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# The Self-Organising Seismic Early Warning Information Network

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The Self-Organizing Seismic Early Warning Information Network (SOSEWIN) represents a new approach for Earthquake Early Warning Systems (EEWS), consisting in taking advantage of novel wireless communications technologies. It also sets out to overcome problems of insufficient node density, which typically affects present existing early warning systems, by having the SOSEWIN seismological sensing units being comprised of low-cost components (generally bought "off-the-shelf"), with each unit initially costing 100's of Euros, in contrast to 1,000's to 10,000's for standard seismological stations. The reduced sensitivity of the new sensing units arising from the use of lower-cost components will be compensated by the network's density, which in the future is expected to number 100's to 1000's over areas served currently by the order of 10's of standard stations. The robustness, independence of infrastructure, spontaneous extensibility and a self-healing/self-organizing character in the event of failing sensors during an earthquake makes SOSEWIN particularly useful for urban areas. Moreover, in the post-event time frame, negligible assumptions or interpolations would be necessary for assessing the strong ground shaking and earthquake intensities.
In SOSEWIN, the ground motion is continuously monitored by conventional accelerometers (3-component) and geophones and analyzed using robust signal analysis methods by each sensing node of the network. The incoming signals are pre-processed by bandpass filtering and the detection processing is performed using an automatic STA/LTA trigger algorithm. Signal attributes are iteratively estimated from the P-wave part of the recordings (e.g. PGA, PGV, PGD, Arias Intensity and Cumulative Absolute Velocity) to determine if the earthquake is of sufficient magnitude to be of concern to issue a system alarm.
Differently from most existing EEWS where the alarming system relies on estimates provided by only a few seismic stations, the SOSEWIN is specifically designed to take advantage during the "event detection" and "appropriate issuing of alarms" stages of a redundancy of available real-time ground motion information, thanks to the dense wireless mesh network. All of these strategies are devoted to minimizing the occurrence of false alarms while maximizing the early warning or lead time. The early warning performance of SOSEWIN in terms of its combination of seismological software, hierarchical alarming protocol and routing protocol are currently being tested by simulations.
The first deployment of the SOSEWIN was carried out in June 2008, with a network of 20 stations installed in the Ataköy district of Istanbul, Turkey. We present here a report of the first months of the associated activities, together with what the field experiences have taught us in terms of wireless communication for early warning purposes.