Daimler’s Perspective on Car-to-X Technologies (5GAA member)
On the road until cars communicate directly …

- Over 90% of new Mercedes-Benz cars are already connected worldwide
- Daimler runs reliable backends to bring connected services to cars since years

→ Why not using existing technology to enhance the safety experience now?

Mercedes-Benz offers **communication between cars** since new E-Class in 2016 – „Car-to-X communication **via backend**“:

- More safety to our customers earlier
- Manageable small implementation effort and very short development time
- Fast rollout to main markets (EU, US, CN)
- Easy technology adoption to further car lines (S-Class done, A-Class soon)
- Many safety use cases from Car-to-Car direct communication standards are covered
Car-to-X via Cellular Radio in E-Class 2016

- Cellular Radio
- Communication Module
- Navi

- Mobile work zone live from the trailers (market dependent)
- Daimler Vehicle Backend
- Cars are connected to the Daimler Vehicle Backend
- Data filtering and aggregation
- Markets: USA, EU, China
- Security and Privacy ensured
- OEMs and Data supplier are invited to share

- Event detection and plausibility check
- No additional components necessary

- Data relevance check
- Display icon on map and generate speech output
## Car-to-X via Cellular Radio in E-Class 2016

<table>
<thead>
<tr>
<th>Event</th>
<th>Triggering Conditions</th>
<th>Icon on Map</th>
<th>Speech output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broken down vehicle</td>
<td>Vehicle system signals</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Vehicle accident</td>
<td>Air bag inflation and others</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Hazard lights</td>
<td>Hazard light on</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Heavy Rain</td>
<td>Highest wiper level for 20 s</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Slippery road</td>
<td>Antilock braking system intervention</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Fog</td>
<td>Rear fog light on</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Mobile work zone</td>
<td>External data from work zone trailers</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>General Warning</td>
<td>Driver manual input</td>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>
Next steps on Car-to-Car communication …

• Enhance driver safety by
  – sharing data among different OEM platforms through HERE
  – receiving data from ITS infrastructure and Smart Cities
• Improve data transfer by using 5G technologies (e.g. QoS, latency)
• Avoid even more safety hazards by continuously improving sensor technologies
→ Direct communication can enable new safety use cases (e.g. V2P) and comfort driving use cases

This adds technical challenges including the debate on ITS G5 802.11p versus C-V2X:

• Low safety benefits and customer acceptance inhibited by slow market penetration
• Higher car integration costs expected to come along with 802.11p
• Coexistence of 802.11p and C-V2X in same ITS spectrum (5.9 GHz) is needed
Daimler’s position on ITS G5 802.11p and C-V2X

• Technology neutrality is crucial

• Sufficient spectrum allocation for technology coexistence is required

• For cars C-V2X is preferred because it:
  – is the natural path to expand connected cars based on mobile networks
  – will be rolled out to cars much faster (update of mobile connectivity equipment)
  – will add additional potential safety improvements (e.g. to pedestrians)
  – will have lower investment impact to cars