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: Resilient communication services protecting end-user applications from disaster-based failures (RECODIS)
STSM start and end date: 12/03/2019 to 18/03/2019
Grantee name: Torsten Braun

PURPOSE OF THE STSM:
Mobile Edge Computing (MEC, aka Multi-Access Edge Computing) is an emerging network paradigm in future mobile networks, in particular in 5G and beyond networks for Ultra-Reliable Low Latency Communications. MEC aims at pushing services for applications towards virtualized computing and storage infrastructures at the edge of the network, e.g., close to the wireless base station, such that communication between user equipment and service entity experiences low delay. Moreover, adaptation to wireless link level characteristics can increase the reliability of the communication, e.g., by adapting media encoding and forward error correction in the communication depending on physical layer link characteristics such as signal strength, packet loss, etc. An important MEC service is caching, which allows to provide requested content with low delays to the users. Caching can be supported by proactive content placement and / or communication mechanisms with built-in caching support such as Information-Centric Networking (ICN). Thus, MEC can be considered as a promising mechanism to support ultra-reliable and low-delay communication. On the other hand, in a mobile scenario with highly mobile users (pedestrians, vehicles), content and services might have to migrate through the network as users migrate through the network as well. This might have some impact on the reliability and delay for the services offered to the end user. Moreover, the deployment and instantiation of MEC services might raise a reliability issue as well. Thus, while MEC can improve latency and reliability of services, reliability measures for MEC must be foreseen as well.

The STSM discussed and investigated the opportunities and challenges of MEC and ICN to support ultra-reliability and low-latency communications. We started to draft an overview of the state-of-the-art on reliability and low-latency in MEC- and ICN-assisted networks.

In addition, new research challenges have been identified. We aim to develop new research proposals on such topics. More detailed topics addressing low-latency and ultra-reliability in MEC and ICN-assisted networks are
- (ICN) Caching
- Proactive content placement
- Virtualization techniques for MEC
- Service placement and load balancing
- Service migration
- Mobility prediction
- Applications for URLLC communications, in particular virtual and mixed reality

DESCRIPTION OF WORK CARRIED OUT DURING THE STSMS

We have started a literature study on the related work in MEC and ICN to support ultra-reliable and low-latency communications. More details see in the Description of the main results. The literature study will be the basis for a chapter of the planned RECODIS book.
A seminar talk has been organized. More information about the talk is available at https://www.cisuc.uc.pt/home/news/deicisucseminars28

There were several discussions between the grantee and other professors at Universidade de Coimbra, namely Prof. Edmundo Monteiro, Prof. Marília Curado, Prof. Fernando Boavida, Prof. Helder Araujo, Prof. Paulo Simoes on the topics of the seminar talk as well as on potential topics for future research projects and collaborations.
DESCRIPTION OF THE MAIN RESULTS OBTAINED

For the RECODIS book a chapter on "Resilience in Information-Centric Networks" has been drafted. The chapter is currently based on the following references:


FUTURE COLLABORATIONS (if applicable)

Universidade de Coimbra and Universitiät Bern identified several topics to be considered for upcoming EU project proposals. Such topics are 5G and beyond networks, fog computing, Internet of Things (in particular security). We mutually plan to assign co-referees for upcoming Ph.D. thesis defenses.