

Agenda item 1.1

(WP 5A / WP 5B, WP 5C, WP 6A, (WP 1A), (WP 3K), (WP 3M))

1.1 to consider an allocation of the frequency band 50-54 MHz to the amateur service in Region 1, in accordance with Resolution 658 (WRC-15);

Resolution 658 (WRC-15) – Allocation of the frequency band 50-54 MHz to the amateur service in Region 1

5/1.1/1 Executive summary

This agenda item addresses a possible new Region 1 allocation to the amateur service in the frequency band 50-54 MHz by full or partial worldwide harmonization with the existing 4 MHz primary allocations in Regions 2 and 3.

The spectrum needs for the amateur service has been quantified in two studies using an application-based approach. One of them indicates that 4 MHz of spectrum is required while the other indicates that 1.75 MHz is required.

Administrations in parts of Region 1 are party to the ST61³⁰ and GE89³¹ Regional Agreements which remain in force in the band 50-54 MHz.

Studies have been undertaken to assess the possibility of sharing with the incumbent broadcasting, land mobile and radiolocation services. The studies have demonstrated that large separation distances are required for sharing with incumbent services. Furthermore, regulatory provisions will need to be implemented. Depending upon the incumbent service to be protected, the different protection distances and some measures can be found in Report ITU-R M.[AMATEUR_50_MHz].

Four methods are provided to satisfy the agenda item including the No Change method:

- **Method A:** An allocation to the amateur service on a primary basis in Region 1 in the band 50-54 MHz, or part thereof;
- **Method B:** An allocation to the amateur service on a secondary basis in Region 1 in the band 50-54 MHz, or part thereof (**Method B1**), or in the band 50 MHz–51.75 MHz (**Method B2**);
- **Method C:** An allocation to the amateur service in Region 1 on a partly primary and partly secondary basis in all or part of the frequency band 50-54 MHz;
- **Method D:** No changes in the frequency band 50-54 MHz.

Regulatory text is also provided for implementation of the proposed methods.

5/1.1/2 Background

In ITU Region 1, the frequency band 50-54 MHz is allocated to the broadcasting service on a primary basis, with additional or alternative allocations to the amateur, fixed, mobile, and/or radiolocation limited to wind profiler radars (WPR) services in some countries.

³⁰ Final Acts of the European Broadcasting Conference (Stockholm, 1961 as revised in Geneva, 2006) (“ST61”) in the European Broadcasting Area.

³¹ Final Acts of the African Broadcasting Conference (Geneva, 1989 as revised in Geneva, 2006) (“GE89”) in the African Broadcasting Area and neighbouring countries.

The frequency band 47-68 MHz in most of Region 1 is governed by the ST61 and GE89 Regional Agreements, which remain in force. Noting that several countries in Region 1 were not party to the original agreements.

Noting that the frequency band 50-54 MHz is allocated to the amateur service on a primary basis in ITU Regions 2 and 3, full or partial worldwide harmonization of the allocation to the amateur service in the frequency band 50-54 MHz would enhance radio amateurs' global efforts to fulfil the purposes of the amateur service, which include self-training, technical investigations and intercommunication for a variety of purposes including communication in support of disaster relief.

5/1.1/3 Summary and analysis of the results of ITU-R studies

5/1.1/3.1 Spectrum needs

In considering the need for spectrum harmonization across the three regions, the required amount of spectrum for existing and future amateur applications needs to be calculated, taking into account the principles contained in Recommendation **34 (Rev.WRC-12)**.

An application-based approach, based on current usage of the 50-54 MHz frequency band in Regions 2 and 3, has been developed and agreed for calculating the spectrum needs for current and envisaged amateur applications in the 50-54 MHz frequency band. The results given by this application-based approach are strongly dependent upon the input parameters used. The parameters obtained through the spectrum occupancy analysis and contest log data are used in one study, while the parameters for another study are based on estimations.

Both studies considered the following applications: point-to-point single sideband (SSB) and frequency modulated (FM) voice transmission, FM voice repeater systems, wideband digital modes and infrastructure applications using a variety of transmission protocols.

In one study, the spectrum needs have been calculated for two different spectrum use situations: an average spectrum use occurring in about 98% of time (average day) and an exceptional intensive spectrum use (e.g., contest) occurring in about 2% of time.

Different parameters used for the spectrum needs calculations for each use case are derived through spectrum monitoring data analysis (only eight days in April 2018) as well as through the amateur contest data analysis (during June 2017 50 MHz contest of International Amateur Radio Union - IARU). The obtained results are representative for European countries with the average amateur population density of 0.117 stations/km². Table 5/1.1-1 summarizes the spectrum needs calculation results of that study.

TABLE 5/1.1-1

Spectrum needs for different combination of amateur applications and use cases based on spectrum occupancy measurements and log-data analysis

Required spectrum (kHz)		
Applications	Average use + 300% margin (98% of time)	Intensive use (2% of time)
SSB, FM, wideband	540	765
SSB, FM, wideband, repeaters	740	1 865**
SSB, FM, wideband, repeaters, infrastructure	1 240	4 865** 1 465*
* Infrastructure and repeaters are only considered in average cases.		
** The spectrum needs calculation regarding infrastructure and repeaters in the intensive use case assumes the same value for the fraction of active amateur stations using SSB; however, such a situation is unlikely to occur in practice and may need to be ignored.		

Another study uses the same applications-based approach, but using only estimated parameters based on long-term band usage patterns for SSB, FM, repeater and propagation beacon applications and extrapolated for future wideband applications (++) gives the spectrum needs shown in Table 5/1.1-2.

Using the parameters typical for the countries of European Conference of Postal and Telecommunications (CEPT), with an average population density of amateur licensees (0.07 stations/km²), the required spectrum is calculated to be slightly in excess of 4 MHz. Table 5/1.1-2 shows the estimated spectrum required for each of the applications.

TABLE 5/1.1-2

Spectrum needs for different amateur applications based on parameter estimation

Required spectrum (kHz)	
Applications	Average use (100% of time)
SSB	87
FM	25
Wideband modes ⁺⁺	500
Repeaters (FM)	950
Infrastructure ⁺⁺	2 500
Propagation beacons	100
Total for all applications	4 162

5/1.1/3.2 Sharing with the broadcasting service in Region 1

The transition to digital television broadcasting has significantly reduced the occupancy of the 50-54 MHz frequency band by the broadcasting service in ITU Region 1. However, the regional plans ST61 and GE89 still contain many frequency assignments in the frequency band 50-54 MHz and the Master International Frequency Register (MIFR) contains hundreds of records for broadcasting service transmitters in ITU Region 1.

Studies have shown that for protection of the broadcasting service from harmful interference, a field strength from an amateur station at the edge of the service area of a broadcasting transmitter shall not exceed 6 dB($\mu\text{V}/\text{m}$) for 10% of the time at a height of 10 m above ground. Typical separation distances between amateur service systems and broadcasting service stations would range from 70 to 175 km.

5/1.1/3.3 Sharing between the amateur service and the land mobile service in Region 1

For an interference protection ratio of $I/N = -6$ dB, studies have shown that for protection of the land mobile service from harmful interference, a separation distance in the range of 170 km to more than 500 km in average terrain is needed. In mountainous regions, the separation distances are in about the same range. Dependent on the amateur service application, interference from a single amateur station may simultaneously interfere with more than 25 mobile channels in a range of up to 170 km. Given the mobile nature of governmental communication systems, new and existing amateur service applications (fixed, mobile or portable) using the frequency band of 50-54 MHz, make sharing difficult.

One study has shown that some amateur service applications, such as repeaters (in high activity situations) and new infrastructure will generate harmful interference into the mobile service if operated in the frequency band 50-54 MHz. However, some other amateur service applications, such as SSB, FM, wideband modes and repeaters (in low activity situations), could share the band 50-54 MHz with the mobile service under specific operational conditions. It was further calculated that the spectrum needs for SSB, FM, wideband modes and repeaters in the band 50-54 MHz could be satisfied within 1.75 MHz. Therefore, in view of *invites* 1 and 2 of Resolution **658 (WRC-15)**, this study concludes that any spectrum allocation within the band 50-54 MHz for the amateur service should be limited to 1.75 MHz.

Monte-Carlo simulations conducted with no mitigation techniques have shown that the probability of interference is highly dependent on the usage density of the band by amateurs. For the SSB mode, it has been shown that the probability of harmful interference ranges between 8 and 86% given the number of active amateur channels considered in the simulation radius. For the FM mode, it is about 28%. For the wideband digital mode, the probability of interference is around 93% for the in-band case (affecting up to 20 land mobile channels) and decreases for the out-of-band emissions.

Interference mitigation measures such as coordination between services in adjacent countries, operational limitation on amateur stations; listen-before-talk operation and technical means such as spread spectrum techniques have not been studied as part of this agenda item.

5/1.1/3.4 Sharing between the amateur service and the radiolocation service (wind profiler radars)

Radio Regulations (RR) No. **5.162A** provides an additional allocation to the radiolocation service on a secondary basis in a number of countries, limited to the operation of wind profiler radars (WPR).

Studies show that typical separation distances between amateur service systems and wind profiler radars would range from 29 km to distances above 300 km, confirming the need for specific protection measures.

Taking into account the limited numbers of systems in or immediately adjacent to the frequency band 50-54 MHz range (and probably the expected low number of amateur systems in the vicinity of WPR installations), sharing could probably be considered on a case-by-case basis e.g. coordination zones established in affected geographical areas.

It has to be noted that this approach, currently, could only be possible and efficient if appropriate regulatory measures in the Radio Regulations ensure that amateur and radiolocation services are of equal status within the 50-54 MHz band.

5/1.1/3.5 Relevant ITU-R Recommendations

Recommendations ITU-R [M.1634-0](#), [M.1651-0](#), [M.1732-2](#), [M.1825-0](#), [P.526-14](#), [P.1546-5](#), [P.2001-2](#), [SM.851-1](#), [SM.1055-0](#), [BT.1368-13](#), [BT.2033-1](#).

5/1.1/3.6 Relevant ITU-R Reports

WDPDN Report ITU-R M.[AMATEUR_50_MHz], Report ITU-R [BT.2387-0](#).

5/1.1/4 Methods to satisfy the agenda item

Four methods are proposed to satisfy the agenda item and all of them involve suppression of Resolution **658 (WRC-15)**.

[Note: CPM19-2 is invited to consider whether to maintain the advantages and disadvantages for each method, taking into account that those might not be present in the draft CPM text for other agenda items.]

5/1.1/4.1 Method A

An allocation to the amateur service on a primary basis in all the band 50-54 MHz, or part thereof, with appropriate footnotes to provide protection to services which already have an allocation in the band.

Advantages:

- The requirement of the amateur service to have an allocation in the frequency band 50-54 MHz in Region 1 would be partly or fully satisfied.
- Partial or full harmonization of spectrum throughout the three ITU regions would be achieved for the amateur service, thus the principles outlined in Recommendation **34 (Rev.WRC-12)** would be respected.

Disadvantages:

- Administrations may need to adopt specific measures or develop multilateral agreements to ensure harmful interference is not caused to stations of incumbent services operated within their territory or in neighbouring territories.
- The amateur service could cause harmful interference to incumbent services which may be difficult to resolve.
- Regarding the radiolocation service, the sharing approach proposed may not be fulfilled.
- May affect current and future usage of the band.

5/1.1/4.2 Method B1

An allocation to the amateur service on a secondary basis in all or part of the frequency band 50-54 MHz, with appropriate footnotes or appropriate regulatory text to provide protection to services which already have an allocation in the band.

Advantages:

- The requirement of the amateur service to have an allocation in the frequency band 50-54 MHz in Region 1 would be fully or partly satisfied.

- Full or partial harmonization of spectrum throughout the three RR Regions would be achieved, thus the principles outlined in Recommendation 34 (Rev.WRC-12) would be respected.
- Incumbent services with a primary allocation remain protected and does not place constraints on the secondary incumbent services.

Disadvantages:

- Full harmonization of spectrum for the amateur service throughout the three RR Regions would not be achieved in terms of service status.
- If the amateur service has secondary status, future introduction of new primary services into the band or modification to RR Article 5 covering all or part of the 50-54 MHz frequency band may adversely impact the amateur service.

5/1.1/4.3 Method B2

An allocation to the amateur service on a secondary basis in the frequency band 50-51.75 MHz, with appropriate footnotes to provide protection to services which already have an allocation in the band.

Advantages:

- The spectrum needs of the amateur service in the frequency band 50-54 MHz in Region 1 would be satisfied according to one study.
- Partial harmonization of spectrum throughout the three RR Regions would be achieved, thus the principles outlined in Recommendation 34 (Rev.WRC-12) would be respected.
- Incumbent services with a primary allocation remain protected and does not place constraints on the secondary incumbent services.

Disadvantages:

- The spectrum needs of the amateur service in the frequency band 50-54 MHz in Region 1 would be only partly satisfied according to another study.
- Full harmonization of spectrum for the amateur service throughout the three RR Regions would not be achieved in terms of service status.
- If the amateur service has secondary status, future introduction of new primary services into the band or modification to RR Article 5 covering all or part of the 50-54 MHz frequency band may adversely impact the amateur service.

5/1.1/4.4 Method C

An allocation to the amateur service on a partly primary and partly secondary basis in all or part of the frequency band 50-54 MHz, with appropriate footnotes to provide protection to services which already have an allocation in the band.

Advantages:

- The requirement of the amateur service to have an allocation in the frequency band 50-54 MHz in Region 1 would be fully or partially satisfied.
- Partial harmonization of spectrum throughout the three ITU regions would be achieved, thus the principles outlined in Recommendation 34 (Rev.WRC-12) would be fully or partially respected.
- The use of RR No. 4.4 for implementing spectrum allocations on a national or multinational basis may be avoided.

Disadvantages:

- The needs of the amateur service in the frequency band 50-54 MHz in Region 1 for spectrum and spectrum harmonization may only be partly satisfied.
- Administrations may need to adopt specific measures, or develop multilateral agreements to ensure harmful interference is not caused to stations of incumbent services (which may be difficult to resolve) operating within their territory or in neighbouring territories.
- Regarding the radiolocation service, the sharing approach proposed may not be fulfilled.
- May affect current and future usage of the band.

5/1.1/4.5 Method D

Method D is to not make any changes (No Change) in the frequency band 50-54 MHz.

Advantage:

- Avoid additional restrictions on the operations of broadcasting, radiolocation, land mobile and fixed services stations and avoid possible interference from the amateur service.

Disadvantage:

- Does not satisfy the requirements of the amateur service.

5/1.1/5 Regulatory and procedural considerations

5/1.1/5.1 For all Methods A, B1, B2, C, and D, suppression of Resolution 658 (WRC-15)

SUP

RESOLUTION 658 (WRC-15)

Allocation of the frequency band 50-54 MHz to the amateur service in Region 1

5/1.1/5.2 For Method A

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations

(See No. 2.1)

MOD

47-75.2 MHz

Allocation to services		
Region 1	Region 2	Region 3
<p>47-6850 BROADCASTING</p> <p>5.162A 5.163 5.164 5.165 5.169-5.171</p>	<p>47-50 FIXED MOBILE</p>	<p>47-50 FIXED MOBILE BROADCASTING</p> <p>5.162A</p>
<p>4750-685[x] <u>AMATEUR</u> BROADCASTING</p> <p>5.162A-5.163 5.164 5.165 5.169-5.171 <u>ADD 5.A11</u> <u>ADD 5.B11</u></p>	<p>50-54 AMATEUR</p> <p>5.162A 5.167 5.167A 5.168 5.170</p>	
<p>475[x]-68 BROADCASTING</p> <p>5.162A 5.163 5.164 5.165 5.169 5.171</p>	<p>54-68 BROADCASTING Fixed Mobile</p> <p>5.172</p>	<p>54-68 FIXED MOBILE BROADCASTING</p> <p>5.162A</p>

ADD

5.A11 In Region 1 in the frequency band 50-5[x] MHz, with the exception of those countries listed in No. **5.169**, stations of the amateur service shall not cause harmful interference to, or claim protection from, stations of the broadcasting service. The administrations of neighbouring countries in Region 1 shall ensure that the field strength emitted by an amateur station does not exceed a calculated value of +6 dB(µV/m) at a height of 10 m above ground at the service area boundary of operational broadcasting stations for more than 10% of time, unless otherwise agreed between affected administrations. (WRC-19)

ADD

5.B11 In Region 1 in the frequency band 50-5[x] MHz with the exception of those countries listed in No. **5.169**, stations of the amateur service shall not cause harmful interference to, or claim protection from, stations of the mobile service and wind profiler radars operating in the radiolocation service. (See Resolution [A11-WPR] (WRC-19).) (WRC-19)

[Note: The draft new Resolution [A11-WPR] (WRC-19) has not been developed yet and contributions to CPM19-2 are invited.]

5/1.1/5.3 For Method B1

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations
(See No. 2.1)

MOD

47-75.2 MHz

Allocation to services		
Region 1	Region 2	Region 3
<p>47-68<u>50</u> BROADCASTING</p> <p>5.162A 5.163 5.164 5.165 5.169 5.171</p>	<p>47-50 FIXED MOBILE</p>	<p>47-50 FIXED MOBILE BROADCASTING</p> <p>5.162A</p>
<p>47<u>50-68</u><u>5[x]</u> BROADCASTING <u>Amateur</u></p> <p>5.162A 5.163 5.164 5.165 5.169 5.171 <u>ADD 5.C11</u> <u>ADD 5.D11</u></p>	<p>50-54 AMATEUR</p> <p>5.162A 5.167 5.167A 5.168 5.170</p>	
<p>47<u>5[x]-68</u> BROADCASTING</p> <p>5.162A 5.163 5.164 5.165 <u>[5.169]</u> 5.171</p>	<p>54-68 BROADCASTING Fixed Mobile</p> <p>5.172</p>	<p>54-68 FIXED MOBILE BROADCASTING</p> <p>5.162A</p>

ADD

5.C11 Amateur stations in the band 50-5[x] MHz, with the exception of those countries listed in No. **5.169**, shall not cause harmful interference to, or claim protection from, existing or planned, broadcasting, mobile, fixed or wind profiler radars operating in the radiolocation service. (WRC-19)

ADD

5.D11 The use of frequencies within the frequency band 50-5[x] MHz by amateur stations with the exception of those countries listed in No. **5.169**, is subject to getting prior special authorization from the administration concerned, together with the agreement of other administrations, whose broadcasting service may be affected. To identify potentially affected administrations in Region 1

the field-strength value must be set to 6 dB(μV/m) at a height of 10 m above the ground for 10% of the time at the border of the territory of this administration. (WRC-19)

5/1.1/5.4 For Method B2

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations

(See No. 2.1)

MOD

47-75.2 MHz

Allocation to services		
Region 1	Region 2	Region 3
<p>47-6850 BROADCASTING</p> <p>5.162A 5.163 5.164 5.165 5.169-5.171</p>	<p>47-50 FIXED MOBILE</p>	<p>47-50 FIXED MOBILE BROADCASTING</p> <p>5.162A</p>
<p>4750-6851.75 BROADCASTING <u>Amateur ADD 5.E11</u></p> <p>5.162A 5.163-5.164 5.165 5.169-5.171</p>	<p>50-54 AMATEUR</p>	
<p>4751.75-6854 BROADCASTING</p> <p>5.162A 5.163-5.164 5.165 5.169-5.171</p>	<p>5.162A 5.167 5.167A 5.168 5.170</p>	
<p>4754-68 BROADCASTING</p> <p>5.162A 5.163 5.164 5.165 5.169-5.171</p>	<p>54-68 BROADCASTING Fixed Mobile</p> <p>5.172</p>	<p>54-68 FIXED MOBILE BROADCASTING</p> <p>5.162A</p>

ADD

5.E11 *Additional allocations:* in countries not listed in No. **5.169** stations in the amateur service shall not cause harmful interference to other services to which this band is allocated. The operation of stations in the amateur service shall be subject to agreement obtained under No. **9.21** with respect to the broadcasting service. For identification of potentially affected administrations in

Region 1 the field-strength value of 6 dB(μV/m) for 10% of the time produced at 10 m above ground level at the border of the territory of any other administration shall be used. (WRC-19)

5/1.1/5.5 For Method C

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations

(See No. 2.1)

MOD

47-75.2 MHz

Allocation to services		
Region 1	Region 2	Region 3
<p>47-6850 BROADCASTING</p> <p>5.162A 5.163 5.164 5.165 5.169-5.171</p>	<p>47-50 FIXED MOBILE</p>	<p>47-50 FIXED MOBILE BROADCASTING</p> <p>5.162A</p>
<p>4750-68[xx] <u>AMATEUR</u> BROADCASTING</p> <p>5.162A-5.163 5.164 5.165 5.169-5.171 <u>ADD 5.F11</u> <u>ADD 5.G11</u></p>	<p>50-54 AMATEUR</p>	
<p>47[xx]-68[<54] BROADCASTING</p> <p><u>Amateur</u></p> <p>5.162A-5.163 5.164 5.165 5.169-5.171 <u>ADD 5.H11</u></p>	<p>5.162A 5.167 5.167A 5.168 5.170</p>	
<p>47[<54]-68 BROADCASTING</p> <p>5.162A 5.163 5.164 5.165 [5.169] 5.171</p>	<p>54-68 BROADCASTING Fixed Mobile</p> <p>5.172</p>	<p>54-68 FIXED MOBILE BROADCASTING</p> <p>5.162A</p>

ADD

5.F11 In Region 1, in the frequency band 50-[xx] MHz, with the exception of those countries listed in No. **5.169**, stations in the amateur service shall not cause harmful interference to, or claim

protection from, stations in the broadcasting service. The administrations of neighbouring countries in Region 1 shall ensure that the field strength emitted by an amateur station does not exceed a calculated value of +6 dB(μ V/m) at a height of 10 m above ground at the service area boundary of operational broadcasting stations for more than 10% of time, unless otherwise agreed between affected administrations. (WRC-19)

ADD

5.G11 In Region 1, in the frequency band 50-[xx] MHz, with the exception of those countries listed in No. **5.169**, stations in the amateur service shall not cause harmful interference to, or claim protection from, stations in the mobile service and wind profiler radars operating in the radiolocation service. (See Resolution **[B11-WPR] (WRC-19)**.) (WRC-19)

*[Note: The draft new Resolution **[B11-WPR] (WRC-19)** has not been developed yet and contributions to CPM19-2 are invited.]*

ADD

5.H11 *Additional allocations:* frequencies in the frequency band [xx-< 54] MHz may be used by amateur service stations as a secondary allocation. The use of frequencies by amateur stations is subject to getting prior special permission from the appropriate authority, together with the agreement of other administrations, whose radio service may be affected. To identify potentially affected administrations in Region 1 the field-strength value must be set to 6 dB(μ V/m) for 10% of the time at the border of the territory of any other administration. (WRC-19)

5/1.1/5.6 For Method D

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations
(See No. 2.1)

NOC

47-75.2 MHz