

SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Near-Earth and Interplanetary Communication Systems (4)

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INNOVATIVE CONCEPTS FOR THE CREATION OF SPACE NETWORKS RELYING ON HYBRID
RF AND OPTICAL COMMUNICATION LINKS**Abstract**

With growing demands for space exploration missions there is a need for enhanced communications capabilities and increased inter-mission interaction. The creation of entire networks on exploration targets is desirable. Such networks will require high link availability, scalability, and high data transmission capabilities. Therefore, for future space missions the provision of networks on the remote targets should be taken into consideration. This paper investigates necessary developments for the creation of interplanetary networks. To support higher data rates, a move towards higher frequencies is required. The paper addresses in particular Ka-band and free-space optics systems for links from a space probe to the ground station. A trade-off between both technologies is made. Benefits of interplanetary networks with dedicated relay satellites to increase the availability are shown. Two communication topologies including key surface elements and orbiting spacecrafts for a near-Earth and a deep space network are presented. Recommendations for future space communication systems are provided.