

Fault-Tolerant Software-Defined Radio on Manycore

Flexible radio provides multimode operation and high processing performance

Software-defined radio (SDR) platforms generally rely on field-programmable gate arrays (FPGAs) and digital signal processors (DSPs), but such architectures require significant software development. In addition, application demands for radiation mitigation and fault tolerance exacerbate programming challenges. MaXentric Technologies, LLC, has developed a manycore-based SDR technology that provides 100 times the throughput of conventional radiation-hardened general purpose processors. Manycore systems (30–100 cores and beyond) have the potential to provide high processing performance at error rates that are equivalent to current space-deployed uniprocessor systems. MaXentric’s innovation is a highly flexible radio, providing over-the-air reconfiguration; adaptability; and uninterrupted, real-time, multimode operation. The technology is also compliant with NASA’s Space Telecommunications Radio System (STRS) architecture.

In addition to its many uses within NASA communications, the SDR can also serve as a highly programmable research-stage prototyping device for new waveforms and other communications technologies. It can also support noncommunication codes on its multicore processor, collocated with the communications workload—reducing the size, weight, and power of the overall system by aggregating processing jobs to a single board computer.

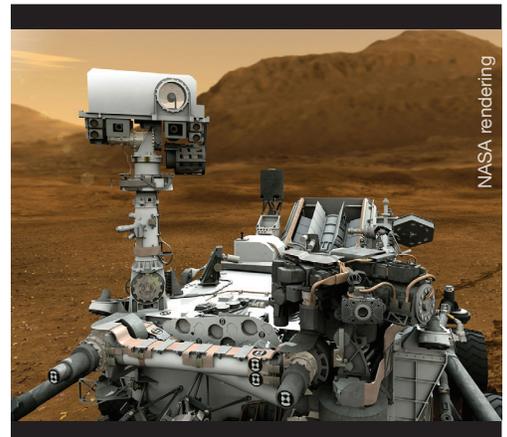
Applications

NASA

- ▶ Multimode rover communications and data processing
- ▶ Satellite communications
- ▶ Flexible research platform for communication labs and research projects

Commercial

- ▶ Military communication networks
- ▶ Satellite-based surveillance
- ▶ Automotive wireless devices



Phase II Objectives

- ▶ Complete ultraflexible baseband processing on radiation-hardened multicore
- ▶ Achieve programmable radiation-hardened multicore network stack
- ▶ Ensure compliance with STRS for multicore-based architecture
- ▶ Demonstrate support for noncommunications applications
- ▶ Finalize radiation tolerance and ruggedization for space applications

Benefits

- ▶ Radiation-hardened
- ▶ Ultraflexible
- ▶ Multimode-operation capable
- ▶ STRS compliant
- ▶ Over-the-air reconfigurable
- ▶ Easy to program

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Proposal Number: 09-2 01.03-8119