An RFI Mitigation Strategy to Improve Protection of Global Navigation Satellite System (GNSS) Radio Occultation (RO) Measurements for Earth Observation

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Measurements utilizing Global Navigation Satellite System (GNSS) Radio Occultation continue to gain acceptance in the weather forecasting community and their value has been demonstrated in several experiments and publications. Due to the perceived high return on investment, several Radio Occultation (RO) missions utilizing GPS and international radio-navigation signals are planned and expected to become valuable sources of space weather and atmospheric temperature and humidity data in the future. However, GNSS-RO receivers are, in general, more susceptible to interference due to their high altitude above the surface compared with terrestrial operation. Space-based operation allows reception of potentially interfering signals from a larger line-of-sight distance and many more sources when compared to terrestrial receivers.

Secondly, the current regulatory structure protects reception of GNSS signals within the Radio-navigation service in contrast to the Earth Exploration Service (EESS) under which Earth observing systems are recognized from a regulatory perspective. Acceptable interference criteria applied to GNSS receivers within the radio-navigation service primarily consider the aggregate effect of all interfering signals, however, additional aspects may need to be considered in defining the interference threshold for emerging remote sensing (EESS) applications.

This paper will address the initial steps that have been taken in order for Earth observing applications of GNSS signals to be recognized within the spectrum regulatory structure as well as examine the current Radio Frequency Interference (RFI) criteria with respect to protection of GNSS-RO measurements for EESS in contrast to RFI criteria based solely on Radio-navigation applications.