

The CENSUS Ground Station as a Node in NanosatGRID: Enabling an Open-Source Network for Two-Way Satellite Communications

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The CENSUS pole (Centre for Nanosatellites in Sciences of the UniverSe) has integrated its ground station (GS) into the SatNOGS Network, enabling more than 10000 satellite observations. To facilitate deployment and maintenance of the station, the SatNOGS client has been containerized using Docker, and an automatic installer has been developed to allow full remote setup of the software stack, exploiting two custom Docker images.

The next development of the ground station involves enabling transmission capabilities, transitioning the station from receive-only mode to full duplex operation. This enhancement is essential to support two-way communication with satellites and future mission operations, and it will involve a dedicated and customized software chain, exploiting GPredict, GQRX and GNU Radio. The available laboratory radio hardware will be used to setup a full closed communication loop, allowing to test and validate the GS hardware and software setup.

These efforts serve as a foundation for the NanosatGRID project, which aims to interconnect multiple ground stations into an open-source network for coordinated satellite operations, in which assets will be shared for both reception and transmission. The proposed architecture introduces a scheduling and management orchestrator, alongside a centralized controller responsible for establishing data links between nodes of the network, and enabling remote telecommand transmission. The design takes inspiration from the open-source SatNOGS ecosystem and aims to remain compatible with it (for reception), allowing integration with existing infrastructure while extending its capabilities to full duplex communication.

The presentation will provide an overview of the current setup, the steps being taken to enable transmission, and the role of these developments in the broader context of open, scalable ground segment infrastructure.

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