



中国长城工业集团有限公司
CHINA GREAT WALL INDUSTRY CORPORATION

Contribution of China's Space Industry to Socio-economic Development of International Community

Presenting for UNISPACE+50

Zhou Wei, CGWIC

Nov 21st, 2016

Topics

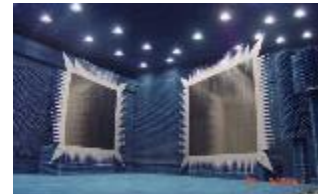
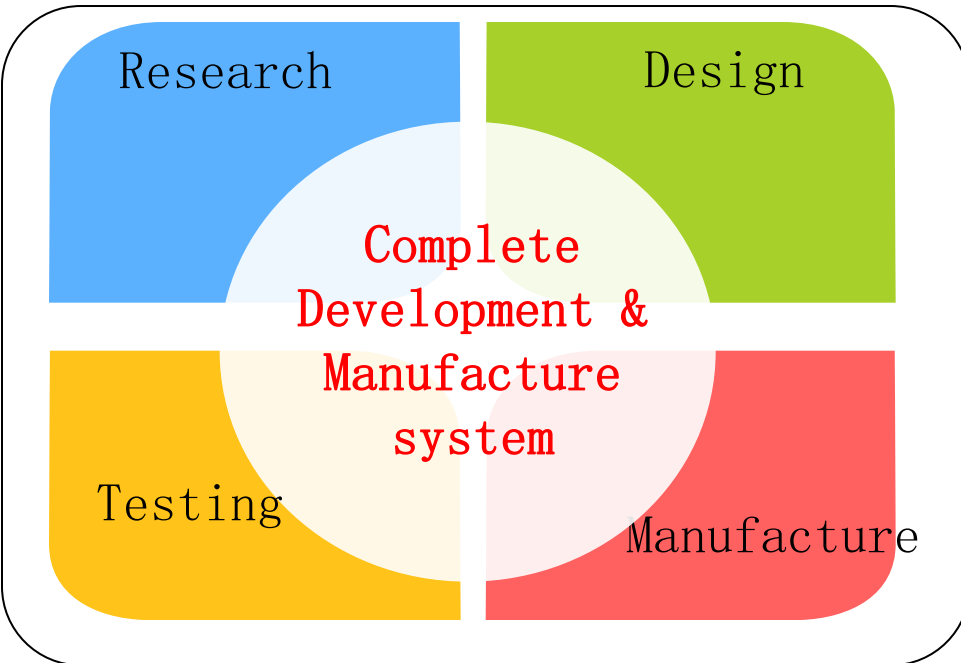
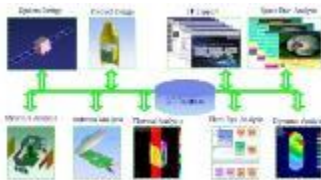
- 1) Overview of China's Space Industry
- 2) Working with World Space Community
- 3) Socio-economic Benefits
- 4) Outlook for the Future



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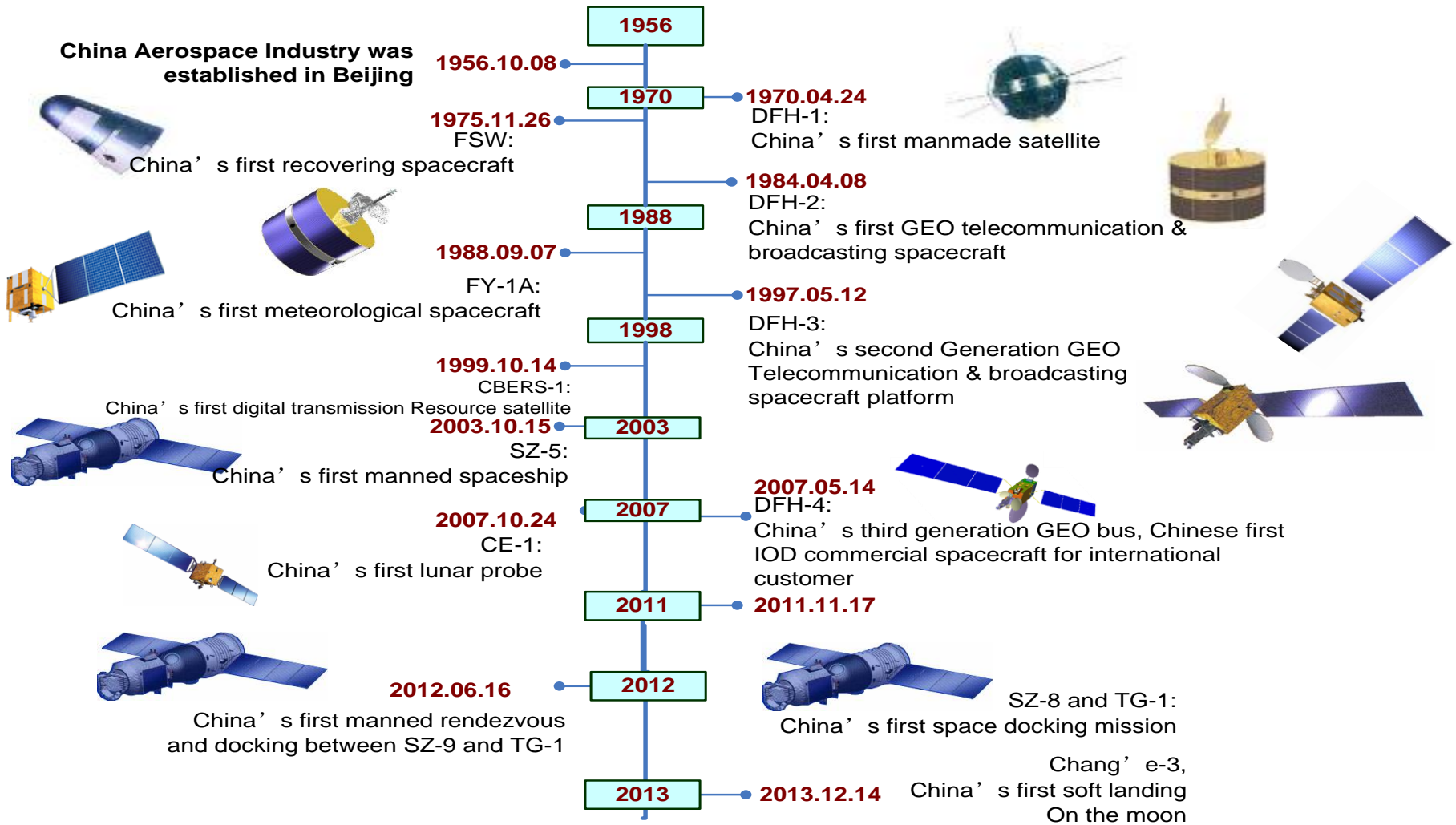
Space Industry System



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Creation and Development



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Long March Launch Vehicles



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New Generation Long March

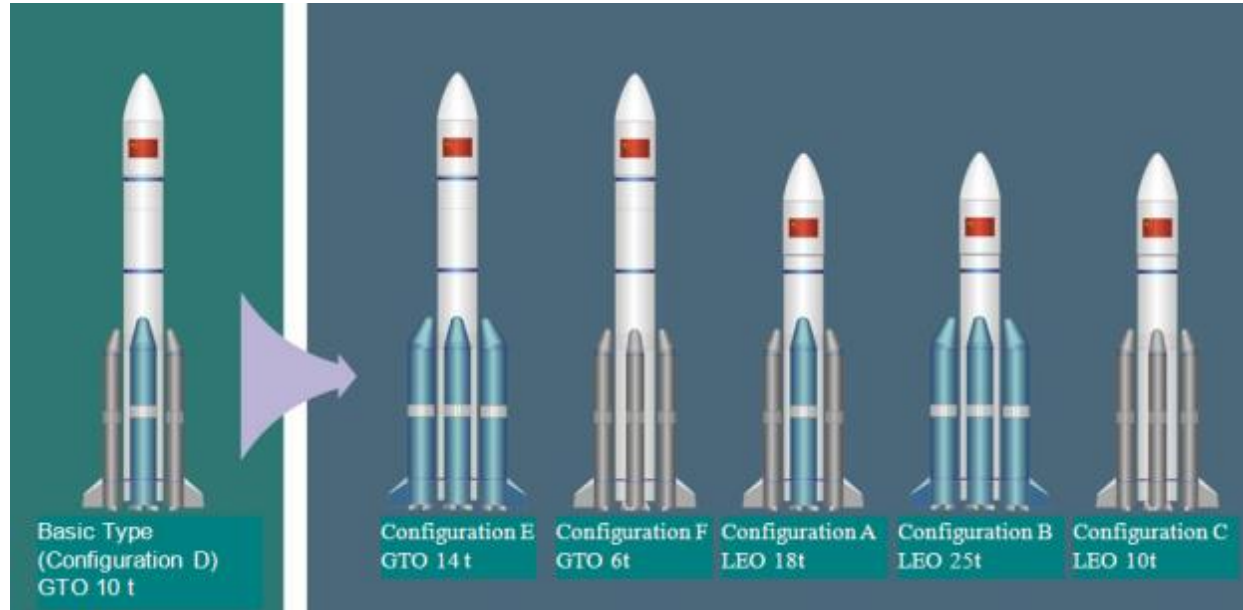
- **LM-5, LM-6, LM-7, LM-11 , all completed their maiden flights:**
 - ✓ **LM-5: LEO 25 tons; GTO 14 tons; first flight successful on Nov 3, 2016.**
 - ✓ **LM-6: SSO (700km) 1 ton; first flight successful on Sep 20, 2015.**
 - ✓ **LM-7: LEO 13.5 tons; SSO (700km) 5.5 tons; first flight successful on Jun 25, 2016.**
 - ✓ **LM-11: LEO solid motor fast response; first flight successful on Sep 25, 2015.**



120t LOX/kerosene engine



50t LOX/LH2 engine



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Long March Flight Record

- **240** flights as of today.
- **97.65%** success rate for the in-service launch vehicle missions.
- The **first 50** launches **in 28 years**, the **second 50 in 9 years**, the **third 50 in 4 years**, in **2015** there were **19**, and in **2016** there are **26**.



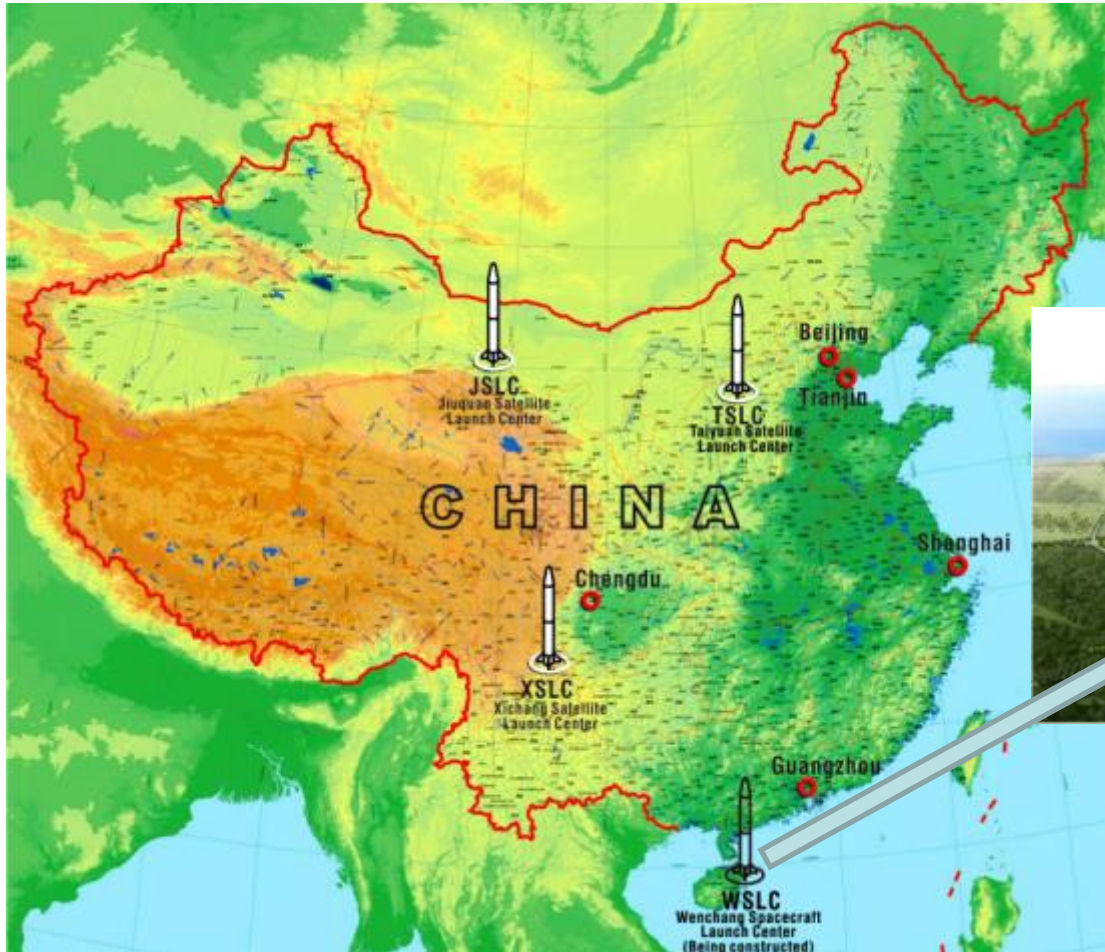
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Launch Sites

4 Launch Sites:

- JSLC (Jiuquan Satellite Launch Center)
- TSLC (Taiyuan Satellite Launch Center)
- XSLC (Xichang Satellite Launch Center)



- WSLC (Wenchang Spacecraft Launch Center), a new launch site located in the Hainan Island as the 4th launch center, is used for LM new generation launch vehicles.



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Topics

- 1) Overview of China's Space Industry
- 2) **Working with World Space Community**
- 3) Socio-economic Benefits
- 4) Outlook for the Future



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China Great Wall Industry Corp. (CGWIC)

- ❑ Established in 1980.
- ❑ A wholly-owned subsidiary, a marketing arm of China Aerospace Science & Technology Corporation (CASC).
- ❑ Sole space company authorized by the government.
 - Commercial launch services;
 - Satellite export;
 - Satellite ground TT&C station construction;
 - Satellite applications;
 - Financing and insurance;
 - Training, etc.

*Pioneer of Commercial Space
Bridge for International Cooperation*



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China Great Wall Industry Corporation



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Major Milestones

Development History

26 Oct. 1985

Announcement to provide international launch services



1 Nov. 1988

1st Performed commercial launch services contract



7 Apr. 1990

1st commercial launch

12 Apr. 2005

1st launch of ITAR free satellite



14 May 2007

1st launch of DFH-4 Comsat for int'l customer



29 Sep. 2012

1st launch of CAST-2000 RS sat for int'l customer



17 Oct. 2015

1st launch of DFH-4 Comsat for int'l leading satellite operator



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International Cooperation

Launch Services



International commercial launches with Long March launch vehicles

Satellite Delivery



8 Communications satellites and **1** remote sensing satellites delivered to international clients.

Cooperation



Various cooperation projects including:

- Training;
- Consultancy;
- Subsystems;
- DC and AITC.



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Satellite Launch Services

- **30+** years of commercial launch services.
- **4** kinds of U.S. & European commercial satellites launched onboard Long March launch vehicles.
- **55** international launches for **64** satellites.



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Remote Sensing Satellites

In-orbit-delivery of remote sensing satellites. Satellite platforms characterized by their high performance, expandability & flexibility:

- S-band TT&C
- X-band data transmission
- 3-axis attitude stabilization



- **VRSS-1** remote sensing satellite contract in 2011 and successfully launched in 2012, marking the first China built RS satellite to world customer.
- **VRSS-2** signed in Oct. 2014 and to be launch in Sept. ,2017.
- **PRSS-01** signed with SUPARCO in April, 2016 and to be launched in 2018.



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Navigation Satellites

- **Beidou Navigation Constellation :**
 - 5 GEO Satellites,
 - 27 MEO Satellites and
 - 3 IGSO Satellites,serving global satellite positioning by providing accurate global navigation and positioning services, and supplying short message services.
- For further improving positioning accuracy of Beidou Constellation and other GNSS system, China Aerospace provides SBAS system and CORS system, so as to meet the different needs of social and economic development worldwide.



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International Cooperation

4 research centers under CGWIC to develop international cooperation:

International Aerospace Cooperation and Research Center

- Space Science
- Deep Space Exploration

International Manned Space Flight Cooperation and Exchange Center

- Human Spaceflight

International Satellite Navigation Cooperation Research Center

- Satellite Navigation
- Beidou Satellites System
- IGMAS

International Space Law Research Center

- Space Law
- China Space Policy



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Our Customers Worldwide

Connect the Earth and Universe



HUGHES

SPACE SYSTEMS
LORAL



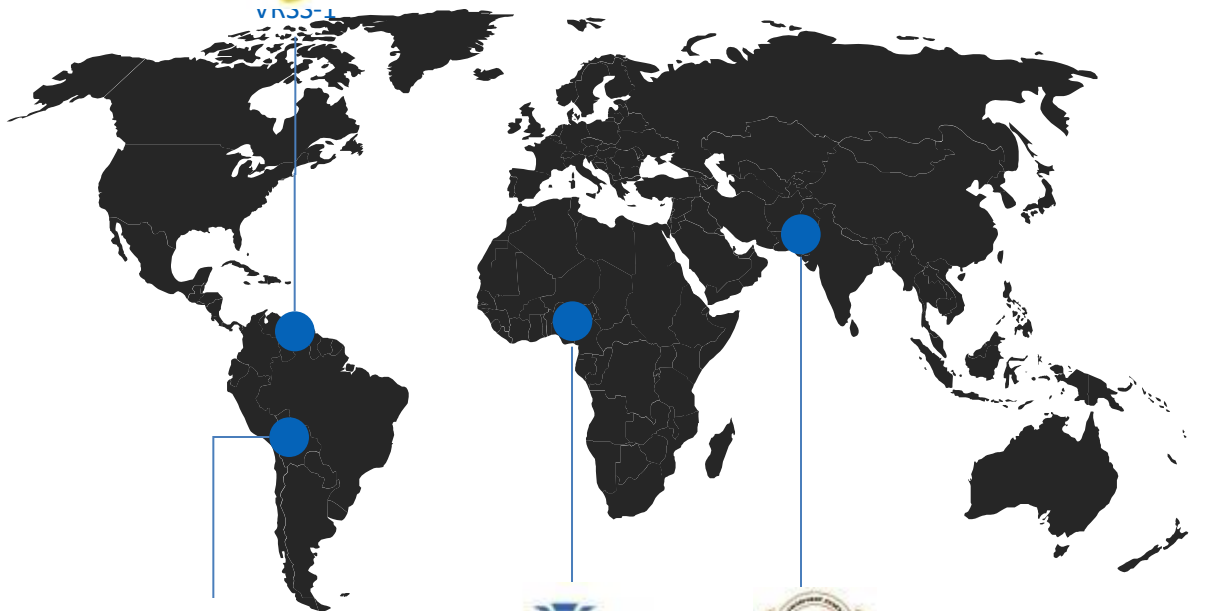
indosat



ECHOSTAR



vncc-1



55 International Commercial Launches Conducted

64 Satellites Launched

12 Piggyback mission completed

9 Satellite IOD Program Launched and Delivered



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Topics

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Socio-economic Benefits

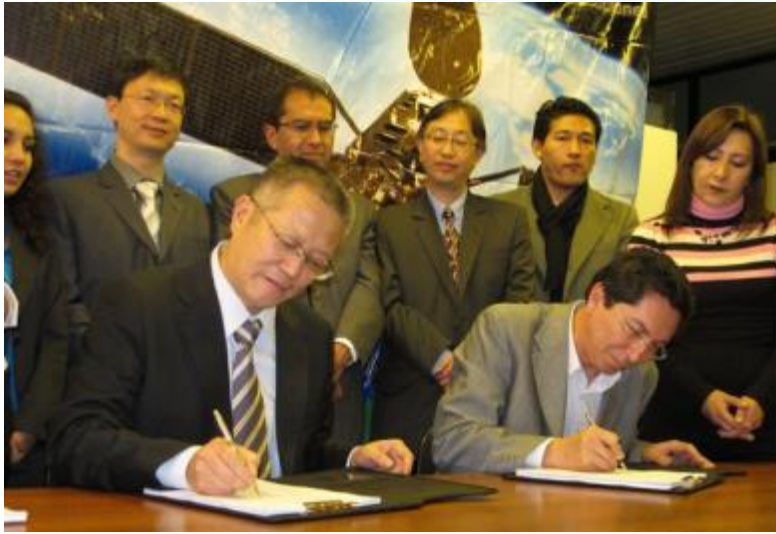
- For the equality and mutual benefit, peaceful utilization and common development, we are cooperating with world customers in developing their space systems, which firmly supports their socio-economic development.



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Case Study: TKSat-1



- In December 2010, CGWIC signed a Tupak Katari Communication Satellite Contract with Bolivia Space Agency (ABE).
- CGWIC earnestly worked with ABE for making project feasibility analysis, establishing business model, providing orbital and frequency consulting service, optimizing the satellite payload design etc. and laid a strong foundation for its successful commercial operation.



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Case Study: TKSat-1

- Since April 1, 2014, TKSat-1 satellite was formally put into operation. It enhanced the communications capacity in Bolivia's remote areas, promoting economic development and social stability .
- As of today, over 80% of transponder capacity leased to Bolivia's major 3 telecom operators (ENTEL, TIGO and VIVA) and government agencies.
- In 2015, its revenue reached \$19 million. In 2016, the expected revenue will be \$25 million to \$28 million.



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Case Study: TKSat-1

- During World Satellite Business Week, hosted by Euroconsult, Spacenews and Satellite Finance, held in Paris on September 14, 2016, ABE was awarded as the best new satellite operator in 2015.
- The in-orbit delivery by package solution helps Bolivia entering into the space age.
- Trained a batch of aerospace technical engineers and management team, laying a solid foundation for Bolivia's future aerospace industry.



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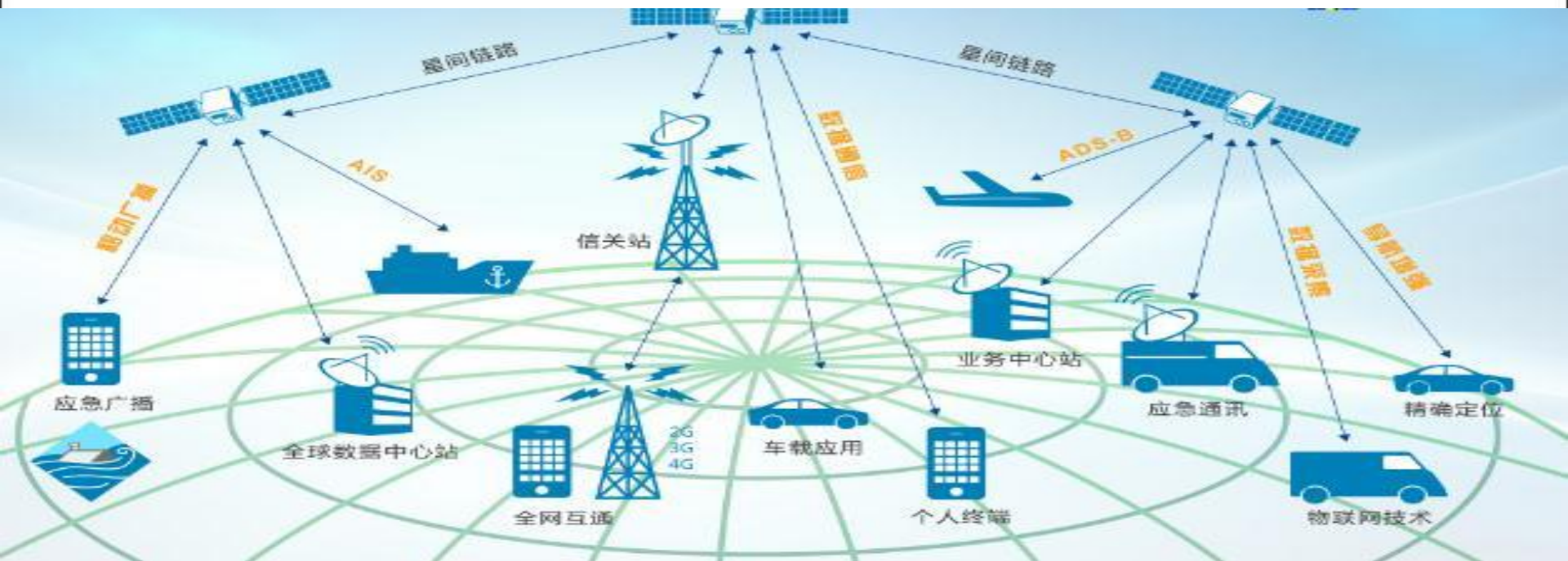
Outlook for the future

- With rich experiences for cooperation in launch services, satellite communication, satellite remote sensing, satellite navigation, we are open to share achievements of China's space industry with governments and operators.
- Ready to serve world community with following 6 products and services:
 1. **Data exchange satellite** (An LEO information service constellation);
 2. **DRAGON system** (Global cm-level positioning service);
 3. **Long March Express** (Launch services);
 4. **Space Workshop** (Next generation reusable space platform);
 5. **DFH-HTS Communications Satellites**;
 6. **Global network of RS service** (Sub-meter High Resolution Commercial RS Satellite Constellation + Global stations+ Internet Service Centers)



1) Data Exchange Satellite

- Data Exchange Satellite : 60 small LEO communication satellites.
- For Data Collection, Data Exchange, AIS, ADS-B, Mobile Message , Broadcasting, Navigation Augmentation.



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1) Data Exchange Satellite

System Features

Extensive Application



- Traditional Industries and Internet
- Internet Emerging Industries and Public Users

Large Capacity

- Supporting Varied Multimedia information
- Over Ten Million User Capacity

Global Coverage



- Global Seamless Coverage
- Triple Play and Freely handover

Cutting Edge Technology

- Constellation Interconnection
- Implantable Chip-level Terminal



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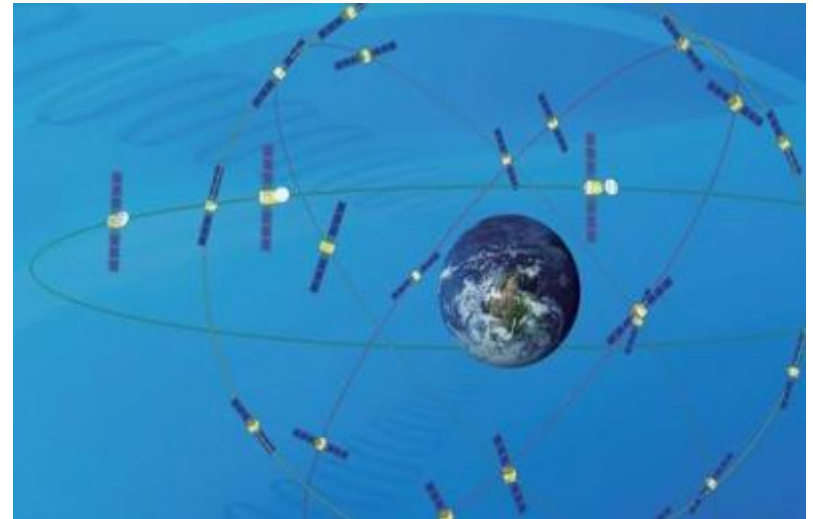


2) DRAGON System

With the data acquired from over 300 global multi-system satellite navigation reference stations, DRAGON system can precisely correct the parameters of orbit error and clock error, with higher positioning accuracy than traditional satellite navigation system.

It can transmit correction parameters to satellite navigation terminal via 5 GEO satellite and 60 more satellites from LEO Communication satellite constellation, increasing the positioning accuracy of the satellite navigation terminal to cm level.

DRAGON---Differential Reference Augmentation Global Overlay Network



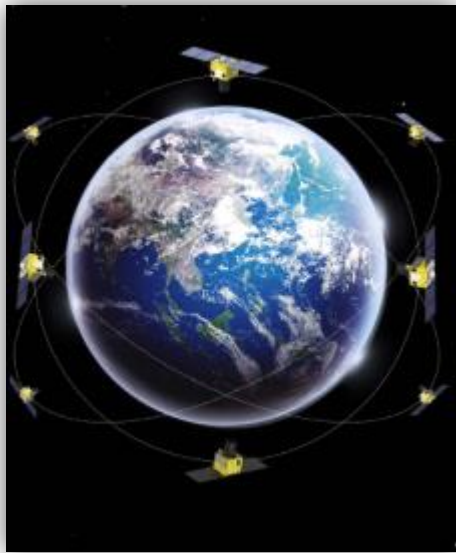
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3) Long March Express

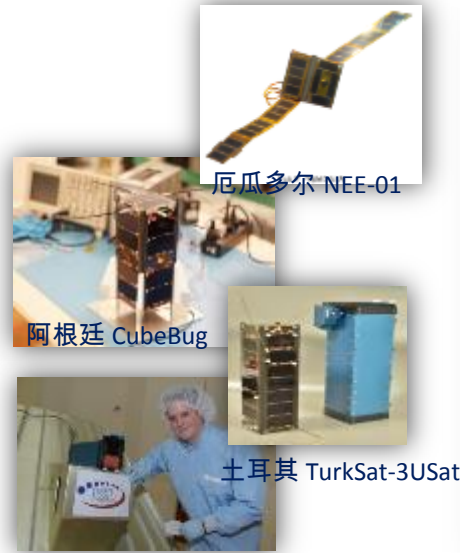
4 LAUNCH MISSIONS



Constellation Launch



Dedicated Launch



Piggyback Launch



Cluster Launch



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3) Long March Express

MEET A VARIETY OF DEMANDS

Various Orbits

- ✓ LEO
- ✓ SSO
- ✓ GTO

All Customers

- ✓ Government
- ✓ SAT Manufactures & Operators
- ✓ Scientific Research Institutions
- ✓ Universities

Different Missions

- ✓ Telecom Sat
- ✓ RS Sat
- ✓ Scientific Experiment
- ✓ Tech Validation
- ✓ Navigation

长征快车 金牌火箭 + 金牌发射服务

继承传统的成熟模式 商业航天的创新升级

LONG MARCH EXPRESS

The Efficient Access To Space Your Reliable Partner To Success

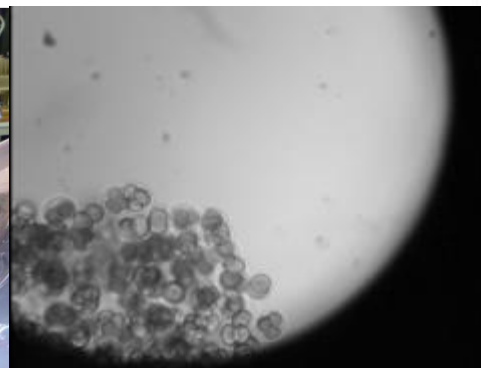


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4) Space Workshop

- ◆ Reusable Space Experiment Platform is the new generation of China's recoverable satellite, with high microgravity level.
- ◆ For promising future in space microgravity science, life science, seed breeding, space materiel, space pharmacy and other domains.



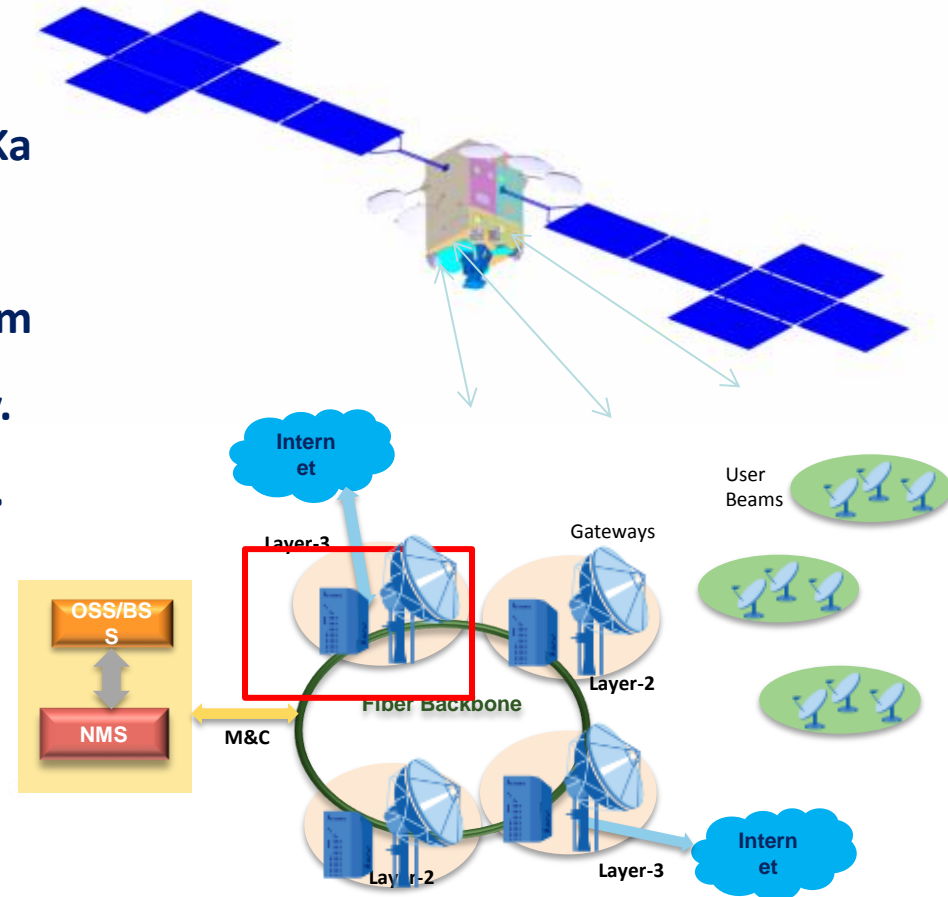
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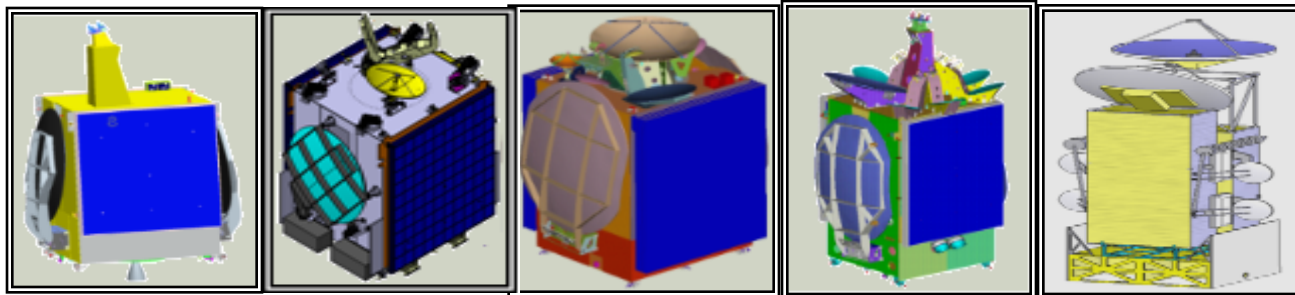
5) DFH-HTS Payload

- DFH Series Multi-mission GEO BUS.
- Broadband Flexible Payload in Ku/Ka Band.
- Broadband Ground Application System with Independent Intellectual Property.
- Integrated Design of Satellite and GAS.
- Up to 200Gbps System Capacity.



5) DFH-HTS Platform

	DFH-4S	DFH-4SP	DFH-4	DFH-4E	DFH-5
Orbit	GEO	GEO	GEO	GEO	GEO
Lifetime (Year)	≥ 15	≥ 18	≥ 15	≥ 15	≥ 16
Lift-off Mass (kg)	4200	2000 Dual Launch	5100	5500	8000
Payload Mass (kg)	450	500	600	900	1500
Payload Power (W)	4000	9000	8000	10000	18000
Propulsion	Hybrid	Electrical	Chemical	Hybird	Hybrid
Typical Payload Capacity (Gbps)	20	50	50	90	200



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6) Global RS Network

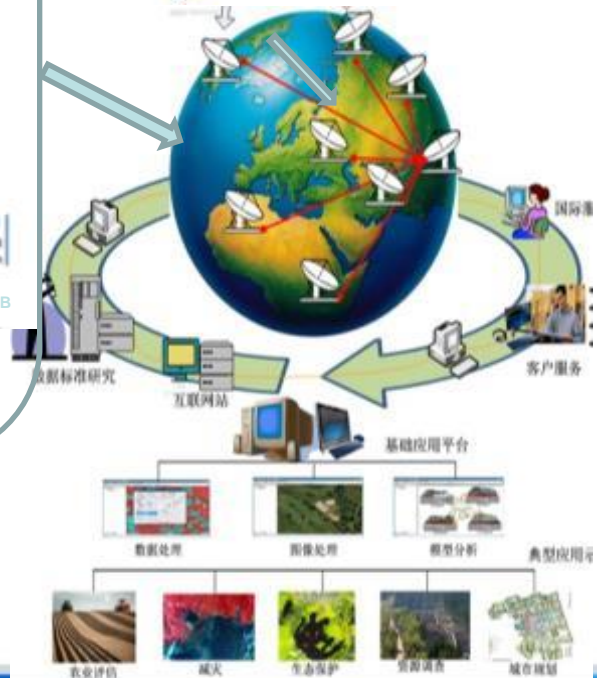
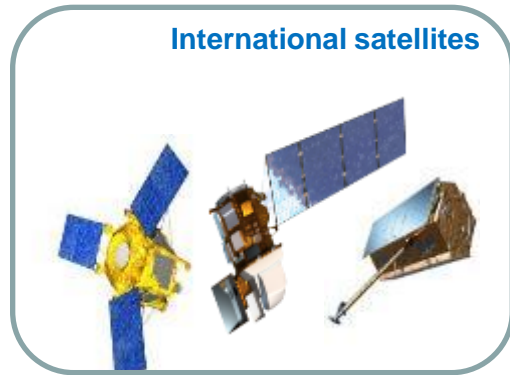
- **By 2022, a high resolution remote sensing satellite system to be built and operated: 16 optical satellites with 0.5 meter resolution, 4 high-end optical satellites, 4 microwave satellites and some high spectrum video small satellites.**
 - **To provides all-weather observation service with high spatial resolution, high spectrum for global customers.**
 - **About 10 to 20 remote sensing satellite ground stations to be constructed and operated, building a global data distribution service system.**
 - **To create some international and regional application centers, providing remote sensing data service and application system solutions for global customers.**



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Multi-satellite RS Data Resources



Multi-satellite data resources include Chinese satellites and international satellites.

GF series: GF-1/2/3/4, ...

ZY Series: CBERS-04, ZY-02C/03, ...

HJ series: HJ-1A/B/C, ...



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Remote Sensing Stations Worldwide

■ Global Network

■ Global Data Acquisition

- ◆ Applicable to multi-resource satellites.
- ◆ Support optical, radar, etc. multi-payload
- ◆ X-band and S-band integrated.
- ◆ Remote control, unmanned.
- ◆ Data downlink rate up to 1.5Gbps.
- ◆ System availability up to 99.9%.



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Extensive RS Data Applications



Remote sensing satellite imagery developed with more applications.

- Public benefit
- Security
- Industry
- Personal services
- ...



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Outlook for the future

- Look forward to working with you in such 6 products and services by:
 - ✓ Providing our products and services to our customers;
 - ✓ Working together in their programs with our customers.

Be your reliable partner to success!



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Thanks!

谢谢!

