Enabling connected mobility via reliable and low-latency communication

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In an increasingly connected world, cooperation among and between people and devices is key to boost innovation, to improve quality of life, and to build a sustainable society. In this context, wireless technologies revolutionized the way in which people and devices interact, providing connectivity on the move and enabling novel cooperative services with stringent communication requirements. A prominent example of such service is Cooperative, Connected and Automated Mobility (CCAM), which has the potential to substantially increase the safety and the efficiency of future transportation systems. Recent advances in wireless networking, which are delivering increased speed and higher reliability, are opening opportunities for novel CCAM use cases based on real-time sensor information shared among connected and automated vehicles. Technologies and standards in the IEEE 802.11 and 5G ecosystems are being developed to address the stringent communication requirements of CCAM applications.

At the same time, modern vehicles integrate hundreds of embedded devices forming complex wired on-board networks. Many of these on-board networked systems are successfully fulfilling stringent system and communication requirements, such as deterministic and very low end-to-end latency and jitter, zero packet loss due to congestion, and tight synchronization between data producer and consumer. These requirements are addressed by ongoing standardization efforts, such as the ones developed by the IEEE Time-Sensitive Networking (TSN) task group.

In this talk we explore the main technologies enabling future CCAM services and applications. In particular, we describe the main standards, recent advances, and open challenges of wireless Vehicle-to-Everything (V2X) communications and wired intra-vehicle networked systems. We also discuss the main challenges that such isolated wired on-board networks face when opportunistically exposed to other similar networked systems via a wireless interface in a highly dynamic manner. Finally, we discuss the potentials of mixing TSN wired networks and best-effort wireless networks for V2X.