

Munich Satellite Navigation Summit



Update On BeiDou Navigation Satellite System

China Satellite Navigation Office

March 26th, 2019



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01

System Construction

BDS-3 Overall Progress

- In December 2018, BDS-3 completed the construction of primary system and provide RNSS service worldwide.

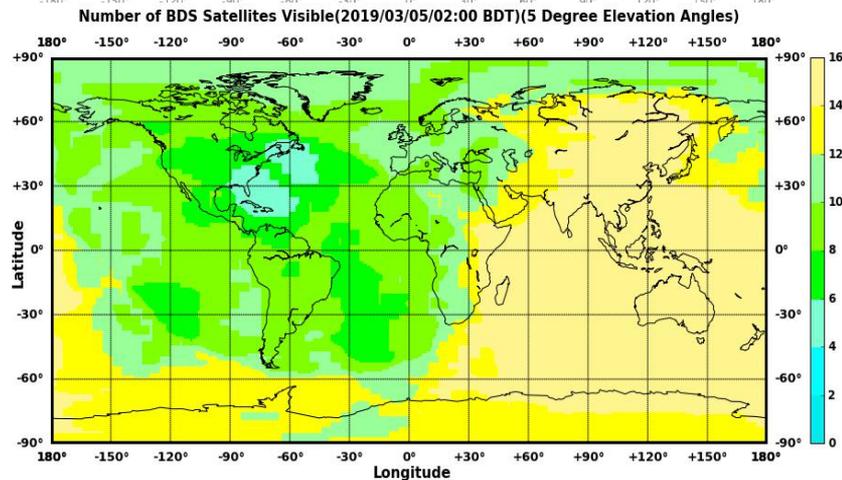
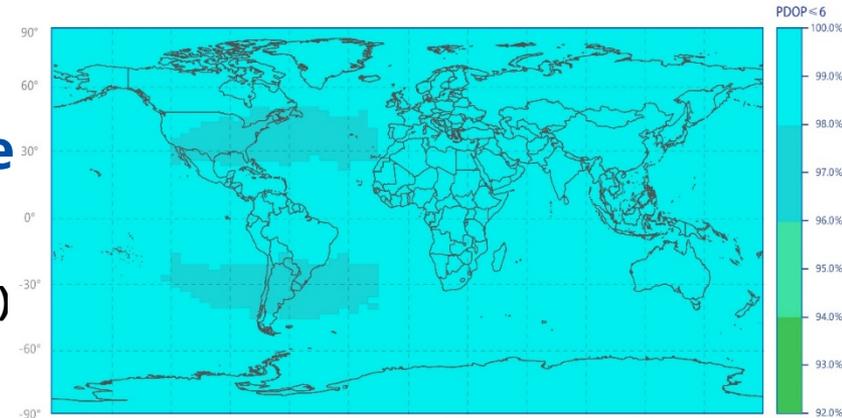
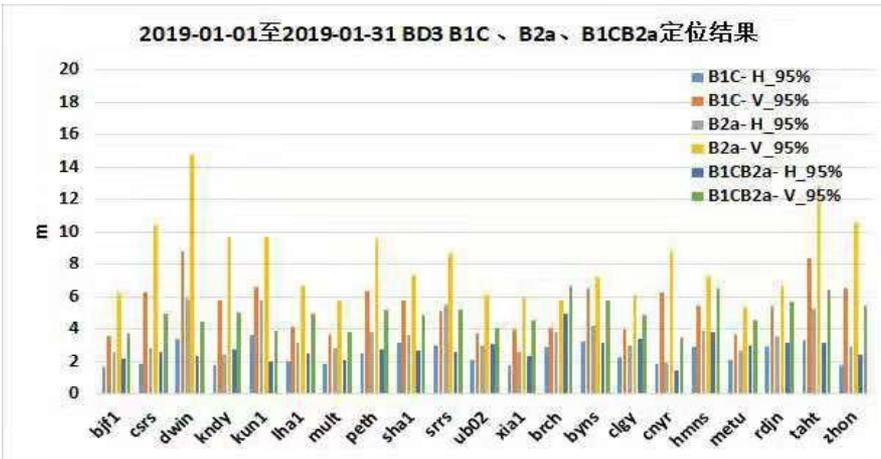
Satellite	Launch Time
First pair MEO	2017.11.05
Second pair MEO	2018.01.12
Third pair MEO	2018.02.11
Fourth pair MEO	2018.03.30
Fifth pair MEO	2018.07.29
Sixth pair MEO	2018.08.25
Seventh pair MEO	2018.09.19
Eighth pair MEO	2018.10.15
First GEO	2018.11.01
Ninth pair MEO	2018.11.19

Service Type		Signal Frequency	Satellite
Basic Navigation Services		B1I, B3I, B1C, B2a	3IGSO+24MEO
		B1I, B3I	3GEO
SBAS		BDSBAS-B1C, BDSBAS-B2a	3GEO
Short Message Communication Service	Reginal	L (Uplink) , S (Downlink)	3GEO
	Global	L (Uplink)	14MEO
		B2b (Downlink)	3IGSO+24MEO
International SAR Service		UHF (Uplink)	6MEO
		B2b (Downlink)	3IGSO+24MEO
Precise Point Positioning		B2b	3GEO



BDS-3 System Service Performance

- ❑ Global service availability: over 95%.
- ❑ Positioning accuracy: 10m(B1C/B2a), 5m(B1I/B3I) in Asia-Pacific region and 8m in the world.
- ❑ Visible satellites in the Asia-Pacific region :15.



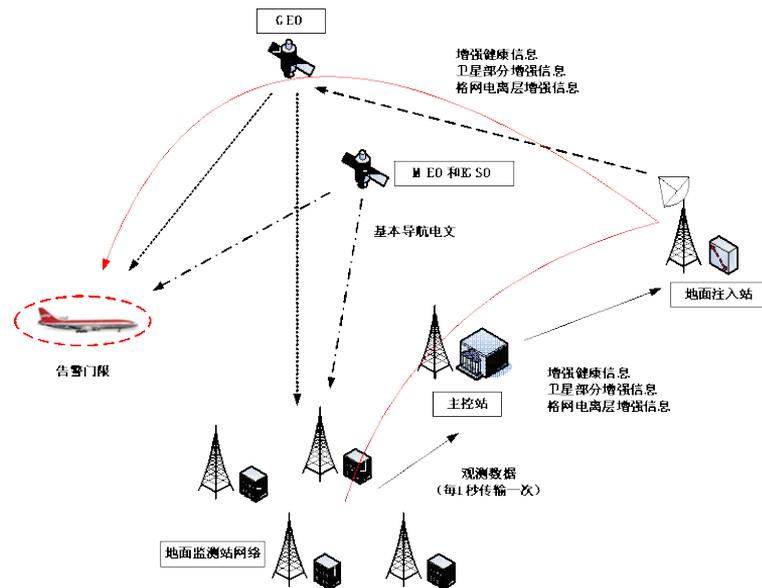
BDS-3 SBAS

Service Planning:

- ❑ Three GEO satellites : 80°E, 110.5°E, 140°E
- ❑ Following the ICAO standards and providing integrity service according to CAT-I precision approach.
- ❑ Servicing China and surrounding areas.

Construction Progress:

A GEO satellite was launched in November 2018, and it is currently undergoing in-orbit testing. It is planned to start the test verification of information transmission in June 2019.



System Construction

BDS-3 Short Message Communication Services (Regional)

Service Planning:

- ❑ Constellation : 3 GEO
- ❑ Two-way links
- ❑ Serve China and surrounding areas
- ❑ System capacity: 10 million times per hour
&14,000 bits per time

Construction Progress:

One GEO satellite has been launched and in-orbit technical tests are under way.

System Construction

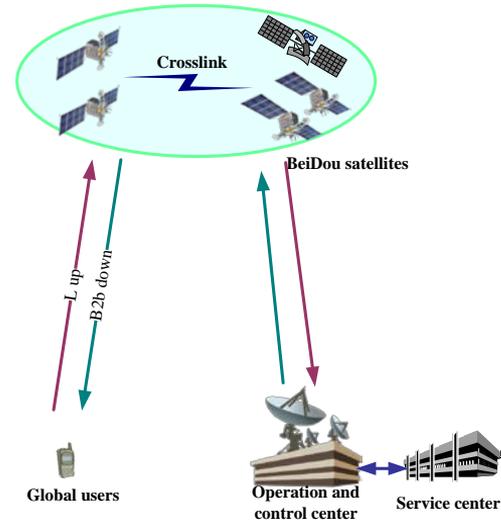
BDS-3 Short Message Communication Services (Global)

Service Planning:

- ❑ Satellite: 14 MEO
- ❑ Two Services: Positioning reporting & Short message communication service
- ❑ System capacity: 200,000 times per hour & 560 bits per time

Construction Progress:

8 MEO satellites have been launched, and in-orbit scientific tests are underway.



System Construction

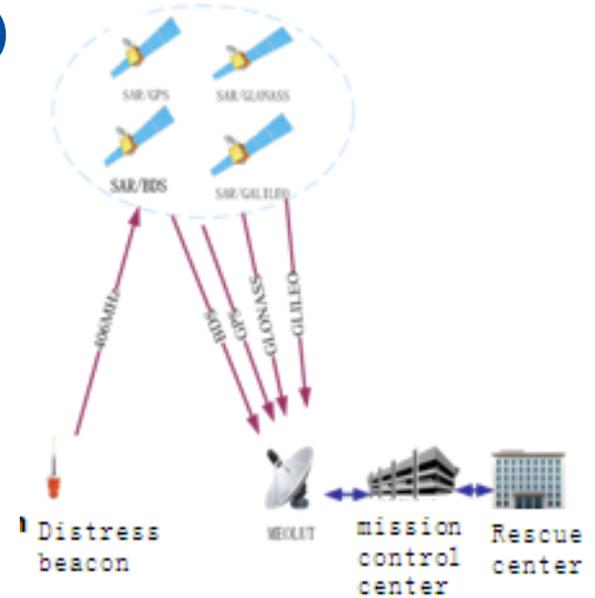
BDS-3 International SAR service (Global)

Service Planning:

- ❑ Will be provided to global users, in accordance with the standards of the IMO and COSPAS/SARSAT.
- ❑ Satellites: 6 MEO
- ❑ Characteristics: provides distress alert services with return link services

Construction Progress:

Two SAR-loaded MEO satellites have been launched, and in-orbit tests are underway. Four SAR payloads will be launched soon.



BDS-3 PPP service

Service Planning:

- ❑ **Satellite: 3 GEO**
- ❑ **Service area: China and surrounding areas**
- ❑ **Broadcast the precise positioning information of multi-GNSS systems**
- ❑ **Positioning Accuracy: low dynamic decimeter level and static centimeter level**

Construction Progress:

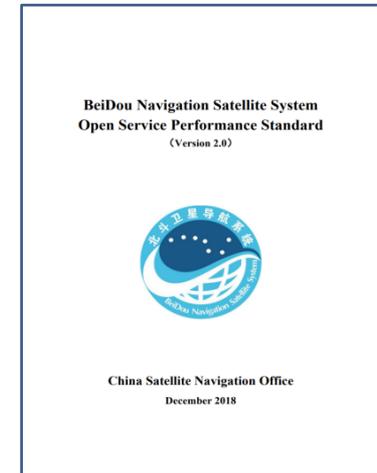
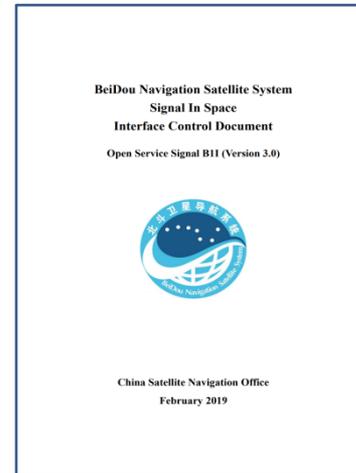
One GEO satellite was launched in November 2018 and is currently undergoing in-orbit tests.

Application Promotion



- ❑ A complete industrial chain
- ❑ The output value in 2018 : 300 billion.

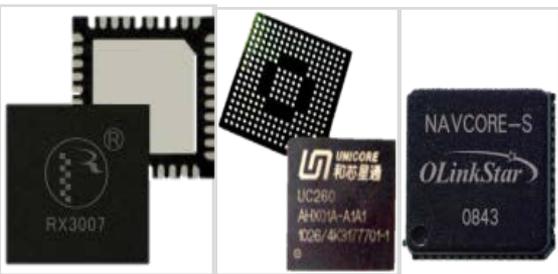
- ❑ Two Open Service Performance Standard
- ❑ Nine BDS SIS ICD



www.beidou.gov.cn

Application Promotion

- ❑ BDS/GNSS chips : in large-scale applications & 28-nanometer category.
- ❑ BDS-enabled navigation chips and modules : 70 million pieces.
- ❑ BDS /GNSS high-precision products : 90 countries and regions.



Application Promotion

- “BDS + Internet and IoT”, from traditional to intelligent
- 《 Application Cases of BeiDou Navigation Satellite System 》



- About **6 million** users for tour buses, class III or above coaches and special road vehicles for dangerous goods.
- **30 thousand** postal and express delivery vehicles covered more than **2 million** kilometers.
- Major accidents and the death toll in the field of road transportation have been decreased by **50%**.

Application Promotion

China Railway Express

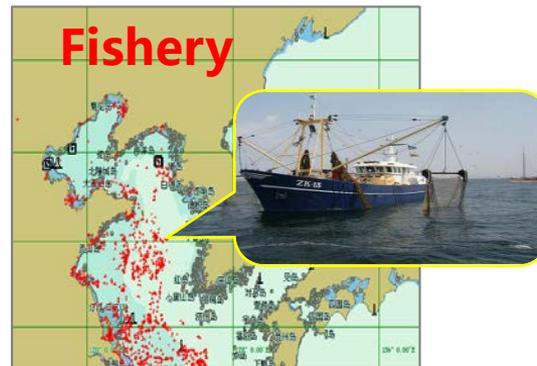


- Whole-process monitoring of containers
- light、 temperature and humidity monitoring
- safety guarantee of cargos and tracking



Precise Agriculture

- Output increases **5%**
- Fuel consumption reduces **10%**



Fishery

- Ship Positioning and Monitoring
- Emergency Rescue
- BDS-enable terminals: in **40** thousand boats.

Bilateral Cooperation

- ❑ China and the United States signed a joint statement on the compatibility and interoperability of the BDS and GPS signals in 2017.
- ❑ In 2018, “the Agreement on Peaceful Use of BDS and GLONASS Between the People’ s Republic of China and the Russian Federation” was signed.
- ❑ The 1st China-Arab BDS Cooperation Forum was held, and the first overseas BDS /GNSS Center was built in Tunisia.



Multilateral Cooperation

- ❑ The Thirteenth Meeting of the ICG in 2018.
- ❑ BDS has officially become an integral part of WWRNS and has acquired the legal status of international maritime applications.
- ❑ BDS acquired the service provider's identification number and the standard time identification identifier.
- ❑ BDS has become a GNSS supported by International Mobile Communication Standards, and 26 international standards on B1I signals have been formulated.

13th Meeting of the International Committee on Global Navigation Satellite Systems



International Cooperation

Academic exchange

Beijing, on May 22nd to 25th, 2019

10 HIGH-END SPECIAL FORUM

- ✓ Application and Industrialization of BeiDou System
- ✓ Policies, Regulations, Standards and Intellectual Properties
- ✓ Co-Development of Satellite Navigation and Mobile Communication
- ✓ Development of BeiDou Industry Parks
- ✓ Innovation of the Integration of Military and Civilian Use of BeiDou System
- ✓ Application and Investment of Satellite Navigation
- ✓ BDS+ Connected Vehicles
- ✓ BDS+ Digital Agriculture
- ✓ BDS+ GF Integration
- ✓ BDS+ Intelligent Winter Olympics

11 ACADEMIC SESSION

- ✓ Satellite Navigation Industry Application
- ✓ Navigation and Location-based Service
- ✓ Satellite Navigation Signal and Signal Processing
- ✓ Satellite Orbit and System Error Handling
- ✓ Space Reference and Precise Positioning Technology
- ✓ Time Primary Standard and Precision Time Service
- ✓ Satellite Navigation Augmentation Technology
- ✓ Test and Assessment Technology
- ✓ User Terminal Technology
- ✓ PNT System and Multi-sensor Fusion Navigation Technology
- ✓ Anti-interference and Anti-Spoofing Technology





第十届中国卫星导航年会

 THE 10th CHINA SATELLITE NAVIGATION CONFERENCE

CSNC 中国·北京

2019 05/22 - 05/25



导航，遇见十年

NAVIGATION, 10 YEARS AND BEYOND

Conclusion

- ❑ **BDS-3 has completed the primary system and provided initial operational RNSS service at better than 10 m level to the world.**
- ❑ **In 2019, BDS-3 will launch 8-10 satellites. In 2020, the constellation will be completed to provide higher performance, more reliable and multiple services to users around the world.**
- ❑ **BDS will make effort with other GNSS providers to enhance the compatibility and sharing of satellite navigation systems, promote technological innovation and continuously improve the performance of satellite navigation services.**

