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| **Radiocommunication Study Groups** |  |
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*1.4 to consider possible new allocation to the amateur service on a secondary basis within the band 5 250-5 450 kHz in accordance with Resolution* ***649 (WRC‑12)****;*

Resolution **649 (WRC‑12)**: *Possible allocation to the amateur service on a secondary basis at around 5 300 kHz*

# 1/1.4/1 Executive Summary

An allocation on a secondary basis to the Amateur Radio Service would facilitate providing communications in disaster situations and during relief operations at times and for distances which might not be possible using existing amateur allocations.

# 1/1.4/2 Background

[Noting Resolution **649** **(WRC-12)**, an allocation of an appropriate amount of spectrum, not necessarily contiguous, to the amateur service at around 5 300 kHz would be adequate to better satisfy its needs associated with use for providing communications in disaster situations and during relief operations.]

Based on the recommendation of the 1978 CCIR Special Preparatory Meeting, WARC-79 accepted the principle that, like other high-frequency radio services, the amateur service should have access to a family of frequency bands such that communications can be maintained as propagation conditions change. The amateur radio service has access to allocations in the vicinity of 3 500 and 7 000 kHz; however, there are frequent occasions when ionospheric conditions render either or both of these allocations unsatisfactory for communications over the distances which amateur radio operators are frequently requested to cover in the course of facilitating emergency and disaster relief operations. These distances might be relatively short (less than 1000 km) when providing direct support to first responders or relatively longer (greater than 1000 km) when exchanging information, for example, with international organizations.

The frequency range 5 250-5 450 kHz is allocated to fixed and mobile (except aeronautical mobile) services in all three Regions on a primary basis. Radiolocation services are also allocated in the range 5 250 to 5 275 kHz as a secondary service in Regions 1 and 3 and Primary in Region 2.

The frequency band 5 250-5 450 kHz is actively used by systems in the fixed, land mobile and maritime mobile services. Analysis of the Master International Frequency Register shows that 13314 frequency assignments in the fixed service, 2104 frequency assignments to base stations in the land mobile service, 251 frequency assignments to transmitting coast stations in the maritime mobile stations and 14 frequency assignments to receiving stations in the maritime mobile stations are recorded therein. Locations of the stations notified in the frequency range considered are shown in Figure 1.

Figure 1

Locations of stations operating in the frequency band 5 250-5 450 kHz



Such intensive usage of the frequency band considered stems primarily from the fact that it is often unfeasible to deploy traditional mobile communication networks and satellite communication stations in large sparsely populated, inaccessible and remote areas of the globe including those in the Arctic and Antarctic regions.

Effective (and solitary in some cases) solution of the issue related to providing communication with such areas seems to be based on employing multi-hop communication links established within the fixed and land mobile services. Such links transfer signals based on multiple reflection of propagating electromagnetic waves from the earth surface and its ionosphere.

Frequency assignments notified in the fixed and land mobile services provide for data transfer in voice and telegraph modes. They may be used for different purposes such as permanent communication with sparsely populated, inaccessible and distant areas and establishing communications in areas of natural disasters and recovery operations.

[Frequency assignments in the maritime mobile services provide for voice communications and data transfer and are used for maritime safety.]

Amateur service characteristics in the frequency range 5 250 to 5 450 kHz are similar to land mobile service with respect to antenna types, modulation, and transmission bandwidths.
This range of spectrum provides propagation at times when the maximum usable frequency (MUF) is below 7 MHz and the lowest usable frequency (LUF) is above 4 MHz permitting reliable communication for radio amateurs at any time of the day.

Depending on the time of day, season and other propagation factors including the progress of the sunspot cycle, propagation conditions are often such that access to spectrum around 5 300 kHz is essential for operation of amateur stations. A number of administrations including, e.g. Bahrain, Bangladesh, the Czech Republic, Cayman Islands, the Dominican Republic, Finland, Ireland, Norway, Sweden, the United Kingdom, the United States and others have authorized, subject to various restrictions in addition to the provisions of RR, Section II, Article **4.4,** operation by amateur radio licensees within the 5 250‑5 450 kHz frequency range.

Therefore, to be equipped to provide communications at any time, including in times of emergency and disaster-relief, radio amateurs require access to frequencies in the vicinity of 5 300 kHz.

It should be noted that RR No. **1.56** specifies that *amateur service:* is *a radiocommunication service* for the purpose of self-training, intercommunication and technical investigations carried out by amateurs, that is, by duly authorized persons interested in radio technique solely with a personal aim and without pecuniary interest.

Thus in case of an allocation of the amateur service in the frequency band 5 250-5 450 kHz or in a part of it the band would be used by the amateur stations not only for the purpose of supporting natural disasters and relief operations but also in traditional amateur service activities which are beyond management from national regulators and which are not coordinated with entities managing emergencies. Due to specific features of radiowave propagation in the frequency band 5 250‑5 450 kHz amateur service stations might cause unacceptable harmful interference to systems in fixed, land mobile, maritime mobile and radiolocation services. [Some administrations have accommodated amateur service operations in segments of or in discrete channels within the 5 250‑5 450 kHz frequency range, under the provisions of No. **4.4** of the Radio Regulations. For example, the United States permits amateurs to operate on five discrete channels within this range, with a maximum effective radiated power of 100 watts, and an authorized maximum bandwidth of 2.8 kHz. Operation utilizing modes less than the authorized bandwidth is confined to the center of the channel. Interference to incumbent services by amateur stations under these conditions generally does not preclude operation in the incumbent services and is generally resolvable on a case by case basis when it does occur.]

Consequently, a range of possible allocations to the amateur service may be proposed such that administrations might determine how much accommodation can be made to the amateur service. Depending upon the results of studies as requested by Resolution **649 (WRC-12)**, possible methods are set out in [Section 1/1.4/5.](#_1/1.4/6_Methods_to)

# 1/1.4/3 Summary of technical and operational studies, including a list of relevant ITU-R Recommendations and Reports

*[Editor’s Note: Studies undertaken in support of this Agenda item should identify the nature of the radio transmissions amateurs would typically make should the requested allocation be realized. Other studies should demonstrate the ability of the amateur service to co-exist in the capacity of a secondary user with other services in the frequency range sought in the agenda item. In particular, these studies should include an analysis of the occupancy by existing users of individual channels and frequency segments in the spectrum range referenced in the agenda item as a function of location and time-of-day.]*

[Relevant ITU Recommendations would include …

[ITU-R P.533](http://www.itu.int/rec/R-REC-P/en)-11, [ITU-R P.372](http://www.itu.int/rec/R-REC-P/en)-10, [ITU-R P.368](http://www.itu.int/rec/R-REC-P/en)-9, [ITU-R F.240-7](http://www.itu.int/rec/R-REC-F.240-7-200602-I/en), [ITU-R F.339-8](http://www.itu.int/rec/R-REC-F.339/en), [ITU-R M.1677-1](http://www.itu.int/rec/R-REC-M.1677/en), [ITU-R M.1732-1](http://www.itu.int/rec/R-REC-M.1732/en), [ITU-R F.1761](http://www.itu.int/rec/R-REC-F.1761-0-200602-I/en), [ITU-R F.1762](http://www.itu.int/rec/R-REC-F.1762-0-200602-I/en), [ITU-R F.1821](http://www.itu.int/rec/R-REC-F.1821-0-200709-I/en), [ITU-R M.1874-1](http://www.itu.int/rec/R-REC-M.1874/en),
[ITU-R.SM.1541-4 and the following relevant ITU Reports …](http://www.itu.int/rec/R-REC-SM.1541/en)

– Report ITU-R M.2080 – Consideration of sharing conditions and usage in the 4‑10 MHz band.

Report ITU-R М.[5 MHz CHAR], ITU-R М.[5 MHz compat] and [ITU-R M.2234](http://www.itu.int/pub/R-REP-M.2234)

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## 1/1.4/3.1 Compatibility with stations in the fixed service

[The compatibility analysis for the stations in the amateur service with the radio links in the fixed service was carried out on the base of single and multihop links of the fixed service under both steady propagation conditions and in case of fading in emission path. Estimations used a methodology agreed with WP 5C (Doc. 5A/77). The obtained results provide for making the following conclusions:

− for assumed power of typical amateur station transmitter the protection distances required for interference-free operation of FS links would exceed 2 000 km for single-hop links and 6 200 km for multihop ones;

− harmful interference caused by amateur transmissions could result in loss of FS link functionality and in degradation of wanted signal reception conditions. Duration of FS link functionality loss would be a function of distances between an amateur transmitter and a FS receiver, their mutual location and used antenna types. For the rest of time harmful interference from amateur stations could result in significant degradation in emission reception at FS receiver such as increasing values of data error rates;

− interference effect on FS link operation could be partially mitigated by using directional antenna in FS stations. However even antenna of 13.4 dB gain in FS receiving station would result in partial reduction of interference to levels which would be still unacceptable for a significant time percentage.

The above notes could provide for making a conclusion that compatibility between the amateur stations and fixed links appears to be extremely difficult regardless of fading conditions.]

## 1/1.4/3.2 Compatibility with stations in the mobile service

[TBD]

## 1/1.4/4 Analysis of the results of studies

Compatibility of amateur stations with the fixed service systems [is quite difficult/complicated] may require operational constraints on the amateur stations.

[One administration has found that Interference to incumbent services by amateur stations on discrete channels under the provisions of No. **4.4** of the Radio Regulations generally does not preclude operation in the incumbent services and is generally resolvable on a case by case basis when it does occur.]

Previous ITU-R studies have found amateur service sharing with HF oceanographic radars in the radiolocation service “seems to be difficult . . . .”[[1]](#footnote-1) For this reason, a secondary allocation to the amateur service within the frequency band 5 250-5 275 kHz has not been considered and should not be established, in consideration of the allocation to radiolocation established at WRC-12.

## 1/1.4/5 Methods to satisfy the agenda item

[Editor’s note: Methods to satisfy the agenda item should be developed and refined pursuant to studies identifying the required protection criteria of the existing users vis-à-vis the proposed secondary allocation. These methods may include a single contiguous secondary allocation or a few smaller allocations within the frequency range of 5 250 to 5 450 kHz.]

## 1/1.4/5.1 Method A

An allocation to the Amateur Radio Service, on a secondary basis, for one or more segments of contiguous spectrum in the range 5 275 kHz to 5 450 kHz.

## 1/1.4/5.2 Method B

No changes to Frequency Allocation Table of Radio regulations in the frequency band 5 250‑5 450 MHz

Advantages

– Unacceptable interference would not be caused to operation of fixed, land mobile, maritime mobile and radiolocation services.

Disadvantage

– Amateur service stations could operate in the frequency band 5 250-5 450 kHz only subject to RR No. **4.4** provisions

# 1/1.4/6 Regulatory and procedural considerations

## *[Editor’s Note: Will need to bring the contents of Annex 1 into this section including only the parts being amended and repeating different alternatives for each method if necessary]*

## 1/1.4/6.1 Regulatory and procedural considerations for Method A

ARTICLE 5

Section IV – Table of frequency allocations

**NOC**

**5 003-7 450 kHz**

1. Report of the Conference Preparatory Meeting to the 2012 World Radiocommunication Conference § 2/1.15/3. [↑](#footnote-ref-1)