
Contribution ID: **61** Type: **poster**

# Time Synchronization for Environmental Sensor Networks in the Einstein Telescope Using PTP

The Einstein Telescope (ET), as a next-generation underground gravitational wave observatory, requires a comprehensive environmental monitoring system to achieve its ambitious sensitivity goals. Dense arrays of seismic and infrasound sensors must operate continuously to track local and global disturbances and to support advanced noise mitigation strategies. Given the large number of sensors and their distributed deployment, precise time synchronization of data streams is a fundamental prerequisite for reliable noise subtraction from the detector signals.

This work discusses the application of the Precision Time Protocol (PTP, IEEE 1588) as a synchronization mechanism for data acquisition in environmental sensor networks. In contrast to conventional solutions based on distributing dedicated timing pulses to each sensor—an approach that may introduce additional electromagnetic interference—we propose a method in which synchronization is embedded within the same network infrastructure used for data transmission. We present results from prototype sensor network implementations where each sensor node acts simultaneously as a switch and a data acquisition unit. This architecture enables sensors to be connected in series, forming an extensive, powered network that guarantees synchronous signal sampling across the array.

**Author:** SUCHENEK, Mariusz

**Presenter:** SUCHENEK, Mariusz

**Session Classification:** Poster Session

**Track Classification:** ISB: ISB - Other