

Title: Reliability Study of GMRT Analog Backend Receiver System

Abstract: Reliability means the probability of the system to perform a required function without failure under stated conditions for a stated period of time. Reliability study is essential for electronic systems. Hence, this study is applicable to a radio telescope receiver. Giant Metrewave Radio Telescope's (GMRT) receiver system consists front end (FE), antenna base receiver (ABR), baseband (BB) and Digital. Also, systems peripheral to the receiver systems are servo, feed positioning, telemetry systems. All these systems are design-wise identical across 30 antennas. ABR and BB systems include local as well as master oscillator systems. These systems have control and monitoring electronics as well. Several types of units i.e. amplifier, oscillator, filter, mixer, switch, attenuation, power supplies form an interconnection. Such multiple active-passive devices and components are connected through RF cables and connectors. Hence the receiver system assembly becomes diverse and complex and hence understanding its reliability becomes crucial.

GMRT, as part of its day-to-day operation, is keeping a record of functional performance of all systems through a callsheet database. Using the data from the same, reliability performance is studied of old (32MHz) and new (400 MHz) Analog back end systems. Studying mean time between failures over a certain duration and plotting performance with respect to time, prediction of quality performance is done for GMRT Analog back end receiver systems.