Home Seismometer Spread Plan

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We have developed an automatic system of analyzing seismic waves for earthquake early warning (EEW) in Japan. Our system can determine accurate hypocenters for about 99 % of the recorded events and we recently introduced a new parameter for the accurate and rapid estimation of shaking intensity. Because of the limitations of relatively long distances between stations and about 1.5 sec of time-delay in the Hi-net telemetry, our automatic system can not issue an EEW to areas within ~30 km distance of the earthquake's hypocenter. We would need ~10 times the number of stations in order to issue an EEW in areas near focal areas; however, this would be cost prohibitive to government agencies.

The practical service of EEW will be started this year and millions of people may install the receiving unit of EEW. The receiving unit is connected to internet and since this unit is equipped with a CPU and memory, the extra addition of cheap seismometer and A/D converter would transform the receiver into a real-time seismic observatory, which we are calling a home seismometer; these additions cost only two or three thousands yen. The installation of the home seismometer can produce alerts at the time of the occurrence of a large local earthquake by using locally observed data. Also, we can estimate a value of the amplification factor in the sedimentary layers, which is used for the site correction of shaking intensity by a comparison between the waveform data from the home seismometer and those by closely located Hi-net or K-NET stations. This amplification factor will be available as the safety index of houses or buildings at a time of large earthquake occurrence, since a house or building located on a site with large seismic amplification can be damaged more seriously than those with small amplification factors. Therefore the addition of a seismometer will produce valuable information to customers. The installation of home seismometers will create an extremely dense seismic network that is without precedence. This network can will developed into an automated system that collects several kinds of observed shaking parameters from all home seismometer stations, calculates earthquake parameters immediately, and then sends back computed results together with observed data in order to provide an extremely accurate estimate of the shaking level at each house or building.