

Sky Watch Array Network (SWAN) : Wide-band Receiver Instrumentation development and Current Status

The Indian SWAN (Sky Watch Array Network) initiative aims to significantly enhance Indian observing capabilities in radio, and importantly, also to sustainably build & nurture future generations of talented radio astronomers in India to take up the challenges and lead in exciting research in astronomy. The SWAN focus is to design, develop and use a wide-band interferometric array of antenna across different parts of India to facilitate and conduct deep searches & studies of fast and slow transient radio radiation from astronomical sources, also enabling high angular resolution (VLBI) imaging of discrete galactic & extragalactic sources at low radio frequencies. It also facilitates hands-on experience to a large number of undergraduate/postgraduate students through their direct & active participation, starting from the design stage to competitive research using the array network. The proposed competitive network, with nominally 1000 sq. m array area at each location and operation spanning a decade in frequency (50-500 MHz), is being developed in three phases. As a proof-of-concept/demonstrator setup, a 7-station narrow-band system, using small tiles (based on MWA design) and receiver hardware from RRI-GBT Multiband system, is successfully configured and tested in array mode. In addition to the above, a broad-band receiver system capable of simultaneously catering to eight input signals (each of width 175 MHz) is being developed to operate in the frequency range 50MHz –400MHz, having low noise amplifiers with FM band rejection, high-gain amplifier modules, a set of band shaping microstrip based filters, as well as a high-speed ADC and Virtex-6 FPGA based digital back-end receiver. The evaluation of this system in the laboratory is in progress.

In this talk, we discuss the technical aspects related to the design, development, and the laboratory test results obtained from the broad-band RF receiver system.