

# ePMP 3000 Dual-Horn MU-MIMO Sector Antenna Helps Dimensione to Serve Large Number of Customers in High-Noise Environment



“I can tell you that the 60-degree dual horn may be the best decision you can make for short-distance and high-interference sites. Having the benefit of MU-MIMO is a great add-on without having to assemble a custom configuration with third-party antennas.”

“It will definitely make a difference. We saw very good isolation.”

GIUSEPPE SOCCI,  
NETWORK ADMINISTRATOR & IT  
MANAGER,  
DIMENSIONE

**DIMENSIONE**



## Overview

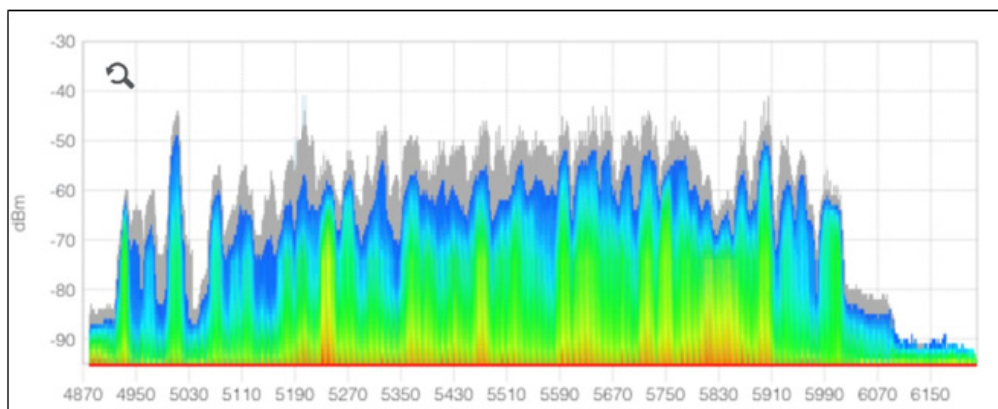
**DIMENSIONE S.R.L. IS AN ITALIAN COMPANY** that operates regularly as a wireless internet service provider (WISP) in the Molise territory and surrounding areas. They offer their quality service to individuals, companies and public administrations throughout the region.

Dimensione uses wireless technologies from industry-leading transit partners like Cambium Networks to reduce infrastructure costs and offer a cutting-edge service. On the other hand, cable technologies take longer to upgrade and cannot reach smaller municipalities.

The bandwidth requirement of Dimensione customers is growing more and more: as of May 2020, the average traffic increased 300% compared to the previous year. This led Dimensione to leverage the latest innovations, including the ePMP 3000 Dual Horn MU-MIMO Sector Antenna from Cambium Networks, to optimize and future-proof their wireless network.

## The Challenge

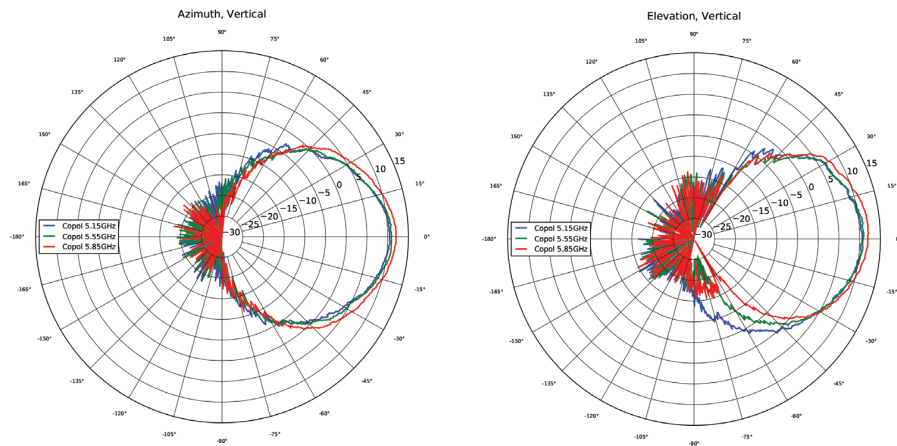
**THE BASE STATION**, located over a hill at Ferrazzano and south of Campobasso, attracts noise from the surrounding area. A spectrum scan conducted by ePMP 3000 reveals the situation as shown in the below figure.



Dimensione was unable to fulfill the increasing demand of customer traffic in such conditions. Eventually, they started looking for a point-to-multipoint (PMP) solution which attracts less noise from all sides except the intended direction. Additionally, they were exploring a solution which delivers high downlink (DL) throughput without increasing the operating channel bandwidth.

## The Solution

**DIMENSIONE DECIDED** that Cambium Networks' solution, the ePMP 3000 Dual Horn MU-MIMO Sector Antenna, would be a good choice for noisy conditions. Horn antennas have the key advantage of focusing higher gain in the main boresight while minimizing side lobes in the propagation pattern. These side lobes further reduce the generation of, and susceptibility to, noise.



*ePMP 3000 Dual-Horn Sector Antenna's symmetrical pattern with low side lobes*

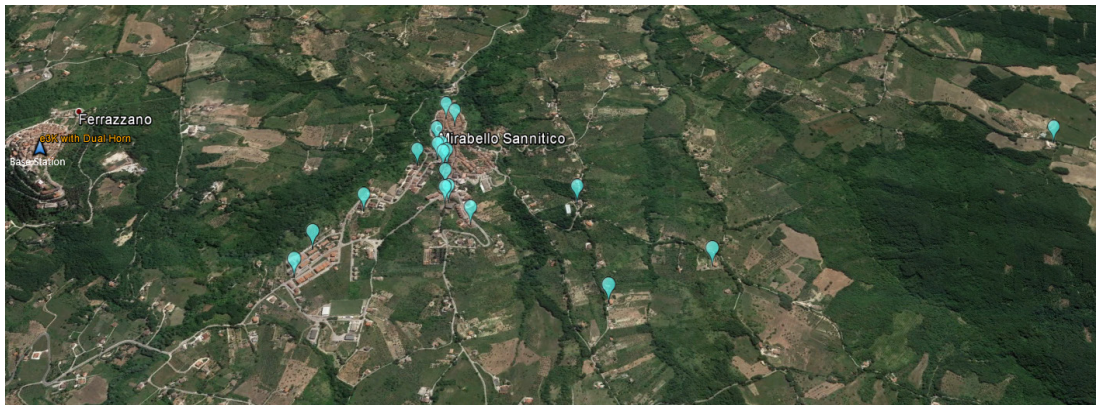
Dimensione chose to work with Cambium Networks' ePMP Force 180 and Force 300-16 subscriber modules (SM). A small form factor dual horn sector antenna makes installations easy at the base station site.



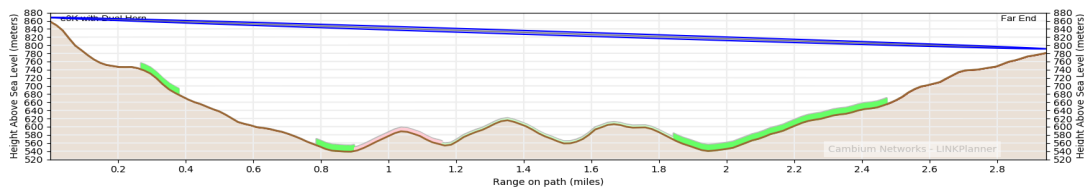
*Small form factor dual horn antenna uses less tower space*

The total subscriber base includes approximately 25 subscribers and is expected to grow in the near future. A majority of the subscribers are located within two miles of the base station. With more customers in such a short distance, Dimensione was less concerned about high antenna gain and more focused on high radio throughput in a noisy environment.

In this case, ePMP 3000's MU-MIMO feature ensures a high-throughput operation. On the other hand, low side lobes on the 4x4 dual horn 60-degree sector antenna helps to avoid noise.



*A view of the base station and customers*



*Terrain view from LINKPlanner*

Terrain was one of the other factors to be considered since the area consists of hills and a valley. Dimensione's deployment team needed to ensure that there were no nulls close to the base station so that they could connect all customers with the same mechanical tilt of the antenna at the base station.

A symmetrical beam pattern on the ePMP 3000 Dual-Horn Sector Antenna helps to address this concern.



*With the dual horn's symmetric antenna pattern, SMs closer to the base transceiver station (BTS) never face coverage issues as there are no nulls.*



*With an asymmetric pattern from the sector antenna, SMs closer to the BTS may face coverage issues due to nulls.*

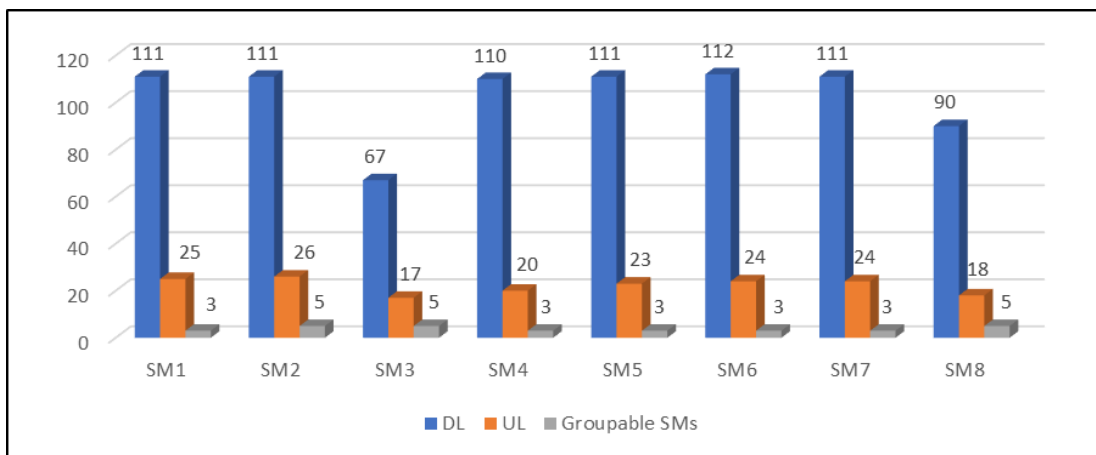
## The Results

**A NORMAL HORN ANTENNA** or a combination of two separate horns cannot consistently generate a MU-MIMO beam pattern. The ePMP Dual Horn MU-MIMO Sector Antenna's mechanics and construction were designed to precisely align the horns while the ePMP 3000 Access Point (AP) software has been optimized to match this antenna and maximize MU-MIMO performance. In the unlicensed 5 GHz spectrum, the ePMP 3000 Dual Horn Sector Antenna is unique as it is the only product in the market using MU-MIMO in a horn configuration.

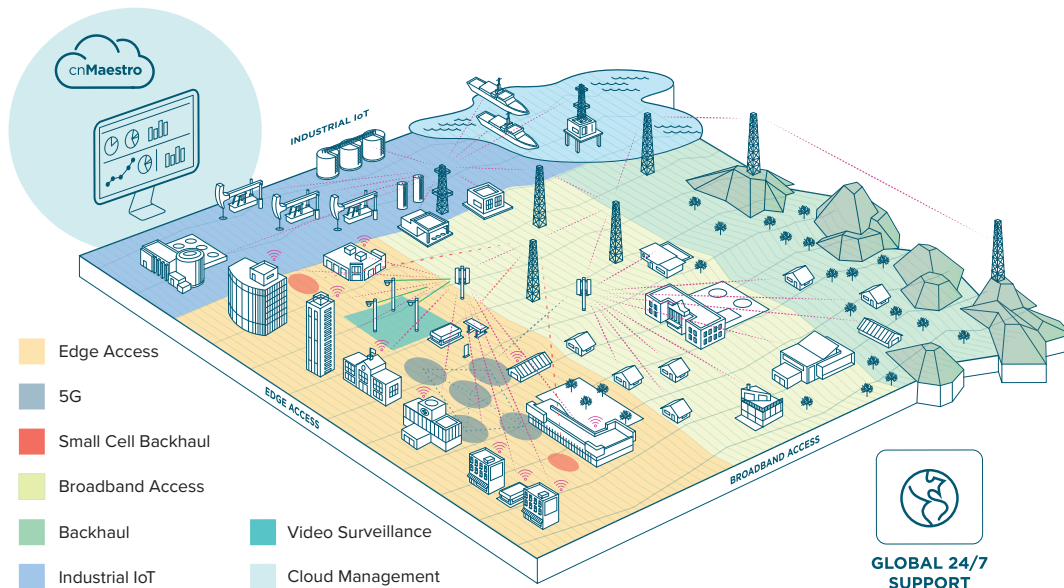
Dimensione's team tested individual SM traffic to evaluate the ePMP 3000 Dual Horn MU-MIMO Sector Antenna solution on a 20 MHz channel bandwidth. The average noise level at the base station was -50 dBm, and the time division duplex (TDD) ratio was set at 75:25. The results show that the dual horn sector can generate an average downlink traffic of **102 Mbps** and uplink (UL) traffic of **22 Mbps** per each Force 300-16 SM. SM3 was located in a high-noise environment and experienced low throughput compared to other SMs.

"We offer speeds up to 50 Mbps on wireless thanks to ePMP 3000 MU-MIMO."

Giuseppe Socci,  
Network Administrator  
& IT Manager,  
Dimensione



DL/UL throughput result in Mbps. Groupable SM count indicates the MU-MIMO characteristic of dual horn sector



Cambium Networks' Gigabit wireless solutions enable municipal, enterprise and service provider operators to tailor connectivity to meet exact requirements and grow as needs evolve.