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ACHIEVEMENT OF ON-ORBIT WIRELESS LAN DEMONSTRATION FOR DOCKING VIDEO
TRANSFER**Abstract**

Japan Aerospace Exploration Agency (JAXA) is developing the next generation unmanned visiting vehicle “HTV-X,” which is the successor to the H-II Transfer Vehicle “HTV” that completed the final 9th mission in Aug 2020. In the 2nd mission of HTV-X, JAXA plans to demonstrate the automated docking techniques to acquire one of the critical technologies to realize the sustainable activities on the future platform in LEO and the future cis-lunar Gateway station.

There are four major elemental technologies required for the automated docking, (1) Relative navigation sensor, (2) Guidance control algorithm, (3) International standard docking mechanism, and (4) Wireless transmission of docking monitor video. As the first step, the demonstration experiment of (4) has been conducted with the last HTV mission, and it has successfully demonstrated the real-time video transfer from HTV to ISS by wireless LAN communication on May 2020.

During the HTV R-bar approaching phase, defined from 300m under ISS, the high-definition video taken by the monitor camera installed on HTV was streaming in real time on ISS via 5GHz Wi-Fi (IEEE802.11n) communication with External Wireless Communication (EWC), which is the Wireless Access Point (WAP) of ISS. This mission is called “WLD (Wireless LAN Demo) mission,” and it was the first time in the world that two spacecrafts succeeded in Wi-Fi communication on orbit. Also, the moving image of ISS taken from a visiting vehicle approaching from minus R-bar was an unprecedented view.

This paper firstly presents the overview of WLD mission and its equipment, and then shows the result of this demonstration, such as the evaluation of video quality and Wi-Fi link stability. Finally, the possibilities of the application to commercial off-the-shelf communication systems is mentioned, which may open the way to make space communication systems easier than conventional.