

QKD system environmental tests results

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Nowadays due to the active development and implementation of QKD systems, there are both laboratory and industrial prototypes of QKD systems. It is an important task is to determine the operating conditions under which QKD system will not loss its operability [1]–[3]. We tested an industrial prototype of the QKD system under various temperature conditions. These tests include:

research of the behavior of crucial optoelectronic elements (phase modulator, piezoelectric element, polarization controller) when cooled to a temperature of +1 °C;

QKD system operability check when exposed to low (+1 °C) and high (+40 °C) temperatures for several hours;

research of the influence of external temperature gradients on the QKD parameters.

The QKD system was placed in a temperature chamber and held at a given temperature (+1 °C or +40 °C) for several hours in accordance with international standards (GOST 15150-69, IEC 721-2-1-82). After holding for 4 hours, the QKD system has demonstrated its operability. The main criterion for operability was the stable quantum key generation with a secret rate of 256 bits per minute.

In gradient tests, the parameters of the quantum key distribution (QBER, Secret key rate) were analyzed during cooling of QKD system. As the result of iterative cooling from +25 °C to +18 °C, to +15 °C and to +10 °C, the maximum temperature difference was determined, which did not lead to malfunction of the QKD system operation.

In addition, we tested the stability of QKD system to the impacts of humidity and vibration, as well as mechanical endurance to free fall. After conducting all of the above tests, the QKD system demonstrated operability without degradation the parameters of the quantum keys generation.

The poster will present more detailed test results of QKD system.

References

References

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