



Global and China Automotive Operating System (OS) Industry Report, 2019-2020

Apr.2020

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

With advances in smart cockpit and intelligent driving, and enormous strides of Tesla, OEMs care more about automotive operating system (OS). Yet, it is by no means easy for both new carmakers and traditional OEMs to develop base software for intelligent cars. It is in the report that world's vehicle OS vendors are compared and analyzed.

Auto OS is generally classified into four types:

- 1) Basic auto OS:** it refers to base auto OS such as AliOS, QNX, Linux, including all base components like system kernel, underlying driver and virtual machine.
- 2) Custom-made auto OS:** it is deeply developed and tailored on the basis of basic OS (together with OEMs and Tier 1 suppliers) to eventually bring cockpit system platform or automated driving system platform into a reality. Examples are Baidu in-car OS and VW.OS.
- 3) ROM auto OS:** Customized development is based on Android (or Linux), instead of changing system kernel. MIUI is the typical system applied in mobile phone. Benz, BMW, NIO, XPeng and CHJ Automotive often prefer to develop ROM auto OS.
- 4) Super auto APP** (also called phone mapping system) refers to a versatile APP integrating map, music, voice, sociality, etc. to meet car owners' needs. Examples are Carlife and CarPlay.

OEMs are not only striving to gain control of vehicle base software and hardware and apt to use neutral OS, but exerting itself to reduce the development cycle and costs by more collaborations and leveraging open source software organizations.

Preference to Neutral and Free OS

It can be seen in the table below that most Chinese automakers select Android, while foreign peers choose AGL. Both Android and AGL are neutral and free operating systems.

AGL now has the support of 11 OEMs including Toyota, VW, Daimler, Hyundai, Mazda, Honda, Mitsubishi, Subaru, Nissan, SAIC, etc.

AGL addresses 70% of OS development work, while the remaining 30% can be developed by OEMs. This facilitates development progress and cuts costs significantly.

More than 140 AGL members work together to develop a common platform for infotainment, which will be further available to ADAS, OTA, gateway, V2X and automated driving in the future.

ANDROID ecosystem, compared with AGL, is more mature and widely used by Chinese OEMs. However, OEMs felt risky to apply ANDROID as Google banned Huawei from using the Google Mobile Services (GMS) on Huawei phones in 2019, giving vitality to other operating systems. For instance, AliOS has already been seen in at least nine auto brands.

OEMs and Basic OS Selection (Partial)

OEMs	Basic OS Selection
Toyota	AGL/MicroITRON
VW	AGL/QNX
Renault-Nissan-Mitsubishi	ANDROID
GM	ANDROID/QNX/VxWorks
Tesla	LINUX
Volvo	ANDROID
Geely	ANDROID
Chery	QNX/Harmony OS
BYD	ANDROID
Dongfeng AEOLUS	ANDROID
DongFeng Citroen	AliOS
Changan Ford	AliOS
Changan Automobile	ANDROID
NIO	ANDROID
XPeng	ANDROID
CHJ Automotive	ANDROID
SITECH	AGL
SAIC	AliOS/AGL
WM Motor	ANDROID
Ford	QNX
BMW	QNX
Audi	QNX/VxWorks
Honda	ANDROID/AGL
Hyundai	AGL/QNX
Nissan	VxWorks/MicroITRON
Daimler	AGL/QNX
Skoda	AliOS
BAOJUN	AliOS

Reduce Development Cycle and Costs with the Help of Open Source Software Organizations

The GENIVI Alliance was jointly founded by giants like BMW, GM and Intel in 2009, aiming to offer applicable standards and open source codes for in-vehicle infotainment (IVI) platform. The alliance associates with the users of Android, AUTOSAR, Linux, and other in-car software and the solution suppliers to form a productive and collaborative community of 100+ members worldwide encompassing leading automakers, Tier 1 suppliers, semiconductor suppliers, software developers and service providers. GENIVI alliance always leads in field of open source cockpit software development.

The successful operation of GENIVI Alliance shows the industry's urgent need to reduce development costs and avoid the duplication of development via open source software organizations.

The Autware Foundation is a non-profit organization founded in Dec. 2018, aiming to develop open source software for autonomous vehicle. With nearly 40 members globally, Autware is adopted by over 200 organizations in the world.

IT firms Marry Cars and Various Smart Hardware via OS

LG acquired webOS (developed by Palm) from HP in 2013, and then extended webOS as a mobile phone OS to the suitable one for TVs, smart refrigerators, smart watches and smart cars. At present, LG has sold millions of its webOS-enabled Smart TVs. In the early 2020, LG's webOS is increasingly seen in automotive sector.

Samsung has ambitious plans for Tizen, an open operating system, which has already been found in Samsung's wearables and smart fridges, and will be applied to floor mopping robots, washing machines, air conditioners and even cars in future. Huawei does alike in Harmony OS, a microkernel-based, distributed OS designed to deliver a 'smooth experience' across all devices in all scenarios. It enables seamless cross-terminal synergy across multiple devices and platforms including smart phone, TV, Tablet PC and automotive infotainment.

IT companies are attempting to realize intelligence of all scenarios from mobility, home to office by centering on OS. It remains to be seen whether OEMs will adopt the plan and when the plan will be actually carried out.

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