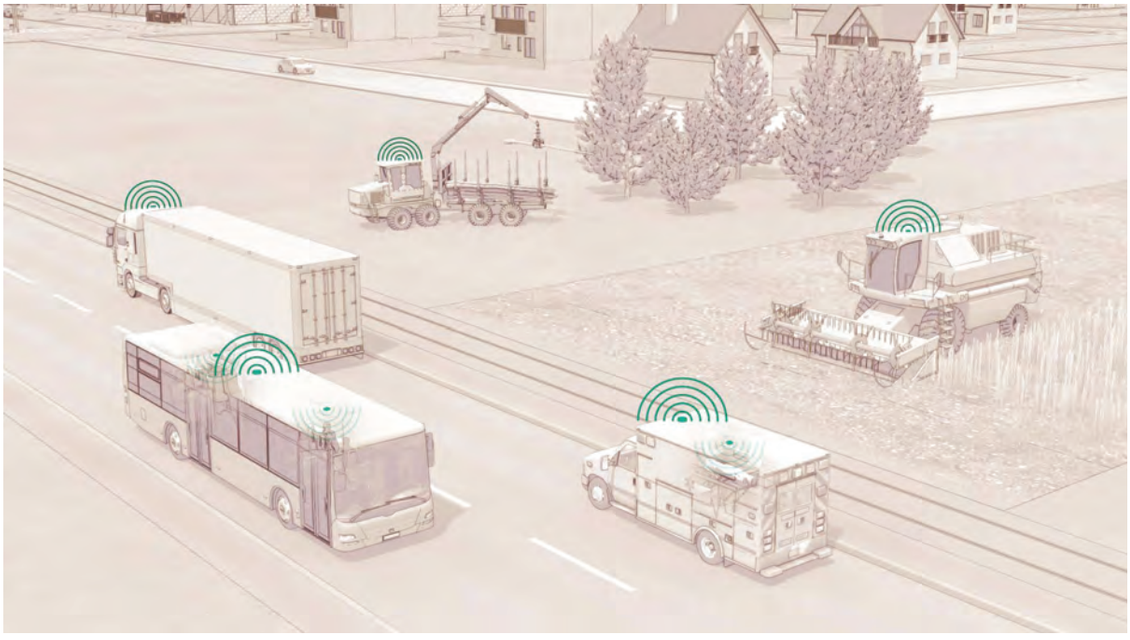
Supporting an evolving automotive market with the latest communication technologies

By Michael Thiel, product manager, antennas at HUBER+SUHNER



The commercial vehicle market – and the technologies used within it – has become increasingly diversified in recent years. On the road, buses, trucks or emergency service vehicles all require upgraded wireless connectivity for a multitude of reasons, whether it's for precise positioning, real-time communications or for systems that are capable of reducing accidents when on the move. At the same time, new technologies are driving a transformation in agricultural and forestry, coinciding with the rise of autonomous machinery. As we look to the future, new micro mobility options such as e-bikes will come to the fore, and therefore reliable connectivity is key if intelligent, seamless and environmentally friendly applications in all areas are to be achieved.

By listening to their customers and monitoring the needs of the automotive industry, vendors are now bringing exciting products to market which will make this a reality. This includes innovative antennas designed to support the numerous applications and new concepts emerging within the market.

Embracing innovation

When we think of vehicles connecting and communicating with the outside environment, in the past this has mainly concerned broadcasting services, alongside the support of cellular functionality inside the car or basic navigation services. Now, advancements through Vehicle-to-Everything (V2X) technology enable the delivery of real-time traffic information through on-board communication, with automakers meanwhile integrating these concepts in their vehicles. Along with V2X, drivers and passengers can be notified of traffic activity close to them, road warnings, adverse road conditions and other elemental factors instantly. This gives them adequate time to take appropriate action and avoid potential incidents. By incorporating different Global Navigation Satellite Systems (GNSS) services, including e.g. GALILEO, manufacturers can now provide maximum positioning accuracy to enhance road safety across the board. However, the vast majority of these services do operate on different frequency bands, and any solution designed to utilise GNSS must cover both the upper and lower L-Bands if they are to successfully support the receivers in the vehicle.

As a result, we are now seeing antennas on the market that have integrated dual band GNSS to support this concept. Not too long ago, having precise location data at a range of over ten meters would seem impressive. Now these solutions are able to provide enhanced positioning down to the centimetre range, depending on the receiver architecture implanted by the manufacturer.

Generally speaking, the latest solutions cover the L1, L2 and L5 bands to provide the required multi frequency reception to customers, alongside the E5a and E5b bands needed to support GALILEO services. Of course, there are other navigational services found across the globe such as BeiDou, which is now fully operational in China and the Indian system IRNSS, though this provides regional information only. These are also able to be represented through the new generation of antennas, such as the SENCITY Road MULTI from HUBER+SUHNER, which offers an adaptable solution to support dual band GNSS connectivity for commercial vehicles found across the globe. Alongside this comes an improved filtering to avoid interference with other e.g. cellular services in 5G.

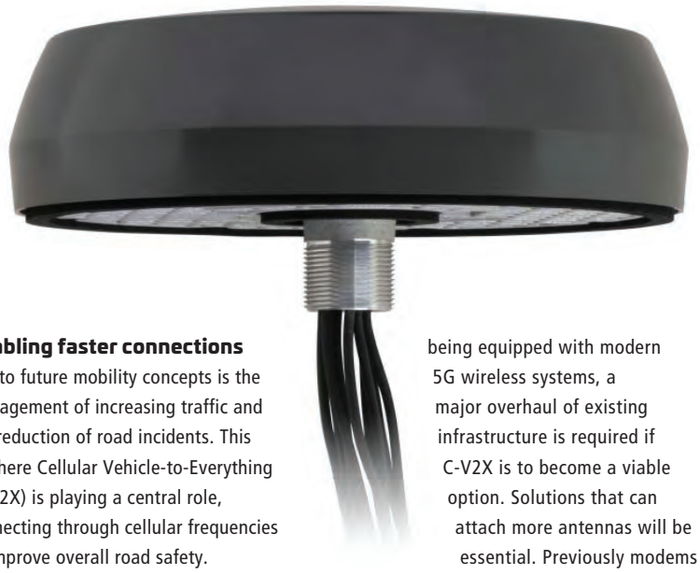
Enhanced performance

Now reliable positioning has been established, many applications benefit from this, including the blue light services responsible for maintaining public safety. Knowing the exact position of where an emergency call took place enables the quick re-direction of nearby emergency forces, resulting in these arriving faster to the incident. Furthermore, any valuable information regarding location, building or video communications can be handled through upgraded systems that are crucial for such critical communication scenarios.

Terrestrial Trunked Radio (TETRA), a global standard for digital radio communications operating in the 380-430

MHz frequency range, is primarily used by blue-light and military crews today owing to the high-voice quality and high secured transmission it offers. However, recent developments in wireless communication technologies have led to the increasing use of LTE450, which provides greater bandwidth while maintaining the same propagation characteristics essential for long-range communication.

The key to successful execution of critical operations is the use of both TETRA and LTE450, which necessitates the use of technologies capable of integrating both at the same time. Designed to be rugged and adaptable, and therefore perfect for mission-critical applications, new antennas like the SENCITY Road MULTI are now able to cover the 380-470 MHz frequency range, capable of providing a strong download link and a higher data rate. If additional capacity is required, modems can integrate an extra antenna connection. Through the connection of two antenna ports, greater performance and consistent communications can be achieved on the move, no matter the location or situation. Ideally, such installations will use antennas that provide multi elements within a single housing.



Enabling faster connections

Key to future mobility concepts is the management of increasing traffic and the reduction of road incidents. This is where Cellular Vehicle-to-Everything (C-V2X) is playing a central role, connecting through cellular frequencies to improve overall road safety.

To avoid collisions, low latency is key, and any information transmitted must relate to the location of vehicles that are moving within the same vicinity, in real time. The connectivity delivered through C-V2X can achieve this. 5G can underpin video surveillance and passenger information systems, increasing security and making roads safer for drivers. With the vast majority of current vehicles not being equipped with modern 5G wireless systems, a major overhaul of existing infrastructure is required if C-V2X is to become a viable option. Solutions that can attach more antennas will be essential. Previously modems could typically utilise two antennas for cellular connectivity, but the recent advancements now mean up to four need to be attached.

4X4 MIMO offers a number of major advantages to best support 5G network connectivity, producing a higher data rate for faster upload and download speeds, as well as redundancy. Antennas like the SENCITY Road MULTI have been designed with these modems in mind and surpass consumer expectations where connectivity is concerned.

An evolving automotive landscape

Advanced connectivity solutions hold the key to successful expansion and diversification within the automotive sector. The industry is experiencing rapid changes with the rise of diverse mobility, autonomous driving, electrification and connectivity, and all commercial vehicles can benefit from these trends so long as the right solutions are in place. Utilising one or a combination of the latest technologies in 5G, GNSS or Wi-Fi can not only vastly improve the connectivity available to vehicle users, but also general road safety, vehicle positioning, and many other transformative use cases. With the data exchange between vehicles, a truly connected system can be designed no matter if it is a bus, truck, agricultural vehicle, emergency vehicle, or a new form of commercial transportation coming to market.

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