Spectrum needs for ITS

Day-1 and advanced use cases

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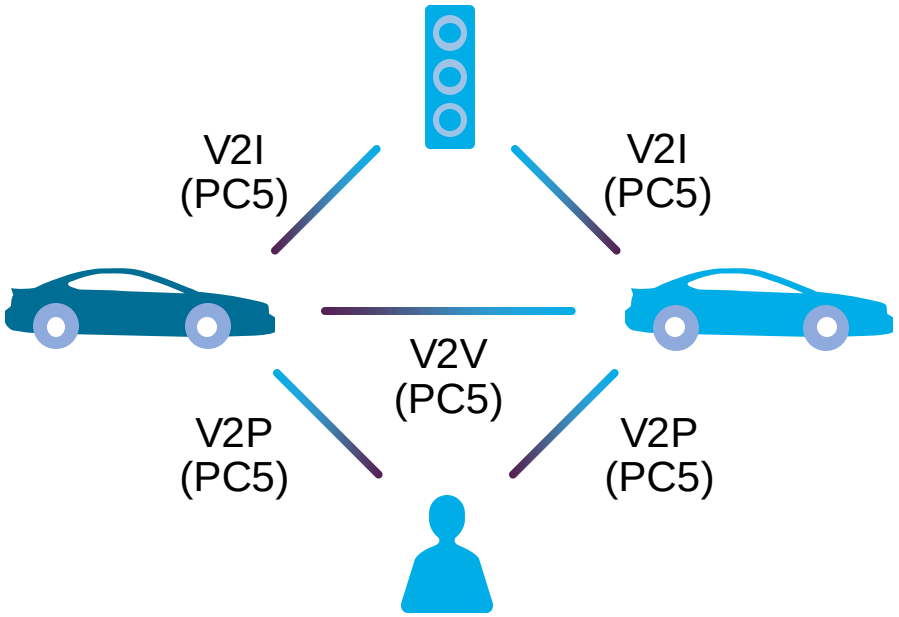
C-V2X: Two complementary modes

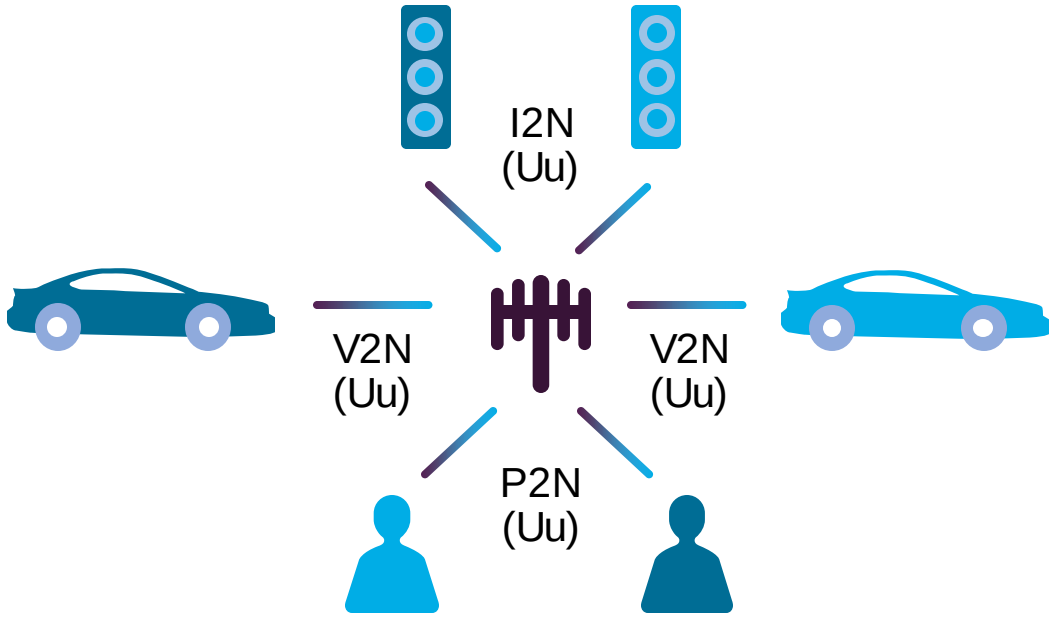
Direct communications
(= Sidelink)

V2V/**V2I**/**V2P** in ITS bands (e.g. ITS 5.9 GHz) independent of cellular network



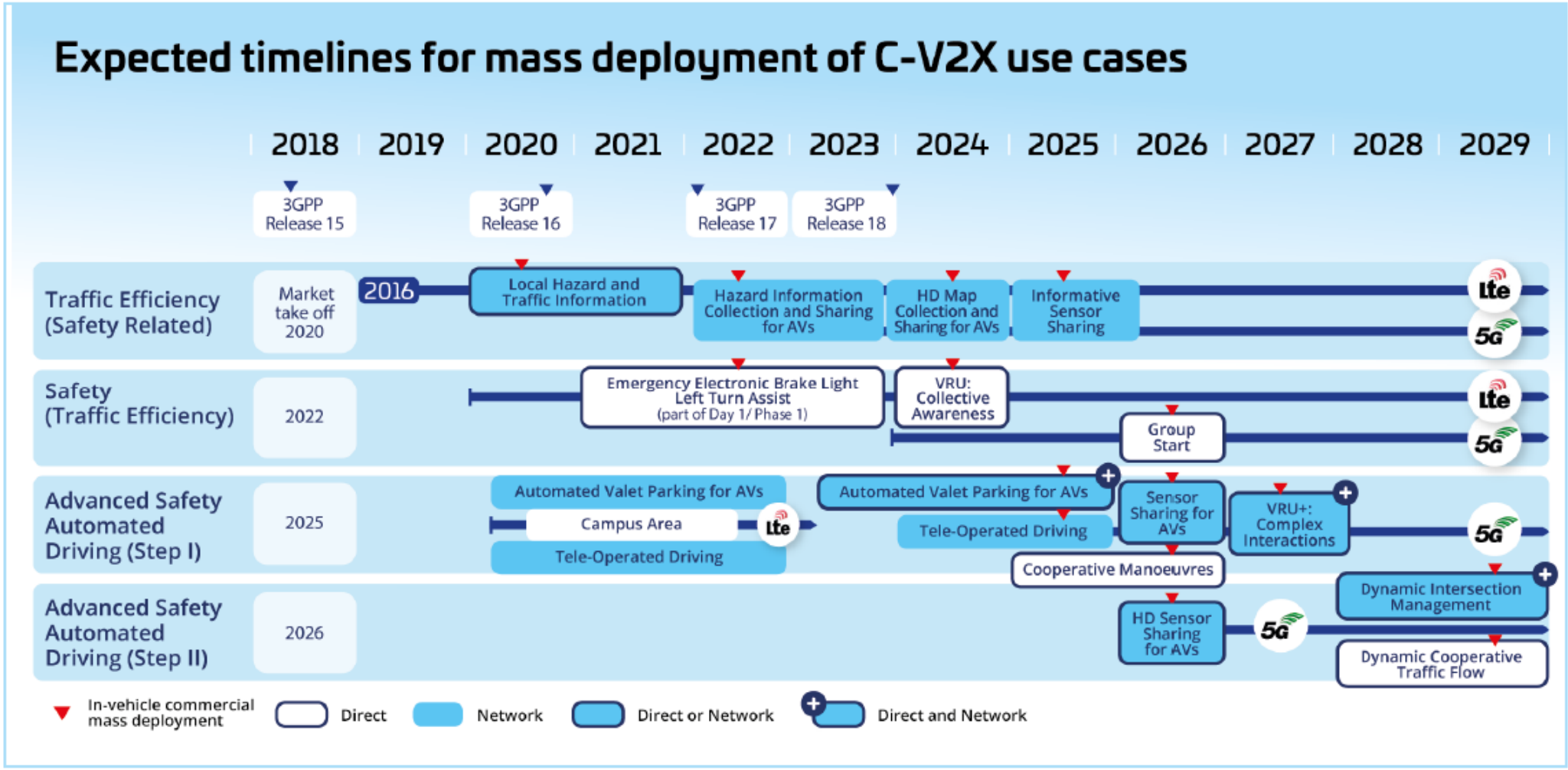
Network-based communications
(= Up/Downlink)

V2N in bands designated for mobile communication networks



5GAA roadmap (published Sep 2020)

https://5gaa.org/news/the-new-c-v2x-roadmap-for-automotive-connectivity/



Conclusions: direct communications

- Based on our studies of C-V2X direct communications (V2V/I/P):
  - We expect that the delivery of day-1 use cases via LTE-V2X for the support of basic safety ITS services will require between 10 and 20 MHz of spectrum at 5.9 GHz for V2V/I communications.
  - We expect that the delivery of advanced use cases via LTE-V2X and NR-V2X for the support of advanced driving services will require an additional 40 MHz or more of spectrum at 5.9 GHz for V2V/I/P communications.
- Detailed analysis of spectrum needs of advanced event triggered use cases is in progress.
- Nevertheless, it is clear that the 70-75 MHz of ITS spectrum in the 5.9 GHz band (as presently allocated in many regions and under consideration in other regions) is needed to support the basic safety and advance use cases under consideration today.
- Like any emerging sector, there could be unforeseen ITS use cases that would require even more spectrum as the market evolves.

Conclusions: network based communications

- Based on our studies of C-V2X network-based (V2N) communications:
  - At least 50 MHz of additional[1] service-agnostic low-band (< 1 GHz) spectrum would be required for mobile operators to provide advanced automotive V2N services in rural environments with affordable deployment costs.
  - At least 500 MHz of additional[1] service-agnostic mid-band (1 to 7 GHz) spectrum would be required for mobile operators to provide high capacity city wide advanced automotive V2N services.
- 5GAA places great value on the importance of V2N communications in enabling future advanced driving use cases, as supported by the Uu interface of C-V2X.
- Accordingly, the 5GAA recommends that national and regional administrations ensure the availability of sufficient spectrum for mobile communication networks in the so-called low-bands and mid-bands for the support of services, including ITS, in the coming decade.

1 In the above, the term "additional" means availability of spectrum in addition to the bands that are currently identified for IMT use by mobile communication networks.