中国电子技术标准化研究院
China Electronics Standardization Institute

Standardized Foundations in Intelligent Connected Vehicles: Safeguarding the Secure and Sustainable Growth of the Low-Altitude Economy

November 2025

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Development Process of the Low-altitude Economy

Concept Proposal (2009-2010)

In December 2009, the concept of "low-altitude economy" was first introduced at the China General Aviation Development Research Seminar.

In August 2010, the "Opinions on Deepening the Reform of Low-Altitude Airspace Management in China" marked the commencement of low-altitude airspace reform.

Initial Development (2011-2020)

In July 2014, the "Regulations on the Management of Low-Altitude Airspace Use (Trial)" (Draft for Comments) categorized low-altitude airspace below a true altitude of 1,000 meters. Based on this, pilot reforms for low-altitude airspace management were implemented in select regions starting from the latter half of 2014.

In May 2016, the State Council issued the "Guiding Opinions on Promoting the Development of the General Aviation Industry," proposing to "scientifically advance reform pilot projects and expand the target true altitude in low-altitude airspace to 3,000 meters," significantly accelerating the pace of low-altitude development.

In May 2019, the "Guiding Opinions on Promoting the Development of Civil UAVs (Draft for Comments)" aimed to foster the healthy development of UAVs and enhance the management and service quality of civil unmanned aerial systems. Starting with low-altitude and isolated operations, it emphasized the gradual accumulation of practical experience and operational data to continually improve aviation service capabilities for the nation, industry, society, and the public.

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Development Process of the Low-altitude Economy

Rapid Development (2021 - present)

In February 2021, the "National Comprehensive Three-Dimensional Transportation Network Planning Outline" proposed fostering the transportation platform economy, hub economy, corridor economy, and low-altitude economy, marking the first inclusion of the low-altitude economy in a national plan.

In December 2022, the "Outline of Strategic Planning for Expanding Domestic Demand (2022-2035)" aimed to accelerate the development of tourism sectors such as island tourism, cruise tourism, low-altitude tourism, and desert tourism, unlocking the potential of general aviation consumption.

In June 2023, the "Interim Regulations on the Flight Management of Unmanned Aircrafts" signified a new phase of standardized development for China's UAV industry, ensuring it operates within a legal framework.

In November 2023, the "Regulations on Airspace Management of the People's Republic of China (Draft for Comments)" clearly defined airspace users and outlined their rights and obligations, representing a significant breakthrough in the liberalization of China's airspace.

In December 2023, the Central Economic Work Conference emphasized the development of strategic emerging industries, including biomanufacturing, commercial aerospace, and the low-altitude economy.

In March 2024, the "2024 Government Work Report" pledged to actively foster new growth engines such as biomanufacturing, commercial aerospace, and the low-altitude economy.

In July 2024, the Third Plenary Session of the 20th Central Committee of the Communist Party of China reiterated the commitment to developing general aviation and the low-altitude economy.

In March 2025, the "2025 Government Work Report" proposed promoting the safe and sound development of emerging industries, including the low-altitude economy.

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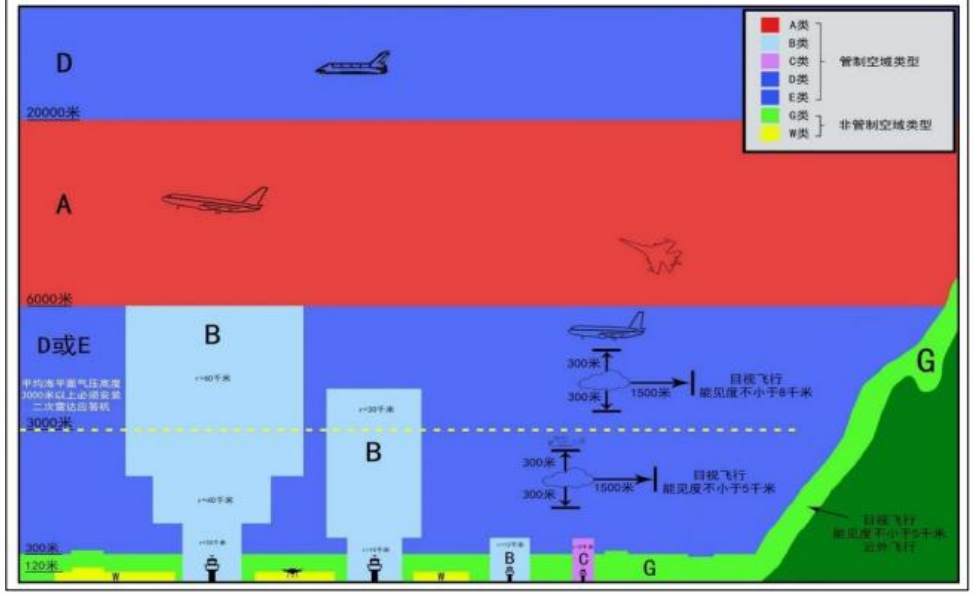
Basic Concept of Low-altitude Economy

The low-altitude economy typically denotes an integrated economic model that operates within the airspace below a vertical distance of 1,000 meters from the ground (extendable to 3,000 meters based on application requirements).

It leverages carriers such as manned and unmanned aircraft and auxiliary operational equipment, along with new production factors like low-altitude airspace and associated data resources. This model is driven by various low-altitude flight activities, including passenger and cargo transport, as well as other operational scenarios, fostering integrated development across related sectors.

Schematic diagram of the basic classification of national airspace



Types of airspace	Demarcation of airspace and its scope	Flight-suitable type
G	1. Airspace below a true altitude of 300 meters, excluding Class B and C airspace (Class W airspace not included); 2. Airspace with an average altitude below 6,000 meters above sea level that does not affect civil aviation public transport flights.	Primarily intended for the operation of medium and large industrial unmanned aircrafts
W	Partial airspace within G-class airspace, below a true altitude of 120 meters	Primarily intended for the operation of micro, light, and small unmanned aircrafts

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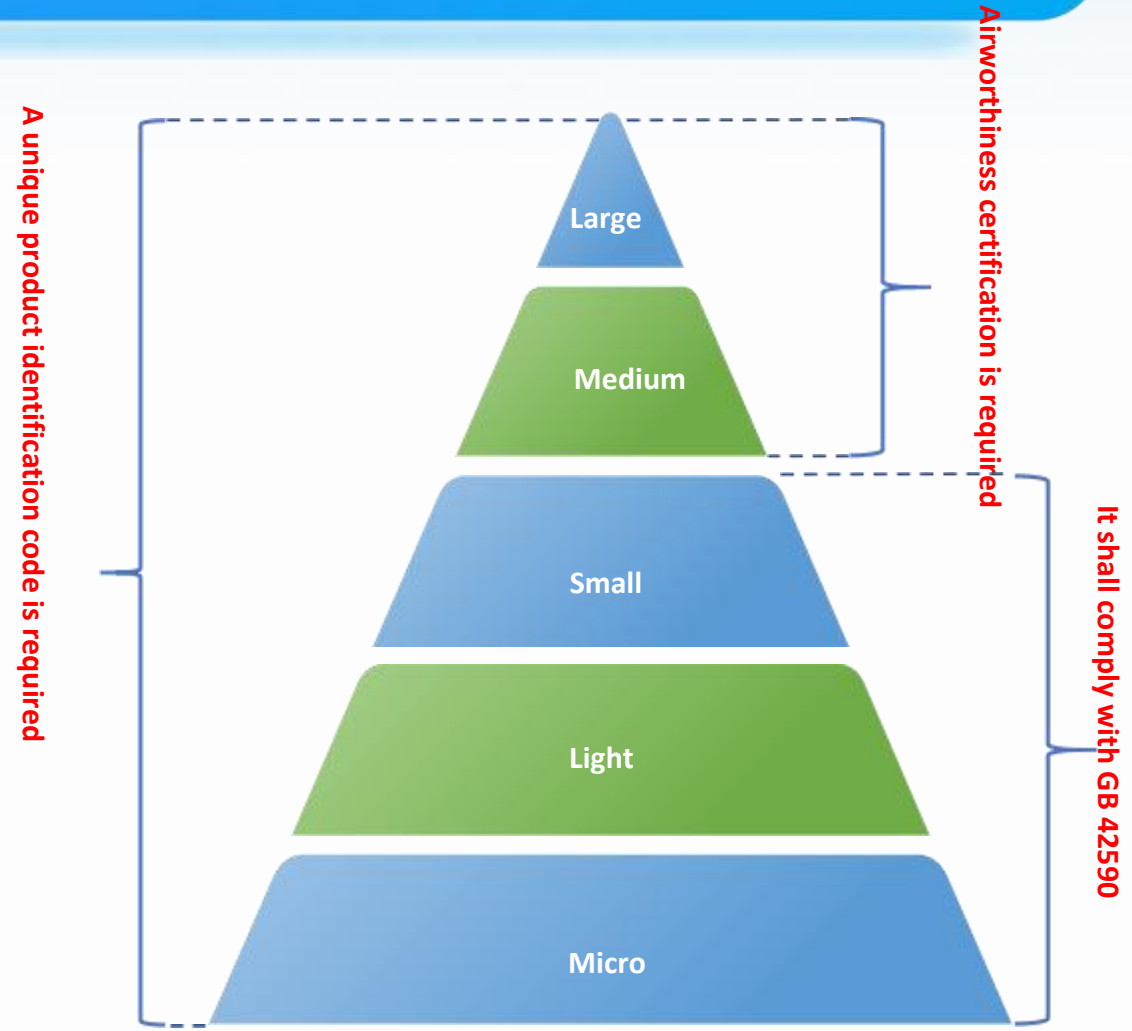
Classification of unmanned aircrafts

The "Interim Regulations on the Flight Management of Unmanned Aircrafts" explicitly define the classification of UAVs into five categories—micro, light, small, medium, and large—based on performance metrics such as empty weight, takeoff weight, and flight speed.

Type	Technical requirements	Document sources
Large unmanned aircrafts	• Airspace above a true altitude of 120 meters is classified as controlled airspace. • The maximum takeoff weight exceeds 150 kilograms.	**Interim Regulations on the Flight Management of Unmanned Aircrafts (State Council Decree No. 761)**
Medium-sized unmanned aircrafts	• Airspace above a true altitude of 120 meters is classified as controlled airspace. • The maximum takeoff weight does not exceed 150 kilograms.	
Small unmanned aircrafts	• Airspace above a true altitude of 120 meters is classified as controlled airspace. • Empty weight does not exceed 15 kilograms. • The maximum takeoff weight does not exceed 25 kilograms. • Manual intervention is possible throughout the entire flight process.	
Light unmanned aircrafts	• Airspace above a true altitude of 120 meters is classified as controlled airspace. • Empty weight does not exceed 4 kilograms. • The maximum takeoff weight does not exceed 7 kilograms. • The maximum level flight speed does not exceed 100 kilometers per hour. • Manual intervention is possible throughout the entire flight process.	
Micro unmanned aircrafts	• Empty weight is less than 0.25 kilograms. • The maximum flight true altitude does not exceed 50 meters. • The maximum level flight speed does not exceed 40 kilometers per hour. • The wireless system complies with the requirements of low-power short-range technology. • Manual intervention is possible throughout the entire flight process.	



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Overall policy situation

Published by	Name	Time	Relevant content
The Central Committee of the Communist Party of China and the State Council	National Comprehensive Three-Dimensional Transportation Network Planning Outline	February 2021	The concept of "low-altitude economy" was included in the national plan for the first time
The Central Committee of the Communist Party of China and the State Council	Tourism Development Plan for the 14th Five-Year Plan Period	December 2021	Proposed key initiatives to advance independent innovation and high-end manufacturing of equipment for low-altitude tourism, and refine policies for the development of low-altitude tourism.
The Central Committee of the Communist Party of China and the State Council	Outline of Strategic Planning for Expanding Domestic Demand (2022-2035)	December 2022	Proposed to expedite the cultivation of low-altitude tourism formats and unlock the consumption potential of general aviation.
The State Council and the Central Military Commission	Interim Regulations on the Flight Management of Unmanned Aircrafts	June 2023	The regulation of unmanned aircraft flights and related activities signifies the beginning of a new law-based development phase for China's UAV industry, ensuring that all operations are governed by clear legal standards.
The State Council	2024 Government Work Report	March 2024	The "low-altitude economy" was mentioned for the first time in the government work report, which proposed actively fostering new growth engines such as biomanufacturing, commercial aerospace, and the low-altitude economy.
Central Committee of the Communist Party of China	Resolution of the CPC Central Committee on Further Deepening Reform Comprehensively to Advancing Chinese Modernization	July 2024	Proposed to deepen reforms in the comprehensive transportation system and develop general aviation and the low-altitude economy.
The State Council	Opinions on Optimizing and Improving the Management Mechanism of Local Government Special Bonds	December 2024	Explicitly stated that local government special bonds can be utilized as project capital for infrastructure in emerging industries such as the low-altitude economy.
The Central Committee of the Communist Party of China and the State Council	Special Action Plan for Boosting Consumption	March 2025	Accelerated the enhancement of the regulatory framework for the low-altitude economy and facilitate the orderly development of low-altitude consumption activities, such as low-altitude tourism, aviation sports, and consumer-grade drones.
The State Council	2025 Government Work Report	March 2025	Proposed to launch large-scale demonstration projects for new technologies, products, and application scenarios, fostering the safe and robust development of emerging industries like the low-altitude economy.

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Published by	Name	Time	Relevant content
Jointly issued by the Ministry of Industry and Information Technology (MIIT), the Ministry of Science and Technology, the Ministry of Finance and Civil Aviation Administration of China	Outline for the Development of Green Aviation Manufacturing (2023-2035)	October 2023	Leverage the role of government procurement to encourage relevant departments and local governments to actively purchase and utilize green aviation equipment. Foster the promotion and application of green aviation equipment through insurance compensation mechanisms for the first (or set of) major technical equipment. Capitalize on the national industry-finance collaboration platform to incentivize enterprises to effectively utilize financial support policies, including green funds, green bonds, green credit, and green insurance. Encourage enterprises to fully tap into market-oriented investment and financing channels. Promote the active involvement of social capital in the research, development, and operational services of green aviation equipment through financing leasing, equity investment, and other means.
Civil Aviation Administration of China	Regulations on Airspace Management of the People's Republic of China (Draft for Comments)	November 2023	The Regulations classifies China's airspace into two tiers and seven categories based on the "airspace classification" approach, namely controlled airspace (Class A, B, C, D, and E) and uncontrolled airspace (Class G and W). The newly introduced G and W airspace categories primarily offer regulatory support for unmanned aircraft flights, complementing the "Interim Regulations on the Flight Management of Unmanned Aircrafts".
MIIT	Several Provisions on the Production Management of Civil Unmanned Aircrafts	December 2023	The Regulation aims to establish a production access system to standardize the production activities of civil unmanned aircrafts and ensure product quality and flight safety.
MIIT	Interim Measures for the Radio Management of Civil Unmanned Aircrafts	December 2023	It further clarifies that the type approval of radio transmission equipment, radio frequency allocation, and the licensing of radio stations for civil unmanned aircrafts communication systems fall within the scope of radio management, effectively aligning management policies with the superior legislation.

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Overall policy situation

Published by	Name	Time	Relevant content
Ministry of Transport	Management Rules for the Operation Safety of Civil Unmanned Aircrafts	January 2024	A comprehensive safety operation framework has been established for the graded and categorized management of civil unmanned aircrafts based on operational risks, covering aspects such as operator qualifications, aircraft registration, airworthiness certification, airspace utilization, and operational activities.
Civil Aviation Administration of China	Civil Unmanned Aircraft System - Guidelines for Airworthiness Safety Assessment	February 2024	It aims to provide a transitional airworthiness assessment scheme for medium and large unmanned aircrafts that were already designed and finalized prior to the enforcement of the "Interim Regulations on the Flight Management of Unmanned Aircrafts, in order to address their airworthiness management challenges.
the Ministry of Industry and Information Technology, the Ministry of Science and Technology, the Ministry of Finance and Civil Aviation Administration of China	Implementation Plan for Innovative Application of General Aviation Equipment (2024-2030)	March 2024	Fully leverage the insurance compensation policy for the first (set of) major technical equipment to support the promotion and application of general aviation equipment. Utilize government procurement to increase the purchase of general aviation equipment and services. Implement the State Council's requirements regarding investment approval for aviation projects and standardize the investment approval procedures for general aviation projects.
State Administration for Market Regulation	Action Plan for Promoting Equipment Upgrades and Consumer Goods Trade-ins through Standard Enhancement	March 2024	Develop standards for UAV flight testing, logistics UAVs, and UAV airworthiness to foster the growth of the low-altitude economy. (The Ministry of Industry and Information Technology, the State Administration for Market Regulation, the Civil Aviation Administration of China, among others, will be responsible according to their respective duties.)

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Local Policy

Since January 2024, the Government Work Reports of nearly 30 provinces and municipalities, including Beijing, Guangdong, Hunan, Anhui, and Jiangxi, have introduced various policies to actively foster the low-altitude economy, designating it as a strategic emerging industry.

01 Development Background of the Low-Altitude Economy

Local Policy

- Provincial level
  - Provinces such as Beijing, Hunan, Jiangxi, and Anhui have successively rolled out policies to initiate the development of the low-altitude economy, introducing plans, policies, and detailed regulations concerning low-altitude economy, UAVs, and other related areas.

The action plans of all provinces span the crucial window period from 2024 to 2027, indicating their shared intent to capture the commanding heights and first-mover advantage in the low-altitude economy over the next three to four years, thereby fostering rapid industrial growth and clustering.

Provincial level	Policy
	Provincial level
Beijing	Action Plan for Promoting High-Quality Development of Low-altitude Economy in Beijing (2024-2027)
Hunan Province	Planning of the Low-altitude Flight Service Guarantee System in Hunan Province
Jiangxi Province	The "1269" Action Plan for the Modernization of Key Manufacturing Industry Chains in Jiangxi Province (2023-2026)
Anhui Province	Implementation Plan for Accelerating the Cultivation and Development of Low-altitude Economy in Anhui Province (2024-2027) and Several Measures
Hainan Province	Three-year Action Plan for the Development of Low-altitude Economy in Hainan Province (2024-2026)
Shandong Province	Action Plan for Technological Innovation in Low-altitude Economy in Shandong Province (2025—2027)
Guizhou Province	Three-year Action Plan for High-Quality Development of Low-altitude Economy in Guizhou Province (2025—2027)
Guangxi Zhuang Autonomous Region	Action Plan for High-Quality Development of Low-altitude Economy in Guangxi (2024—2026)
Zhejiang Province	Several Opinions of the People's Government of Zhejiang Province on Building a Strong Civil Aviation Province at a High Level and Creating a High Ground for Low-altitude Economy
Guangdong Province	Action Plan of the General Office of the People's Government of Guangdong Province for Promoting High-Quality Development of Low-altitude Economy in Guangdong Province (2024—2026)
Yunnan Province	Several Measures of Yunnan Province to Support the Healthy Development of Low-altitude Economy
Shaanxi Province	Measures for Strengthening and Supplementing the Low-altitude Economy Industrial Chains through Quality Enhancement and Promoting the Quality Linkage of the Industrial Chain in Shaanxi Province
Hebei Province	Several Measures on Accelerating the High-Quality Development of Low-altitude Manufacturing Industry in Hebei Province
Hunan Province	Several Policy Measures on Supporting the High-Quality Development of the Low-altitude Economy throughout the Province
Jiangsu Province	Opinions of the General Office of the Provincial Government on Accelerating the High-Quality Development of Low-altitude Economy

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Local Policy

- Prefecture level

  Cities such as Shenzhen, Hefei, Hangzhou, Suzhou, Chengdu, and Chongqing in eastern and southern China have successively rolled out implementation plans, action plans, and specific industrial support measures to foster the development of the low-altitude economy.

  Policies across different regions generally cover aspects such as infrastructure development, expansion of application scenarios, cultivation of industrial chains, and investment projects.

Municipal level		Policy
Municipal level		
East China	Nanjing City	Implementation Opinions on Promoting High-Quality Development of Low-altitude Economy in Nanjing City (2024-2026), Several Measures of Nanjing City on Supporting the High-Quality Development of Low-altitude Economy
	Suzhou City	Development System and Vision of Low-altitude Economy in Suzhou City, Implementation Plan for High-Quality Development of Low-altitude Economy in Suzhou City (2024- 2026), Several Measures of Suzhou City to Support the High-Quality Development of Low-altitude Economy (trial)
	Wuxi City	Three-year Action Plan for High-Quality Development of Low-altitude Economy in Wuxi City (2024-2026) Administrative Measures for Civil Unmanned Aircrafts in Wuxi City
	Hefei City	Action Plan for the Development of Low-altitude Economy in Hefei City (2023-2025)
	Fuzhou City	Several Opinions of the People's Government of Fuzhou City on Promoting the High-Quality Development of the Civil Unmanned Aircraft Industry
	Hangzhou City	Implementation Plan for High-Quality Development of Low-altitude Economy in Hangzhou City (2024-2027), Several Measures of Hangzhou City to Support the High-Quality Development of Low-altitude Economy (Draft for Comments)
South China	Shenzhen	Implementation Plan for the Innovative Development of Low-altitude Economy Industry in Shenzhen City (2022-2025)
	Zhuhai City	Several Measures of Zhuhai City to Support the High-Quality Development of Low-altitude Economy
	Guangzhou City	Development Plan for Low-altitude Economy in Guangzhou, Implementation Plan for the Development of Low-altitude Economy in Guangzhou, Regulations on the Development of Low-altitude Economy in Guangzhou City
North China	Tianjin	Eight Measures of Ninghe District to Promote the high-quality Development of Low-altitude Economy, Action Plan for High-Quality Development of Low-altitude Economy in Ninghe District, Tianjin City (2024-2026)
Central China	Wuhan City	Implementation Plan for Promoting the Development of UAV Industry in Wuhan City
Southwest China	Chengdu City	Several Policy Measures of Chengdu City to Accelerate the Improvement of Low-altitude Flight Capabilities and Cultivate the Low-altitude Economy Market, Special Policies for Promoting the High-quality Development of the Industrial UAV Industry in Chengdu
	Chongqing	Action Plan for Promoting the Reform of Low-altitude Airspace Management and Facilitating the High-Quality Development of Low-altitude Economy in Chongqing Municipality (2024-2027), Several Policy Measures of Chongqing Municipality for Promoting the High-Quality Development of Low-altitude Economy
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02 Development Status of the Low-Altitude Economy

02 Development Status of the Low-Altitude Economy

Aircraft technology is diverse and flourishing

Current status of technological development - Aircraft

· Consumer-grade UAVs (primarily "micro, light, and small" types)

- **Flight performance:**
  - · Maximum flight time: **Approximately 40 minutes**
  - · Maximum flight speed: **100 km/h**
  - · Maximum flight altitude: **500 meters**
  - · Maximum control range: **10 kilometers**
- **Applicable Scenarios:**

· Professional aerial photography and videography: Ideal for creators seeking high-definition and high-precision images, such as those involved in film production, vlogging, advertising shoots, etc.

· Agriculture, construction, and surveying: High-precision sensors and thermal imaging equipment facilitate industry applications including agricultural monitoring, building inspections, and environmental monitoring.

· Commercial UAVs (primarily "medium to large" sized)

· Flight performance:

· Maximum flight time: **Over 4 hours (hybrid-powered)**

· Maximum flight speed: **130 km/h**

· Maximum flight altitude: **5,000 meters**

· Maximum control range: **280 kilometers (for unmanned operations in surveying and mapping areas)**

Applicable scenarios:

· **Infrastructure inspection:** Conducting structural inspections in high-risk and complex environments.

· **Construction and engineering monitoring:** Utilized for monitoring construction progress and conducting safety inspections on construction sites.

· **Search and rescue:** During post-disaster search and rescue operations, the intelligent obstacle avoidance capability of Skydio 2 enables it to navigate through heavily obstructed areas and carry out effective searches.

·New Aircraft Type (eVTOL)

·Pilots and passengers:

Passenger capacity: Up to 2 passengers

Cabin: Dual-cabin design, suitable for transporting passengers or small cargo.

· Power system:

Electric propulsion system: Utilizes 16 electric rotors (each rotor providing vertical lift and stability).

Battery: Lithium-ion battery pack, supporting rapid charging and high energy efficiency.

·Flight performance:

Maximum flight speed: Approximately 130 km/h (approximately 80 mph)

Maximum flight altitude: Approximately 3,000 meters (9,843 feet)

·Maximum flight time: Approximately 25 minutes

Maximum range: Approximately 35 kilometers (approximately 22 miles)

Application scenarios: Air taxis, tourism and sightseeing, logistics, and emergency rescue services, etc.

DJI Mavic Air 2 UAV

DJI Mavic 3 UAV

Skydio X2 UAV

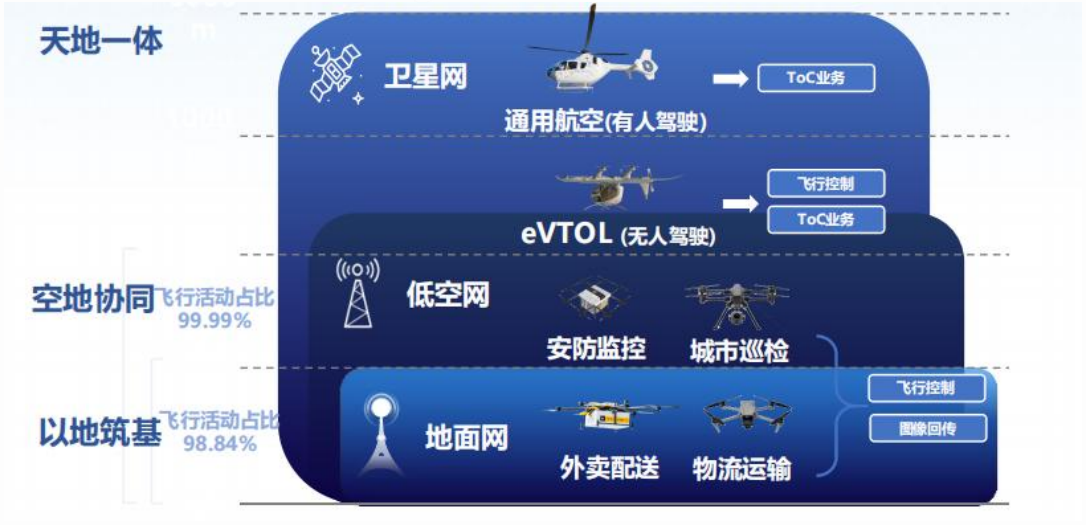
DJI Avata UAV

Ehang
EH216 flight chart

Product image of
EHang Smart EH216

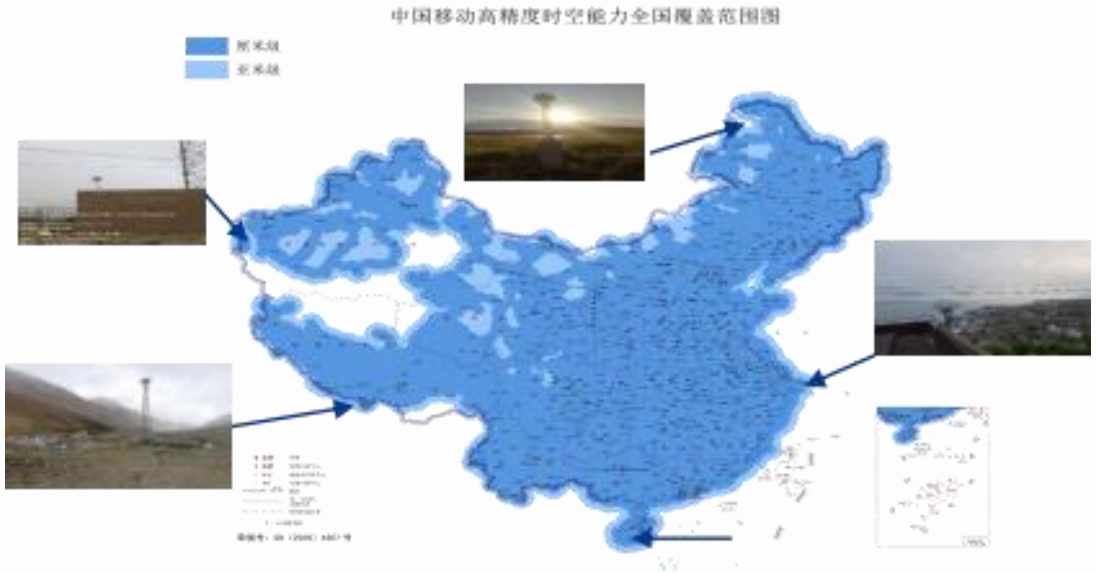
Realize reliable low-altitude communication over a wide area

Taking China Mobile as an example, it has constructed a total of 6.8 million base stations, including over 2.5 million 5G base stations having been put into operation.



Realize intelligent and precise low-altitude navigation

4400 ground-based enhanced positioning reference stations



Development of low-altitude surveillance technology

- Remote ID

The "digital license plate" for UAVs actively broadcasts identity and location information via radio or network signals, forming the foundation for large-scale regulatory oversight.

- ADS-B (Broadcast-based Automatic Dependent Surveillance)

The mainstay of general aviation surveillance, ADS-B involves aircraft autonomously broadcasting high-precision positional data. It is cost-effective and efficient but requires safeguards against signal spoofing.

- 5G-A Cellular Network Surveillance

Leveraging the advantages of the 5G-A network, the communication network doubles as a surveillance network, enabling deep integration of communication, navigation, and surveillance functions. This represents a pivotal development for the future of urban low-altitude airspace.

- Multi-base/Distributed Radar

As the nemesis of "low, slow, and small" targets, multi-base/distributed radar effectively compensates for traditional radar blind spots through multi-station collaborative detection, serving as a core surveillance method in key areas.

- Radio Spectrum Sensing

Acting as a sentinel against "unlicensed" UAVs, radio spectrum sensing detects drone remote control signals and identifies non-cooperative targets with coarse positioning, providing an important supplement to joint security defense efforts.

Development of low-altitude meteorological technology

Through meteorological data collection and analysis, risk early warning and decision support services are provided.

Technical direction	Development status
Low-altitude three-dimensional detection technology	Preliminary network deployment and application. Wind profiler radars and lidar wind measurement radars have become standard configurations in key areas such as airports and cities, enabling operational observation of the vertical structure of wind fields.
High-resolution numerical modeling	Operational implementation. Through "downscaling" techniques, it is now feasible to achieve low-altitude meteorological forecasts with a resolution of up to 100 meters. However, this comes with high computational costs and a strong reliance on initial conditions.
Information services and applications	Transitioning from data provision to risk quantification. Currently, the focus is primarily on offering basic data interface services, with active exploration into decision-support products that directly impact flight, such as collision risk and flyability.

02 Development Status of the Low-Altitude Economy

Construction of low-altitude management platform:
National-level leadership, provincial and municipal-level collaboration, and city-level innovation

National-level platform

Coordinate the utilization of national low-altitude airspace resources, formulate relevant policies and regulations, standardize unified criteria, facilitate cross-regional coordination, and ensure national and airspace security.

Integrated management platform for civil unmanned aerial vehicle (UOM)

Positioning: Serving as the "central hub" and "data brain" for the national low-altitude economy.

Core functions: Cross-regional coordination, airspace data distribution, emergency command, and the formulation and dissemination of regulatory standards.

Progress: The top-level design completed, committed to achieve a "unified" nationwide management approach for low-altitude operations.

02 Development Status of the Low-Altitude Economy

Construction of low-altitude management platform:
National-level leadership, provincial and municipal-level collaboration, and city-level innovation

Provincial platforms

Implement national policies based on the province’s reality, coordinate airspace resources within the province, harmonize efforts among military, civilian, and local government entities, and foster the low-altitude economy.

Anhui Province low-altitude UAV management and service platform: The inaugural provincial-level UAV management and service platform.

Jiangsu Province low-altitude flight service platform: Capable of simultaneously supporting 50,000 flights.

Guangdong Province low-altitude flight comprehensive management and service platform: Realizing the four core functions of the "low-altitude digital infrastructure."

Hubei Province low-altitude flight service platform: Implementing a province-wide "unified network" layout.

Hainan Province UAV comprehensive supervision and testing platform: One of the first batch of UTMISS testing platforms for civil aviation.

02 Development Status of the Low-Altitude Economy

Construction of low-altitude management platform:
National-level leadership, provincial and municipal-level collaboration, and city-level innovation

City-level platform

Execute specific regulatory tasks and provide services such as flight approval, real-time monitoring, and emergency response to operational entities, including UAV enterprises and general aviation companies.
Shenzhen: Focusing on research into low-altitude intelligent integration systems, Shenzhen is committed to establishing four networks: the facility network, air connectivity network, air route network, and service network. Concurrently, it is advancing collaboration between the Longhua District Low-Altitude Airspace Management Platform and enterprises like China Southern Airlines.
Suzhou: On October 18, 2024, the "Suzhou Low-Altitude Flight Service and Supervision Platform" commenced trial operations and has since entered regular operation.
Chengdu: The "First Phase of the Low-Altitude Traffic Management Service Platform" has been launched and is now operational, offering technical support for low-altitude economy management.

02 Development Status of the Low-Altitude Economy

Current status of technological development - test and verification

A testing and verification system is being steadily established.

- **Full-scale basic performance flight tests:** Mainstream domestic and foreign manufacturers have conducted thousands of flight tests in core flight modes for eVTOLs, including hovering, transition, and cruise, verifying their basic flight performance.
- **Initial formation of specialized flight test verification capabilities:** Specialized flight test verification capabilities, such as high-precision differential navigation (DGPS), flight control system identification, and electromagnetic compatibility, have been established to support onboard system testing.
- **Breakthroughs in power and energy flight tests:** Lithium-ion battery-powered eVTOLs have obtained global airworthiness certification; new energy solutions, including hydrogen fuel cells and hybrid power, have also successfully completed demonstration and validation flight tests.
- **Accelerated verification of typical application scenarios:** Scaled trial applications have been conducted in fields such as urban logistics, emergency rescue, and industrial inspection, exploring and validating feasible business models and operational processes.

Test field

Environmental laboratory

Communication test laboratory

Communication test laboratory (signal screen room)

Core system detection for low-altitude aircraft

1. Comprehensive avionics system testing: Simulate complex electromagnetic environments to verify the accuracy, anti-interference capabilities, and protocol compliance of communication, navigation, and identification modules.

2. Flight control system testing: Introduce faults and extreme operating conditions into the loop to rigorously verify the dynamic response and reliability of control laws, sensors, and actuators.

3. Electromechanical and energy power system testing: Perform high-load, high-cycle-life tests on motors, electronic speed controllers, and battery packs to assess their output power, thermal management, and efficiency degradation.

4. Task payload performance verification: Conduct performance baseline measurements and environmental adaptability tests for task equipment such as cameras, sensors, and dispensers in a simulated environment.

Component testing for low-altitude infrastructure

1. Verification of communication and navigation enhancement stations: Conduct on-site calibration and validation of the accuracy, integrity, and coverage of positioning and timing signals transmitted by ground base stations.

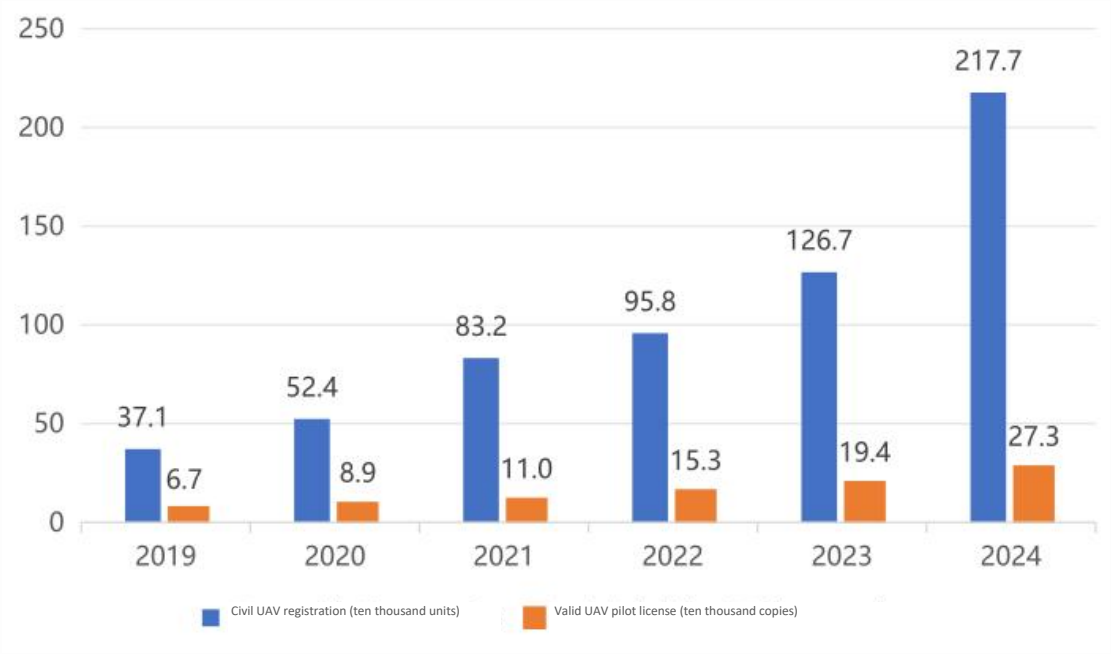
2. Field testing of perception equipment: Comprehensively evaluate the low-altitude target detection, recognition, and tracking capabilities of radar, electro-optical, and other surveillance equipment in real-world scenarios.

02 Development Status of the Low-Altitude Economy

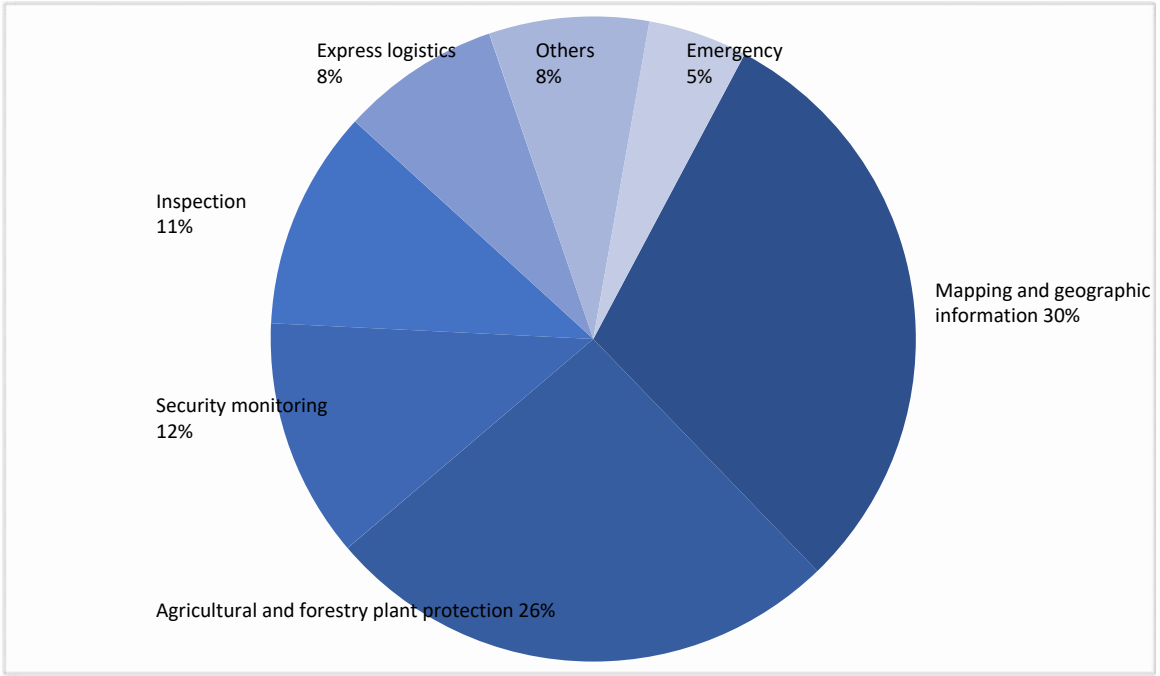
An overview of the industrial development

- Civil unmanned aircrafts constitute the dominant sector of the low-altitude economy, with the market size surpassing 170 billion yuan in 2024. Both the number of registered civil UAVs and the number of valid pilot licenses have maintained rapid and steady growth. By 2024, the number of domestically registered UAVs had soared to 2.177 million, while the number of pilot licenses reached 273,000.

- According to the application scenario structure diagram of China's civil UAV operation market, low-altitude surveying and agricultural and forestry plant protection are the primary application areas within the low-altitude economy. Meanwhile, application scenarios such as security monitoring, inspections, express logistics, and emergency rescue are experiencing rapid growth.



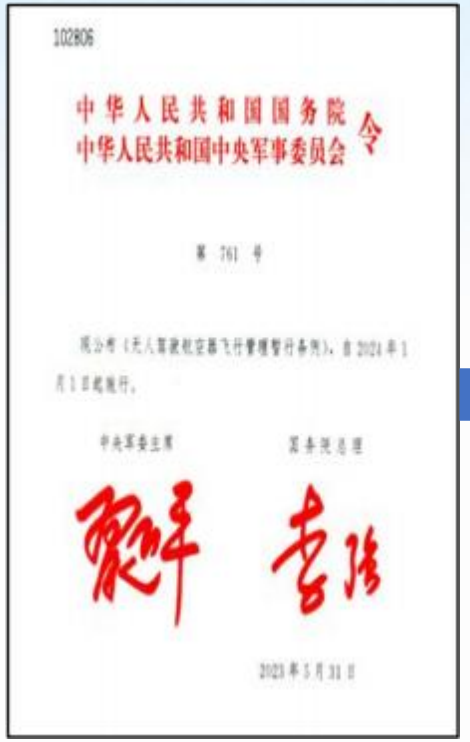
Number of civilian UAV registrations and pilots in China



Structure diagram of application scenarios in the UAV operation market

02 Development Status of the Low-Altitude Economy

Industrial Management

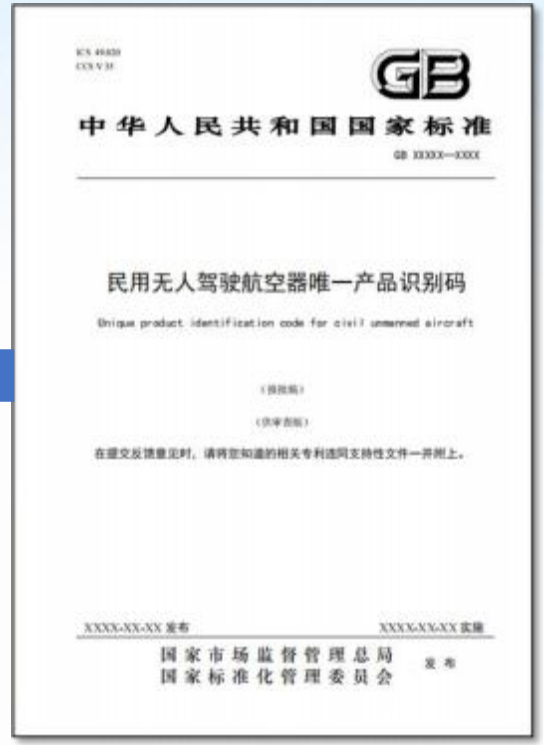


In June 2023, the State Council and the Central Military Commission jointly issued the "Interim Regulations on the Flight Management of Unmanned Aircrafts," aiming to standardize flight operations, enhance airspace control, and ensure flight safety.
Specifically, Articles 9 and 45 of these regulations pertain to "unique product identification codes."

In December 2023, MIIT promulgated the "Several Provisions on the Production Management of Civil Unmanned Aircrafts," primarily aimed at regulating production activities and mandating the assignment and registration of unique product identification codes (Articles 3, 4, 5, 6, 7, and 12).

Civil unmanned aircraft product information system (Launched and operational since January 2024)

- ☑ Collaborated with the Electronic Information Department of MIIT to conduct supervision and inspection of the "one UAV, one code" policy across various regions;
- ☑ Carried out supervision and inspection activities at 18 manufacturers across 9 key provinces (autonomous regions, municipalities).



The regulations have stipulated the coding rules, registration and filing procedures, product outer packaging labeling, body surface labeling, storage and safety measures, as well as reporting and broadcasting requirements for the unique product identification code.

02 Development Status of the Low-Altitude Economy

Standard Development Status - Standardization Organizations Related To Low-Altitude (International)

Name	Secretariat country	Domestic technical counterpart unit	Professional scope	Classification
Aircraft and Space Vehicles Technical Committee (ISO/TC20)	USA	AVIC China Aero-Polytechnology Establishment	Primarily responsible for the international standardization work of materials, components, and equipment necessary for aircraft and spacecraft (encompassing their manufacturing and operational processes), along with the equipment utilized for the maintenance and servicing of these vehicles.	Low-altitude aircraft
Process Management for Avionics (IEC/TC107)	UK	AVIC China Aero-Polytechnology Establishment	Primarily responsible for formulating international standards for process management of systems and equipment within the aviation electronics sector. Aviation electronics covers electronic devices utilized in commercial, civilian, and military aerospace applications, encompassing, but not limited to, flight control systems, navigation equipment, communication systems, and associated onboard electronic devices.	
Sub-technical Committee on Cards and security devices for personal identification (ISO/IEC JTC1/SC17)	**UK**	**China Electronics Standardization Institute**	**Primarily responsible for the standardization work of security devices and tokens in the fields of cards and identity recognition, as well as interfaces for cross-industry applications and international interoperability.**	
Sub-technical Committee on Telecommunications and information exchange between systems (ISO/IEC JTC1/SC6)	**South Korea**	**China Electronics Standardization Institute**	**Primarily responsible for formulating international standards for information exchange among open systems, covering the physical layer, data link layer, network and transport layers, as well as protocols and services for higher layers.**	Low-altitude infrastructure
Sub-technical Committee on Information security, cybersecurity and privacy protection (ISO/IEC JTC1/SC27)	**Germany**	**China Electronics Standardization Institute**	**Primarily responsible for international standardization work concerning general methods, technologies, and guidelines for information security and privacy protection. This encompasses security requirements capture methodology, management of information and ICT security, management of information and ICT security, security management support documentation, identity management, biometric and privacy security, conformance assessment, accreditation and auditing requirements in the area of information security management systems, as well as security evaluation criteria and methodologies.**	

02 Development Status of the Low-Altitude Economy

Standard Development Status - Standard Development (International)

- A total of 38 international standards (IS), 12 technical specifications (TS), and 10 technical reports (TR) have been released, bringing the overall number of official international publications to 60, with the entire endeavor still in its development phase.
- Among these, China has taken the lead in publishing 12 international standards (IS), primarily focusing on the field of low-altitude aircraft.

	International standards (IS)	Technical specifications (TS)	Technical reports (TR)
A Basic commonalities	2	0	1
B Management	10	1	1
C Low-altitude aircraft	6	0	0
D Low-altitude infrastructure	6	0	0
E Test flight	13	11	8
F Safety	1	0	0
Subtotal	38	12	10
Total	60		

02 Development Status of the Low-Altitude Economy

Standard Development Status - Major Standardization Organizations (China)

Name	Segments	Secretariat	Professional scope	Classification
National Technical Committee on Aviation Vehicles (TC435)	Aircraft	AVIC China Aero-Polytechnology Establishment	Standards pertaining to civil aircraft, civil helicopters, and other civil aircraft, covering aspects such as comprehensive design, overall specifications, aerodynamics, structure, power plants, fuel systems, hydraulic systems, pneumatic systems, flight control, electrical systems, avionics, life support systems, environmental control systems, cabin equipment, cargo systems, as well as product support, foundational requirements, components, tooling processes, and materials.	Low-altitude aircraft
National Technical Committee on Process Management for Avionics (TC427)	Avionics	AVIC China Aero-Polytechnology Establishment	Avionics process management	
National Technical Committee on Rotating Machinery (TC26)	Power	Shanghai Electric Apparatus Research Institute	Responsible for the standardization work in professional fields such as rotating motors across the country	
National Technical Committee on Opto electronic Measurement (TC487)	Sensing Technology	Aerospace Information Research Institute, Chinese Academy of Sciences	Terminology of electrical measurement systems, general and application technologies, optoelectronic devices and characteristics of materials, as well as calibration and measurement methods for performance parameters of optoelectronic systems. This also encompasses optical, environmental, mechanical, and safety requirements for optoelectronic devices and optoelectronic measurement systems, along with functional interfaces of optoelectronic measurement systems.	

02 Development Status of the Low-Altitude Economy

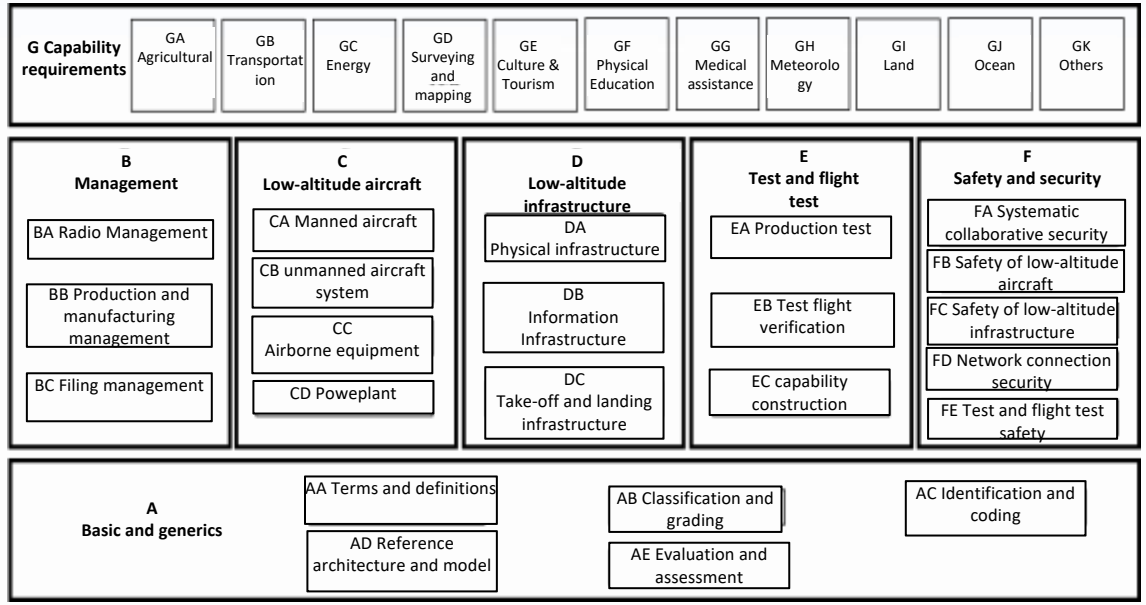
Standard Development Status - Major SDOs (China)

Name	Field	Secretariat	Professional scope	Classification
National Technical Committee 28 on Information Technology (TC28)	**Information technology**	**China Electronics Standardization Institute**	**National standardization work in the specialized areas concerning the specification, design, and development of systems and tools for information collection, representation, processing, transmission, exchange, presentation, management, organization, storage, and retrieval.**	Low-altitude infrastructure
National Technical Committee 260 on Cybersecurity of SAC (TC260)	**Cybersecurity**	**China Electronics Standardization Institute**	**Responsible for the formulation and revision of national standards in areas of cybersecurity such as technology, mechanisms, services, management, and evaluation.**	
National Technical Committee 609 on Data of Standardization Administration of China (TC609)	**Data**	**China Electronics Standardization Institute**	**Basic and generic standards concerning data resources, data technology, data circulation, smart cities, and digital transformation, along with data infrastructure standards that support data circulation and utilization, as well as security standards that safeguard the same.**	
National Technical Committee 485 on Communication of Standardization Administration of China (TC485)	Communication technology	China Communications Standards Association	Performance requirements, basic communication protocols, and related testing methods for communication networks, systems, and equipment	
National Technical Committee 543 On Communication Service of Standardization Administration of China (TC543)	Communication service	China Communications Standards Association	Field of information and communication services	
National Technical Committee 544 on Beidou Satellite Navigation (TC544)	Navigation	China Satellite Navigation Engineering Center, China Aerospace Standardization Institute of CASC	The development and revision of national and military standards concerning the infrastructure, system construction, operation and maintenance, and application areas of the Beidou Satellite Navigation System	
National Technical Committee 602 on Air Traffic Management (TC602)	Air management	China Academy of Civil Aviation Science and Technology, the 93209th Unit of the People's Liberation Army of China	Standardization work in the field of air traffic management, encompassing basic and general aspects, national airspace management, air traffic flow management, air traffic services, aeronautical telecommunications (including communication, navigation, surveillance, and flight inspection), aviation meteorology, personnel management, as well as data and automation.	Low-altitude management
National Technical Committee 464 on Air Transportation (TC464)	Air transportation	China Academy of Civil Aviation Science and Technology	Safety, security, and services in air transportation (including both public and general air transportation), encompassing flight safety, ground safety, aviation security, cargo safety, facilities and equipment, emergency response, air traffic services, aviation telecommunications, aeronautical information, aviation meteorology, passenger and baggage handling, air cargo and mail transport, general aviation activities, air transport of dangerous goods, green aviation operations, and eco-friendly airports.	

02 Development Status of the Low-Altitude Economy

Standard system construction for low-altitude equipment

- Supervisory unit: **Ministry of Industry and Information Technology**
- Leading unit: **China Electronics Standardization Institute, AVIC China Aero-Polytechnology Establishment, China Academy of Civil Aviation Science and Technology**
- Compilation stage: **Completed (to be published at an appropriate time)**
- Scope of fields: **the design, R&D, manufacturing, repair and maintenance, security guarantee, test and flight trials of low-altitude aircrafts and infrastructure; as well as the application of low-altitude equipment across various industrial scenarios that equipment capability required.**

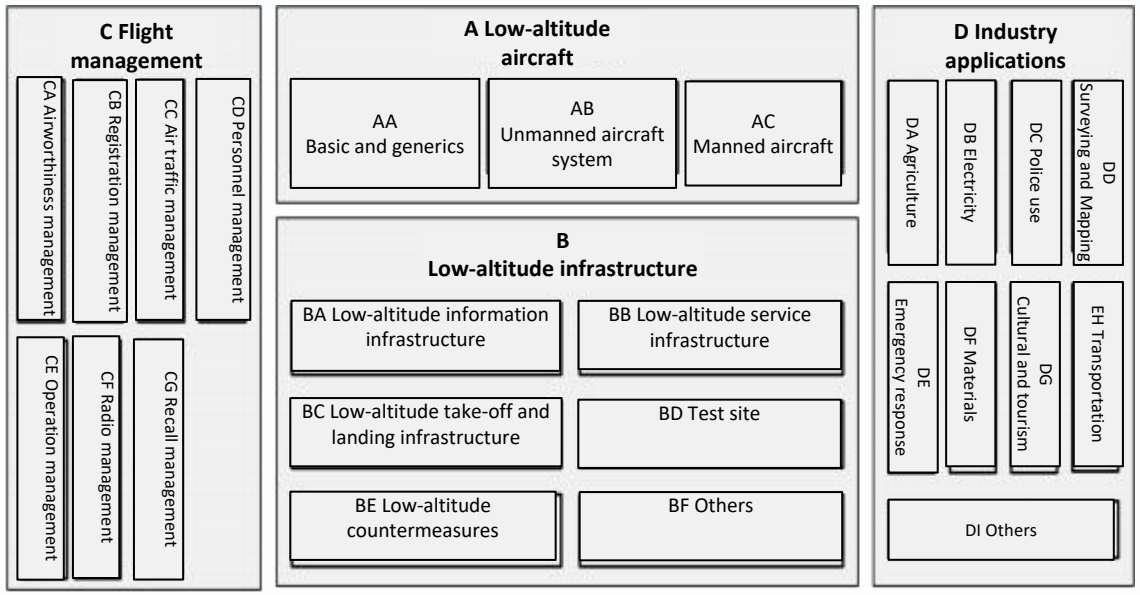


02 Development Status of the Low-Altitude Economy

Standard Development Status - Standard System Construction (Domestic)

Standard system construction for low-altitude economy

- Supervisory unit: **National Standardization Administration of the People's Republic of China**
- Leading unit: **AVIC China Aero-Polytechnology Establishment, China Electronics Standardization Institute, China Academy of Civil Aviation Science and Technology**
- Compilation stage: **formulation in progress**
- Scope of field: **including the entire low-altitude economy chain, including low-altitude aircraft, low-altitude infrastructure, flight management, and industrial applications.**



02 Development Status of the Low-Altitude Economy

Current Standard Development Status - Standard development summary (Domestic)

165 national standards have been published and 32 national standards under research, along with 102 sector standards, 114 local standards, and 306 association standards published. A total of 719 relevant standards, demonstrating certain capacity for standard supply.

	National Standards				Sector standards	Local Standards	Association Standards
	Published		Under research				
	Voluntary national standards	Mandatory national standards	Voluntary national standards	Mandatory national standards			
A Basic and generics	21	1	3	1	9	0	2
B Management	59	4	7	1	4	0	20
C Low-altitude aircraft	17	1	9	0	34	0	39
D Low-altitude infrastructure	3	0	1	0	15	2	19
E Test and flight test	25	0	3	0	16	0	23
F Safety and security	25	2	6	0	6	0	0
G Capability requirements	7	0	1	0	18	112	203
Subtotal	157	8	30	2	102	114	306
Total	719						

02 Development Status of the Low-Altitude Economy

Standard Development Status – Summary of Key Standards (Domestic)

Standard No.	Standard Name	Status	Leading Unit	Main content
GB 42590-2023	Safety Requirements for Civil Unmanned Aircraft System	Published	AVIC China Aero-Polytechnology Establishment	It applies to "**micro, light, and small**" civil unmanned aircrafts, setting forth **17 safety requirements** along with corresponding test methods for aspects such as **electronic fencing, remote identification, emergency response, airframe structure, power and energy systems, controllability, and data link protection**.
GB 46750-2025	Specification for Civil Unmanned Aircraft System Operational Identification	Published	The Second Research Institute of Civil Aviation Administration of China	It applies to "**micro, light, small, medium, and large**" civil unmanned aircrafts. It specifies **the information content and format for operational identification, outlines the functional performance requirements for transmission, reception, processing, and related systems**, and describes the corresponding **verification methods**.
GB 46761-2025	Registration and Activation Requirements for Civil Unmanned Aircraft	Published	Civil Aviation Administration of China	It applies to "**micro, light, small, medium, and large**“ civil unmanned aircrafts, and outlines **the general procedures, technical specifications, and testing methods for the real-name registration and activation** of such vehicles.
20242837-Q-339	Unique Product Identification Code for Civil Unmanned Aircraft	Approved	China Electronics Standardization Institute	It applies to "**micro, light, small, medium, and large**" civil unmanned aircrafts, and outlines the **coding rules, registration and filing procedures, product packaging labeling, body surface marking, storage and safety measures, as well as reporting and broadcasting requirements for the unique product identification code.**

03 Characteristics and Challenges of the Low-Altitude Economy

03 Characteristics and Challenges of the Low-Altitude Economy

Development characteristics

- **The low-altitude economy, as a novel form of economic development emerging from the digital economy transformation, is a comprehensive economic model. It is underpinned by low-altitude airspace and its associated ground infrastructure, utilizes civil manned and unmanned aircrafts as its carriers, and is propelled by a variety of low-altitude flight activities, including passenger and cargo transport, as well as other operational scenarios. This model fosters the integrated development of industries related to aircraft R&D, production, sales, , as well as that of infrastructure construction and operation, flight support services, and comprehensive derivative services associated with low-altitude flight activities.**

Notable features of the low-altitude economy

- Long industrial chain
- Wide radiation coverage
- Strong growth potential and driving force

Industrial structure of low-altitude economy

- Low-altitude manufacturing industry
- Low-altitude flight industry
- Low-altitude support industry
- Low-altitude comprehensive service industry

Low-altitude economy +

Logistics distribution

Emergency response

Medical assistance

Sightseeing and entertainment

Manned transportation

03 Characteristics and Challenges of the Low-Altitude Economy

The challenges that low-altitude operations will meet in the future

High density and high frequency

- In the future, the flight **density** and takeoff and landing **frequencies** of low-altitude intelligent vehicles will witness a surge by orders of magnitude.

Complex and high-risk

- The low-altitude airspace, ground conditions, and electromagnetic environment, which are **complex and constantly changing**, have **intensified operational risks**.

Heterogeneous, diverse

- The **heterogeneity** of performance and function of low-altitude aircrafts
- Huge difference between types and dimensions of operational data

03 Characteristics and Challenges of the Low-Altitude Economy

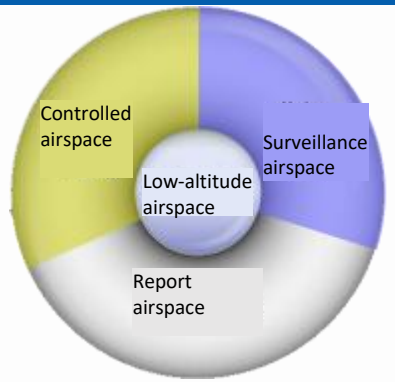
Technical perspective (1/2):

Challenges faced by low-altitude operation technology

- The operation of low-altitude airspace constitutes a complex systems engineering endeavor, and related technologies still require systematic integration.
- The lack of interconnectivity and data-sharing capabilities among low-altitude management platforms at various levels has further complicated the challenge of achieving such integration.

Technical field: Communication | Navigation | Monitor | Safety Supervision | ...

The urgent need for the opening of low-altitude airspace

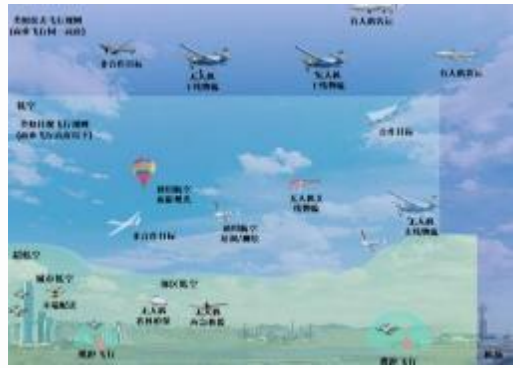


The lack of capabilities in low-altitude communication, navigation, surveillance, and safety management and control

Complex scenarios in low-altitude airspace

Multiple participants in low-altitude operations

Complexity of low-altitude flight activities



- Management level: **Difficult management** for low-altitude airspace
- Technical level: **Difficulties in ensuring** reliable communication, navigation, and surveillance
- Safety/security level: **Challenges** in achieving **precise and controllable responses**
- Service guarantee: Infrastructure needs requires **further supportive measures/facilities**
- Local governments: **Obstacles** in promoting implementation
- Operating organizations: **Need to enhance** professional competence

Challenges faced by low-altitude supervision platforms

1. Data silos creates formidable barriers, hindering business collaboration.

Disconnection of vertical data: There is a dearth of unified data-sharing interfaces and exchange mechanisms across national, provincial, and municipal platforms, coupled with a cumbersome data submission process, which makes it arduous to achieve business collaboration and closed-loop management.

Disconnection of horizontal data : Concerns over data ownership and security " among governments, enterprises, institutions, and operational platforms have led to the formation of "data chimneys, resulting in a lack of awareness on comprehensive and full picture.

Disconnection of internal data: The data formats and protocols of various functional modules within the platform, such as communication, navigation, and monitoring, are not standardized, posing challenges in integrating and processing them into unified intelligence.

Challenges faced by low-altitude supervision platforms

2. The technical standard system is outdated, leading to high interconnectivity costs

Lack of interface standards: Mandatory communication interface protocols and data exchange standards are absent among platforms and aircraft, platforms and sensors, as well as between platforms themselves. This results in customized development and exorbitant costs for each integration.

Lack of data specifications: There is an absence of unified standards governing the data format, coding rules, and update frequency for core elements such as aircraft electronic identification, flight plans, real-time positions, and airspace status. Consequently, extensive data cleaning and conversion are required before utilization.

Lack of security standards: Unified standards for identity authentication, transmission encryption, and access control are lacking among platforms, users, and aircraft. Each party operates with its own system, hindering the establishment of secure mutual trust and interconnectivity.

Challenges faced by low-altitude supervision platforms

3. The performance and functionality of the existing platforms struggle to support commercial-scale operations.

Bottleneck in system architecture: Most existing platforms are designed based on traditional information technology architectures, lacking sufficient concurrent processing capabilities, real-time performance, and reliability. They are unable to meet the demands for large-scale concurrent take-off, landing, scheduling, and monitoring of UAVs at the city level.

Insufficient core algorithm capability: The core algorithms for real-time conflict resolution among multiple aircraft routes, dynamic allocation of airspace resources, and large-scale concurrent scheduling are not sufficiently mature, relying heavily on manual intervention and resulting in low efficiency.

Insufficient high availability guarantee: The system design fails to fully account for redundant disaster recovery, posing a risk of single-point failures and making it difficult to meet the requirements for uninterrupted 7x24 commercial operations.

Challenges faced by low-altitude supervision platforms

4. Unclear management responsibilities and business models

Blurred construction and operation entity:
As a public infrastructure, it remains unclear whether the government or the market should take the lead in the platform's construction and operation, leading to a lack of investment entities and slow construction progress.

Lack of sustainable business models: The charging targets, pricing methods, and cost-sharing mechanisms for platform services have yet to be established, resulting in a lack of clear profit models and hindering the entry and long-term operation of social capital.

03 Characteristics and Challenges of the Low-Altitude Economy

Standard perspective (1/3)

The standards fail to fully achieve unified coordination and compatibility, exhibiting a lack of systematic integration

Lack of systematic standardization construction

- The standardization work of the low-altitude economy encompasses a **broad scope of work and involves a multitude of stakeholders**.
- When undertaking standard development, relevant units/organizations **lacks a systematic approach** and sufficient coordination.
- In the realm of **low-altitude infrastructure, the absence of connectivity standards among systems** has resulted in challenges regarding infrastructure adaptability for various low-altitude equipment, thereby hindering the coordinated development of the industry.

Insufficient construction of standard compatibility

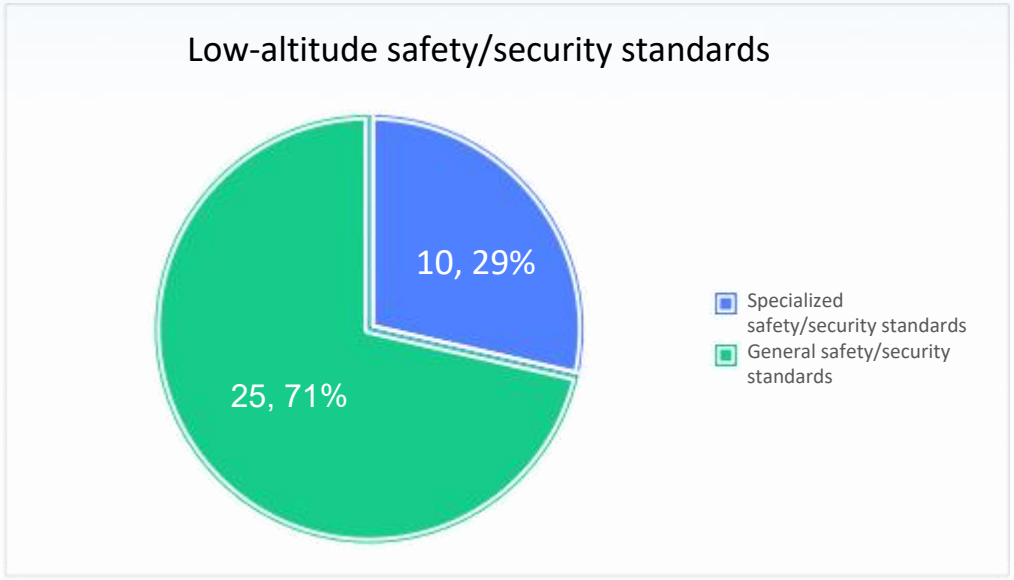
- Some existing standards **have not adequately considered compatibility issues** during their formulation.
- The process of selecting and implementing standards is disorganized.
- For instance, the **management requirements for civil unmanned aerial vehicle systems vary** across regions, and **communication protocols are diverse**, leading to **difficulties in cross-regional flights** of civil unmanned aerial vehicles and impeding the large-scale development of the industry.

Prominent issue of overlapping standard construction

- The problem of **overlapping standard construction** at various levels has become increasingly apparent, leading to inefficient utilization and waste of standard resources.
- There are **112 local standards** and **203 association standards** concentrated in the application field.
- For example, regarding the **vertical positioning accuracy requirements for UAV operations**, some **association standards** specify an error margin of **±0.3 m**, while the **power industry standard** sets it at **≤0.5 m**, causing confusion for enterprises in adopting and applying standards.

03 Characteristics and Challenges of the Low-Altitude Economy

The standards fail to fully address the requirements of safety/security control, and lack sufficient adaptability



Lack of low-altitude specific safety/security standards

- At present, there are a total of **35** standards pertaining to low-altitude economy safety/security, among which only **10** are specific to low-altitude safety, while the remaining are general information safety/security standards;
- Specialized standards are lacking in areas such as low-altitude disposal, safety/security of new aircraft, low-altitude network security, and safety of key components.

The standards fail to fully address the requirements of safety/security control, and lack sufficient adaptability

Challenges in adaption of general safety/security standards

- **General safety/security standards** struggle to **fully cater to** the practical demands of low-altitude economy development;
- The **swift development** of the low-altitude economy has increasingly **underscored the lag in safety/security standards**;
- Current safety/security standards are not sufficiently targeted in **preventing "unlicensed flight" incidents involving civil unmanned aircrafts**, failing to effectively ensure the safety of low-altitude airspace;
- The **absence of safety/security standards for critical components of unmanned aircrafts** poses challenges in effectively **regulating and tracing** the **product quality and market distribution** of those **assembled by individuals or produced in small-scale workshops**.

In January 2024, flights at Danxia Airport in Shaoguan city of Guangdong Province were delayed due to UAV intrusion

03 Characteristics and Challenges of the Low-Altitude Economy

Standards fail to fully exert their guiding role in industrial practices due to insufficient implementation.

01

Enterprises replies on traditional approach when utilize standard

- Enterprises primarily refer to standards from the **traditional general aviation sectors** in their R&D and production activities;
- Demonstrate a **low level of understanding and application** of **standards pertinent to the low-altitude**;
- The **effectiveness of standard implementation** is subpar.

02

Enterprises have weak compliance awareness

- Issues were identified during the **supervision and inspection of the unique product identification codes for civil unmanned aircrafts**;
- **Misconceptions** persist regarding identification code regulations **(e.g., the perception that only micro and light-sized vehicles require registration, while medium and large-sized ones do not)**;
- The identification code **management** requires enhancement **in standardization**;
- The **execution** of technical specifications **lacks rigor**;

03

Collaborative supervision remains further strengthened

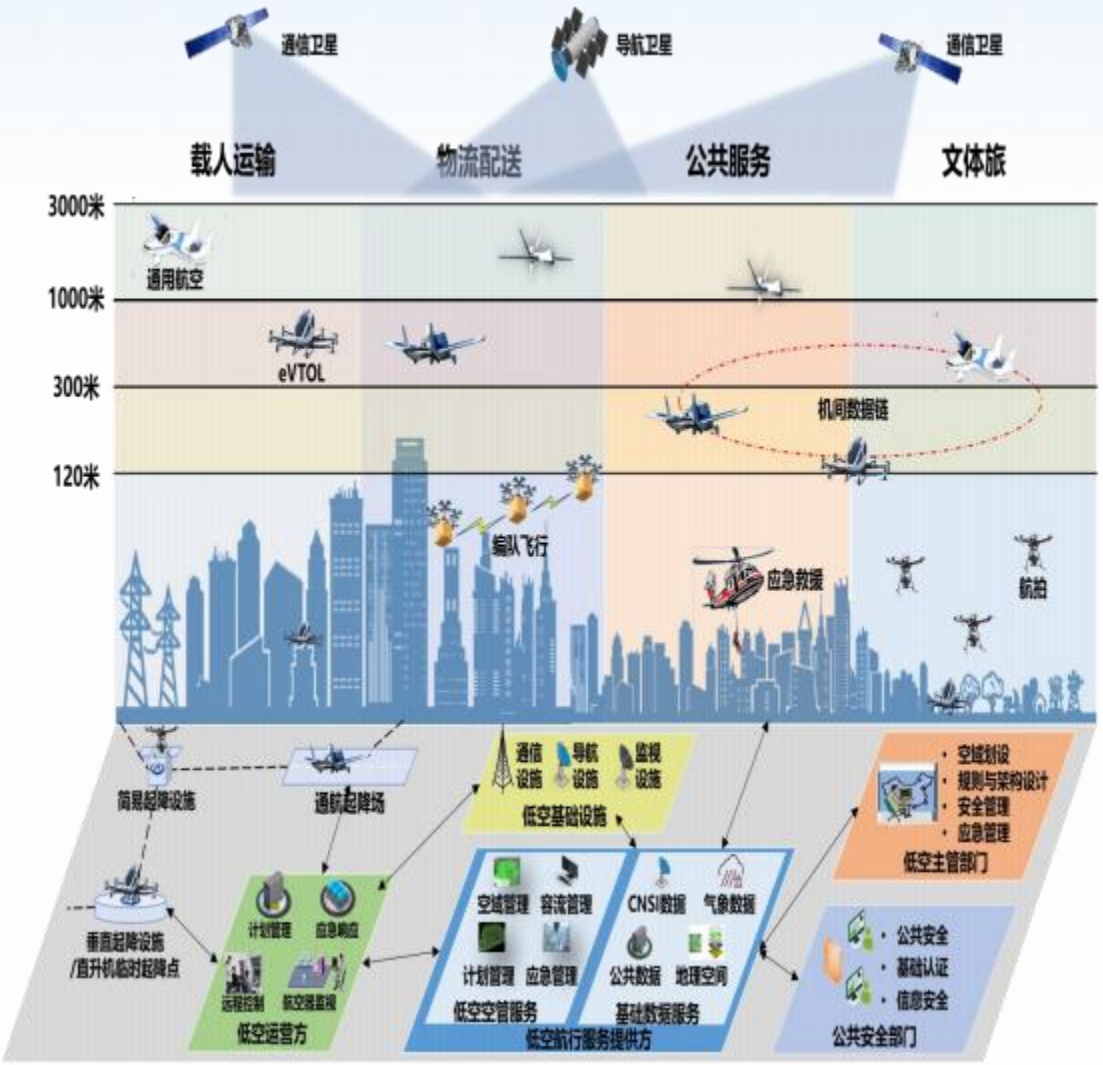
- The supervision of the implementation of **certain mandatory standards** has not been incorporated into **the responsibility lists of local governments**;
- The absence of **effective regulatory measures** hinders the **effective enforcement** of standards.

04 Development Strategies for the Low-Altitude Economy

04 Development Strategies for the Low-Altitude Economy

Development Strategies for Low-altitude Operation Technology (1/2)

Networked development



Intelligent development

Demand: Airspace service provider


Standardized operation


Refined scheduling


Digital performance deployment

Edge computing | Large-scale simulation | Safety/security risk management | Low-altitude intelligent control and management

Scheduling, migration, and optimization for cloud-edge-node

AI Data-driven decision-making core

Real-time interaction of low-altitude situations

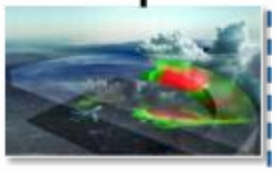
Low-altitude and all-domain situation awareness | Data base | Digital twin


Intelligent vehicle


Airspace sensing


Urban digital twin


Digital supervision

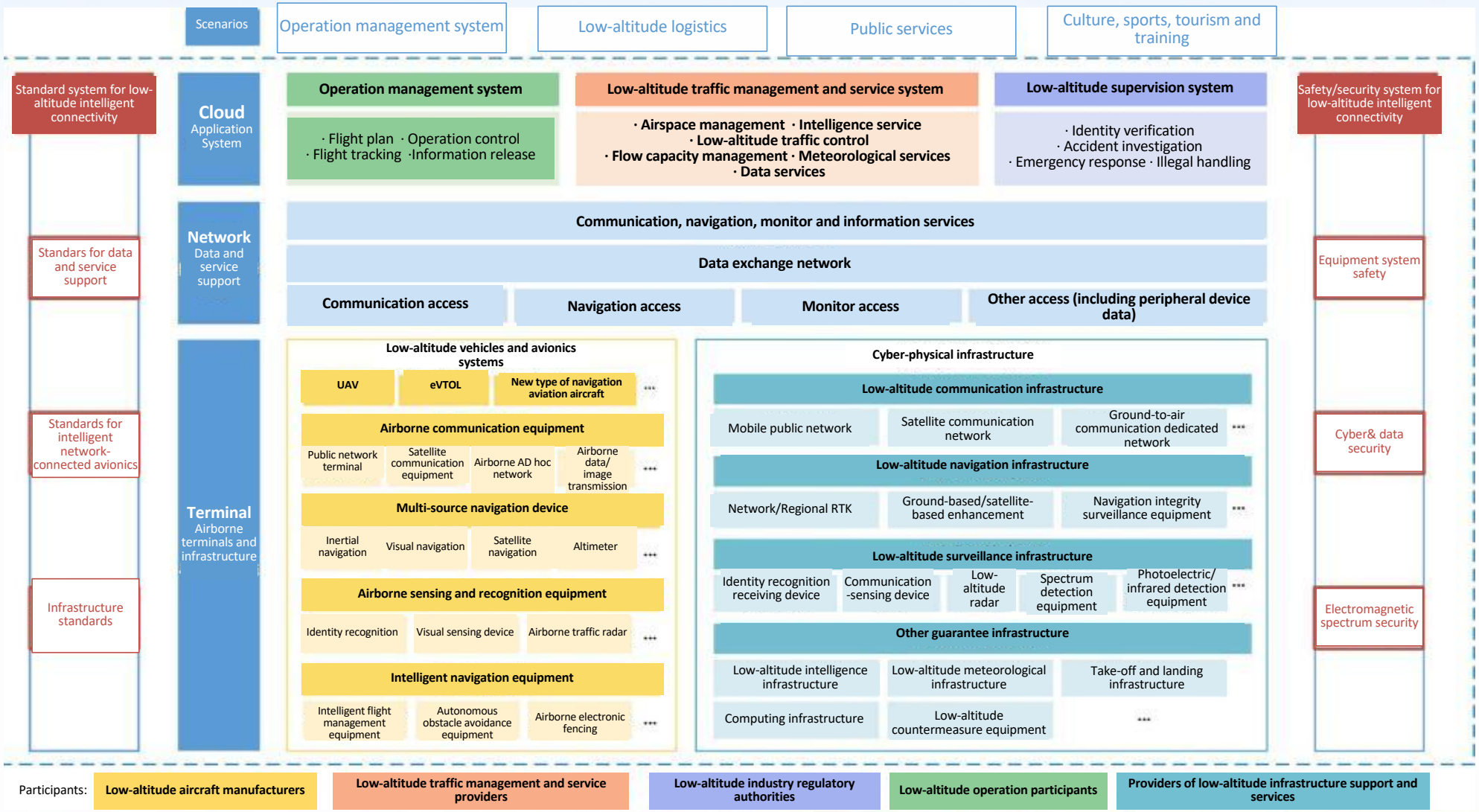

Meteorological data base

Support: Data and inference service provider

04 Development Strategies for the Low-Altitude Economy

Development Strategies for Low-altitude Operation Technology (2/2)

Reference architecture for low-altitude intelligent connected vehicle system



- An integrated system comprising **digital, network-connected, and intelligent** new aircraft and equipment, cyber-physical infrastructure, digital information networks, as well as application service systems.

- Achieve **ubiquitous sensing, wide-area interconnection,** and **intelligent management and service** applications in low-altitude airspace, thereby ensuring the safe/secure and efficient operation of typical application scenarios.

Addressing challenges in low-altitude platform construction: Prioritizing standards, ensuring data connectivity, and enhancing capabilities

1. Primary objective: Establish a mandatory and unified standard specification framework

Develop interface standards: Formulate data exchange interface standards between platforms and communication protocol and those between terminals and platforms. Clarify the content, format, frequency, and protocols for data exchange to eliminate interconnection barriers.
Unify data specifications: Define unified identifiers, data formats, and business meanings for core data elements such as aircraft, personnel, airspace, and events, enabling seamless and unambiguous data flow and interpretation across different platforms.
Establish safety/security standards: Develop digital identity certification standards and data security transmission protocols, and construct a cross-platform, cross-domain, and cross-user security trust system.

Addressing challenges in low-altitude platform construction: Prioritizing standards, ensuring data connectivity, and enhancing capabilities

2. Construct a data sharing and exchange system to dismantle information silos

Establish national-level low-altitude data hub: Create a low-altitude data exchange center, compile a data resource catalog, and establish sharing rules and procedures to provide a compliant, efficient, and secure data exchange environment for all stakeholders.
Promote data right and ownership reform: Explore the separation of data ownership from using rights, and facilitate the value circulation of data elements through authorized use, data anonymization, and other methods, while ensuring the rights and security of all parties' data.
Enhance governmental data empowerment: Encourage the classified, graded, and orderly disclosure of government data, including airspace, geographical, meteorological, and legal entity information, to low-altitude platforms, thereby enhancing the platforms' foundational service capabilities.

Addressing challenges in low-altitude platform construction: Prioritizing standards, ensuring data connectivity, and enhancing capabilities

3. Enhance the core processing and intelligent decision-making capabilities of the platform

Adopt an advanced technical architecture: Utilize distributed computing, stream processing, and other technologies to restructure the platform's underlying architecture, thereby comprehensively improving its capabilities in handling high concurrency access, low-latency processing, and ensuring high reliability.
Develop and research core intelligent algorithms: Concentrate on addressing key algorithms such as multi-agent collaborative scheduling, real-time conflict prediction and resolution, and dynamic airspace capacity assessment, to elevate the platform's automation and intelligence levels while minimizing manual intervention
Apply digital twin technology: Construct high-fidelity digital twins of low-altitude environments for conducting simulation and deduction, pre-setting emergency plans, and system functionality testing, enabling precise control and proactive risk mitigation.

04 Development Strategies for the Low-Altitude Economy

Development Strategies for Low-altitude Platform Technology (2/2)

Accelerate the construction of new infrastructure and lay a solid foundation for large-scale applications.

Address collaborative scheduling challenges

Build a foundational platform for low-altitude management and services.
Establish national and regional platforms to resolve the challenges of coordinating high-frequency takeoffs and landings.

Navigation enhancement network
Intensify the construction of Beidou ground-based augmentation stations, build cloud platforms, and provide high-precision positioning services.

Low-altitude communication network
Accelerate the deployment of 5G networks, optimize parameters, achieve continuous coverage of low-altitude air routes, and ensure stable communication.

Address security challenges

Establish an integrated network for communication, navigation, and monitoring.
Deploy dedicated low-altitude communication networks, navigation enhancement networks, and comprehensive monitor networks to meet application demands.

Address economic benefit challenges

Supporting ground support facilities
Plan and construct a ground infrastructure network to meet the energy supply and maintenance needs of aircraft.

Address reliability challenges

Develop vertical airports, charging/hydrogen refueling stations, UAV nests, etc.

Support high-density and commercial operations to promote the sustainable development of the low-altitude economy.

Comprehensive surveillance network
Deploy sensing facilities in a layered manner to create a three-dimensional surveillance network, enabling effective management of low-altitude activities.

04 Development Strategies for the Low-Altitude Economy

Standard Development Strategies (1/4)

Establish a multi-party collaborative standard system construction mechanism

Top-level planning (National Development and Reform Commission, Ministry of Finance, Central Air Traffic Management Committee, State Administration for Market Regulation)

Pay attention to the development of both mandatory and voluntary national standards concerning basics and generics, safety/security control, and industrial collaboration, to guarantee the basic norms and safety thresholds of the low-altitude equipment industry.

- National Energy Administration
- Civil Aviation Administration of China
- Ministry of Industry and Information Technology
- Ministry of Transport
- Ministry of Agriculture and Rural Affairs
- Ministry of Natural Resources
- ...

Industrial level

Develop sector-specific standards in accordance with the unique characteristics and requirements of each sector, refining and complementing the technical criteria and norms outlined in national standards for particular industrial applications.

Regional level

Formulate local standards that are adapted to the actual conditions of local industrial development, foster the differentiated growth of the local low-altitude equipment sector, and prevent clashes or inconsistencies with national and industry standards.

Solidify the red line for safety standard control

Expedite the bridging of gaps in safety/security standards

- Fully integrate the core requirements of safety/security management, the practical demands of China's industrial development, and the advanced experiences from global counterparts;
- Focus on key links and critical areas such as the; **safety/security of low-altitude aircraft, low-altitude infrastructure, and low-altitude network connectivity**
- Accelerate the mobilization of professional and technical expertise to develop stringent, scientific, and rational **specialized safety/security standards**, enhancing their advancement and applicability.

Strengthen the dissemination and supervision of safety/security standards

- Conduct regular inspections, evaluations, and provide feedback;
- Impose legal penalties on enterprises that fail to comply with mandatory national standards;
- By adhering to standards as the baseline, we will establish a robust safety control red line for the low-altitude equipment industry, proactively prevent and mitigate safety risks, and safeguard the security of people's lives, property, and national interests.

Enhance the synergy between standard implementation and supervision

Establish a dynamic standard evaluation mechanism

- Regularly assess **the implementation status, technical proficiency, and applicability** of standards in the low-altitude equipment industry, promptly identifying the effectiveness and existing issues of standard implementation;
- **Dynamically adjust and update** standards based on evaluation results to ensure they keep pace with the rapid development of the low-altitude equipment industry.

Promote the adoption of standards in policy supervision

- **Integrate standard implementation into the market regulation framework**, intensify supervision and inspection of enterprise on standard implementation, publicly disclose and penalize non-compliant enterprises, and steer the market towards high criteria and quality;
- Offer preferential policies such as **tax relief and priority in airspace approval to enterprises that conform with national standards**, motivating them to actively implement these standards.

04 Development Strategies for the Low-Altitude Economy

Standard Development Strategies (4/4)

Drive forward the progress of standardization work across the whole chain

Formulating Standards

Support the national quality infrastructure (NQI) project

- Conduct research and development of relevant standards in **fundamental commonalities, management**, and other areas

01

02

Support a series of key projects with standardized outcomes

- Conduct **technical R&D, engineering applications**, and other related research in critical areas such as **low-altitude aircraft and low-altitude infrastructure**, and generate a set of **standardized achievements** accordingly.

Using Standards

Support the development of standard compliance testing capabilities

- Cultivate the capabilities for standard compliance testing to expedite standard implementation

03

Adopting Standards

04

Support the establishment of a certification and assessment system

- Based on the outcomes of standard compliance testing, create a scientific **certification and assessment system** (e.g., 3C certification, energy efficiency labeling) to further **standardize the industrial ecosystem**

Thanks for your listening!

Uphold the spirit of "Science, Impartiality, Innovation, and Service";
Fulfill the mission of "supporting the government, service the industry, and maximizing the value of standardization";
Establish a premier standardization research institute and forging a national high-end think tank for standardization.