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WiFi data transmission system for monitoring volcanic areas: an example application on Mt. Vesuvius

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The Seismic Monitoring Network of Mt.Vesuvius, managed by Istituto Nazionale di Geofisica e Vulcanologia, sezione di Napoli, Osservatorio Vesuviano (INGV-OV), currently consists of 13 analog short period stations (9 single component and 4 triaxial), 2 digital broadband stations and a permanent seismic array (composed of 16 triaxial sensors). Moreover 2 dilatometers are installed in the area, that are integrated in the seismic monitoring system.

The distance among the station and between each station and the data acquisition center varies from hundreds of meters to some kilometers. Part of the data is collected in local Data Acquisition Centers (CAD) and then centralized at the Monitoring Center of INGV-OV.
In recent years, information technology has become fundamental in seismic networks and geophysical instrumentation, this includes also the data transmission systems. In this context, the new standards for wireless networks has proved to be a useful tool for the transmission of geophysical data. This is the reason why we have chosen to adopt the Wireless Fidelity transmission system, based on available frequencies typical of the IEEE 802.11h standard, which allows high capacity data traffic.

We have realized different local area networks based on WiFi technology. They can offer a coverage to high density traffic with extensions varying from a few dozen of meters to kilometers. Each network can be connected through a concentrator device, called access points, and a base station, through a high-capacity system of geographic

connectivity, which will be responsible for the liaison to the Monitoring Center of INGV-OV, where seismic data are centralized. There the data are acquired and analyzed by automated systems, that produces parametric information in real time.

The architecture of local networks and the backbone for data transmission has been designed to allow a modular development that is well suited for the needs of continuous improvement of the network and the introduction of new systems for geophysical and geochemical volcano monitoring. Currently the infrastructure manages a total of 79 channels with a 24-bit at 100 cps sampling, but the network has a much greater potential. So the future transition of the seismic network from analog to a fully digital equipment will be supported by this data transmission system.