



SEISMIC MONITORING CASE STUDY

Institute of Geophysics of Ecuador

Wireless M2M Communication Solutions Provide Seismic and Volcanic Monitoring for Early Eruption Warning in Ecuador

Quito, Ecuador – The Instituto Geofísico [Institute of Geophysics of Ecuador] has been responsible for seismic and volcanic monitoring throughout the country since 1983. Early warning of volcanic eruption is essential so that authorities and citizens have enough time to take the appropriate precautionary measures. Therefore, the Institute's mission is to improve disaster preparedness and lessen the impact of seismic and volcanic phenomena throughout Ecuador via constant monitoring, scientific research and technology that promotes the creation of a precautionary culture. Thanks to the Red Nacional de Sismógrafos [National Seismograph Network] and the Red de Observatorios Volcánicos [National Volcano Observatories], the Institute is able to issue early warnings based on risk maps produced by scientists. The dedication to seismic and volcanic monitoring helped warn hundreds of thousands of people early, got them out of harm's way and saved countless lives in the eruptions of the Tungurahua Volcano in July and August 2006, December 2008 and December 2010.

FreeWave Usage and Applications

Given the problem of implementing an affordable, real-time telemetry system that is simple and sturdy, new options were considered, and, for the first time, an international organization installed

FreeWave Technologies' serial radio solutions to transmit data of the deformation of the Cotopaxi Volcano and the Galapagos Islands. Although the mechanics, features, advantages and cost of these M2M solutions were not known at the time, very good results were obtained, reducing maintenance of monitoring stations to zero. Later, one of the institute's engineers set up a photographic camera with serial data transmission using FreeWave for the Reventador Volcano. Currently, the Institute has added FreeWave M2M communication solutions to many of its monitoring networks and used them in various monitoring applications and implementation activities. Among the primary monitoring applications are: real-time broadband seismic stations in the active volcanoes and tectonic faults, accelerometers located in the cities, meteorological stations, stations to monitor volcanic gases, deformation stations using GPS technology and borehole sensors, remote digital cameras, and stations to quantify mud flow.

Outcomes

Over the past six years, the work with FreeWave's M2M communications solutions has met the Institute's expectations in many regards. Connections at different distances have proven them highly reliable and stable. Performance in extreme conditions has met its needs, as evidenced by a FreeWave M2M device that transmits images from the top of the

highest active volcano in the world, which operates at below zero degree temperatures from a height of 5,947 meters above sea level. For this application, a camera network was installed in the Tungurahua volcano for visualizing the volcano from four critical zones in real time.

The performance and flexibility of FreeWave M2M communication solutions allowed engineers at the Institute to continue to consider this transmission equipment as the best option for different applications and projects already underway. Additionally, the cost/benefit ratio was excellent for the job and budget. The M2M solutions play an important role in the big responsibility that the Institute has with the community in Ecuador for warning those at risk.

HIGHLIGHTS

- > Cost-effective, real-time data transmission enabled by FreeWave's serial M2M communication solution.
- > Institute of Geophysics of Ecuador is able to issue early volcano warnings that helped hundreds of thousands of people get out of harm's way.
- > Real-time broadband seismic stations in the active volcanoes and tectonic faults.
- > Highly reliable performance in extreme conditions, with images being transmitted from the top of the highest active volcano in the world, which operates at zero-degree temperatures.



CONTACT US

5395 Pearl Parkway, Boulder, CO 80301
TF 866.923.6168 T 303.381.9200
For more information, visit www.freewave.com