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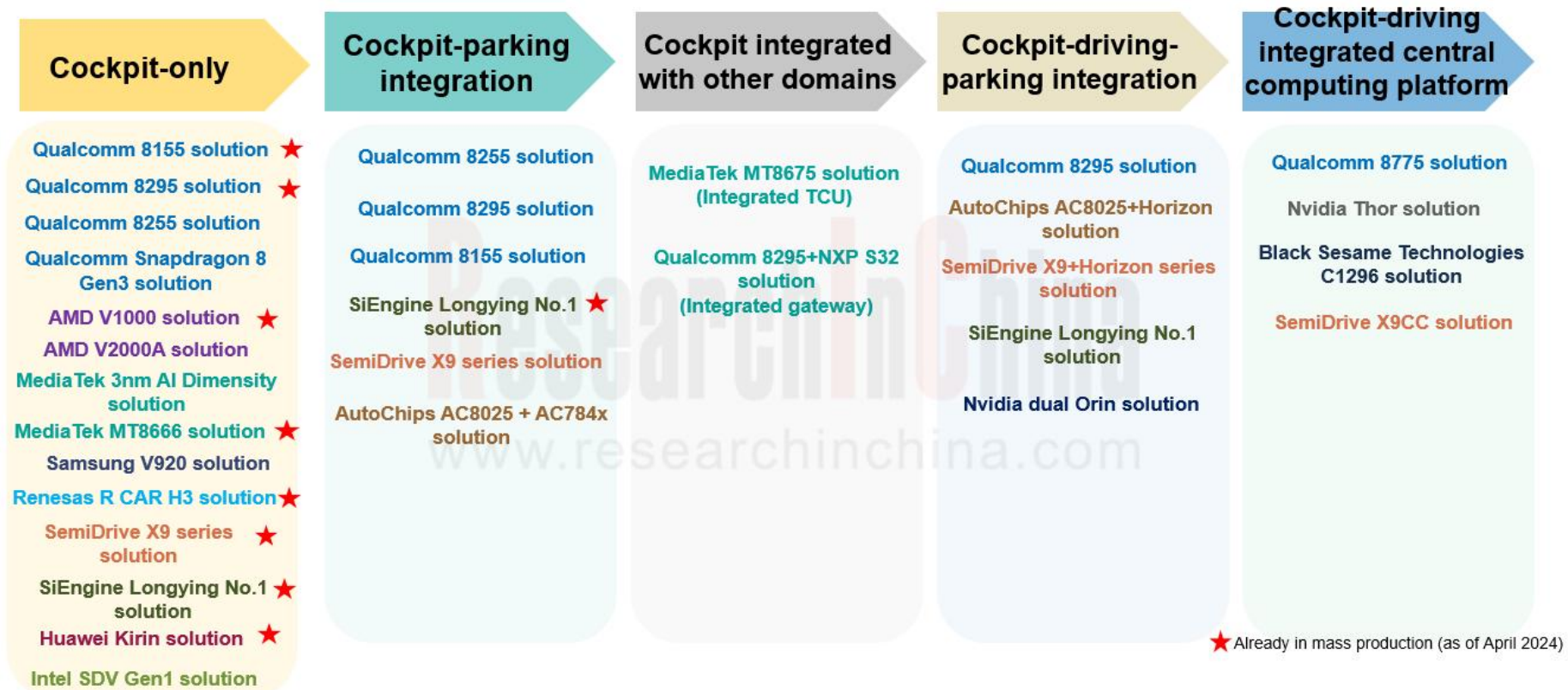
# Automotive Intelligent Cockpit Platform Configuration Strategy and Industry Research Report, 2024

May 2024

# Layout of Intelligent Cockpit Platform Solution (by Type) Since 2024

According to the evolution trends and functions, the cockpit platform has gradually evolved into technical paths such as cockpit-only, cockpit integrated with other domains, cockpit-parking integration, cockpit-driving-parking integration, and cockpit-driving integrated central computing platform. OEMs and Tier1s are actively laying out.

## Layout of Intelligent Cockpit Platform Solution (by Type) Since 2024



Source: ResearchInChina

## Layout strategy of intelligent cockpit platform solution (by type)

(1) Cockpit-parking integration: the first choice for mid- to low-configured models, mass production is expected to accelerate in 2024

Cockpit-parking integration fuses parking functions into the cockpit, saving hardware costs for parking controllers. Therefore, OEMs consider it from the perspective of user experience and cost optimization, and mid- to low-configured models are the main market for this solution.

In 2024, with the support of high-computing power cockpit SoC products and multi-camera hardware, many mainstream intelligent cockpit solution providers such as Bosch, Visteon, Desay SV, ADAYO, BICV, ECARX, and Yuanfeng Technology have launched relevant cockpit-parking integration solutions.

Most cockpit-parking integration solutions are mainly based on a single cockpit SoC chip to realize intelligent cockpit and parking functions. Qualcomm 8255, Qualcomm 8295, etc. have become the preferred chips for cockpit-parking integration's main single SoC solutions. Products based on this chip platform can enhance system collaboration, improve system performance, and more fully explore and realize cross-domain integration, active intelligence, multimodal interaction, and other functions.

## **(2) Cockpit-driving-parking integration: the optimal solution for cost reduction and efficiency improvement, with L2 ADAS functions integrated in the cabin**

Cockpit-driving-parking integration integrates the cockpit functional domain with driving and parking functions, while driving domain currently integrates assisted driving functions at L2 and below. Therefore, this solution is mainly suitable for mid- to low-configured models equipped with L2 ADAS functions. High- or top-configured models will still give priority to being equipped with independent driving control units, which have higher requirements for computing power and functional safety levels, and are more difficult to integrate into the cockpit.

Leapmotor C10 model, launched in March 2024, is based on the latest "Four Leaf Clover" central integrated EEA. In standard- and mid-configured versions, it uses one SoC chip (Qualcomm 8295/8155) and one MCU chip (NXP S32G), based on QNX Hypervisor to drive multiple systems such as QNX, Android, Linux, and RTOS, achieving deep integration of cockpit and intelligent driving, and realizing L2 intelligent driving (e.g. ACC), instrument cluster, infotainment, sound effects, power amplifier, surround view, fatigue monitoring, whole vehicle, body, gateway, and other functions.

### **(3) Cockpit-driving integration (central computing platform): Advanced intelligent driving integrated with cockpit, realizing One Box + unified vehicle OS platform, expected to be landed in 2025**

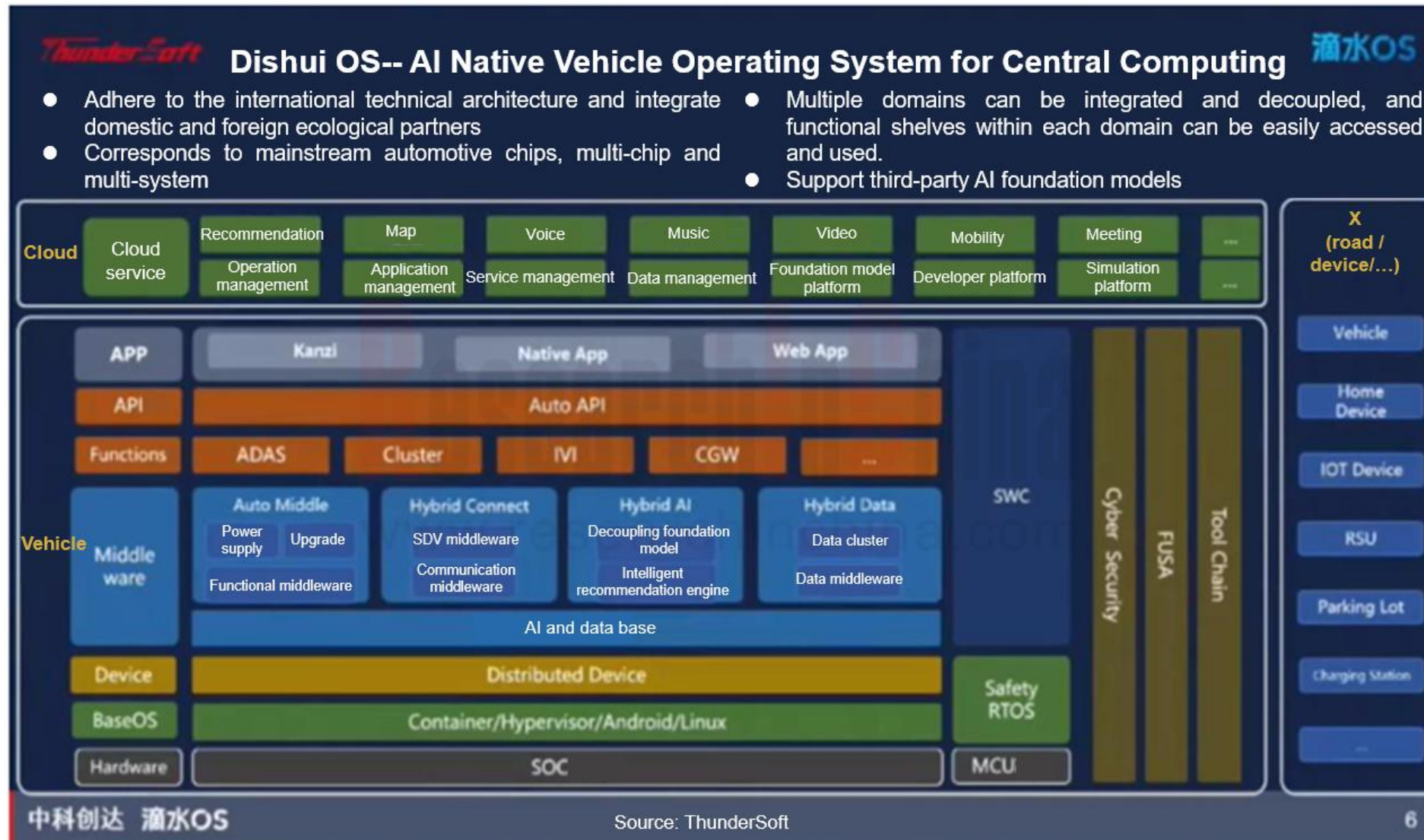
Cockpit-driving integration is a central computing platform dedicated to achieving One Box, One Board, One Chip (including multi-SoC inter-chip cascading), among which One Chip is widely regarded as the "ultimate solution" for cockpit-driving integration, which runs both intelligent driving domain and intelligent cockpit domain on a single chip.

Currently, multiple suppliers or OEMs have announced the next-generation single-chip cockpit-driving integration layout, but there are slight differences.

Among them, mainstream cockpit Tier1 suppliers such as Bosch, Autolink, ThunderX Auto, Hangsheng Electronics, ADAYO, Zhuoyu Technology, BICV, and Megatronix have announced the creation of cockpit-driving integration solutions based on Qualcomm Snapdragon Ride? Flex 8775. Some suppliers have even implemented a product layout that integrates software and hardware with cockpit-driving integration, aiming at OEMs' demands for cost reduction on intelligence.

ThunderX Auto, a subsidiary of ThunderSoft, created RazorDCX Tarkine, a single-SoC cockpit-driving integration solution based on Qualcomm Snapdragon Ride? Flex SoC. Equipped with ThunderSoft's Aqua Drive OS cockpit-driving integration system, it supports a through-type 8K long screen, displays a full-scenario, immersive, and full 3D interface, and can realize 360° surround view, driver monitoring, game audio & video entertainment, interconnection and other cockpit functions. Meanwhile, it can also support automatic parking, L2++ intelligent driving functions for highways and urban areas, planned to achieve mass production from 2024 to 2025.

# Aqua Drive OS-- AI Native Vehicle Operating System for Central Computing



# Desay SV, Xpeng Motor, Li Auto, ZEEKR, Jiyue, BYD, and Xiaomi announced that they will create cockpit-driving integration products based on NVIDIA Thor

In 2024, companies such as Desay SV, Xpeng Motor, Li Auto, ZEEKR, Jiyue, BYD, and Xiaomi announced that they will create cockpit-driving integration products based on NVIDIA Thor, which can provide "cockpit-driving integration" technical solutions for high-level autonomous driving above L4, and through systematic integration, the software and hardware are fully integrated, shortening the development cycle, significantly reducing costs and improving efficiency.

At GTC 2024, Nvidia announced that BYD will adopt Nvidia's next-generation intelligent vehicle chip Thor, which is expected to be used in the central brain of BYD's newly released Xuanji architecture to achieve a cockpit-driving integration layout, while also being compatible with deploying various AI models.

In addition, cockpit-driving integration solutions based on local chips from Black Sesame Technologies and SemiDrive Technology are also being laid out. In April 2024, NESINEXT cooperated with Black Sesame Technologies to release the CoreFusion, a cockpit-driving integration software open platform based on Black Sesame Technologies' automotive cross-domain computing chip Wudang C1296, providing developers with efficient operating system-level software base, development tool chain and complete ecology.

It can be seen that major suppliers and OEMs have accelerated the layout of single-chip cockpit-driving integration solutions, and are expected to achieve mass production as soon as 2025.

## **(4) High-end cockpit AI solution: running AI foundation model in the cabin to achieve 4K/8K HD display and 3D immersive high-performance experiences**

As generative AI, 4K/8K HD display, 3D immersive experience, multimodal interaction, multi-scenario integration, etc. continue to be introduced into cars, the demand for higher computing power and high-performance cockpit platforms continues to grow, especially in the high-end car market, where market competition is becoming more intense.

Beginning in 2023, AI foundation models have become popular. Both emerging and conventional OEMs have introduced them into cockpits. AI foundation models to create future cockpits have become the current mainstream development trend.

However, current intelligent cockpit relies more on cloud AI in terms of computing power. Although it can run foundation models with more than 100 billion parameters, the car side currently only has 1 billion parameters or even less, and the performance level is still insufficient.



# AI Foundation Model Deployment for OEM Cockpit Platforms at Present Stage

AI Foundation Model Deployment for OEM Cockpit Platforms at Present Stage

OEM	AI Foundation Model	Supplier	Vehicle-side Computing Power Support Capability of AI Foundation Model	Equipped Model
Xiaomi	MiLM-1.3B	Self-developed	Lightweight + end-side model, with 1.3 billion parameters and deep learning algorithm. The cockpit uses Qualcomm 8295 chip (AI computing power: 30TOPS). SenseNova is also used in the intelligent cockpit.	Xiaomi SU7
Li Auto	Mind GPT	Self-developed	The computing power of AI foundation models is supported by cloud-side GPT and end-side NPU. Based on the T5 model architecture, the parameter magnitude is around 1B (1 billion). Vehicle-side computing power mainly comes from the cockpit SoC, which is currently Qualcomm 8295 (high-performance version AI 60TOPS).	Li MEGA, etc.
NIO	NOMI GPT	Self-developed	End-cloud integration architecture, NIO self-developed end-side multimodal perception capabilities, with parameter scale in the billions. Based on the capabilities provided by LLM and an efficient computing platform powered by NVIDIA AI stack. Vehicle-side computing power is supported by the AI computing power sharing of ADAM central computing platform. The total AI computing power is 256TOPS, consisting of 1* Qualcomm 8295 (AI 30TOPS) + 4* Orin chip.	ET7, ET5, ES7, etc.
Jiyue	ERNIE Bot	Baidu	Using Qualcomm 8295 chip (AI computing power 30TOPS). Baidu Intelligent Cockpit Foundation Model 2.0 adopts a new MoE architecture, which can support localized deployment and is equipped with an exclusive development tool chain to support OEMs to efficiently customize brand features.	Jiyue 01, Jiyue 07
Geely Galaxy	Xingrui AI foundation model	Self-developed	The computing power is supported by cloud-end Geely Xingrui Intelligent Computing Center, and its total computing power has been iterated to 102 petaflops/second. The vehicle-side cockpit uses Qualcomm 8295.	Galaxy Starship, Galaxy E8, Galaxy L6
BYD	Xuanji AI foundation model	Self-developed	Self-built AI intelligent computing center, vehicle-side AI + cloud-side AI, dual-cycle multimodal AI. The vehicle-side AI algorithm will continuously learn user's usage habits, realize a small closed loop of single vehicle data, and bring about optimal configuration in the car. Cloud AI accelerates vehicle self-learning and continues to evolve through massive data bases, computing power clusters, and vehicle-level multimodal AI model libraries. In the future, vehicle-side will develop and manufacture its own central brain, which is compatible with a variety of SoC chips and will bring about expansion of computing power through chip decoupling. AI module of master chip is a general-purpose GPU architecture, with a modular design, which can realize arbitrary allocation of storage and calculation, adjust the computing power method according to functional requirements, achieve seamless switching and adaptation to future algorithm models, and enable rapid iteration of automotive functions.	Qin L, etc.
GAC	GAC's end-cloud integrated foundation model agent	Self-developed	Use local inference capabilities of vehicle-side and cloud-side hybrid model technology. It will have dual brains on vehicle-side and cloud-side, with response speed tripled and interaction capabilities doubled.	Hyper

Source: ResearchInChina

# OEMs begin to introduce end-side foundation models into their cars

Considering that the cloud-side foundation model is subject to privacy security, latency, stability, cost and other issues, part of calculation and storage during the use of foundation model needs to be completed by vehicle-side computing resources, so the vehicle-side AI foundation model needs to be added. In the future intelligent cockpit, it is necessary to support an AI large language model with more than 7 billion parameters to achieve strong end-side intelligence. In addition, it will also have a full-time online foundation model in-car assistant, full-scenario multimodal interaction and other performance experiences, all of which place higher requirements on intelligent cockpit platform.

In 2024, many OEMs begin to introduce end-side foundation models into their cars. How to match capabilities of end-side foundation models will become one of the key development directions of new intelligent cockpit platforms in the future. Suppliers such as BICV, ECARX, and Shanghai Ruicheng have launched cockpit solution products with high AI performance.

In April 2024, BICV announced the creation of MARS06 cockpit solution product based on MediaTek 3nm chip MT8678, which can support end-side running of a 13 billion parameter AI large language model. It is outstanding in performance, multimedia, security technology facilities, audio and video processing capabilities, end-side AI foundation model, etc. And can meet the needs of intelligent vehicles for infotainment and intelligent driving assistance systems, and bring safer, more comfortable and smarter mobility experiences to occupants.

And CT-Y1 chip cockpit solution product based on MediaTek's 4nm sub-flagship chip supports a 7 billion parameter foundation model and can generate AI images within 1s. It also supports up to 12 cameras, up to 32MP, as well as multi-screen display and built-in 5G.

Dimensity Automotive Intelligent Cockpit CT-Y1



Source: MediaTek

# ECARX released Qogir intelligent cockpit computing platform product

In March 2024, ECARX released Qogir intelligent cockpit computing platform product, which uses flagship 4nm mobile phone chip Qualcomm Snapdragon 8 Gen3 and is equipped with Flyme Auto + WiFi 7 system. Its hybrid end-side AI reaches 60 TOPS, supports up to 10 billion parameter foundation model platform operation, supports up to 8K display, and hardware supports light tracing technology, providing the ultimate phone-car connectivity experience.

In addition, in 2024, high-performance cockpit platform products based on Qualcomm 8295 from Neusoft Group, Aptiv, Desay SV, Harman and other suppliers have been installed and achieved mass production on models from OEMs such as Jiyue, Geely Galaxy, ZEEKR, Li Auto, Xiaomi, Mercedes-Benz, etc. Its AI computing power reaches 30TOPS (the high-performance version reaches 60TOPS) and adopts a dual NPU architecture, which can effectively improve the speed and performance of foundation model calculations and help the efficient operation of end-side AI foundation models.

Furthermore, products based on cockpit-only platform solutions such as Samsung V920, Intel and Qualcomm consumer chips will also be mass-produced from 2024 to 2025, making market competition more intense.



Source: ECARX

## Hybrid end-side AI

NPU has computing power of up to 60 TOPS  
Supports foundation model platforms with up to 10 billion parameters

## Flyme Auto + Wi-Fi 7

A more extreme phone & car connectivity experience  
Super performance: Wi-Fi peak speed reaches 5.8 Gbps  
Ultra-low latency: less than 2ms transmission delay and smooth experience

**Mainstream next-generation cockpit platform supplier layout: high computing power, focus on AI, flexible and customizable**

**Qualcomm 8255 cockpit platform solution: booming in 2024, may be the next-generation mainstream automotive solution**

From the perspective of supplier layout, Qualcomm remains the main product in the market, mainly Qualcomm 8295 and Qualcomm 8255. Especially the Qualcomm 8255 product, highly recommended by Qualcomm, many OEMs who used to make 8295 intelligent cockpits have begun to access to 8255. However, performance of SA8255 is lower than that of SA8295, especially in terms of GPU performance. CPU performance is also slightly lower than SA8295. But in AI, SA8255 can reach up to 48TOPS, and the price is significantly lower than SA8295.

Beginning in 2024, many mainstream Tier 1 companies have launched their cockpit platform products based on Qualcomm 8255 chip, positioned as an upgraded version of Qualcomm 8155, which can directly undertake Qualcomm 8155 cockpit system ecology and shorten the development cycle for vehicle installations. At the same time, based on high computing power of 8255, cockpit integration solutions such as cockpit-parking integration can also be realized. It is expected that in 2024-2025, Qualcomm 8255 cockpit platform products are expected to inherit the Qualcomm 8155 market and become the mainstream solution in the market.

# Qualcomm 8255-based Cockpit Platform Solutions from Major Suppliers

Qualcomm 8255-based Cockpit Platform Solutions from Major Suppliers

Supplier	Product and Solution	Release Time	Main Components
Bosch	The second-generation intelligent cockpit platform (upgraded version)	2024	Qualcomm 8255
Desay SV	The fourth-generation intelligent cockpit platform (G9SH)	Oct. 2023	Qualcomm 8255
Hangsheng Electronics	The third-generation advanced intelligent cockpit platform	Apr. 2024	Qualcomm 8255+ software virtualization
ECARX	ECARX Atlas computing platform	Apr. 2024	Powered by Qualcomm Snapdragon 8255 Software China Flyme Auto Ecosystem Overseas Google GAS ecosystem
BICV	SA8255 cockpit-parking integrated domain controller	Apr. 2024	Qualcomm 8255
ADAYO	ADAYO new-generation cockpit domain control solution	Apr. 2024	Qualcomm 8255+QNX+ADAYO's own open platform AAOP3.0
Joyson Electronics	nGene3H	2023	Qualcomm 8255 + Android Codec2.0 + Linux + ALiOS +Software virtualization
ThunderX Auto	Mass production level cockpit-parking integrated domain control solution RazorDCX Tongass	2024	Qualcomm 8255+SerDes chip+Dishui OS Pre1.0 8255intelligent cockpit version
Autolink	AL-C2 High-end cockpit product with cockpit-parking integration	2024	Qualcomm SA8255P

Source: ResearchInChina

**Samsung V920 platform solution: mainly deployed by Harman, Visteon and other foreign Tier1s, and Hyundai is the first to mass-produce and install it**

In 2024, Harman launched the latest Ready Upgrade Advanced cockpit domain controller, which provides optimized solutions for high-end models or OEMs who want to add more displays, richer safety functions, and connectivity services to existing vehicles. Provide superior in-car experience through new Samsung Exynos processor, and introduce new features and service capabilities for on-demand access through Harman Ignite Store app and third-party applications. Meanwhile, Harman also collaborates with TE Connectivity to achieve easier hardware upgradability via patented NET-AX + modular hybrid connectors.

**AMD V2000A platform solution: creating the ultimate cockpit for PC-level performance**

ECARX builds Makalu computing platform, based on AMD Ryzen embedded V2000 processor and Radeon RX6600 series GPU. Equipped with ECARX Cloudpeak cross-domain system, it can provide console game-level graphics and image rendering capabilities. It also supports the latest graphics processing interface of PC-level computing platform and Unreal Engine 5, which can realize real-time rendering of 3D environment and 7.X.4 panoramic spatial audio. Comprehensively empower partners to create full-scenario 3D immersive cockpit functions and provide a complete soft and hard capability base for the next-generation intelligent cockpit products. It will be mass-produced in Smart models in 2024.



Source: ECARX

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