

Self-Organizing Seismic Early Warning Information Network (SOSEWIN)

Applications in Atakoy District and Fatih Sultan Mehmet Bridge

Can Zulfikar, Nafiz Kafadar, Mustafa Erdik and SAFER, EDIM Working Groups

Abstract

This paper addresses a new approach of seismic early warning and engineering application system using low-cost sensors and wireless technology termed as Self-Organizing Seismic Early Warning Information Network (SOSEWIN). The system has been developed within EDIM (Earthquake Disaster Information System for the Marmara Region) and SAFER (Seismic Early Warning for Europe) projects. The system has been firstly installed into the Fatih Sultan Mehmet Bridge for ambient vibration testing and it has been installed in Atakoy district of Istanbul for early warning testing purpose.

Some of the major features of the system are as follows:

- Each seismological sensing unit or sensing node (SN) is made of low-cost components, with each unit initially costing several hundred euros, in contrast to thousands to tens of thousands for standard seismological stations.
- Each SN undertakes its own, onsite seismological data processing, preliminary analysis, archiving, and communication of data as well as early warning messages.
- The reduced sensitivity of the SNs compared to standard instruments (due to the use of lower-cost components) will be compensated for by the network's density, which in the future is expected to number hundreds to thousands of units over areas served currently by the order of tens of standard stations.
- SOSEWIN will be a decentralized, self-organizing wireless mesh network (WMN).
- Its self-organizing capability will allow it to adapt continuously to changing circumstances, *e.g.*, the addition/ removal/malfunctioning of nodes,
- Instruments will also be purchasable by the public. Thus, SOSEWIN also be able to integrate additional data from private persons.
- For rapid response purposes during the post-event period, the much higher instrumental density of SOSEWIN means tools such as ShakeMap can rely more on real data and less on interpolation schemes.