



Real time RF and Optical signal monitoring system of remotely located antennas of uGMRT

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This paper discusses about broadband RF and Optical monitoring scheme for uGMRT, each antenna receives two polarizations signal, which is sent over two different wavelengths from remote antenna location without conversion to IF on a single fiber, and in addition it also supports return link on 1310nm wavelength in reverse direction from central processing station by using wavelength division multiplexing technique. In total we have 60 channels from 30 antennas. The optical monitoring is done for 30 antenna signals using in-line photodiode which records the incoming optical power from 30 remotely located antennas. Radio astronomy receivers are designed to sense very weak noise like signal from celestial bodies, one of the most critical parameters of receiver is sensitivity which depends on system parameters and signal quality. To continuously keep track of system health status and signal quality from 60 channels using conventional method is time consuming and may be prone to human error, so an automated broadband RF monitoring system is implemented. The system is designed with high isolation RF switches for channel selection having adjacent ports isolation of 55 dB. The system can support a frequency range from 50 MHz to 2 GHz, it runs for 24 x 7 records and displays real-time 60 channels from 30 antennas in sequential manner, the RF switch logic is controlled using LabVIEW software and it also acquires the respective channel RF spectrum. This has proven to be a very useful tool to study various parameters like antenna signal power levels, system gain, power level variation over band, and it also provides continuous information of RFI situation at each antenna. The recorded spectrum can be analyzed and used to flag the data corrupted due to RFI during the astronomical observation.

References

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