

China's Space Capabilities:

The CAST Catalog: China's State Organization for Satellite Manufacturing

Summary

This report provides a listing of entities subordinated to the China Academy of Space Technology (CAST) that appear to be involved in satellite development and manufacturing. It is intended as an open-source update to the limited data available in English and as a basis for further research. Inclusion in this catalog and the descriptions of missions are based on CAST online media.

In all, 30 CAST organizations were identified. Of these, 11 appeared to perform ancillary functions such as space component quality assurance, facilities management, or non-space commercial production. The other 19 appear to have missions in satellite or manned spacecraft research, design, development, and/or manufacturing. These are:

China Academy of Space Technology (CAST) Headquarters in Beijing



Source: sina.com.cn

Academy of Space Information Systems	Beijing Institute of Control Engineering
Beijing Institute of Spacecraft Environment Engineering	Beijing Institute of Spacecraft Systems Engineering
Beijing Institute of Space Mechanics and Electricity	Beijing Satellite Manufacturing Factory
Beijing Space Technology Research and Test Center	China Spacesat Company, Ltd
DFH Satellite Company, Ltd	Institute of Communication and Navigation Satellites
Institute of Manned Space System Engineering	Institute of Remote Sensing Satellites
Institute of Spacecraft Application System Engineering	Lanzhou Institute of Physics
Qian Xuesen Laboratory of Space Technology	Shandong Institute of Space Electronic Technology
Shenzhen Aerospace Dongfanghong Development Company, Ltd	Space Star Technology Company, Ltd
Tianjin Aerospace Electromechanical Equipment Research Institute	

Background

The purpose of this report is to provide an updated definition of the organizational structure for Chinese state-owned satellite manufacturing as background for research on Chinese military satellite reconnaissance. China limits public information on military space programs, and information currently available in English is even more limited. The placement of military satellite production in Chinese industry first requires a broad and current picture of China's satellite production base. Therefore, the first steps attempted were to identify from Chinese sources the macro-organizations under which satellite research and production takes place, the organizational nomenclature for their component entities, and the distribution of production responsibilities across those components.

As an open-source baseline, this report reflects what the Chinese entities involved say about themselves—their public face. Such materials are usually vague and tend toward being sales pitches. Still, it seemed useful to document what these entities say they do before digging deeper in future research.

The Chinese tend to give rather bland names to state-owned research and production entities. Trying to differentiate the tasks assigned, for example, to the Beijing Institute of Spacecraft Systems Engineering, Beijing Institute of Space Mechanics and Electricity, Beijing Institute of Space Science and Technology Information, and Beijing Space Technology Research and Test Center obviously cannot be done based on their names alone. The task, then, was to find some materials that show something of the work assignments for the respective organizations.

China's space manufacturing base includes many entities working in a complicated web of apparently overlapping responsibilities. In some cases, it appears impossible to define discreet responsibilities for each entity because the Chinese have not cleanly differentiated the tasks themselves. In any event, research was attempted using a top-down approach, drilling down through the hierarchy to the research and production units, and compiling the catalog of the elements and their stated responsibilities that follows.

The Role of CAST

China has an immense state-owned spacecraft (manned and satellite) research and production infrastructure consisting of scores of companies and factories distributed under the supervision of corporations and “academies,” many of which have evolved from government ministries. Space production is dominated by two giant enterprises: China Aerospace Science and Industry Corporation (CASIC) and China Aerospace Science and Technology Corporation (CASC). Responsibilities for space research, development, manufacturing, and launching are distributed across numerous academies under each of these entities.

CASIC, one half of this effort, is a large state-owned enterprise under the direct administration of China's central government. CASIC is China's biggest missile weapon system development and manufacturing industry. It claims to own more than 600 companies and institutes, and it may employ more than 140,000 people. CASIC primarily conducts research, development and manufacturing of air defense missile systems, cruising missile systems, and solid propellant rockets. Its space technology products have also supported manned space flight and lunar exploration.

CASC, the other half, is mainly engaged in the research, design, manufacture, test, and launch of space products such as launch vehicles, satellites, manned spaceships, cargo spaceships, deep-space exploration craft, and a space station, as well as strategic and tactical missile systems. CASC also develops space services such as satellite and ground operations, commercial space services, space investment, software, and information services. For the most part, CASC's spacecraft and satellite manufacturing entities are found in the CASC Fifth Academy, also known as the China Academy of Space Technology (中国空间技术研究院), or CAST. CAST has defined itself in the following terms, based on information found and translated from its website:

"The China Aerospace Science and Technology Corporation [CASC] Fifth Academy [CAST] was established in February 1968. Through its more than 50 years of development, it has become the most powerful backbone force in China's space enterprises and an important space technology and product research and development base.

"CAST is primarily involved in space technology development, space vehicle production, space technology applications and other services. Since 1970 CAST has taken the lead in development and launch of more than 300 space vehicles. More than 220 of these are in operation on orbit. It has created six major series of spacecraft: manned space flight, lunar and deep-space exploration, the Beidou satellite navigation system, earth observation, communications broadcast, and space science and technology testing. It crafted China space development's three major milestones: the Dongfanghong-1 [first] satellite, Shenzhou-5 [first] manned spacecraft, and Chang'e-1 [first] lunar satellite.

"CAST has established manufacturing bases in Beijing, Tianjin, Hebei, Xian, Lanzhou, Yantai, Shenzhen, and Inner Mongolia. It is capable of total spacecraft design, subsystem research and production, systems integration, final assembly and testing, environmental testing, and ground equipment manufacturing.

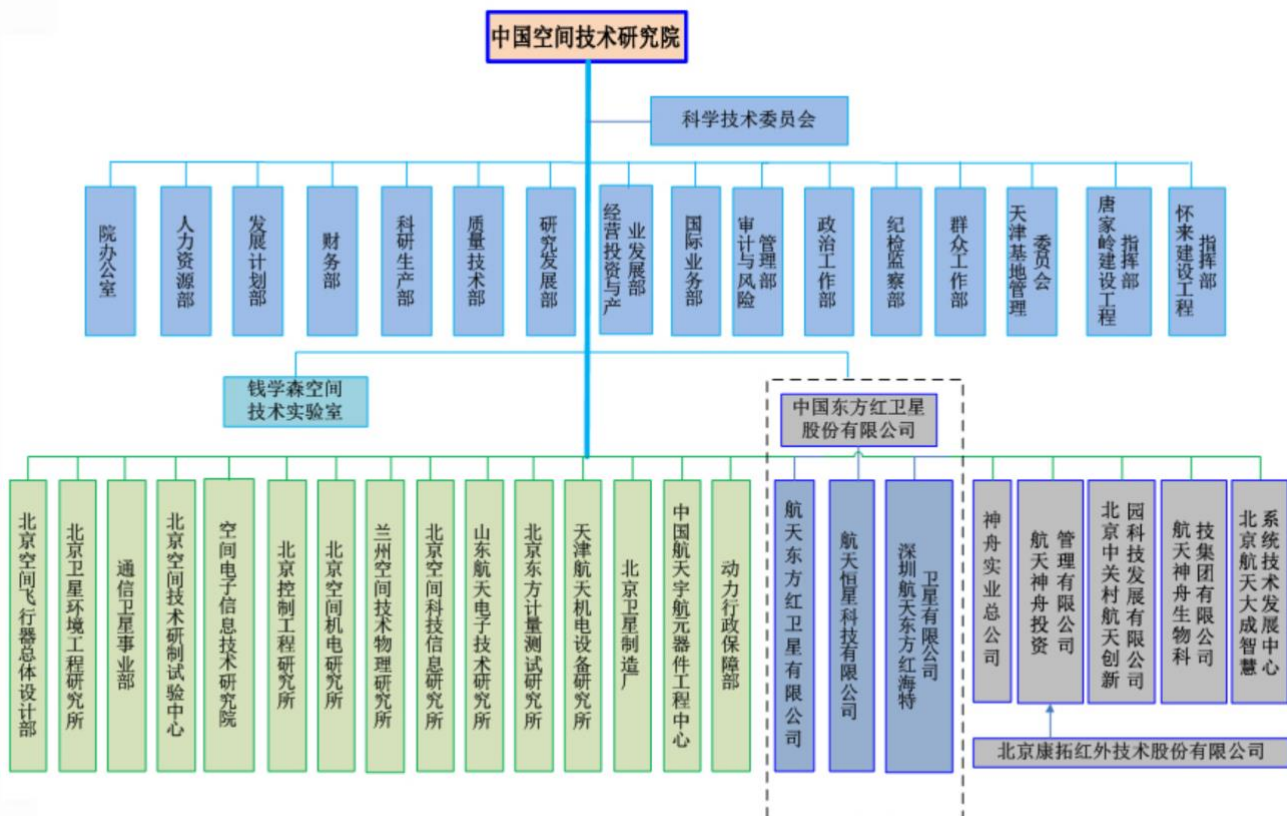


“Since 2004, it has signed cooperative agreements with 13 countries and regions for the export of a total of 28 satellites, and provided integrated space and ground solutions for the countries to which it has exported. The exported products include communications satellites, remote sensing satellites, satellite applications, spacecraft development infrastructure, and space components.”

CAST Structure

A diagram of the CAST organizational structure as it appears at the entity's website is shown below. It shows the Political Committee (blue box just under the box reading “CAST” at the top), headquarters staff departments (the upper row of blue boxes), the Qian Xuesen Lab (solitary blue box under the top row), and the subordinate institutes and departments (lower row of boxes). In the lower row, the four entities inside the dashed-line box are the China Spacesat Company and its subordinate entities. The gray boxes on the lower right are mostly the Shenzhou (manned program) companies.

CAST depiction of its organizational structure



Source: cast.cn

This diagram does not show all CAST entities. There were 30 entities subordinated to CAST found by this research, most identified in this diagram and in a listing at the CAST website. Another overlapping set of descriptions was found in a detailed September 2021 work solicitation written by CAST and posted at universities in China. These entities were sometimes identified only as a numbered institute, but they could be linked back to the full names as given on the CAST website. From these two CAST sources plus some details in other CAST job listings, a composite mission statement for each of these entities was created and appears below. They are listed alphabetically by the English-language name used by these entities. Like the description of the CAST mission shown above, these statements are in CAST's own words.

The CAST Catalog of Subordinate Institutions

Academy of Space Information Systems

"The Academy ... is located in Xi'an, Shaanxi Province. Its primary missions are research and development, production, and related electronics research for space vehicle payloads and electronic systems equipment, space vehicle telemetry, weapons equipment and satellite-use electronic systems and equipment. This academy has produced critical products for manned spacecraft missions, lunar and deep-space exploration missions, and Beidou navigation satellite missions. For China, it is a leader in several fields: communications satellite technology development, satellite navigation technology, satellite data transmission and processing technology, space-based antenna research and development, satellite remote sensing technology, satellite link technology, and measurement and control technology for ground, maritime, and space-based equipment. It has made thousands of pieces of equipment for China's communications broadcast satellites, navigation satellites, remote sensing satellites, weather satellites, scientific research satellites, and Shenzhen spacecraft."

Name in Chinese: 空间电子信息技术研究院.

Other names: Academy of Space Electronics Information Technology (name used at CAST website, but researchers at this institute use the English name "Academy of Space Information Systems" in their publications), Xi'an Institute of Space Radio Technology (西安空间无线电技术研究所), 504 Institute.

Location: Xi'an Space Production Base, No. 504 East Changan Road, Xi'an (西安市航天产业基, 西安市东长安街 504 号).

Aerospace Shenzhou Smart System Technology Company, Ltd

"This company was established under CAST in 2015 and is supported by investment from CAST and its components: Xi'an Radio Technology Institute, Beijing Satellite Manufacturing Factory, and Shenzhou Investment Management Company. The company goal is to promote the modernization of urban governance systems and capabilities. It provides space technology services and products that support

information services and smart city development for national enterprises and regional entities. It is CAST's top-level company for smart city and smart production methods and systems."

Name in Chinese: 航天神舟智慧系统技术有限公司.

Location: No. 5 Minzu Yuan Road, Chaoyang District, Beijing (北京市朝阳区民族园路 5 号).

Website: www.spacesystech.com.

Beijing Ctrowell Technology Corporation Ltd [sic]

"This comprehensive shareholding company was established under CAST in 2011. Its chief function is applying satellite attitude-control infrared detection technology to China's railroad-car security field, becoming the first non-rail enterprise in domestic railroad-car security monitoring. It is currently an important operational security monitoring equipment and services provider for China rail systems. Its principal product is a rail-car intelligent infrared axle temperature detection system."

Name in Chinese: 北京康拓红外技术股份有限公司.

Other names: Beijing Kangtuo Infrared Technology Co., Ltd [literal translation].

Location: No. 16 Zhongguancun South Third Street, Building 1, 2nd Floor, Haidian District, Beijing (北京市海淀区中关村南三街 16 号院 1 号楼 2 层).

Website: www.cchbds.com.cn.

Beijing Institute of Control Engineering

"This is a research entity for integrated research, development, design, manufacturing, and testing of space vehicle guidance, navigation and control (GNC) systems, propulsion systems, program control systems and their components. Its research also involves the fields of control science and information science. For the DFH-1 [Dong Fang Hong] satellites, manned space flight, and lunar exploration, it has successfully developed satellite control and propulsion systems, process control systems, and Chang'e satellite GNC systems and components. It holds the lead position in China's space vehicle control field. This institute has within it a State Key Lab for Space Smart Control Technology."

Name in Chinese: 北京控制工程研究所.

Other names: CAST Control and Propulsion Systems Department (五院控制与推进系统事业部), 502 Institute.

Location: No. 16 Zhongguancun South 3rd Street, Haidian District, Beijing (北京市海淀区中关村南三街 16 号).

Beijing Institute of Spacecraft Environment Engineering

“This institute is responsible for final assembly, integration, special testing, and environmental testing of China’s manned spacecraft, navigation satellite series, communications satellite series, earth observation satellite series, lunar exploration and deep-space satellite series, scientific experimental satellite series, and recoverable satellite series. This institute also operates the National Defense Technology Key Lab for Reliability and Environmental Engineering. It has conducted the great majority of China space vehicle systems final assembly and environmental testing missions, and it holds the largest market share for development of China’s spacecraft environmental simulation and testing equipment. It has successfully promoted these products to a variety of other countries including Russia, Brazil, Pakistan, and Egypt. It has also had cooperative projects with Russia, France, and Germany, including the development and export of the GVV-600 large-scale space environment simulator to Russia.”

Name in Chinese: 北京卫星环境工程研究所.

Other names: CAST Assembly and Environmental Engineering Department (院本部总装与环境工程部), 511 Institute.

Location: No. 104 Youyi Road, Haidian District, Beijing (北京市海淀区友谊路 104 号).

Beijing Institute of Spacecraft Systems Engineering

“Established in 1968, it is China’s most prominent spacecraft and space vehicle technology research and production unit, responsible for high-resolution earth observation systems, second-generation satellite navigation systems, manned space flight and lunar exploration projects. It successfully developed China’s first recoverable satellite, the first experimental communications satellite in geostationary orbit, the first transmitting earth observation satellite, the first navigation satellite, and the first international commercial communications satellite.”

Name in Chinese: 北京空间飞行器总体设计部.

Other names: General Design Department (总体设计部), 501 Institute.

Location: No. 104 Youyi Road, Haidian District, Beijing (北京市海淀区友谊路 104 号院).

Beijing Institute of Space Mechanics and Electricity

“Established in 1958, this institute was one of China’s first space technology research units, integrating research, design, production, and testing. It is China’s only research entity involved with spacecraft recovery and landing technology. It has successfully completed development of dozens of spacecraft data capsule and recoverable satellite systems, and has completed recovery of all Shenzhou series spacecraft without a loss. Its recovery and landing technology is also used in weapons recovery, unmanned drone recovery, weapons stabilization and slow-down, and deep-space exploration. It has recently pioneered technology for inflatable space structures and extraterrestrial object

recovery. This institute is China's unit responsible for space optical remote sensing payloads, has developed and successfully launched commercial optical sensors, accounting for 80% of China's on-orbit optical sensors. It has equipped recoverable satellites, remote sensing satellites, resource satellites, maritime satellites, and environmental disaster reduction satellites. The institute is also the top-level research institute for space laser radar and laser range-finding equipment, with breakthroughs in the critical technologies for space laser detection systems, with capabilities in space laser systems design, production, set-up and adjustment, and testing processes."

Name in Chinese: 北京空间机电研究所.

Other names: 508 Institute.

Location: No. 1 South Dahongmen Road, Dong Gaodi, Fengtai District, Beijing (北京市丰台区东高地南大红门路 1 号).

Beijing Institute of Space Science and Technology Information

"This entity was established as an advanced knowledge collection and analysis coordination work center and special knowledge repository, covering the fields of strategic information, intelligence research, standardization, publishing, and intellectual property rights services. It provides specialized information products and solutions to government, military, business, and research entities. It is also responsible for PLA Strategic Support Force's Space Systems Department standardization support structure."

Name in Chinese: 北京空间科技信息研究所.

Other names: 512 Institute.

Location: No.82 Zhichun Road, Haidian District, Beijing (北京市海淀区知春路 82 号).

Beijing Orient Institute Of Measurement and Test

"This is a special research institute for metrology testing and is a top-level electronic test station for national defense science and industry. Its focus is national military and commercial standards revision work that integrates electromagnetic interference, radio electronics, time-frequency and geometric volume, heat mechanics and vacuum, and satellite applications. It is responsible for metrology verification for spacecraft development, ground testing equipment, and field environment and safety testing, supporting manned spacecraft and lunar exploration missions."

Name in Chinese: 北京东方计量测试研究所.

Other names: 514 Institute.

Location: 99 East Zhongguancun Road, Haidian District, Beijing (北京市海淀区中关村东路 99 号).

Beijing Satellite Manufacturing Factory

“This is a national-level high-technology enterprise for spacecraft manufacturing, going back to the creation of China’s first artificial satellite, Dong Fang Hong-1, and China’s first manned spacecraft, Shenzhou-1. This factory has been involved in research and development, final assembly, testing, and launchpad services for nearly 400 satellites, lunar exploration craft, and manned spacecraft. Over its 58 years, the 529 Factory has

completed the development, final assembly and integration, testing, and launch site services for more than 180 mechanical, electrical, and heat-control products for communications broadcast satellites, deep-space exploration, and manned spacecraft.”

Name in Chinese: 北京卫星制造厂.

Other names: 529 Factory.

Location: No. 82 Zhichun Road, Haidian District, Beijing (北京市海淀区知春路 82 号).

Beijing Space Technology Research and Test Center

“Established in 2009, this is CAST’s responsible enterprise and supervisory business unit for manned spacecraft, responsible for development planning, advanced research, general design, systems integration, operational support and applied research for the manned spacecraft field. It has successfully completed development and flight missions for four unmanned test spacecraft, six manned spacecraft, and one space laboratory. It is also responsible for international cooperation in the development of related fields.”

Name in Chinese: 北京空间技术研制试验中心.

Location: No. 104 Youyi Road, Haidian District, Beijing (北京市海淀区友谊路 104 号).

Beijing Zhongguancun Space Entrepreneur Park

“Established in 2011, this facility provides a nurturing development environment for space technology production projects based on CASC and CAST’s dominance in technology and human resources. It provides business incubation services for the mutual transformation of space military-industry technology and civilian technology.”

Name in Chinese: 北京中关村航天创新园科技发展有限公司.

Location: No. 63 Zhichun Road, Haidian District, Beijing (北京市海淀区知春路 63 号).

China Aerospace Components Engineering Center

“Formerly known as the Electronic Components Reliability Center, it was the earliest professional organization engaged in the quality assurance of space components in China. Over the past 30 years, CACEC has formed a complete service system integrating space materials selection, certification, procurement, and logistics warehousing. CACEC has provided high-reliability components and materials for more than 130 domestic and

foreign spacecraft. It is also CASC's designated components reliability center, materials reliability center, standardized fastener reliability center, failure analysis center, space component use certification center, and space component anti-radiation hardening lab."

Name in Chinese: 中国航天宇航元器件工程中心.

Other names: CAST Astronautical Material Support Department (五院宇航物资保障事业部).

Location: No. 104 Youyi Road, Haidian District, Beijing (北京海淀区友谊路 104 号).

China Spacesat Company, Ltd

"This exchange-listed company controlled by CAST is a high-tech space enterprise specializing in micro-satellite development, satellite ground systems manufacturing, and satellite operations services. It has developed into an industrialized company with integrated design, development, integration, and operation service capabilities. It now has more than ten subsidiaries and has formed a series of well-known brands such as Shenzhen Aerospace Dongfanghong and Space Star."

Name in Chinese: 中国东方红卫星股份有限公司.

Location: No. 31 Zhongguancun South Street, Shenzhou Building, 12th Floor, Haidian District, Beijing (北京市海淀区中关村南大街 31 号神舟大厦 12 层).

Website: www.spacesat.com.cn.

DFH Satellite Company, Ltd

"This entity was established in Beijing in 2001 as the 'Small Satellite and Applications National Engineering Center.' It is the CAST subordinate enterprise that has primary responsibility for the development of small satellites, and is China Spacesat Company's wholly-owned subsidiary for high technology. Its responsibilities include small satellite research and development, systems design, systems integration, and on-orbit support services. It has developed the CAST1000, CAST2000, and CAST3000 common satellite platforms and the nano-satellite product series, which includes 1-1,500kg small- and micro-satellites. Based on these, it has developed and launched more than 100 satellites, including those in the fields of ocean surveillance, environmental and disaster monitoring, earth remote sensing, stereo mapping, and technology testing."

Name in Chinese: 航天东方红卫星有限公司.

Location: No. 104 Youyi Road, Haidian District, Beijing (北京市海淀区友谊路 104 号).

Institute of Communication and Navigation Satellites

"Established in its current form in 2008, this is China's primary enterprise for the communications satellite business. This was the research and development supervisory

entity for China's first artificial earth satellite, its first functional communications satellite, its first commercial satellite for export, its first mobile communications satellite, and its first low-earth-orbit communications and space Internet systems satellite. It is primarily responsible for development of data relay satellite systems, and was involved in development of the Beidou satellite navigation system. It has exported 11 international commercial communications satellites to government customers and international corporations in Asia, Africa, Latin America, and Europe, which together cover 80 percent of the earth and its population."

Name in Chinese: 通信与导航卫星总体部.

Other names: Formerly known as Institute of Telecommunication Satellites (通信卫星事业部).

Location: No. 104 Youyi Road, Haidian District, Beijing (北京海淀区友谊路 104 号).

Institute of Manned Space System Engineering

"Established in 2009, this institute is the main force behind research and production of China's manned space flight technology and manned spacecraft. It is responsible for manned space flight development plans, advanced research, systems design, systems integration, operations support, and applied research. There are six research entities subordinated to this institute: Systems Research, Development and Simulation Center, General Systems Research Office, General Mechanics Research Office, General Information Research Office, and Experiment and Testing Center. It successfully developed the Shenzhou-1 through -7 spacecraft, which included Shenzhou-5 which in 2003 successfully completed China's first manned space flight."

Name in Chinese: 载人航天总体部.

Location: No. 104 Youyi Road, Haidian District, Beijing (北京市海淀区友谊路 104 号).

Institute of Remote Sensing Satellites

"This entity was formally established in August 2020, and its previous identity was as the CAST General Design Department's First Office. It is CAST's supervisory unit for development of remote sensing satellites and their systems. It is responsible for remote sensing satellite business development, market development, and customer maintenance. Its responsibilities include spacecraft development, overall design, systems integration, on-orbit technical support, and after-sales services. It has successfully launched more than 30 of CAST's large- and medium-scale remote sensing satellites, including the first transmitting remote sensing satellite (Ziyuan-1), the first ocean dynamics satellite (Haiyang-2), the first civilian stereo mapping satellite (Ziyuan-3), the first sub-meter [resolution] earth observation satellite (Gaofen-2), the first high-resolution, the first full-polarization radar imaging satellite (Gaofen-3), and the first high-orbit, high-resolution optical remote sensing satellite (Gaofen-4)."

Name in Chinese: 遥感卫星总体部.

Location: No. 104 Youyi Road, Haidian District, Beijing (北京海淀区友谊路 104 号).

Institute of Spacecraft Application System Engineering

“Established in 2018, this is the supervisory entity for CAST’s satellite applications operations, with support to the military as its first responsibility. It provides space-to-earth integrated satellite information service systems for various military, civilian and commercial users, and drives development of China's satellite-use industry.”

Name in Chinese: 卫星应用总体部.

Location: No. 104 Youyi Road, Haidian District, Beijing (北京市海淀区友谊路 104 号).

Lanzhou Institute of Physics

“This institute was established in 1962 and was China’s earliest professional institute engaged in vacuum science and technology research. It has been engaged for more than 50 years in space technology and space product research and development. It has established four national research institutions under it: Key Laboratory of Vacuum Technology and Physics for National Defense Technology, Key Laboratory of Space Environment Materials Behavior and Evaluation, National Defense Industry Vacuum Metrology Station, and National Cryogenic Vessel Quality Supervision and Inspection Center, as well as the National Defense Science and Industry Space Technology Innovation Center. Its key products include space electric propulsion systems, space high-performance atomic clocks, space refrigerators, spacecraft storage tanks, satellite secondary power supplies, and flexible thermal control materials.”

Name in Chinese: 兰州空间技术物理研究所.

Other names: 510 Institute.

Location: No. 100 Feiyan Street, Chengguan District, Lanzhou (兰州市城关区飞雁街 100 号).

Power Administrative Security Department

“This department is responsible for power safeguards, security, fire protection, and administrative safeguards work for the CAST Space City Research Zone, and for the operation and maintenance management of public facilities and equipment in the related residential zone.”

Chinese name: 动力行政保障部.

Location: No. 104 Youyi Road, Haidian District, Beijing (北京市海淀区友谊路 104 号).

Qian Xuesen Laboratory of Space Technology

“This is CASC’s ‘special zone’ for innovation. Its components include an invention center, a research center, and an incubation center. Its work focus is on innovative business development in strategic research for space systems development, research for advanced systems projects, and basic research for space technology applications. The laboratory conducts scientific research for future space systems development, directed toward on-orbit services, pulsar navigation, space solar power stations, and deep-space exploration. It has completed work on information collection and processing technology, nano-optoelectronics technology, and materials and mechanics technology.”

Name in Chinese: 钱学森空间技术实验室.

Location: No. 104 Youyi Road, Haidian District, Beijing (北京市海淀区友谊路 104 号).

Shandong Institute of Space Electronic Technology

“Established in 1966 in Yantai’s national-level high-technology production development zone in Shandong Province, this institute is primarily involved in space measurement and control and communications, power electronics, microelectronics technology research and product development for defense field telemetry encryption equipment, booster rocket (upper stage) data processing, and micro-satellite engineering. In recent years it has created a competitive force in special technology for S-band relay measurement and control terminals, pulsar navigation receivers, high-power energy sources, fast-response electronic products, laser energy transmission, image compression chips, large-capacity storage, data transmission communications equipment, self-organizing networks, anti-jamming navigation antennas, and interferometer radars.”

Name in Chinese: 山东航天电子技术研究所.

Other names: 513 Institute.

Location: No. 513 Hangtian Road, Yantai High-Technology Zone (山东省烟台市高新区航天路 513 号).

Shenzhen Aerospace Dongfanghong Development Company, Ltd.

“Established in 2008, the Shenzhen Aerospace Dongfanghong Development Company is a wholly-owned subsidiary of the China Spacesat Company. It is primary involved in micro-satellite research and development operations and space technology applications. Its Micro-Satellite Research and Development Center (Shenzhen Satellite Building) has the capacity to produce 8-10 micro-satellites per year. It successfully developed, produced, launched, and tested the Shijian-4, New Technology Verification satellite, and Kaitouzhe-1 satellite.”

Name in Chinese: 深圳航天东方红卫星有限公司.

Other names: Formerly known as Shenzhen Aerospace Dongfanghong HiT Satellite Company, Ltd (深圳航天东方红海特卫星有限公司).

Location: No. 61 South 9th Street, Satellite Building, Yuehai Neighborhood, Nanshan District, Shenzhen (深圳市南山区粤海街道高新南九道 61 号卫星大厦).

Shenzhou Industrial Corporation

“This is CAST’s largest comprehensive safeguards and security services entity. Its services include CAST large-scale test safeguards, transportation services, medical services, communications services, property services, catering services, and hospital facility management.”

Name in Chinese: 神舟实业总公司.

Location: Future Science City South Compound, Changping District, Beijing (北京市昌平区未来科技城南区).

Shenzhou Investment Management Company, Ltd

“This is an exclusive investment establishment of CAST with registered assets of 330 million yuan (US\$55 million). Its primary areas of business include industrial control and systems integration, new power sources, energy saving and environmental protection, hotel and travel services, and logistics and trade.”

Name in Chinese: 航天神舟投资管理有限公司.

Location: No. 31 Zhongguancun South Street, Shenzhou Science Building, 11th Floor, Haidian District, Beijing (北京市海淀区中关村南大街 31 号神舟科技大厦 11 层).

Website: www.castholding.com.

Shenzhou Science and Technology Development Company, Ltd

“This is CAST’s agency in the Tianjin region, representing CAST in Tianjin’s developing business, planning, and construction services. Working at the entrepreneurial level, it is responsible for planning and infrastructure work. It is located in the Bohai Petroleum military supply depot in Tianjin’s Binhai High-Tech Park.”

Name in Chinese: 航天神舟科技发展有限公司.

Location: No. 166 Rixin Road, Binhai High-Tech Park, Tianjin (天津市滨海高新区滨海科技园日新道 166 号)

Shenzhou Space Biotechnology Group

“Established through investment from CAST, this entity is involved in the high-tech enterprise and service fields for biological production, including bio-medicine and bio-health products. It primarily conducts space biological research and product

development, and employs more than a thousand people. The company is China's first space bio-production base."

Name in Chinese: 航天神舟生物科技集团有限公司.

Location: No. 31 Zhongguancun South Street, Building No. 14, Haidian District, Beijing (北京市海淀区中关村南大街 31 号 14 号楼).

Website: www.space-biology.com.cn.

Space Star Technology Company, Ltd

"This company has more than 3,000 employees and is a comprehensive support services structure for the eight major fields of space applications, satellite remote sensing, satellite navigation, satellite communications, datalink, cloud computing and information security, unmanned craft systems integration, and data operations services. In over 30 years of development, it has served as a leading state key lab for space-ground integrated information technology. It provides equipment manufacturing and operations services based on space-based resources for national defense, industry, and regional customers. It has a strong capability for development and production of VSAT satellite communications systems, highly dynamic jam-resistant digital image transmission systems, spacecraft satellite navigation receivers, Beidou [NAVSAT] user equipment, and other systems-level and terminal-level products."

Name in Chinese: 航天恒星科技有限公司.

Other names: 503 Institute.

Location: No. 77 Jindai Road, Huanbao Park, Zhongguancun District, Beijing (北京市海淀区中关村实创环保园内锦带路 77 号).

Website: www.spacestar.com.cn

Tianjin Aerospace Electromechanical Equipment Research Institute

"This research institute moved in 2012 into Tianjin's Binhai District High-Tech Zone, to CAST's super-large-scale spacecraft research, development, manufacturing, and applied production base. It is a scientific research and production entity for spacecraft ground equipment, spacecraft components, structural components, and satellite-use products. It has conducted product development for spacecraft storage and transportation, final assembly testing equipment, satellite solar panel expansion structures, and antenna structures for manned spacecraft, lunar exploration projects, and remote sensing satellite series."

Name in Chinese: 天津航天机电设备研究所.

Other names: 518 Institute.

Location: No. 101 Shenzhou Blvd, Binhai Technology Park, Tianjin (天津市滨海新区滨海科技园神舟大道 101 号).

Preliminary Conclusions

The lists found largely overlap but are not duplicates of one another. Three entities that appeared on the September 2021 work solicitation are not listed at the CAST website or on the organization chart (General Design Department, Institute of Remote Sensing Satellites, Shenzhou Science and Technology Development Company). One other element appeared in neither of these listing but was identified as CAST in a different job listing (Institute of Manned Space System Engineering). It is not clear why there seems to be no single coherent set of CAST elements in online materials.

Of the 30 elements identified, not all are directly involved with satellite research or manufacturing. Some institutions appeared focused on ancillary support to spacecraft production, including metrology support (precision measurement), quality assurance, and environmental protection. Others provide services to facilities or personnel, such as fire protection and medical services. Still others are dedicated to business incubation and the development of space technology for non-space commercial uses, such as smart city technology, railroad-car security, and bio-health products. The 11 organizations that seem to fall in this ancillary status are the following:

- Aerospace Shenzhou Smart System Technology Company, Ltd
- Beijing Ctrowell Technology Corporation, Ltd
- Beijing Institute of Space Science and Technology Information
- Beijing Orient Institute Of Measurement & Test
- Beijing Zhongguancun Space Entrepreneur Park
- China Aerospace Components Engineering Center
- Power Administrative Security Department
- Shenzhou Industrial Corporation
- Shenzhou Investment Management Company, Ltd
- Shenzhou Science and Technology Development Company, Ltd
- Shenzhou Space Biotechnology Group

The remaining 19 institutions appear to be involved the research, design, development, and/or manufacturing of Chinese satellites and other spacecraft. These are shown in the following table with a brief CAST quote on that entity's responsibilities.

Institution	Responsibilities
Academy of Space Information Systems	"Research for space vehicle payloads, space vehicle telemetry, weapons equipment and satellite electronics."
Beijing Institute of Control Engineering	Design, manufacturing, and testing of space vehicle guidance, navigation and control (GNC) systems."
Beijing Institute of Spacecraft Environment Engineering	"Final assembly, integration, and environmental testing of China's manned spacecraft, and several satellite series."
Beijing Institute of Spacecraft Systems Engineering	"Earth observation systems, satellite navigation systems, manned space flight, and lunar exploration projects."

Beijing Institute of Space Mechanics and Electricity	“Spacecraft recovery and landing technology for weapons recovery, drone recovery, and weapons stabilization.”
Beijing Satellite Manufacturing Factory	“Assembly, testing, and launchpad services for nearly 400 satellites, lunar exploration craft, and manned spacecraft.”
Beijing Space Technology Research and Test Center	“Supervisory business unit for manned spacecraft, including six manned spacecraft and one space laboratory.”
China Spacesat Company, Ltd	“Micro-satellite development, satellite ground systems manufacturing, and satellite operations services.”
DFH Satellite Company, Ltd	“Small satellites: ocean surveillance, environmental and disaster monitoring, earth remote sensing, and stereo mapping.”
Institute of Communication and Navigation Satellites	“Communications satellite business, data relay satellite systems, the Beidou satellite navigation system.”
Institute of Manned Space System Engineering	“Manned space flight plans, advanced research, systems design, systems integration, operations support, and applied research.”
Institute of Remote Sensing Satellites	“Remote sensing satellite business development, planning, market development, and customer maintenance.”
Institute of Spacecraft Application System Engineering	“Space-to-earth integrated satellite information service systems for various military, civilian and commercial users.”
Lanzhou Institute of Physics	“Vacuum science research for electric propulsion systems, atomic clocks, spacecraft storage tanks, power supplies.”
Qian Xuesen Laboratory of Space Technology	“Future space systems including on-orbit services, pulsar navigation, space power stations, and deep-space exploration.”
Shandong Institute of Space Electronic Technology	“Space measurement and control and communications, power electronics, microelectronics, and telemetry encryption.”
Shenzhen Aerospace Dongfanghong Development Company, Ltd	“Developed, produced, launched, and tested the Shijian-4, New Technology Verification satellite, and Kaitouzhe-1 satellite.”
Space Star Technology Company, Ltd	“VSAT satellite communications systems, jam-resistant digital image transmission systems, and satellite navigation receivers.”
Tianjin Aerospace Electromechanical Equipment Research Institute	“Spacecraft structures, storage and transportation, assembly testing equipment, solar panel and antenna structures.”

No attempt has been made to distinguish design, development, and manufacturing entities. The Chinese term for “research and manufacturing” (研究制造) is often abbreviated with a two-character term (研制) which can mean “research and development” or “research and manufacture” or even just “manufacture,” so the CAST descriptions are not always helpful in clarifying this issue.

This, then, is a preliminary documentation of the satellite development entities for China’s state-owned satellite and manned spacecraft hardware. Further elaboration of missions will depend on drilling down into each of these, if in fact there is more definition available from open sources on these institutions individually.