

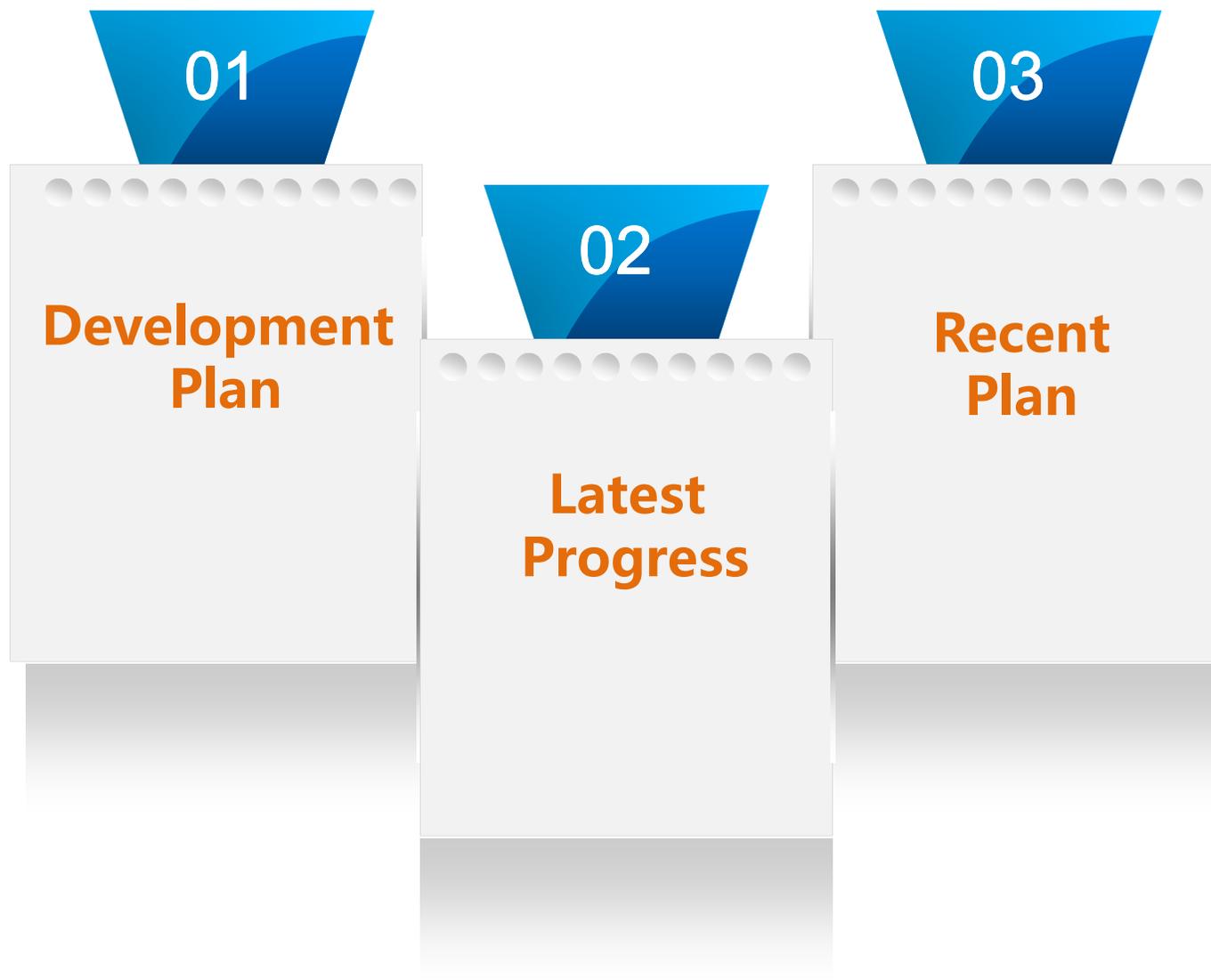


Operation and Development of BeiDou Navigation Satellite System

China Satellite Navigation Office



China Satellite Navigation Office



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Plan**

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Development Objectives

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Development Objectives

The BeiDou System is committed:

- **To provide continuous, stable and reliable positioning, navigation and timing services to global users;**
- **To meet the requirements derived from national security, economic and social development sectors, to accelerate IT applications and the transformation of economic development methods, and to improve both economic and social benefits;**
- **To serve the world and benefit the mankind through joint efforts with other navigation satellite systems across the globe.**



Basic Principles

Openness

The BeiDou System will offer open services free of charge for global users.

Independency

Develop and operate BeiDou system independently.

Basic Principles

Compatibility

The BeiDou System is devoted to pursue compatibility and interoperability with other navigation satellite systems, and enable users to obtain better services.

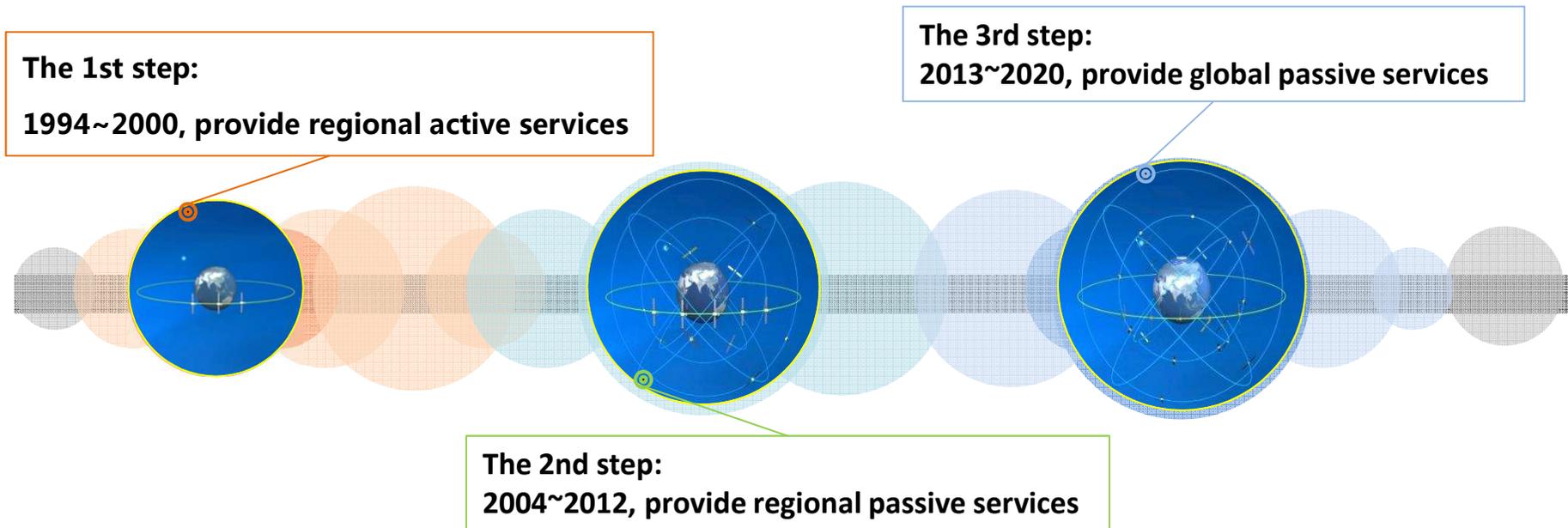
Gradualness

The establishment of BeiDou System follows a stepwise manner in the light of Chinese actual technical and economic conditions.

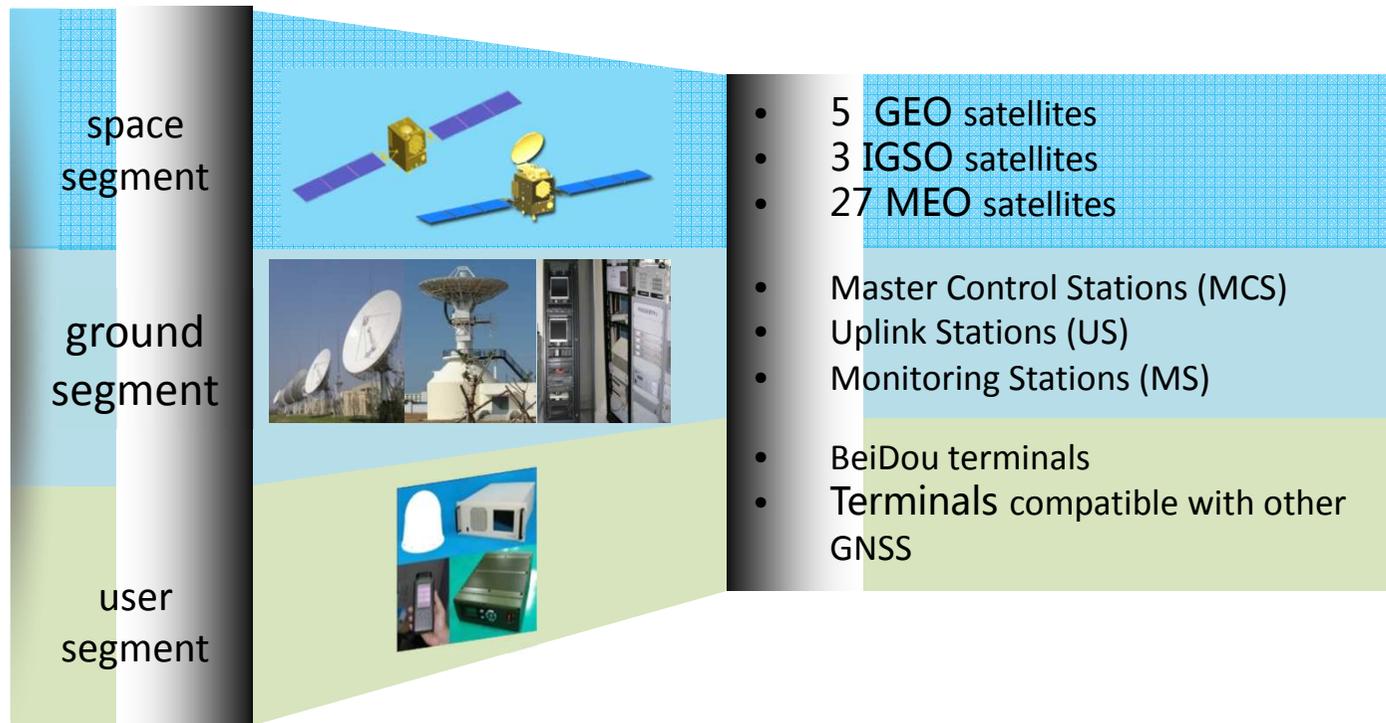


Development Steps

The BeiDou System has been developing in line with the “three-step” roadmap and the thinking of “from regional to global, and from active to passive”, and forms a development path as region-highlighted, world-oriented, with its own features.



System Components



The BeiDou System is comprised of three major components: space segment, ground control segment and user segment. The BeiDou System is able to provide four types of services, namely, open, authorized, wide area differential and short message services. The positioning accuracy is better than 10 meters (The positioning accuracy is better than 5 meters in the regions with low geographic latitude), the timing accuracy is better than 20 nanoseconds, and the velocity accuracy is better than 0.2 meters per second.



Fundamental Policies

Provide open services free of charge for users.

Maintain and perfect the system constantly, improve service performance continuously, and offer services with higher quality.

Release open service performance specifications on schedule, bring the function of government and market to full play, promote innovation, popularization and internationalization of BeiDou/GNSS applications, and lay foundation for the national strategic emerging industries.

Adhere to the concept of development and win-win cooperation, realize compatibility and interoperability between BeiDou and other GNSS, give the system efficiency into full play and increase users' benefits.



01

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System Construction

Application Promotion

International Cooperation

**Latest
Progress**

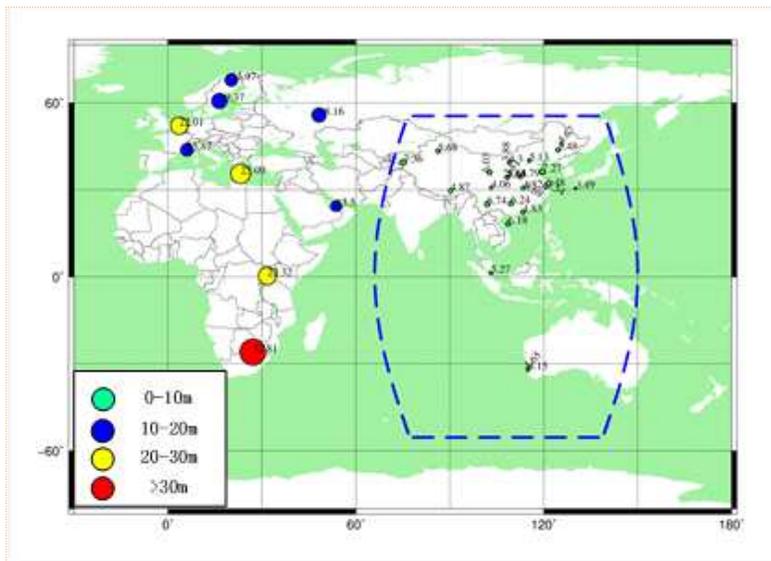
03

**Recent
Plan**

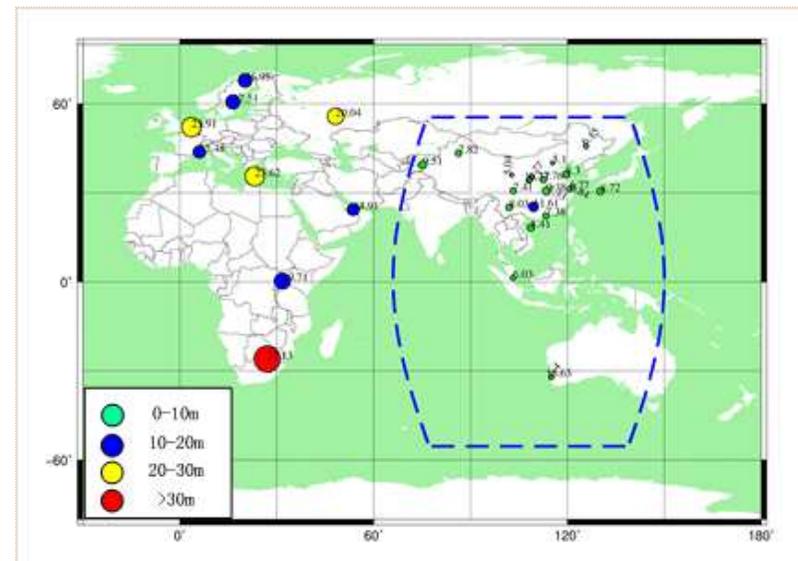


1. Maintain Stable Operation of the BeiDou System

Since formal regional services provision on December 27 2012, the BeiDou System has maintained continuous and stable operation, and the service performance has met with the specification requirements.



B1I Horizontal Positioning Accuracy



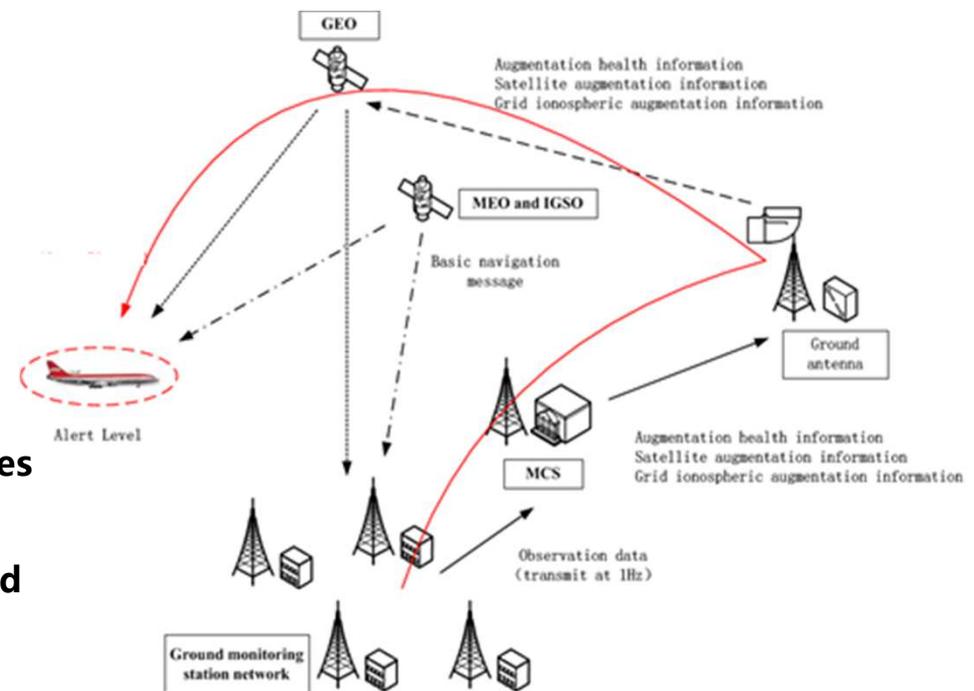
B1I Elevation Positioning Accuracy

System Construction

2. Carry forward the construction of augmentation system

The construction of Satellite-Based Augmentation System

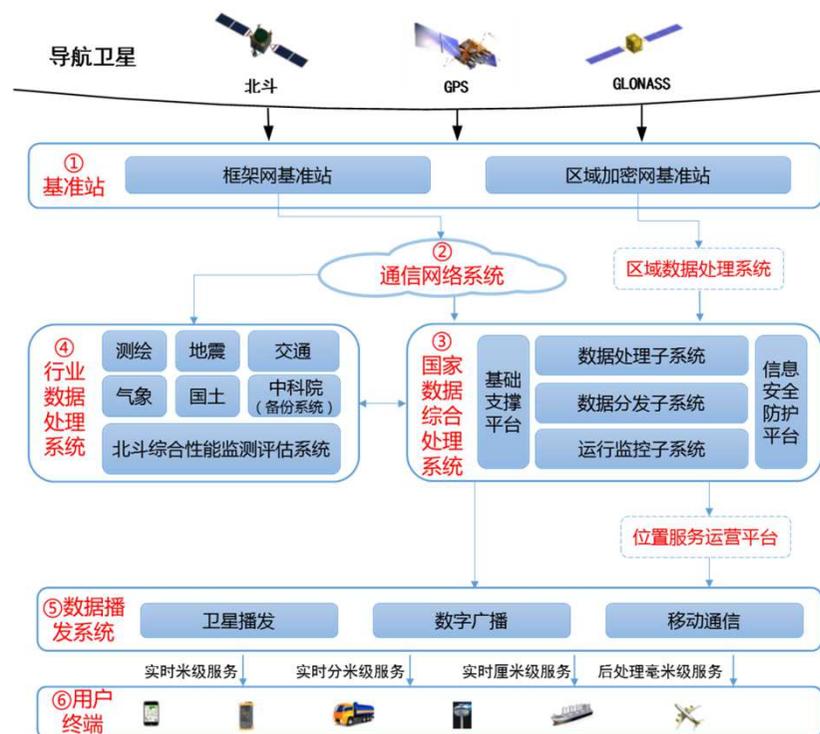
The BeiDou System will comply with the international civil aviation standards, carry out the design, validation and construction of BeiDou Satellite-Based Augmentation System (BDSBAS), and provide CAT-I services to civil aviation users in China and surrounding areas. So far, the Satellite Based Augmentation System Interoperability Working Group (SBAS IWG) has identified the availability of BeiDou System service in the future SBAS network.



System Construction

The construction of Ground-Based Augmentation System

Comply with the principle of “unified plan, unified standard, co-construction and sharing” , integrate the domestic ground based augmentation resources, and build up a high precision service system, which gives priority to the BeiDou System and is also compatible with other systems.



System Construction

The construction of Ground-Based Augmentation System

The R&D and construction of the basic system has been preliminarily completed, while the positioning accuracy is under test, including meter and decimeter level for wide-area real-time services, centimeter level for the areas within Beijing, millimeter level for post-processing services.



Overall layout of National framework network reference stations



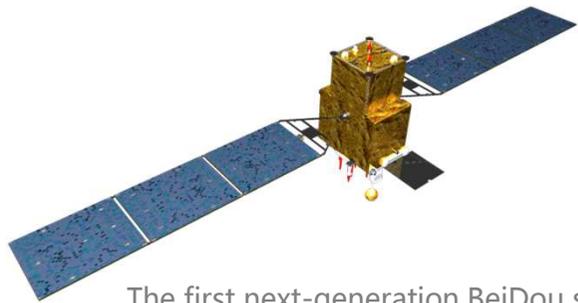
Completed 31 National framework network reference stations



System Construction

3. Steadily carry forward the deployment of global constellation

The first next-generation BeiDou satellite has been successfully launched on March 30th, 2015. The satellite has adopted advanced signal structure, inter-satellite link and other new technologies, and installed on-board clock with higher accuracy, for the interest of improving service capability comprehensively. Right now, the satellite is undergoing in-orbit test as scheduled, and has preliminarily verified the new technology structure and performance specifications, which meet the designed requirements .



The first next-generation BeiDou satellite



1. Industrialization of fundamental Products

Promote the R&D and industrialization of fundamental navigation products with independent IPR in an all-round way, with the core as BDS/GNSS compatible chips.



- the sales volume of BDS/GNSS navigation chip/module has surpassed 6 million pieces
- the sales volume of high-precision surveying boards has surpassed 85, 000 sets, which amounts to 1/3 of the domestic market share
- the sales volume of navigation antenna is approximately 3 million sets
- the sales volume of high-precision antenna is approximately 280, 000 pieces, which amounts to 90% of the domestic market share

Application Promotion

The research and development of next-generation BDS/GNSS chips which integrate baseband with RF has made great breakthroughs, and will meet global users' demands in the mass market, such as smart phones, PAD, wearable equipment, etc.



Smart phones



PAD



Wearable equipment



Application Promotion

2. Industrial/Regional Demonstrative Applications

In view of the significant orientation and fields which have impact on the national welfare, the people's livelihood, and national security, carry out demonstrative applications in selected industries and regions with relevantly large application scales and outstanding marketing prospects.



Totally **750,000 sets** of BeiDou terminals have been promoted and applied.



Application and Popularization

3 . Mass Market Applications



Application and Popularization

4 . Industrial Environment

- **Make research and formulate Some Policies on Promoting Development of BeiDou Satellite Navigation Industry (draft) together with the National Development and Reform Commission, Ministry of Industry and Information Technology, Ministry of Science and Technology, and other institutions.**
- **The National Standard System for BeiDou Satellite (Version 1.0) has been reviewed and formulated. 8 national standards have been applied for approval, 18 standards of BeiDou project will be publicized recently.**

关于促进北斗卫星导航产业
发展的有关政策（草案）

国家北斗卫星导航标准体系（1.0）



International Cooperation

1 . Bilateral Cooperation



Sino-Russia



Sino-U.S.



Sino-EU

Keep coordinating with other navigation satellite systems in the sector of compatibility and interoperability, to jointly provide high quality services for users.



International Cooperation



China -Russia

The Project Committee on China-Russia GNSS cooperation has been founded, the first bilateral round table meeting on GNSS cooperation has been held, the MOU on China-Russia cooperation in the field of satellite navigation has been signed, the on-site survey have been completed including GLONASS ground stations in China and BeiDou ground stations in Russia, and the joint statement on compatibility and interoperability has also been released.



International Cooperation

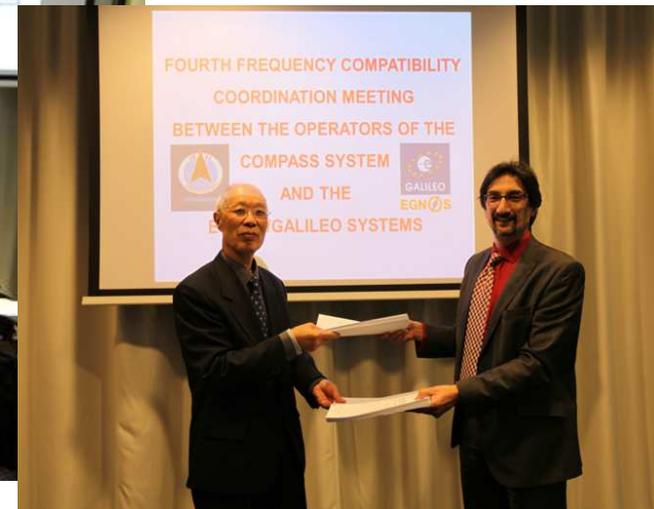


China-U.S.

The first bilateral meeting of China- U.S. civil GNSS cooperation has been held, the cooperation mechanism between BeiDou and GPS has been set up, and the Joint Statement between these two systems have been signed.



International Cooperation



China -EU

The frequency coordination towards navigation frequency channel between BeiDou and Galileo has been completed, and the cooperation mechanism between these systems are under discussion.



International Cooperation

2 . Multilateral Cooperation

Actively undertake international responsibility, promote the compatibility and co-existence among navigation satellite systems.

- **Actively participate in the 9th Meeting of the ICG, IWG, ITU and other GNSS activities organized by the United Nations**
- **Deeply join in the coordination of important subjects, such as the compatibility and interoperability among basic systems and Satellite-Bases Augmentation Systems, service performance parameter, GNSS monitoring and assessment, etc.**

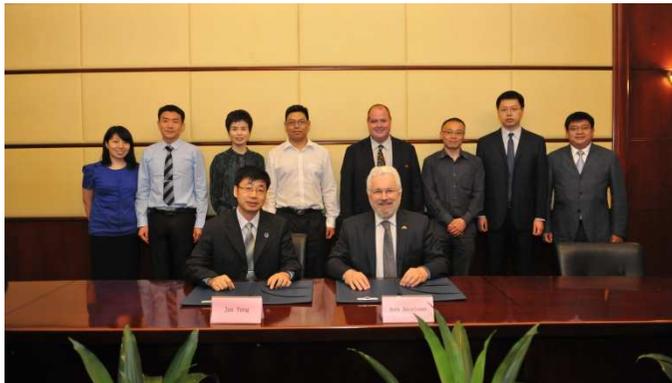


International Cooperation

3 . Applications Cooperation

Advocate integrated applications of multiple systems, push forward the BeiDou services to spread abroad and benefit neighboring countries, and include applying BeiDou System into the national strategic planning of jointly building the Silk Road Economic Belt and 21st-Century Maritime Silk Road, namely "One Belt and One Road".

- Carry out cooperation with Korea, Australia, Indonesia, Pakistan, Thailand , Singapore, the United Arab States, Nigeria, etc.
- Continue to hold BeiDou ASEAN Tour and BeiDou Asia-Pacific Tour, and promote system applications.



Satellite navigation cooperation meeting between China-Australia



Visit Egypt for on-site survey in 2015



BeiDou ASEAN Tour Thailand



International Cooperation

4. International Standardization

Actively propel the recognition of the BeiDou System in international organizations, such as IMO, ICAO and 3GPP.

The Ship-borne BeiDou-based Receivers Performance Standard has been approved by IMO, making the BeiDou System the third navigation satellite system worldwide recognized by IMO.



International Cooperation

Promote the establishment of BeiDou Working Group affiliated to the 104th professional committee of RTCM. 16 technical standards which support positioning function of the BeiDou System have been approved by the 3rd and 4th Generation Partnership Projects.



*National Marine
Electronics Association*



International Cooperation

5. Technical Exchanges

- Encourage academic exchanges, host the China Satellite Navigation Conference, and keep attending other international academic conferences in the field of satellite navigation.
- In the aspect of International Exchange and Training, CSNO has organized three sessions of Master Program majored in satellite navigation, while 44 trainees from 8 countries in the Asia-Pacific and African areas have been recruited. Three sessions of Summer School on Frontier Technology in the field of satellite navigation have successfully organized, and more than 200 trainees have completed their studies.



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System Construction

- 1. Keep improving the continuous stability and service accuracy of the BeiDou System, ensure its regional service performance maintain stable and grow better.**
- 2. Launch another 3-4 next-generation BeiDou satellites in 2015, and steadily accelerate the deployment of next-generation global constellation, to lay foundations for serving the areas along the Silk Road Economic Belt and 21st-Century Maritime Silk Road by 2018.**
- 3. Complete the construction of 150 reference stations for the frame network of BeiDou ground based augmentation system, and 300 reference stations for regional density network before the end of 2015, and broadcast the correction data, with meter/decimeter-level positioning accuracy available to major regions nationwide, centimeter level to density regions, and millimeter level correction data for post-processing services. The regional density network will be established within the whole country before the end of 2018.**



Application Promotion

1. Carry out all-round R&D and industrialization of new generation BDS/GNSS fundamental products, to promote mass market applications amount to ten-million units.
2. Bring GNSS to full play in the integration procedure between industrialization and IT applications, push forward all-scale industrial and regional demonstrative applications.
3. Comprehensively implement industrial policies and action plans on products quality monitoring, standardization and IPR protection. Improve the industry chain of satellite navigation.



International Cooperation

- 1. Publicize the white paper of the BeiDou System and explain its development concepts, policies and opinions.**
- 2. Perfect the cooperation mechanism among GNSS, deeply participate in the tasks under the ICG, ITU, IMO, ICAO, 3GPP and other international organizations, enhance coordination between BeiDou and GPS, GLONASS, Galileo in the field of compatibility and interoperability.**
- 3. Grasp the opportunity of jointly building the “One Belt and One Road” national strategy, promote the international applications of BeiDou/GNSS.**





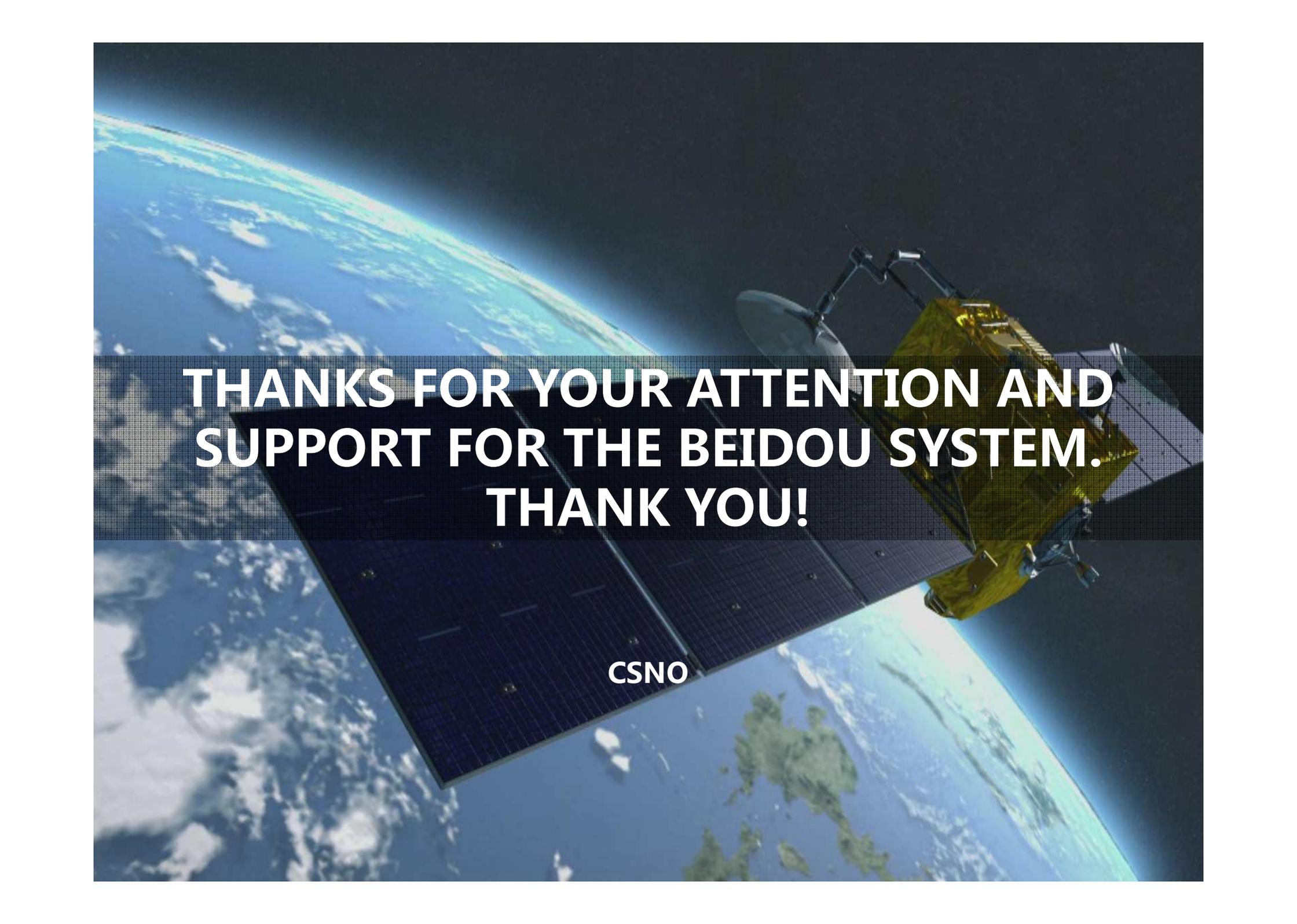
CONCLUSIONS

The BeiDou System has been providing stable services to the Asia-Pacific area, successfully launched the first next-generation BeiDou satellite to verify new technologies, deploy the BeiDou augmentation system from all-round scale, and steadily push forward the construction of BeiDou System.

The BeiDou applications market has been preliminarily fostered, expanding from the typical industries to mass market, and the application industry is under fast development.

The BeiDou system deeply promotes cooperation among GNSS, and keeps strengthening international exchanges. "BeiDou" becomes one of the Chinese brands.



A satellite is shown in orbit above the Earth. The satellite has a yellow body and a large solar panel. The Earth's surface is visible below, showing blue oceans and white clouds. The text "THANKS FOR YOUR ATTENTION AND SUPPORT FOR THE BEIDOU SYSTEM. THANK YOU!" is overlaid in the center of the image.

**THANKS FOR YOUR ATTENTION AND
SUPPORT FOR THE BEIDOU SYSTEM.
THANK YOU!**

CSNO