

## Communication Satellite:

### Onboard Communication

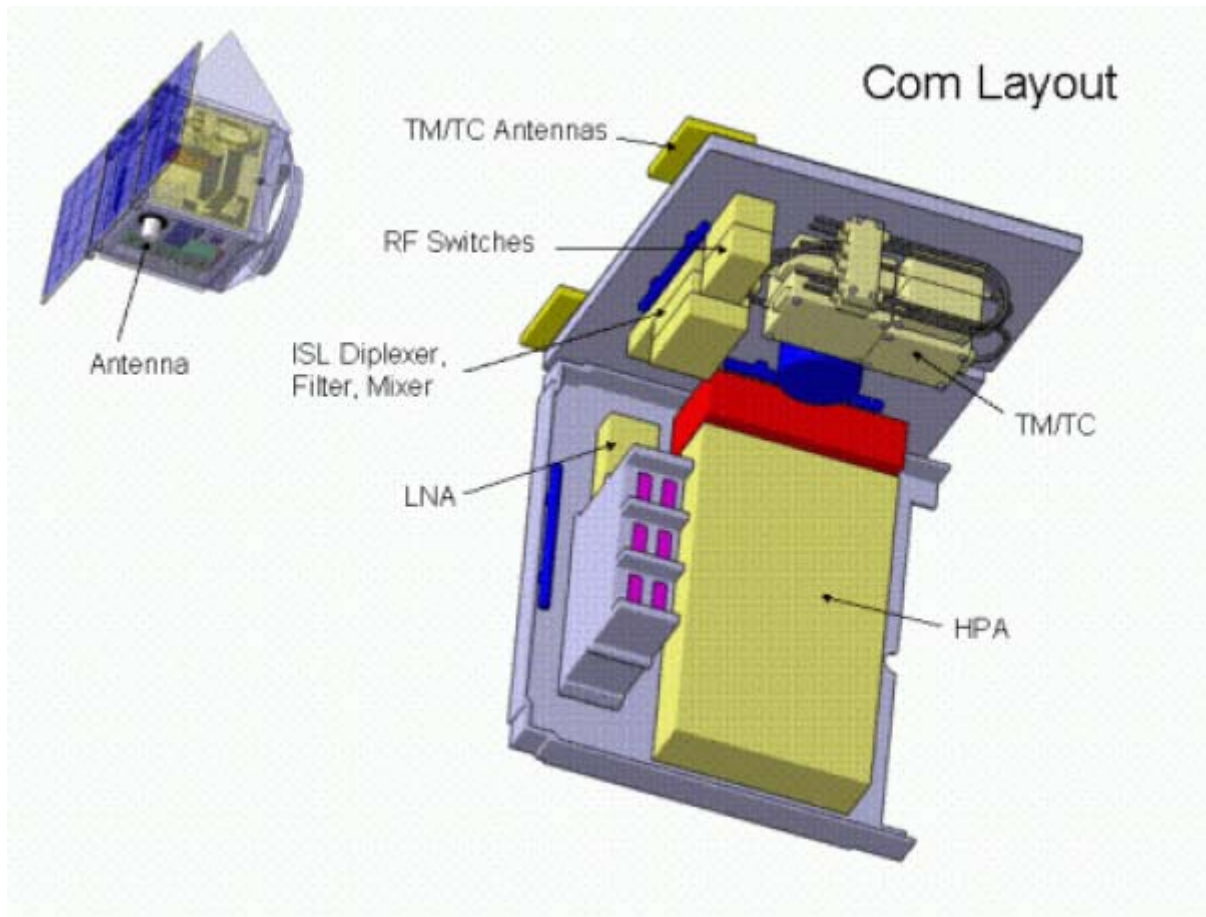


Figure 2: Com layout

The communication architecture of the satellite is very much influenced and driven by the extraordinary requirement to implement an InterSatelliteLink on a microsatellite. The following preliminary block diagram of a schematic onboard architecture reveals some of the challenges.

A double redundant design of the TMTC links is obligatory to be able to guarantee the contact independent of the position of the satellite. Adequate coverage characteristics are supposed to be achieved by the special antenna arrangement.

The single-design InterSatelliteLink is considered an experiment or payload part; for weight and energy supply reasons it cannot be designed in a redundant way.

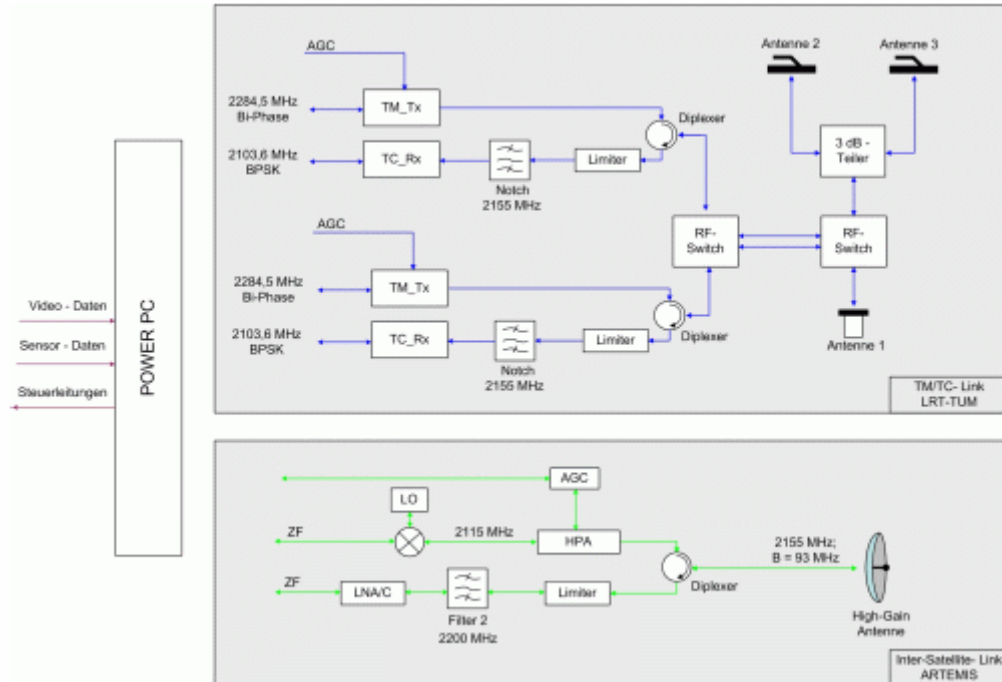


Figure 3: Onboard communication architecture preliminary plan

The possibility to use ARTEMIS as relay satellite for the mission free of charge, as well as the offer of the Max Planck Institute for Extraterrestrial Physics to use their TMTC modules from the successful Equator-S mission, limits the possibilities of variation in the onboard design.

The following figure shows the problem of the very narrow frequency bands in the transmitter area of both communication connections.

The design and implementation of the communication system will be the main focus in the coming months.

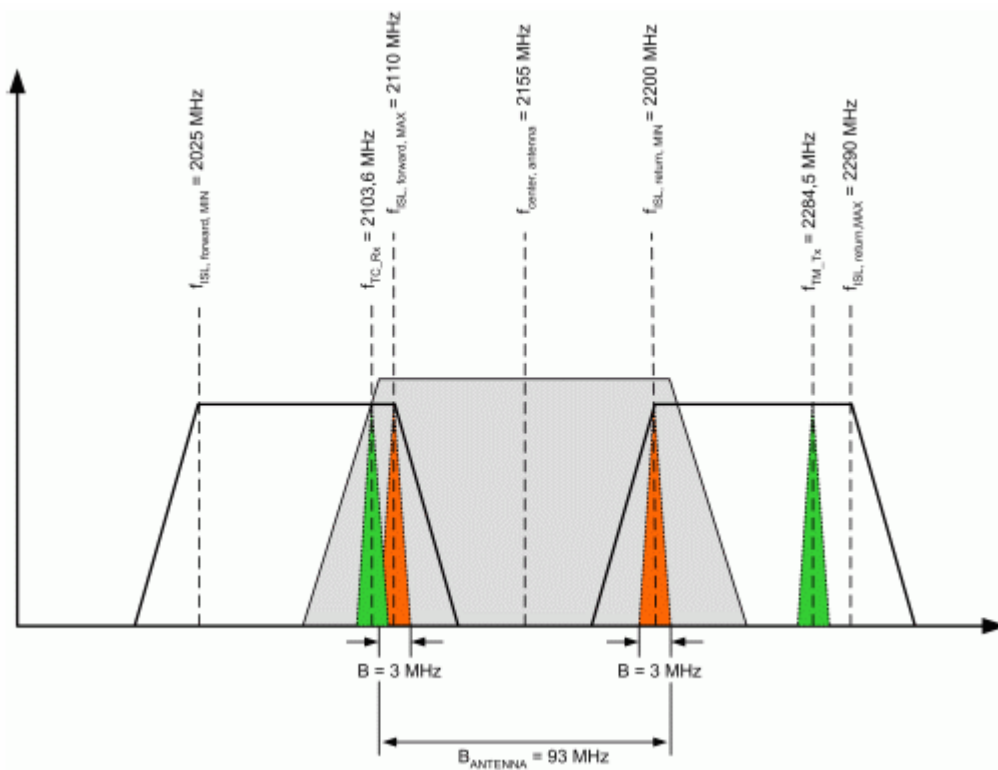


Figure 4: Frequency bands TMTC and ISL link



Figure 5: TMTC Module

### 2.9.1.2 Patch Antenna

The implementation of an InterSatelliteLink from Low Earth Orbit to a microsatellite makes high demands on communications technology. The weight as well as the possibility to swivel the required antenna make the development even more difficult.

A fully new approach will be pursued in cooperation with a renowned high frequency technology company from Donauwörth, RolfHeine Hochfrequenztechnik, and with the Institute for Lightweight Structures in the field of on-orbit space communication. The development of a patch antenna suitable for use in space combines complicated matters such as the weight, size, and quality of the antenna. With a length of less than 40 cm and a weight of less than 2 kg the gain will be in the range of 16 dB.

The development of this antenna is an important step in implementing an InterSatelliteLink via a geostationary satellite.

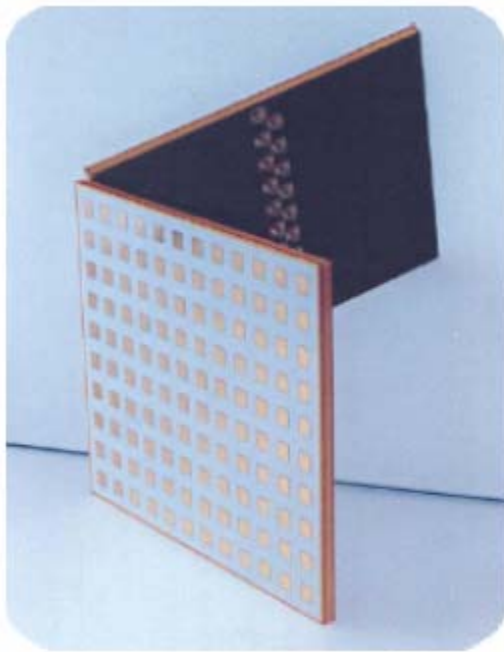


Figure : TMT modules