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SIMULATION OF THE EARTH'S RADIO-LEAKAGE FROM MOBILE TOWERS AS SEEN FROM SELECTED NEARBY STELLAR SYSTEMS

Abstract

Mobile communication towers represent a relatively new but growing contributor to the total radio leakage associated with planet Earth. We investigate the overall power contribution of mobile communication towers to the Earth's radio leakage budget, as seen from a selection of different nearby stellar systems. We created a model of this leakage using publicly available data of mobile tower locations. The model grids the surface of the planet into small, computationally manageable regions, assuming a simple integrated transmission pattern for the mobile antennas. In this model, these mobile tower regions rise and set as the Earth rotates. In this way, a dynamic power spectrum of the Earth was determined, summed over all cellular frequency bands. We calculated this dynamic power spectrum from three different viewing points - HD 95735, Barnard's star, and Alpha Centauri A. Our preliminary results demonstrate that the peak power leaking into space from mobile towers is 4GW. This is associated with LTE mobile tower technology emanating from the East Coast of China as viewed from HD 95735. We demonstrate that the mobile tower leakage is periodic, direction dependent, and could not currently be detected by a nearby civilisation located within 10 light years of the Earth, using instrumentation with a sensitivity similar to the Green Bank Telescope (GBT). We plan to extend our model to include more powerful 5G mobile systems, radar installations, ground based up-links (including the Deep Space Network), and various types of satellite services, including low-Earth orbit constellations such as Starlink and OneWeb.