Stations were adapted, large distances of fiber optic links and electricity networks were deployed for some points, and for ensure the integration of the most distant and difficult-to-access points to the IP / MPLS Network of COPACO S.A., equipment for satellite connections and an energy system were chosen, using solar panels, in this way, the Radio Base Station will be able to maintain the connectivity of the indigenous communities.

COPACO S.A. - HOLA PARAGUAY S.A. (VOX) contemplates the donation of 23 (twenty-three) accounts of free access to broadband internet, with WiFi technology, as too terminal equipment and accessories for the correct operation of the service, in compliance with social commitments assumed with the National Telecommunications Commission -CONATEL.

Taking into account all the aspects and efforts that the project demands, another important challenge will be to attract, with the services offered, as many users as possible; For this, training mechanisms, equipment donation programs (computers, smartphones) should be used so that the Beneficiaries can make the most of the resources that the Government provides them.

Looking forward of the future of this project, after an evaluation of the acceptance of the Service by the beneficiaries, it will be proposed to expand the coverage through other access points and thus, reach other lagging areas of the country, which are needing taking be account inside the Public and Social interests to provide services for more indigenous communities in our country, such as access to the Internet, and all related benefits.



## PROJECT SCHEDULE

The project has been executed by the consortium between HOLA PARAGUAY S.A. (VOX) and Lexa Company, contemplating an implementation period of 1 (one) year and it consists of 2 (two) phases:

1. First phase: Deployment, configuration and startup of 70% of the sites, nine of thirteen Radio Base Stations.
2. Second phase: Deployment, configuration and startup of the remaining four of thirteen sites.

Currently, this project is about to finish with the works of the last Radio Base Station, named Km 193 – Gabaglio located, in the department of Presidente Hayes of the Western Region.

## PROJECT INVESTMENT COST

The amount budgeted for the NATIVE COMMUNITIES OF PARAGUAY CONNECTED TO THE WORLD project is Gs. 24.968.500.000 (Twenty-Four Thousand Nine Hundred Sixty-Eight Million Five Hundred Thousand Guaranies) which is equivalent to approximately USD 3.566.928 (American Dollars, Three Million Five Hundred Sixty-Six Thousand Nine Hundred Twenty-eight).

# PROJECT PICTURES



## SITE 02 - Indigenous community Campo Loa



*Photograph 3. Radio Base Station located in the indigenous community Campo Loa*



*Photograph 4. Campo Loa indigenous community*



### SITE 03 – Indigenous Community Campo Loro



*Photograph 5. Antennas of the Radio Base Station of the Campo Loro Indigenous Community*



*Photograph 6. Radio Base Station of the Campo Loro indigenous community*



## **SITE 07 – Indigenous Community La Princesa**



*Photograph 7. Radio Base Station located in the La Princesa indigenous community*



*Photograph 8. La Princesa indigenous communities*



## SITE 08 - Santa María de los 12 apóstoles



*Photograph 9. Radio Base Station located in the indigenous community 12 apostoles*



*Photograph 10. Radio Base Station located in the indigenous community 12 apostoles*



## GALLERY

