Document Information

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3.3 Lane Change Warning / Blind Spot Warning (LCW/BSW)

3.3.1 General description

The Lane Change Warning and Blind Spot Warning (LCW/BSW) application is intended to warn the rider of a PTW during a lane change attempt if the blind-spot zone into which the PTW intends to switch is, or will soon be, occupied by another vehicle traveling in the same direction. Moreover, the application provides information that is intended to inform the rider that another vehicle in an adjacent lane is positioned in a blind-spot zone of the vehicle even if a lane change is not being attempted.

3.3.2 Use case description at PTW side
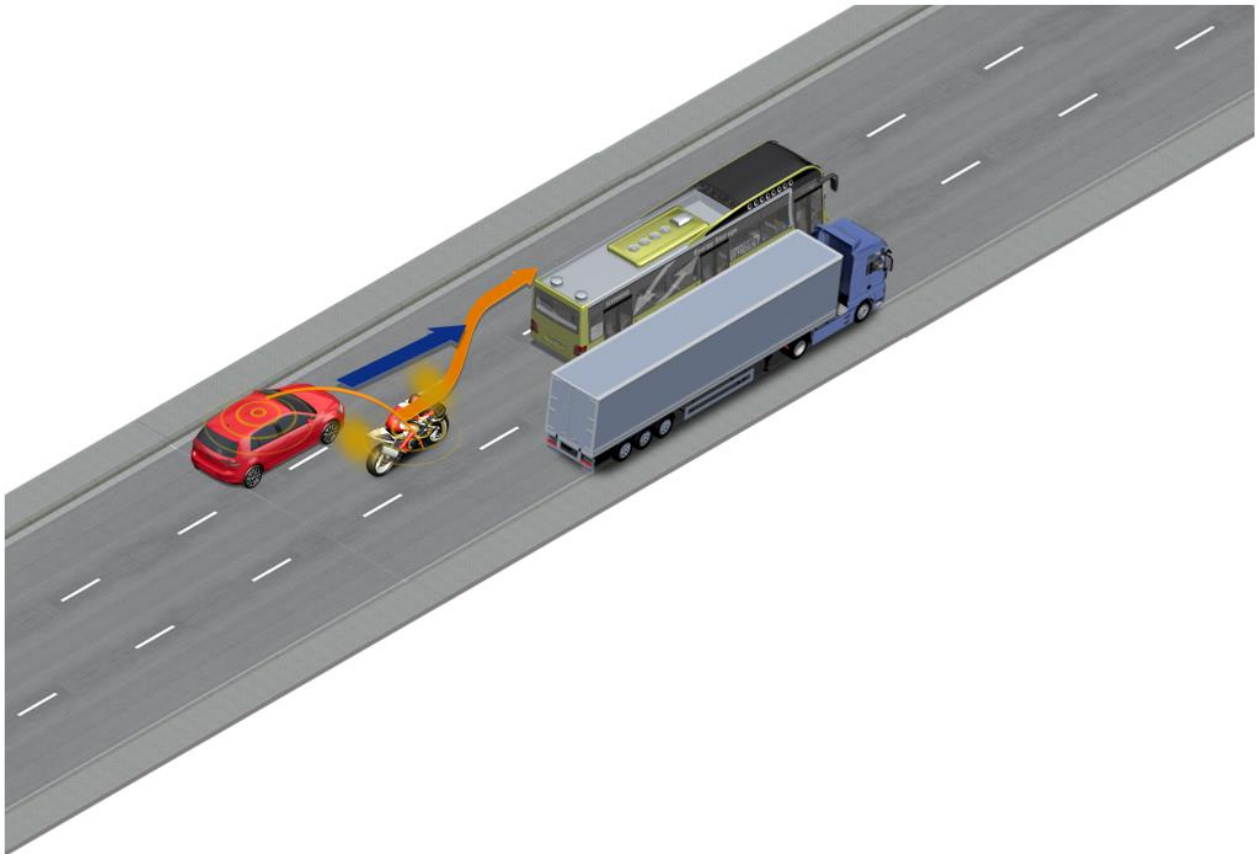
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Figure 1: General overview

The LCW/BSW application can operate on any kind of road, like highways, country roads and urban environment, as long as there are at least two lanes leading to the same direction. It shall prevent accidents caused by lane changes whilst other vehicles are entering a predefined blind spot area or driving therein.

Those use cases require very accurate positioning, at least lane level, and are purely based on own vehicle data and processing received CAM. The example scenario shows a PTW, which is going to overtake the bus in front of it but didn't notice the car from behind. Due to the received CAMs, the C-ITS System recognizes the car being in the blind spot and provides a Blind Spot Warning to the rider. There are different use cases to consider, a few of them are explained hereafter.

There are two scenarios for this use case to consider.

PTW transmit CAM where the PTW is located in the blind spot area. The C-ITS System continuously sends CAM and no extra calculation will be done on the ego vehicle.

PTW receive CAM where the PTW executes the lane change. The calculation is processed at the ego vehicle receiving CAMs and, if required, warns the rider about the occupied lane.

3.3.2.1 Scenario description: PTW transmit CAM

In this scenario, the PTW sends CAMs and causes another vehicle to show a Lane Change Warning or Blind Spot Warning. That will happen, when the PTW is driving in the blind spot of another vehicle, which is going to change lanes.

Some examples are stated below:

PTW overtaking a turning vehicle

The PTW is overtaking the car, which is going to turn left. If the car turned left without noticing the PTW, it would come to an accident. This is a very common scenario. By processing the CAMs sent by the PTW, the car will provide a Lane Change Warning to the driver. In addition, PTW will provide a Do Not Pass Warning to the rider. Thus, they will be able to avoid an accident.
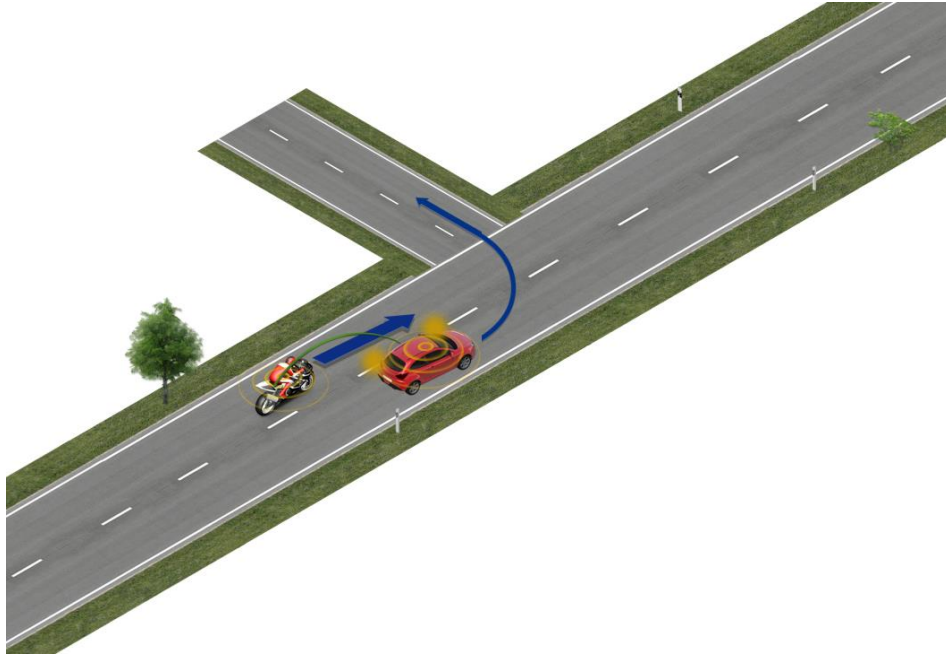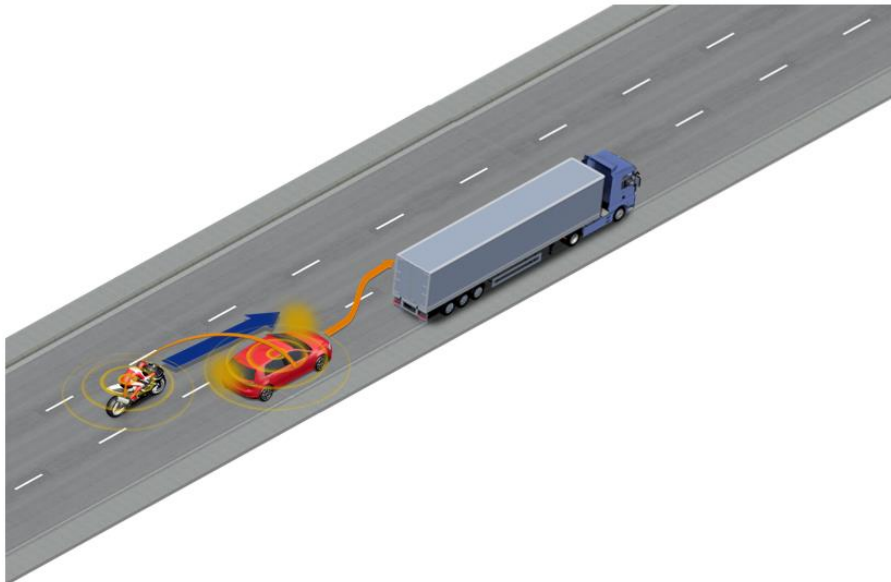
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Figure 2: PTW overtaking turning vehicle

PTW in blind spot of another vehicle

The car is going to change lanes to overtake the truck but doesn't notice the PTW behind it. The PTW is sending CAMs. The car is receiving and processing the PTWs CAMs and will provide a BSW to the driver, so they can cancel its lane change attempt.
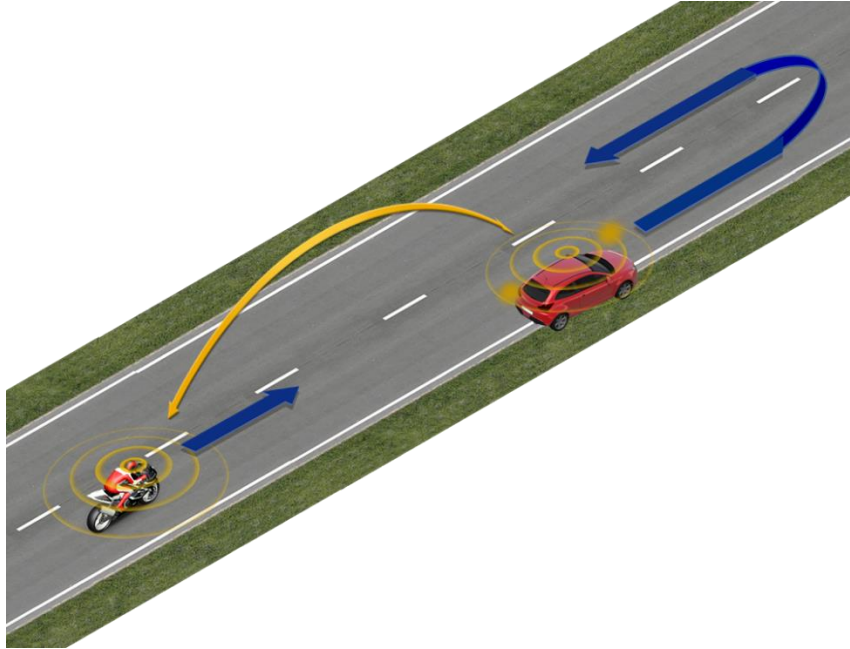

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Figure 3: PTW in the blind spot of another vehicle

PTW not recognised by U-turn vehicle

The car is going to perform a U-turn but doesn't notice the PTW coming from behind. The PTW is sending CAMs. The car is receiving and processing the PTW's CAMs and will provide a LCW to the driver, so they can cancel its lane change attempt.

*Figure 4: PTW not recognized by U-turn vehicle*

3.3.2.2   Scenario description: PTW receive CAM

In this scenario the PTW receives messages from another object. Those are processed by the PTW and a Lane Change Warning or Blind Spot Warning will be provided to the rider, if necessary.

An example is stated below:

Overtaking on a multilane road

The PTW is going to overtake the bus in front of it and didn't notice the car on the adjacent lane. The car is sending CAMs, which are processed by the PTW. The PTW will provide a LCW/BSW for the rider to be able to avoid an accident.
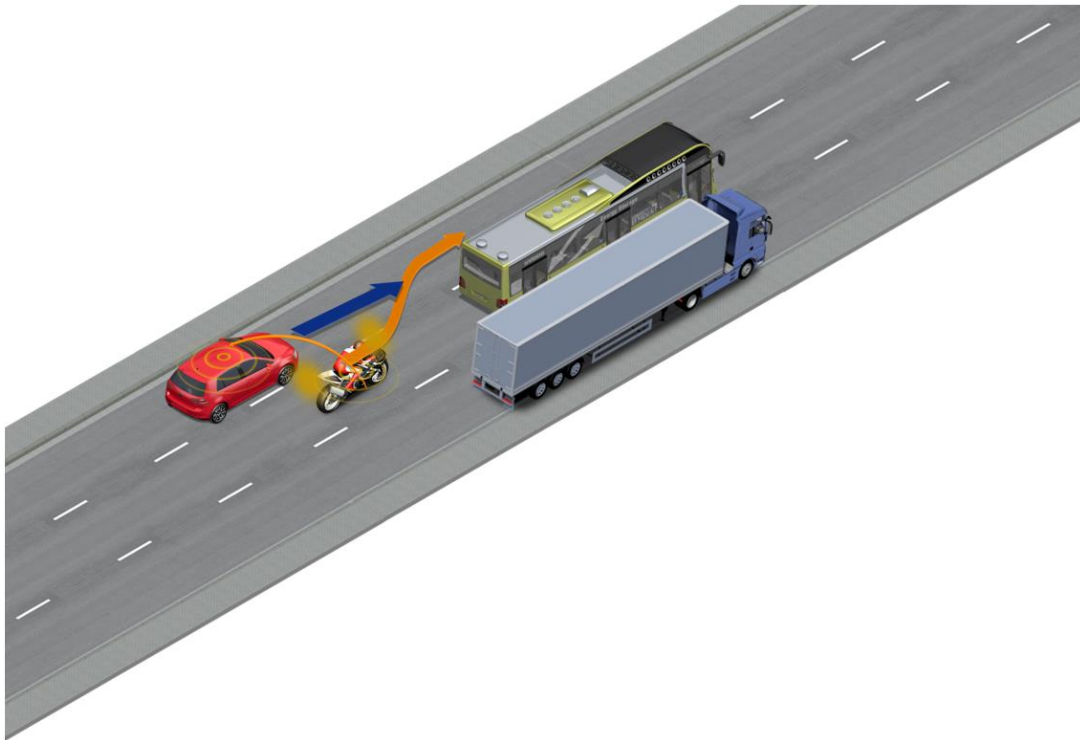
Figure 5: Overtaking on a highway

3.3.3 Use case description at car side

This section shows the request for consideration of the PTW specific issues to car OEMs.
Due to the PTW's high mobility, it is possible that the PTW will filter through by utilising a small amount of space. In other words, the potential of collision risk between a car and the PTW approaching from behind is remaining, even with car's small movement in traffic jam or when the car's not moving at all.
Even if LCW/BSW application of car side suspend warning temporarily to avoid annoying warning in traffic jam situation, please continue to supply LCW/BSW warning against PTW to driver because PTW may come.
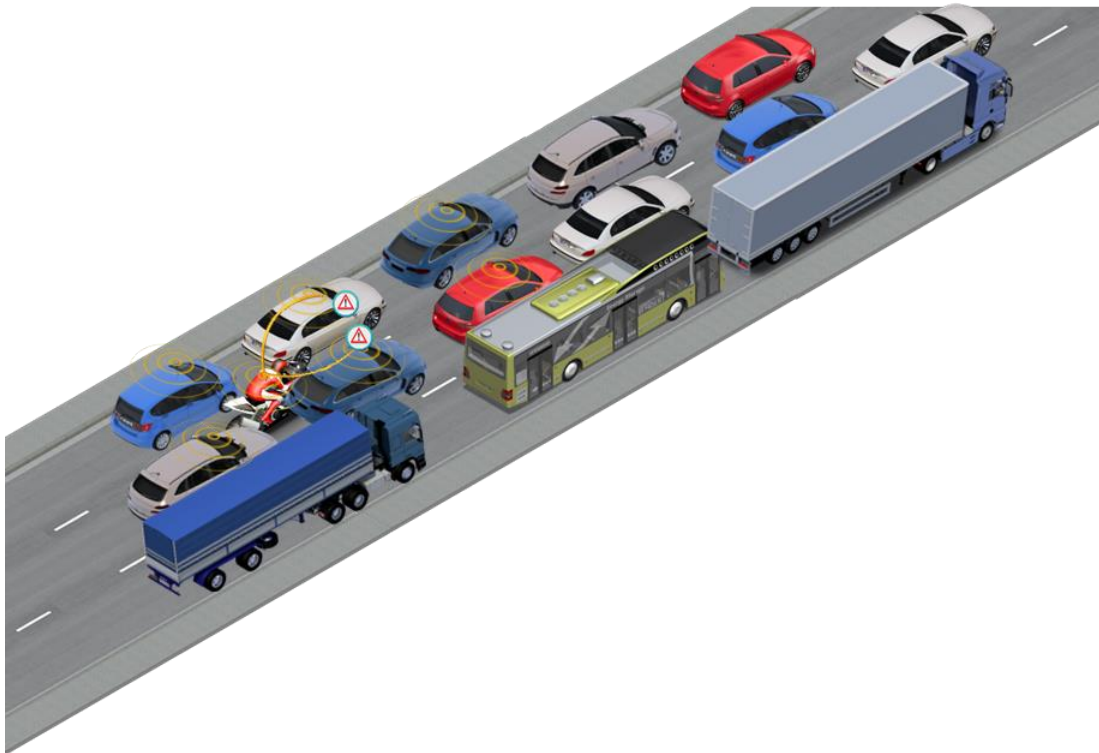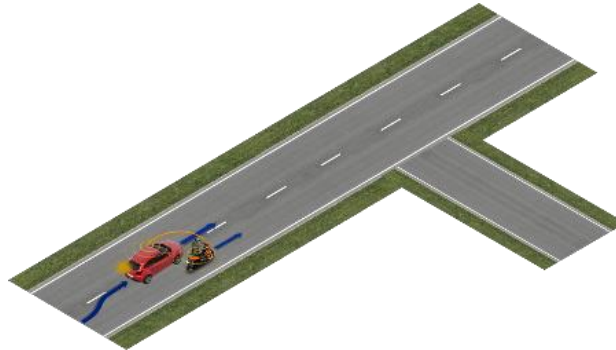
Figure 6: Request for continuation of LCW/BSW warning against PTW in traffic jam situation

In addition, if a car turns right after overtaking PTW, PTW may exist in blind spot. Therefore, please continue to supply LCW/BSW warning against PTW to driver even in the case of right turn.

Time sequence 1

Time sequence 2

Time sequence 3

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Figure 7: Request for continuation of LCW/BSW warning against PTW when car turn right

Abbreviations

Please refer to the abbreviations in Preamble document.