Conference Preparatory Meeting for WRC-12
Geneva,14-25February 2011

PLENARY MEETING

Revision 1 to
Document CPM11-2/175-E
18 February 2011
Original: English

Working Group 2

PROPOSED MODIFICATIONS TO THE CPM REPORT

AGENDA ITEM 1.23

(**WP 5A** / (WP 5B), (WP 5C), (WP 6A))

1.23 to consider an allocation of about 15 kHz in parts of the band 415-526.5 kHz to the amateur service on a secondary basis, taking into account the need to protect existing services

NOTE – There is no corresponding WRC resolution for this agenda item.

2/1.23/1 Executive summary

The frequency band 415-526.5 kHz provides unique ground-wave propagation characteristics well suited for present and potential future systems in incumbent services, as well as a secondary allocation to the ARS.

After taking studies into account, the following methods to satisfy this agenda item have been proposed:

Method A

A secondary allocation of up to 15 kHz to the ARS on a worldwide basis between 472 kHz and 487 kHz.

Method B

Two non-contiguous worldwide secondary allocations to the ARS at 461-469 kHz and 471-478 kHz, totalling 15 kHz.

Method C

No change to the Radio Regulations.

2/1.23/2 Background

The frequency range 415-526.5 kHz is currently allocated to the BS, MMS, AMS, LMS and ARNS. Traditionally the band has been utilized extensively by these services due to its good ground-wave propagation characteristics. This frequency range would be well suited to reliable, relatively low-power ARS communications for the purposes of training, intercommunication, and technical investigation. A secondary allocation would also augment the overall capability of the ARS to

provide assistance in disaster and emergency situations (see, e.g. Recommendation ITU-R M.1042-1 "Disaster communications in the amateur and amateur-satellite services", Recommendation ITU-D 13 "Effective utilisation of the amateur services in disaster mitigation and relief operations". ARS communications in the MF band would also allow for experimentation, thereby furthering knowledge relating to propagation and equipment design for new transmission modes.

Operations in this band are accomplished most frequently by point-to-point over-the-horizon transmissions. Ground-wave transmissions on the order of 200-400 km are common over sea with transmissions on the order of 150-300 km common over land. Recommendation ITU-R P.368 provides ground-wave propagation curves showing expected transmission range for a given transmission field strength. In the case of sky-wave propagation, the maximum propagation expected is 1 000 km from a station, depending on transmission parameters and specific propagation factors, such as sunspot number, power, antenna characteristics, and time of day, as shown in Recommendation ITU-R P.1147. Most MF links use the minimum e.i.r.p. required for a successful link for the reliability factor required. Co-frequency use is not possible inside the geographic range of such MF links without the potential for harmful interference.

2/1.23/3 Summary of technical and operational studies and relevant ITU-R Recommendations and Reports

Existing relevant ITU-R Recommendations: M.540-2, M.688, M.627-1, BS.560.

New relevant ITU-R Reports: M.2201, M.[AS EXP OP 415-526.5 kHz], M.2200, M.2203.

2/1.23/3.1 Introduction

Some administrations have given temporary authorization for stations of the ARS to operate, on a non-interference basis, within the frequency range 415-526.5 kHz. In addition to these experimental operations, studies have been undertaken in the ITU-R to provide additional information (Report ITU-R M.[AS EXP OP 415-526.5 kHz]) on the characteristics and compatibility of a possible secondary allocation to the ARS in this frequency range.

Details of amateur station characteristics and compatibility studies can be found respectively in Reports ITU-R M.2200 and ITU-R M.2203. The transmission modes and antenna simulations provided in this Report demonstrate that ARS operations in this range would be limited to relatively low e.i.r.p., in the range from several milliwatts to watts.

Implementation of the global maritime distress and safety system has rendered certain incumbent systems obsolete. However, new technologies as described in Report ITU-R M.2201are being considered by incumbent users and should be taken into account as much as practicable when considering the possibility of coexistence with the ARS.

2/1.23/3.2 Compatibility of amateur service stations with systems of existing services

2/1.23/3.2.1 Maritime mobile service

The range 415-526.5 kHz is allocated to the MMS in all three Regions. Maritime safety information (MSI) is currently broadcast on 424 kHz, and mainly 490 kHz and 518 kHz via NAVTEX (Navigational text messages), standardized under International Standard IEC 61097-6, Global maritime distress and safety system (GMDSS) – Part 6: Narrowband direct-printing telegraph equipment for the reception of navigational and meteorological warnings and urgent information to ships.

Report ITU-R M.2201 provides technical details and examples of, the possible future MF maritime communication systems within the frequency range for ship and port security to enhance safety of navigation at sea.

A study was done to evaluate the required geographical separation as a function of frequency separation and power (e.m.r.p.) between stations in the ARS and NAVTEX stations. The minimum field strength used in this study was based on a minimum required field strength of 31.5 dBμV/m, which is a worst-case figure, as a level of 51.5 dBμV/m is required for near tropical areas. In addition, calculations were performed for two arbitrary additional protection levels of −14 dB and −20 dB. IMO Resolution A.801(19), Annex 4 requires a protection level of −8 dB.

As well, a ground conductivity figure for sea water of 5 S/m was used in the calculations. This is a conservative value as, typically, amateur stations would be located inland from the sea, where a lower level of ground conductivity would cause the ground-wave signal to be attenuated at a greater rate.

Calculations using a variety of protection criteria were generated. These calculations show protection distances as a function of frequency separation and transmitter output power of amateur stations. It should be noted that with a frequency separation of ≥ 3 kHz using much higher protection criteria than required by IMO Resolution A.801(19), Annex 4, the necessary geographical separation is only slightly increased. The study concludes that ARS operation within 3 kHz from the centre of the NAVTEX operation frequencies is neither practical nor desirable, because amateur transmitters could cause interference to NAVTEX signals. As well, given that maritime safety information is transmitted via NAVTEX, co-channel operation is not considered an option.

2/1.23/3.2.2 Land mobile service

Compatibility studies for the LMS were not undertaken as no usage was identified.

2/1.23/3.2.3 Aeronautical radionavigation service

Aeronautical non-directional beacons (NDB) operate in the band prescribed for study under this agenda item. While the long-term goal may be to remove NDBs from use, this is unlikely to be achieved in the near future. It is therefore essential to ensure whatever action is taken under this agenda item does not adversely affect NDB operations.

Two studies were undertaken to determine the compatibility between NDBs and amateur operations as described in Report ITU-R M.2203. Both studies were based on ICAO technical specifications.

The first study demonstrated that in a worst-case scenario of an aircraft in the immediate vicinity of an amateur station located at the edge of an NDB service area, a co-frequency amateur transmitter with an output power level exceeding a few milliwatts would result in unacceptable interfering field strength at the aircraft NDB receiving antenna. Therefore, co-frequency coexistence between amateur stations and NDB systems is unlikely.

In the second study, a table of protection distances was derived for different frequency offsets and amateur station radiated power using ground-wave and sky-wave propagation analyses. A worst-case ground conductivity value of 10 mS/m was used, which rendered propagation optimal. A lower value of 3 mS/m, for example, would reduce the radius of the protection zone by 50%. Protection of the RNS could be achieved by geographical separation, taking into account the technical and operational characteristics of the systems, which may result in distances in the range of 20 km in the best case to 800 km in the worst case. This protection can also be provided by sufficient frequency separation.

2/1.23/3.2.4 Aeronautical mobile service

The AMS operates on a secondary basis in parts of this frequency range and uses NDBs for audio broadcasts. Although no technical specifications were received on AM audio broadcasts using NDBs, it was assumed that the technical analyses undertaken for NDBs used in the ARNS would be applicable to this subset of NDBs.

2/1.23/3.2.5 Broadcasting service

There is no overlap in Regions 1 and 3 between the frequency range proposed for this allocation to the ARS and the 526.5 to 1 606.5 kHz allocation to the BS. In Region 2 the allocation to the BS (525 to 1 605 kHz) overlaps the spectrum range under study only between 525 and 526.5 kHz. Therefore, there is no possibility in Regions 1 and 3 of co-channel operation between the proposed ARS allocation and a station in the BS and a low probability of co-channel operation in Region 2, despite the frequency overlap.

However, a potential does exist for off-channel interference to reception of MF broadcast signals by ARS transmissions in a case of collocation of an amateur transmitter and a BS receiver. A study was undertaken that considered the potential interference to an MF broadcast receiver from an amateur station transmitter operated at a nearby frequency, as a function of the frequency separation and distance from the broadcast receiver. Two situations were examined: urban areas where amateur stations may be operated close to broadcast receivers, but where broadcast signal strength is high; and rural areas, where typical separation distances are greater, but broadcast signal strength may be closer to the minimum level recommended in Recommendation ITU-R BS.560. A table of calculations giving the minimum allowable distance between a broadcast receiver and an interfering transmitter as a function of frequency necessary to meet the required protection ratio was generated.

2/1.23/4 Analysis of the results of studies

2/1.23/4.1 Compatibility of amateur service stations with existing services

2/1.23/4.1.1 Maritime mobile service

Amateur radio operations cannot operate co-frequency or immediately adjacent to the existing NAVTEX frequencies, i.e., 424 kHz, 490 kHz and 518 kHz. Given the relativelynarrow bandwidth of the NAVTEX receivers, studies indicate that a guardband of 3 kHz would be sufficient to minimize the potential for harmful interference from ARS transmissions.

2/1.23/4.1.2 Land mobile service

Compatibility studies for LMS were not undertaken as no usage was identified.

2/1.23/4.1.3 Aeronautical radionavigation service

The transmission modes and antenna simulations provided in Report ITU-R M.2200 demonstrate that ARS operations in this range would be limited to relatively low e.i.r.p., in the range from several milliwatts to watts.

One study demonstrated that co-frequency operation of an amateur station and an NDB is not feasible.

Another study showed that such operation could be feasible if protection distances, which would depend on frequency offsets and amateur station radiated power, were implemented. Such distances would be derived using sky-wave and ground-wave analyses as per Recommendations ITU-R P.1147 and ITU-R P.368, respectively, as shown in Report ITU-R M.2203. Mitigation measures

such as avoidance of co-frequency operation, protection distances and power limitations may be implemented by administrations licensing ARS operations.

2/1.23/4.1.4 Aeronautical mobile service

It is assumed that the same mitigation measures as described in section 2/1.23/4.1.3 for the ARNS would apply to the AMS, which has a secondary allocation in Region 3 and which overlaps a potential secondary allocation to the ARS in the range 505-510 kHz.

2/1.23/4.1.5 Broadcasting service

The study demonstrated that provided the upper limit of an amateur allocation did not exceed 516 kHz, the potential for interference with broadcast reception at 525 kHz or higher would meet specified protection ratios. The methods below contemplate frequencies no higher than 510 kHz, therefore there would be no impact to the BS.

2/1.23/5 Methods to satisfy the agenda item

2/1.23/5.1 Method A

A secondary allocation of up to 15 kHz to the ARS on a worldwide basis between 472 kHz and 487 kHz.

Advantages

– Would provide the ARS with the opportunity to develop and experiment with new communication technologies using both sky-wave and ground-wave propagation in the MF spectrum.

– Would provide the ARS with additional coverage for reliable medium-range communication for potential use in the event of emergency and disaster situations.

Disadvantages

– Could increase the possibility of interference to incumbent services, including aeronautical radionavigation in certain parts of the world, and possible future maritime mobile systems.

– Administrations may have to take the necessary mitigation measures to protect incumbent services that would make part of the band unusable to the ARS.

2/1.23/5.2 Method B

Two non-contiguous worldwide secondary allocations to the ARS at 461-469 kHz and 471-478 kHz, totalling 15 kHz.

Advantages

– Would provide the ARS with the opportunity to develop and experiment with new communication technologies using both sky-wave and ground-wave propagation in the MF spectrum.

– Would provide the ARS with additional coverage for reliable medium-range communication.

Disadvantages

– Could increase the possibility of interference to incumbent services, including aeronautical radionavigation in certain parts of the world, and possible future maritime mobile systems.

– Administrations may have to take the necessary mitigation measures to protect incumbent services that would make part of the band unusable to the ARS.

2/1.23/5.3 Method C

No change to RR Article **5**.

Advantage

– Would not increase the possibility of interference to incumbent services.

Disadvantage

– Would not provide a secondary allocation to the ARS.

2/1.23/6 Regulatory and procedural considerations

2/1.23/6.1 Method A

A secondary allocation of up to 15 kHz to the ARS on a worldwide basis between 472 kHz and 487 kHz.

This method is reflected in the proposed changes to RR Article **5**.

ARTICLE 5

Frequency allocations

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

MOD

200-495 kHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
...		
415-435 MARITIME MOBILE 5.79 AERONAUTICAL RADIONAVIGATION 5.72	**415-~~495~~472** MARITIME MOBILE 5.79~~5.79A~~ Aeronautical radionavigation 5.80	
435-~~495~~472 MARITIME MOBILE 5.79~~5.79A~~ Aeronautical radionavigation 5.72MOD5.82	5.775.78MOD5.82	
472-487	MARITIME MOBILE 5.79~~5.79A~~ Aeronautical radionavigation 5.80 Amateur 5.72 5.77~~5.78~~MOD5.82	
487-495	MARITIME MOBILE 5.795.79A Aeronautical radionavigation 5.80 5.72 5.77~~5.78~~MOD5.82	

Отформатировано: Шрифт: не полужирный, английский (Великобритания)
Отформатировано: Шрифт: (по умолчанию) Times New Roman Bold, английский (Великобритания), все прописные
Отформатировано: английский (Великобритания)
Отформатировано: Шрифт: Times New Roman Bold, 10 пт, полужирный, английский (Великобритания)
Отформатировано: Шрифт: Times New Roman Bold, 10 пт, полужирный, Цвет шрифта: Авто, английский (Великобритания)
Отформатировано: Шрифт: Times New Roman Bold, 10 пт, полужирный, Цвет шрифта: Авто, английский (Великобритания)
Отформатировано: Шрифт: Times New Roman Bold, 10 пт, полужирный, Цвет шрифта: Авто, английский (Великобритания)
Отформатировано: Шрифт: Times New Roman Bold, 10 пт, полужирный, Цвет шрифта: Авто, английский (Великобритания)
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатированная таблица
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано: Шрифт: 10 пт
Отформатировано: Шрифт: 10 пт
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано: Шрифт: 10 пт
Отформатировано: Шрифт: 10 пт
Отформатировано ...
Отформатировано ...

MOD

5.82 ~~In the maritime mobile service, the frequency 490 kHz is to be used exclusively for the~~ transmission by coast stations of navigational and meteorological warnings and urgent information to ships, by means of narrow-band direct-printing telegraphy. The conditions for use of the frequency 490 kHz are prescribed in Articles **31** and **52**. In using the band 415-495 kHz for the aeronautical radionavigationservice or the band 472-487 kHz for the amateurservice, administrations ~~arerequested to~~ shallensure that no harmful interference is caused to the frequency 490 kHz. (WRC-07)

Отформатировано: Шрифт: (по умолчанию) Times New Roman Bold, 12 пт, полужирный, Цвет шрифта: Авто, английский (Великобритания), все прописные

Отформатировано: Шрифт: полужирный, Цвет шрифта: Авто, английский (Великобритания)

Отформатировано: Шрифт: 12 пт, полужирный, английский (Великобритания)

Отформатировано: Шрифт: 12 пт, не полужирный, английский (Великобритания), не выделение цветом

2/1.23/6.2 Method B

Two non-contiguous worldwide secondary allocations to the ARS at 461-469 kHz and 471-478 kHz, totalling 15 kHz.

This method is reflected in the proposed changes to RR Article **5**.

ARTICLE 5

Frequency allocations

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

MOD

200-495 kHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
...		
415-435 MARITIME MOBILE 5.79 AERONAUTICAL RADIONAVIGATION 5.72	**415-~~495~~461** MARITIME MOBILE 5.79~~5.79A~~ Aeronautical radionavigation 5.80	
435-~~495~~461 MARITIME MOBILE 5.79~~5.79A~~ Aeronautical radionavigation 5.72MOD 5.82	5.775.78MOD 5.82	
~~461-469~~ MARITIME MOBILE 5.79~~5.79A~~ Aeronautical radionavigation Amateur 5.72MOD 5.82	~~461-469~~ MARITIME MOBILE 5.79~~5.79A~~ Aeronautical radionavigation 5.80 Amateur 5.77~~5.78~~MOD 5.82	
469-471 MARITIME MOBILE 5.79~~5.79A~~ Aeronautical radionavigation 5.72MOD 5.82	**469-471** MARITIME MOBILE 5.79~~5.79A~~ Aeronautical radionavigation 5.80 5.77~~5.78~~MOD 5.82	
471-478 MARITIME MOBILE 5.79~~5.79A~~ Aeronautical radionavigation Amateur 5.72MOD 5.82	**471-478** MARITIME MOBILE 5.79~~5.79A~~ Aeronautical radionavigation 5.80 Amateur 5.77~~5.78~~MOD 5.82	
478-495 MARITIME MOBILE 5.795.79A Aeronautical radionavigation 5.72MOD 5.82	**478-495** MARITIME MOBILE 5.795.79A Aeronautical radionavigation 5.80 5.77~~5.78~~MOD 5.82	

MOD

5.82 In the maritime mobile service, the frequency 490 kHz is to be used exclusively for the transmission by coast stations of navigational and meteorological warnings and urgent information to ships, by means of narrow-band direct-printing telegraphy. The conditions for use of the frequency 490 kHz are prescribed in Articles **31** and **52**. In using the band 415-495 kHz for the aeronautical radionavigation service or the bands 461-469 kHz and 471-478 kHz for the amateur

Отформатировано: Не отрывать от следующего
Отформатировано: Шрифт: (по умолчанию) Times New Roman Bold, 12 пт, полужирный, английский (Великобритания), все прописные
Отформатировано: английский (Великобритания)
Отформатировано: По левому краю, Разрешить разрывать абзац, Поз.табуляции: нет в 14 см + 16,8 см
Отформатировано: По левому краю, Отступ: Слева: -0,03 см, Разрешить разрывать абзац, Поз.табуляции: нет в 14 см + 16,8 см
Отформатировано: Разрешить разрывать абзац, Поз.табуляции: нет в 14 см + 16,8 см
Отформатировано ...
Отформатировано ...
Отформатированная таблица
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано: Шрифт: 12 пт
Отформатировано ...
Отформатировано ...
Отформатировано ...
Отформатировано: Шрифт: 12 пт
Отформатировано ...
Отформатировано: Шрифт: 12 пт
Отформатировано ...

service, administrations ~~are requested to~~ shall ensure that no harmful interference is caused to the frequency 490 kHz. (WRC-07)

Editorial note: In the table above, if the proposed modifications for the bands 461-469 kHz and 471-478 kHz are accepted, then the allocations to services in these bands, as well as in the bands 469-471 kHz and 478-495 kHz, become identical for all three Regions, and the corresponding cells of the Table should be merged for Regions 1, 2, and 3. RR Nos. **5.72**, **5.77**, **5.79**, **5.80** and **5.82** will also be part of the merged cells for the various bands listed above, as appropriate.

2/1.23/6.3 Method C

NOC

ARTICLE 5

Frequency allocations

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

_____

Отформатировано: Шрифт: 12 пт, не полужирный

Отформатировано: Шрифт: 12 пт, не полужирный

Отформатировано: Шрифт: 12 пт, не полужирный

Отформатировано: Шрифт: не полужирный, английский (Великобритания), не выделение цветом

Отформатировано: Шрифт: (по умолчанию) Times New Roman Bold, 12 пт, полужирный, все прописные

Отформатировано: Шрифт: Times New Roman, 14 пт, не полужирный, все прописные