Wireless Network for Traffic Control
Pereira, Colombia

arba pro

albentia systems

CENTRACOM
EL CENTRO DE LA TECNOLOGIA Y LAS COMUNICACIONES

Instituto Municipal
De Tránsito De Pereira

The city of **Pereira** is the industrial center and commercial metropolitan area in the western region of **Colombia**. Its strategic location falls within the national and international economic environment and unites the three most important urban centers of the country.

The Municipal Transit Institute of Pereira (IMTP) has decided to conduct a Mobility Plan in the city, aimed at improving the fluidity and decrease private vehicles through the center of the city.

For this purpose the IMPT studied the need to regulate traffic lights in real time through a telecommunications infrastructure. This network would send information from traffic controllers to the **Traffic Management Center in the PTMI** for monitoring the intersections of the city in real time and thus regulating traffic remotely, quickly and efficiently.

Broadband Wireless Connectivity

The growing need for wireless broadband connectivity in municipalities for applications such as intelligent traffic control, requires solutions able to:

- ➲ Transmit high data rates with **guaranteed quality of service (QoS).**

- ➲ **Operate successfully in highly interfered scenarios** and in the most adverse climatic conditions.

About the Technology

Albentia Systems, Spanish pioneer producer in the sector of wireless broadband, presents with his partner in Colombia **CENTRACOM**, a wireless solution for municipalities which is robust, reliable, sustainable and highly scalable, based on the use of **IEEE 802.16 technology**.

Albentia Systems equipment is designed and manufactured in Spain and meet the most demanding telecommunications regulations.

The Challenges

The project's main objective was to establish a **telecommunications infrastructure** based on Albentia Systems' IEEE 802.16 technology, **to improve traffic in Pereira by controlling traffic lights** at intersections in the city.

There were two main issues on which action was needed:

- ⟳ **Uncontrolled traffic:** at certain times of the day, or due to unforeseen events such as accidents or blocked roads, traffic in some streets was very high while others were cleared, so it was necessary to regulate traffic lights at intersections in real time, attending to the needs of each moment and each intersection.

- ⟳ **Jams:** to lighten the traffic in the most jammed streets during rush hour, it was necessary to extend the duration of green traffic lights or remotely activate "green waves" in real time to prioritize the traffic at the busiest roads each time.
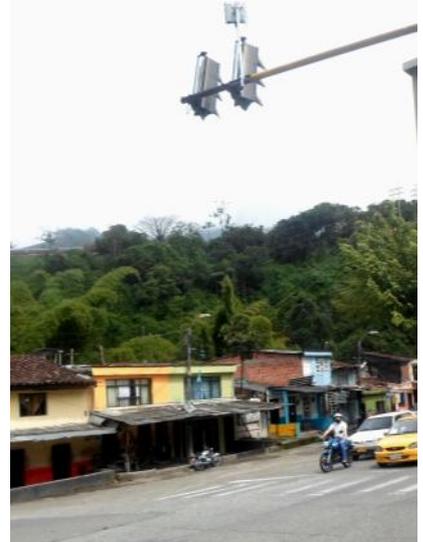
The Solution

The wireless network for traffic control is a combination of point-to-multipoint and point-to-point solutions:

- ⟳ **Three interoperable 802.16 Albentia Systems' base stations** installed in one of the main communications towers of Pereira, located on a high hill with line of sight (LOS) to every subscriber unit. Each station provides coverage to different sectors of the city.

- ⟳ **A synchronization unit** to synchronize the 3 bases and avoid co-channel interference between sectors.

- ⟳ **32 user terminals** located throughout the city, which are connected via Ethernet to the controllers. Some of them have integrated 20 dBi antennas and others 23 dBi antenna, so the longest distances are covered without trouble.

- ⟳ **Two backhaul 4.4 Km radiolinks** connecting the communications tower with the monitoring center, aimed to send to the center all data that the user terminals get from the controllers through the base stations.

- ⟳ **AMS software monitoring system** (Albentia Management System).

The **professional point-to-multipoint ARBA Pro solution** was selected because it is specially designed for professional applications like traffic control. It is a solution with extraordinary spectral efficiency, QoS and powerful security mechanisms, combined with the robustness of the equipment, making it the ideal wireless solution for scenarios that require high performance and reliability in outdoor environments with a high level of interference, as is the case of the city of Pereira.

For the backhaul system, **point-to-point ARBA Link-350 radiolinks** were used, which provide a capacity of up to 300 Mbps, low latency and 2x2 MIMO technology, making the solution suitable for applications that demand high capacity and long range.

Low Power Consumption Equipment

The wireless network by Albentia Systems complies with the project's principles of sustainability due to its low power consumption equipment:

- ⟳ Base station: <4.5 watts
- ⟳ Terminal: <4.5 watts
- ⟳ Radiolinks: <10 watts

A reduced 10 MHz channel width provides to network robustness against interference.

The Benefits

The Municipal Transit Institute of Pereira now has a wireless data network to manage and monitor the traffic light controllers network and city traffic.

Until now, the PTMI leased to a third party a fiber optic channel to perform the communications and it was a very expensive service. This problem was overcome thanks to the wireless network by Albentia Systems, which provides **high capacity** and **no recurring cost** for the Municipality.

In addition, the **easy deployment** of network enabled **significant savings in time and costs**, which would not have been possible using wired networks.

The low consumption of Albentia Systems' equipment allow to supply power to the equipments in the hill by using a UPS, ensuring **operation under power outages**, and with **a range of over 10 hours** working on batteries.

This network was specially designed for outdoor environments with high levels of interference, so it is robust, secure and guarantees quality of service (QoS) as well as 24x7 availability. This means **big savings on repairs and equipment replacement**.

Following this success story, other municipal traffic institutes are considering to replicate this project with 802.16 technology, in order to deploy networks that help recover public space and improve mobility**.**

Main Characteristics

ARBA Pro-1100 Series

- ➲ Professional OFDM wireless point-to-multipoint system
- ➲ Real capacity up to 35 Mbps
- ➲ Available in the 4.9-5.9 GHz bands
- ➲ IEEE 802.16-2012 standard solution
- ➲ Long-range coverage > 50 km
- ➲ Guaranteed throughput per terminal and differentiated service
- ➲ *True-TDMA* with layer 2 QoS
- ➲ Low latency < 5 ms
- ➲ Configuration and provisioning web interface
- ➲ AES 256 encryption and X.509 certificates
- ➲ TDD synchronization to avoid interference between sectors
- ➲ Anti-jamming mechanisms against interference
- ➲ Robust and reliable full-outdoor IP67
- ➲ Low power consumption < 4.5 W

ARBA Link- 350 Series

- ➲ PtP wireless radio links
- ➲ IEEE 802.16-2012
- ➲ Capacity up to 300 Mbps raw
- ➲ 5 GHz unlicensed bands
- ➲ 2x2 MIMO
- ➲ 60 000 packets per second
- ➲ Long distance coverage
- ➲ OFDM with adaptive modulation
- ➲ AES128 encryption
- ➲ Full-outdoor IP67
- ➲ PoE
- ➲ Low power consumption: <10 W

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Albentia Systems is the leading Spanish manufacturer of broadband wireless solutions and systems with great added value. Based in Madrid (Spain), the company uses its knowledge and experience in developing innovative radio systems for IEEE 802.16 deployments, for broadband access, data, VoIP and professional video applications.