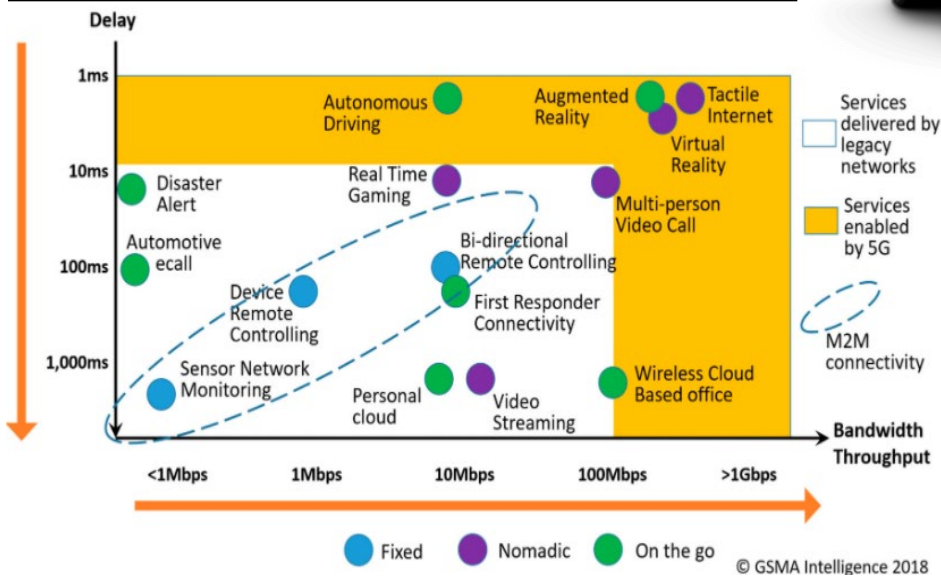


Mass implementation of 5G: An analysis of future safety and autonomous driving capabilities of commercial vehicles

Created by Jamie Groves - Beng (Hons) Electronic Engineering (BEE)

5G is the fifth-generation wireless standard legislated by the 5GPP, enabling applications of person to person (P2P) upto vehicle to everything (V2X) technology including everything in-between. Several notable current and future applications can be found in the diagram below.

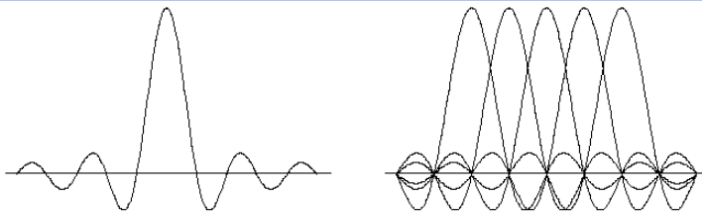


Pictured above is the 2021 of the model S by Tesla featuring a SAE automation level of three. Elon Musk states that level 5 fully autonomous capabilities are within reach once "vision" has been solved. The Current 5nm chip's powering the AV capabilities of tesla have the required performance to enable level 5 self-driving.

The Project's literature review found that the topic is very relevant with studies from numerous academic disciplines being published only weeks before the project itself was. The main themes of the literature review and by extension the project is the 5G network and the advancements of vehicles in terms of AV capabilities and safety mechanisms that come with it

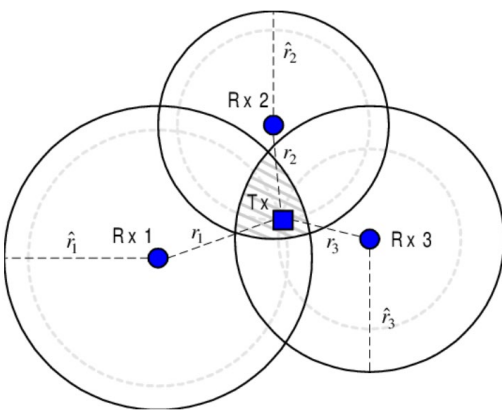
The contents of numerous documents were analysed for several performance metrics of both the 5G network and the sensors of AV's that will utilise the improved latency and bandwidth.

The main themes were, RADAR, Geo-location and the network properties of 5G covering aspects indicative of performance such as the range and bandwidth of RADAR for example.



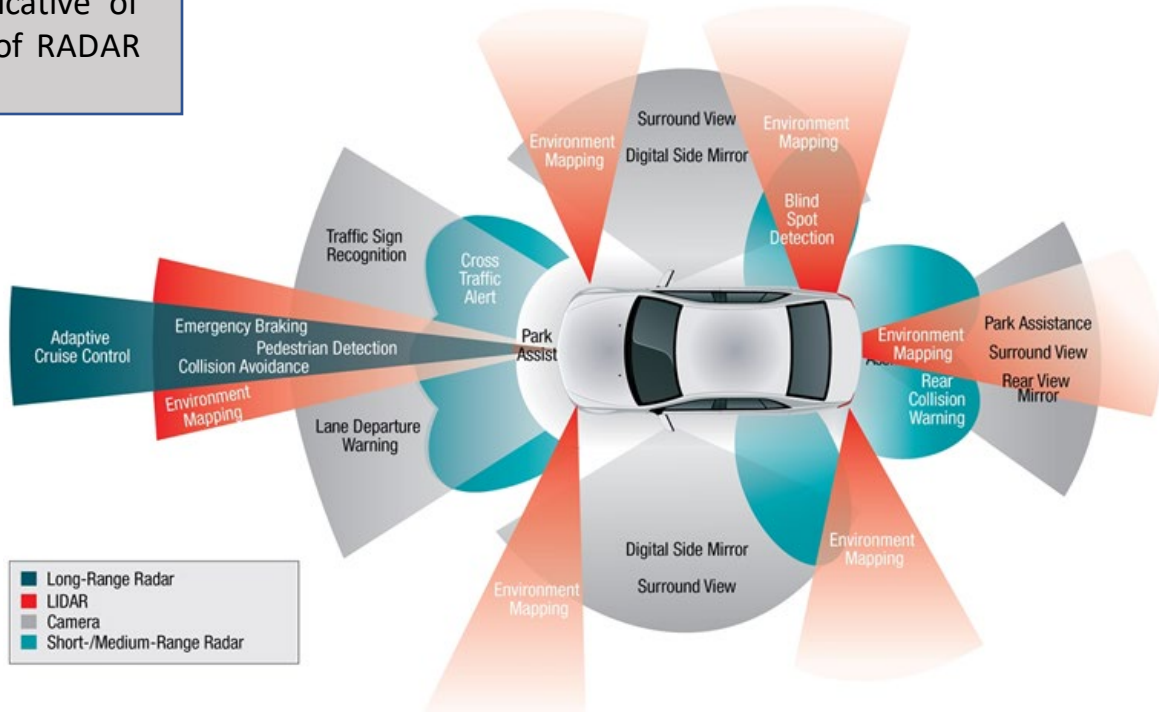
Above is how orthogonal frequency-division multiplexing (OFDM) is utilised to efficiently use the available bandwidth 5G has available to it, this has numerous positive effects such as bandwidth, latency and connection density.

Below shows a method of GPS using terrestrial base stations.



With the ultra low-latency (1ms) and large bandwidth (>10Gbps) being exploited correctly, the road to a worldwide availability of SAE level 5 vehicles along with the numerous safety benefits it brings with it is coming ever closer.

Another benefit to the development of AV's is how the external environment will be affected such as lower pollution in cities due to less traffic along with more social factors like allowing the elderly and disabled to travel more conveniently.



Scan me to read more.