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Global and China HD Map Industry Report, 2022

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HD maps have been applied on a large scale, spreading from freeways to cities

According to ResearchInChina, more than 100,000 Chinese passenger cars were equipped with HD maps by OEMs in the first half of 2022. OEMs will constantly speed up the installation of HD maps. HD maps were mainly regarded as an option in the past, but now they have been gradually included in the standard configuration of vehicles, such as Li L9, NIO ET7, HiPhi, etc.

HD Map Installation of Some OEMs

OEM	Model	Launch Time	HD Map Installation
GAC	Aion LX Plus	Jan. 2022	80D Flagship, 80D Max standard
	Aion V Plus	Sep. 2021	80 Pilot Smart Driving and 90 Extra Long-range standard
NIO	ET7	Jan. 2021	Standard
	ES6	May. 2020	Signature standard, other models optional (optional price 39,000 RMB)
XPeng Motors	P5	Sep. 2021	460G, 460E, 510E, 550E, 550P, 600P with optional advanced driver assistance map
	G9	Sep. 2022	702E, 650E Performance with optional XNGP assisted driving (including highway NGP, urban NGP, VP [A-L parking lot memory parking enhancement), optional price 28,000 RMB; 650X Performance and 650X Commemorative standard (among the currently delivered model series, the version with XNGP assisted driving function will need to be implemented in following OTAs, and the vehicle will not be delivered with full functionality).
Changan/Huawei	AVATR 11	Aug. 2022	Optional, Smart Driving Upgrade Package (includes: AVATRANS Smart Pilot System - Urban NCA Navigation Cruise Assist, AVATRANS Smart Pilot System - Urban CA Cruise Assist, Smart Parking Assist System - AVP.
			Complimentary highway NCA.
Li Auto	2021 ONE	May-21	Standard
	L9	Apr. 2022	Standard
Human Horizons	HiPhi X	Sep. 2020	Standard
	HiPhi Z	Aug. 2022	Standard
FAW Hongqi	E-HS9	Dec. 2020	E-HS9 Qichang and Qiling standard, other versions optional advanced intelligent driving assistance function, optional price 28,000 RMB
BAIC ARCFOX	αS	Dec. 2021	HI Basic, αS Huawei HI Advanced standard
GWM	Ora Lightning Cat	Aug. 2022	Equipped with ORA-PILOT 3.0 intelligent driving assistance system (not yet known whether it is optional or standard)
	Tank 500	Mar. 2022	Five seats of Zaojing Business and five seats of Zaojing Sports can be equipped with intelligent package (NOH + 5G + V2X)
SAIC	IM	Apr. 2022	Optional full-featured package (including NOA, NDM AVP), optional price 36,800 RMB
GM	Cadillac CT6	Jul. 2020	28T Flagship Super Cruise, 28T Lead Super Cruise standard

Source: ResearchInChina

Three technical routes for advanced driver assistance in cities

From the perspective of the layout of OEMs, advanced driver assistance in urban scenarios has become a new hot spot in intelligent field. At present, there are three technical routes for advanced driver assistance in cities:

(1) Pure vision: Companies represented by Tesla mainly rely on cameras, super powerful algorithms, etc. to realize assisted driving in cities. It is reported that Tesla may introduce FSD Beta to Chinese market.
(2) Perception + map: The solution does not depend heavily on pre-made HD maps. It builds real-time HD maps through vision systems in places where there are no HD maps. For example, the LiDAR version of WEY Mocha released by Great Wall in August 2022 adopts Haomo.AI's urban NOH technology with a weak HD map, which require fewer lane-level attributes than regular HD maps.
(3) Multi-sensor fusion + HD map: Companies represented by NIO, Li Auto and Xpeng enhance the intelligent driving experience by making use of HD maps and LiDAR to make up the insufficient computing power.

Three technical routes for advanced driver assistance in cities

Xpeng expects to gradually introduce urban NGP functions to users in Guangzhou, Shenzhen, Beijing, Shanghai, Hangzhou and other cities since 2022.

After the launch of urban NGP by Xpeng, the point-to-point autonomous driving has been realized to some extent (except that drivers cannot take their hands off the steering wheel), covering more than 90% of daily driving scenarios including parking lots, cities and freeways.

NIO plans to make urban assisted driving possible on models such as ET7 and ET5 equipped with NAD system in 2022. When the driver sets a destination on the navigator, the IVI map shows the start and end sections of NOP. When the vehicle enters the sections, the driver can turn on or off the NOP function through the "Pilot Assist" in the lower left corner of the navigator.

Li L9 equipped with intelligent driving system “Li AD Max” can see navigation and assisted driving in all scenarios.
With the computing power as high as 400TOPS, **Avatr** 11 equipped with Huawei ADS can secure high-level intelligent driving functions at freeways, urban areas and parking.

BAIC ARCFOX αS HI Advance equipped with Huawei ADS can accomplish autonomous driving on freeways, high-level autonomous driving in urban areas, AVP and other functions.
In terms of mainstream solutions, OEMs except Tesla basically adopt the sensor + map solution, but they have different requirements for map accuracy. As per the development progress of HD maps, urban HD maps face long mileage, surveying and mapping restrictions and update challenges. Therefore, some OEMs consider using SD pro maps for urban assisted driving to avoid HD map elements as much as possible.

HD Map Coverage of Some Map Companies

Map providers step up the layout of HD maps in urban scenarios

With a higher OEM installation rate of HD maps, the application in urban scenarios has become a new arena. Map players are aggressively deploying urban scenarios, mainly in the following ways:

Faster collection of urban HD map data

The mileage of China's freeways is about 300,000 kilometers, and the mileage of urban roads is close to 10 million kilometers. Mainstream map players have basically completed the collection of HD maps for freeways and urban expressways. Therefore, the production passenger cars equipped with HD maps can realize advanced driver assistance in high-speed scenarios. In the future, map players will make breakthroughs in HD maps for cities to meet the demand of OEMs.

HD Map Coverage of Some Map Companies

Map companies	Coverage
NAVINFO 四维图新	· Freeways and expressways: 100% of national freeways, urban expressways and ramps are covered.
	· Urban roads: The company has covered more than 200,000 kilometers of roads, and will soon cover the main road network of 120 cities across the country.
高德地图 AutoNavi (amap.com)	· Freeways and expressways: The data of more than 300,000 kilometers of freeways and urban expressways has been collected.
	· Urban roads: By the end of 2021, the company had collected the data of main roads in nearly 30 cities in China, with the mileage of nearly 200,000 kilometers.
Baidu 地图	Freeways and expressways: The company has collected more than 350,000 kilometers of HD map data that meets the requirements of L3 autonomous driving.
	· Urban roads: The company expects to cover physical roads in China's top 100 cities by 2022Q4.
Tencent 腾讯	· Freeways and expressways: In 2021, the company delivered 358,000 kilometers of high-precision data in China according to the plan.
	· Urban roads: The company will cover L1~L4 urban roads in TOP100 cities nationwide in 2022Q4.

Source: ResearchInChina

Integration of SD maps and HD maps

In high-speed scenarios, map companies can post-match SD maps with HD maps, with a high accuracy rate. However, in urban scenarios, SD maps and HD maps can't be associated in the later stage due to different production processes. Therefore, in order to facilitate advanced driver assistance in cities, map companies have begun to actively deploy the integrated production of SD maps and HD maps.

Baidu has developed SD-HD integrated AI map production platform, which integrates various data production structures and technological processes via a system. It satisfies the standardized and unified model expression of map data with different accuracy levels, thus solving the consistency problem.

For **Here**, different maps share the same map data, the same specification, and the same database. Here produces three modes of maps - SD, ADAS and HDML with the same standard, production environment and production process, so that they are interrelated by sharing and the same data and standard.

Strict supervision amid pilot application of HD maps

Six cities start HD map pilot application projects

In August, 2022, the General Office of the Ministry of Natural Resources of China issued the “Notice on HD Map Pilot Application Projects of Intelligent Connected Vehicles”. The pilot projects will stage in six cities including Beijing, Shanghai, Guangzhou, Shenzhen, Hangzhou and Chongqing.

The Notice requires the provincial natural resources authorities in these pilot cities to work out pilot implementation plans, timetables and roadmaps in accordance with the deployment of the State Council and the national laws, regulations and policies on surveying, mapping, geographic information management and data security. Besides, they should rationally delineate the pilot scope according to the specific application scenarios of autonomous driving map data.

In August 2022, the Ministry of Transport of China issued "Opinions on HD map construction and other pilot projects of Beijing Baidu Netcom Science Technology Co., Ltd. for the purpose of building a transportation powerhouse". Baidu plans to provide centimeter-level HD map services on freeways and typical urban roads in three to five years, and make its integrated mobility service platform available in about 10 cities.

Strict supervision in HD map field

As China continues to strengthen the security management of geographic information, the Ministry of Natural Resources is intensifying the supervision over the HD map market while opening up pilot cities for application of intelligent connected vehicles.

Tightened supervision on surveying and mapping qualification

by the end of 2021, a total of 31 companies were approved for a-level electronic navigation map qualification, which is valid for 5 years, many enterprises need to re-apply for A-level electronic navigation map qualification in 2022, and there are 19 companies of A-level mapping qualification for navigation electronic map production that completed the re-examination and renewal in 2022.

Companies that Completed the Review and Renewal of A-level Navigation Electronic Map Qualification, 2022

No.	Company	No.	Company
1	AutoNavi Software Co., Ltd.	11	Liaoning Future Development Survey of Surveying and Mapping Co., Ltd.
2	Shenzhen Careland Technology Co., Ltd.	12	Jiangsu Basic Geographic Information General Center
3	Speed China Technology Co., Ltd.	13	NavInfo Co., Ltd.
4	SFMAP Technology Co., Ltd.	14	Beijing Meida Zhida Technology Co., Ltd.
5	Shenyang Mxnavi Co., Ltd.	15	ECARX (Hubei) Technology Co., Ltd.
6	Tencent Dadi Tongtu (Beijing) Technology Co., Ltd.	16	Zhejiang Academy of Surveying and Mapping Science and Technology
7	Beijing Baidu Zhitu Technology Co., Ltd.	17	Jiangsu Province Surveying and Mapping Engineering Institute
8	Beijing Piesat Information Technology Co., Ltd.	18	Guizhou Wide Bench ZhiYun Technology Co., Ltd.
9	Beijing Huawei Digital Technologies Co., Ltd.	19	Hebei Roadgrids Technology Co., Ltd.

Source: ResearchInChina

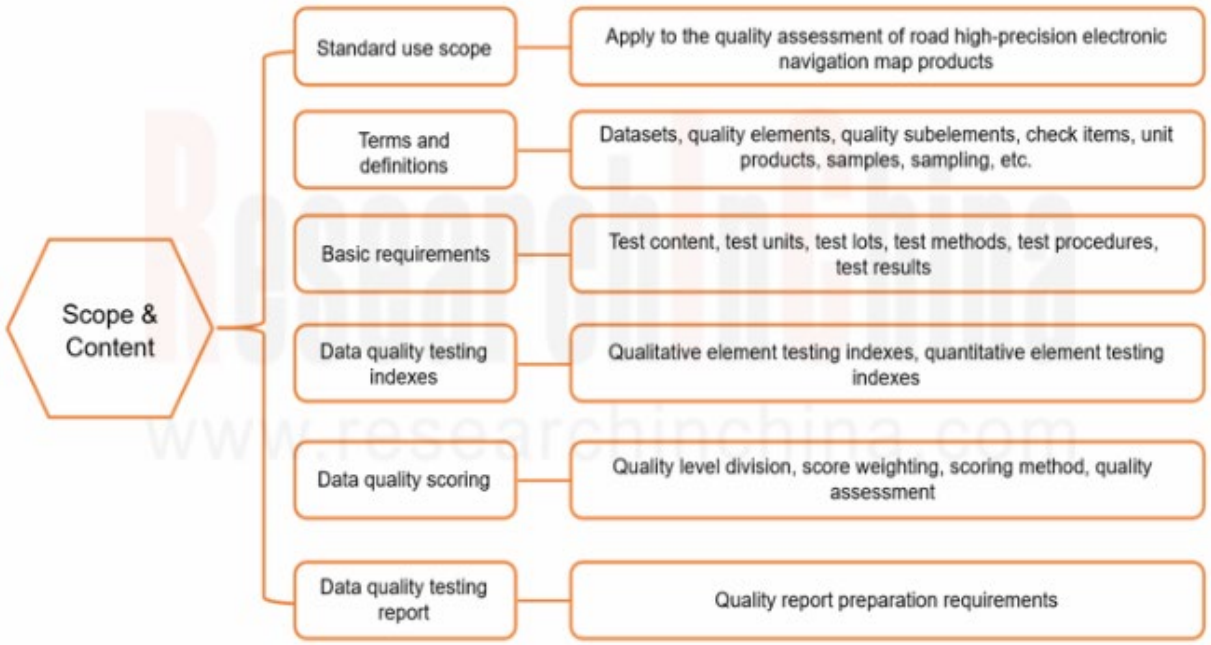
Subjects of surveying and mapping

Subjects of surveying and mapping: In August 2022, the Ministry of Natural Resources clearly pointed out that the following activities should be subject to the "Surveying and Mapping Law of the People's Republic of China": The intelligent connected vehicles installed or integrated with sensors such as satellite navigation and positioning modules, inertial measurement units, cameras and LiDAR collect, store, transmit and process spatial coordinates, images, point clouds, attributes and the like of vehicles and surrounding road facilities during operation, service and road testing.

China's first road HD electronic navigation map quality standard was officially established.

In September 2022, the Road HD Electronic Navigation Maps Quality Specification, recommended by Department of Land and Mapping of the Ministry of Natural Resources and led by Baidu, was officially approved by National Geographic Information Standardization Technical Committee, which is also the first industry standard for road HD electronic navigation map quality specification approved in China. It will solve “What to inspect, how to inspect, how to analyze and evaluate the inspection results, and how to compile the quality report”, which are concerned by map and car companies.

Main Content of Road HD Electronic Navigation Maps Quality Specification



Highlights of Global and China HD Industry Report, 2022

Global and China HD Industry Report, 2022 highlights the following:

- Policies, regulations, standards and compliance about HD maps;
- HD map market size, market structure, business models, etc.
- HD map production technology, update technology, data distribution and fusion technology; the fusion application of HD maps and V2X; the application of HD maps in lane-level positioning, etc.
- Main application scenarios of HD maps, such as autonomous passenger cars, automated parking of passenger cars, passenger and cargo transportation by autonomous driving, etc.;
- HD map production and update technology, main products and application scenarios of major map companies at home and abroad;
- HD map business layout and main technologies of major HD map technology providers at home and abroad.

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