

SHORT TERM SCIENTIFIC MISSION (STSM) SCIENTIFIC REPORT

This report is submitted for approval by the STSM applicant to the STSM coordinator

Action number: CA15127

STSM title: Verification of the analytical model for calculating influence of weather conditions on FSO link capacity degradation in realistic networks

STSM start and end date: 08/05/2019 to 17/05/2019

Grantee name: Ilya Kalesnikau

PURPOSE OF THE STSM:

(max.200 words)

The main purpose of the STSM was to verify and improve the formulas that are used in the analytical model for calculating FSO link degradation coefficients with respect to adverse weather conditions. An additional purpose of the STSM was to develop a new method for representing link degradation states.

DESCRIPTION OF WORK CARRIED OUT DURING THE STSMS

(max.500 words)

During the STSM, the following tasks were carried out:

- An analytical model for calculating FSO link degradation coefficients was verified and improved. The obtained results will be taken into account in Chapter 3-11 of the RECODIS final book.
- Additionally, a new method of representing link degradation states was elaborated. This method allows for using as an improvement to the previously developed method (called the K-set method). The new method is based on a combinatorial problem called the hitting sets problem, and consists in finding an optimal family of subsets/couples of links that cover (to some extent) all the assumed real weather states and the corresponding link degradation sets.
- The previously elaborated model for optimization of FSO-based networks resilient to adverse weather conditions was extended by the above described. This extensions lead to solutions with lower cost (as compared to K-set method) while keeping an acceptable level of average carried traffic.

DESCRIPTION OF THE MAIN RESULTS OBTAINED

The main results obtained during the STSM are as follows:

- Verification and improvement of the analytical model for calculating FSO link degradation coefficients corresponding to various weather states.
- Development of an optimization model assuming a new method of representing link degradation states.
- Extension of the existing implementation of the optimal link dimensioning problem for the FSO-based networks in order to include the new method. The implementation is based on the CPLEX optimization package.

FUTURE COLLABORATIONS (if applicable)

The collaboration of Ilya Kalesnikau (the STSM applicant) with the host institution will continue in the nearest future; in particular a paper based on the results obtained during this STSM will be prepared and submitted to RNDM 2019.