

INMCC EXPERIENCE AND ASSESSMENT OF COMMUNICATIONS SYSTEMS

1. ACTION REQUIRED

The Task Group is invited to review and make note of INMCC experience and assessment of the present Cospas-Sarsat communication systems for planning future systems and communications standards.

2. BACKGROUND

INMCC presently uses AFTN as prime mode for alert data communication to RCCs, SPOCs & MCCs. The telex system was earlier used as backup to AFTN, but it is not in use now. Later when problems were faced with AFTN data corruption, email was tried as prime mode and found to be not up-to the mark to meet SAR requirements. Assessment of email system was presented in Cospas-Sarsat JC-13 meeting and was recommended to be used as backup mode. Now FAX has been used as backup to AFTN for RCCs and SPOCs. Often problems have been faced with AFTN messages that are delivered garbled at receiving MCCs.

This paper presents overall experience and assessment of the communications systems used by INMCC, in particular AFTN, and suggests ways to overcome some of the problems faced.

3. COMMENTS

AFTN: AFTN has been widely used mode of data communication in Cospas-Sarsat network for distribution alert messages. Often problems have been faced due to message corruption/distortion between MCC to MCC communication. Analysis shows that valid messages without any error have been sent by the originating MCC, the corruption takes place during transit at different nodes through which the message gets routed to the end destination (MCC).

More problems were faced when 'SS' priority was used for transmission of SIT messages. CMC after analysing the problem found that 'SS' priority messages are more prone to transmission errors. CMC observed that 'SS' messages are processed differently by different international nodes for routing the messages, hence corruption takes place. On advice from CMC, INMCC switched over to 'DD' priority to avoid message corruption. After making this change, drastic improvement was observed in the quality of message transmission but it was not 100%.

Several useful inputs were received from AUMCC and CMC on the type of corruption. The type of corruption observed are numeric values changing to alpha numeric, portion of the message chopped off, numeric values changing to another numeric value (very serious error),

getting unrecognised symbols introduced in the messages etc. Australia and India jointly carried out several tests to fix the problem and identify a particular node that introduces the errors, by routing the messages through different international nodes, but no specific reason could be fixed. The nature of the problem was found to be random. The message corruption is not observed always or not at a particular time, occasional message corruption was noticed. One of the most likely reasons could be quality of transmission lines, and the other one could be performance of hardware systems at intermediate nodes.

It is very difficult to fix a node that is causing problem as AFTN is maintained entirely by different agencies and people having no connection and commitment to Cospas-Sarsat System. Hence nothing much can be done by MCC operators to resolve this problem.

AFTN is an old system (teleprinter based, working at 50 baud) without having any protection for error detection and correction, being specifically used for aviation purposes to exchange only text messages that have no requirement of further computer processing at receiving end. Complete message transaction is done in manned operational environment, and any corruption / distortion in the text message is handled manually by making repeat requests.

It is clear that AFTN was not designed to meet Cospas-Sarsat requirements, therefore it would be unwise to expect the system to comply with Cospas-Sarsat specifications. As Cospas-Sarsat has adopted AFTN as one of the widely used mode of communication, we have to live with its limitations and try to overcome the shortcomings by way of operational procedures and adopting appropriate software solutions.

At this stage it is not possible to take out AFTN from the Cospas-Sarsat network, as many of the MCCs and RCCs are fully dependent on it.

Following corrective measures may be taken to overcome the problems:

1. If message is received corrupt and not validated by an MCC, an automatic repeat request may be generated to the source MCC that originated the message in a standard SIT format (to be defined). On receiving this SIT message, source MCC will know which message is to be repeated, and accordingly will comply with the repeat request automatically.
2. Even some qualified messages may have errors as one numeric value may change to another (or '+' may become '-') and it passes through validation check as per SID. Such errors are very serious in nature and should be handled by appropriate software checks to detect the errors and make a repeat request automatically. The software solutions like one proposed by Australia in a paper "Checksum Field In SIT Messages" would solve such problems.

Telex: Indian RCCs have phased out telex system, hence INMCC is no more using the telex for alert distribution. Following drawbacks are found in the telex system:

1. Occasional transmission errors
2. Telex link quality is not very stable, several breaks used to be observed while transmission
3. It is a public domain system and 100% availability can not be guaranteed
4. Restoration of telex link breakdown (national and international) taking long-time
5. Slow rate of data transmission
6. It is not cost effective

Hence it is suggested to phase out telex system of communication from CS MCCs.

Email: The detailed analysis of email system was presented jointly by India and Australia in JC-13 meeting (JC-13/6/21), and it was concluded that it can not be used as a prime mode for alert data distribution. However, it was recommended to use email as backup system and for non-critical SAR requirements. Except delays (14% cases) and messages loss (2%), email was found to be most simple and effective mode of SIT messages transmission in Cospas-Sarsat network. It is a cost effective and most simple mode of data communication and has been recommended as support communication system in Cospas-Sarsat network (see separate Indian paper on email as support communication system).

FAX: FAX can not be used for MCC to MCC communications as SIT messages sent by fax can not be automatically processed by the receiving MCC and need manual data entry. This mode is used as backup for RCC and SPOCs only, where there is no further requirement of alert message processing.

X.25: Extensive survey of X.25 communication was carried out in India and it was found to be most expensive compared to all other modes of communications. Hence India did not opt for it. Moreover it also poses some of the problems as described in Australian paper "Cospas-Sarsat Ground Segment Communications" (JC-13/6/22).

FTP: As the initial results indicate FTP is the most reliable and efficient mode for data communication especially for SAR requirements, India is planning to augment the MCC with FTP facility for alert data communication.

4. RECOMMENDATIONS

India recommends that:

1. AFTN may continue to be used as one of the modes of SAR data communication in Cospas-Sarsat network by taking care of its limitations through appropriate software solutions. It may also be noted that MCC operators can not help resolving the data corruption problem in AFTN network.
2. Telex system may be phased out from Cospas-Sarsat MCC communication network in future by setting an appropriate deadline.
3. Use of FTP may be included as one of the prime modes of data communication in Cospas-Sarsat network.