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: Modeling the Capacity of Wireless Links Under Weather-induced Disruptions
STSM start and end date: 18/01/2019 to 23/01/2019
Grantee name: Jacek Rak

PURPOSE OF THE STSM:

(max.200 words)

The purpose of this STSM was to focus on analysis of vulnerability of Space Optical (wireless) links to weather-induced disruptions, e.g., due to fog or rain leading to a partial or a complete degradation of the available capacity of multiple links at a time (i.e., a correlated degradation of performance of multiple links). Special objective was on advancing the preparations of the respective chapter of a RECODIS book with a draft title being “Optimization of wireless networks resilient to adverse weather conditions”, in particular in the context of its respective part on modelling the time-varying available link capacity.

DESCRIPTION OF WORK CARRIED OUT DURING THE STSMS

(max.500 words)

During this STSM, the work carried out provided the progress in preparation of the chapter sections on modelling the weather states, modelling of availability FSO link availability states, and in formulation of the related optimization problems.

DESCRIPTION OF THE MAIN RESULTS OBTAINED

This STSM has resulted in advancement of a chapter on “Optimization of wireless networks resilient to adverse weather conditions” of the RECODIS book concerning:

a) weather states modelling (Section 2.1) based on hourly periods for which the observed weather conditions were translated into the available link capacity (each of the hourly period was described by the respective link degradation vector),
b) modelling of FSO link availability states (Section 2.2) assuming four modes of operations, i.e., the nominal link capacity under normal weather conditions with 16-QAM modulation, 75% of the nominal capacity available with the modulation scheme changed to 4-QAM, availability of 50% of the nominal link capacity with QPSK scheme, and a complete link unavailability,
c) the use of link availability models in formulations of optimization problems (Sections 4.1-4.3).

FUTURE COLLABORATIONS (if applicable)

Future collaboration of the STSM grantee with Lund University is foreseen concerning the finalization of a joint chapter of a RECODIS book (in the first half of 2019), as well as in the context of other potential joint research related to design and operation of resilient communication systems.