

## COVERAGE SYSTEMS

## Rio Metro

### Powerwave Deploys CDMA 800-1XRTT in Rio de Janeiro

The Rio Metro has two lines with a total of 31 stations above ground and underground. Most heavily trafficked is metro line 1, which runs entirely underground. Each day, line 1 transports an estimated 295,000 passengers (approx 80 million per year), many of them business travelers who need seamless cellular coverage wherever they go. Telefonica Celular became the first CDMA operator in Brazil to meet this demand by providing seamless cellular coverage in a metro system environment.

#### Radiating Cable

The Rio Metro travels in several long tunnels with an average distance between stations of 830 meters; however several tunnels reach up to 1.7 km long. In most cases tunnels run separately in both directions, with more than one turn between stations. To ensure even coverage, Telefonica Celular decided to use radiating cable in all tunnels throughout the line. Each repeater fed a distributed antenna system covering the platform and access areas. Radiating cables were also installed in both directions toward preceding and next stations.

#### Worldwide Experience

With the hands-on experience and know-how as well as expertise in complex environments worldwide, Powerwave became Telefonica Celular's choice as semi-turnkey provider for the Rio Metro project. Telefonica Celular engineers provided system design, handling overall project management and installation of base stations, repeaters, antennas, fiber and cable, while Powerwave delivered the customized, system-specific equipment, as well as handling commissioning and programming.

#### Data Communications and 2.5G

Both base transceiver stations (BTS) and repeater systems were installed to support CDMA 1xRTT, now in operation in a portion of the Metro, delivering data transmission speeds of up to 144 Kbit/s.



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## Operation and Maintenance

To ensure efficient, easy-to-handle system monitoring and supervision, Powerwave installed the advanced Operation and Maintenance System (OMS) at Telefonica Celular's supervision center in Rio de Janeiro. All repeaters are remotely-accessed via a CDMA modem installed in each unit. With receiving alarms and a design for making problem solving suggestions, the OMS is always on standby and interconnected with Telefonica Celular's supervision and control software. The OMS software allows all possible parameter changes such as gain, output power, software upgrade, etc, as well as monitoring system behavior and CDMA channels in real time, using the measurement receiver (MRX) feature of Powerwave repeaters.

## Flexibility and Scalability

Not only are current requirements being met, but the system also serves as a broad base for meeting future needs. Base station master units (BMU) are in place, ready to handle any increase in the amount of operators and/or implementation of a new system with new BTS's in other frequencies. Also, Powerwave's fiber optic repeaters (FOR) are designed for upgrading to additional channels, or to a different system with the help of easy-to-use upgrade kits. Fiber backbone, cable, and radiating cable network support and facilitate capacity growth and/or implementation of other systems in other frequencies.



## Powerwave's Coverage System

**Innovations Team** is a team of RF and system engineers within Powerwave who manage, or assist you in, your projects for cellular coverage worldwide.

Increasing complexity of wireless systems today combines with regulatory restrictions and a variety of practical considerations to demand comprehensive experience and knowhow for cost-efficient cellular coverage solutions. Based on Powerwave's outstanding track record of customer projects completed, and on our extensive experience and know-how in quality wireless communications, Powerwave offers novel solutions that are carefully tailored to your specific needs.

## About Powerwave Technologies

A global leader in end-to-end wireless coverage and capacity solutions, Powerwave Technologies, Inc. offers cutting edge wireless infrastructure to address the demands of enterprise and commercial customers. Powerwave offers a comprehensive suite of solutions, including Antennas, Base Station Solutions and Coverage Solutions. Powerwave's product line supports all wireless network protocols and frequencies including Next Generation Networks in 4G technology such as WiMAX™ and LTE®. Powerwave solutions, products and services also help wireless operators and OEMs reduce capital and operating expenses, speed rollout of services, improve coverage and capacity, and reduce environmental impact. For more information, visit us at [www.powerwave.com](http://www.powerwave.com).



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