



Mobile communication RFI monitoring and its mitigation at GMRT observatory

Ankur, S Sureshkumar, Pravin Raybole, Shrikant Bhujbal
Giant Metrewave Radio Telescope, Khodad, Pune, India
ankur@gmrt.ncra.tifr.res.in

Radio astronomy heavily relies on highly sensitive radio receivers to detect weak celestial emissions, but these efforts are hampered by man-made radio frequency interferences (RFI), which can overshadow celestial signals and degrade telescope sensitivity.

The upgraded Giant Metrewave Radio Telescope (uGMRT) faces significant challenges due to strong signals from mobile communications, causing nonlinear performance in its wideband receiver. The expanding mobile communication spectrum, especially at lower frequencies, exacerbates this issue by affecting uGMRT observations.

To mitigate these problems, the uGMRT observatory continuously monitors mobile tower emissions and conducts periodic surveys within a 30 km radius from the GMRT site. The observatory employs two primary strategies to address mobile RFI: the use of mobile notch filters at various receiver stages, including the front-end and backend electronics, to maintain receiver linearity, and negotiations for mutual coexistence with mobile operators and regulatory agencies, successfully persuading some operators to shift their operations to higher frequencies.

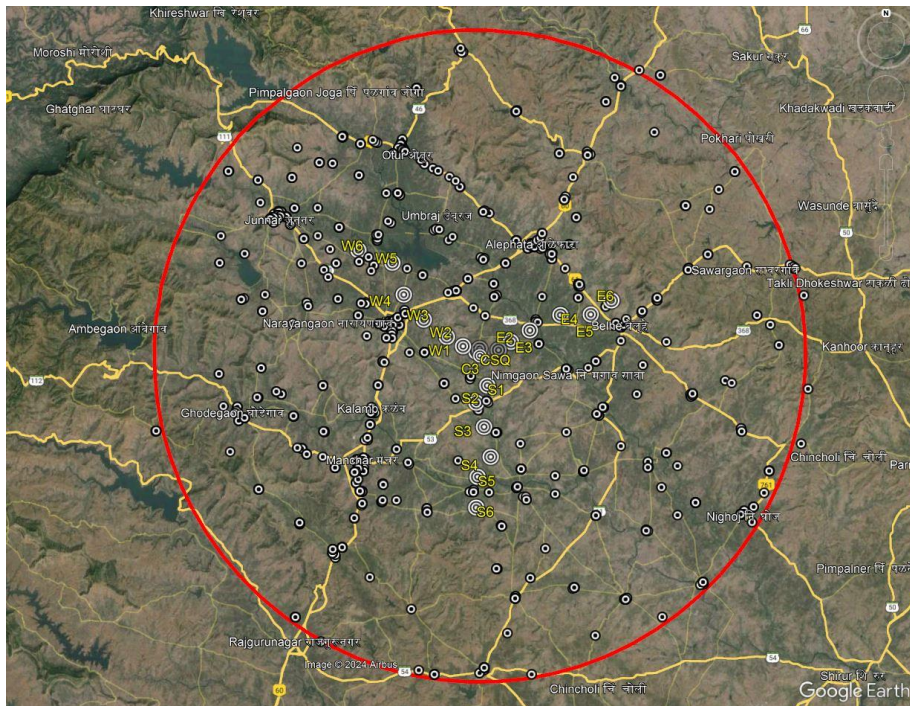


Fig. 1 The above image shows the distribution of all mobile towers within 30km of the radius (Red colour circle) from the GMRT site.

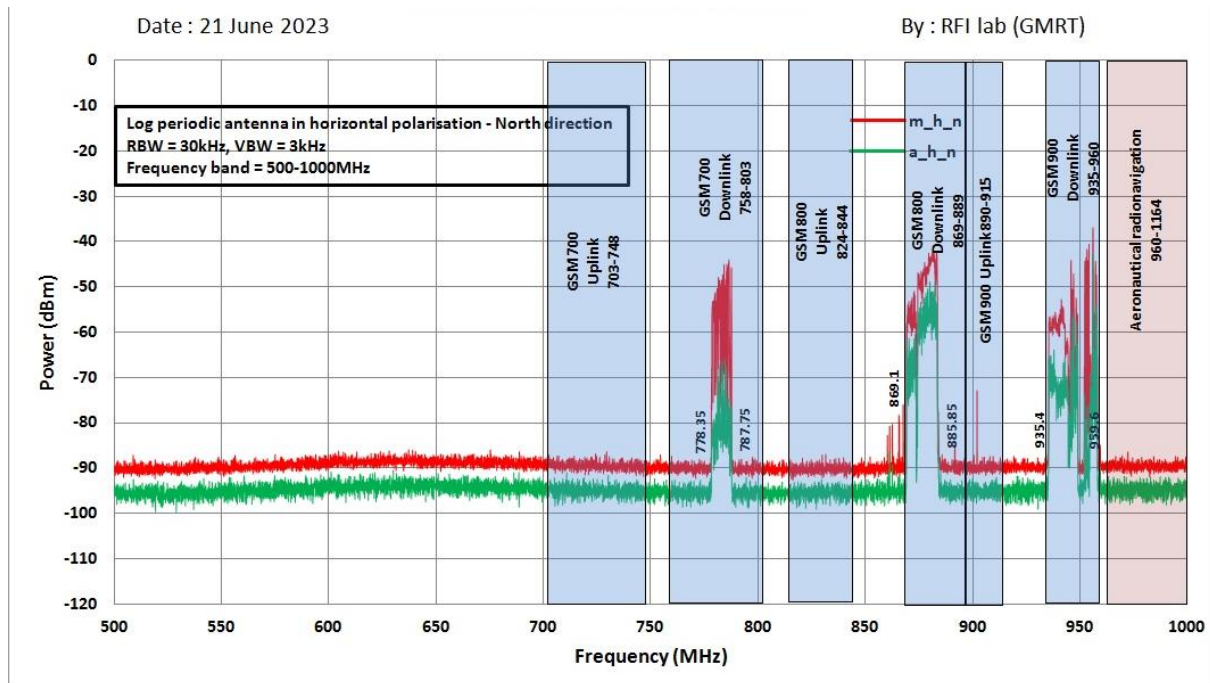


Fig. 2 shows the spectrum from 500 MHz to 1 GHz covering all the mobile communication within the band. This was measured using the log periodic antenna setup at the GMRT site.

References:

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