



The BDS-3 Featured Services

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

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China Satellite Navigation Project Center

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Overview

- ❑ Initial services at the end of 2018
- ❑ Full services in 2020
- ❑ Basic services: RNSS, SBAS
- ❑ Featured services:

I . SAR(International search and rescue) service

II . SMC(Short message communication) service

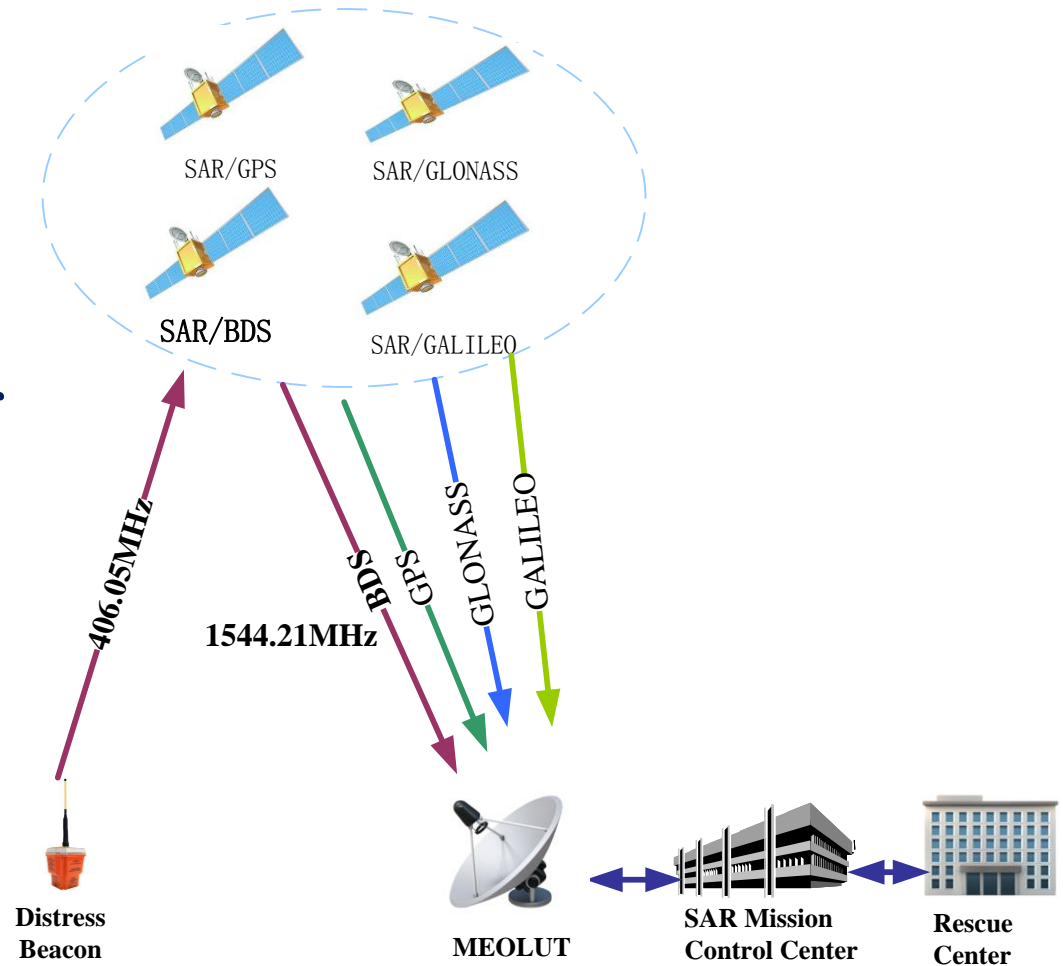
RSMC(Regional SMC)

GSMC(Global SMC)

III . PPP(Precise point positioning) service

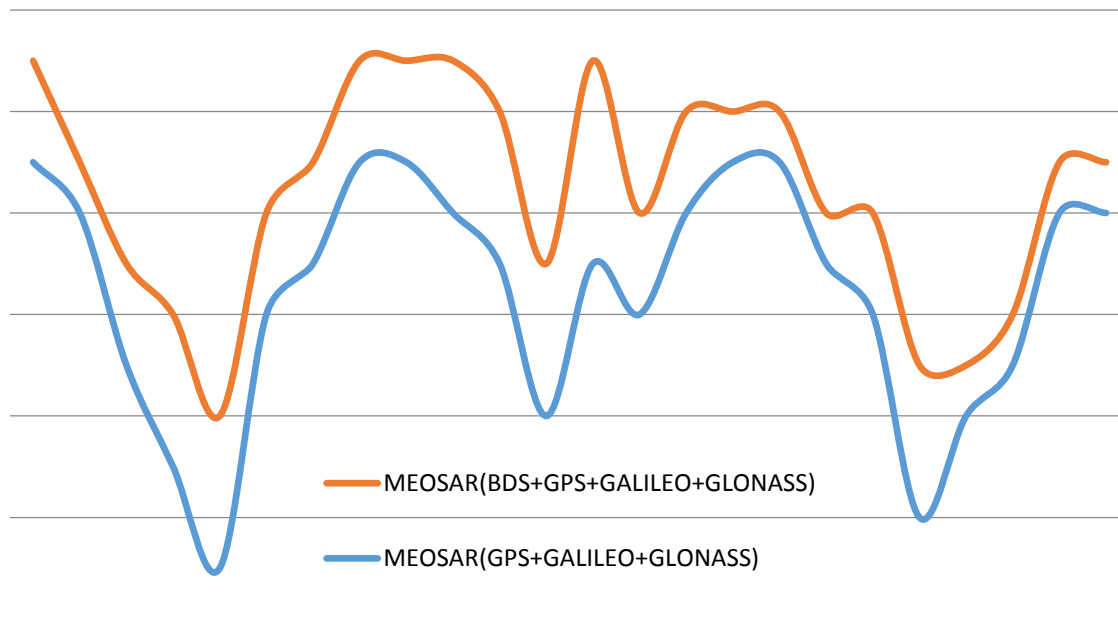
I . SAR service

- Meets international SAR standards
- Works together with other SAR payloads
- 6 MEO satellites
- Global coverage

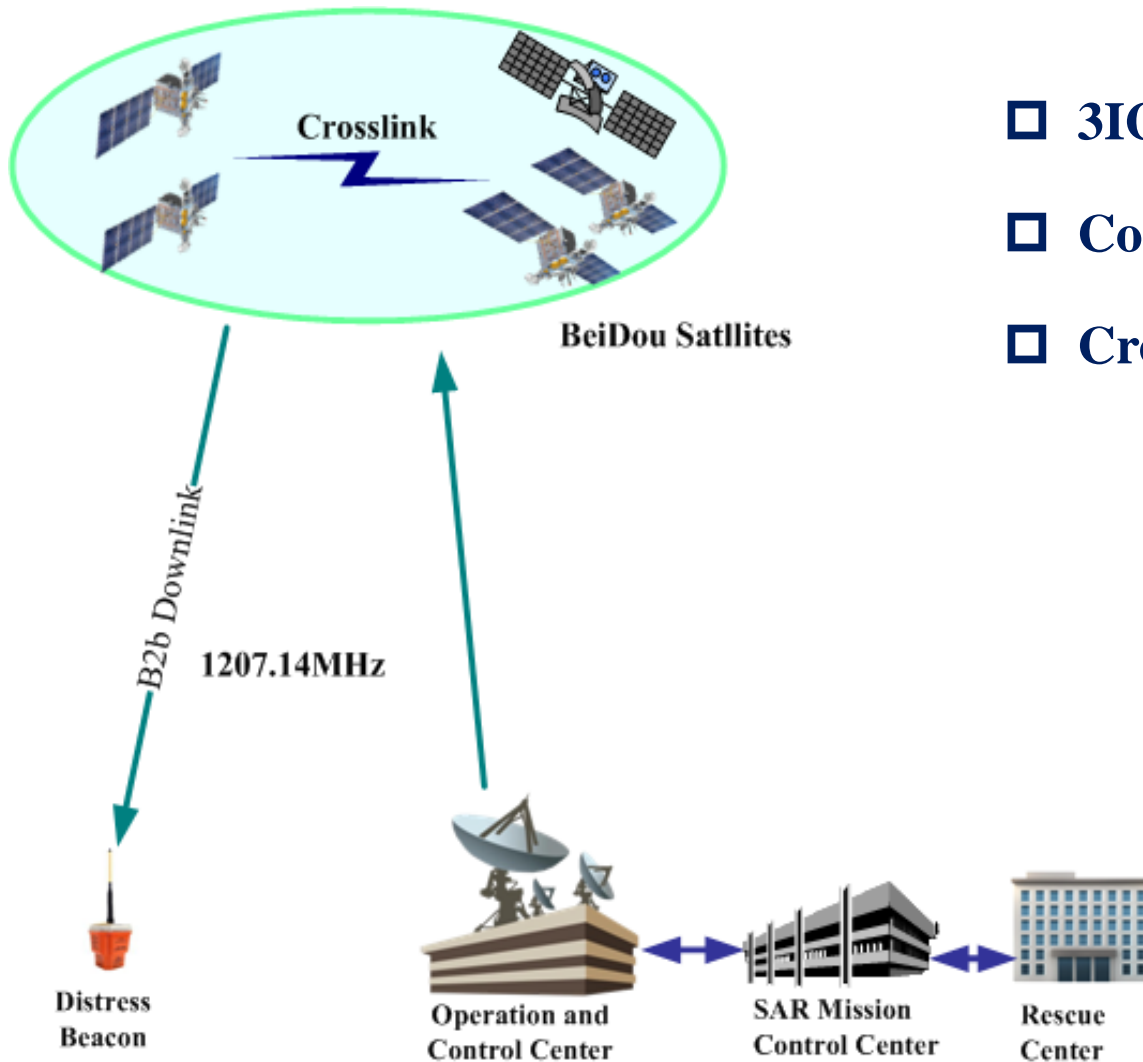


Improve SAR performance

- ❑ MEOSAR satellites increased from 65 to more than 70
- ❑ Visible satellites increased from 25 to 28
- ❑ Service reliability improved



SAR + Return link



□ 3IGSO + 24MEO

□ Confirmation messages

□ Crosslink

- Reduce false alarm rate
- Improve efficiency and success rate
- Enhance psychological comfort

Progress of International standards

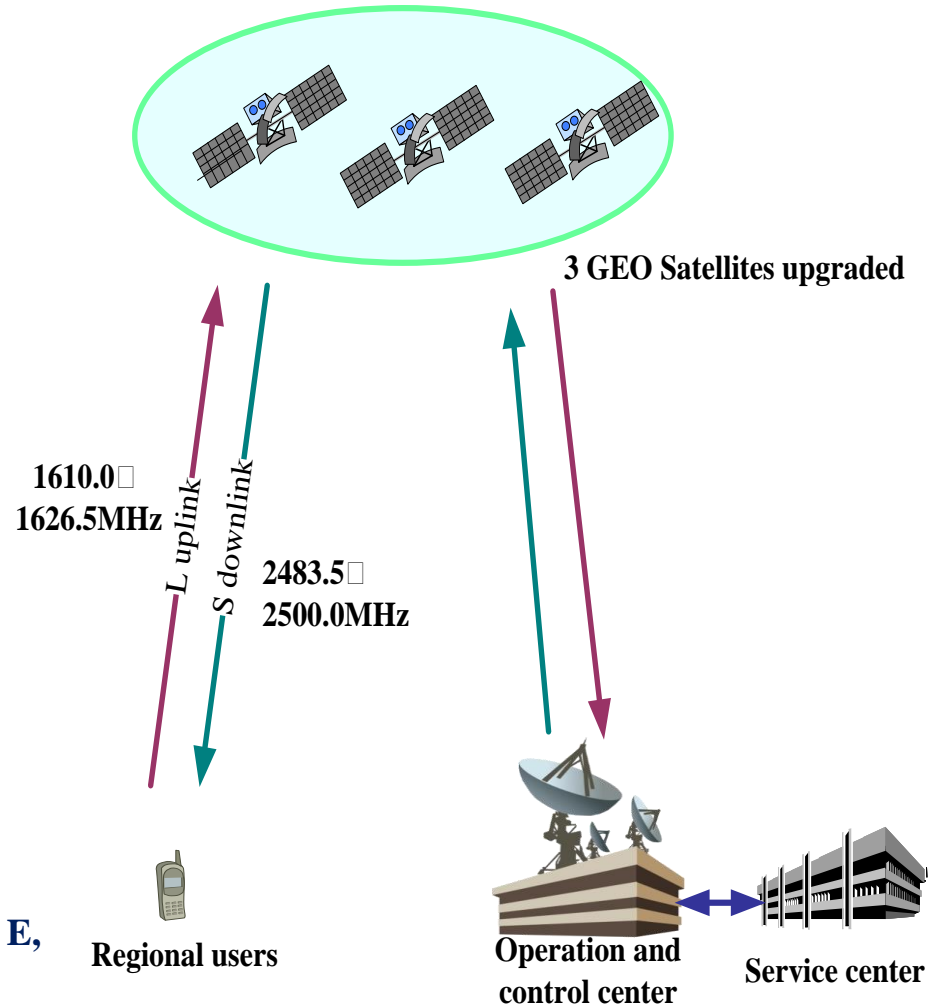
- ❑ **Payload downlink frequency coordination has almost completed**
- ❑ **Preparing documents to join COSPAS-SARSAT**
- ❑ **Participate in relevant technical standards' revision**
 - ✓ **COSPAS-SARSAT 57th Council (CSC-57) , Dec.2016**
 - ✓ **The 31st joint Commission of COSPAS-SARSAT (JC-31) , Oct.2017**
 - ✓ **BeiDou and Galileo Search and Rescue Load Frequency Compatibility Talks, Jan.2018**
 - ✓ **The 59th Open Meeting of COSPAS-SARSAT (CSC-59/OPN) , Feb. 2018**
 - ✓ **The first meeting of Experts Working Group on Downlink Frequency of MEOSAR, Mar. 2018**

II. RSMC (Regional SMC) service

- ❑ Two-way link
- ❑ Solve where I am and where you are, solve the problem of what status I am in and what status you are in
- ❑ Emission power < 3W
- ❑ System capacity > 10 million times/hour



China and the surrounding areas (75°~135° E, 10°~55° N)



Applications

□ More than 400,000 users

✓ Opened since 2003

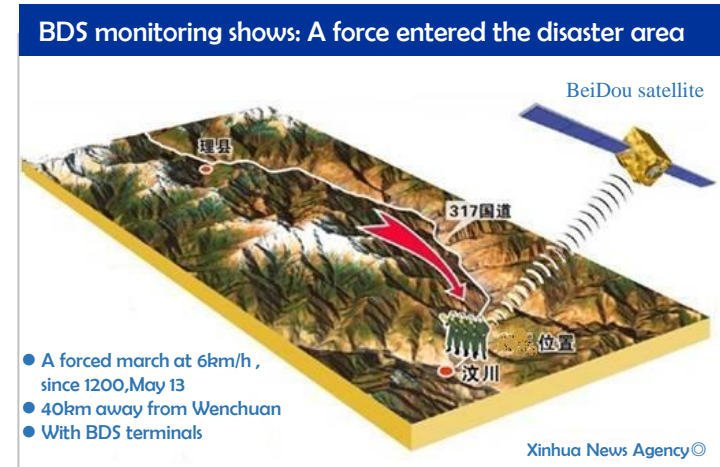
✓ The amount capacity used is more than 600,000 times/hour

□ Plays an important role in earthquake relief, marine fishery, vehicle safeguard, forest fire prevention, electricity monitoring, frozen disaster, especially in life safety field



Typical applications in earthquake disaster relief

- Disaster information report
- Monitoring and command
- More than 45,000 BDS disaster reduction terminals
- ◆ *Wenchuan earthquake, May 12, 2008*
 - ✧ More than 200 forest police advancers of Sichuan Armed Police Corps carried the BDS terminals into disaster area, and sent back the very first disaster information
 - ✧ More than **740,000** short messages were sent during 72 hours of golden emergency rescue.
 - ✧ Thousands of lives were rescued

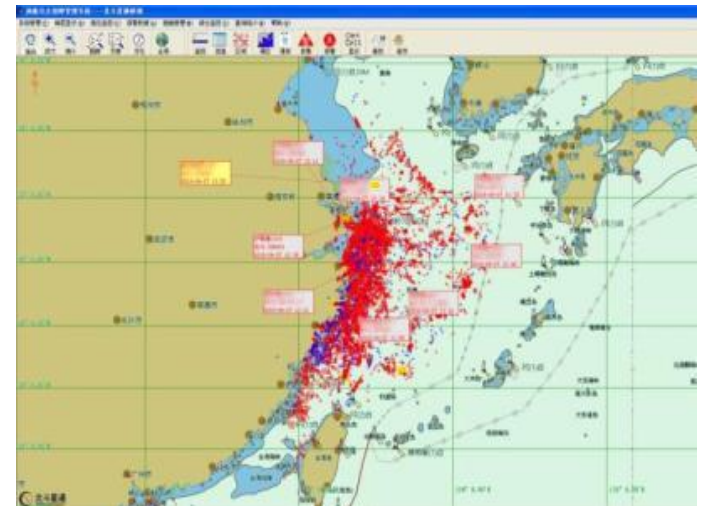


Typical applications in marine disaster rescue

- Shipping boats monitoring
- Emergency rescue
- More than 50,000 ships installed with the terminal
- More than 10,000 persons rescued

◆ *Zhejiang Province, March 2, 2011*

- ✧ The fishing boat(No.20169) was collided by a Georgian large ship, and was seriously deformed to be flooded gradually
- ✧ The fishing boat(No.7838) nearby was dispatched to rescue by short message service
- ✧ 11 persons were saved



GSMC (Global SMC) service

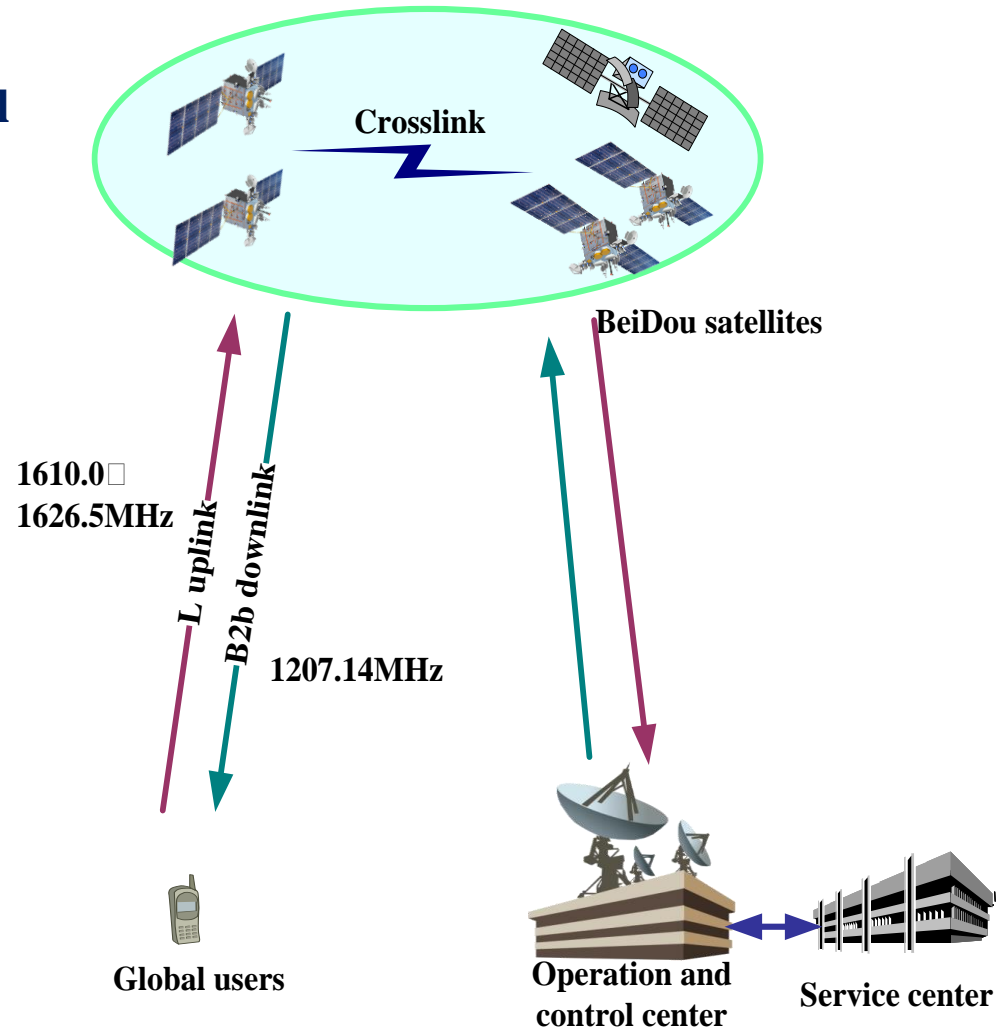
□ Deploy SMC service to the global area with crosslink by creative design

□ Satellite : 14 MEO

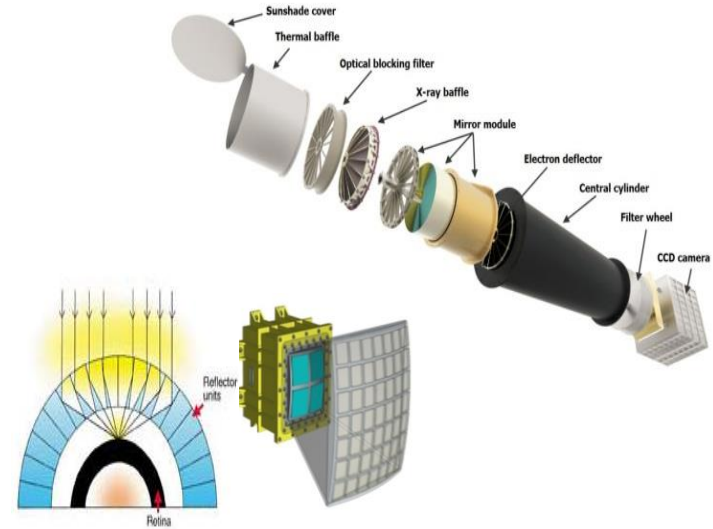
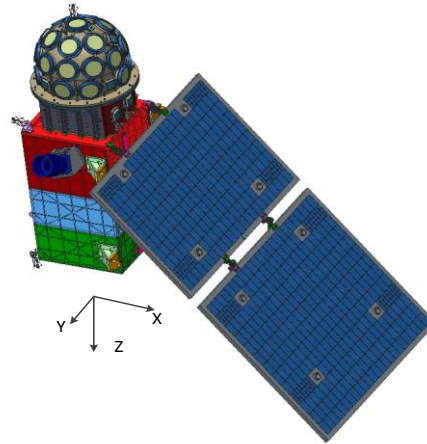
□ Service area : Global

□ Emission power : 10W

□ System capacity : 200,000 times/hour



Typical applications in space science research



- Gravitational wave high-energy electromagnetic counterpart all-sky monitoring
- 2 LEO microsattellites, 2020

- Soft X-ray wide field of view survey
- 1 LEO Satellite, 2022

Critical observation data will be transmitted from satellites to ground by GSMC

Advantages of SMC service in life safety

- Served for more than 10 years
 - ✓ played an important role in life safety field

- Supports BeiDou B2b or GNSS positioning
 - ✓ positioning accuracy is 10 meters
 - ✓ better than SAR positioning accuracy (several kilometers)

Advantages of SMC service in life safety

□ Coverage

- ✓ the country and the surrounding areas
- ✓ the vast ocean, aviation, the South Pole and North Pole regions of the globe

□ Two-way communications

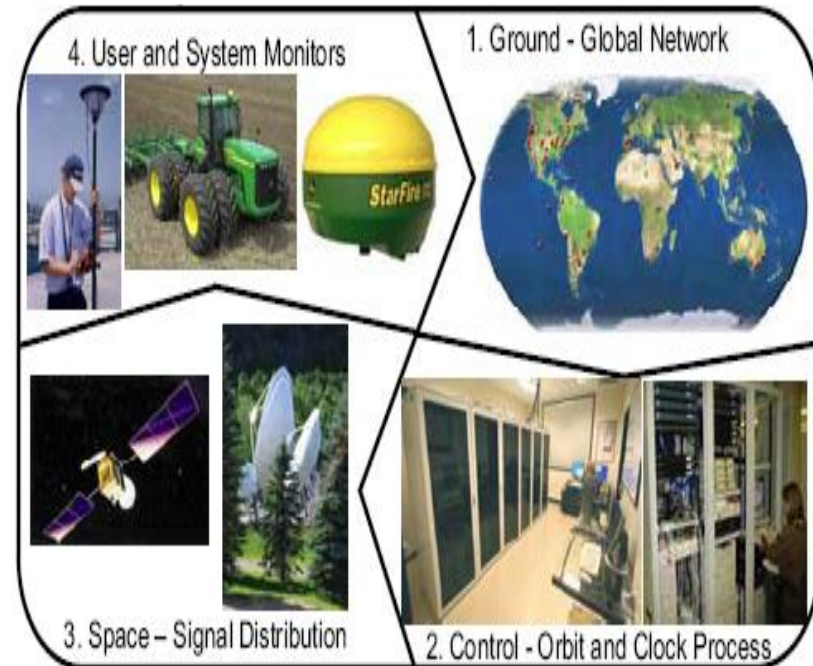
- ✓ improving accuracy and efficiency of search and rescue

Progress of SMC service joining in GMDSS

- ❑ Application about joining in GMDSS of BeiDou short message service has been submitted to MSC, Feb,2018
- ❑ The application has been deliberated and accepted at the 99th meeting of MSC, May, 2018
- ❑ Next, we will develop related works under the IMO requirements framework

III. PPPservice

- Accuracy: low dynamic decimeter level, static centimeter level
- Broadcast related information of two GNSS systems at first , four GNSS systems later
- Satellite : 3 GEO
- Service area : China and the surrounding areas
- User link : 1207.14MHz (GEO B2b signal)



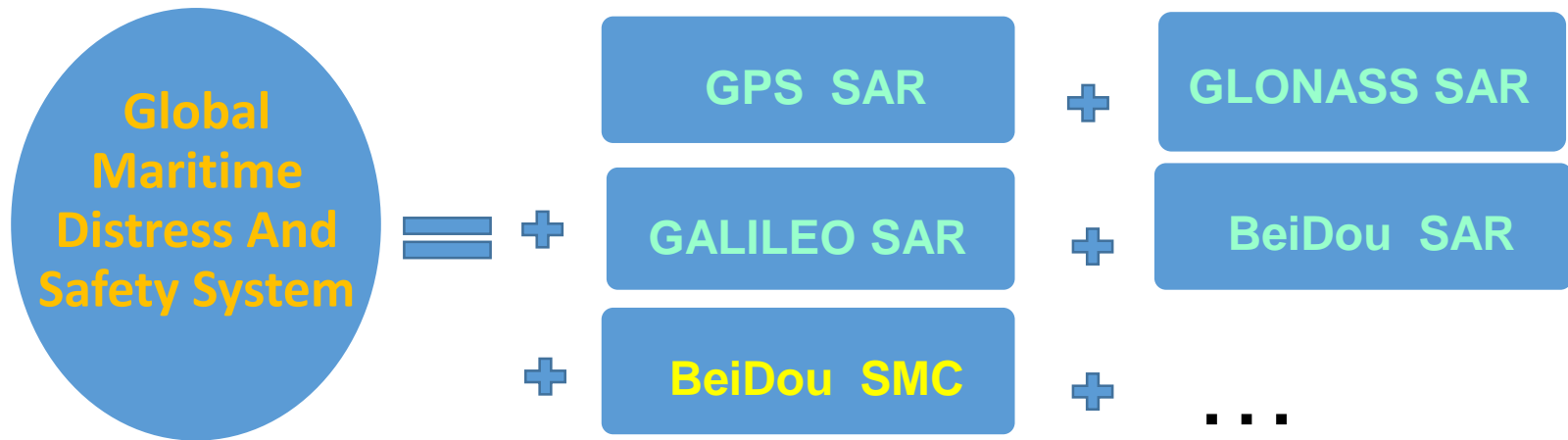
Summary

GNSS systems and other related should work together to provide better service to users around the world.

—Propose that SAR return link should become an international standard to improve SAR performance.

| | Coverage | False rate | Positioning accuracy | Efficiency | Successful rate |
|-----------------------------|---------------|-------------|----------------------|-------------|-----------------|
| SAR | Global | High | Low | Low | Low |
| SAR +Return Link | Global | Low | High | High | High |

—Propose that SMC service should provide life safety service and enrich better methods of search and rescue.



| | Coverage | Positioning accuracy | Emission power | Communication link |
|------------|--------------------|----------------------|----------------|--------------------|
| SAR | Global | 3000 meters | 5W | one-way |
| BeiDou SMC | Regional Global | 10 meters | 3W | two-way |

—Propose that GNSS providers should discuss a universal template for PPP service together to improve high-precision positioning service.

| Accuracy | decimeter/centimeter? dynamic/static? |
|--------------------|--|
| Objects enhanced | 1/2/3/4/5 GNSS systems? |
| Link | BeiDou B2b/Galileo E6B/QZSS L1S, L6? |
| Information rate | 500/600/1200/2000/2400bps? |
| Information format | JPL SOC/RTCM/CMRx/Compact RTCM SSR? |

THANK YOU!

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