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HIGH CAPACITY OPTICAL EARTH-MARS COMMUNICATION SYSTEM FOR FUTURE MARS HUMAN COMMUNITY

Abstract

The purpose of this paper is to discuss the high speed optical communications system between Earth and Mars in the era of future Mars human community and its application to the other space communications.

First, the structure of the Earth-Mars communication link with the capacity of 10 Gbps is described. The capacity requirement stems from the necessity of creating the mirror database of Earth for the Internet search action on Mars in conjunction with the recent Internet movement to the Web 2.0, if the human community is created on Mars probably around 2050(1). The discussion includes the detailed description of various technologies to realize the 10 Gbps system including FSK (Frequency Shift Keying)-PPM (Pulse Position Modulation) system, AWG (Array Wave Guide) multiplexer and their preliminary experimental performance. In addition, a proposal of the relay satellite configuration is included to obtain a good pointing performance needed for the very long distance optical communication link.

Second, a possibility of higher capacity communication system is examined, because the transmission speed of 10 Gbps would be the minimum requirement of transmission capacity and much more capacity would be required in the future[1]. It is discussed that the requirement of data transmission rate would be ten times or hundred times as much as the above mentioned data rate in the future, considering the large growth rate of information. So this paper will further discuss the research and development items for the future studies for creating the mirror database on Mars.

References [1] T.Iida, Y.Arimoto and Y.Suzuki: "Consideration of Space Communications Needs for Future Mars Human Community", IAC2008, No.IAC-08-B.2.3.13, Sep.30, 2008.