To: Spectrum Policy Task Force
Federal Communications Commission
445 12th Street S.W., TW-A325
Washington, DC 20554

From: Dr. Peter R. Backus
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Re: Comments on ET Docket No. 02-135

I am a radio astronomer heading the world's most sensitive and comprehensive search for extraterrestrial intelligence (SETI) project. SETI is a branch of radio astronomy that tries to detect radio communication signals from planets orbiting other stars. Naturally, communication signals from terrestrial, airborne, and satellite transmitters are easily detected. Mitigating the effect of these "local" signals is a major challenge for SETI. Our project uses a second antenna, thousands of miles from the primary dish, to check on signals. Using a pseudo-interferometric technique, we can eliminate signals that are not coming from the direction of the star we are observing.

SETI and the Radio Astronomy Service are passive users of the spectrum, operating with receivers that define the state-of-the-art in sensitivity and bandwidth. With advances in electronics and computer technology, and with new large telescopes coming on line, observations with even greater sensitivity are now possible.

The current recommendation on "Protection Criteria Used for Radioastronomical Measurements" (Rec. ITU-R RA.769-1) defines "detrimental" interference at a level of 10% of the r.m.s. noise. If this level is reached, effective observing time is reduced by 20%. This is a waste of the telescope resource. In the case of national facilities like the Robert C. Byrd Telescope (Green Bank, WV), the Arecibo Observatory (PR), and the Very Large Array (NM), the resource represents a considerable investment by the government.

Other antennas under construction or in the planning phase will push the limits on sensitivity and bandwidth even further. The Allen Telescope Array (ATA) is a privately funded telescope, built by the SETI Institute and the University of California, Berkeley. Paul Allen, co-founder of Microsoft, is the primary contributor. When completed in 2005, the array will be equivalent to a fully-steerable 100-meter dish, with a 35 K system temperature. However, in terms of interference, the most important feature of the ATA will be its instantaneous bandwidth covering from 0.5 GHz to 11.4 GHz. Such wide

frequency coverage is necessary to allow observations of distant regions of the universe. The scientists and engineers are developing techniques to mitigate the effects of terrestrial and satellite transmitters.

An international consortium is studying possible designs for a Square Kilometer Array. Such an antenna could increase sensitivity more than 13 dB over existing telescopes.

When considering the "best and highest value use" of the radio spectrum, please consider the Radio Astronomy Service. It is difficult to put a dollar value on the contribution of radio astronomy and SETI to the national economy. Both push the envelope of technology and, in the university, help train the next generation of scientists and engineers. Both also fascinate the general public. Inspired by this fascination, the SETI Institute has developed award-winning science curriculum materials for grades three through nine, a future generation of scientists and engineers. Protection of radio astronomy is an investment in the economic future of our country.

Radio astronomy and SETI need protection under any market-oriented spectrum allocation and assignment policies. Out-of-band and spurious emissions leaking into radio astronomy bands must be kept below the existing limits. The impact of "ultra wide band" transmissions must be carefully scrutinized for their effects on passive services. Existing and future radio observatories must be afforded protection from nearby transmitters through the use of radio quiet zones and radio coordination zones.