VRG23-002 - ASUCAR: Achieving SUstainable, sCAlable, and Resilient wireless networks

Abstract

Previous research into improving the performance of wireless networks has produced impressive results. These results have led to wireless networks now playing a central role in our daily lives. In addition to new entertainment possibilities, wireless networks are an important part of basic infrastructures such as water supply, power grids, transportation, agriculture and logistics networks. However, for safety-critical applications such as these, performance alone is not enough. Our reliance on wireless networks brings sustainability, scalability and resilience to the fore, especially when it comes to wireless connectivity between end devices such as smart sensors, smartphones, tablets and laptops and the network's base stations and access points. Until now, however, the focus has been on increasing network capacity, while other important aspects, such as those mentioned above, have received little attention. To close this gap, the ASUCAR project focuses on achieving sustainability, stability and robustness in wireless networks. The aim of the project is to further develop wireless networks so that they not only function optimally, but are also robust, adaptable and environmentally friendly in order to meet the diverse and ever-changing requirements of our networked world.

 In our project, we consider dynamic wireless communication scenarios where users are constantly on the move, communication load varies, communication resources are unevenly distributed and user requirements are constantly changing. Furthermore, we assume that in real-world applications we often do not have perfect knowledge of network conditions. For example, privacy requirements may restrict access to certain information. Our main focus is therefore on developing advanced algorithms for wireless networks that can work effectively despite uncertainty about the network and its users. To overcome this challenge, we apply methods of numerical optimization, machine learning and game theory. This is how we manage to stay connected under all circumstances!

Scientific disciplines:
Communication engineering (50%) | Telecommunications (30%) | Network engineering (20%)

Keywords:
Wireless Networks, Sustainability, Scalability, Resilience, Radio Access, Networks

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VRG leader: Andrea Patricia Ortiz Jimenez

Institution: Technische Universität Darmstadt

Proponent: Markus Rupp

Institution: TU Wien

Further links to the persons involved and to the project can be found under

https://wwtf.at/funding/programmes/vrg/VRG23-002/