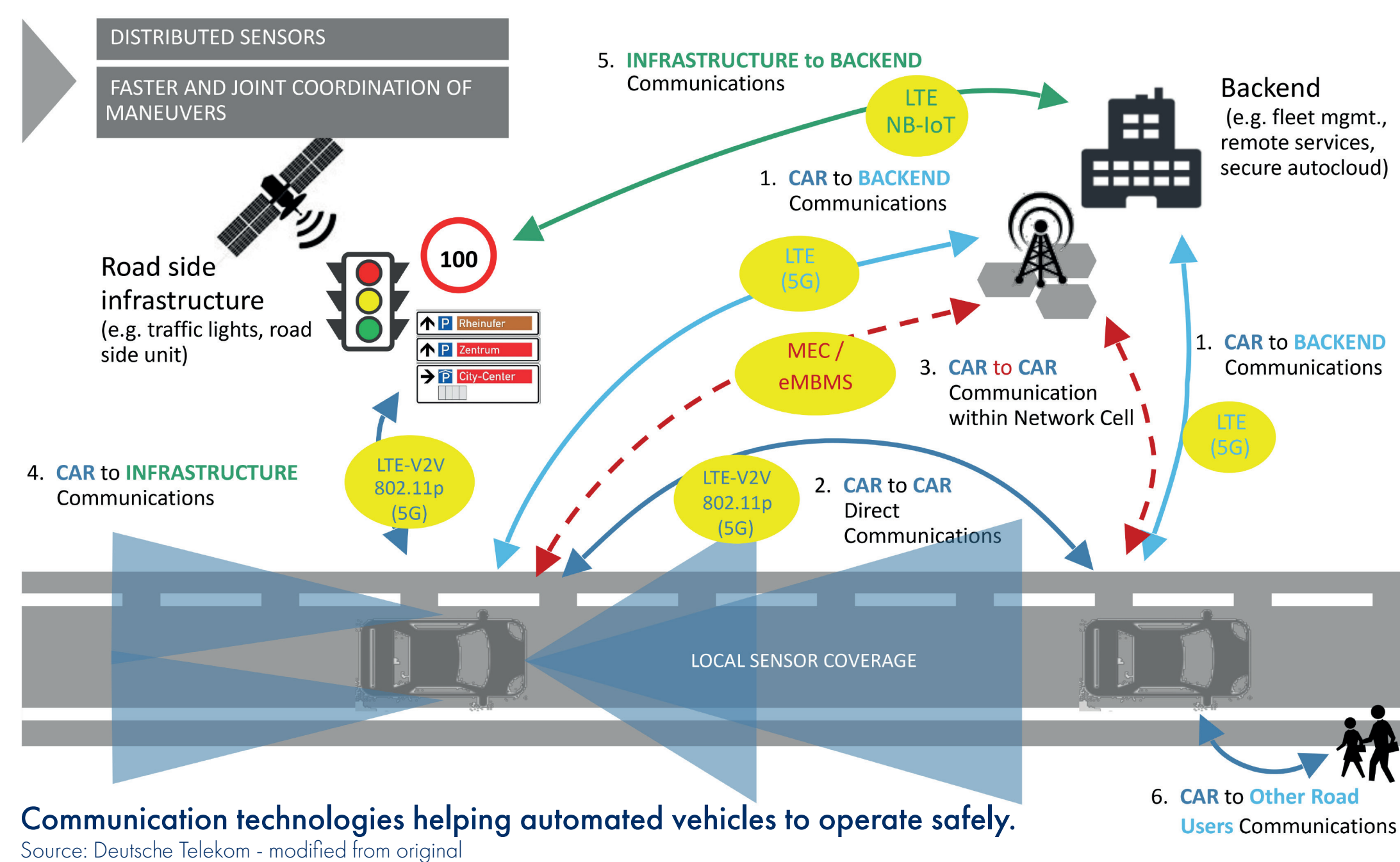




This thematic area identifies the future needs for connectivity of higher levels of automation. Vehicle-to-everything (V2X) connectivity, in its various forms, will act as an additional enabler for the highly and fully automated vehicles. Industry efforts to develop V2X for highly and fully automated vehicles have accelerated significantly and will eventually lead to 5G working jointly with standards such as ITS-G5 and C-V2X. The development of viable V2X business models will be as essential to a sound and safe deployment of CAD.



Statements

- L2 CAD cannot (and will not) wait for wider penetration of V2V/V2I
- Current C-ITS standards do not yet answer the needs of automated driving especially for safety critical functions
- L4 CAD will require reliable low latency connectivity to a vehicle cloud to address liabilities
- Internet of Things have similar horizontal security and privacy issues
- Vehicle clouds and their interfaces to the service clouds will offer a viable solution
- Connectivity reliability, quality, coverage will always remain an issue today or in 2040 but at different levels of QoS

Challenges

- **Back-end connectivity:** Is it needed for L2 CAD? Can it solely rely on its own sensors? What about L4 and above? If yes, what performances are required? What if the communication fails?
- **Traffic information:** Where should geo-located traffic information from vehicles or/and from traffic operators be published and disseminated: In short range, on an access point or/and on an IoT platform?
- **Privacy and security:** How do we ensure privacy and security concerns are addressed in order to build up trust among the users? Should CAD vehicles mostly rely on their own sensors to make safety critical decisions? Can V2V data be considered as another sensor?
- **V2V penetration:** Should higher levels of automation wait for higher penetration of V2V equipped vehicles?
- **“Killer” applications:** Are CACC and platooning the best level 1-2 applications motivating V2V equipped vehicles?
- **Functional Safety:** How can a CAD vehicle integrate V2V data in its safety-critical decisions?
- **Safety for All:** How do we ensure safety of all road users? How do pedestrians, bicyclist and bikers participate in the V2V short-range ecosystem?

Future Research Needs

- Next generation of V2V-V2I protocols and communication technologies in view of integration with functional safety
- Further work to guarantee independence of the communication stacks in the C-ITS standards
- Privacy & security need to be addressed across sectors with common horizontal approaches
- Vehicle clouds should be encouraged as an extension of the vehicle on-board sensor platform and their interfaces to the service clouds as long as we keep fair access to data and freedom of choice
- Address CAD connectivity needs on a long term basis considering gradually higher levels of automation as new communication technologies are being deployed

