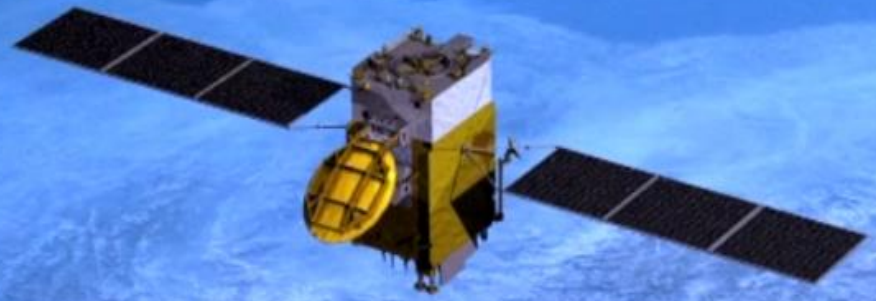
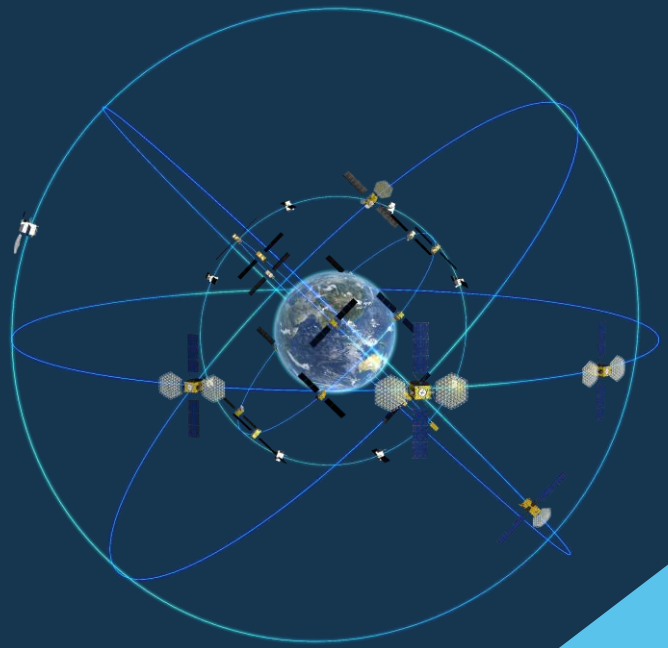
Developments of BDS Applications in Communication and SAR



Liu Falong
China Transport Telecommunications & Information Center
10/20/2023

CONTENTS

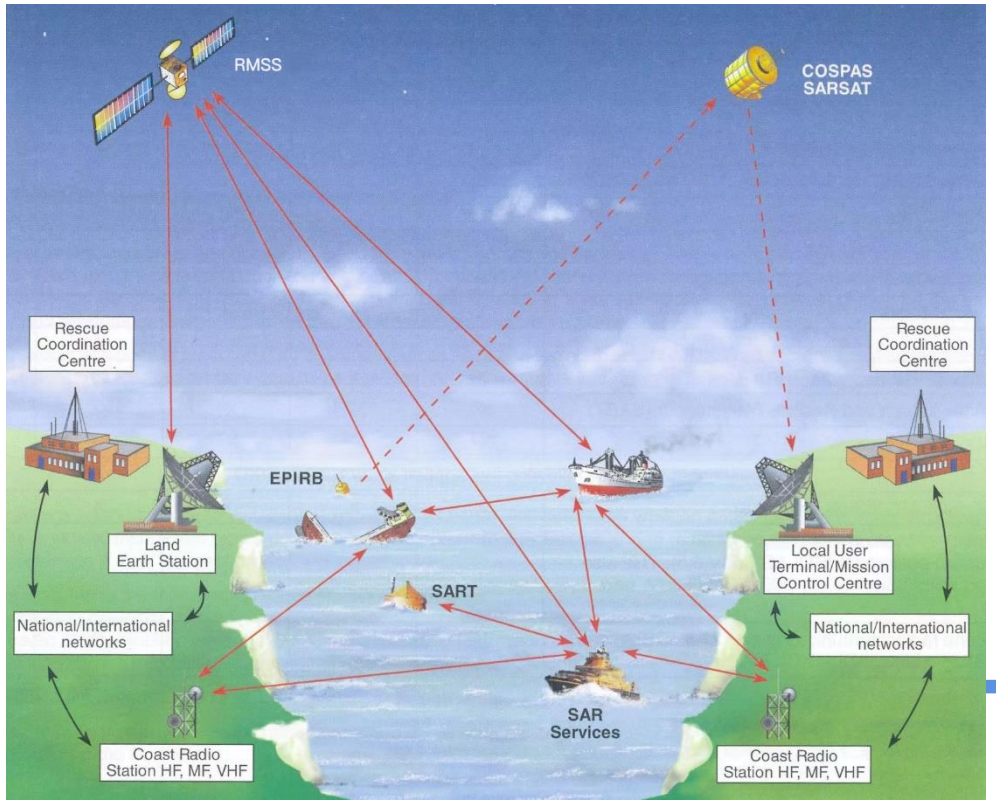


Developments of BDS Application in GMDSS

01

GMDSS Overview

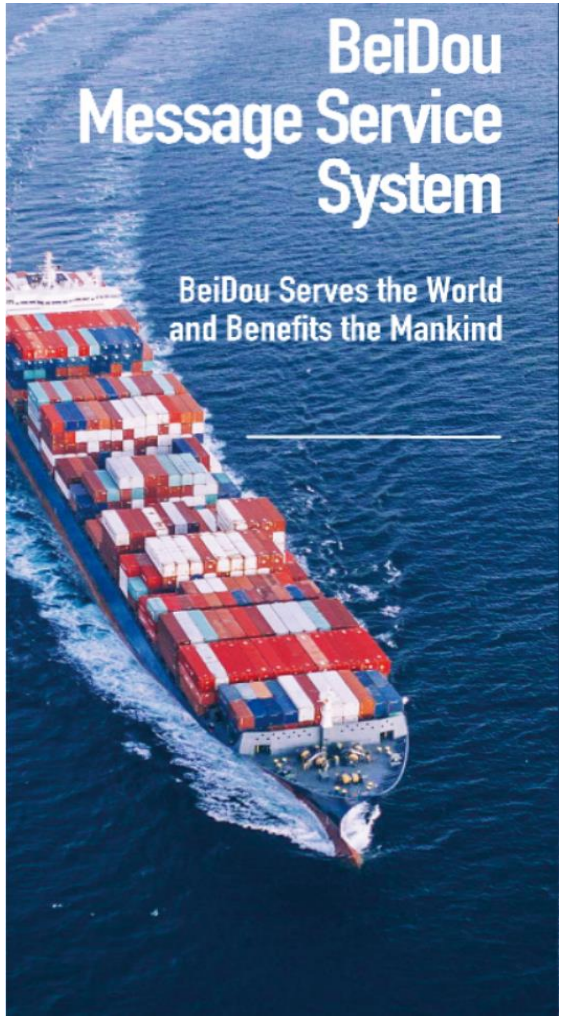
Global Maritime Distress and Safety System (GMDSS) is a maritime communication system as proposed and implemented by the International Maritime Organization (IMO) for distress, safety and general radiocommunications .



Components

- **Satellite Systems**
- **Terrestrial radiocommunication systems**
- **Maritime Safety Information broadcast system**

Inclusion of BDMSS into GMDSS

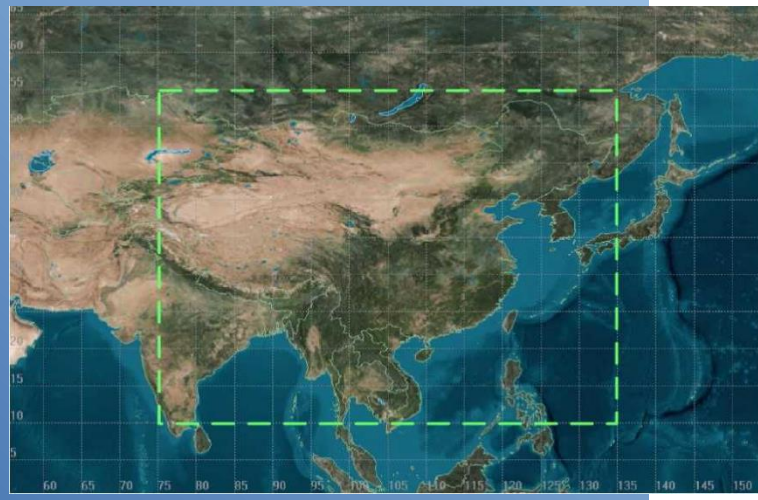


- **BeiDou Message Service System (BDMSS): a functional component of BDS & a public service product;**
- **enriches maritime distress and safety communication means; and**
- **provides guarantee to safety of life and property at sea.**

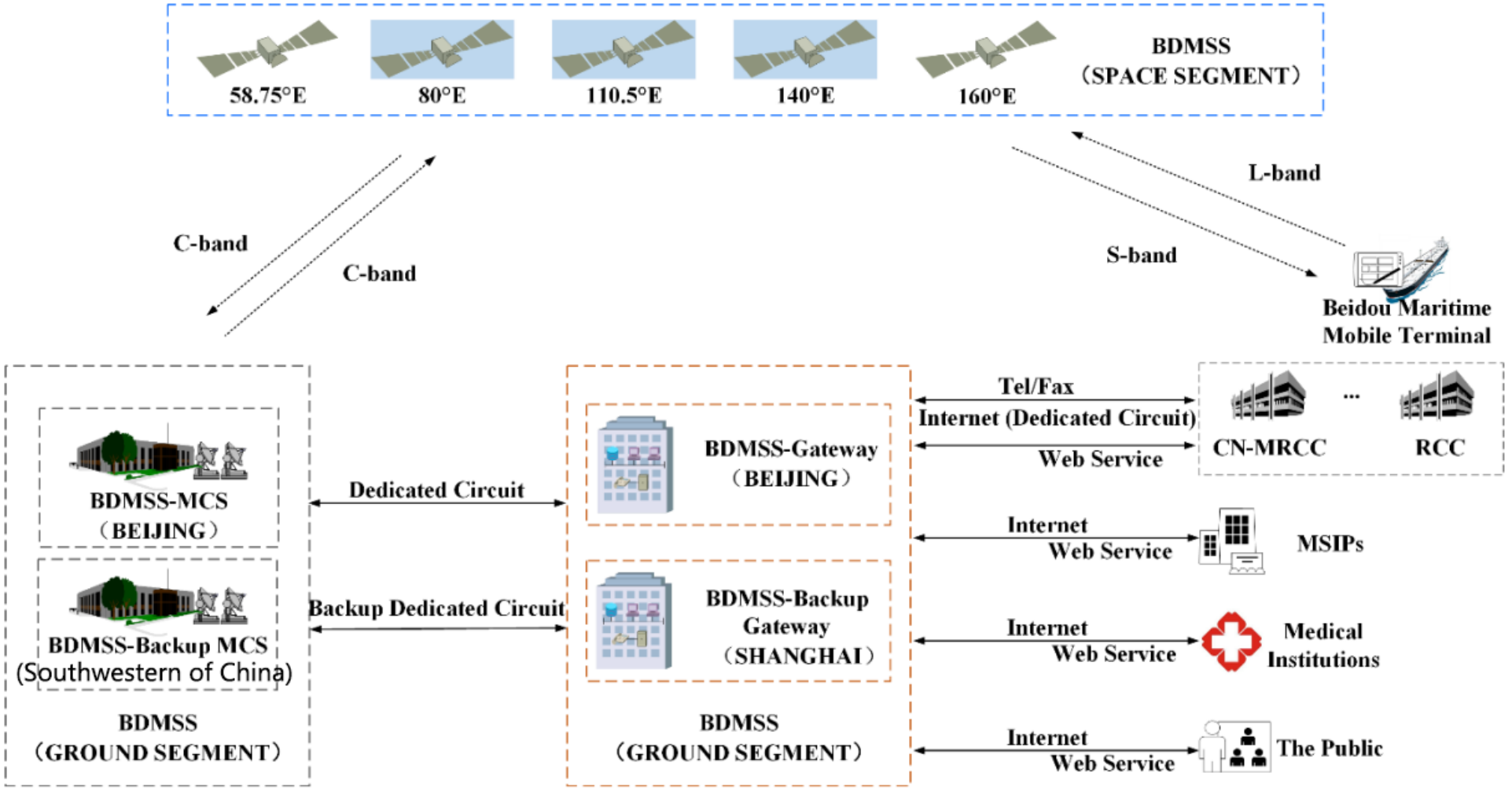
Coverage

10°N-55°N、75°E-135°E

- Covers the Asian and Western Pacific area
- Capable of providing maritime communication services for (partial or whole) land and sea areas of China, Japan, RoK, DPRK, Philippines, Viet Nam, Cambodia, Thailand, Malaysia, Myanmar, Bangladesh and India.



BDMSS Overall Structure



Full Verification in Maritime Services

- Deployed BeiDou maritime mobile terminals on vessels to test the maritime distress and safety communication functions of BDMSS
- Successfully verified maritime service functions and procedures
- Marking the formation of maritime service capability

Onsite Verification of BDMSS by IMSO

BDMSS successfully completed the onsite evaluation and verification conducted by the IMSO experts group and demonstrated the compliance with IMO resolution A.1001(25) on maritime distress and safety communications.

Provides following maritime distress and safety communications:

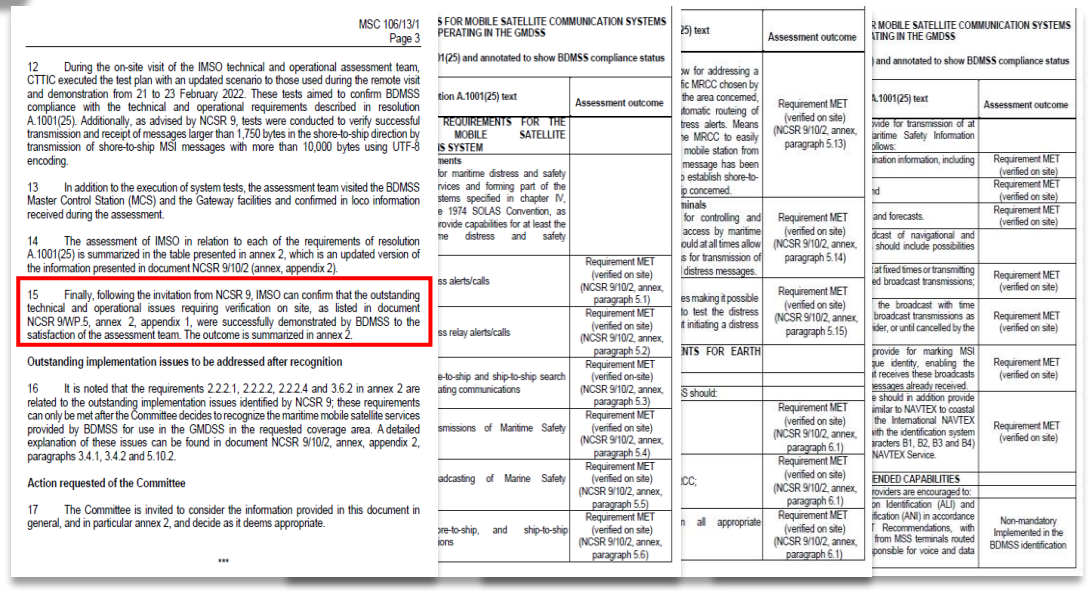
- Ship-to-shore distress alerts/calls
- Shore-to-ship distress relay alerts/calls
- Ship-to-shore, shore-to-ship and ship-to-ship SAR coordination communications
- Ship-to-shore MSI transmission
- Shore-to-ship MSI broadcast
- Ship-to-shore, shore-to-ship and ship-to-ship general radiocommunications

Processes maritime distress, urgency, safety and general radiocommunications with the following priority order:

Lvl 1 - Distress	**Lvl 3 – Safety**
Lvl 2 - Urgency	**Lvl 4 – General**

- Automatically recognizes communication or message access priorities
- Provides immediate access for distress alerts/calls and pre-emption over general communications when necessary
- Automatically recognizes maritime distress communications and routes to associated RCCs
- Processes ship-to-shore and shore-to-ship urgency and safety communications in required priority order

Onsite Verification of BDMSS by IMSO



MSC 106/13/1
Page 3

12 During the on-site visit of the IMSO technical and operational assessment team, CTTIC executed the test plan with an updated scenario to those used during the remote visit and demonstration from 21 to 23 February 2022. These tests aimed to confirm BDMSS compliance with the technical and operational requirements described in resolution A.1001(25). Additionally, as advised by NCSR 9, tests were conducted to verify successful transmission and receipt of messages larger than 1,750 bytes in the shore-to-ship direction by transmission of shore-to-ship MSI messages with more than 10,000 bytes using UTF-8 encoding.

13 In addition to the execution of system tests, the assessment team visited the BDMSS Master Control Station (MCS) and the Gateway facilities and confirmed in loco information received during the assessment.

14 The assessment of IMSO in relation to each of the requirements of resolution A.1001(25) is summarized in the table presented in annex 2, which is an updated version of the information presented in document NCSR 9/10/2 (annex, appendix 2).

15 Finally, following the invitation from NCSR 9, IMSO can confirm that the outstanding technical and operational issues requiring verification on site, as listed in document NCSR 9/WP.5, annex 2, appendix 1, were successfully demonstrated by BDMSS to the satisfaction of the assessment team. The outcome is summarized in annex 2.

Outstanding implementation issues to be addressed after recognition

16 It is noted that the requirements 2.2.2.1, 2.2.2.2, 2.2.2.4 and 3.6.2 in annex 2 are related to the outstanding implementation issues identified by NCSR 9; these requirements can only be met after the Committee decides to recognize the maritime mobile satellite services provided by BDMSS for use in the GMDSS in the requested coverage area. A detailed explanation of these issues can be found in document NCSR 9/10/2, annex, appendix 2, paragraphs 3.4.1, 3.4.2 and 5.10.2.

Action requested of the Committee

17 The Committee is invited to consider the information provided in this document in general, and in particular annex 2, and decide as it deems appropriate.

***

S FOR MOBILE SATELLITE COMMUNICATION SYSTEMS
PERATING IN THE GMDSS

)1(25) and annotated to show BDMSS compliance status

tion A.1001(25) text	Assessment outcome
REQUIREMENTS FOR THE MOBILE SATELLITE IS SYSTEM	
tments for maritime distress and safety rvices and forming part of the stems specified in chapter IV, e 1974 SOLAS Convention, as rovide capabilities for at least the he distress and safety	
ss alerts/calls	Requirement MET (verified on site) (NCSR 9/10/2, annex, paragraph 5.1)
ss relay alerts/calls	Requirement MET (verified on site) (NCSR 9/10/2, annex, paragraph 5.2)
e-to-ship and ship-to-ship search ating communications	Requirement MET (verified on-site) (NCSR 9/10/2, annex, paragraph 5.3)
smissions of Maritime Safety	Requirement MET (verified on site) (NCSR 9/10/2, annex, paragraph 5.4)
adcasting of Marine Safety	Requirement MET (verified on site) (NCSR 9/10/2, annex, paragraph 5.5)
re-to-ship, and ship-to-ship ions	Requirement MET (verified on site) (NCSR 9/10/2, annex, paragraph 5.6)

25) text	Assessment outcome
w for addressing a fic MRCC chosen by the area concerned, utomatic routeing of tress alerts. Means e MRCC to easily mobile station from message has been establish shore-to-p concerned.	Requirement MET (verified on site) (NCSR 9/10/2, annex, paragraph 5.13)
minals for controlling and access by maritime ould at all times allow s for transmission of distress messages.	Requirement MET (verified on site) (NCSR 9/10/2, annex, paragraph 5.14)
es making it possible to test the distress t initiating a distress	Requirement MET (verified on site) (NCSR 9/10/2, annex, paragraph 5.15)
NTS FOR EARTH	
S should:	
	Requirement MET (verified on site) (NCSR 9/10/2, annex, paragraph 6.1)
CC;	Requirement MET (verified on site) (NCSR 9/10/2, annex, paragraph 6.1)
n all appropriate	Requirement MET (verified on site) (NCSR 9/10/2, annex, paragraph 6.1)

R MOBILE SATELLITE COMMUNICATION SYSTEMS
ATING IN THE GMDSS

and annotated to show BDMSS compliance status

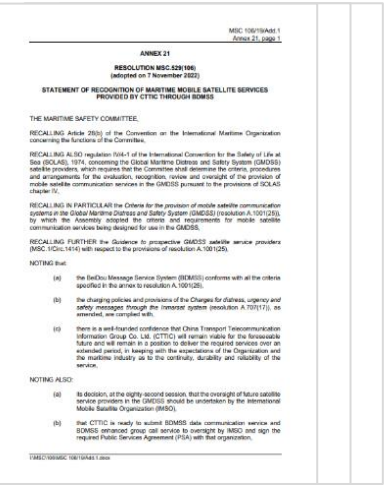
A.1001(25) text	Assessment outcome
vide for transmission of at aritime Safety Information llows:	
nation information, including	Requirement MET (verified on site)
id	Requirement MET (verified on site)
and forecasts.	Requirement MET (verified on site)
dcast of navigational and should include possibilities	
at fixed times or transmitting ed broadcast transmissions;	Requirement MET (verified on site)
the broadcast with time broadcast transmissions as der, or until cancelled by the	Requirement MET (verified on site)
provide for marking MSI ue identity, enabling the it receives these broadcasts essages already received. e should in addition provide imilar to NAVTEX to coastal the International NAVTEX with the identification system aracters B1, B2, B3 and B4) NAVTEX Service.	Requirement MET (verified on site)
ENDED CAPABILITIES	
roviders are encouraged to:	
on Identification (ALI) and fication (ANI) in accordance Recommendations, with from MSS terminals routed onsible for voice and data	Non-mandatory Implemented in the BDMSS identification

All functional requirements are concluded "Requirements Met (verified onsite)"

IMSO can confirm that the outstanding technical and operational issues requiring verification on site were successfully demonstrated by BDMSS. (MSC 106/13/1)

BDMSS – Third GMDSS Sat-Com System

106th Session of IMO Maritime Safety Committee in 2022.11



ANNEX 21

RESOLUTION MSC.529(106)
(adopted on 7 November 2022)

STATEMENT OF RECOGNITION OF MARITIME MOBILE SATELLITE SERVICES PROVIDED BY CTTIC THROUGH BDMSS

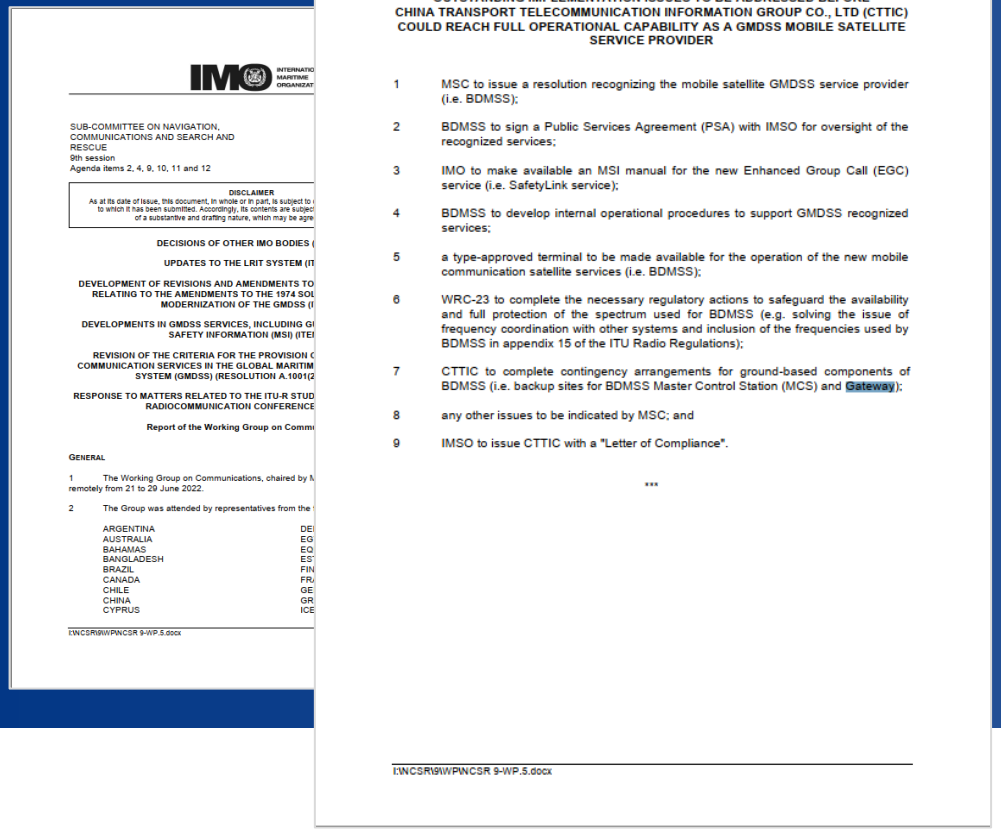
THE MARITIME SAFETY COMMITTEE,

Adopted *Statement of recognition of the maritime mobile satellite services provided by CTTIC through BDMSS* (resolution MSC.529(106))

Recognized BDMSS for use in GMDSS, marking that BDMSS becomes the **third IMO recognized satellite communication system** after Inmarsat and Iridium.

Shifted from recognition by IMO to Commencement of Service

Outstanding Implementation Issues



NCSR 9/WP.5
Annex 2, page 23

APPENDIX 2

OUTSTANDING IMPLEMENTATION ISSUES TO BE ADDRESSED BEFORE CHINA TRANSPORT TELECOMMUNICATION INFORMATION GROUP CO., LTD (CTTIC) COULD REACH FULL OPERATIONAL CAPABILITY AS A GMDSS MOBILE SATELLITE SERVICE PROVIDER

1 MSC to issue a resolution recognizing the mobile satellite GMDSS service provider (i.e. BDMSS);

2 BDMSS to sign a Public Services Agreement (PSA) with IMSO for oversight of the recognized services;

3 IMO to make available an MSI manual for the new Enhanced Group Call (EGC) service (i.e. SafetyLink service);

4 BDMSS to develop internal operational procedures to support GMDSS recognized services;

5 a type-approved terminal to be made available for the operation of the new mobile communication satellite services (i.e. BDMSS);

6 WRC-23 to complete the necessary regulatory actions to safeguard the availability and full protection of the spectrum used for BDMSS (e.g. solving the issue of frequency coordination with other systems and inclusion of the frequencies used by BDMSS in appendix 15 of the ITU Radio Regulations);

7 CTTIC to complete contingency arrangements for ground-based components of BDMSS (i.e. backup sites for BDMSS Master Control Station (MCS) and Gateway);

8 any other issues to be indicated by MSC; and

9 IMSO to issue CTTIC with a "Letter of Compliance".

***

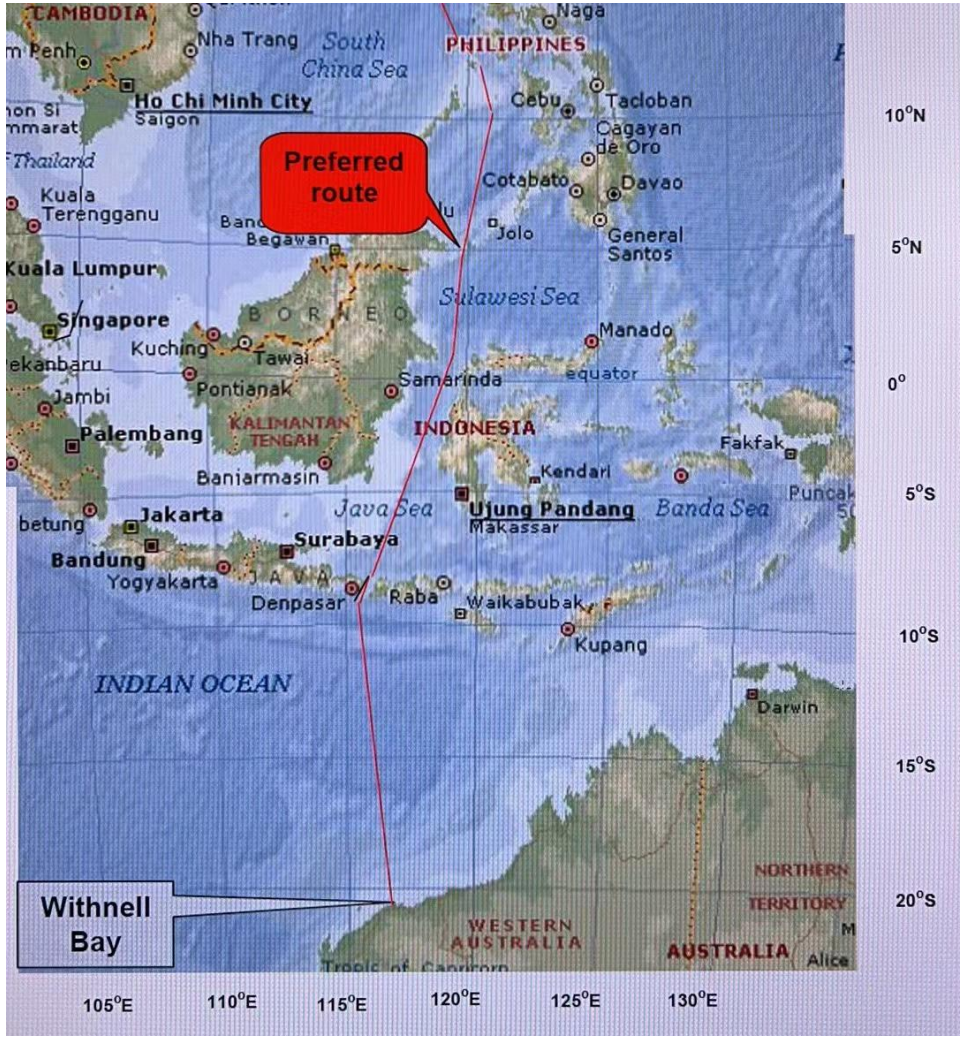
I:\NCSR\9\WP\NCSR 9-WP.5.docx

Before the commencement of GMDSS services

- to sign a Public Services Agreement with IMSO;
- IMO to make available a BDMSS MSI manual;
- to develop internal operational procedures to support GMDSS services;
- a type-approved GMDSS terminal to be made available;
- to complete necessary regulatory actions in ITU;
- to complete contingency arrangements for BDMSS;
- IMSO to issue a "Letter of Compliance ".

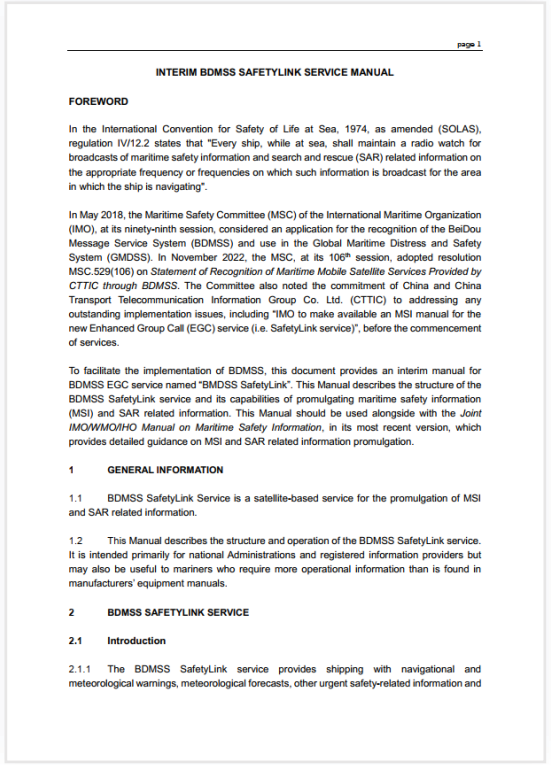
On-scene Testing in International Voyages

In May 2023, a BDMSS terminal was installed on an Chinese ocean shipping vessel sailing between Shenzhen and Australia to test maritime distress, EGC and location reporting functions and verify the operation and success rate of GMDSS services provided by BDMSS.



Review of BDMSS EGC Service Manual

In September 2023, the WWNWS Sub-Committee of the International Hydrographic Organization (IHO) agreed with the proposals by China and authorized its Document Review Working Group to review and revise BDMSS EGC service manual.



page 1

INTERIM BDMSS SAFETYLINK SERVICE MANUAL

FOREWORD

In the International Convention for Safety of Life at Sea, 1974, as amended (SOLAS), regulation IV/12.2 states that "Every ship, while at sea, shall maintain a radio watch for broadcasts of maritime safety information and search and rescue (SAR) related information on the appropriate frequency or frequencies on which such information is broadcast for the area in which the ship is navigating".

In May 2018, the Maritime Safety Committee (MSC) of the International Maritime Organization (IMO), at its ninety-ninth session, considered an application for the recognition of the BeiDou Message Service System (BDMSS) and use in the Global Maritime Distress and Safety System (GMDSS). In November 2022, the MSC, at its 106th session, adopted resolution MSC.529(106) on *Statement of Recognition of Maritime Mobile Satellite Services Provided by CTTIC through BDMSS*. The Committee also noted the commitment of China and China Transport Telecommunication Information Group Co. Ltd. (CTTIC) to addressing any outstanding implementation issues, including "IMO to make available an MSI manual for the new Enhanced Group Call (EGC) service (i.e. SafetyLink service)", before the commencement of services.

To facilitate the implementation of BDMSS, this document provides an interim manual for BDMSS EGC service named "BMDSS SafetyLink". This Manual describes the structure of the BDMSS SafetyLink service and its capabilities of promulgating maritime safety information (MSI) and SAR related information. This Manual should be used alongside with the *Joint IMO/WMO/IHO Manual on Maritime Safety Information*, in its most recent version, which provides detailed guidance on MSI and SAR related information promulgation.

1 GENERAL INFORMATION

1.1 BDMSS SafetyLink Service is a satellite-based service for the promulgation of MSI and SAR related information.

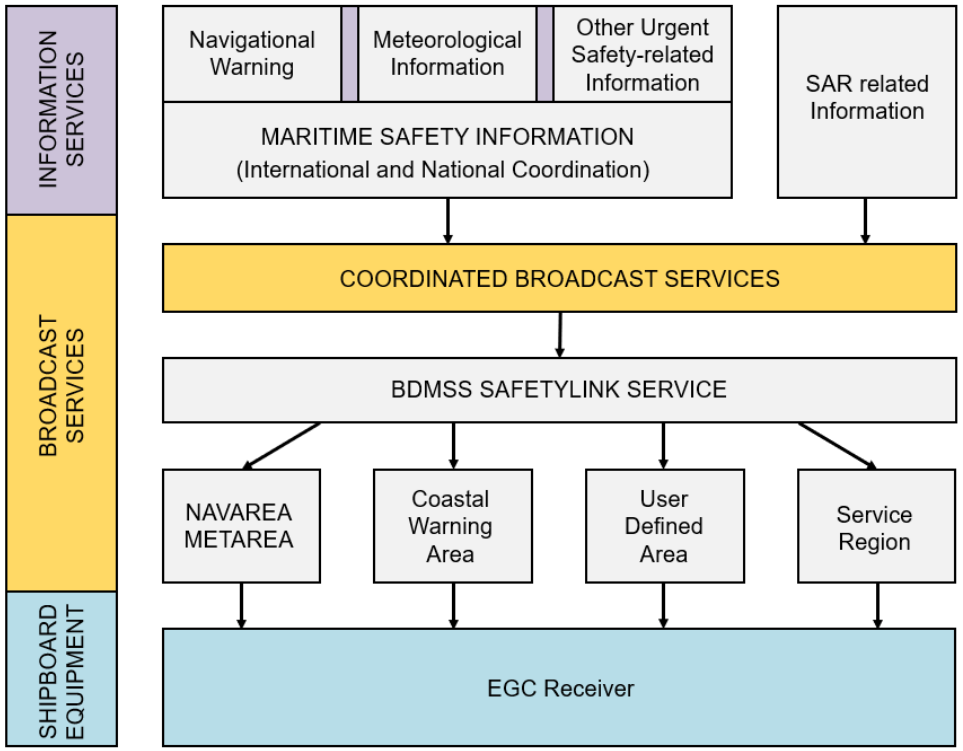
1.2 This Manual describes the structure and operation of the BDMSS SafetyLink service. It is intended primarily for national Administrations and registered information providers but may also be useful to mariners who require more operational information than is found in manufacturers' equipment manuals.

2 BDMSS SAFETYLINK SERVICE

2.1 Introduction

2.1.1 The BDMSS SafetyLink service provides shipping with navigational and meteorological warnings, meteorological forecasts, other urgent safety-related information and

BDMSS EGC Service Manual



BDMSS EGC Service Flow

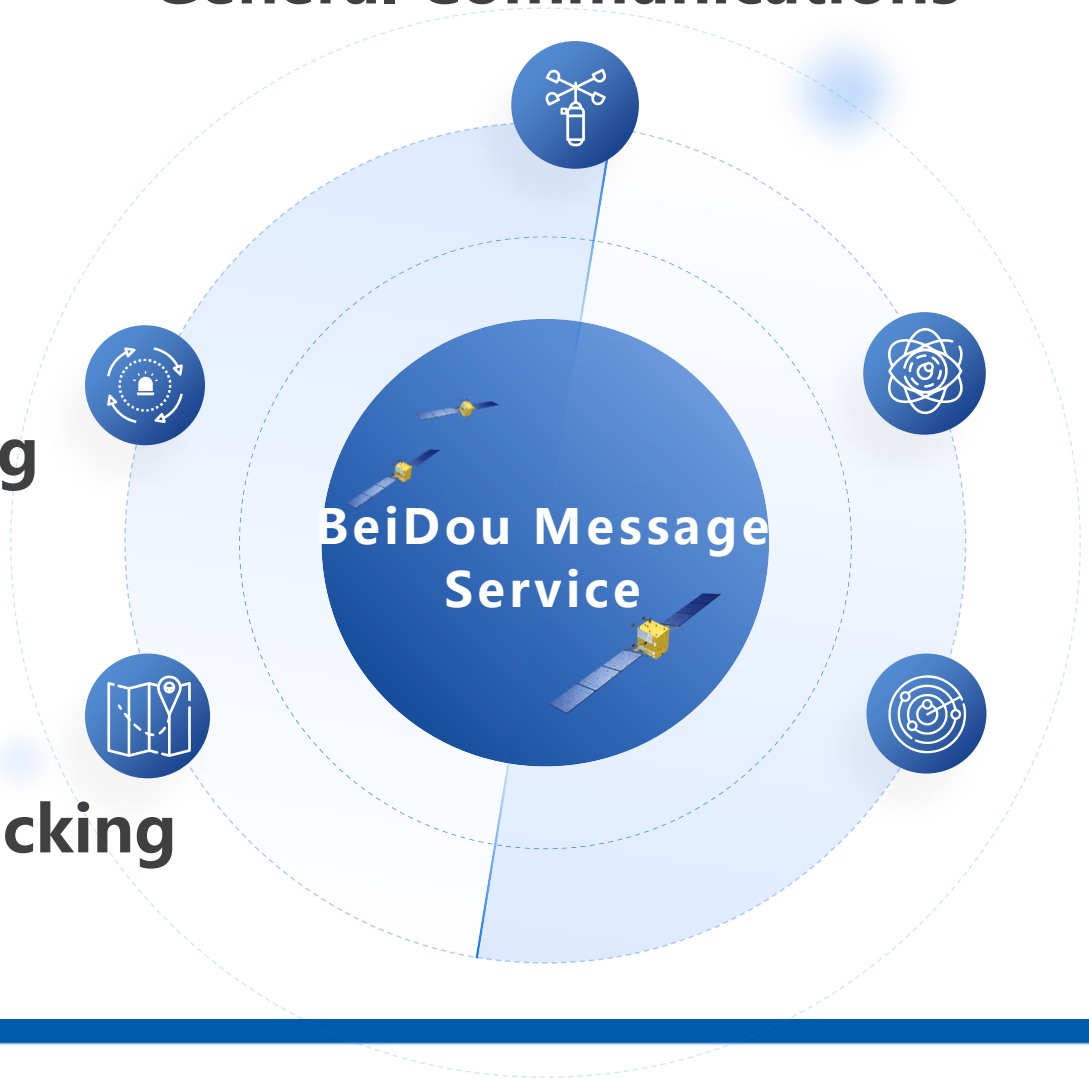
Defines and regulates service procedure, user management and message formats of BDMSS EGC service.

BDMSS Application Scenarios

General Communications

Maritime
Distress Alerting

EGC



Vessel Location
Identification and Tracking

Fleet
Management

Scenario – Maritime Distress Alerting

Process and Forward Distress

Forward distress alerts to associated RCCs immediately upon reception and record follow up actions.

Distress Status Monitoring

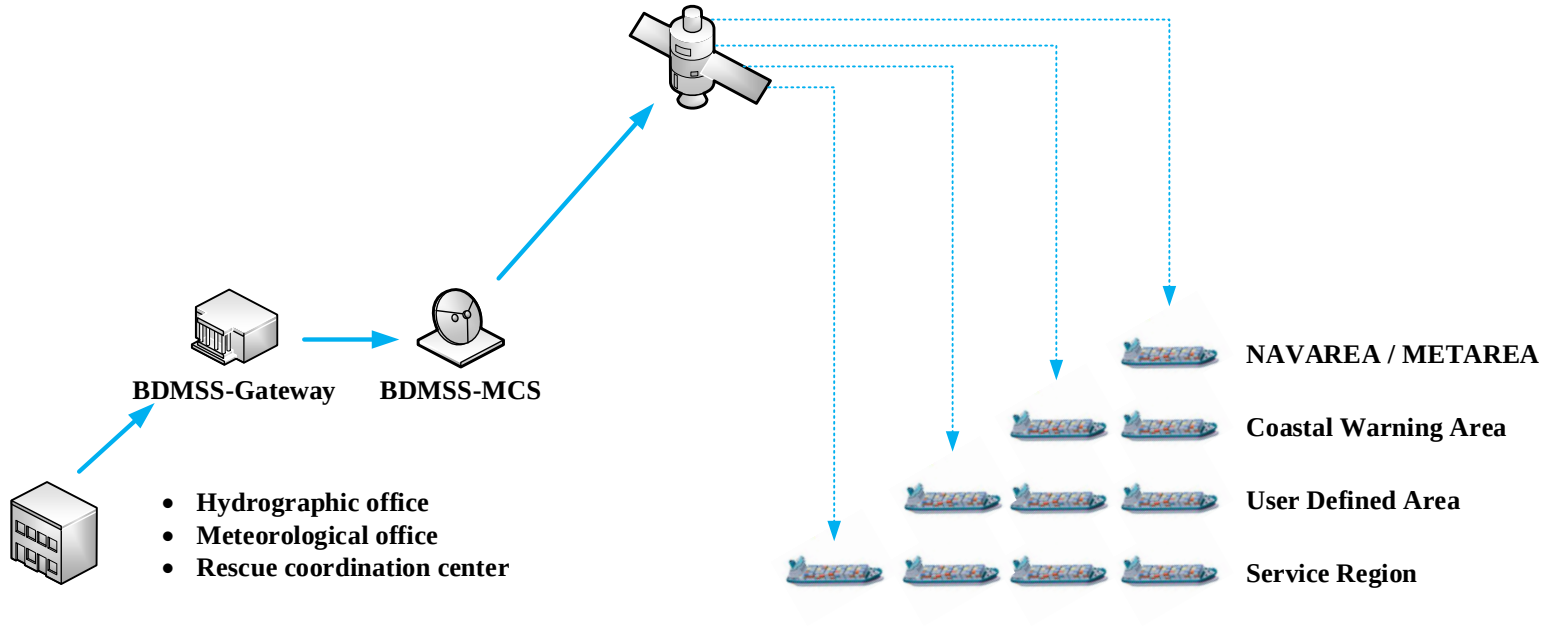
Track and monitor vessels in distress, including its position, speed, sailing course, etc., to assist search and recue activities.

SAR Coordination Communication

Capable of supporting two-way communications for search and rescue operations commanding and coordination, improving search and rescue efficiencies and enhance the confidence of person in distress.

Scenario - Enhance Group Call

Provides satellite broadcast services on navigational warning, meteorological forecasts and SAR related information for maritime users.



Scenario – Location Identification and Tracking

Ship-side scheduled location reporting

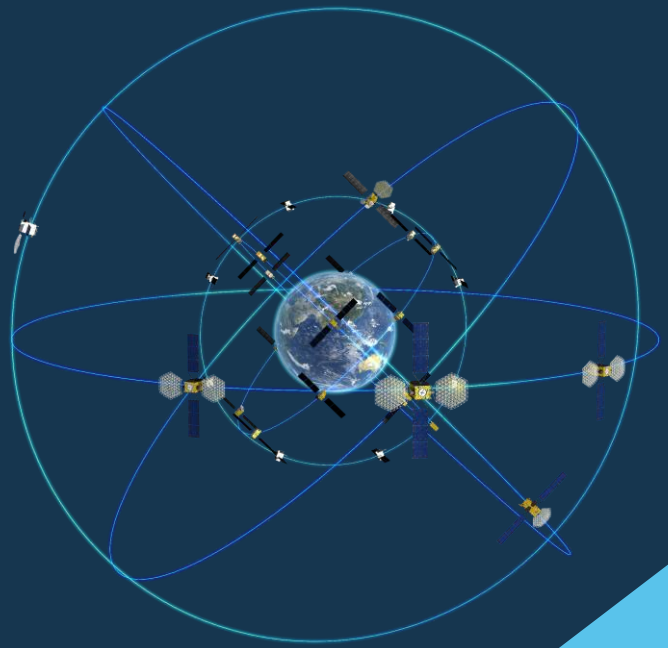
Automatic location reporting is realized by setting scheduled transmission of messages containing real-time position information.

Platform-side polling

Platform side users could query the position of a vessel by sending a polling message from the platform to the terminal onboard the vessel. The terminal will automatically respond to the polling with a message containing real-time position.

Scenario – Fleet Management

Harmonized fleet management via BDMSS message communication contributes to orderly and safe operation activities, compliance with regulations in sailing and mooring, therefore enhances maritime traffic safety.



02

Developments of BDS in International Search and Rescue

Becoming Space Segment Contributor

November 2022, Cospas-Sarsat CSC/OPN 67

BDS is included in the Cospas-Sarsat MEOSAR system.

Announced the completion of signing the Declaration of Intent between China and the four Council States.

Adopted revisions to Cospas-Sarsat technical and operational documents to include BDS.

In 1992, China become a user Member State of Cospas-Sarsat.

In 1997, China became a ground segment provider of Cospas-Sarsat.

In 2022, China became a space segment contributor of Cospas-Sarsat.

Plans to Facilitate the FOC of SAR/BDS

01

To declare that SAR/BDS enters into FOC

Distribute SIT 605 message to MCCs around the world to declare that SAR/BDS enters into FOC and notify that China will formally start distributing ephemeris information 3 months later.

02

To follow up MEOLUTs upgrade to support SAR/BDS

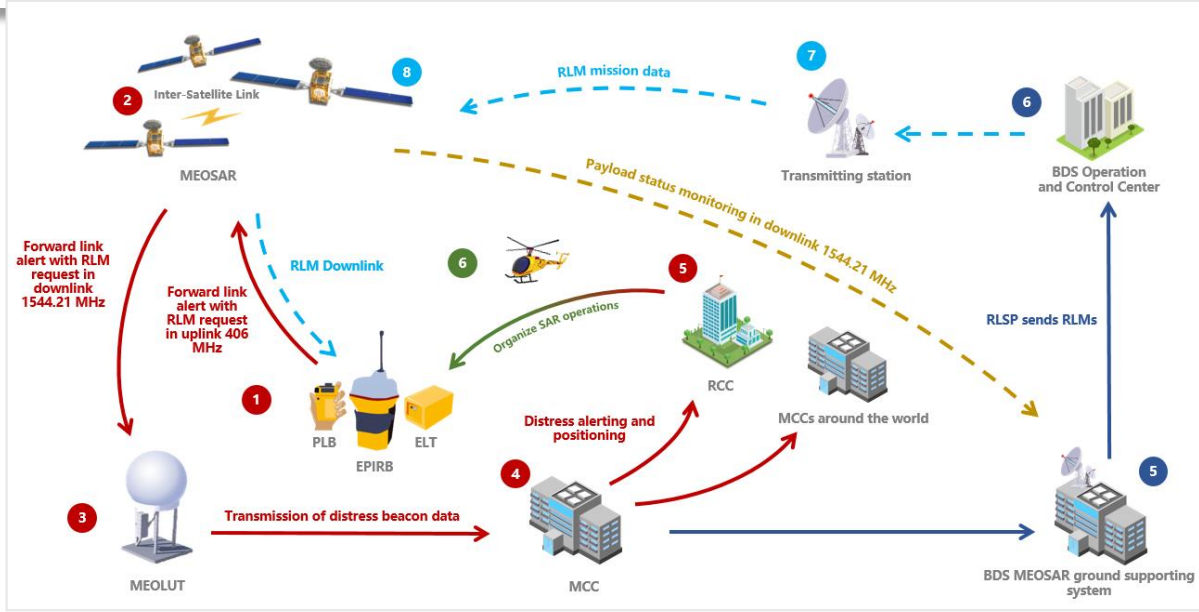
COSPAS-SARSAT ground segments will upgrade their MEOSAR local user terminals (MEOLUTs) in accordance with SAR/BDS parameters as included in Cospas-Sarsat standards. After the FOC of SAR/BDS, China will follow up such upgrade and future usage by MEOLUTs.

03

To fulfill the obligations as a space segment contributor

After 3 months entering FOC, we will distribute to global MCCs the SAR/BDS ephemeris information via SIT 217 messages and notification and alarm information via SIT 525 messages when SAR/BDS payloads are malfunctioning.

Application of BDS RLS



Type I

Used to send automatic acknowledgement to the user beacon after receiving distress alerts.

Type II

Used to send edited information by RCCs to the user beacon after evaluating the distress situation.

Type III

Similar as Type II, used for sending freely edited text to the user beacon by needed party.

Inclusion of BDS RLS into Cospas-Sarsat

In accordance with the A series documents of Cospas-Sarsat, facilitate the CSC to approve and include BDS RLS identifier and data distribution plan into Cospas-Sarsat standards.

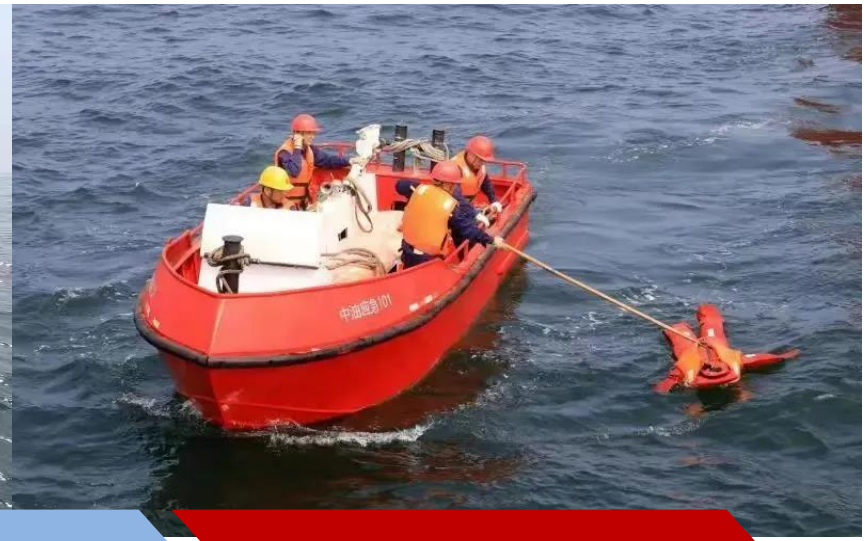
In June 2023, BDS RLS proposal was reviewed and approved by the JC 37 of C/S.

The document submitted by China proposes revisions to C/S A.001 on data distribution plan, T.001 on the standard for FGB, T.018 on the standard for SGB and the G.005 on the coding, registration and type approve of 406 MHz beacons, with a view to incorporating BDS RLS. The outcomes are recorded in the summary records of JC 37.

In October 2023 at the CSC 67, we will continue promoting the revision to C/S standards to include BDS RLS.

No-script Maritime SAR Exercise

In September 2021, China conducted a no-script maritime SAR exercise with the support of BDS in Hebei province in a scenario that a fishing vessel capsized and 11 mariners are in distress.



Hebei MCC coordinated and directed national professional SAR vessels, coast guard and social SAR forces to conduct SAR operations.

BDS SAR beacons are used together with SAR helicopters, drones and artificial unmanned vessels.

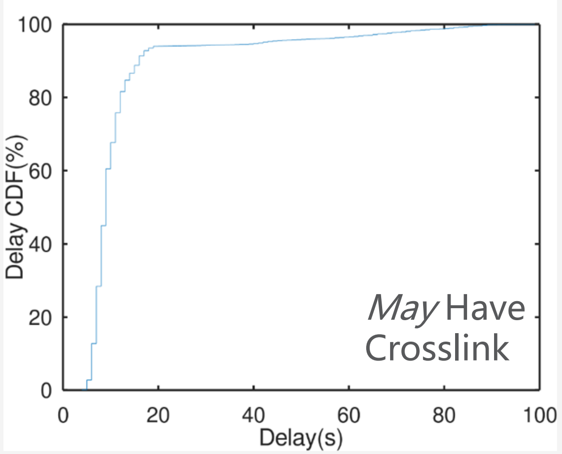
Tested SAR/BDS service and capabilities in real maritime environment and completed the distress alerting and SAR operation.

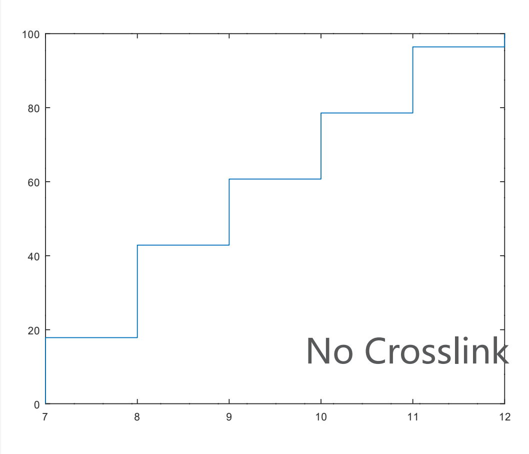
Rapid and efficient SAR activities were conducted to save the marines in distress.

BDS RLS Service Testing

The time delay RLS service performance standard.

Zhejiang China   9 seconds delay



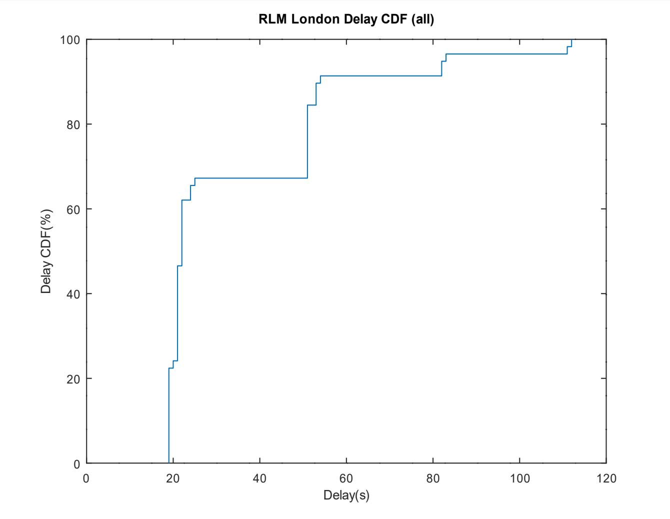


PRN	SOW	Message	RMK
37	291714 (BDT)	0F46BC000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000	Target Address 122 E, 30 N

B2b message time stamp **CST 17:01:50**

Request time-stamp in dummy message **CST 17:01:41**

London, U.K.



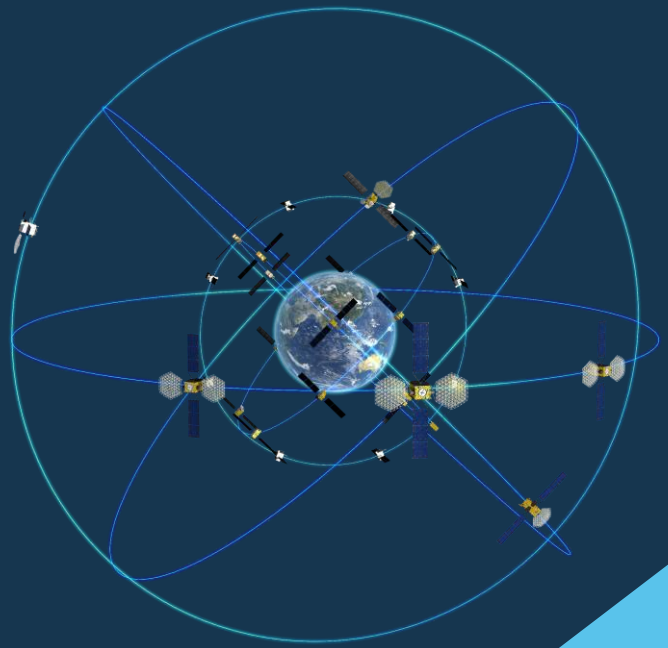
The delays is between 19 seconds and 112 seconds, **averaging 34 seconds**.

BDS RLS Service Testing

In the northern, southern, eastern and western parts of China to conduct BDS MEOSAR and RLS service testing.

In the future, would like to conduct joint tests on BDS RLS with interested MCCs.

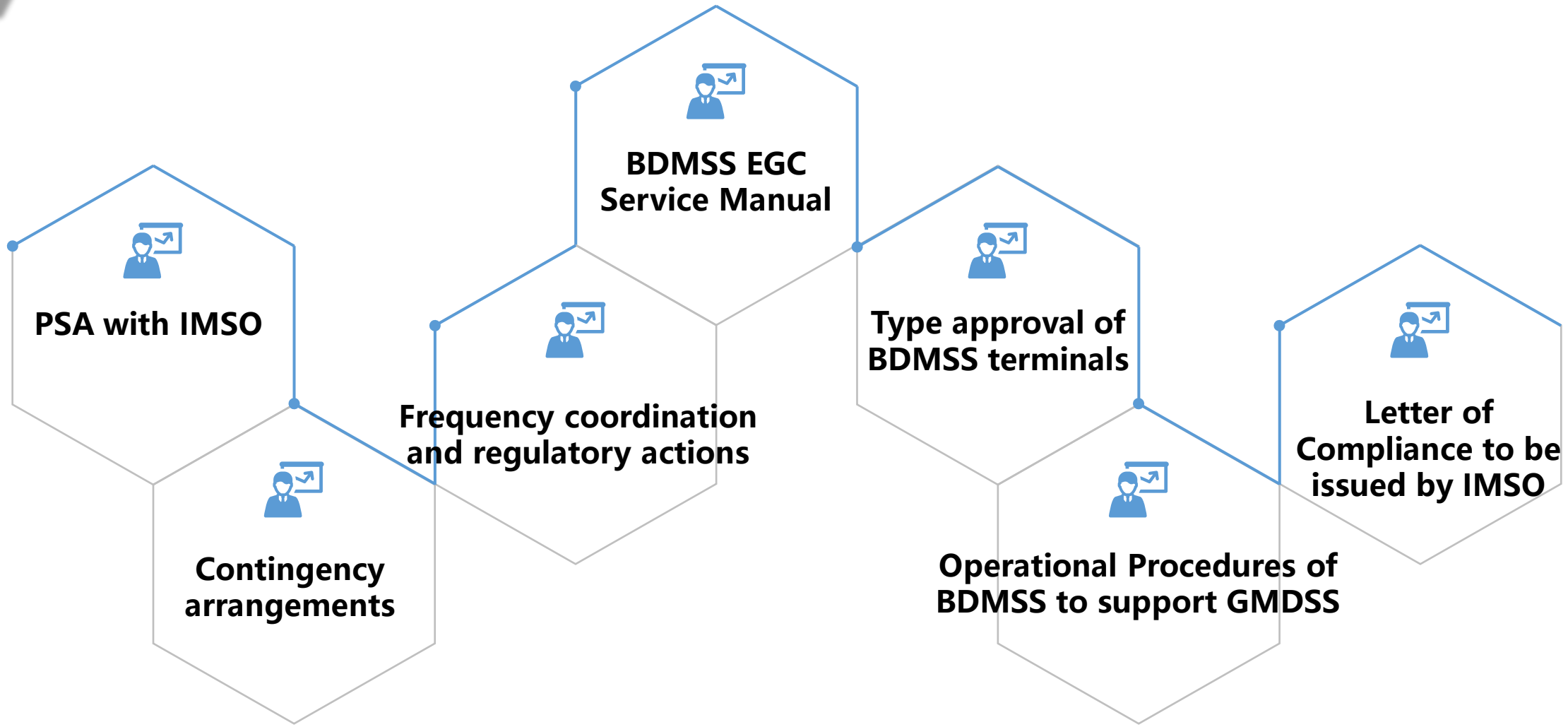
Distress beacon that supported BDS RLS



Cooperations in the Framework of ICG

03

Updating on Commencement of GMDSS Service



Conducting Joint tests on BDMSS GMDSS Services

Interested ICG Members are invited to conduct joint tests and verifications on BDMSS GMDSS services and functions, which may include:

1.Maritime distress alerting tests;

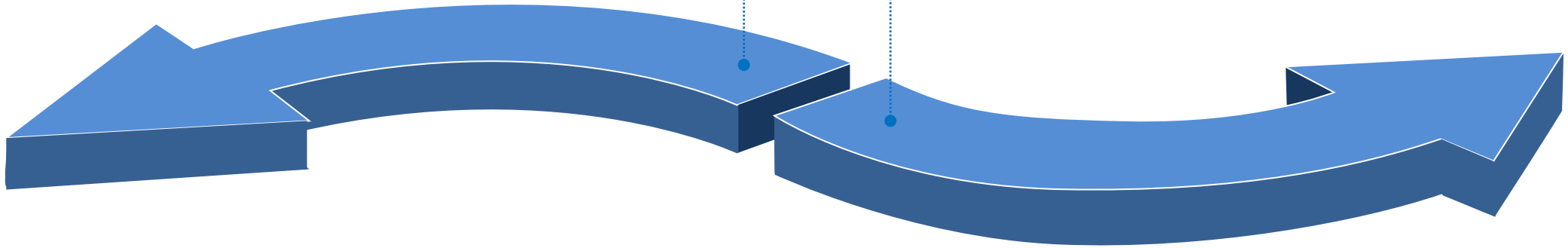
2.Maritime safety information broadcast;

3.Maritime coordination, dispatching and routine messaging communications。

Technical Cooperation in BDS SAR and RLS Services

Following the inclusion of SAR/BDS into Cospas-Sarsat, we are seeking technical cooperation in compatibility and interoperability to better contribute to international search and rescue via BDS.

Invite interested MCCs to conduct testing and verifications on BDS international SAR and RLS services.




BeiDou message communication and international SAR services are public service products China provides to global users, with a view to enriching global maritime distress and safety communications and SAR approaches, empowering life saving forces and improving SAR efficiency. We will provide BDS protections for your safety of life and property.

Initiative to the ICG

The Committee is invited to note the outcome achieved of BDS in contributing to satellite communication and search and rescue, as well as the continuous efforts made by China.

Open

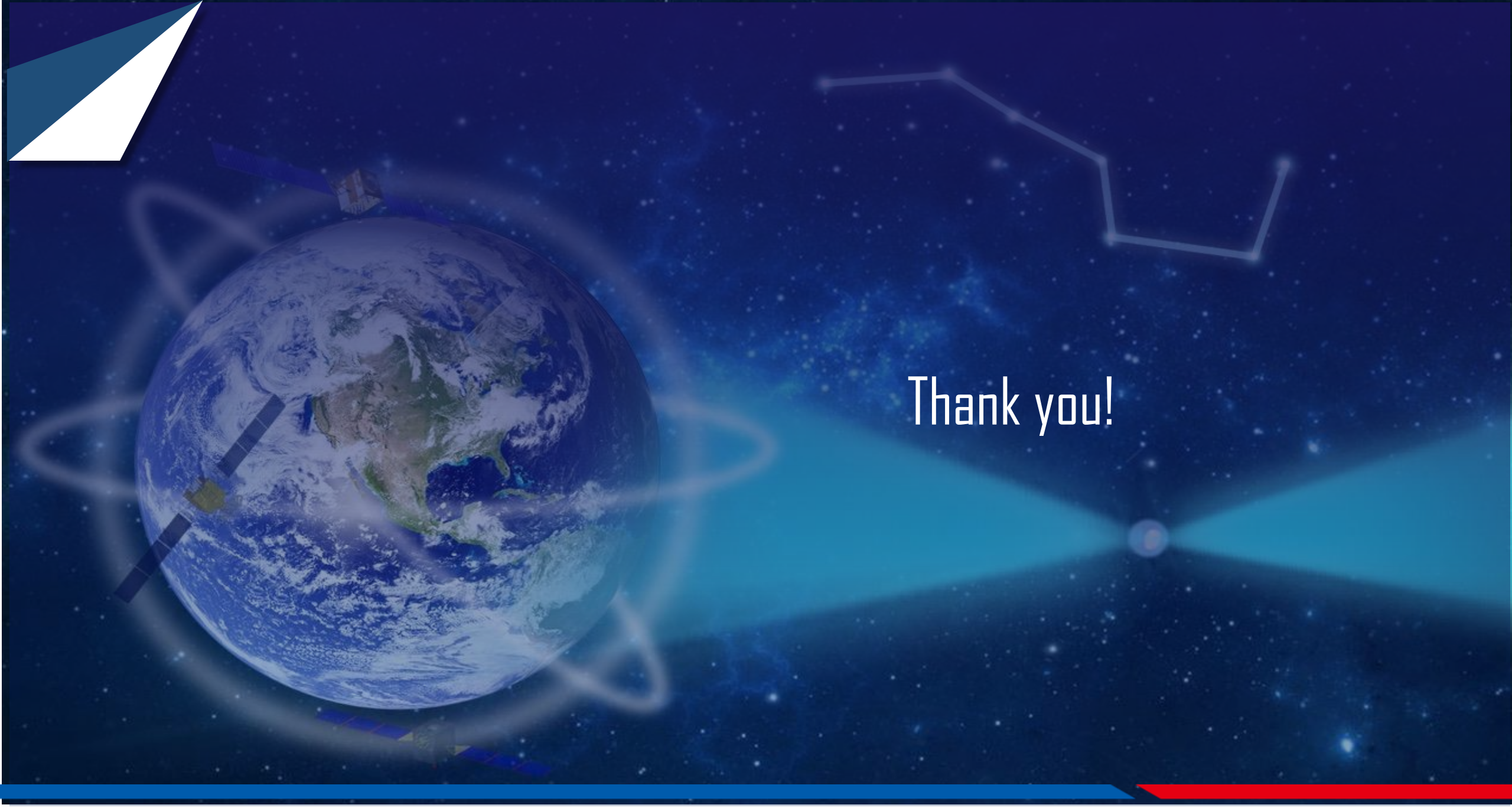
Inclusive

Cooperative

Win-Win

Interested ICG Members are invited to participate in the tests and technical exchange and cooperation on BDMSS GMDSS services and BDS SAR services, with a view to facilitating the satellite technology development and applications.

- **Contact: Falong Liu**
- **Email: liufalong@cttic.cn**
- **Mobile: +86 182 1013 6059**


Thank you!