Developments of BDS Applications in Communication and SAR

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Developments of BDS Application in GMDSS
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

**Space Segment**

- 58.75°E
- 80°E
- 110.5°E
- 140°E
- 160°E

**Ground Segment**

- BDMSS-MCS (BEIJING)
- BDMSS-Backup MCS (Southwestern of China)
- BDMSS (GROUND SEGMENT)

**Gateway**

- BDMSS-Gateway (BEIJING)
- BDMSS-Backup Gateway (SHANGHAI)
- BDMSS (GROUND SEGMENT)

**Communications**

- C-band
- L-band
- S-band

**Terminal**

- Beidou Maritime Mobile Terminal

**Networking**

- Dedicated Circuit
- Backup Dedicated Circuit

**Service Providers**

- CN-MRCC
- RCC
- MSIPs
- Medical Institutions
- The Public

**Internet Services**

- Tel/Fax
- Web Service

**Web Services**

- Internet
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 2 - Urgency
- Lvl 3 – Safety
- 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

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

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

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.
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.

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

- General Communications
- Maritime Distress Alerting
- Vessel Location Identification and Tracking
- BeiDou Message Service
- EGC
- Fleet Management
### Scenario – Maritime Distress Alerting

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<thead>
<tr>
<th>Process and Forward Distress</th>
<th>Distress Status Monitoring</th>
<th>SAR Coordination Communication</th>
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<tr>
<td>Forward distress alerts to associated RCCs immediately upon reception and record follow up actions.</td>
<td>Track and monitor vessels in distress, including its position, speed, sailing course, etc., to assist search and rescue activities.</td>
<td>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.</td>
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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.
Developments of BDS in International Search and Rescue
November 2022, Cospas-Sarsat CSC/OPN 67

BDS is included in the Cospas-Sarsat MEOSAR system.

In 1992, China became 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.

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.
# Plans to Facilitate the FOC of SAR/BDS

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<th>01</th>
<th>To declare that SAR/BDS enters into FOC</th>
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<td>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.</td>
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<th>02</th>
<th>To follow up MEOLUTs upgrade to support SAR/BDS</th>
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<td></td>
<td>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.</td>
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<th>03</th>
<th>To fulfill the obligations as a space segment contributor</th>
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<td></td>
<td>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.</td>
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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.
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.

Rapid and efficient SAR activities were conducted to save the marines 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.
BDS RLS Service Testing

The time delay RLS service performance standard.

**Zhejiang China**  9 seconds delay  **London, U.K.**

The delays is between 19 seconds and 112 seconds, **averaging 34 seconds.**
In the future, would like to conduct joint tests on BDS RLS with interested MCCs.

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

Distress beacon that supported BDS RLS
Cooperations in the Framework of ICG
Updating on Commencement of GMDSS Service

PSA with IMSO

Contingency arrangements

Frequency coordination and regulatory actions

BDMSS EGC Service Manual

Type approval of BDMSS terminals

Operational Procedures of BDMSS to support GMDSS

Letter of Compliance to be issued by IMSO
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;
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.
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.

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.
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Thank you!