

Recommendations for Smartphone Infotainment Assistants

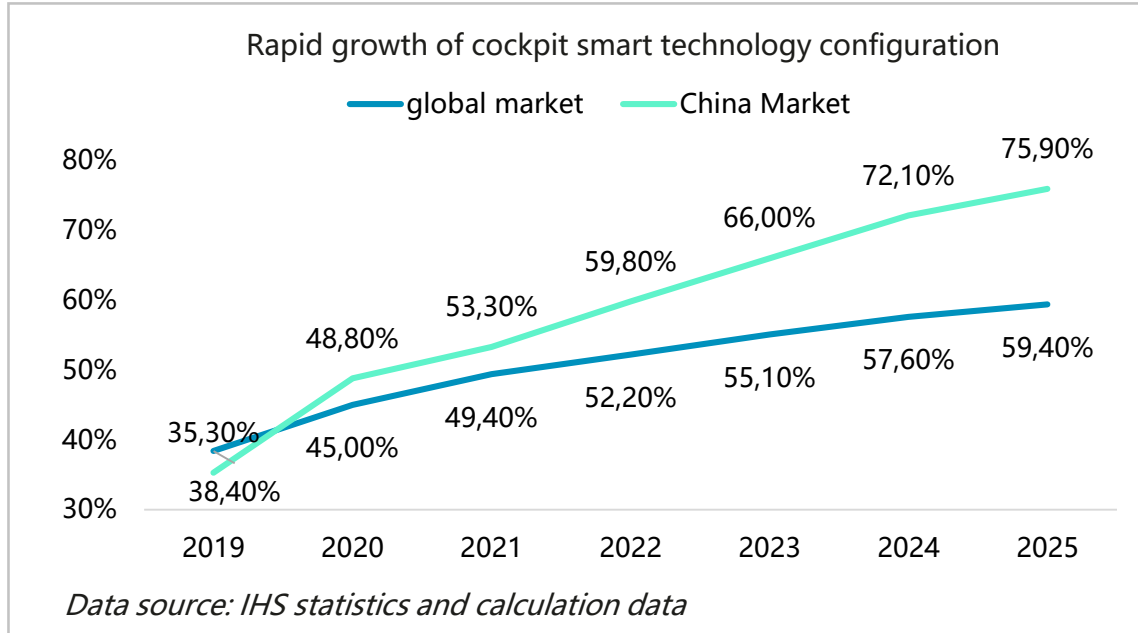


Security Level:



Industry Insight: Mobile Phones and Vehicles Collaborate to Enable Vehicle Intelligence

- The integration of new-generation information technology and automobile industry has become an important driving force for industry transformation. **Smart cockpits are an important criteria for user requirements.**



- Fully autonomous driving is still actively explored, laws and regulations still need to be improved, so **Smart Cockpit intelligence has become a new pole of competition** for OEMs.
- Consumers demand gradually change from safety to individualization, and **Car market positioning evolving from travel tool to living space.**

Collaboration between Cars and Smartphones accelerates Smart Cockpit evolution and provision Smart Mobility services.

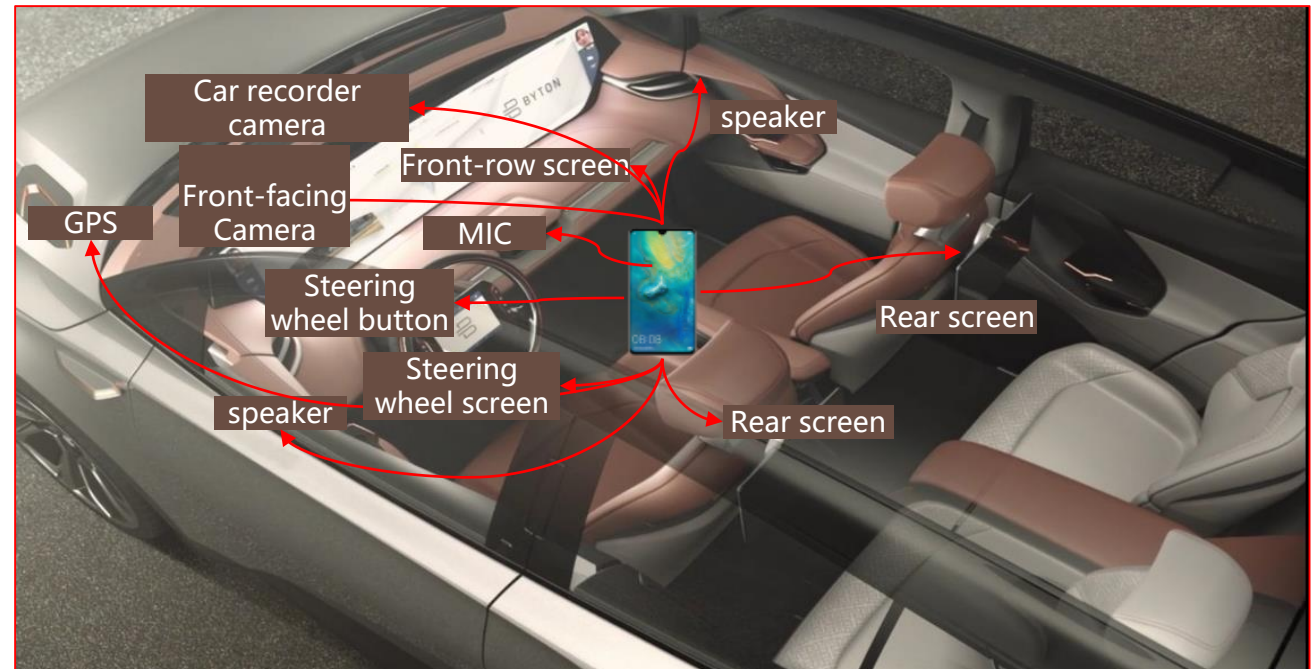
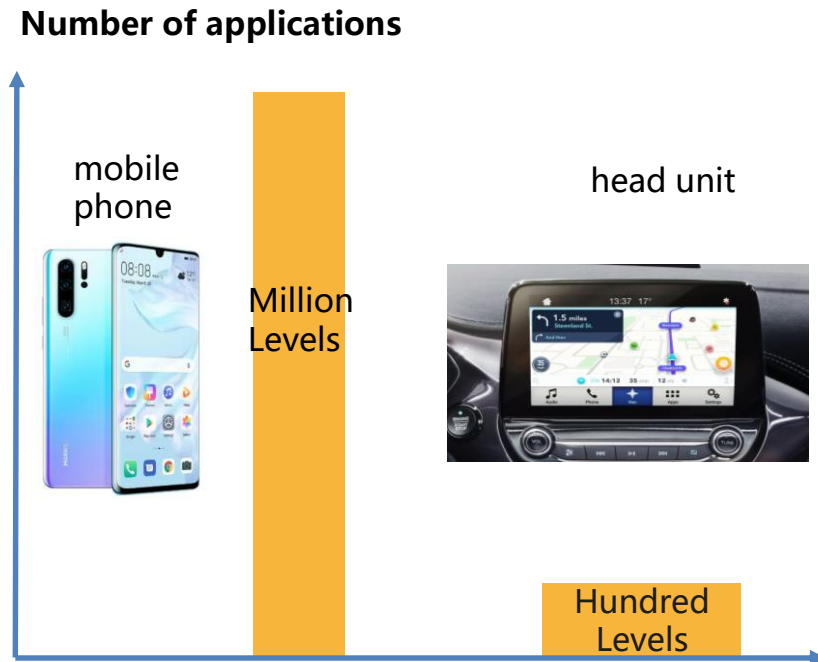


Industry Foundation	OEMs expect to boost sales and enhance brand value.	IT players lay out in Car OS	Consumers highly dependent on Smartphone Apps
Technical Foundation	Quick grow of Car E/E developments	ICT developments	Device-cloud network security solutions are becoming mature.

Interconnection 2.0 Value Scenario: HW Mutual Assistance and Ecosystem Sharing

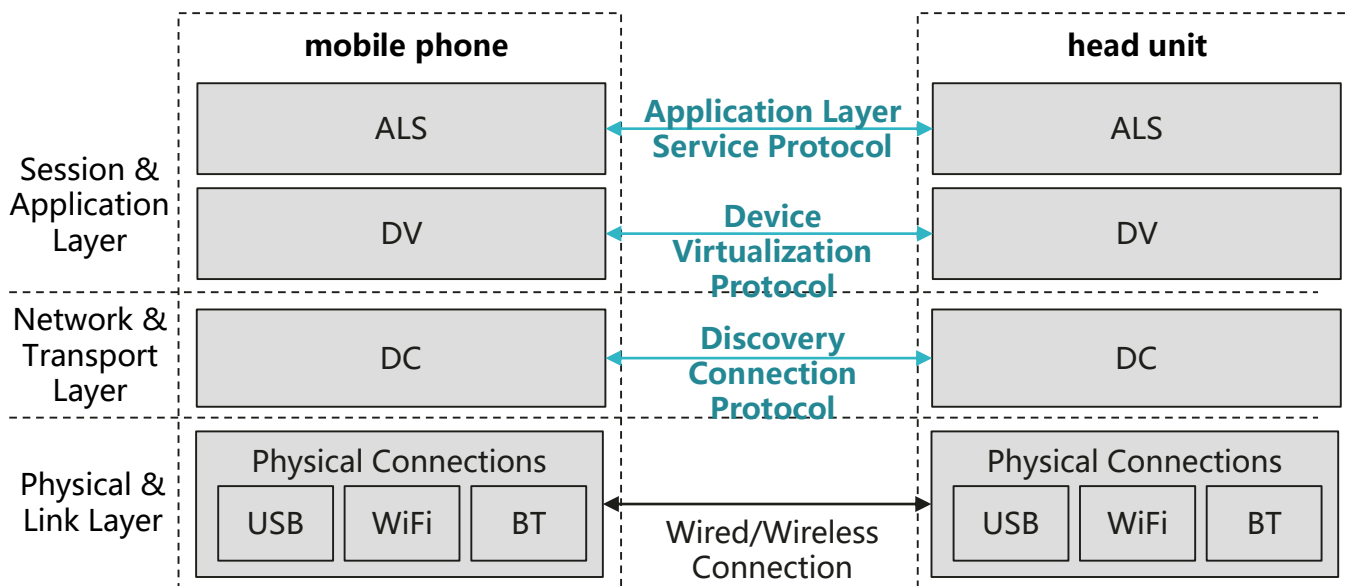
- **Smartphone millions app ecosystem and services for car**
 - ✓ Smart Apps are richer and more diverse than Car Apps
 - ✓ Reduce the cost of building a Car Apps ecosystem

- **Collaboration between smartphones and in-vehicle HW**
 - ✓ Cars provide better display, HMI, and control capabilities.
 - ✓ Smartphones offer latest computing power, SW, and high-speed connectivity.



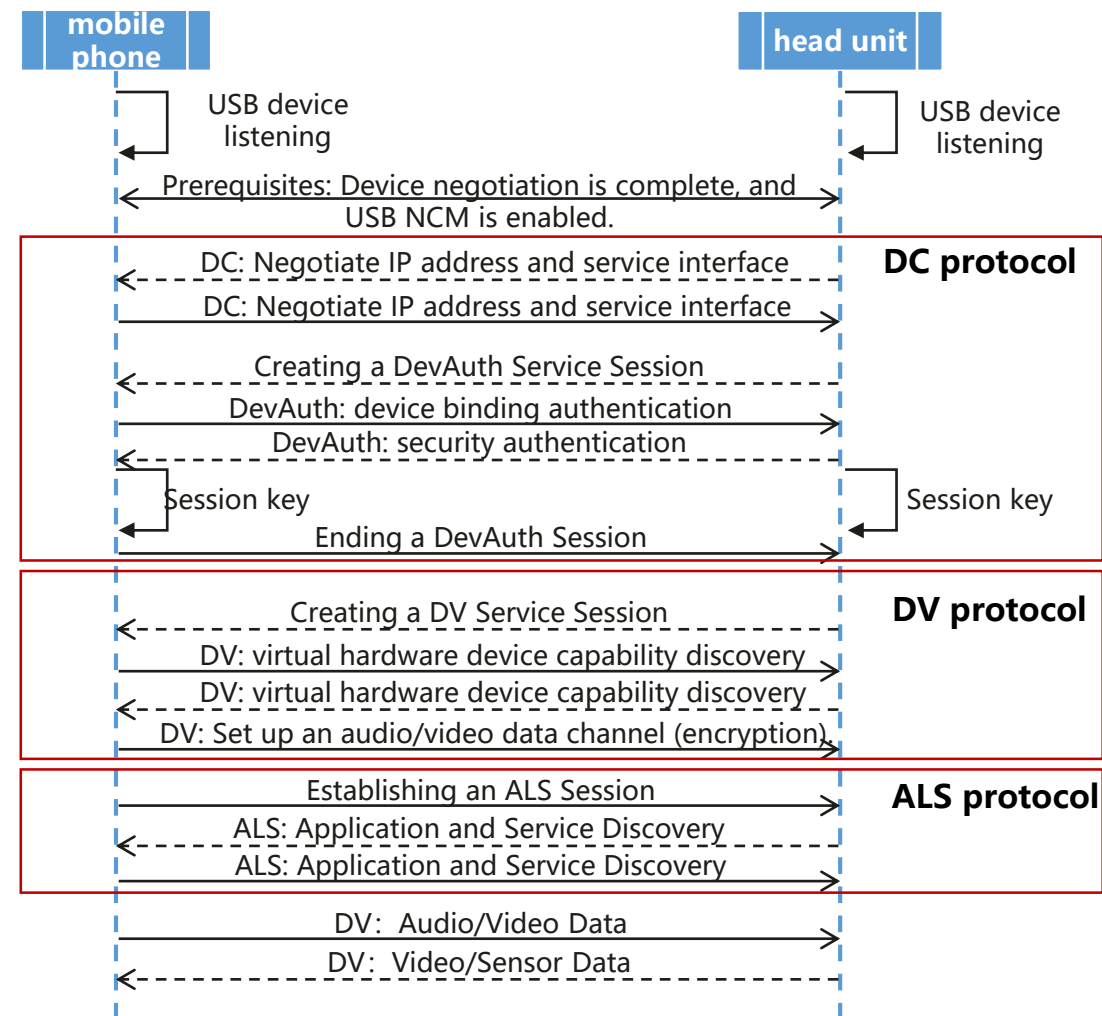
Technical Architecture Suggestion: High-speed and stable data channels through hierarchical connection protocols

Solution Architecture



- **DC protocol:** implements **device discovery** and connection, and establishes network transmission channels based on upper-layer service requirements.
- **DV protocol:** used to **discover and virtualize shared hardware** at both ends. For example, mobile phones send audio data to car speakers for playback.
- **ALS protocol:** used for **service discovery, invoking, and collaboration** at the application layer between devices. For example, the in-vehicle infotainment may request to use the network capability of the mobile phone to access the Internet.

Interaction process (using USB connection as an example)

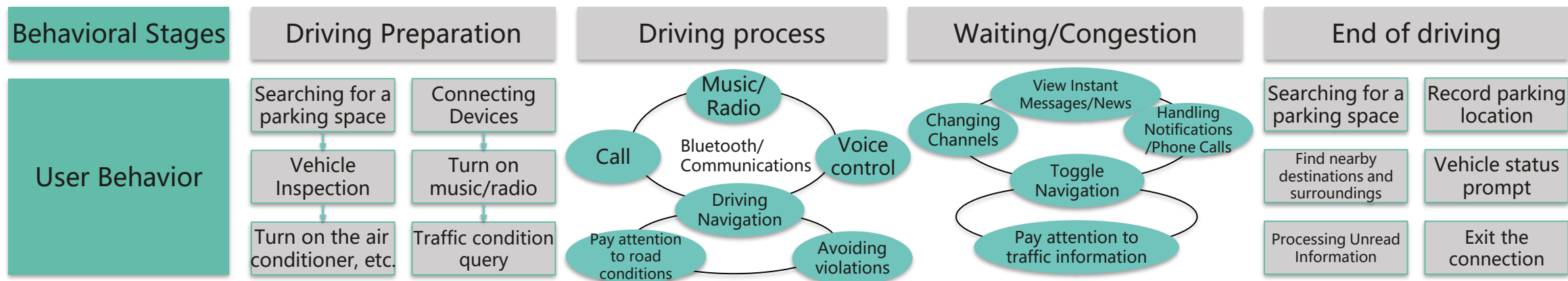


Interconnection: user experience analysis

Why do we need to define interconnection performance recommendations?

- ✓ Critical to ensuring safe driving conditions
- ✓ Maintain the experience to a good level and improve consumer satisfaction
- ✓ Provide acceptance reference for OEMs during Smartphone-car interconnection

• User Journey Definition Experience Scenarios



- Related User Experience Indicators: Connection efficiency and stability, smooth system running, clear images, high resolution, and voice recognition sensitivity

Interconnection performance recommendations: 6 basic scenarios and 29 indicators

- Example of performance recommendations approved in the public FGVM TR3 Technical Report

Scenario	Indicators	Suggestions
Wired connection	First connection completion delay	$\leq 5s$
	Non-First Connection Completion Delay	$\leq 5s$
	Connection Success Rate	$\geq 99\%$
	Long-term connection reliability (disconnection times)	0 (at least 8 hours)
Wireless connection	First Discovery Completion Delay	$\leq 1.5s$
	First discovery success rate	$> 70\%$
	Furthest discovery distance	150 cm
	First connection completion delay	$\leq 5s$
	Non-First Connection Completion Delay	$\leq 5s$
	First Connection Success Rate	$\geq 99\%$
	Long-term connection reliability (disconnection times)	0 (at least 8 hours)
	Reconnection completion delay (which is started after vehicle shutdown)	$\leq 5s$
	Reconnection Success Rate	$\geq 99\%$

Scenario	Indicators	Suggestions
Projection Display	Screen projection delay	$\leq 150ms$
	Projection frame rate	FPS ≥ 55 (60 fps video source) FPS ≥ 24 (30 fps video source)
Audio Output	Audio output delay	$\leq 1000ms$
	No frame freezing duration for audio output	$\geq 4h$
	Voice and picture synchronization delay	$T \in (-125 ms, +45 ms) \sim (-185 ms, +90 ms)$
User Operations	Touch screen response delay	$\leq 200ms$
	Steering wheel control response delay	$\leq 200ms$
Voice Interaction	Voice wakeup success rate (low noise)	$\geq 93\%$
	Voice wakeup success rate (medium noise)	$\geq 90\%$
	Voice wakeup success rate (high noise)	$\geq 85\%$
	Voice interaction response delay (entertainment category)	$\leq 2600ms$
	Voice interaction response delay (call category)	$\leq 2100ms$
	Voice interaction response delay (navigation category)	$\leq 2500ms$
	Voice interaction success rate (entertainment category)	$\geq 85\%$
	Voice interaction success rate (call category)	$\geq 85\%$
	Voice interaction success rate (navigation category)	$\geq 85\%$

Standard Research Source: China ICCE Alliance - New Power for Cross-Border Cooperation between Smart Devices and Smart Vehicles

September 2020: 52 industry players established ICCE



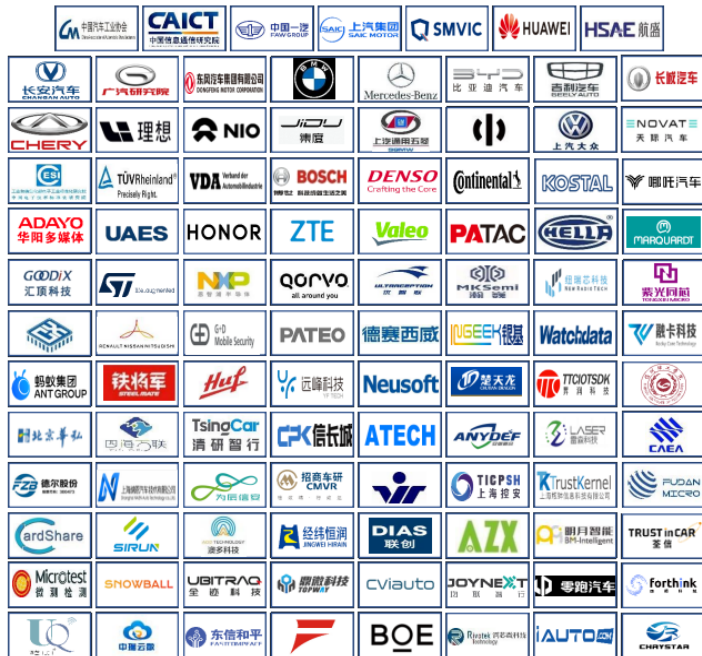
Intelligent Car Connectivity Industry Ecosystem Alliance

Mission: commit industry forces to build interconnected and collaborative Car/Phone ecosystem

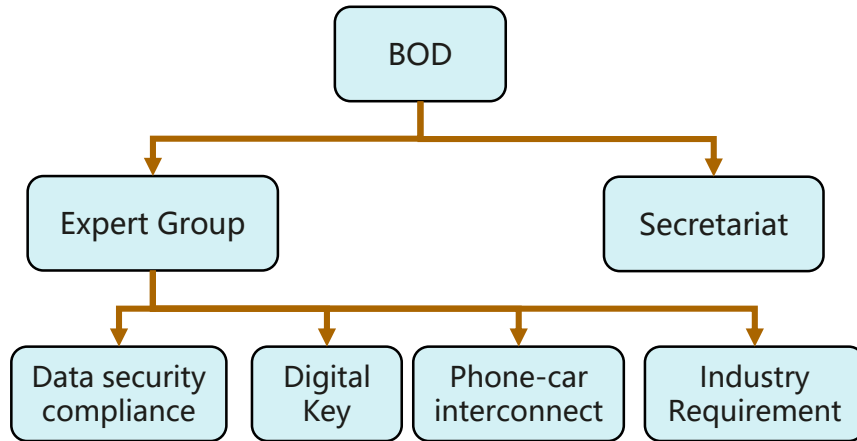
Number of members: 115 (as of 2023.3)

Organizational structure

Service scenario

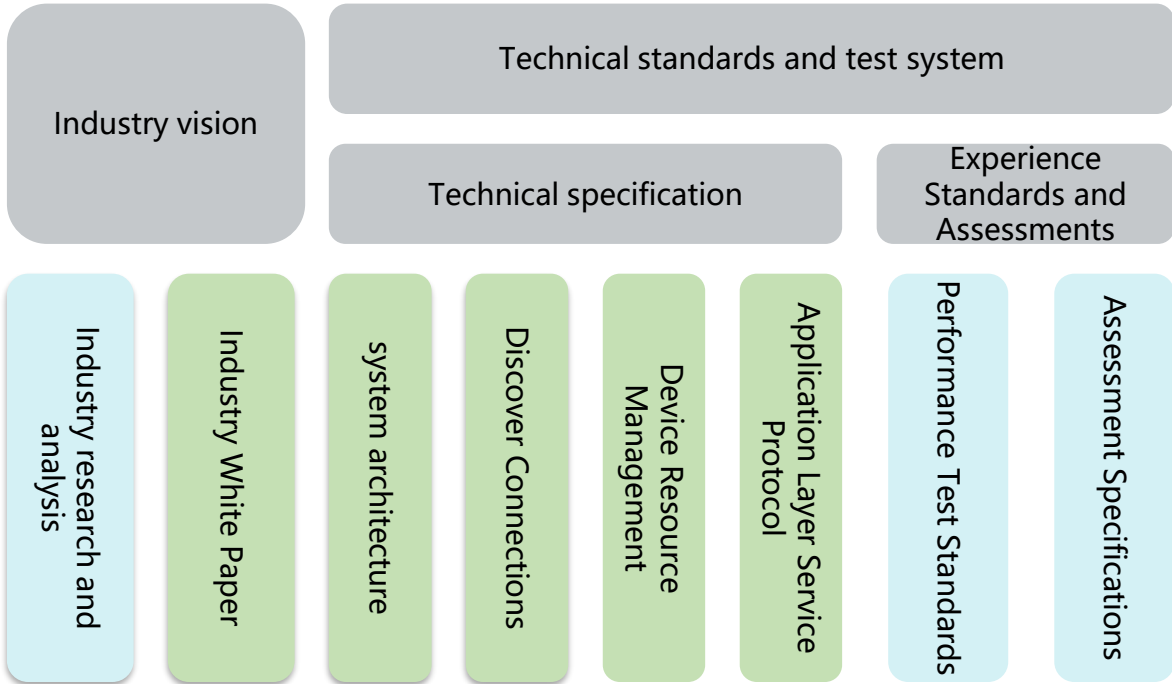


- Chairman: China Association of Automobile Manufacturers(CAAM)
- The first executive director unit: CAAM, China FAW Group, CAICT, Huawei Device, SAIC, Hangsheng Electronics, SMVIC



- **Digital Key:** Resolve the pain points through industry collaboration and standardization, accelerate the widespread of the solution.
- **Phone-car interconnect:** widespread the concept of smart interconnectivity and collaboration between vehicle and mobile device
- **Data security compliance:** Develop a framework for data use cases which also comply with latest car data regulation in China.

ICCE Standard Achievements (Phone/Car interconnect)



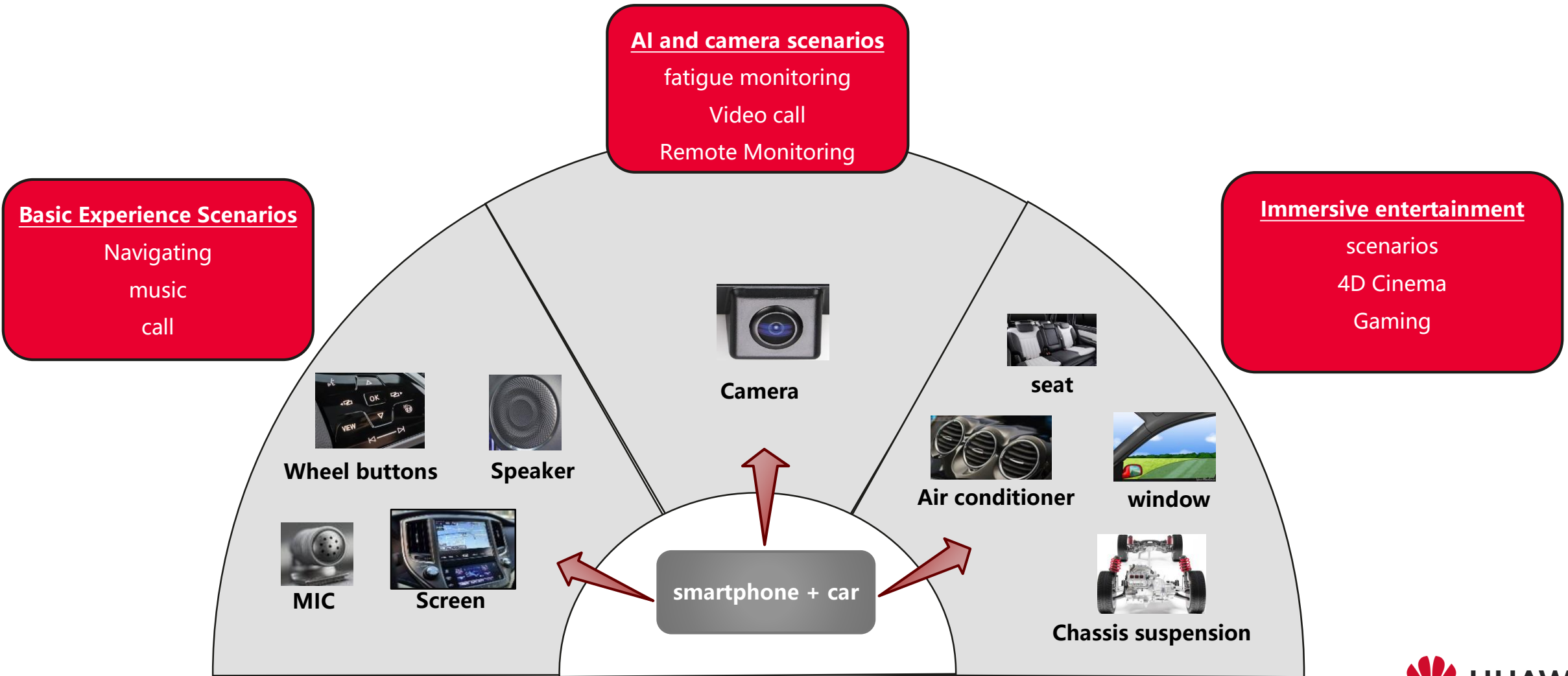
- The standards are jointly formulated by more than 30 companies, including CAAM, HUAWEI, FAW, SAIC, DFAC, Great Wall, Changan Automobile, CAICT, SMAIC, Hangsheng, DESAY SV, and PATEO.



- Huawei's role in standard formulation: A major contributor to ICCE standards, leading the formulation of technical standards as WG leader alongside developing the corresponding Huawei HiCar product**
- Currently, Huawei and Changan Automobile hope to contribute their technical experience to ITU standards and provide reference for the industry.

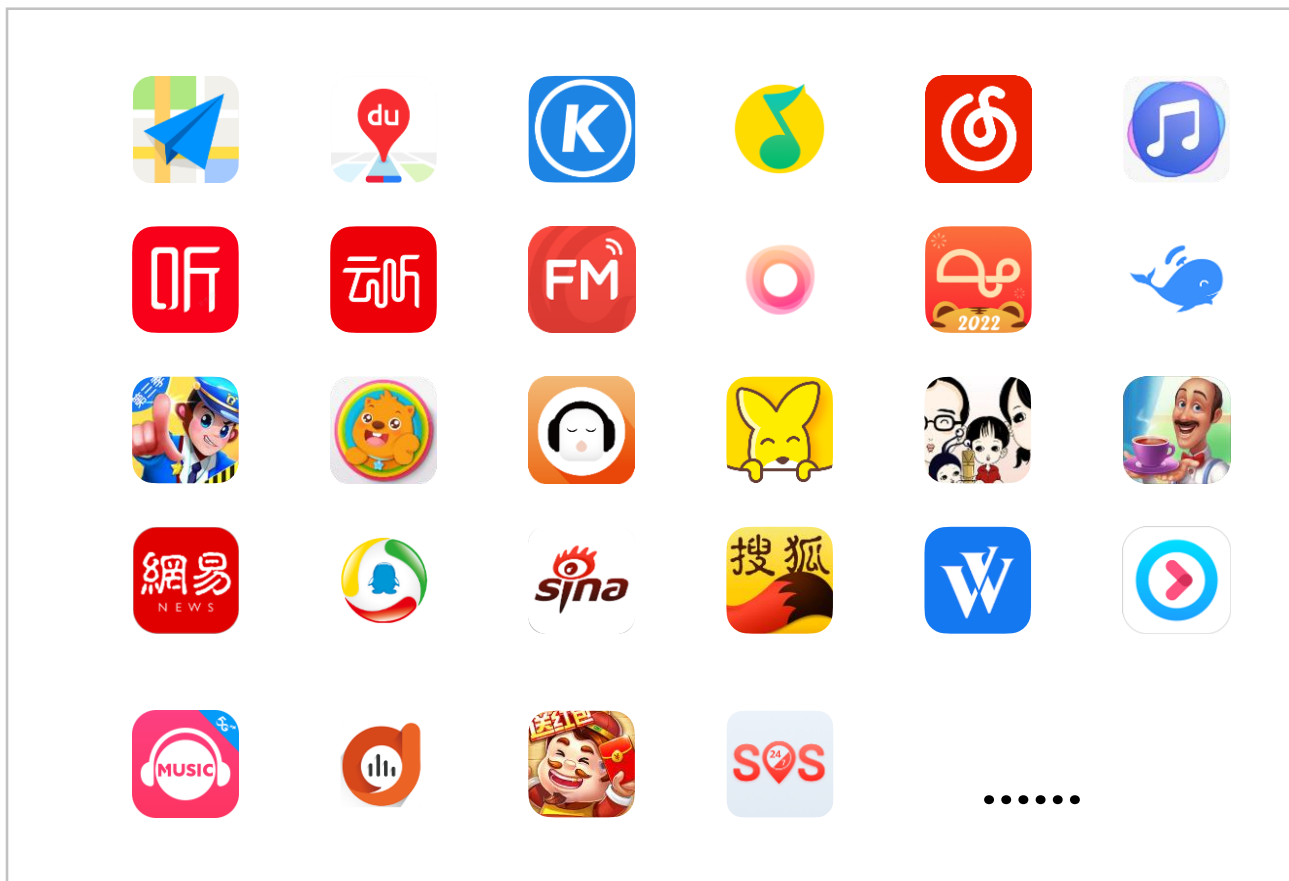
ICCE Standard Practice applied to HUAWEI HiCar (1/3)

As the interconnection 2.0, the [distributed technology](#) is used to form a [HyperTerminal between smartphones and car](#)



ICCE Standard Practice applied to HUAWEI HiCar (2/3)

Ecosystem sharing capability: Top 100+ apps can be shared with vehicles.



ICCE Standard Practice applied to HUAWEI HiCar (3/3)

HW mutualization

Shake phone easy start Navigation



Hands free operation with AI assistant



Easy HD Video call/meeting



Seamless Flow of Map Navigation from phone to car



Car-Home Interconnection



Thank you.

把数字世界带入每个人、每个家庭、
每个组织，构建万物互联的智能世界。

Bring digital to every person, home and
organization for a fully connected,
intelligent world.

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