

Communication Packages for future TET-Satellites

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Motivation

- ◆ Enhancement of TET communication capabilities
- ◆ Demand for higher data rates from experiments
- ◆ Separation of TT&C from Mission/Payload comm's
- ◆ Extended communication time with experiment
- ◆ Demonstration of possible future capabilities for commercial use

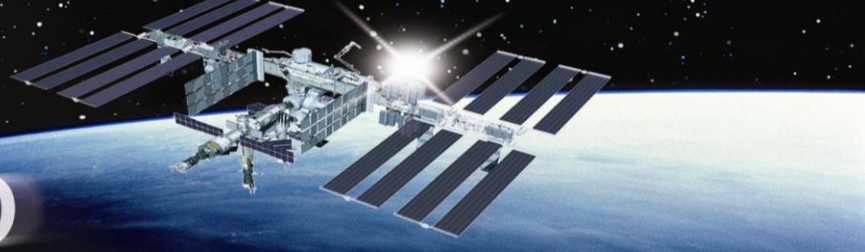
There is a strong demand from the Payload and Experimenters side to enhance the communications capabilities of future TET missions.

Current:

- ◆ 4 kbps UL (on 16 kHz subcarrier)
- ◆ 2.2 Mbps high rate downlink
- ◆ 137.5 kbps low rate downlink

Future Requirements:

- ◆ up to 256 kbps uplink for payload control and software uploads
- ◆ 10...300 Mbps downlink (total of all experiments)



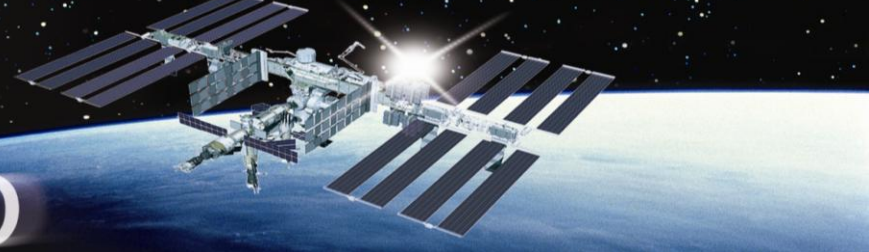
The bus of future TET satellites could be extended to include a S/S/X Comm's Package (or similar):

S-Band for TC and TM with omnidirectional coverage

- ◆ up to 256 kbps uplink
- ◆ ca. 1 Mbps downlink, 50 kbps emergency mode

X-Band Payload Downlink with directional antenna

- ◆ 10...300 Mbps, OQPSK downlink
- ◆ Coding (RS / Viterbi) ?



Payload experiments for future TET satellites could be:

Very high rate downlink using TCM 8-PSK modulation

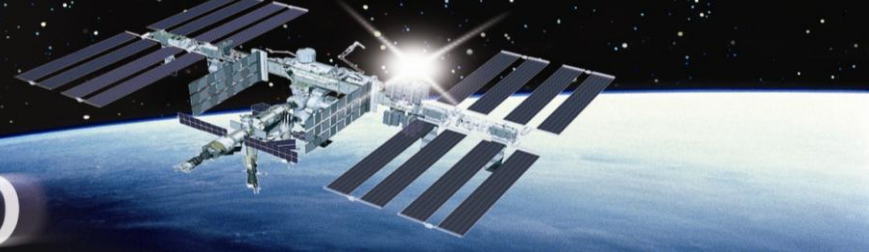
- ◆ X-Band or Ka-Band
- ◆ up to 800 kbps

S-Band / Ka-Band Transponder

- ◆ S-Band Receiver + Ka-Band Transmitter

Ka-Band Transponder with steerable antennas

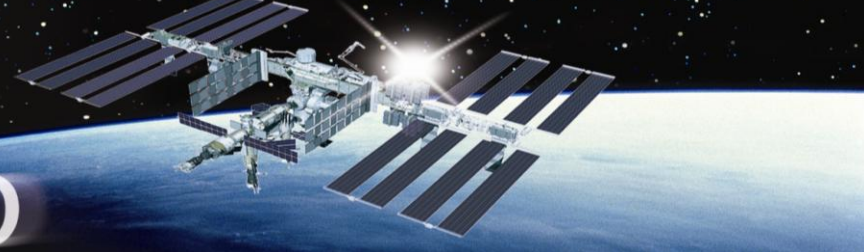
- ◆ Communication with geostationary relay satellite
- ◆ Extension of communication time with satellite



Conclusion

There are several options available to enhance the capabilities of the TET bus. Detailed configuration (data rates, power consumption, antenna configuration, etc.) is dependent on the actual mission and can be setup accordingly.

Listed experimental Comm's packages could also be used for actual payload data downlinks.



Final Note

In order to extend the visibility of German Space Research activities to the “people in the street” and to engage sympathies for the money spent in this field it could be considered to setup an experiment which is able to present a live video of the satellites (TET) view to earth via internet live-stream. This could also be a good driver to attract people of our interesting work and the job opportunities in the space industry and research.

Thank you!

Questions?