

Broadband network on-line data acquisition system with web based interface for control and basic analysis

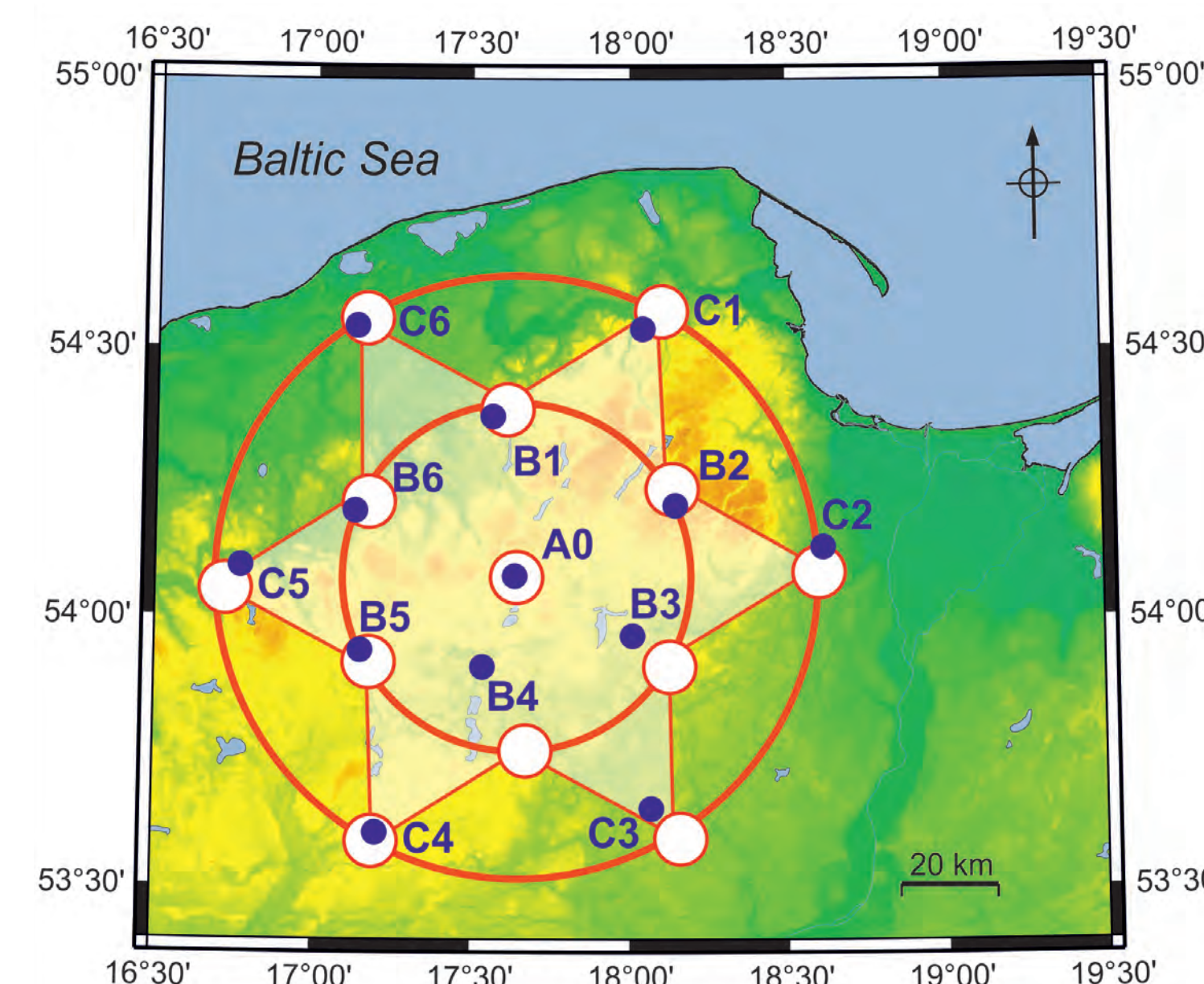
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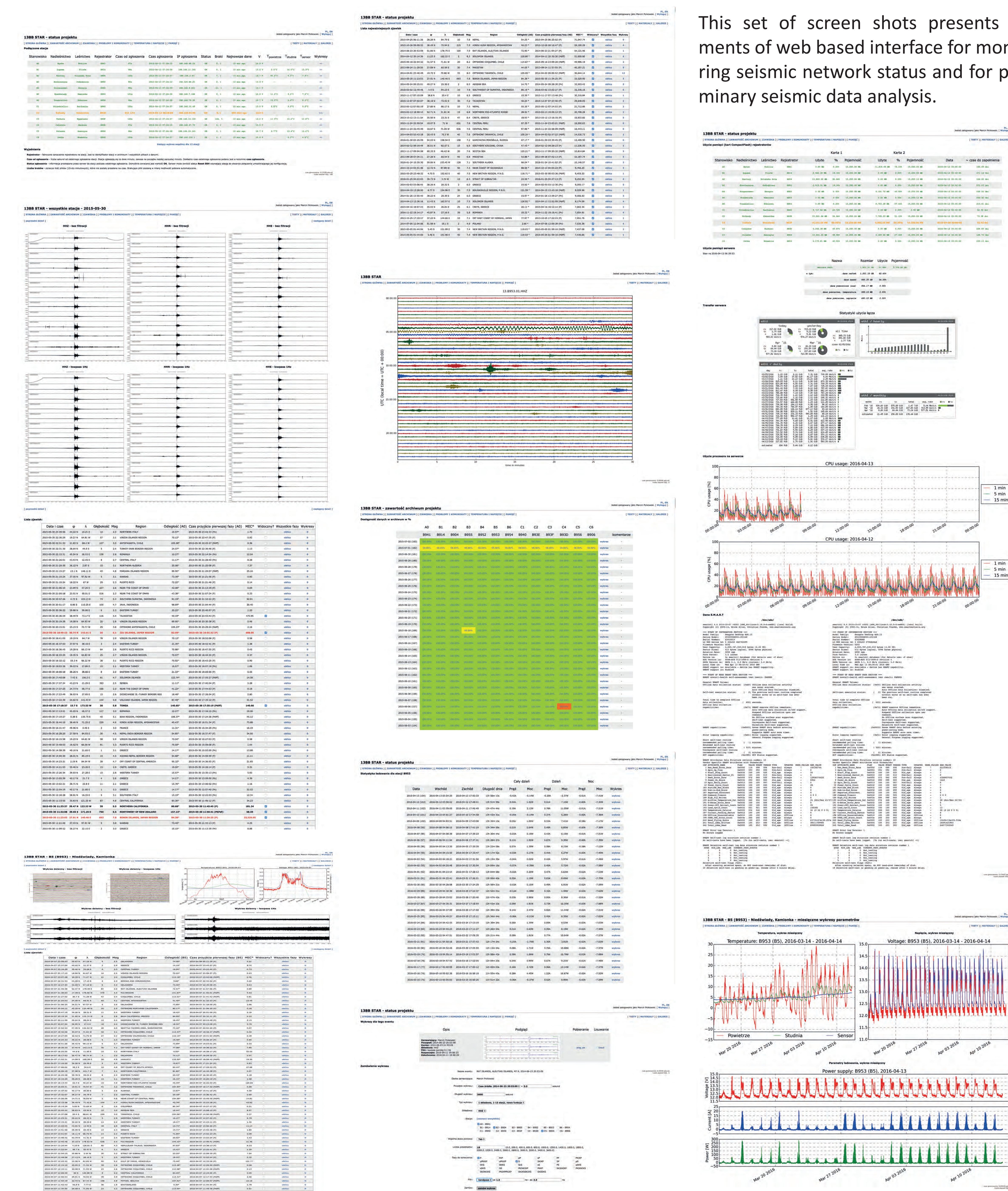
Abstract

Passive seismic experiment "13BB Star" is operated since mid 2013 in northern Poland and consists of 13 broadband seismic stations. One of the elements of this experiment is dedicated on-line data acquisition system comprised of both client (station) side and server side modules with web based interface that allows monitoring of network status and provides tools for preliminary data analysis. Station side is controlled by ARM Linux board that is programmed to maintain 3G/EDGE internet connection, receive data from digitizer, send data do central server among with additional auxiliary parameters like temperatures, voltages and electric current measurements. Station side is controlled by set of easy to install PHP scripts. Data is transmitted secu-

rely over SSH protocol to central server. Central server is a dedicated Linux based machine. Its duty is receiving and processing all data from all stations including auxiliary parameters. Server side software is written in PHP and Python. Additionally, it allows remote station configuration and provides web based interface for user friendly interaction. All collected data can be displayed for each day and station. It also allows manual creation of event oriented plots with different filtering abilities and provides numerous status and statistic information. Our solution is very flexible and easy to modify. In this presentation we would like to share our solution and experience. National Science Centre Poland provided financial support for this work via NCN grant DEC-2011/02/A/ST10/00284.

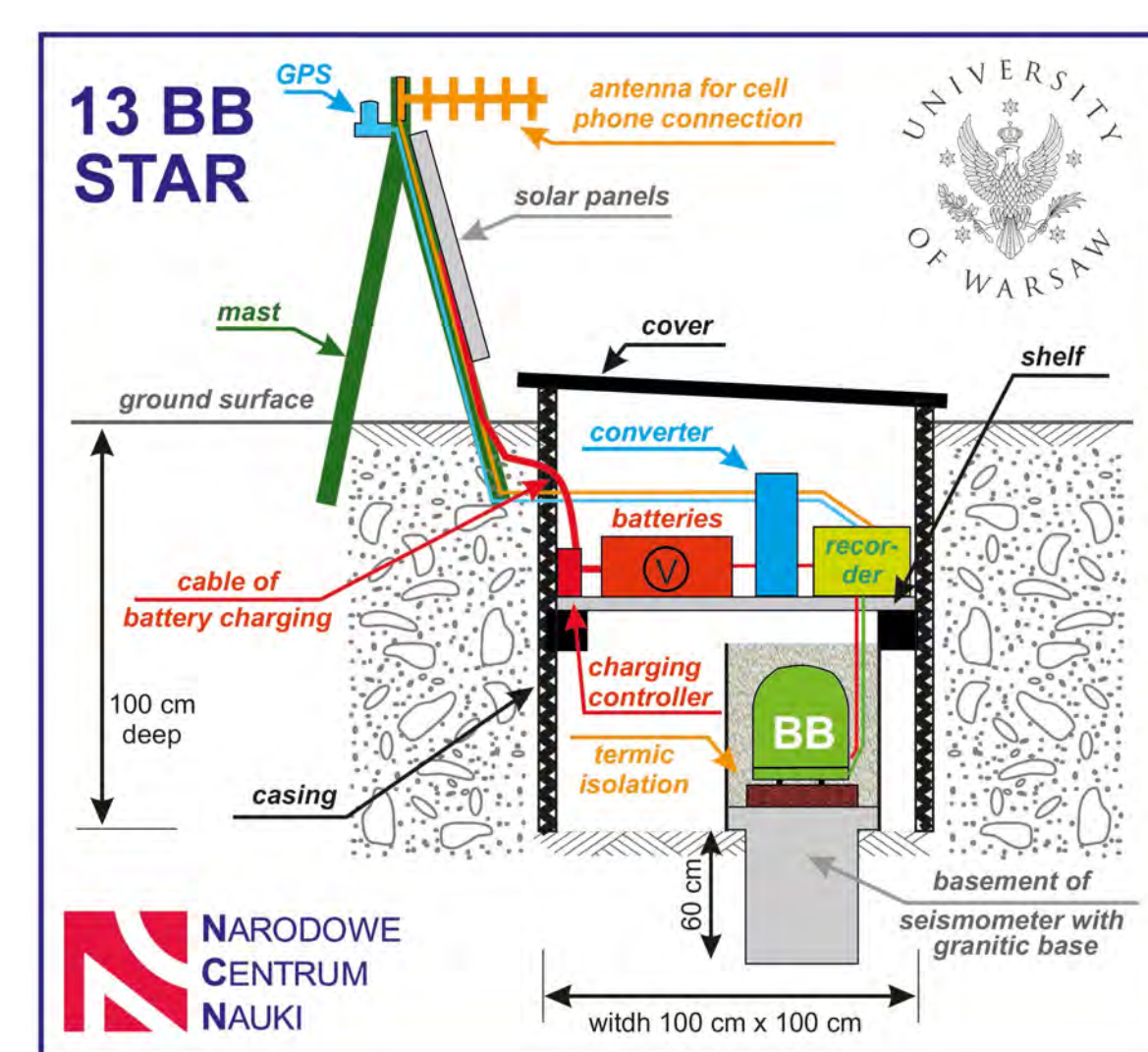


Web based interface



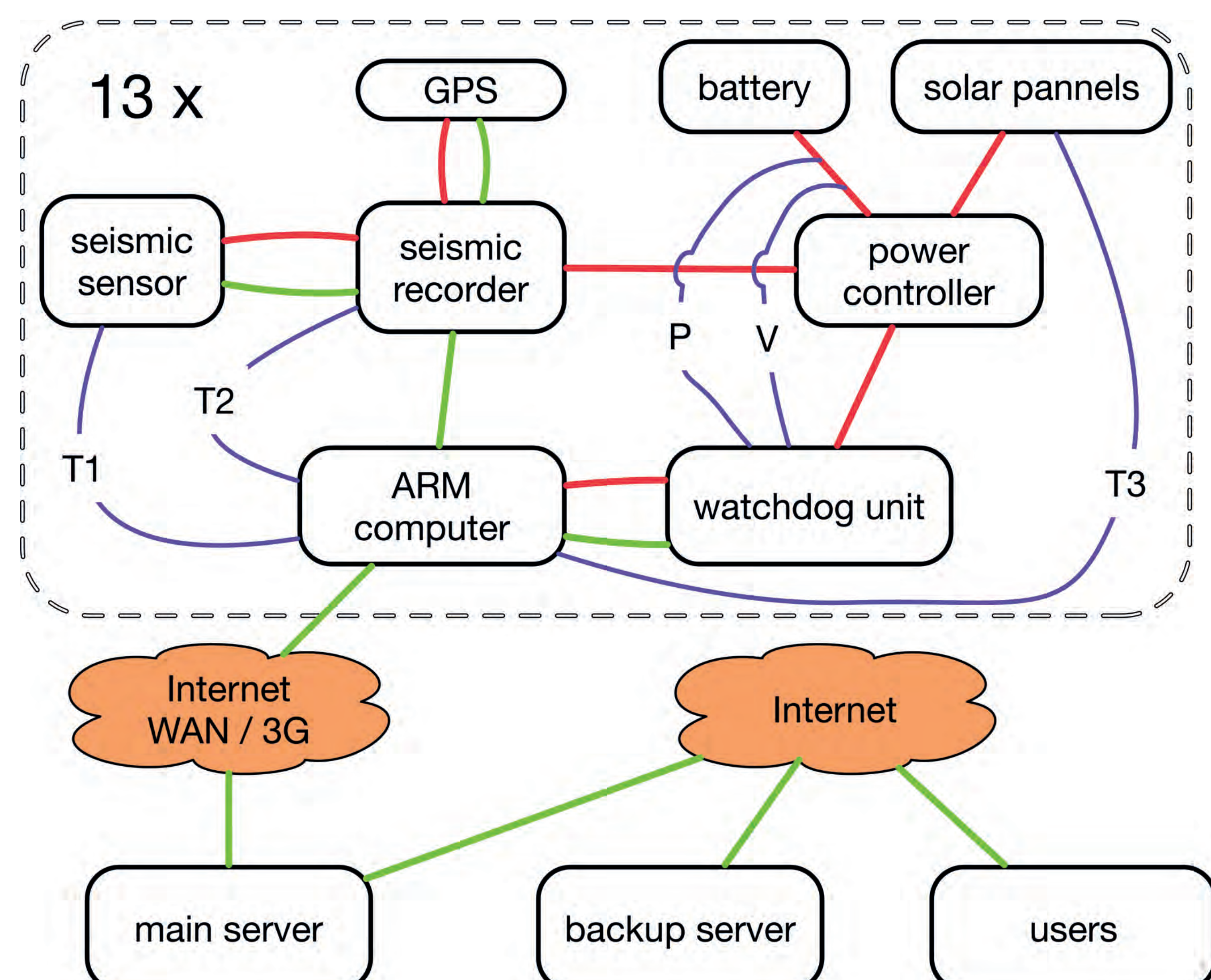
Stations

Each station is equipped with ARM based Linux computer with USB 3G dongle for internet connection. This unit is powered via hardware WatchDog for for better failure recovery. Seismic data from the recorder is fetched every 15 minutes using local network and FTP function of the recorder and send to the central server. Additionally, computer is programmed to gather data from temperature and voltage sensors.



Communication

Data files collected from the recorder are transferred to the central server over SSH using RSYNC. This kind of transfer is fast, secure, and allows resuming broken transfer – this is important when connection quality is poor due to location or weather conditions. For security reasons, stations use dynamic IP protected by operator's firewall. Every two minutes station connects to server, sends temperatures and voltages, and requests status over http. At this point server may request opening of SSH tunnel that allows remote login to arm board and direct control of seismic recorder. Additionally, station asks server if there are any missing files that should be downloaded from the recorder and sent to the server. Data form temperature and voltage sensors is collected every minute and sent to the server every hour.



Server

Central server collects data from all stations and performs basing processing: integrity checking, converting to mseed format, monitoring for missing data and its recovery, replicating (backup) to alternative location. Additionally, servers run web based application for basic seismic network monitoring and preliminary analysis. For security and reliability server is located in professional datacenter.

