

SHORT TERM SCIENTIFIC MISSION (STSM) SCIENTIFIC REPORT

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

Action number: CA15127 - Resilient communication services protecting end-user applications from disaster-based failures" (RECODIS)

STSM title: Quality of Service of wireless communications under weather-based disruptions in transport systems.

STSM start and end date: 20/02/2020 to 29/02/2020

Grantee name: Antons Patlins

PURPOSE OF THE STSM:

The main aim of my STSM is – to collect the information and materials for providing the research about: "Quality of Service of wireless communications under weather-based disruptions in transport systems".

During the STSM materials has been collected and discussed with experts. The agenda for scientific publication has been prepared.

Our Chapter #1570541994 ('Chapter 12: Quality-driven Schemes Enhancing Resilience of Wireless Networks Under Weather Disruptions'), is finished and a formally approved from book editors (many thanks to Rasa Bruzgiene and all our colleagues). During the STSM it was worked for dissemination of RECODIS results, by writing a scientific paper.

After the STSM, I plan to prepare the scientific publication and to upload it for dissemination the results of our COST-Action (RECODIS) in international scientific conference TRANSPORT MEANS – 2020 (of course, if the scientific committee of the conference will accept this article for the presentation at the Conference).

DESCRIPTION OF WORK CARRIED OUT DURING THE STSMS

Steps (activities) taken to achieve proposed aim:

- The experience of Kaunas University of Technology in the field has been obtained;
- It was identified the preliminary research agenda for preparing the scientific publication.
- The materials have been collected and studied to prepare international scientific publication for dissemination the results of our COST Action.
- Defined theme and materials has been discussed with experts and colleagues from Kaunas University of Technology;
- An adequate list of references for topic: " Quality of Service of wireless communications under weather-based disruptions in transport systems." has been collected.
- A scientific report about STMS results for the host institution and MC Chair (or the STSM coordinator) has been prepared.
- Results of my STSM has been discussed with international experts for making conclusions based on own opinion and suggestions from experts.
- As it was planed, after the STSM, I plan to prepare the scientific publication and to upload it for dissemination the results of our COST-Action (RECODIS) in international scientific conference TRANSPORT MEANS – 2020 (of course, if the scientific committee of the conference will accept this article for the presentation at the Conference).

DESCRIPTION OF THE MAIN RESULTS OBTAINED

There are a lot of scientific papers and other references have been reviewed and discussed during current STSM.

Current scientific report (approved by HOST) have been prepared.



- It was identified the preliminary research agenda for preparing the scientific publication. The materials have been collected for international scientific publication to disseminate the results of our COST Action. First draft has the structure listed below:

-Introduction – shows the actuality of current topic. Currently, the most relevant form of communication and data transferring in transport systems is wireless. Therefore, to ensure the proper level of service and security in transport systems, it is necessary to ensure uninterrupted communication in all weather conditions. The above is due to the relevance of this article. The goal of the research also is defined here - The aim of this work is to review the wireless technologies used in transport systems and offer solutions to improve the quality of service when using wireless technologies in all weather conditions.

-Chapter 1. Wireless Information and Communication Technologies in Transport Systems.

Any information processes in a particular system are associated with the transfer of information between objects or subjects of information interaction. As a means of transmitting information over a communication line, electromagnetic waves are used, which can be transmitted by wire, or wirelessly, when an antenna is a mandatory element of the receiver and transmitter. The effectiveness of the antenna depends on the frequency of the wave that it emits or receives; its dimensions should be comparable to wavelengths. Signals can be regular and irregular. A regular signal is considered as a carrier of useful information; the number of forms that he can take is strictly limited. In the transmitter and receiver there are means for extracting information from a signal of any provided (permitted) form, as well as for the inverse transformation - creating a signal that carries certain information. Irregular signals can be of any shape, they do not carry useful information and are sources of interference or disturbance. When transmitting useful information, irregular signals are superimposed on the information-carrying signals and distort them. The mathematical description of the signal is a function of a varying quantity versus time and mathematical formulas are also given here.

Wireless networks are classified here according to the classification of the International Telecommunication Union (ITU). Among individual sub-technologies, there are a variety of solutions that differ from each other according to different criteria. As a result, the key ones are given here.

-Chapter 2 - How to Increase QoS in Transport Systems.

A short literature review is given here. Given the negative impact of weather on wireless, it is obvious that in order to increase QoS, you should try to maximize the uninterrupted availability of all system functions, regardless of the availability of each of the communication channels at any given time. This can be achieved by using duplicating various communication channels, constant monitoring of the system and instant response to malfunctions by eliminating them. Two examples are also given here:

1) Quality of Service in Public Transport.

2) Quality of Service with remote monitoring and control of the vehicle route.

As well as, the approach - how to increase quality of service in transport system is offered.

The conclusions also have been made at the end of the article.

- As it was planned, after the STSM, I plan to prepare the full scientific paper and to upload it for dissemination the results of our COST-Action (RECODIS) in international scientific conference TRANSPORT MEANS – 2020 (of course, if the scientific committee of the conference will accept this article for the presentation at the Conference).

FUTURE COLLABORATIONS (if applicable)

Discussions about possible further cooperation between Riga Technical University and Kaunas University of Technology has also been performed.

Hopefully, possible further cooperation with colleagues from COST Action CA15127 "Resilient communication services protecting end-user applications from disaster based failures" (RECODIS) will bring very best experience.

Grantee (STSM applicant):



/Antons Patlins/ (29. February 2020)

Approved by Host:



/Robertas Kersys/ (29. February 2020)

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