

EFFICIENT USE OF THE BANDS 1 544 - 1 545 MHz
AND 1 645.5 - 1 646.5 MHz

(Question 90/8)

(1990)

1. Introduction

The frequency bands 1 544 - 1 545 MHz (space-to-Earth) and 1 645.5 - 1 646.5 MHz (Earth-to-space) have been allocated by WARC-79 to the mobile-satellite service and are limited, by RR 728, to distress and safety operations. The 1988 amendments to the International Convention for the Safety of Life at Sea (SOLAS) 1974 to introduce the Global Maritime Distress and Safety System (GMDSS) include requirements for equipment using satellite techniques operating in these bands, which are to enter into force between 1992 and 1999. However, other systems may also be potential users of these bands.

2. Utilization of the frequency bands

2.1 Frequency band 1 544 - 1 545 MHz

By provision of RR 27, the mobile-satellite service may also include feeder links necessary for its operation. A portion of the 1 544 - 1 545 MHz band (800 kHz centered at 1 544.5 MHz) is already being used for feeder links by the 406 MHz satellite emergency position indicating radio beacon distress alerting and locating (COSPAS-SARSAT) system (Report 761).

The International Maritime Satellite Organization (INMARSAT) is introducing in this band, its Enhanced Group Call (EGC) Safety Net which will also be a part of the GMDSS. Through the Safety Net, shore-to-ship distress alerting, promulgation of maritime safety information (MSI), and perhaps the transmission of correction data for electronic chart display systems (ECDIS), will be provided for ships using the broadcast mode (Report 921).

The utilization of this band is shown in Figure 1.

* The Director, CCIR, is requested to bring this report to the attention of the International Maritime Organization (IMO), the International Civil Aviation Organization (ICAO), and the International Maritime Satellite Organization (INMARSAT).

2.2 Frequency band 1 645.5 - 1 646.5 MHz

WARC-79 allocated this frequency band without knowing how many different systems would be implemented or the specific detailed bandwidth requirements of each. WARC MOB-87 permitted intersatellite links to be used in this band for distress and safety operations. Now it appears that two different systems and possibly one additional may use this band in the near future. The two known systems and their anticipated bandwidth requirements are as follows:

1.6 GHz satellite EPIRB system	200 kHz ¹⁾
COSPAS-SARSAT intersatellite links ²⁾	400 kHz.

A possible future use of this band for safety communications using INMARSAT or other satellite systems can be anticipated. This latter service could probably be implemented in a band of approximately 30 to 50 kHz, and 100 kHz should be more than adequate. Future distress and safety applications are unknown, but it is feasible that there may be some new applications. Only the 1.6 GHz satellite EPIRB system will utilize this band in the near future. Therefore, implementation of the 1.6 GHz satellite EPIRB system must be orderly if the spectrum is to be available for the future utilization by as yet unknown distress and safety operations. The 200 kHz bandwidth for the 1.6 GHz satellite EPIRB system should be sufficient for implementation of the system. The bandwidth required is determined by two major factors: the needed capacity to meet the IMO requirement and the practical economics of receiver-processor implementation.

In developing its GMDSS, the IMO estimated a demand for detecting 20 simultaneously-active satellite EPIRBs within a 10-minute interval. Report 1045 states that the 1.6 GHz satellite EPIRB system can achieve a capacity for handling at least 46 simultaneously-active satellite EPIRBs in a 200 kHz bandwidth. Considering that part of all Convention ships may utilize the 1.6 GHz satellite EPIRB system and part may utilize the 406 MHz COSPAS-SARSAT satellite EPIRB system, it can be conservatively assumed that the 1.6 GHz satellite EPIRB system³⁾ may be required to detect around 10 simultaneously-active satellite EPIRBs within a 10-minute interval. The 1.6 GHz satellite EPIRB system implemented within a 200 kHz band can meet the capacity required for Convention ships; however, the amount of additional capacity required for non-Convention ships cannot yet be estimated.

1) Reports 761 and 1045 indicate that 200 kHz provides a capacity larger than the IMO requirement for receiving 20 simultaneous satellite EPIRB transmissions within a 10-minute period.

2) COSPAS-SARSAT is studying the possibility of this application to improve the system alerting times, but no operational plans for implementation exist.

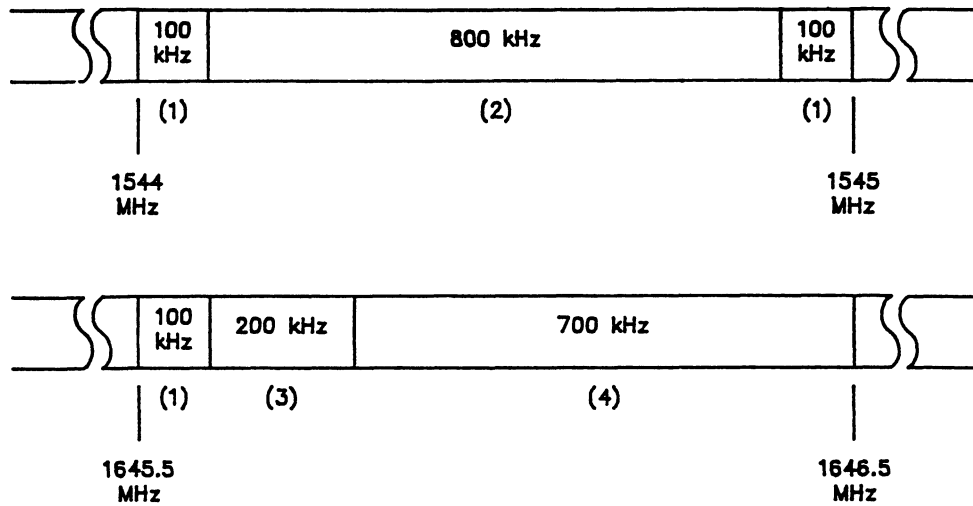
3) It can be estimated that more administrations will utilize the 406 MHz system rather than the 1.6 GHz system, but for purposes of predicting required capacity, this report assumes (conservatively) that about half of the vessels will utilize each system.

It follows, therefore, that in order to efficiently utilize the spectrum and to provide for future distress and safety applications in this band, the 1.6 GHz satellite EPIRB system should be implemented in a 200 kHz sub-band, preferably near the lower band edge, allowing a maximum contiguous spectrum availability for growth and new future applications.

The needs of future aeronautical and other distress communications will also have to be met in this frequency band. The utilization of this band is shown in Figure 1. Additionally, it should be noted that the low power systems in this band are subject to potential interference from spurious emissions from outside the band, in particular from intermodulation products from mobile-earth stations operating in adjacent bands (Report 1173). This potential problem needs to be taken into account and should be studied further.

3. Conclusion

Considering the growth in demand for frequency spectrum for distress and safety communications operating in the mobile-satellite service, the bands 1 544 - 1 545 MHz and 1 645.5 - 1 646.5 MHz need to be examined with the objective of efficient utilization. Due to the safety-related nature of communications in these bands, precautions need to be taken to avoid interference among the users of these bands, including, in some cases, separation of uses of a frequency. However, there may also be some potential for sharing frequencies among some users. These issues should be studied further, particularly in light of the current development of aeronautical mobile-satellite systems and the World Administrative Radio Conference scheduled for 1992, which is proposed to include consideration of the mobile-satellite services in the bands 1 to 3 GHz.



- (1) Distress and safety communications (for example, INMARSAT EGC operating in the 1.5 GHz band).
- (2) Feeder links for distress and safety mobile-satellite services (COSPAS-SARSAT system).
- (3) 1.6 GHz satellite EPIRBs (INMARSAT system)
- (4) Other users or expansion of existing users (for example, inter-satellite-links of the 406 MHz COSPAS-SARSAT system)

FIGURE 1

Possible utilization of the 1.5 and 1.6 GHz
distress and safety bands