

**SPACEWIRE/RMAP-BASED DATA ACQUISITION FRAMEWORK FOR
SCIENTIFIC INSTRUMENTS:
OVERVIEW, APPLICATION, AND RECENT UPDATES**

Session: SpaceWire missions and applications

Short Paper

Takayuki Yuasa, Wataru Kokuyama, Kazuo Makishima, Kazuhiro Nakazawa,
The University of Tokyo, 7-3-1 Hongo, Bunkyo, Tokyo, Japan 113-0033

Masaharu Nomachi,

*Laboratory of Nuclear Studies, Graduate School of Science, Osaka University, 1-1
Machikaneyama, Toyonaka, Osaka 560-0043*

Hirokazu Odaka, Motohide Kokubun, Takeshi Takashima, Tadayuki Takahashi,
*Department of High Energy Astrophysics, Institute of Space and Astronautical
Science (ISAS), Japan*

*Aerospace Exploration Agency (JAXA), 3-1-1 Yoshinodai, Sagamihara, Kanagawa
229-8510 Japan*

Iwao Fujishiro, and Fumio Hodoshima

Shimafuji Electric Incorporated, 8-1-15 Nishikamata, Ota, Tokyo, Japan 144-0051

*E-mail: yuasa@juno.phys.s.u-tokyo.ac.jp, kokuyama@granite.phys.s.u-tokyo.ac.jp,
maxima@phys.s.u-tokyo.ac.jp, nakazawa@phys.s.u-tokyo.ac.jp,
nomachi@lms.sci.osaka-u.ac.jp, odaka@astro.isas.jaxa.jp,
kokubun@astro.isas.jaxa.jp, ttakeshi@stp.isas.jaxa.jp, takahashi@astro.isas.jaxa.jp
fujishiro@shimafuji.co.jp, hodo@shimafuji.co.jp*

ABSTRACT

To develop and test satellite-borne scientific instruments, we, Japanese SpaceWire Users Group, have been developing and utilizing a modular SpaceWire-based data acquisition system (Yuasa et al. in SpaceWire Conference 2007, 2008). The core components, such as circuit boards with SpaceWire/RMAP-capable FPGAs, the SpaceCube computers with the TRON real-time OS, and the portable class library running on the SpaceCube, have been available for more than four years. They have already been deployed in several actual examples; development and test of SpaceWire Interface Module (SWIM) of Japanese Small Demonstration Satellite I (SDS-I; see Kokuyama et al. in SpaceWire Conference 2008) and developments of instruments onboard the next Japanese X-ray satellite ASTRO-H as reported by Fujinaga et al. and Kouzu et al. in this conference. We note that SDS-I/SWIM successfully performed RMAP data transfer in orbit about one month after its launch in January 2009, and have been operational more than half a year obtaining precise data of satellite

vibration which give vital information for planned gravitational wave detector in space.

In this paper, as an introduction to above-mentioned individual applications, we present an overview of the data acquisition system reviewing our design concept and its implementation in each component. We also report recent upgrade of the SpaceCube computer and an open SpaceWire/RMAP IP cores used in our framework.