Foreword

The role of the Radiocommunication Sector is to ensure the rational, equitable, efficient and economical use of the radio-frequency spectrum by all radiocommunication services, including satellite services, and carry out studies without limit of frequency range on the basis of which Recommendations are adopted.

The regulatory and policy functions of the Radiocommunication Sector are performed by World and Regional Radiocommunication Conferences and Radiocommunication Assemblies supported by Study Groups.

Policy on Intellectual Property Right (IPR)

ITU-R policy on IPR is described in the Common Patent Policy for ITU-T/ITU-R/ISO/IEC referenced in Annex 1 of Resolution ITU-R 1. Forms to be used for the submission of patent statements and licensing declarations by patent holders are available from http://www.itu.int/ITU-R/go/patents/en where the Guidelines for Implementation of the Common Patent Policy for ITU-T/ITU-R/ISO/IEC and the ITU-R patent information database can also be found.

Series of ITU-R Recommendations

(Also available online at http://www.itu.int/publ/R-REC/en)

Series	Title
BO	Satellite delivery
BR	Recording for production, archival and play-out; film for television
BS	Broadcasting service (sound)
BT	Broadcasting service (television)
F	Fixed service
M	**Mobile, radiodetermination, amateur and related satellite services**
P	Radiowave propagation
RA	Radio astronomy
RS	Remote sensing systems
S	Fixed-satellite service
SA	Space applications and meteorology
SF	Frequency sharing and coordination between fixed-satellite and fixed service systems
SM	Spectrum management
SNG	Satellite news gathering
TF	Time signals and frequency standards emissions
V	Vocabulary and related subjects

Note: *This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.*

Electronic Publication
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RECOMMENDATION ITU-R M.1174-3*

Technical characteristics of equipment used for on-board vessel communications in the bands between 450 and 470 MHz

(1995-1998-2004-2015)

Scope

This Recommendation describes the technical characteristics for equipment operating in the maritime mobile services in accordance with the provisions of No. **5.287** of the Radio Regulations (RR) for on-board vessel communications. Provision is made for 25 kHz or 12.5 kHz channel spacing for analogue and digital technologies. In addition, 6.25 kHz channel spacing may also be used for digital technology.

Keywords

Maritime, on-board communication, territorial waters, channel spacing, frequency arrangement, UHF

Abbreviations/Glossary

Ch. Channel number

FSK Frequency-shift keying modulation

The ITU Radiocommunication Assembly,

considering

a) that there is a need to describe the characteristics of equipment for on-board vessel communications in the bands between 450 and 470 MHz;

b) that changes have recently been made to the frequency availability,

recommends

1 that transmitters and receivers used in the maritime mobile service for on-board vessel communications in the bands between 450 and 470 MHz should conform to the technical characteristics shown in Annex 1;

2 that for analogue technology the use of continuous tone coded squelch systems or digital coded squelch (DCS) constitute an effective means of mitigating the impression of congestion to the user;

3 that for digital technology the use of DCS or a similar operational system should be used as a way to mitigate the impression of congestion to user;

4 that during operation, to detect whether there is an available channel for operation, it is advised that a method of listen before talk be employed as a possible mitigation technique;

5 that ship owners when replacing or installing communications equipment upon vessels are encouraged to fit equipment using 12.5 kHz or 6.25 kHz channel spacing.

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* This Recommendation should be brought to the attention of the International Maritime Organization (IMO) and the International Maritime Radio Committee (CIRM).

Annex 1

Technical characteristics of equipment used for on-board vessel communications in the bands between 450 and 470 MHz

1 The equipment should be fitted with sufficient channels for satisfactory operation in the area of intended use.

2 The effective radiated power should be limited to the maximum required for satisfactory operations, but should in no case exceed 2 W. Wherever practicable the equipment should be fitted with a suitable device to reduce readily the output power by at least 10 dB.

3 In the case of equipment installed at a fixed point on the ship, the height of its antenna should not be more than 3.5 m above the uppermost level of the deck.

	25 kHz channels analogue technology	**12.5 kHz channels analogue technology**
4	Only frequency modulation with a pre-emphasis of 6 dB/octave (phase modulation) should be used.	Only frequency modulation with a pre-emphasis of 6 dB/octave (phase modulation) should be used.
5	The frequency deviation corresponding to 100% modulation should approach ±5 kHz as nearly as practicable. In no event should the frequency deviation exceed ±5 kHz.	The frequency deviation corresponding to 100% modulation should approach ±2.5 kHz as nearly as practicable. In no event should the frequency deviation exceed ±2.5 kHz.
6	The frequency tolerance should be 5 parts in 10^6.	The frequency tolerance should be 2.5 parts in 10^6.
7	The audio-frequency band should be limited to 3 000 Hz.	The audio-frequency band should be limited to 2 550 Hz.

	12.5 kHz channels digital technology	**6.25 kHz channels digital technology**
8	Only constant-envelope modulation, entitled 4FSK (Four-level frequency-shift keying modulation) should be used.	Only constant-envelope modulation, entitled 4FSK (Four-level frequency-shift keying modulation) should be used.
9	The frequency deviation is limited to ±3 024 Hz.	The frequency deviation is limited to ±1 324 Hz.
10	The maximum transmit frequency error: ±2 ppm. The maximum time base clock drift error: ±2 ppm.	The maximum transmit frequency error: ±1.5 ppm. The maximum time base clock drift error: ±2 ppm.

11 Control, telemetry and other non-voice signals such as paging, should be coded in such a manner as to minimize the possibility of false response to interfering signals. The frequencies specified in § 15 below for on-board communications may be used for single frequency and two-frequency simplex operation.

12 When used in the duplex mode the base transmitter frequency should be selected from the lower range for improved operability.

13 In general, if the use of a repeater station is required on board a ship, the frequency bands described in RR Nos. **5.287** and **5.288** should be used. The detailed duplex frequency arrangement is described in § 15 below.

14 Within territorial waters, these frequencies should be used subject to national regulations.

15 Frequencies

The frequency bands specified in RR No. **5.287** (subject to national regulations) shall be used with the following arrangement:

Lower channel					
25 kHz channel		12.5 kHz channel		6.25 kHz channel	
Ch.	MHz	Ch.	MHz	Ch.	MHz
				102	457.515625
		11	457.5250	111	457.521875
1	457.525			112	457.528125
		12	457.5375	121	457.534375
				122	457.540625
		13	457.5500	131	457.546875
2	457.550			132	457.553125
		14	457.5625	141	457.559375
				142	457.565625
		15	457.5750	151	457.571875
3	457.575			152	457.578125
				161	457.584375

Upper channel					
25 kHz channel		12.5 kHz channel		6.25 kHz channel	
Ch.	MHz	Ch.	MHz	Ch.	MHz
				202	467.515625
		21	467.5250	211	467.521875
4	467.525			212	467.528125
		22	467.5375	221	467.534375
				222	467.540625
		23	467.5500	231	467.546875
5	467.550			232	467.553125
		24	467.5625	241	467.559375
				242	467.565625
		25	467.5750	251	467.571875
6	467.575			252	467.578125
				261	467.584375

NOTE – The repeater station should be used as pairs of lower channel and upper channel with frequency separation exactly 10 MHz (e.g. Ch. 2 and Ch. 5, Ch. 11 and Ch. 21).

Interference from digital system to existing analogue system is concerned. Administrations are invited to consider the impact of analogue communication especially those operating lower channel.