

# BeiDou Navigation Satellite System (BDS): Status and Development

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June 2019 FIJI

China Satellite Navigation Office





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**01**

**System Construction**

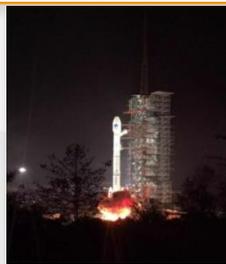


# System Construction BDS enters into global era

A total of 19 BDS-3 satellites have been successfully launched and the BDS preliminary system has been built within a year



**2017.11.5**



**2018.1.12**



**2018.2.12**



**2018.3.30**



**2018.7.29**



**2018.8.25**



**2018.9.19**



**2018.10.15**



**2018.11.1**



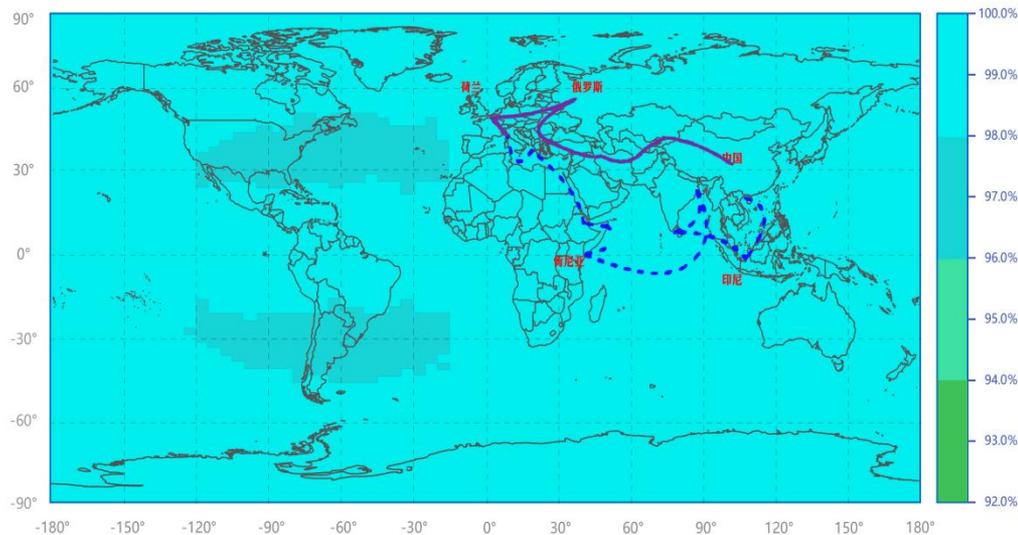
**2018.11.19**



# System Construction

The overall performance of BDS (B1I and B3I signals)

北斗系统服务可用性 (PDOP≤6、高度角5度)

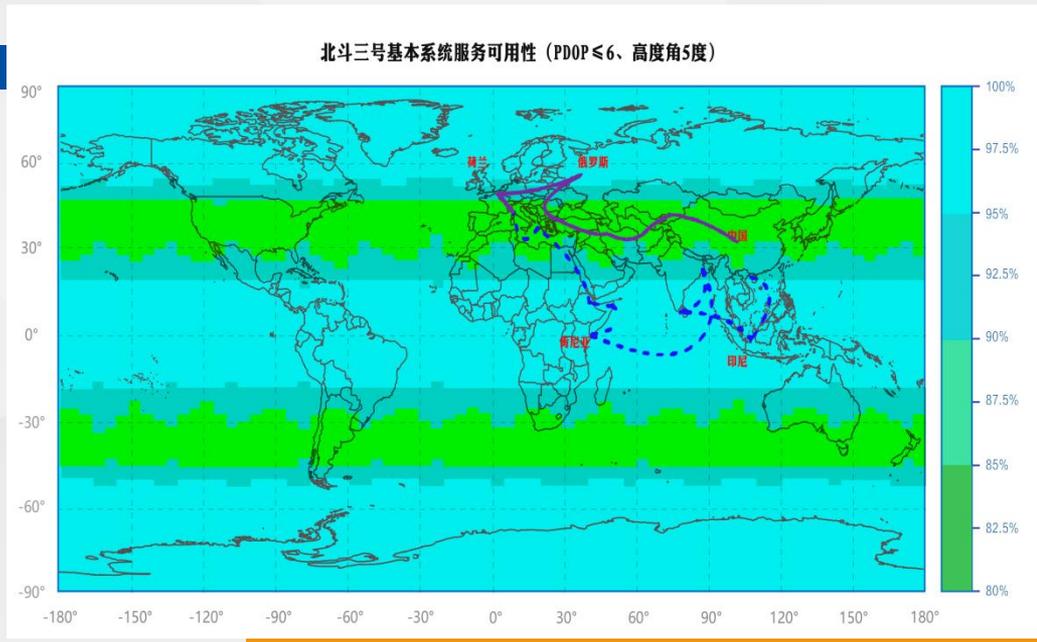


- System service availability can reach over **99%** in most regions worldwide
- Horizontally positioning accuracy is about 3.6m, vertical positioning accuracy is about 6.6m, velocity accuracy is about 0.05m/s and timing accuracy is 9.8ns (95%)
- The service accuracy in Asia-Pacific region has increased by about **30%** and the service availability has increased by about **5%**.



# System Construction

The overall performance of BDS (B1C and B2a signals)



- Had achieved global coverage, the service availability is **over 87%**
- Horizontally positioning accuracy is about 2.4m, vertical positioning accuracy is about 4.3m, velocity accuracy is about 0.06m/s and timing accuracy is 19.9ns (95%)



# System Construction

Follow-up launch plan



6-8 BDS-3 satellites



2-4 BDS-3 satellites



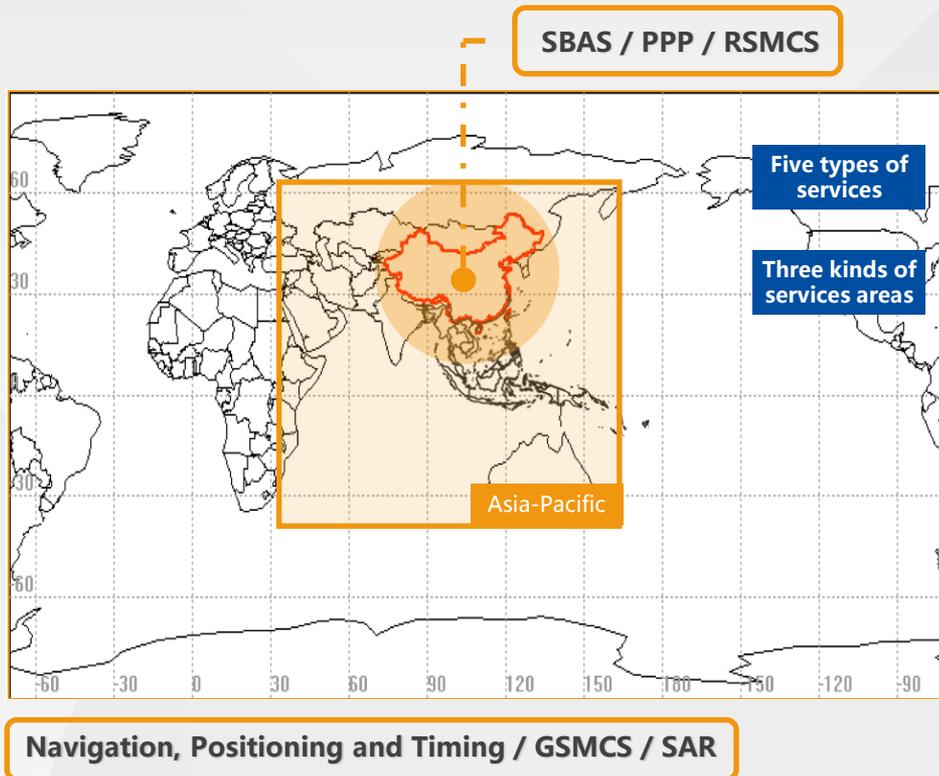
**Possess Full  
Operational Capability**



# System Construction

## Five types of services provided by BDS-3

Type of service		Signal frequency	Satellite
Basic navigation services		B1I, B3I, B1C, B2a	3IGSO+24MEO
		B1I, B3I	3GEO
SBAS		BDSBAS-B1C, BDSBAS-B2a	3GEO
Short-message communication services	Regional	L ( uplink ) S ( downlink )	3GEO
	Global	L ( uplink )	14MEO
		B2b ( downlink )	3IGSO+24MEO
International search and rescue services		UHF ( uplink )	6MEO
		B2b ( downlink )	3IGSO+24MEO
Precise Point Positioning service		B2b	3GEO





# System Construction

Navigation, positioning and timing services





# System Construction

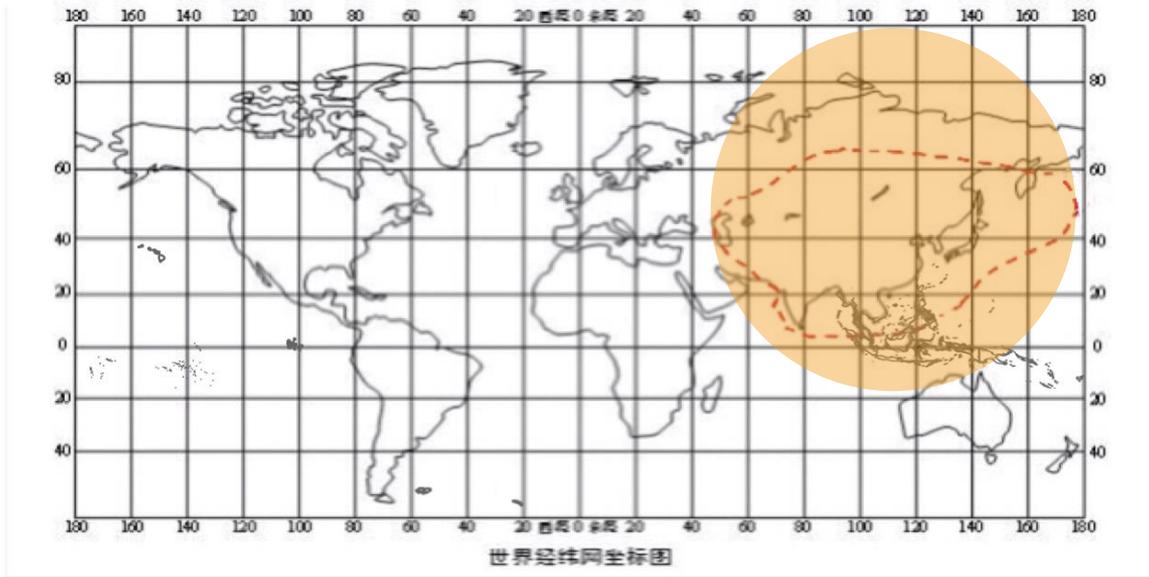
Short-message communication services (regional)

## Service Planning:

-  3 GEO satellites
-  Serve China and the surrounding regions
-  System capacity increased by 10 times

## Construction Development:

1 GEO satellite has been launched and the in-orbit technology experiments are currently being conducted





# System Construction

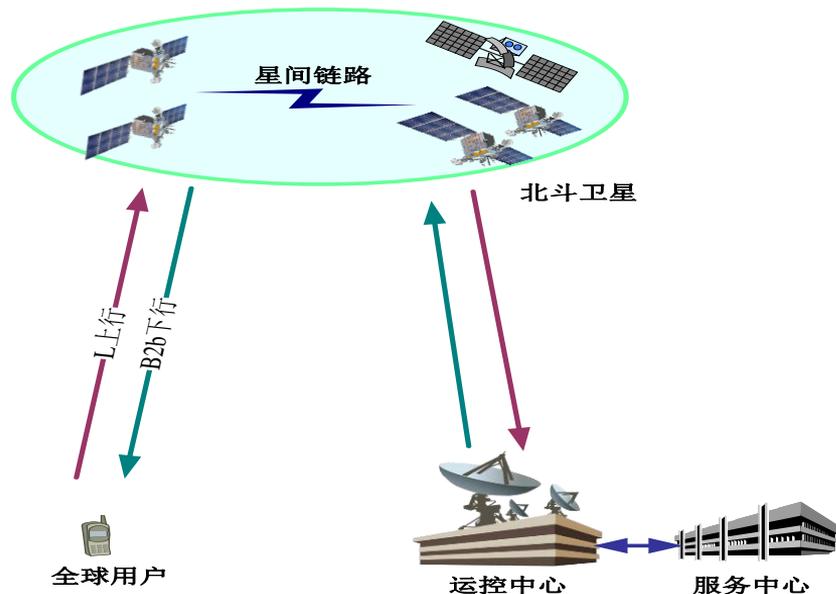
Short-message communication services (global)

## Service Planning:

- 14 MEO satellites
- Global random access
- 40 Chinese characters per message

## Construction Development:

8 MEO satellites with short-message communication function have been launched and the in-orbit technology experiments are currently being conducted





# System Construction

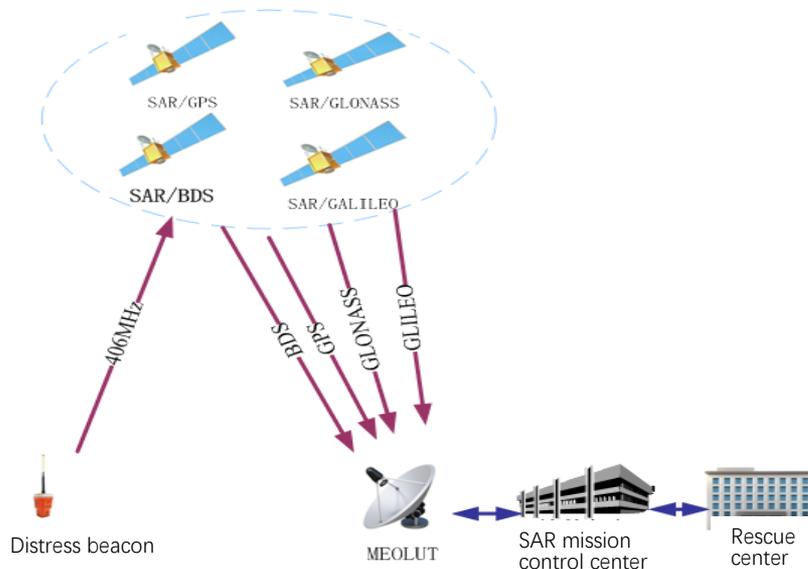
## International search and rescue services

### Service Planning:

- Follow international standards
- 6 MEO satellites with SAR payload
- Return-links

### Construction Development:

4 MEO satellites with SAR payload have been launched and the in-orbit technology experiments are currently being conducted





# System Construction

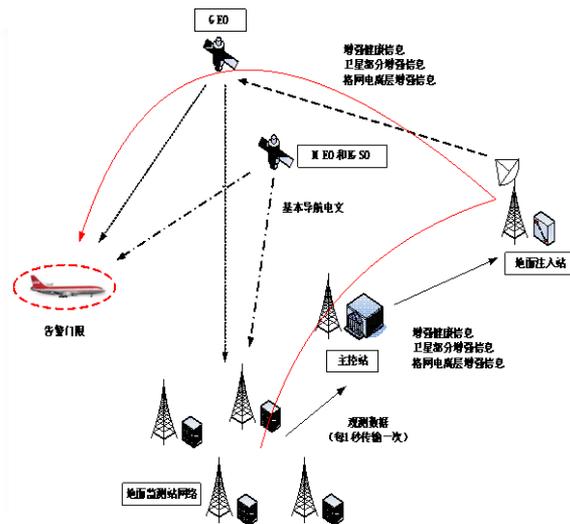
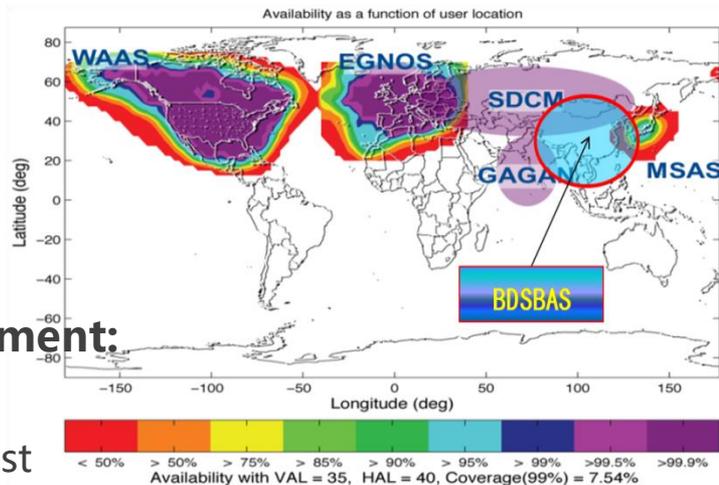
## Satellite-based augmentation services

### Service Planning:

-  3 GEO satellites
-  Follow ICAO standards
-  Serve China and the surrounding regions

### Construction Development:

1 GEO satellite has been launched and the broadcast experiment is planned to be tested in June 2019





# System Construction

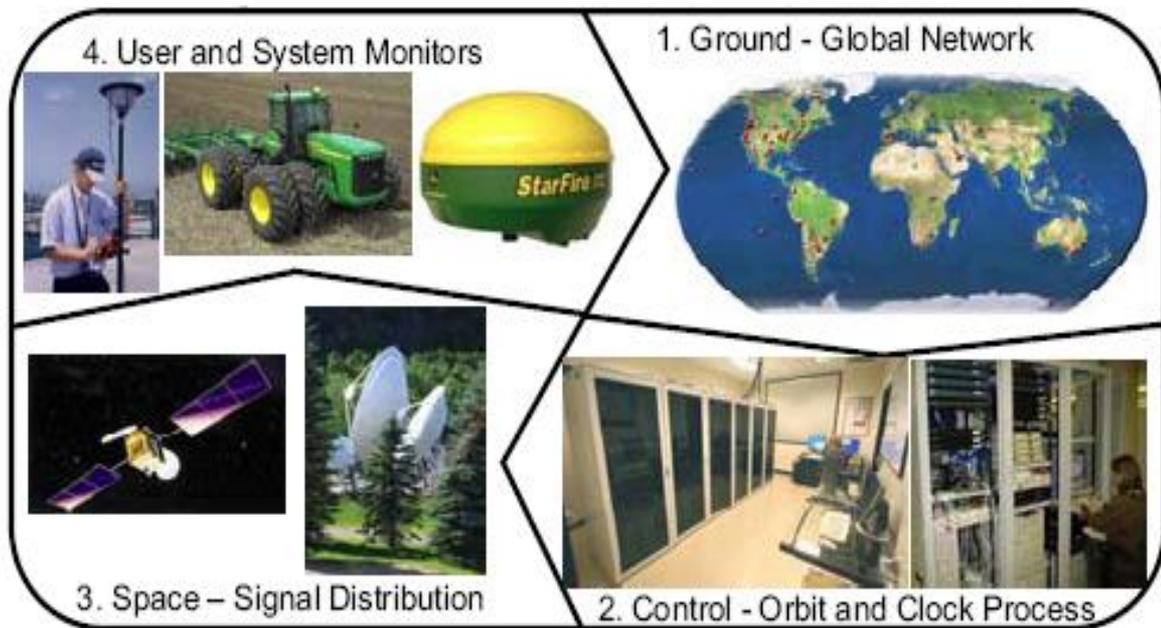
## Precise Point Positioning Service

### Service Planning:

- 3 GEO satellites
- Serve China and the surrounding regions
- Positioning precision: dynamic decimeter-level , static centimeter-level

### Construction Development:

1 GEO satellite has been launched and the in-orbit experiments are currently being conducted

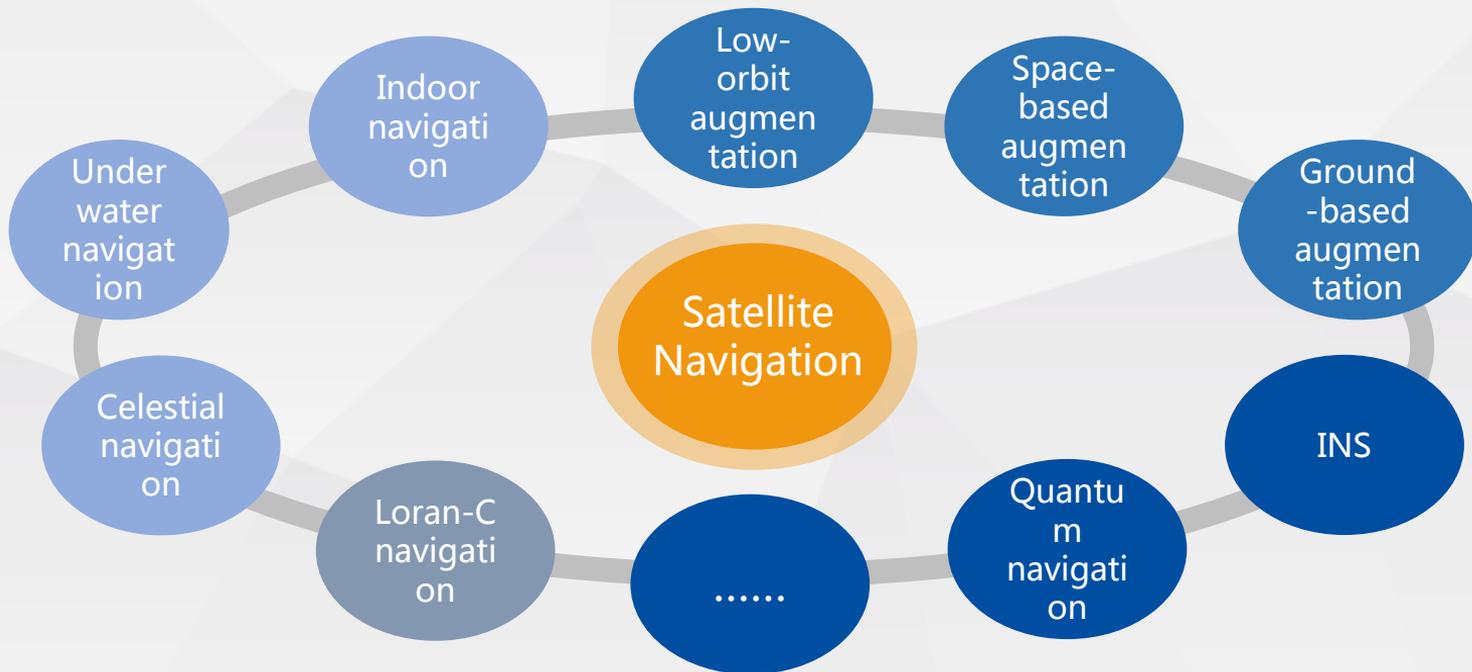




# System Construction

Future development

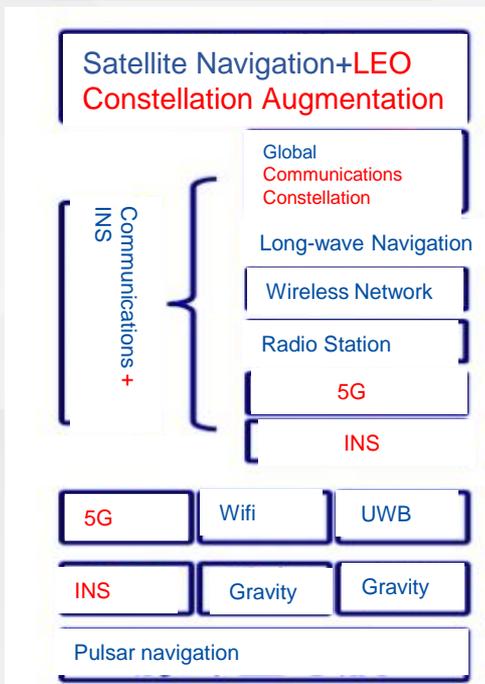
It's expected to be built into a national comprehensive PNT system by 2035





# System Construction PNT system

## PNT System



## PNT System Structure





# Applications Promotion



# Applications Promotion

## BDS Industry



BDS' s  
contribution to  
core industrial  
output value

2018  
RMB

**300+ billion**



2020  
RMB

**400+ billion**



# Applications Promotion

## Fundamental products

The sales of domestically made BDS-enabled chips reached over 80 million, with the domestically made high-precision board chips and antennas being sold to over 100 countries and regions, and accounting for 30% and 90% of the domestic market respectively.





# Applications Promotion

## Industrial and regional applications

BDS-enabled products have been widely used in traffic & transportation, public security, agriculture, forestry and fishing, hydrologic monitoring, weather forecast, communications system, generation dispatch and disaster response & relief, as well as national core infrastructure, which has greatly increased economic and social benefits.





# Applications Promotion

## Applications in traffic and transportation

- The world's largest dynamic monitoring system for operational vehicles has been built
- 6.2 million operational vehicles
- 30,000 postal and delivery vehicles
- 80,000 buses
- Over 3200 inland waterway navigation facilities
- Over 2900 marine navigation facilities

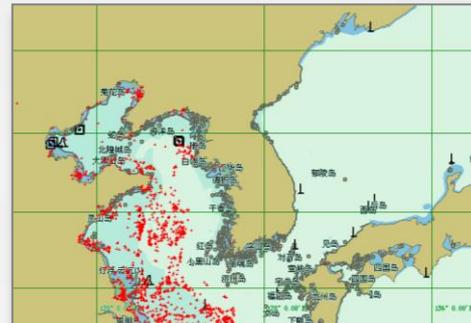




# Applications Promotion

## Applications in agriculture, forestry and fishing

-  Serve over 50,000 agricultural equipment
-  Precision farming output has increased by 5%
-  Income growth of RMB 60-90 per Mu per peasant household
-  Positioning & short-message communication function help prevent forest fires
-  Over 70,000 networked boats
-  Has rescued over 10,000 people

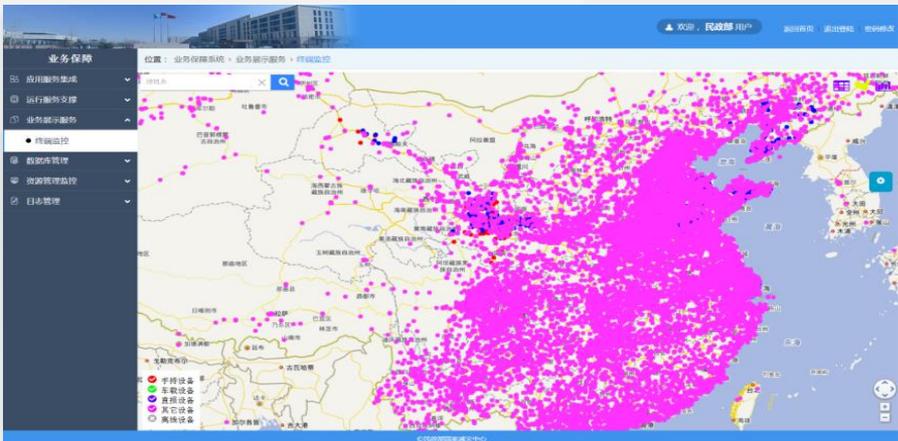




# Applications Promotion

## Applications in disaster response and relief

- 6 levels of business applications
- Over 45,000 BDS terminals have been promoted
- Relevant disaster response information has been reported
- Disaster relief materials management has been improved





# Applications Promotion

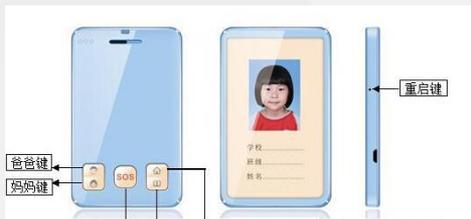
## Mass market applications





# Applications Promotion

## Mass market applications





# Application and Promotion

## International applications

- Land rights confirmation in Indonesia
- Building construction deformation monitoring in Kuwait
- Homeland surveying and mapping in Uganda
- Agriculture in Myanmar
- Marine piling in Maldives
- Construction piling in Singapore
- Land rights confirmation in Laos
- UAVs in Cambodia
- Postal services and ecommerce in Uganda
- Information rescue system time service in Pakistan's airports
- Electricity patrolling and checking in Russia



The background features a complex geometric pattern of overlapping triangles in various shades of light gray and white. A large, bold, blue '03' is centered on the page. A semi-transparent white horizontal bar is positioned behind the text 'International Cooperation'.

# **03**

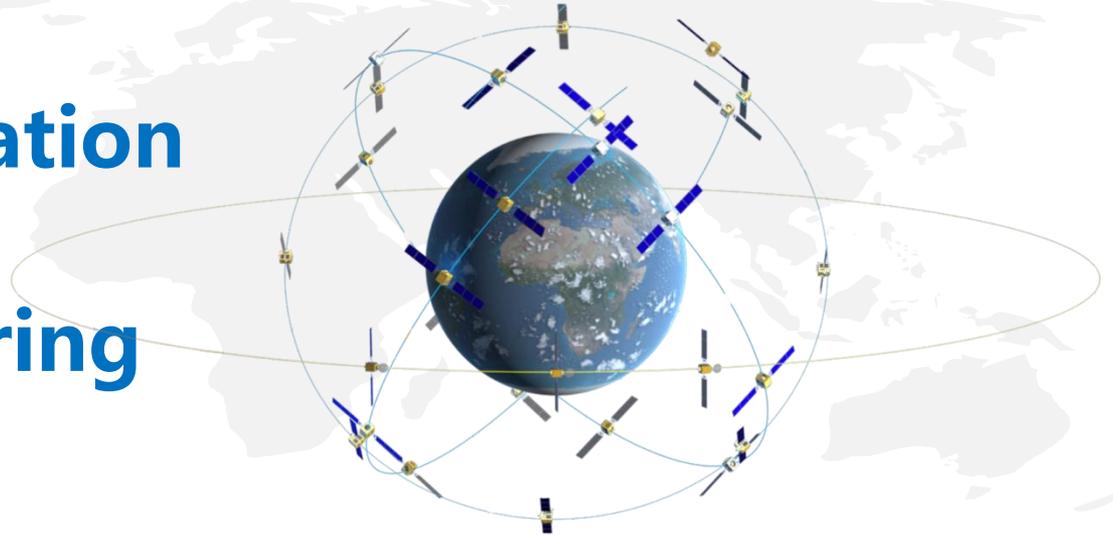
## **International Cooperation**



# International Cooperation

**Open Cooperation**

**Resource Sharing**





# International Cooperation

The ICG-13 Meeting has been successfully held

## 13<sup>th</sup> Meeting of the International Committee on Global Navigation Satellite Systems





# International Cooperation

## China-Russia Cooperation





# International Cooperation

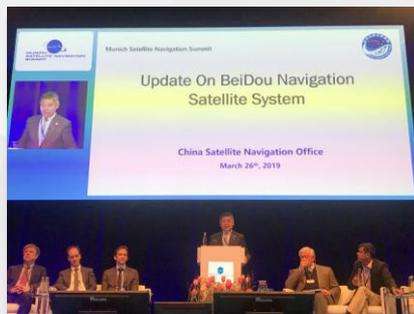
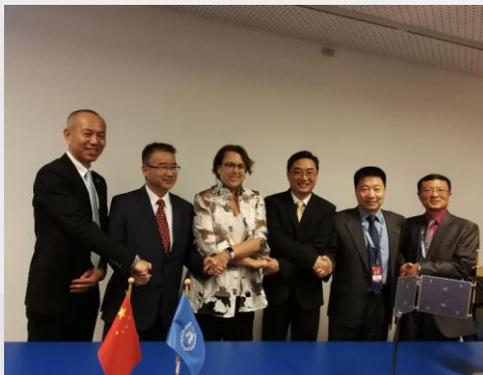
## China-Arab States BDS Cooperation





# International Cooperation

## International conferences





# International Cooperation

## International standards



国际民航组织

COSPAS-SARSAT.INT  
INTERNATIONAL SATELLITE SYSTEM FOR SEARCH AND RESCUE  
406<sup>TM</sup> DISTRESS ALERTING SERVICE



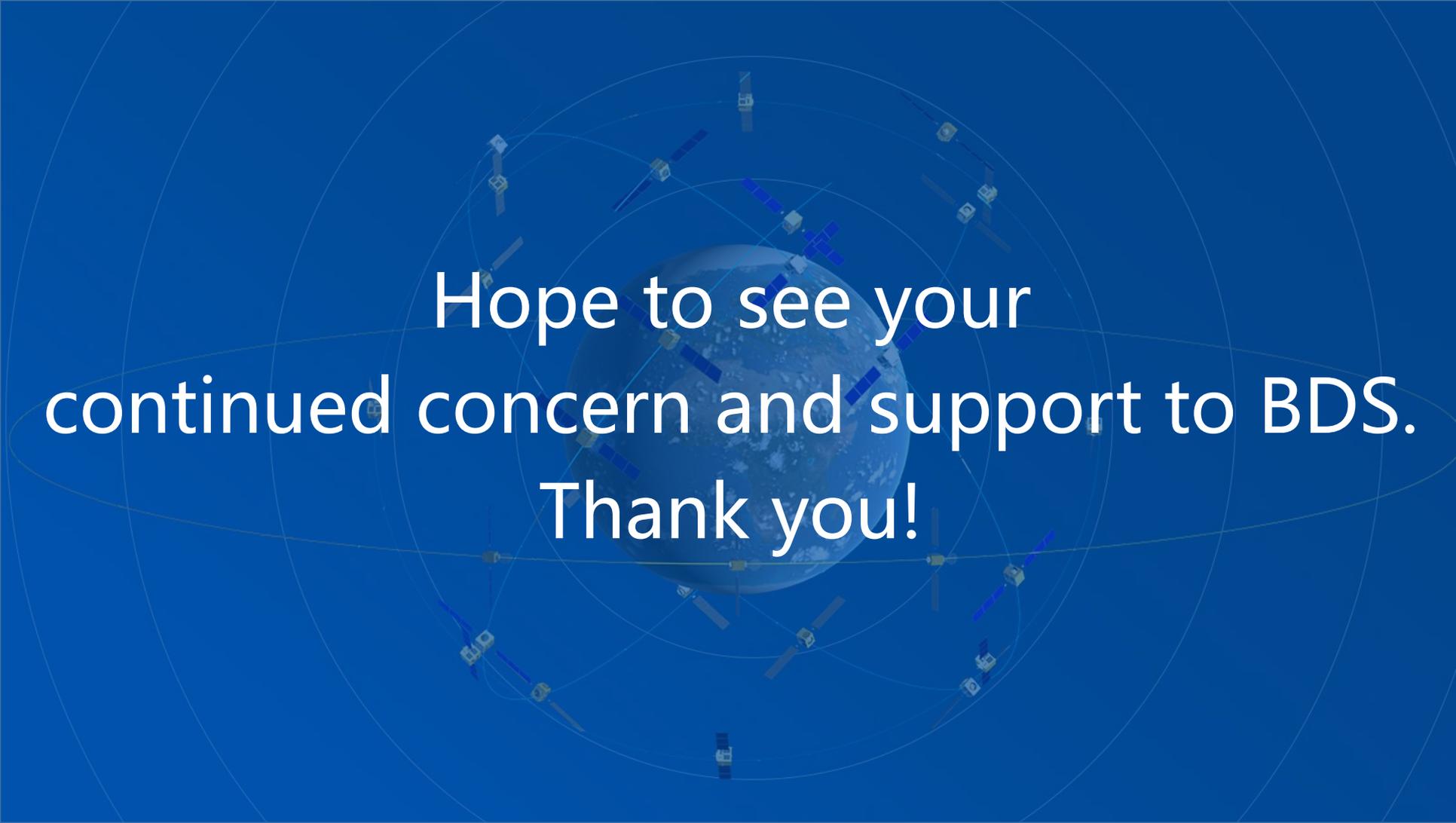
International  
Electrotechnical  
Commission

# Conclusion

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## Looking back on the past decade and looking into the new journey!

During the last decade, BDS went global successfully, developed from struggling to keep up with its peers to matching its peers. In the next decade, BDS will play a more active role in serving mankind and the world and keep contributing wisdom and strength to the world with its stronger abilities and better-quality services.



Hope to see your  
continued concern and support to BDS.  
Thank you!