

**CHINA SATELLITE NAVIGATION OFFICE**

**The 6th meeting of International Committee on GNSS**



# **Development of BeiDou Navigation Satellite System**

**China Satellite Navigation Office**

**September 2011**



# Contents

## 1. Brief Introduction

## 2. System Progress

## 3. International Cooperation

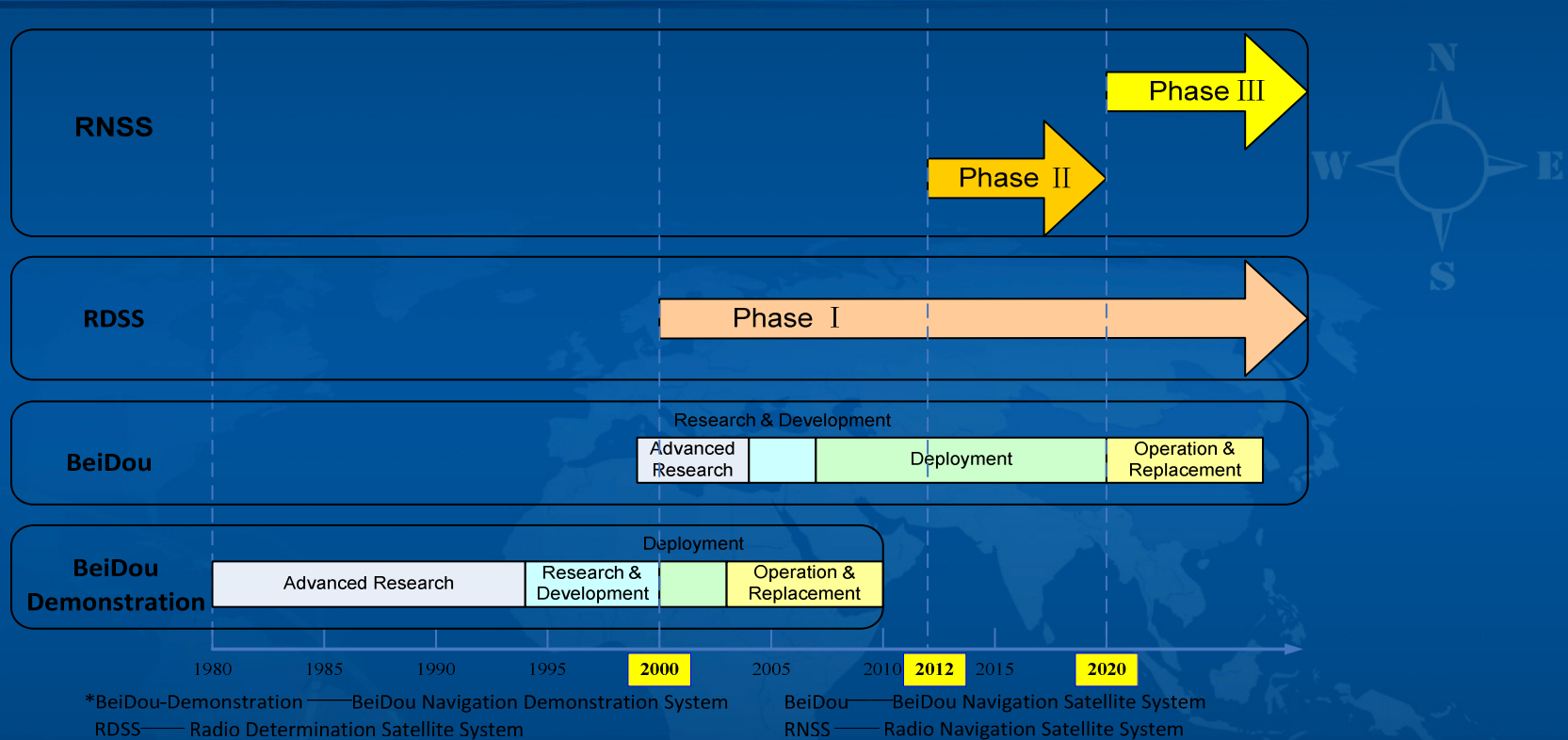
## 4. Conclusion



北斗



# (1) Development Roadmap



**PHASE I:** Provided RDSS from 2000;

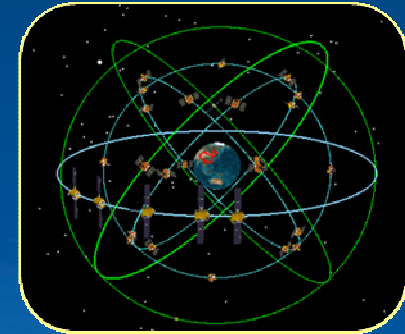
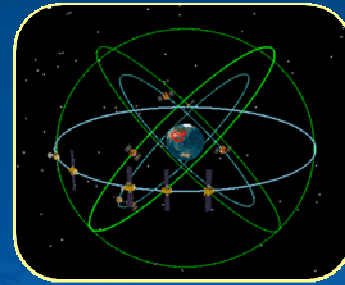
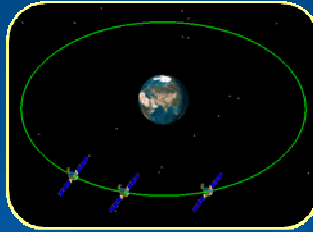
**PHASE II:** To provide RNSS for users in China and its surrounding areas, and RDSS with broader coverage from 2012;

**PHASE III:** To provide RNSS with global coverage and also upgraded RDSS from 2020;



# (2) System Description

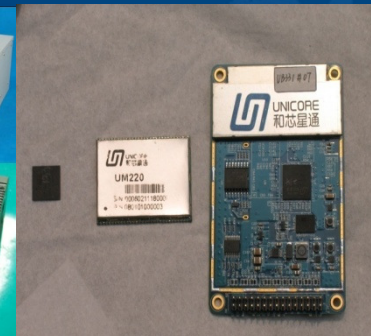
## ◆ Space Constellation



## ◆ Ground Control Segment



## ◆ User Terminals



北斗



### (3) Services and Performance

The system can provide four types of services, including authorized service, open service, wide range differential service and position report service.

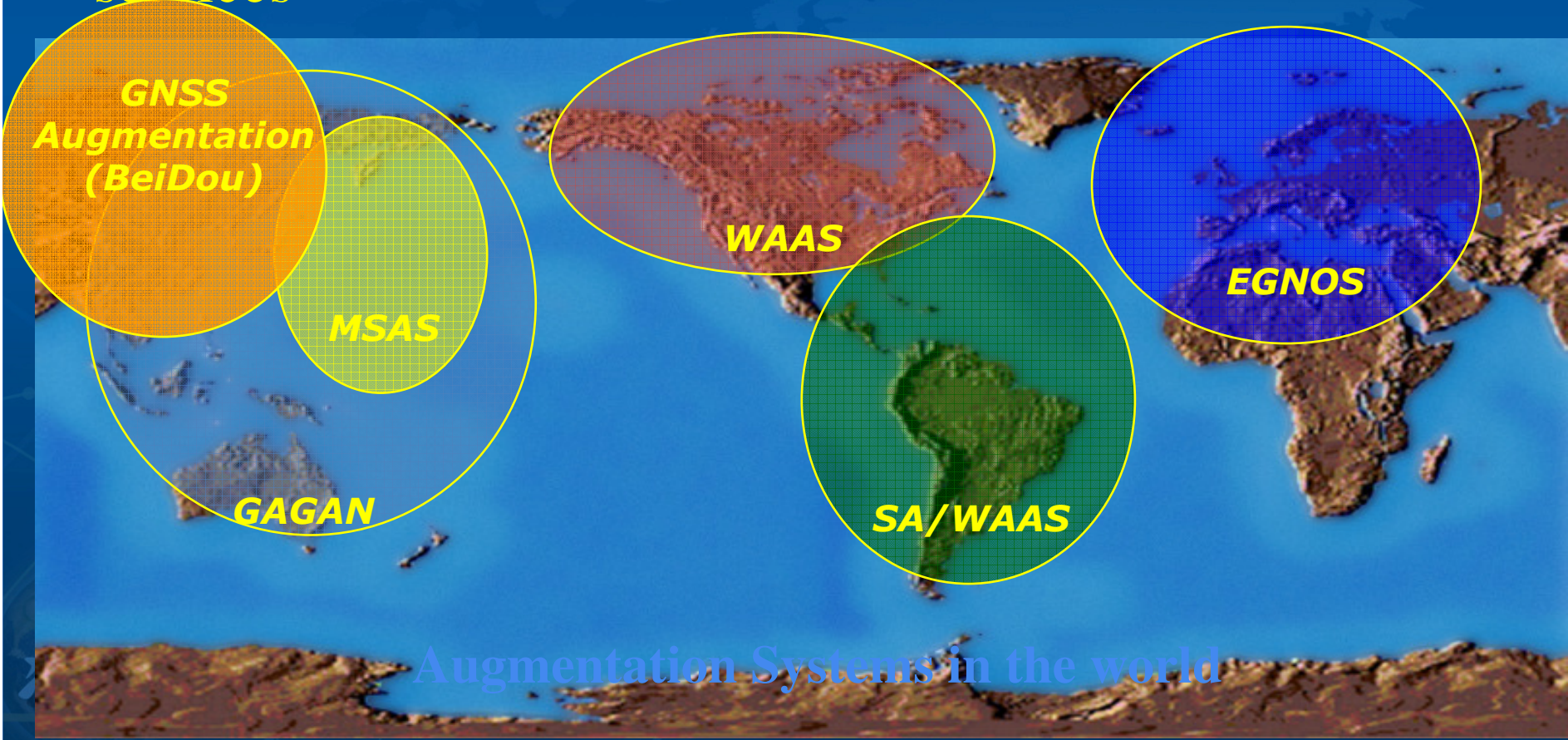




# (3) Services and Performance

◆ Two kinds of regional services

Wide area differential service:  
Positioning accuracy: 1 m  
Short message service





## (4) Time and Coordinate System

- BeiDou time (BDT) is identical to UTC
- The definition of China's Geodetic Coordinate System 2000 (CGCS2000) is identical to ITRS
- Both BDT and CGCS2000 keep improving



北斗



# Contents

**1. Brief Introduction**

**2. System Progress**

**3. International Cooperation**

**4. Conclusion**



北斗

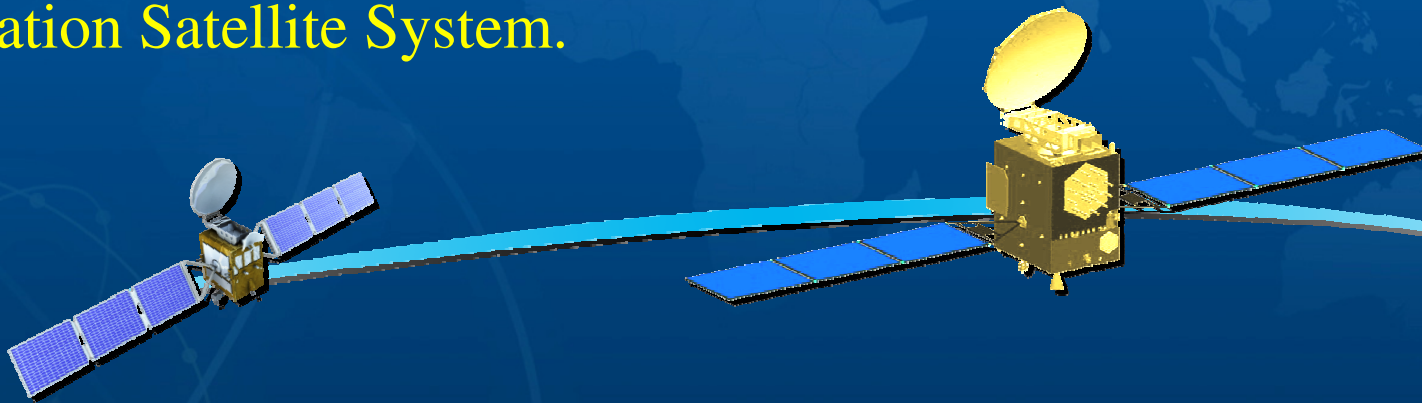




# (1) System Progress

## ◆ Transition from BeiDou Navigation Satellite Demonstration System to BeiDou Navigation Satellite System

In 2010, BeiDou navigation Demonstration satellites were replaced by BeiDou navigation satellites, while BeiDou Navigation Satellite Demonstration System was seamlessly transferred to BeiDou Navigation Satellite System.



北斗



# (1) System Progress

## Launch record of BeiDou navigation satellites

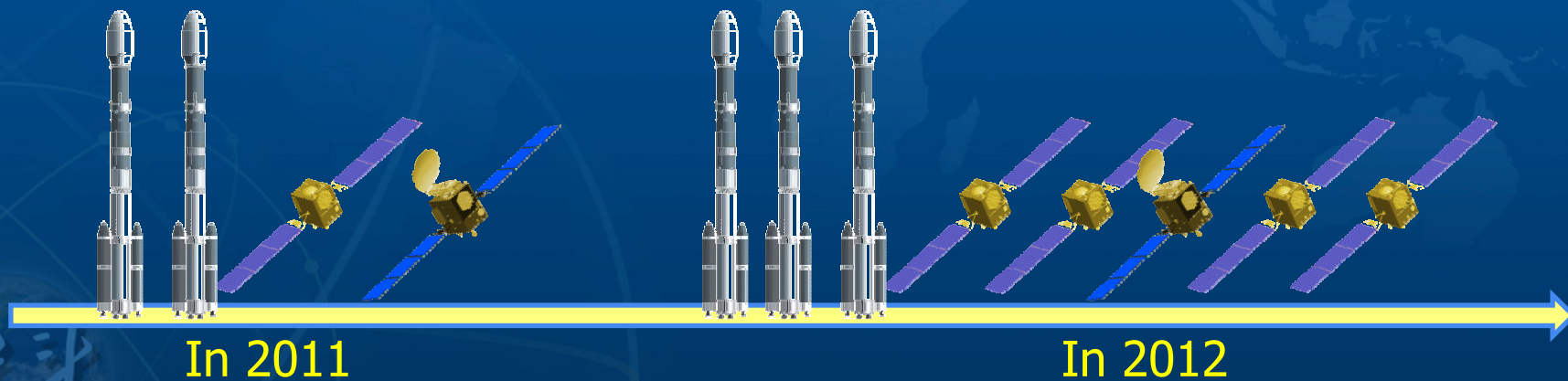
Date	Type	Launch Site	Launch Vehicle	Satellite Platform	Orbit
2007.04.14	MEO	Xichang	CZ-3A	DFH-3	~21,500km
2009.04.15	GEO	Xichang	CZ-3C	DFH-3	In-orbit maintenance
2010.01.17	GEO	Xichang	CZ-3C	DFH-3	144.5°E
2010.06.02	GEO	Xichang	CZ-3C	DFH-3	84°E
2010.08.01	IGSO	Xichang	CZ-3A	DFH-3	Intersection node:118°E
<i>2010.11.01</i>	<i>GEO</i>	<i>Xichang</i>	<i>CZ-3C</i>	<i>DFH-3</i>	<i>160°E</i>
<i>2010.12.18</i>	<i>IGSO</i>	<i>Xichang</i>	<i>CZ-3A</i>	<i>DFH-3</i>	<i>Intersection node:118°E</i>
<i>2011.04.10</i>	<i>IGSO</i>	<i>Xichang</i>	<i>CZ-3A</i>	<i>DFH-3</i>	<i>Intersection node:118°E</i>
<i>2011.07.27</i>	<i>IGSO</i>	<i>Xichang</i>	<i>CZ-3A</i>	<i>DFH-3</i>	<i>Intersection node:95°E</i>



# (1) System Progress

## Satellite Launch Plan:

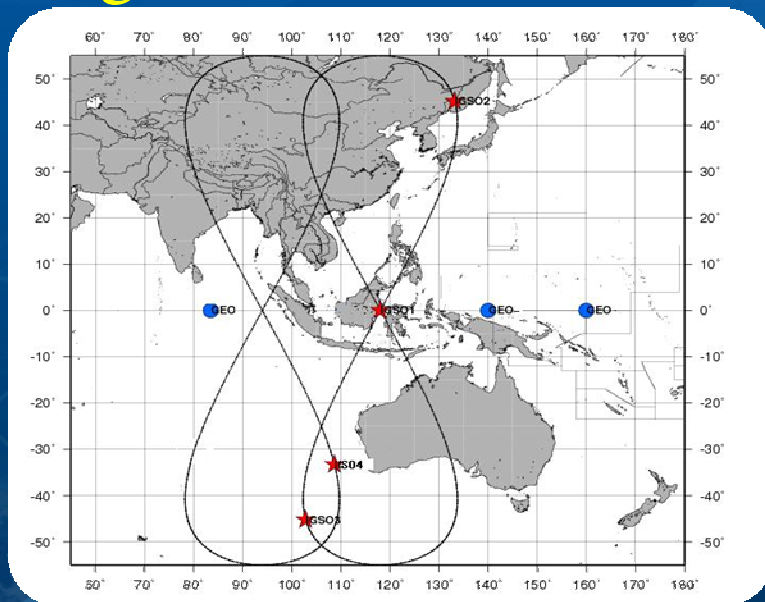
- ◆ Two more BeiDou navigation Satellites will be launched in 2011;
- ◆ Five more BeiDou navigation Satellites will be launched in 2012.



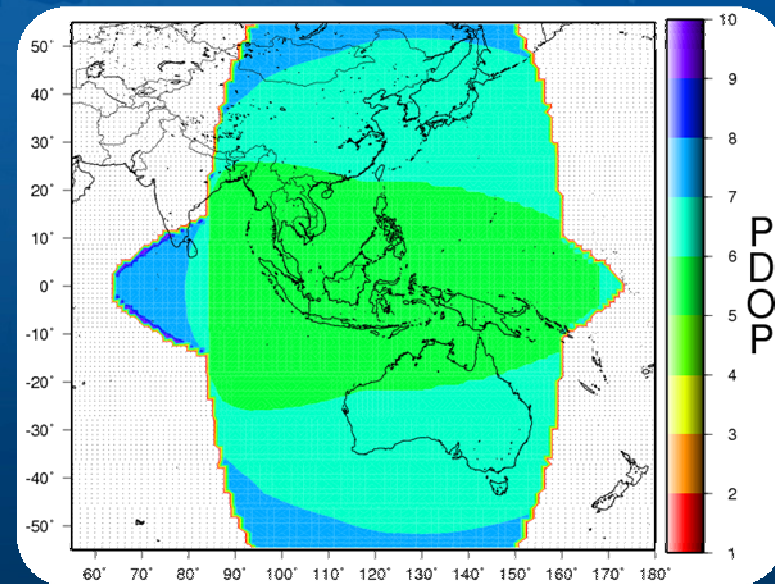


## (2) Initial Operational Capability

- A simple navigation constellation consisted of 9 satellites has been established. Preliminary test will be completed by October 2011, enabling the system to provide initial operational services in the Asia-Pacific region.



Space Constellation

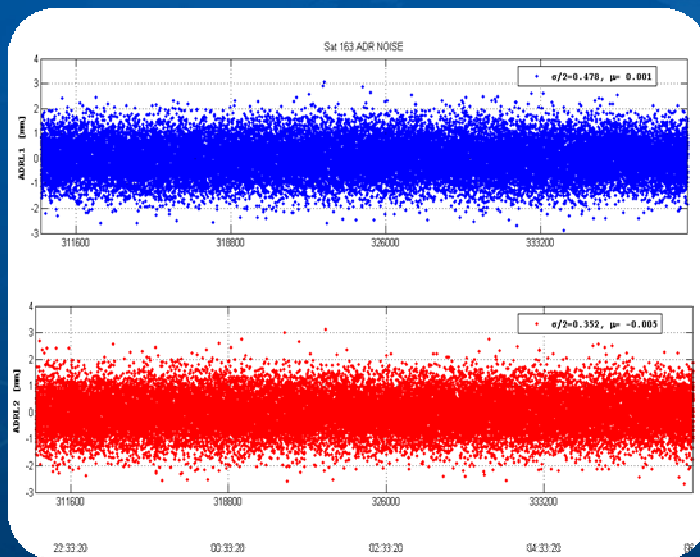


PDOP

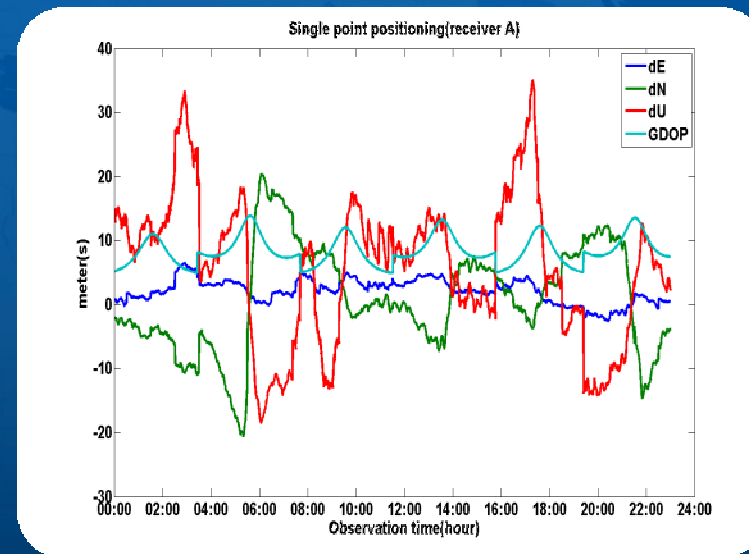


## (2) Initial Operational Capability

- Integrated test of the system has been completed, which verified the coordination of satellite constellation, ground control segment and user terminals, and tested the precision of system services.



北斗 Pseudo Range Precision

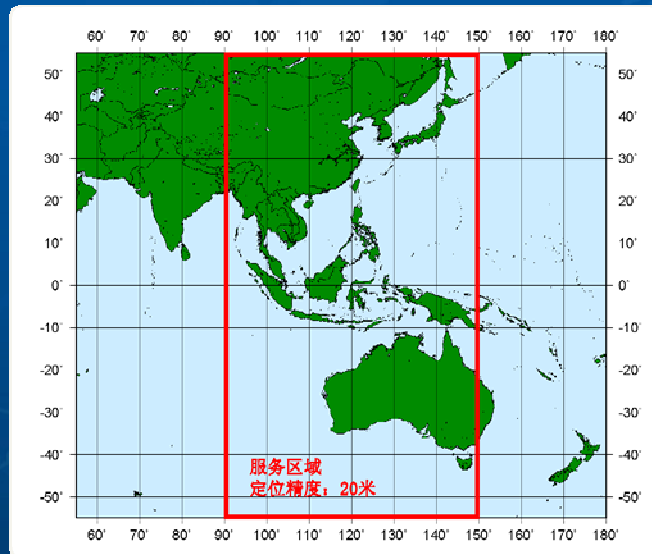


Positioning Result

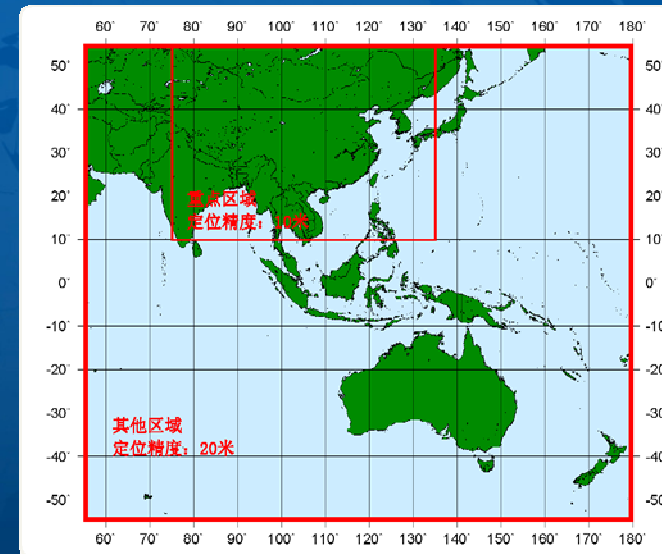


## (2) Initial Operational Capability

- BeiDou will gradually expand its service area, steadily improve performance, so as to provide services for uses in a broader region.



Coverage area in 2011

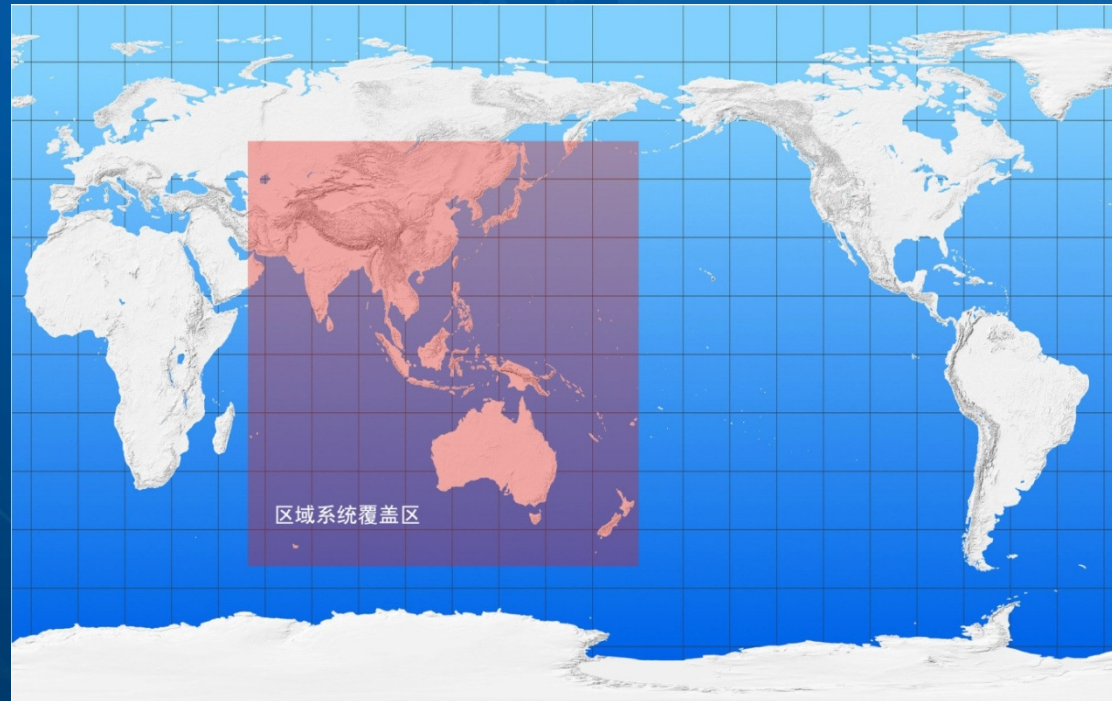


Coverage area in 2012



## (2) Initial Operational Capability

- Domestic users can evaluate the system performance through pilot operation. China has already promoted the demonstration of application programs in Asia-Pacific area.



Area of demonstration of application



## (3) System Applications

BeiDou Navigation Satellite Demonstration System has been widely used in transportation, marine fishery, hydrological monitoring, meteorological forecasting, forestry fire prevention, telecommunication and timing, power dispatching and disaster mitigation and relief.

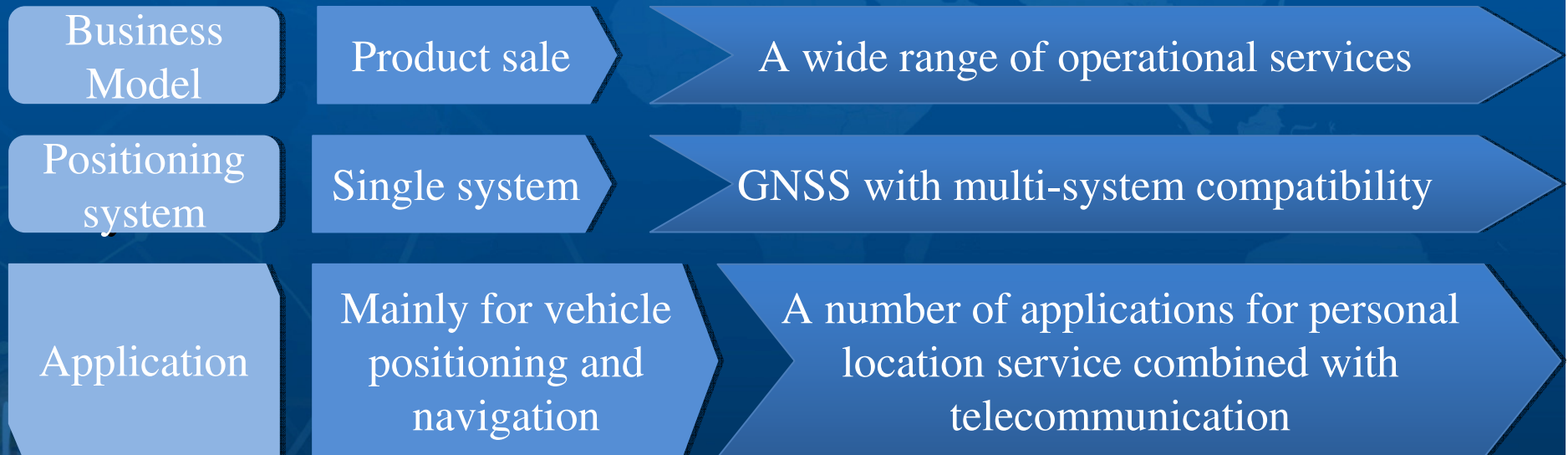






## (3) System Applications

BeiDou Navigation Satellite System will strengthen its application among different industries, build up an integrated BeiDou application system, promote the development of positioning service market.





## (3) System Applications

BeiDou will gradually extend from China to the Asia-Pacific region, and further extend to all over the world by 2020.





## (4) System Services

- ◆ BeiDou Navigation Satellite system will provide high quality open service free of charge for worldwide users;
- ◆ The system will initially provide regional services by the end of 2012, which can satisfy the requirements of users in Asia-Pacific area; it will also continue improving system performance, and provide high quality service for users worldwide;
- ◆ We are planning to publish ICD document (V1.0) in October 2011, and actively promote R&D of BeiDou products and the development of application services.



# Contents

**1. Brief Introduction**

**2. System Progress**

**3. International Cooperation**

**4. Summary**



北斗



# (1) Principle

Adhering to the policy of opening up to the outside world

Engaged in international exchange and cooperation in space field

Supporting all activities that utilize outer space for peaceful purposes

Strengthening cooperation with other countries based on equality, mutual benefit, peaceful utilization of outer space and common development

Conducting phased, focused, non-discriminatory and selective approach





## (2) Policy Structure

i. Publish blue paper of BeiDou Navigation Satellite System – Update the Development of BeiDou Navigation Satellite System every half a year;





## (2) Policy Structure

ii. Actively promoting monitoring and evaluation of GNSS performance, support application demonstration of multi-GNSS, and improve the service performance of GNSS;

iii. Dedicated to realize compatibility and interoperability with other satellite navigation systems, and provide better services for global users;

iv. Integrated into international standards of civil aviation, maritime, etc., enabling the system to serve global users better.



## (3) Main Activities

### i. Activities related to ICG

Organized the Working Group B Interim Meeting of ICG-6 in Shanghai in May 2011;  
Attended the meetings of the ICG.







```
ERROR: undefined
OFFENDING COMMAND: ~
STACK:
```