V2X (Vehicle to Everything) and CVIS (Cooperative Vehicle Infrastructure System) Industry Report, 2019-2020

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STUDY GOAL AND OBJECTIVES

This report provides the industry executives with strategically significant competitor information, analysis, insight and projection on the competitive pattern and key companies in the industry, crucial to the development and implementation of effective business, marketing and R&D programs.

REPORT OBJECTIVES

- To establish a comprehensive, factual, annually updated and cost-effective information base on market size, competition patterns, market segments, goals and strategies of the leading players in the market, reviews and forecasts.
- To assist potential market entrants in evaluating prospective acquisition and joint venture candidates.
- To complement the organizations' internal competitor information gathering efforts with strategic analysis, data interpretation and insight.
- To suggest for concerned investors in line with the current development of this industry as well as the development tendency.
- To help company to succeed in a competitive market, and

METHODOLOGY

Both primary and secondary research methodologies were used in preparing this study. Initially, a comprehensive and exhaustive search of the literature on this industry was conducted. These sources included related books and journals, trade literature, marketing literature, other product/promotional literature, annual reports, security analyst reports, and other publications. Subsequently, telephone interviews or email correspondence was conducted with marketing executives etc. Other sources included related magazines, academics, and consulting companies.

INFORMATION SOURCES

The primary information sources include Company Reports, and National Bureau of Statistics of China etc.

Abstract

5G+V2X CVIS will be a strong driver for highly automated driving.

The V2X industry is thriving with advances in automotive connectivity, to which great importance has been attached by car producing powers worldwide, and it is vigorously promoted and deployed about which the development plans, laws & regulations, technical criteria and pilot construction are in full swing in different countries.

Till 2025, the intelligent vehicles with conditional autonomy will be spawned in China, LTE-V2X and other networks will be regionally viable, 5G-V2X will be progressively available on expressways and in some cities, and the high-precision spatial-temporal datum service network will be fully covered, according to the Strategy for Innovative Development of Intelligent Vehicles circulated by National Development and Reform Commission (NDRC) in February 2020. An intelligent vehicle system with Chinese standards will be established between 2035 and 2050.

Two V2X technology roadmaps prevail worldwide, i.e., IEEE802.11p (DSRC) and C-V2X (Cellular-V2X). Application layer standards are drafted differently by countries.

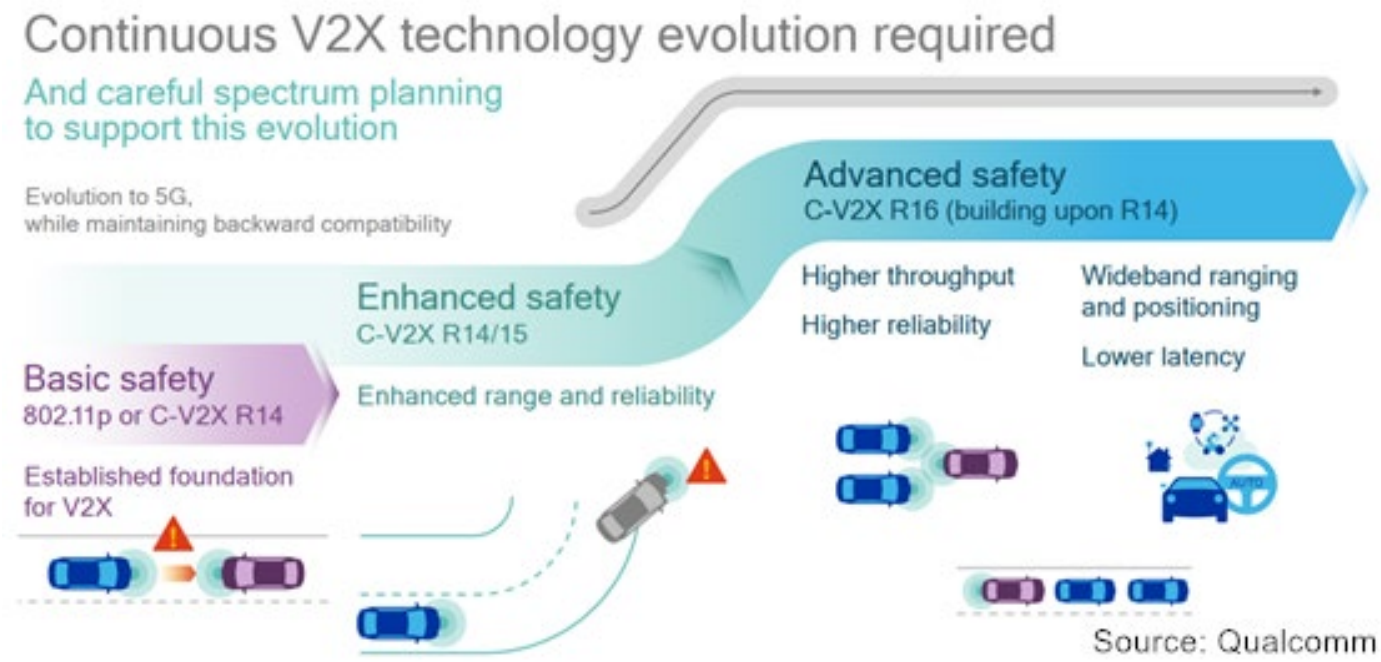
C-V2X springs up and wins the hearts of industry insiders since it is far superior to DSRC. C-V2X, encompassing LTE-V2X and 5G-V2X, gets energetically promoted in China.

In December 2019, Federal Communications Commission (FCC) passed a resolution with one accord that most spectrums of 5.9GHz band will be reallocated and they will be dedicated for the unlicensed spectrum technology and the C-V2X technology. Over the past two decades, 75MHz in the 5.9GHz band was used for DSRC, but FCC seeking to revise the rules pointed it out that DSRC is at a standstill for many years, particularly in April 2019 when Toyota stopped using DSRC V2X technology.

5G NR based V2X will boost the development of fully automated vehicles.

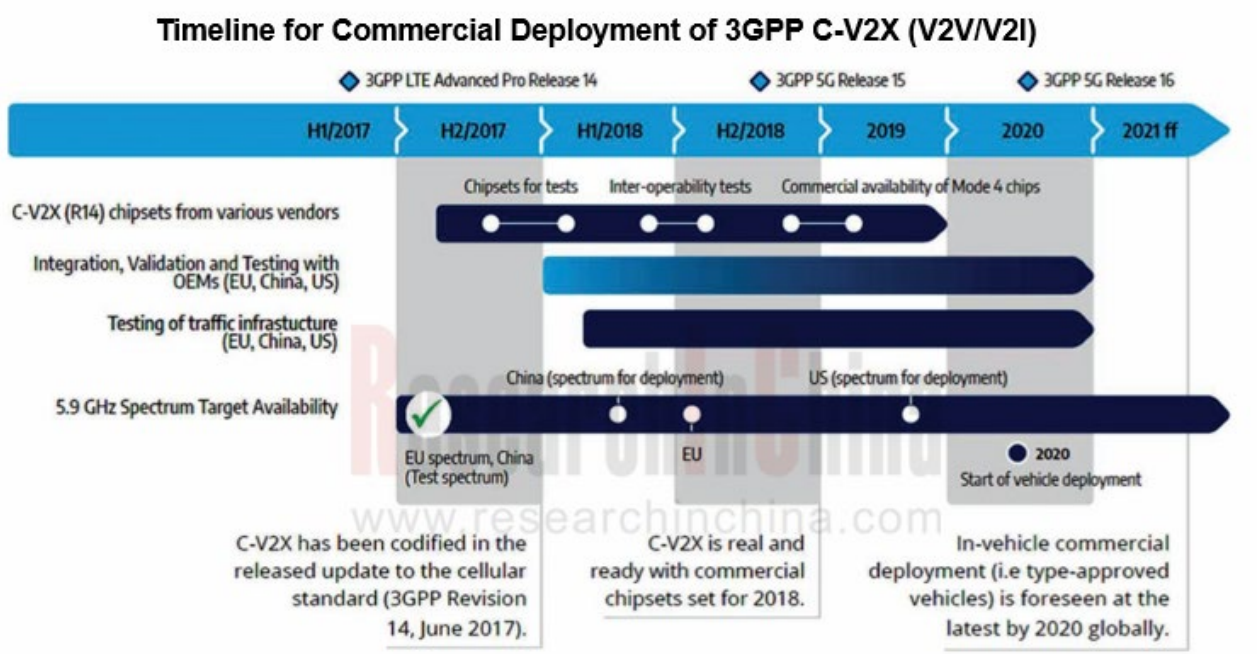
C-V2X (incl. LTE-V2X, 5G-V2X) is based on 3GPP specifications. LTE-V2X evolves towards 5G-V2X.

3GPP R14 standards supporting LTE-V2X was issued in 2017; 3GPP R15 standards that support LTE-V2X enhanced (LTE-eV2X) were formally completed in June 2018; 3GPP R16+ standards supportive for 5G-V2X started to be studied in June 2018.



LTE-V2X is designed mainly to enable driver assistance, improve road safety, efficiency and comfort. NR-V2X, a fusion of communication technologies, big data, artificial intelligence, among others, suffice autonomous driving and other new features better. 5G NR V2X standards are rapidly under way and physical layer specifications plan to be nailed down in March 2020.

Among the 25 projects about Rel-17 that were established at the 3GPP RAN Meeting held in Spain in December 2019, a standardization project -- 5G new radio sidelink enhancement -- will be a souped-up version of Rel-16 NR-V2X sidelink. Also, the technology roadmap of 3GPP 5G 3rd edition (Rel-17) was made explicitly during the Meeting. Noticeably, Chinese operators initiated and joined many projects of criteria constitution about 3GPP RAN R17.



Progress in C-V2X deployment

It is put forward in the Strategy for Innovative Development of Intelligent Vehicles to build a full-fledged intelligent vehicle infrastructure system, including (1) to build smart roads and next-generation national traffic control network, to expedite 5G construction and combination with telematics; (2) to study the licensing of special spectrums for automotive wireless communications, to hasten construction of wireless communication network for automotive use; (3) to accelerate construction of a unified national high-accuracy spatial temporal datum service capabilities by giving full play to the existing Beidou satellite positioning reference station network; (4) to develop the intelligent vehicle maps with unified standards, to build a perfect geographic information system containing road network information, to offer real-time kinematic (RTK) data services; (5) the existing facilities and data resources will be leveraged to build a national intelligent vehicle big data cloud-enabled platform.

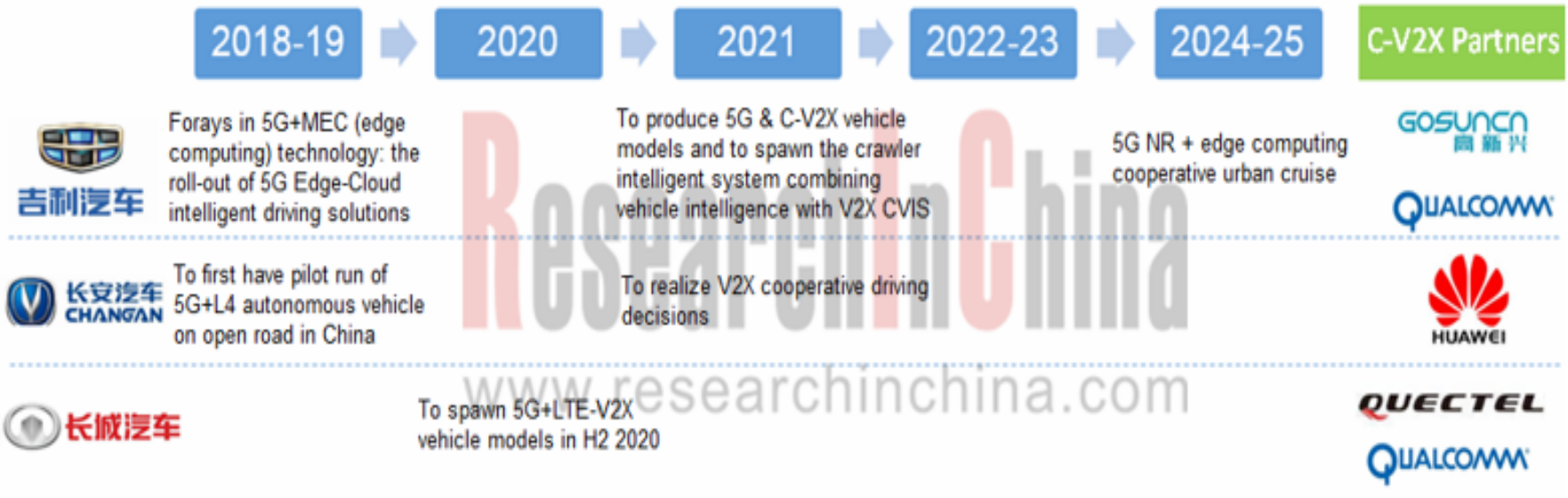
5G+V2X, as a crucial infrastructure to autonomous driving, is booming with policy support. V2X started from 2019 to be piloted successively and will be more popular with 5G deployments in 2022. Meanwhile, 5G NR V2X is being tested and certified, setting the stage for large-scale application of intelligent vehicles with higher autonomy in 2025.

The traditional automotive terminals like T-Box are on the brink of a revolution. The automotive TCU (Telematics Control Unit) integrates 4G/5G module, C-V2X module, onboard navigation module and so forth, which means the opportunities and challenges to the providers of both cockpit electronics and conventional telematics.

Huawei Technologies rolled out the C-V2X T-Box compatible with both 4.5G and 5G; PATEO launched 4.5G C-V2X T-box; Neusoft released T-Box 3.0 combining C-V2X, 5G, Ethernet and other technologies; Samsung Harman announced the availability of TCU in-built with cellular NAD and Autotalks' 2nd-Gen chipset, offering C-V2X capabilities.

Telematics evolves from initially TSP platform to intelligent connectivity platform and then to autonomous driving cloud-enabled platform (cooperative vehicle infrastructure system). 5G T-Box, a portal for big data of intelligent vehicles in future, will be the core product for smart hardware producers. Automakers also have collaborations with Tier 1 suppliers and plan to have the to-be-launched models configured with 5G+V2X successively.

C-V2X Deployments of Some Chinese Automakers



Perfection of C-V2X industry chain in China

C-V2X industry chain involves communication chip, communication module, terminals & equipment, vehicle manufacturing, test & certification, operation services, etc., where there are many players such as chip vendors, equipment manufacturers, OEMs, solution providers and telecom carriers. In October 2019, C-V2X 'Four Crosses' (cross-chip module, cross-terminal, cross-vehicle, cross- safety platform) connectivity demonstrations were successfully held, a full interpretation of C-V2X complete chain technology competences and facilitating further C-V2X deployments at home.

C-V2X Industry Map

Source: IMT-2020 (5G) Promotion Team

Huawei make great strides in C-V2X and has unveiled C-V2X chip, gateway, T-Box, RSU (Road Side Unit) to end-to-end solutions. In 2019, Huawei launched 5G in-car module MH5000 which is highly integrated with 5G and C-V2X technologies and is packed with 5G baseband chip Balong 5000 with such features as one-core multi-mode, high rates, downlink-uplink decoupling, support of SA (5G standalone) and NSA (5G non-standalone) dual-mode network, support of C-V2X, to name a few.

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