

Information about the BIOSAT satellite network

BioSat is a 3U CubeSat (approx. $10 \times 10 \times 34$ cm, ~4 kg) developed by Orbit NTNU, a student organisation at the Norwegian University of Science and Technology (NTNU) in Trondheim. The mission is educational and non-commercial: the satellite carries an in-house developed life-support system for a biological experiment and an experimental software-defined radio payload. The mission is planned for launch in 2027 on a SpaceX rideshare flight (via Exolaunch) into a sun-synchronous orbit at 500 - 600 km altitude (nominal 550 km, inclination $\approx 97.6^\circ$). The intended operational lifetime is up to 5 years; the satellite has no propulsion and will re-enter passively through atmospheric drag.

The BIOSAT space station (SS) and its ground station (GS) will operate with the following frequencies:

Direction	Frequency	Service
GS $\rightarrow$ SS (uplink)	Assigned frequency: 2032.5 MHz Necessary bandwidth: 246.6 kHz (2032.3767–2032.6233 MHz) Modulation: GMSK Max Doppler shift: ± 52 kHz	Space research (Earth-to-space). Telecommand (TT&C).
SS $\rightarrow$ GS (downlink)	Assigned frequency: 2215.0 MHz Necessary bandwidth: 667 kHz (2214.6663–2215.3337 MHz) Modulation: GMSK Max Doppler shift: ± 56 kHz	Space research (space-to-Earth). Telemetry and payload data.

Transmissions between the satellite and Earth will primarily use the NTNU ground station at Gløshaugen, Trondheim (latitude 63.417832° N, longitude 10.401832° E): a 2.4 m parabolic dish (transmit EIRP 36 dBW, receive G/T 9 dB/K), shared with the NTNU SmallSat Lab HYPSON missions. Use of a KSAT ground station at Svalbard as a supplementary station is under consideration. The satellite transmits only when commanded during passes over its ground station; the S-band transmitter is otherwise inactive.

The satellite EIRP is up to 6 dBW. The space station receiving noise temperature is 290 K; the earth station receiving system noise temperature is approximately 200 K. Antenna characteristics are captured in the accompanying SNS and GIMS databases (satellite beams: ITU reference pattern APSND_499; earth station: Rec. ITU-R S.465-5).

Note on the validation report: the warning regarding minimum operating height below perigee is intentional, the spacecraft has no station-keeping capability and will decay naturally, in line with debris-mitigation practice for CubeSats.

For further information, direct contact may be established with the operator of BIOSAT, Orbit NTNU (org. nr. 999 171 583).

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