Chapter 4
Safety and Commercial Applications

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ABSTRACT
Applications in Vehicular Networks are the main motive for all researchers and vehicle manufacturers to design new protocols; technologies and implementations that allow a specific type of applications. The chapter starts with different classifications of Applications in Vehicular Ad-Hoc Network (VANET). Then, it gives a background on Applications in VANET. Then, it discusses different categories of applications in details starting with different types of safety application and commercial applications. It compares between communications in high and low safety application. Then, it describes in details monitoring, service applications and a view on entertainment applications. Finally, it will explain the requirements for real-time applications. At the end, the chapter gives some case studies for applications.

INTRODUCTION
Top vehicle manufactures are competing to the new technology of Vehicle-to-Vehicle communication (V2V) or Vehicle-to-Infrastructure (V2I) targeting the idea of improving their vehicles to improve the market. General Motors, Opel, Ford and Volvo are examples for manufactures that trying to improve themselves in this field. General Motors is focusing on ‘Vehicle-to-X’ communication system that is independent of the manufacturer or vehicle-type.

In June 2007, (General Motors Website) General Motors (GM) announced on its official website the start for a new era of vehicles by developing vehicles with a Sixth Sense. On the other hand, (Ford Website) Ford designing ‘Smart Intersection’ technology, which relies on GPS and wireless communication technologies to enable traffic lights and street signs to send warnings to approaching vehicles. Furthermore, Nissan and (Volvo Website) Volvo have confirmed similar systems.

There are many classifications for applications in Vehicular Networks. One of these classifications is using three categories for application depending
on the method of technology used for communications: Santa, J., et al (2008) used Vehicle-to-Vehicle, Vehicle-to-Infrastructure or a combination between both technologies. Blum, J. et al (2004) used another method which is to classify them to Safety Oriented, Convenience Oriented and Commercial Oriented. Our vision of classifications is a multi-level classification, level one: is to divide it into two categories of Safety Applications and Commercial Applications. Then, sublevel divides Safety Applications into two other categories of Low Priority Safety Applications and High Priority Safety Applications. On the other hand, Commercial Applications is divided into two other categories of Monitoring & Service Applications and Entertainment Applications. Figure 1 below shows this classification.

Safety and commercial applications are two different categories in Vehicular Ad Hoc Network (VANET). In general, real-time applications are a very challenging issue in Vehicular Networks. Commercial applications including entertainment applications, advertising applications, information guiding applications and shopping applications are less challenging than safety applications. Commercial applications – others (Jordan, R. et al 2004) call it Comfort Applications- can be defined as a user application that requires a subscribing to receive specific type of data from specific locations. It includes the vehicle acceptance to generate data periodically or respond to some events. End-users or drivers may accept a delay or even a loss of data in commercial application for a specific margin. On the other hand, drivers will not accept the chance of risking their life or even relaying on applications that has a small margin of error. Safety application can also be categorized into two different types: High Priority Vehicle Safety and Low Priority Safety. First type includes the notifications of sudden problems that would result in a sudden accident or a vehicle, while the latter is more related to the passenger notifications of incident ahead or road weather prediction can be called “Advisory Message Delivery” as mentioned by Schagrin, M. (2008); which gives the driver the option to choose if he/she would prefer to continue driving or take another decision as taking a rest for a period of time.

Applications in VANET focus on a reliable communication that gives a guaranteed real-time message delivery. Different types of applications have been discussed recently by researchers: Emergency electronic Brake Light which is the first vehicle to vehicle cooperative active safety
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