

IAF SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 1 (2A)Author: Dr. Lihua Zhang
DFH Satellite Co. Ltd., ChinaFROM QUEQIAO TO QUEQIAO-2: THE SUSTAINABLE DEVELOPMENT OF CHINESE LUNAR
RELAY COMMUNICATIONS SATELLITE**Abstract**

With the growth of the lunar exploration activities, the sites of interest in the lunar surface are located mainly in the south pole and the far side. These locations limit direct communication links with Earth stations. Therefore, any surface exploration missions in these areas must be supported by additional relay communications spacecraft. In 2018, in order to support Chang'e-4, the first lunar far side landing exploration mission in the world, Queqiao relay communications satellite was launched and entered into the halo orbit around the Earth-Moon libration point L2. Up to now, Queqiao has been operating on the halo mission orbit about five years and providing continuous, reliable relay communication support for the lander and the Yutu-2 rover, which have obtained a great amount of valuable scientific data. The Chang'e-6 mission will collect and return samples from the far side of the Moon. Then the lunar south pole will be the next target of Chinese lunar exploration programs. The Chang'e-7 and the Chang'e-8 will explore the environment and resources at the south pole of the Moon. Aiming to satisfy the requirements of Chinese lunar exploration programs in the coming years, a new lunar relay communications satellite, named as Queqiao-2, is developing. In order to increase the communication coverage to lunar south pole areas, an elliptical frozen orbit around the Moon was selected. Queqiao-2 will provide relay communications support for multiple probes to maintain contact with the Earth stations during their landing and surface operations. Both the real-time and store-and-forward relay communications can offer to multiple users. Queqiao-2 is not only a relay communications satellite, but also a scientific satellite with extreme ultraviolet camera, array neutral atom imager and Earth-Moon length baseline VLBI experiment system onboard. The design life of the Queqiao-2 is more than 8 years. Based on the flexible and extensible system architecture, as well as the ability to provide communications supports for multiple, concurrent missions. Apart from providing relay support for future Chinese lunar missions, it is possible to provide relay communication services for other lunar landing exploration missions on lunar south pole or lunar far side in the future. In this paper, the five years operation status of Queqiao lunar relay satellite is summarized. The system design of Queqiao-2 lunar relay satellite is introduced, including the mission orbit selection, flight profile, the communications system design and capabilities, etc.