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Author: Mr. Norbert M.K. Lemke
OHB System AG - Munich, Germany, norbert.lemke@ohb.de

Mr. Mathias Van Den Bossche
Thales Alenia Space France, France, mathias.van-den-bossche@thalesaleniaspace.com

Dr. Bettina Heim
OHB System AG - Munich, Germany, bettina.heim@ohb.de

Mrs. Stéphanie Molin
France, stephanie.molin@thalesgroup.com

TOWARDS THE SPACE COMPONENT OF THE EUROPEAN QUANTUM COMMUNICATION
INFRASTRUCTURE QCI

Abstract

Across Europe, a Quantum Communication Infrastructure (QCI) will be deployed to prepare Europe against the foreseeable threat of quantum computer on data security. This first service provided within the QCI will be Quantum Key Distribution (QKD), a technology that uses the principles of quantum mechanics to perform cryptographic tasks. In later stages the QCI will distribute quantum resources and information, connect quantum computers, simulators and sensors and could ultimately become Europe's "Quantum Internet".

The European Commission, EC, as initiator of the QCI targets public or critical-infrastructure users over the whole territory of the European Union, i.e. including overseas regions. This means that the distances to be covered by the QCI will require a terrestrial component (terrQCI), which will be network "islands" with a typical size of a metropolitan area, connected by satellite links in a space component (spaceQCI).

With a technical agreement between the EC and the European Space Agency, ESA, to collaborate in designing the QCI, the provision of pan-European, even global coverage is given. The spaceQCI will be developed by ESA, while the terrQCI will be designed by the EC in collaboration with the EU27 member countries and probably federated networks on national levels.

The three Large System Integrators in Europe take part in the EC system study on the user requirements of the QCI and prepare for the design of the space component, which shall be developed as SAGA with funds from ESA.

The paper describes the current status of the QCI system study as seen from one consortium's perspective, resulting user requirements for the complete ground/space network, and architectural options for the space component and provides key performance parameters for the space component and the free space optical quantum links.