

IAF SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)  
Advances in Space-based Communication Systems and Services, Part 2 (3)

Author: Dr. Christopher Vasko  
European Space Agency (ESA), The Netherlands, christopher.vasko@esa.int

Mr. Josep Maria Perdigues Armengol  
European Space Agency (ESA), The Netherlands, Josep.Maria.Perdigues.Armengol@esa.int  
Dr. Harald Hauschildt  
European Space Agency (ESA), The Netherlands, harald.hauschildt@esa.int

KEYNOTE: OPTICAL AND QUANTUM COMMUNICATION – BRIDGING THE FINAL FRONTIERS  
TO SPACE. WHERE WE ARE AND WHERE WE MIGHT BE GOING

**Abstract**

Optical and Quantum Communication are certainly disruptive technologies for satcom market. While terrestrial services have successfully revolutionized the market, significant technology gaps remain for space applications for both optical and quantum technologies. Initially, only few isolated and self-standing developments have successfully been launched in niche areas. This is now changing rapidly.

In the recent years, the emergence of large commercial satcom constellations have created new opportunities for developing upstream technologies, figuratively tying satellites into commercial networks and making them true non-terrestrial networks. The move from RF towards optical technologies is made evident as next generations of constellation nodes aim to embark optical intersatellite links to manage the data traffic across the constellations.

Quantum technologies are slowly evolving beyond quantum key distribution concepts. Those are the domain of security applications and often underpin large governmental projects that are able to develop security sensitive hardware. However, other quantum technologies are slowly emerging from labs and academic environments, in search of early adopters. Today a key challenge remains in the identification of commercial use cases that allow to validate the advantages of quantum technologies in real world conditions beyond the labs.

This paper will review ongoing development programmes around the world aimed at developing Optical and Quantum communication technologies, discuss current market developments and upcoming projects. It aims to provide a wider, global perspective on the topic and to refine both the context and background on these for an interested audience.