

“Single Antenna Receiver Design for Radio Astronomy”

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The single dish telescope is a basic building element of radio astronomy that can be used for trying new concepts like FPA (Focal Plane Array), Pulsar & VLBI experiments and by enthusiastic students to get hands on experience. The single dish telescope receiver chain consists of various sub-systems viz. feeds, front-end electronics, signal transportation system, analog back-end system (signal conditioning circuits, down conversion circuits) and digital back-end. The front-end system may differ in frequency of operation viz. L-band, X-band, S-band. The back-end system consists of analog back-end and digital back-end. The analog back-end is a dual polarization system with frequency down conversion, bandwidth selection and gain adjustment features. The digital back-end system is used as a spectrometer and for pulsar & VLBI observations. Remote radio quiet zone is chosen for antenna site and unlike in array of telescopes operation of all antennas can simultaneously controlled & monitored from center station, single dish telescope control is at antenna site. Hence reliability is important due to remote location and manpower availability.

The single dish receiver system can be used on full time basis in existing antennas viz. 15m NCRA campus and possibly with unused/experimental communication dish in various organizations. The system can be a piggy back on partially used antennas. We are in search of and in talk with some organizations to revamp their telescope back-end. The receiver setup can be used by any universities in their campus all over country and will be in public domain for encouraging it's use.

The receiver systems for 15m dish at NCRA operates at L-band and going with other telescopes will give access to extended frequency range and will be useful to get experience to build back-ends for them. The 15m dish receiver system has real time spectrometer and 10Gbe raw voltage recording facility for offline analysis. Various features and modes of back-end system and test results will be illustrated in the poster presentation.