Operational Data Sharing (ODS) Framework - A coexistence strategy for radio observatories in the broadband era

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Low Earth orbit (LEO) satellite constellations bring broadband internet and cell phone service to the most remote locations on the planet. Unfortunately, many of those remote locations host some of the world's great optical and radio observatories. With the number of LEO satellites expected to increase by an order of magnitude in the upcoming decade, radio frequency interference (RFI) from these satellites is a growing concern in protected radio-quiet areas like the National Radio Quiet Zone (NRQZ). When these satellites transmit in spectrum near a radio astronomy (RA) band, undesired noise can leak into the band and impact the observations. Although passive RFI mitigation techniques, such as kurtosis-based flagging, real-time tracking, and machine learning classification, have had limited success in removing RFI from scientific data, RFI-free radio spectrum for astronomical research has been an increasingly precious and diminishing resource. It is imperative to adopt an agile spectrum access framework allowing multiple users to be mutally aware and share their respective licensed and unlicensed bands efficiently. In this study, we present the Operational Data Sharing (ODS) framework which publishes RA observation information to a public database for satellite service providers to query through a representational state transfer (REST) API. The satelittes will use these observational metadata to adjust their transmission properties in real time to avoid the sensitive RA facilities. Preliminary results from coordinated tests between the Jansky Very Large Array (JVLA), along with the Green Bank Telescope (GBT), and the SpaceX Starlink team will be presented to showcase a partnership effort in how an automated ODS system can be adopted by other RA facilities and stakeholders in the near future.