

## **Preliminary Results for the NTNU Test Satellite CubeSat Bus**

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NTNU is currently engaged in the CubeSat project NUTS (NTNU Test Satellite). The electronics of most CubeSats are still being built around a ten-year old de-facto standard of the PC-104 form factor. The NUTS project proposes a different approach, offering strengthened data bus and power supply lines and an easier access to the different electronic subsystems. This will make handling and working with the satellite during the development, integration and test phases easier. The concept is using a backplane layout where cards for other systems can be slotted in. Through the backplane all subsystems will get access to power and a communication bus, and two subsystems will be able to act as controllers/supervisors for the rest.

The NUTS CubeSat platform will make use of the CubeSat Space Protocol (CSP) for communication between the different modules, as well as for the downlink. This protocol takes care of the necessary routing and packet forwarding between nodes in the network. CSP supports different physical layers, e.g. USART and I2C, and it can be used over the radio link between the satellite and the ground station. The low power internal wireless system used in the bus will enable modules to communicate on higher bit rates than provided by the I2C interface. The wireless bus will also use CSP.

The first satellite using this bus is the NUTS satellite, planned to be launched late 2014. This satellite will also be demonstrating the use of composite materials as the main satellite structure. An engineering model of the satellite is currently being developed. This paper will discuss the design of the NUTS CubeSat bus, preliminary test results and experiences from the lab tests.