The status of the new set of seismic sensors at VIRGO

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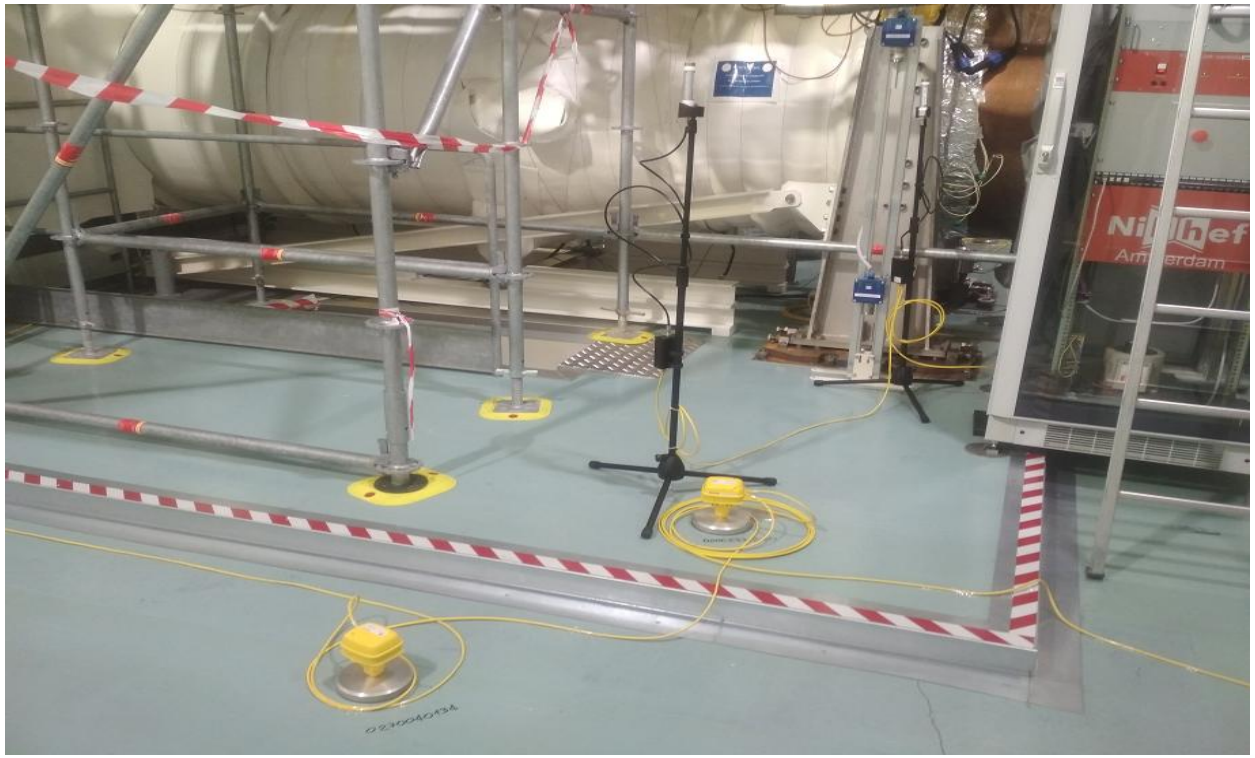
Current status of seismic sensors at VIRGO

Installed sensors in **NEB, WEB, CEB** buildings:

- CEB 85 (55 seismics + 30 infrasounds)
- NEB 38 (30 seismics + 8 infrasounds)
- WEB 56 (30 seismics + 26 infrasounds)

Total 179 seismic (115) and infrasound (64) sensors

Also more than a dozen more are planned to be added



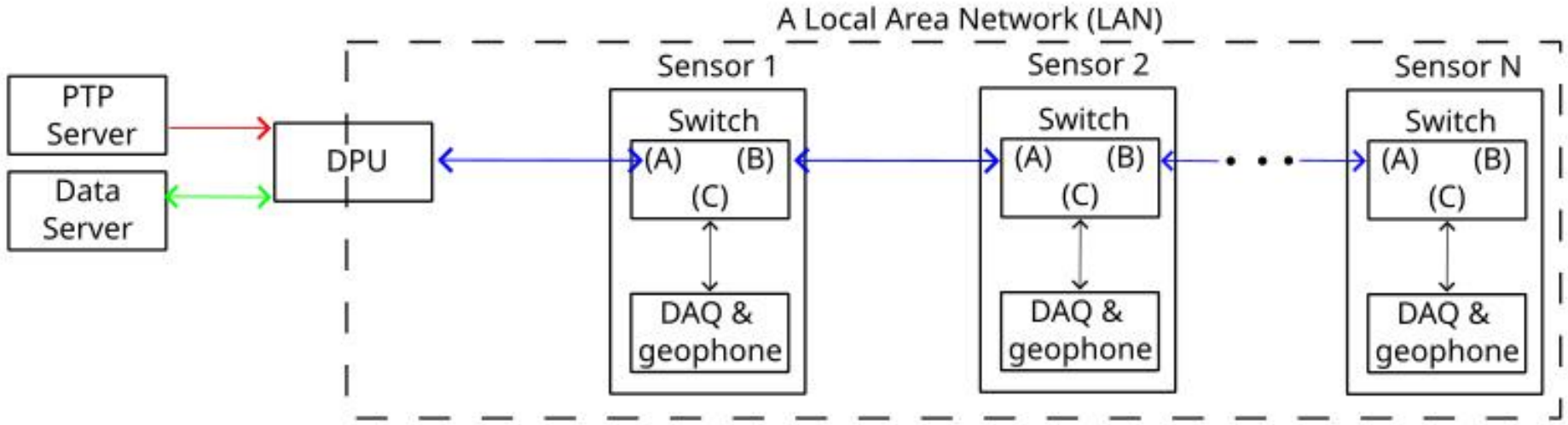
Second generation of seismic sensors

System unification:

- communication, ethernet standard
- synchronisation, PTP protocol
- power supply, PoE++ standard

Replacement of 4.5 Hz geophone with 2.0 Hz **(**wider measurement range)

- higher geophone sensitivity from approx. 174 mV/cms/s to 2 V/m/s



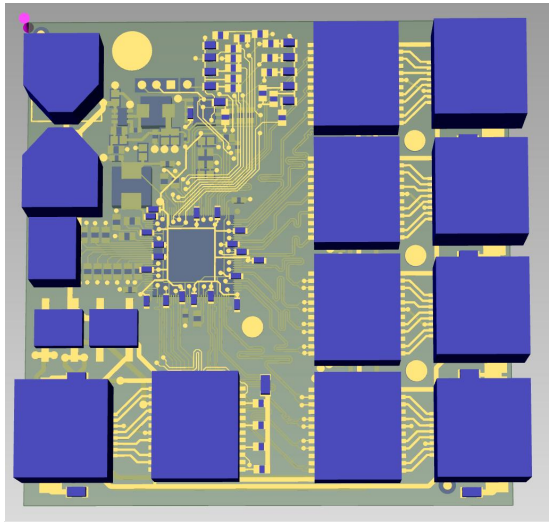
Second-Generation Sensor Network – Assumptions

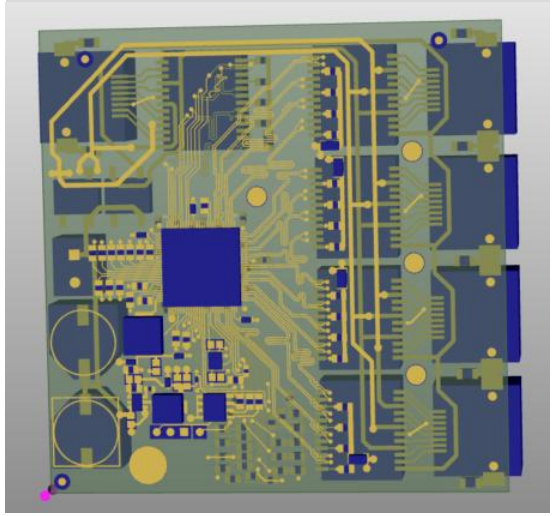
- Ethernet communication (1 Gb/s)
- Data acquisition system synchronization via Ethernet
  - No dedicated 1 PPS signal distribution
  - Synchronization based on PTP (Precision Time Protocol)
- Serial sensor interfaces
  - Reduced number of connections
  - Simplified system architecture
- Standardized power supply
  - PoE++ (power and data over a single Ethernet cable)

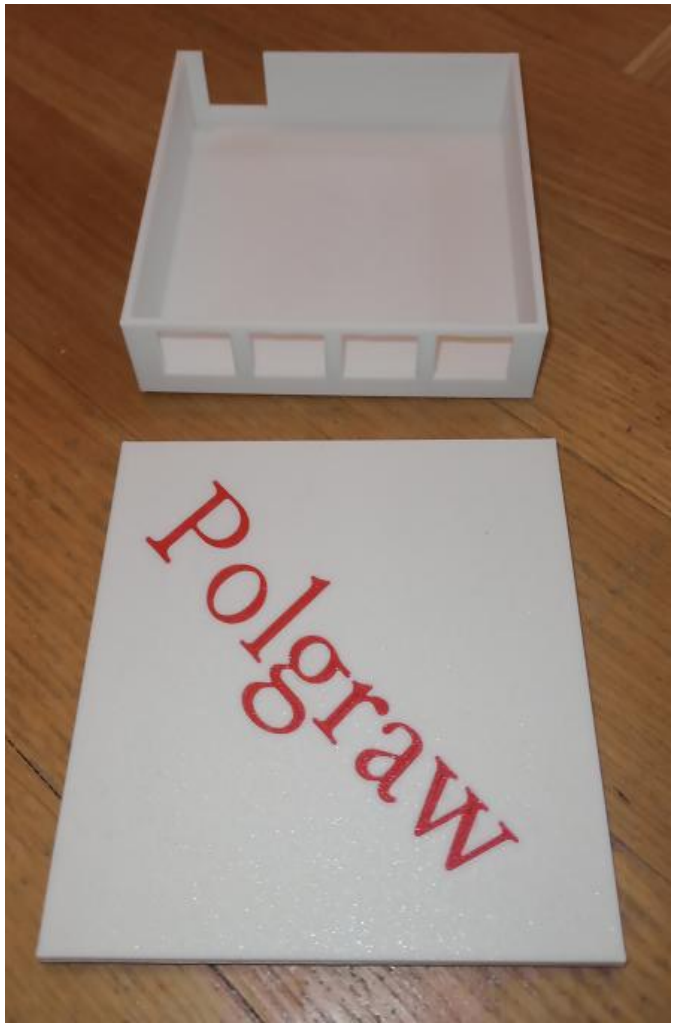
Switch connecting sensors

Ethernet switch:

- 1 GB ethernet
- support PoE++
- power distribution by PoE++



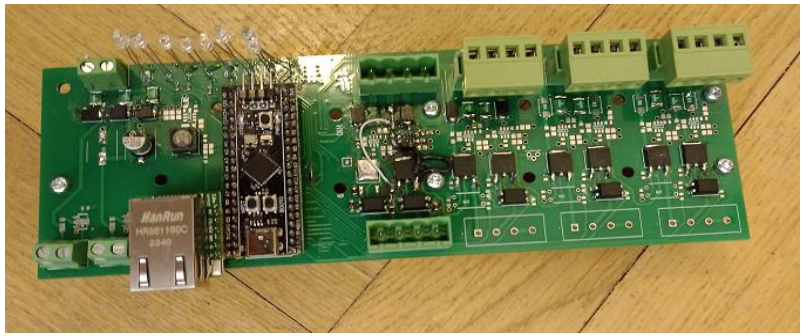


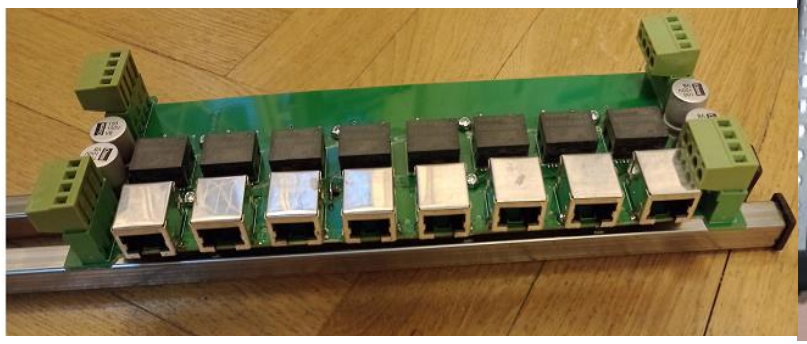


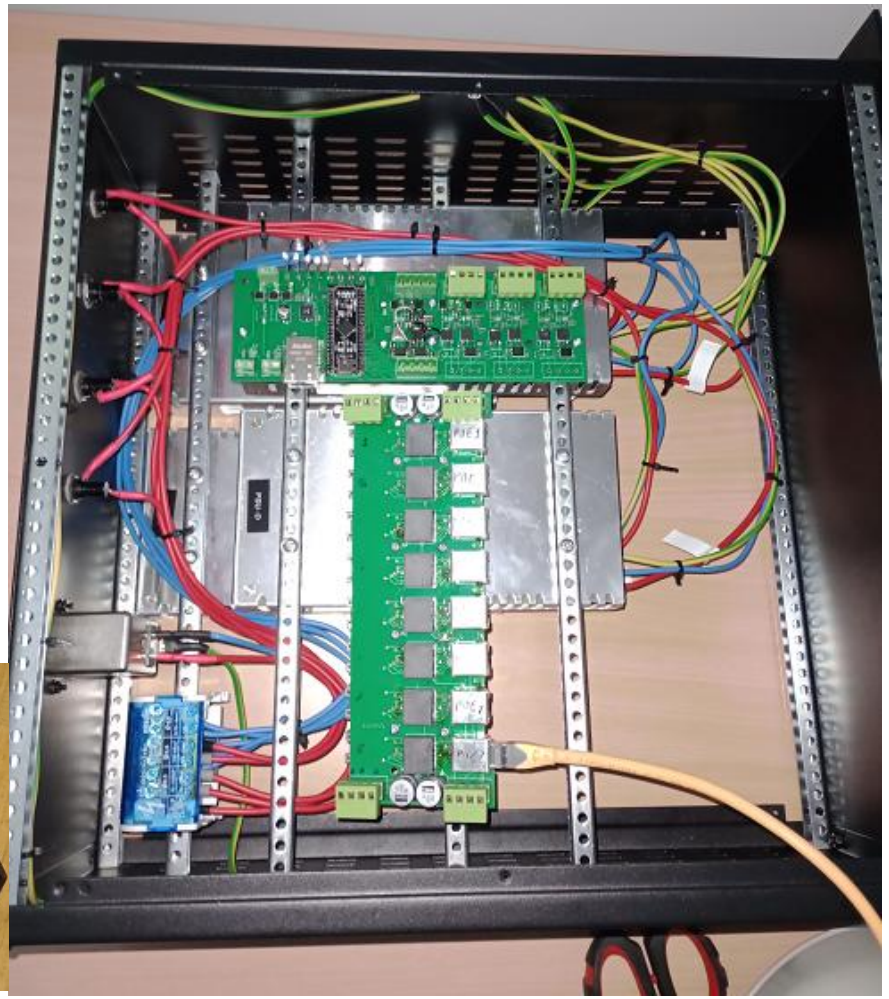
DPU Data Processing Unit

A single DPU consists of:

- 19" enclosure
- power supplies, 4x 200 W 48 V
- PoE++ controller - designed
- PoE++ driver - designed



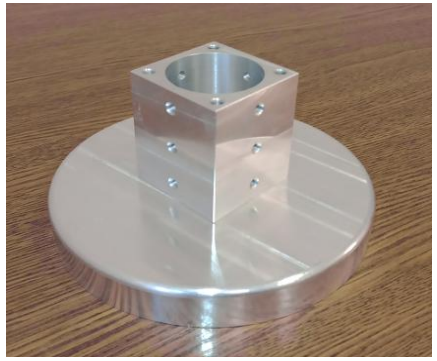




Seismic sensors

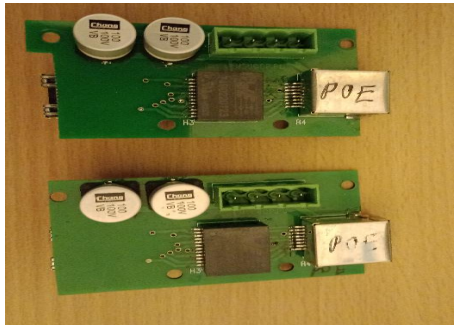
The single seismic sensor consists of:

- a geophone sensor - bought
- mechanical components for its construction - designed and bought
- and an ethernet data acquisition system - designed, production pricing ...



DPU Data Processing Unit - tests

- We have assembled 5x DPU
- single ethernet PoE++ testers



- power supply load tester (200 W)

single switch 65 Ω (48 V, 33.3 W)

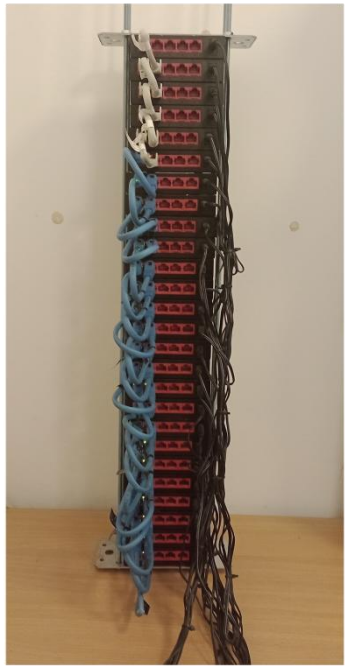
Cable length 20 m, load 200 W, 48 V

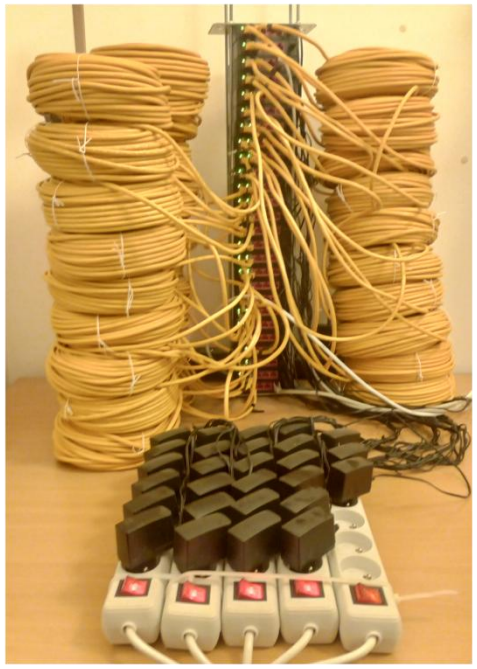
cable cat., voltage drop across the cable

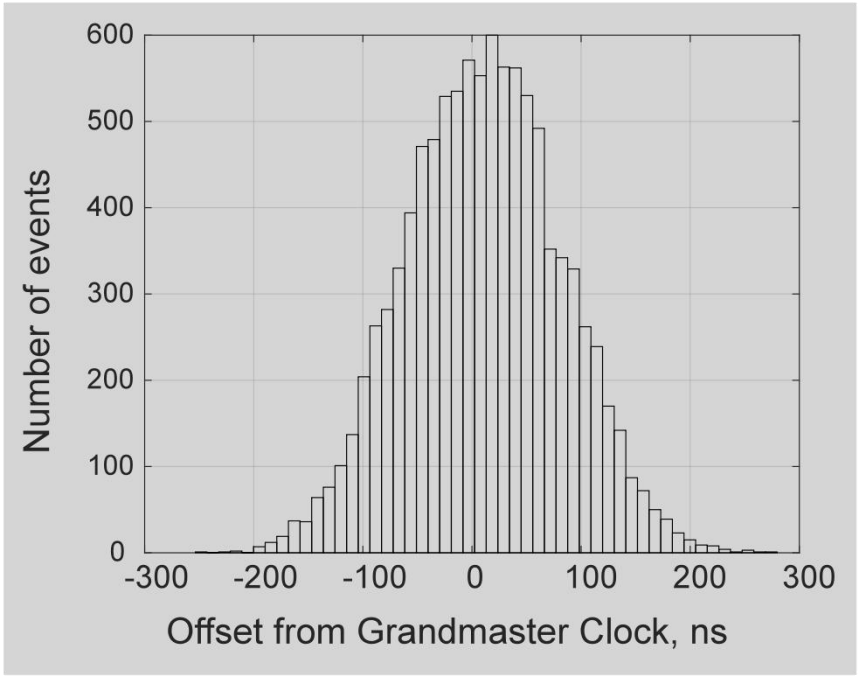
- cat. 5e 8 V
- cat. 6 8 V
- **cat. 6a 4 V**

Clock Synchronization Test

- Tests conducted over more than 20 chained switches
- demonstrated synchronization stability sufficient for coherent data acquisition
- software synchronization offset from - 200 ns to +200 ns







Thank you for your attention

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