

SHORT TERM SCIENTIFIC MISSION (STSM) – SCIENTIFIC REPORT

The STSM applicant submits this report for approval to the STSM coordinator

Action number: CA15127

STSM title: Common Optimization Framework Wireless Networks Resilient to Adverse Weather Conditions

STSM start and end date: 18/01/2019 to 24/01/2019

Grantee name: Michal Pioro

PURPOSE OF THE STSM/

(max. 500 words)

The purpose of the STSM was twofold. The first purpose was to combine, in a common framework, the two optimization models developed so far (by me and my co-workers) for dimensioning wireless mesh networks (WMN) resilient to adverse weather conditions, namely, a model for FSO networks and a model for radio networks (taking interference into account). As in both cases the key issue is to select a representative set of weather states that capture different combinations of link capacity degradation that can occur in reality, the second purpose of the STSM was to develop a realistic network model (based on the Paris metropolitan area) for which the optimization framework in question could be applied.

DESCRIPTION OF WORK CARRIED OUT DURING THE STSM

(max. 500 words)

During the STSM, the following two research tasks were carried on:

- The two previously elaborated models for optimization of wireless mesh network resilient to adverse weather conditions (one for FSO-based networks, and one for radio networks) were unified using the AMPL modelling language, and put into a common implementation framework based on the CPLEX optimization package.
- A complete, realistic WMN network instance was designed, using the weather and population data of the Paris metropolitan area.

DESCRIPTION OF THE MAIN RESULTS OBTAINED

(max. 500 words)

The major results of the STSM are as follows:

- A common implementation platform for the two WMN optimizations models (one for FSO networks and one for radio networks).
- A realistic metropolitan network example, based on the Paris area demographic data and weather records, focused on identifying typical weather states occurring during a one year time horizon.
- A new version of Chapter 3.11 of the RECODIS book.

In summary, the results achieved during the STSM form the basis for the final version of Chapter 3.11 (devoted to optimization of mesh networks resilient to weather condition) in the RECODIS book "Guide to Disaster-resilient Communication Networks".

FUTURE COLLABORATIONS (if applicable)

(max. 500 words)

The collaboration of Prof. Michal Pioro (the STSM applicant) with Lund University in the field of resilient wireless networks optimization will continue, with a visit in Lund planned later in 2019.