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THE PRETTY SOFTWARE DEFINED RADIO SYSTEM AND ITS USE AS COMMUNICATION
PLATFORM IN SPACE**Abstract**

Software Defined Radio (SDR) systems are highly flexible and powerful devices that allows radio signal reception and transmission. Most signal processing tasks are implemented in software instead of hardware to allow designer to change the system whenever necessary.

For the ESA PRETTY and other subsequent missions, an improved next generation SDR is going to be developed with the goal to implement a Multiple Input Multiple Output (MIMO) architecture with two times two independent transmit and receive channels. The resulting state-of the art SDR allows simultaneous signal reception and transmission between 300 MHz and 6 GHz in its easiest variant.

As an extension, the SDR can be equipped with an additional frequency conversion circuit that allows signal reception and transmission in a frequency range up to 36 GHz. In practice, signal transmission and reception is restricted to a selected band in accordance to the ITU frequency allocation plan. In contrast, reception is principally possible over the full frequency range because this does not affect the transmissions. The SDR is equipped with multiple frequency converter channels, antennas, amplifiers, filters and signal switches to enable operate over the full frequency range to enable the detection and monitoring of signals at different frequencies by stepping through the different converter channels. The MIMO design allows the usage of at least two communication bands at the same time. Hence, the SDR can be used for a wide range of applications like high data rate multi-band communication and scientific experiments. Additionally, it is possible to implement a general purpose spectrum analyzer to measure the received signal power versus frequency. Such a spectrum analyzer is suitable for spectral monitoring and provides different possibilities to verify the type and strength of received signals.