



# cleansat

BB23

Wireless Temperature Sensing  
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# Description of proposed technology Building Block



- Wireless (Radio Frequency) sensors as replacement of the wired sensors (essentially thermistors) for temperature measurement on board a spacecraft
- Active and passive sensors' technologies as candidate solutions
- Potential applications are:
  - In-orbit use for intra-spacecraft temperature monitoring
  - In-orbit use, outside the spacecraft, e.g. for temperature monitoring on solar arrays
- Baseline design is active sensors inside and passive sensors outside the satellite
- Trade off between active sensors and passive sensors:
  - Active sensors (with internal battery and active circuits) are more performant but less robust against the environment
  - Passive sensors (with neither battery nor active electronic circuits) are more robust but less performant. The complexity is moved from the sensor to the reader and the interrogation signal



# Description of proposed technology Building Block



- The proposed wireless technology may be applied to various satellite classes with different orbits (LEO, MEO and GEO), being the temperature monitoring function a common need
- The primary benefit consists in the installation flexibility of the sensors, with less harness constraints and also with AIT cost reduction
- Very effective in moving parts with slip rings elimination in rotary joints (e.g. solar arrays)
- A general mass saving is also expected for the whole system when compared to the existing wired temperature sensor solution due to harness reduction
- A small increase in power budget will take place due to the consumption of the reader or receiver unit which collects the temperature data from the sensors
- The RF communication between the sensors and the reader is one of the key design driver, in particular for intra-spacecraft use, where the RF propagation is affected by multi-reflections and multipath conditions within cavities with metal walls



- The technical areas to be focused during the development are essentially those related to system level operation:
  - Reliable operation (RF communication) in the frame of the specified environmental conditions, i.e. metal walls cavities with avionic equipment installed in, for intra-spacecraft application
  - Electromagnetic compatibility with the existing electronic systems, especially in terms of:
    - Radiated emission of the wireless system (which may disturb other systems)
    - Radiated susceptibility of the wireless system (RF noise of the satellite which may interfere with the wireless sensors)

