PUBLIC NOTICE

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Scientific Uses of the Spectrum and Spectrum Policy

A tutorial on Radio Astronomy, Earth Exploration Satellite Service, and the Space Research Service

The FCC's Office of Engineering and Technology is sponsoring a tutorial by Dr. Paul G. Steffes, a Professor in the School of Electrical and Computer Engineering at the Georgia Institute of Technology. The presentation will begin at 10:30 a.m. on Tuesday, May 29 in the Commission Meeting Room (TWC-305), 445 12TH Street, S.W., Washington, D.C. and will last approximately one and one-half hours.

The Radio Astronomy Service, the Earth Exploration Satellite Service, and the Space Research Service employ ultra-sensitive receivers to measure natural emissions from objects in space and from the earth's atmosphere and surface. These services have been instrumental in improving our understanding of the earth and our universe and have practical implications that may not be obvious, such as weather tracking, land use management and other essential sciences.

Through the use of radio astronomy, scientists have in recent years made the first discovery of planets outside the solar system, circling a distant pulsar. Measurements of radio spectral line emissions have identified and characterized the birth sites of stars in our own galaxy and the complex distribution and evolution of galaxies in the universe. They have also provided unique insights into the structure and composition of the atmospheres of the planets in our own solar system. Radio astronomy measurements of the cosmic background both from earth-based radio telescopes (the Radio Astronomy Service) and from space-based radio telescopes such as NASA's Cosmic Background Explorer, or COBE (Space Research Service) have detected ripples generated in the early universe, which later formed the stars and galaxies we see today. Observations of supernovas have witnessed the creation and distribution of the heavy elements essential to the formation of planets like earth, and of life itself.

The Earth Exploration Satellite Service represents a unique resource for monitoring the earth's

global atmospheric and surface conditions, and has made vital contributions to the study of land resource management, hazard prediction, meteorology, ocean studies, atmospheric chemistry, and global change. Currently, instruments operating in the EESS bands provide regular and reliable quantitative measurements that support an extensive array of scientific, commercial and government (civil and military) users. Applications include aviation forecasts; flood, hurricane, and severe storm warning and tracking; seasonal climate forecasts, monitoring of climate variability, studies of the ocean surface and internal structure; and monitoring of tropospheric and stratospheric ozone.

Much of this research is conducted on portions of the radio spectrum through the use of "passive" operations, which do not employ any sort of transmitter, but measure electro-magnetic energy. As passive users of the spectrum, radio astronomers and earth scientists have no control over the frequencies that they must use for their observations or over the nature of the signals they receive. These parameters are determined by the laws of nature. Generally, the emissions that radio astronomers receive are extremely weak – a typical radio telescope only receives about one-trillionth of a watt from even the strongest cosmic source, and routinely receives radiation from sources even one million times weaker than that. Because radio astronomy receivers are designed to detect such remarkably weak signals, spectrum management and spectrum policy decisions are of great significance to this scientific community.

Facilitating passive services research can pose a significant challenge to spectrum policy makers, given the increasing demand for, and intensity of, use of spectrum.

This presentation will provide a broad overview of the scientific uses of the radio spectrum and discuss research that uses portions of the radio spectrum occupied by "passive" services (i.e., those that do not use any transmitters). In this tutorial, Dr. Steffes will discuss how such passive services are used for scientific research. The tutorial will also address sources of interference, as well as the problems that policy makers encounter in addressing the needs of the scientific community while also addressing increasing demands for electromagnetic spectrum usage. This presentation has been developed for a general audience and does not require previous study of electrical engineering or physics. Technical approaches to the analysis and remediation of these problems will also be discussed.

Members of the public may attend the presentation, and every effort will be made to accommodate as many people as possible. Admittance, however, will be limited to the seating available in the Commission meeting room. Please allow sufficient time for clearance through Commission security before the presentation begins. For additional information, please contact Tom Derenge at 202-418-2451 (e-mail: tderenge@fcc.gov)