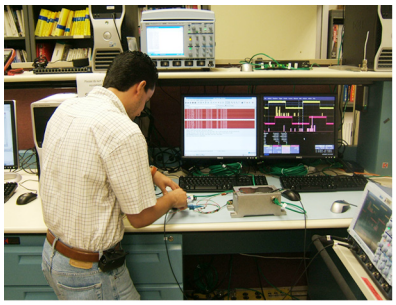
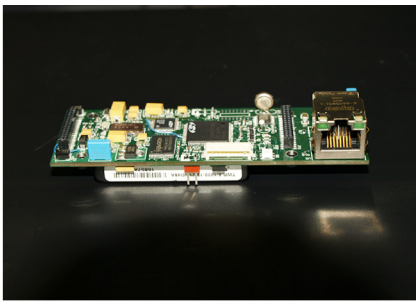
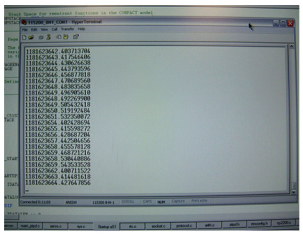
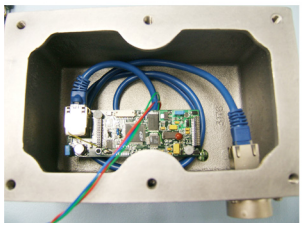
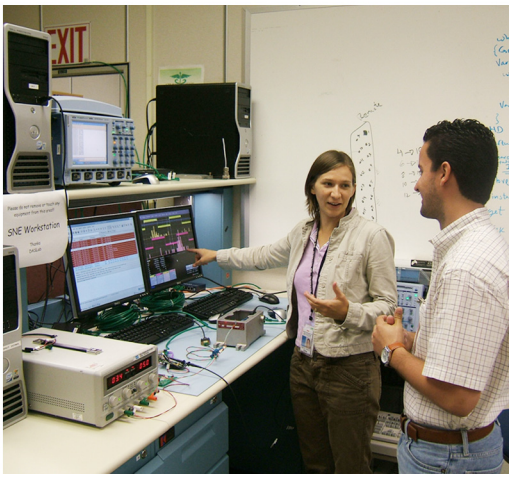
John F. Kennedy Space Center's Ethernet-Enabled Power and Communication Module for Embedded Processors











The National Aeronautics and Space Administration (NASA) seeks partners interested in the commercial application of the Ethernet-Enabled Power and Communication Module for Embedded Processors. This communications module for embedded systems is useful in precision control, data acquisition, and anywhere that precisely time-stamped information needs to be acquired. The module uses Power over Ethernet (PoE) to eliminate the need for a separate power source and cable. PoE takes power from the CAT-5 Ethernet cable to produce the voltage levels needed for the other add-on boards that are to be connected to it. Previous designs of the Power and Communication Module were limited in their communication speed and program memory, provided little user control over packet handling, and made no concessions for time synchronization.

BENEFITS

- Power over Ethernet (PoE) eliminates separate power source need
- Conforms to the IEEE-1588 PTP standard
- Allows data to be recorded quickly into ferroelectric nonvolatile RAM
- Allows time stamping to within a few hundred microseconds without adding significantly to bandwidth requirements

technology ▪ opportunity

APPLICATIONS

- Data acquisition and encryption
- Serial-to-Ethernet conversion applications
- Any application requiring precision time stamping
- Any application where sensors are distributed over wide geographical areas

TECHNOLOGY STATUS

- ☐ Patent pending
- ☐ U.S. patent
- ☐ Copyrighted
- ☑ Available to license
- ☐ Available for no-cost transfer
- ☐ Seeking industry partner for further codevelopment

Technology Details

The new design of the Power and Communication Module creates a robust serial-to-Ethernet conversion powered by existing Ethernet cable. It is the first of its kind to integrate Power over Ethernet (PoE) with conformance to the IEEE-1588 Precision Time Protocol (PTP) standard, as well the ability to accommodate other standards, such as IEEE-1451. The module also has the processing capability and memory to implement other protocols and offload these tasks from other embedded processors. The additional nonvolatile memory (ferroelectric RAM) allows the module to store state information or data, and a hardware watchdog timer ensures that the module is running properly and will reset the module if it is not. More capability may be added to the module through programming the embedded processor.

The Power and Communication Module was developed as a part of the Smart Network Element (SNE). The SNE depends on the Power and Communication Module to provide power to the Digital and Analog Modules and to convert serial communications from the Digital Module over the Ethernet. The ultimate goal is for the SNE to transform traditional analog sensors into Ethernet-enabled sensors capable of transmitting health information and diagnosing potential problems with the analog or digital circuitry in a standard way.

Partnership Opportunities

NASA licenses are individually negotiated with the prospective licensee, and each license contains terms concerning commercialization (practical application), license duration, royalties, and periodic reporting. NASA patent licenses may be exclusive, partially exclusive, or nonexclusive. If your company is interested in the new Ethernet-Enabled Power and Communication Module for Embedded Processors technology, or if you desire additional information, please reference Case Number KSC-13112 and contact:

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