1 Introduction

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The engineering test satellite VIII (ETS-VIII) is Japan's first three-ton-class large-scale geostationary satellite. Its mission is to develop and test large-bus technology and other technologies that will be required in a mobile satellite communications system equipped with a large satellite-borne antenna. Satellite-borne communications payloads aboard the ETS-VIII include a large deployable antenna having a 13-m aperture, an onboard switch, and a high-output power (400 W) transponder, as well as a high-precision time standard device (for the development of basic satellite positioning technologies). This satellite has been the subject of study since FY1994. Following a delay in the original development schedule for the H-IIA rocket, the launching of ETS-VIII has been postponed to FY2004.

Mobile satellite communications utilizing the S band adopted in the ETS-VIII has already been studied in Japan using the N-STAR. The ETS-VIII is expected to enable satellite communications using a smaller mobile terminal, utilizing its large antenna and high-output transponder. A satellite communications system using a small mobile terminal and a lower frequency, the L band, has already been commercialized. However, an S-band system using a 13-m antenna had yet to be developed. The ETS-VIII is therefore expected to enable high-quality multi-media satellite communications using compact mobile terminals.

The ETS-VIII has been developed jointly by the National Space Development Agency of Japan (NASDA; now JAXA, or the Japan Aerospace Exploration Agency, as of October 1, 2003), the Advanced Space Communications Research Laboratory (ASC), and Nippon Telegraph and Telephone Corporation. The role of the Communications Research Laboratory (CRL) is to develop a phased array feeder device for the primary feeder unit of the large expandable antenna and beam former, a data communication packet switch for the onboard switch system, and an onboard precise time transfer device for satellite-based positioning. As the ASC, which had a limited mission, has been disbanded, the CRL has taken over the onboard voice communication switch and transceiver under development by the ASC since 2001. The CRL is now in charge of the design and post-installation maintenance and testing of these components.

With respect to ground facilities, the CRL has developed a telemetry command device for the satellite-borne communications system, for a main station, and for small ground-station devices used in communications experiments. Specifically, we have developed a mobile ground station system using a foldable antenna and mobile terminals, PDA-type terminals, and a compact ground experimental station that will capitalize on the advantages of the ETS-VIII.

Satellite communication experiments now scheduled include an S-band mobile multimedia satellite communication experiment expected to enable nationwide use of cell phones, an S-band mobile multi-media satellite broadcast experiment designed to enable a high-quality satellite-based voice broadcasting service for mobile terminals, and a basic satellite-based positioning experiment utilizing a high-precision time standard. In addition to the basic experiments to be conducted by the satellite development organization, a practical experiment is under consideration that will allow public users in Japan and the Asia-pacific region to use the new S-band system. In Japan, a wide range of ideas for experiments have been discussed and studied—for exam-

The ETS-VIII had been scheduled for launch in 2004 at the time of preparation of this special issue. The launch date is currently set for 2005. Please note that the papers in this issue refer to the former launch date of 2004.

ple, among the Satellite Use Promotion Committee, of which NASDA is a member. Also in the Asia-Pacific region, we have exchanged views with colleagues in a variety of forums, such as the Asia-Pacific Advanced Satellite Communications Forum hosted by Japan's Ministry of Public Management, Home Affairs, Posts and Telecommunications (MPHPT). Further ideas about the effective use of the ETS-VIII were collected from the public through the Meeting on Experimental Satellite Applications of the MPHPT. In fact, elements of a number of these ideas have been adopted in the design of future satellite applications, the contributions of public users thus joining those of researchers directly involved in the development of the new system.

This special issue reports on the current status of the ETS-VIII experimental program, in cooperation with the relevant organizations, with a summary of the details of the ETS-VIII program of experiments and the results of development of an onboard transponder and the experimental ground station. We hope that our research efforts will aid the ETS-VIII satellite project and contribute to the realization of Japan's future mobile satellite communications system. Currently, development of the ETS-VIII is running smoothly in preparation for a scheduled launch in FY2004. We would like to thank all of those involved in experiments relating to this important national project for their efforts and contributions.

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