NASA SBIR 2008 Phase I Solicitation

S1.02 Active Microwave Technologies

Lead Center: JPL

Participating Center(s): GSFC

NASA employs active sensors (radars) for a wide range of remote sensing applications (http://www.nap.edu/catalog/11820.html). These sensors include low frequency (less than 10 MHz) sounders to G-band (160 GHz) radars for measuring precipitation and clouds and for planetary landing. We are seeking proposals for the development of innovative technologies to support future radar missions. The areas of interest for this call are listed below (with applications and/or mission concept names):

- Lightweight deployable L-band antenna structures and deployment mechanisms suitable for large aperture (reflectors or phased array of 50m^2 and larger) systems. (Solid Earth Science , http://solidearth.jpl.nasa.gov/)
- Compact wide bandwidth L-band and S-band (200 MHz) array antennas for airborne real aperture and synthetic aperture radar remote sensing applications.
- Rad-hard, high-efficiency, low-cost, lightweight L- and P-band Transmit/Receive (TR) modules (~250 W peak RF output power at ~100 us pulsewidth and 20% duty cycle) with respective energy storage units to provide pulsed DC power to the power amplifier while minimizing ripple on the primary DC power source. (DESDynI, http://desdyni.jpl.nasa.gov/; SES, hydrology http://www.nasa.gov/topics/earth/features/decadal_missions.html)
- Low Power 10-bit, 1.5 GHz analog bandwidth ADCs and digital filtering with an emphasis on rad-tolerance and space-qualification. (Ice Topography (GLISTIN), planetary landing)
- Lightweight deployable reflectors (Ku-band and Ka-band) and active feed electronics.
- High efficiency Ka-band (34-36GHz) TR modules with output power of 5-10W. The Low Noise Amplifiers (LNAs) should have a NF less than 3dB and gain better than 30dB. Included in the TR module is a low loss phase shifter. (GPM, Clouds and precipitation, planetary landing)
- Power amplifier and associated LNA for a Ka-band (34-36GHz) radar system with a peak output power of 2KW to 10KW (duty cycle of 10%) and system bandwidth of up to 1 GHz and LNA NF of less than 1.5dB. The LNA needs to have enough isolation and power handling capability to operate in this high power transmission environment. (SWOT, GLISTIN, clouds and precipitation)
- 140-160 GHz planar frequency-scanned antenna with scan range +/- 16 degrees, beamwidth 0.5 degrees, and bandwidth 400 MHz per beam. (planetary landing, atmospheric radar)
- Dual or tri-frequency (Ku/Ka/W band), matched beam antennas with high cross-polarization isolation (>32 dB). (Cloud and precipitation)
- Innovative approaches to realizing a low-cost instrument (sub-system).

Proposals should show an understanding of one or more relevant science needs, and present a feasible plan to fully develop a technology and infuse it into a NASA program.