

IAF SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Advances in Space-based Communication Systems and Services, Part 3 (3)

Author: Ms. Muna Darweesh
University of Dubai, United Arab Emirates, midarweesh@ud.ac.ae

CLIMATE DATA COMMUNICATION BETWEEN MARS-EARTH

Abstract

The rapid increase in the engineering and science to transmit data about Mars' climate, atmosphere and geology to the Earth is mainly the most essential aspect of discovering the red planet. The variations in the air and ground temperatures, pressure, wind speed and direction, humidity and ultraviolet radiation level are the key parameters that will give the full picture about the atmospheric fluctuations there. These data can be obtained from special sensors that are part of a rover that are designed to sustain the temperature that considerably varies between -130 to 70. Moreover, the geology of the Mars is a rocky ground. These gathered data must be transmitted to Earth for further analysis. The most efficient way to have the data transmitted is to have the rover communicating to the orbiter by employing the Ultra-High Frequencies (UHF). Therefore, UHF ranges between 390MHz-450MHz which represents 16 channels. These channels can be used in two different communication schemes, namely half duplex and full duplex where the transmitter and the receiver channels are assigned from the range 435 to 450 MHz and the range 390 to 405 MHz, respectively. The frequency for communication between orbiter and the earth is X-band (8GHz). In addition, the signal faces some attenuation with 3dB- 4dB due to the rain. To avoid this severe degradation, a ground station can be built in UAE, since the rain percentage is relatively low. In this research, a comprehensive view about the rover-orbiter- Earth (ground station) communication.