Ethical and privacy issues in autonomic vehicular networks

Dr. Gérard Le Lann

Abstract

The Trolley Problem (TP) serves as an introduction to ethical issues that arise with partially and fully automated vehicles: when there is no alternative, how to “choose” a victim? Since human injuries and fatalities are the most appropriate “yardstick” of safety, it makes sense to examine the (wifi-based) V2X and the (cellular radio-based) C-V2X solutions currently promoted by the Cooperative Intelligent Transportation Systems community. A worrisome conclusion is that safety can be compromised by remote cyberattackers. Moreover, these solutions favor privacy threats, via path tracking as well as by collecting data carried in broadcast V2X messages. Pseudonym schemes do not help, owing to mandatory periodic beaconing. Fortunately, there are solutions (with proofs) to the overall problem of safety and privacy and efficiency and cybersecurity in autonomic vehicular networks. Hints will be given in the course of this presentation.

Short bio

Dr. Gerard Le Lann holds French degrees, a M.S. in Applied Mathematics (University of Toulouse), an Engineering Degree in Computer Science (ENSEEIHT, Toulouse), and a Ph.D in Computer Science (University of Rennes). He started his career at CERN, Geneva (Switzerland), and joined IRIA (now INRIA) in 1972. His main areas of research are distributed dependable computing and networking, real-time computing and networking, proof-based system engineering and, more recently, mobile wireless safety-critical cyber-physical systems, including ad hoc vehicular networks. At Stanford University (1973-74), working with Professor Vint Cerf, he was involved in the design of what became known as the Internet TCP/IP protocol.

In 1977, he published one of the founding papers on distributed fault-tolerant computing. In the early 80’s, he published innovative results on non-blocking concurrency control in distributed databases, which work was eventually transferred to Digital Equipment Corp. In the mid 80’s, he co-patented a deterministic version of the Ethernet protocol, which became a French Navy standard. More recently, he has been conducting research on safety and privacy issues as they arise with fully automated driving. He has published on time-
bounded wireless communications, distributed agreements and distributed real-time transactions in ad hoc vehicular networks, based on radio or optics.

In 2012, G. Le Lann has received the Willis Lamb Prize from the French Academy of Sciences for his work applicable to defense systems.

Besides its current affiliation with INRIA as Research Director Emeritus, G. Le Lann is an international consultant. He has conducted a number of audits and managed more than 60 contracts in his research areas, for US, European, and French organizations or companies.