MT2000/TG2/0312.doc **Agenda Item 3.3**

# MCC INTERNET INTERFACE (MII)

## 1. ACTION REQUIRED

To enhance the capabilities of Cospas-Sarsat MCCs in par with the current technology as well as to provide a standard platform for exchange of operational data among Cospas-Sarsat community, the Task Group is invited to consider the development of MCC Internet Interface (MII) as described in this paper. The interface is expected to support the following operational requirements:

a) FTP and email as mode of data communications in Cospas-Sarsat network;

b) access to alert data, SIT messages and beacon registration database (limited) from individual MCC through Internet by authorized Cospas-Sarsat users for operational use, analysis and reporting;

c) common software utilities and query based information retrieval system through Internet (standardization of operator/user interface); and

d) common website of Cospas-Sarsat alerts with limited information and provision to update alert status (false or real) by authorized MCCs/RCCs/SPOCs or external SAR agencies.

Having agreed for the development of above interface, the Task Group is requested to workout a common implementation approach so as to bring a level of commonality among Cospas-Sarsat MCCs.

## 2. BACKGROUND

The present Cospas-Sarsat MCCs have been developed over a long period by different vendors using different systems, standards and software tools. The systems have gone through several changes/ refinements based on requirements of Cospas-Sarsat participants. Each system is different from the other.

When we closely analyze the performance of the Cospas-Sarsat system with respect to a specific incident, it takes quite a long time, and sometimes required information is not available as different MCCs have different modes of data storage and retrieval. Also the data provided by different MCCs have different formats and contents that requires a lot of time to organize and derive a meaningful information. It is felt that there should be a set of standard procedures and formats to get operations data from any MCC at the earliest while supporting/analyzing SAR incidents. The information loses its importance if delayed.

To have accuracy and consistency in reporting system data (data statistics and specific analysis) there should be a common system of reporting.

Most of the changes proposed and recommended in Cospas-Sarsat meetings are related to data formats, message routing and communications, and majority of them are straightforward to implement. It would be easier to implement these changes, if there is a separate interface that could handle the changes of this nature.

Most of the MCCs are custom built, and there is hardly a scope to make minor changes or integrate external software utilities for specific requirements or applications.

There is a powerful medium of Internet to make the SAR information (alert data, messages, beacon registration details and status of alerts) easily and quickly available to every individual concerned. Use of such techniques would certainly help SAR agencies to resolve several problems associated with false alarming which is a major concern in Cospas-Sarsat system today. The MCCs would be benefited by having open and transparent system to exchange messages and other related data quickly and easily without needing any assistance from source MCC.

While working for a common cause, and purely on humanitarian ground, there is a need to have a suitable platform to share data, information, resources and efforts for overall development of the system. This stresses a need to have a commonality among Cospas-Sarsat MCCs as everyone has the same requirements.

## 3. COMMENTS

Internet is the greatest communication tool that has been conceived in the twentieth century. The Internet evolution is expected to be as powerful as the industrial and scientific revolutions. It has penetrated into all strata of society and all types of information from all over the world is easily accessible. Internet has changed profoundly our life styles.

The main objective of this paper is to propose a development of common interface that could handle diversity among Cospas-Sarsat MCCs and provide a common approach for management of operational data of mutual interest, and to handle Internet related applications. This would be a common standard platform providing link between MCCs through Internet to share the data and other related information within Cospas-Sarsat and user community.

### 3.1 System Description

The proposed system will consist of following elements:

- Cospas-Sarsat MCC (Core Processing Module)
- Communication Interface between Cospas-Sarsat MCC and MII
- MCC Internet Interface (MII)

**Cospas-Sarsat MCC:** Cospas-Sarsat MCC performs alert data processing as per Cospas-Sarsat specifications and communicates the alert locations to MCCs and SAR agencies (RCCs/ SPOCs) through preformatted messages (known as SIT message). Main functions of Cospas-Sarsat MCC are receiving alert locations from LUTs and external MCCs, performs match-merge, geographical sorting and generation and transmission of formatted messages to external agencies for SAR action.

**Communications Interface between Cospas-Sarsat MCC and MII:** This would be a two way communication interface between Cospas-Sarsat MCC and MII for exchange of alert data and formatted SIT messages as per defined communication protocol and data format. This interface would network the MCC and MII for exchange of alert messages and related data. It would perform following tasks:

- All the SIT messages (incoming & outgoing) will be transmitted to MII. The MII would archive these messages as per source & destination ids.
- The messages received from the parent MCC with FTP/email header would be transmitted to external MCCs as per the destination code.
- After each pass parent MCC would transmit processed data (important parameters pertaining to each alert) to MII in a defined format, in addition to SIT messages.
- MCC would transmit LUT pass schedule once in day or whenever any change is made.
- MCC would also provide log of activities, system alarms and related data for system monitoring.
- MII would transmit incoming SIT messages to parent MCC for further processing.

**MCC Internet Interface (MII):** This is a proposed system that would be interfaced with Cospas-Sarsat MCC and would carry out defined tasks related to data communication, alert processing, and query based retrieval/transmission of operational data and information through Internet. This would communicate with Cospas-Sarsat MCC through a software interface implemented at both the ends, to exchange alert data and SIT messages. The beacon registration database would also be maintained by MII.

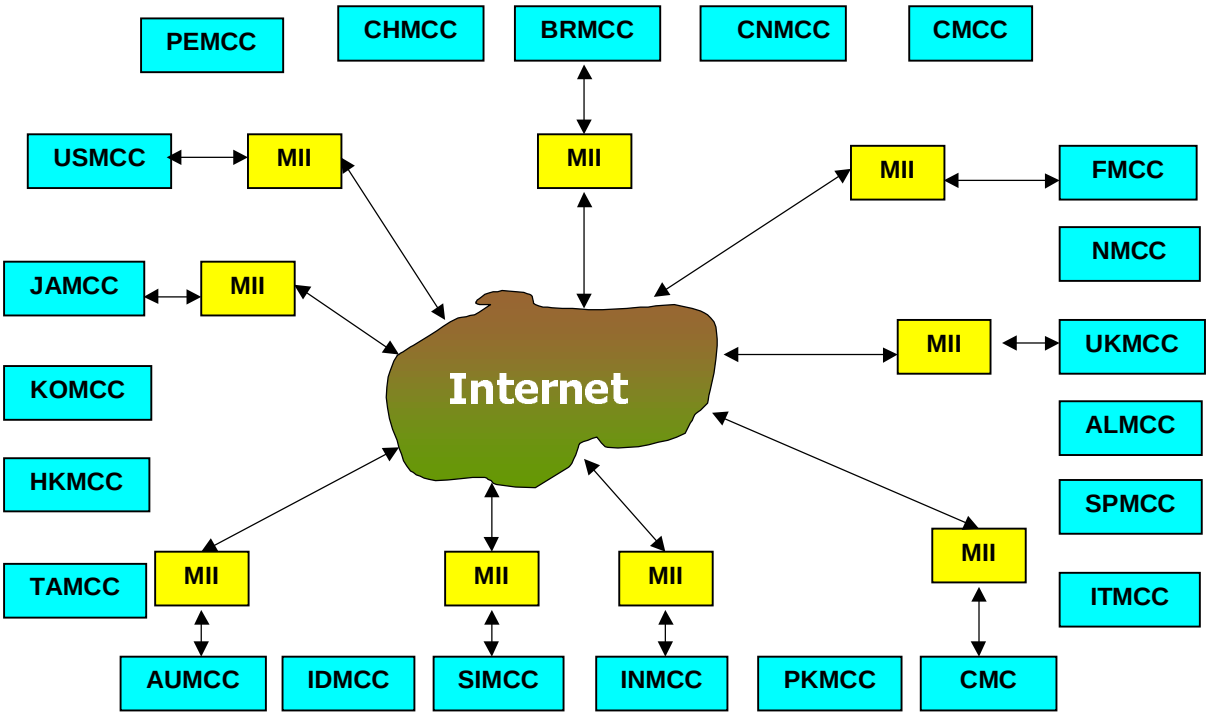


**Fig 1: MII INTERCONNECTIVITY**

(Only few MCCs are shown connected to Internet through MII in the above diagram, in real scenario each MCC will have similar interface and connectivity to Internet through MII)

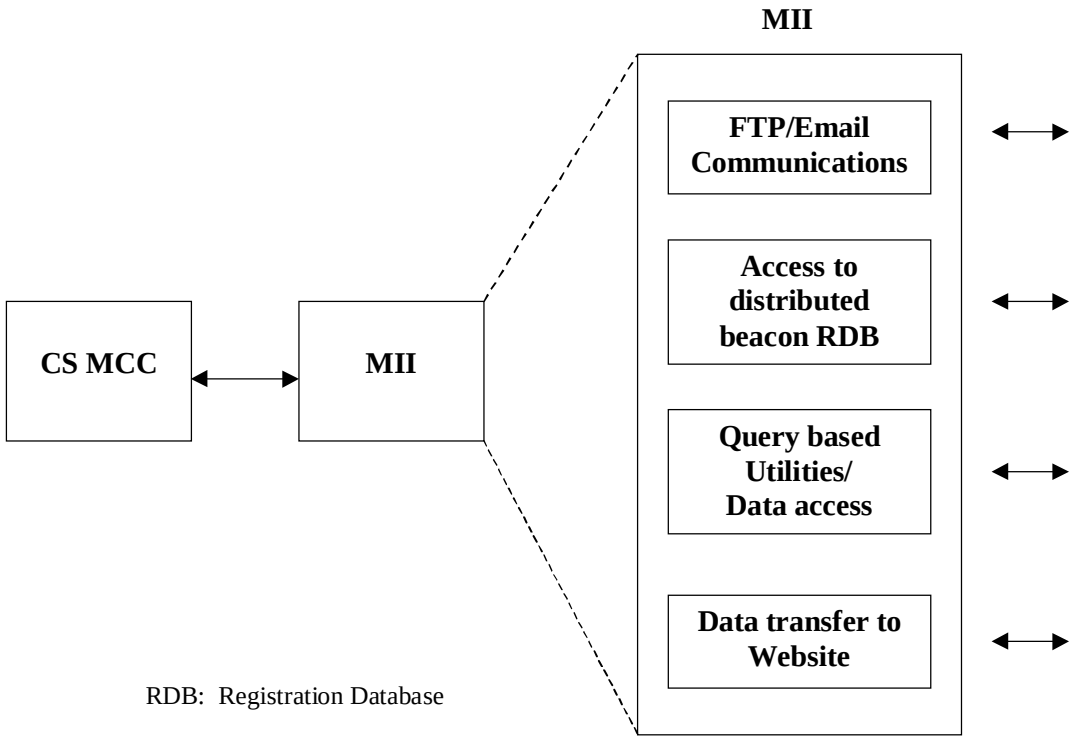


**Fig 2: MII FUNCTIONS**

### 3.2 System Requirements

**The proposed MCC Internet Interface is required to perform following main tasks:**

- Receive formatted SIT messages and related alert data from Cospas-Sarsat MCC after each satellite pass, perform validation, process the data and append to necessary files/databases.
- Transmit SIT messages to respective destinations (as contained in the message body) using FTP or email (automatic/manual) as defined in the configuration. It will have provision to handle any number of destinations using a logic based on country code, destination code, SRR as contained in the message, as well as operator defined criteria.
- Receive SIT messages from external MCCs directly, process them, append to necessary files/databases and send to Cospas-Sarsat MCC for further processing.
- Retrieve beacon registration data from different administrations/MCCs based on country of beacon registration using automatic as well as manual options and transmit to RCCs.
- Provide data query interface to external users through valid password to extract and transmit the requested information (like beacon detection summary, alert summary

for a given period, SIT messages for a given period/ beacon/ destination, beacon registration information, LUT tracking schedules etc.).

- Provision to integrate external software for specific requirements/data analysis (after minor modifications and conversion to compatible platform).
- Option to transfer alert data to website maintained by the MCC.

**It is also planed to include following support functions:**

- Generation of 406 MHz interference report, beacon exercise report, daily operations summary and validation of DDP procedures.
- Database of concerned RCCs and SPOCs under MCC service area with contact details.
- Alert history around a given location (characterisation of locations often producing false alarms/interference signals etc.).
- History of real alerts in MCC service area.
- Provision interface to GIS (Geographical Information System).

**Common Website of Cospas-Sarsat Alerts:** Nodal MCCs jointly could organize alerts on a common Cospas-Sarsat website for use by RCCs, SPOCs and other SAR agencies around the world. The website may have provision to update the status of alerts (real / false) by authorized SAR agencies. In addition to this, each MCC can transfer SIT messages to a common Cospas-Sarsat website apart from normal routing for access by any MCC if needed. The data storage period may be fixed depending upon the volume of the data.

### 3.3 Technical Approach

The main objective here is to propose a secured mechanism to exchange information between MCCs over Internet. FTP is sufficient for SIT message transfer, however it becomes more difficult to manage queries through FTP. FTP has been covered in Australian paper (JC-13/6/22) and it is already in use/test phase at some of the Cospas-Sarsat MCCs. This section proposes a solution that facilitates both alert messages and queries between MIIs.

**Assumption:** This paper assumes that all the MIIs will be connected to the Internet directly.

**Key Technical Terms:** FTP (File Transfer Protocol), SMTP (Simple Mail Transfer Protocol), DES (Data Encryption Standard), HTTP (Hyper Text Transfer Protocol), SSL (Secured Socket Layer), XML (Extended Markup Layer)

**Data Exchange Mechanism between MIIs**

The MII can support three interfaces for information exchange: FTP, Email and HTTP. FTP and Email can be used for SIT messages transfer. HTTP can be used for exchange of SIT messages and specific queries.

**Considerations**

The following issues are considered for implementation before arriving at this proposed solution:

- Security
- Standard Protocol
- Message format definition

**Security**: Any critical information that gets transferred across the Internet must be protected. One way of ensuring the security of the data transferred across Internet is encryption. This paper proposes to use two mechanisms: DES and SSL (Secured Socket Layer) for information exchange between MIIs. All the SIT messages transferred through FTP and Email will be encrypted using DES. HTTP query exchange will be implemented using SSL. These transfer mechanisms protect not only corruption of data but also prevent any hacker introducing spurious SIT messages or queries into the system.

**Protocol**: Internet has a range of application protocols for information exchange. This is a fairly large list, which includes application protocols like SMTP, Telnet, FTP, HTTP, SNMP (Simple Network Management Protocol) etc. FTP and Email applications are widely used. HTTP is another common protocol that is used widely between the Web Server and the browser. HTTP servers and client/browsers also support SSL for secured information transfer. Low cost tools are available to develop applications based on FTP, Email and HTTP. Telnet is designed on the premise of interactivity, and though can be automated; it would amount to implementing a customized application. In light of these considerations, India proposes to use FTP, Email and HTTP as the mechanisms for transfer of information between MIIs.

**Query Message Formats**: Given the protocol and information transfer mechanism, it is necessary to define the query message formats. It is proposed to use XML, which is a widely used language on the Internet for content definition of web sites. XML definitions will be developed and used for the information exchange on HTTP only. The other SIT messages through Email and FTP will not be redefined using XML definitions.

**Problems with the current approach**

**Firewall Protection to MIIs**: Hacker attack is the most serious problem in directly connecting MIIs to Internet. By setting up a firewall, this threat can be reduced to a large extent. The problems with the firewall are well known. The reliability of the firewall depends on how well the firewall is configured. A configuration error can result in isolation of MCCs from the rest of the world. Such firewall configuration errors can be reduced by implementing a health check test suite, which can test the connectivity between MIIs at regular intervals. If any of the MIIs is not reachable the system administrators can be alerted for manual intervention.

### 3.4 Implementation

In light of flexibilities offered by the current software techniques and tools, blended with the experience gained over the years by the entire Cospas-Sarsat community in the development, operations and maintenance of Cospas-Sarsat ground systems, a flexible MCC interface can be designed. This would meet most of the routine operational requirements.

It is proposed to have this interface as an identical one with all the MCCs, so as to have compatibility for data exchange. A common Specification Requirement document may be prepared, based on the inputs received from the participants and the development may be shared by the interested MCCs, having good experience/resources and willing to work together for a common objective.

### 3.5 Operational benefits

- ⇒ standardization of operator interface
- ⇒ uniformity in maintaining operations data
- ⇒ sharing the resources, information, data, efforts and avoiding duplication of work
- ⇒ keeping systems updated to current technological standards and trends
- ⇒ flexibility in the system to adopt the changes quickly and simultaneously at all the global MCCs
- ⇒ integrating external software for specific applications/analysis
- ⇒ to easily maintain distributed beacon registration database on existing platform (without stressing a need to have common registration database that is very difficult to maintain)
- ⇒ easy access to SIT messages that are received corrupted or lost in transit
- ⇒ handling minor changes as proposed by Cospas-Sarsat (like checksum, message sequencing, minor changes in message formats, automatic repeat request etc.)
- ⇒ implementation of common tools and software for system monitoring and reporting
- ⇒ participation of every individual of Cospas-Sarsat community in the developmental process, any person, at any time, from any place will have access to the data for analysis and would be able to contribute to the Cospas-Sarsat system
- ⇒ an approach for 100% automation
- ⇒ easy to identify false alarms
- ⇒ globalization of SAR information
- ⇒ flexibility in routing alert messages to any number of additional users based on requirements
- ⇒ making various types of databases and processed information available to users in standard formats

⇒ availability of reliable, quick and consistent information on system status and operations from each MCC

## 4. RECOMMENDATIONS

India recommends the development of MCC Internet Interface for enhancement of the system capability to current technology (Internet), most popularly used for information dissemination, along with many other benefits as described in this paper. The proposed interface will not interfere with the current Cospas-Sarsat procedures and operations, and could be taken up as a parallel development.

It is also recommended to follow a common approach for the development of MII to have flexibility and compatibility for further enhancement of all Cospas-Sarsat MCCs simultaneously, and to meet common operational requirements having consistency in reporting.