Near Real-Time Radio Frequency Interference Monitoring Database for the Very Large Array

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The radio frequency interference (RFI) environment of radio interferometers is an ever-evolving challenge. While mitigation and excision typically take precedence over source identification and monitoring, to effectively monitor the changing RFI landscape, we need to identify, quantify, and catalog the RFI and correlate it back to the sources of emission. A database of RFI would then allow us to schedule observations better and leverage the ability to coordinate with known emitters, such as overhead satellite constellations.

With this lofty goal in mind, we set about generating a snapshot of the RFI environment at the VLA in near real-time. We achieved this by sampling the data from the ADCs in the DSP chain prior to correlation, allowing us access to the direct voltage streams from the antennas. We identified the presence of RFI by means of peak finding in both voltage and power streams from an antenna and examined how it translates to post-correlation data. As a final step, we developed Pythonic methods to access the database, with the intent of informing a user at the time of RFI flagging about the possible sources of RFI in their data, thereby increasing awareness of the current situation.

We hope that a database of this sort provides an effective bargaining chip or, at the very least, information on the very real impact of RFI at a large facility like the VLA. A database of this kind is unquestionably a necessity for any future radio interferometric array, such as the ngVLA, SKA, or DSA-2000