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HF Users Group
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IWG-4

Draft Proposal for the Work of the Conference of WRC 2007

Executive Summary.

This document proposes that no additional spectrum be allocated to the Broadcast Service. Consideration has been given to the fact that:

a) the Broadcast Service is already scheduled to receive additional spectrum in 2007and again in 2009 and,
b) some broadcasters are cutting back or eliminating their HF broadcast services, but there is an increasing demand for safety related mobile services.

The serious consequences associated with allocating further additional spectrum to the Broadcast Service at the expense of Fixed and Mobile is outlined in this document.

> **Agenda Item 1.13***: taking into account Resolutions **729 (WRC-97), 351 (WRC-03)** and **544 (WRC-03)**, to review the allocations to all services in the HF bands between 4 MHz and 10 MHz, excluding those allocations to services in the frequency range 7 000-7 200 kHz and those bands whose allotment plans are in Appendices 25**, 26** and **27** and whose channelling arrangements are in Appendix 17, taking account of the impact of new modulation techniques and the spectrum requirements for HF broadcasting;*

Background: This is a very broad agenda item, as there are multiple services allocated to the HF bands between 4 MHz and 10 MHz, including aeronautical mobile (OR), aeronautical mobile (R), amateur, broadcasting, fixed, maritime mobile and mobile services. Agenda item 1.13 covers three resolutions that deal with three separate issues. These issues are connected within the agenda item on the basis that they cover overlapping frequency ranges. The Conference Preparatory Meet (CPM) convened following WRC-03 assigned the primary responsibilities for the separate issues to different ITU-R Working Parties.

Resolution 351:

resolves

"1) that, in order to provide full worldwide interoperability of equipment on ships, there should be one technology, or more than one interoperable worldwide technology, implemented under Appendix **17**;

2) that, as soon as the ITU-R studies are completed, a future competent conference should consider necessary changes to Appendix **17** to enable the use of new technology by the MMS;"

The focus of Resolution **351 (WRC-03)** is to identify a digital technology, or family of digital technologies, that provide interoperability and improved usage of the MF and HF bands allocated to the maritime mobile service under Appendix **17**. The scope of this portion of the agenda item includes a review of all Appendix **17** assignments to facilitate the introduction of these advanced maritime mobile digital systems.

Resolution **351 (WRC-03)** calls for studies to include; future requirements of the MMS, technical characteristics of the digital systems, the necessary modifications to Appendix **17** to enable the use of new technologies by MMS, a timetable for the introduction of new digital technologies, and recommendations on how digital technologies can be introduced while ensuring compliance with distress and safety requirements. In accordance with *resolves* 2 of Resolution **351**, as soon as the ITU-R studies are completed, a competent conference should consider necessary changes to Appendix **17**, to enable the use of new digital maritime technologies by the MMS. These studies are still underway and should be refined to examine the requirements of GMDSS electronic messaging. The future spectrum needs of the maritime mobile service in the HF bands are closely related to the introduction of new data exchange technologies into the maritime mobile service, as an alternative standard for narrow-band direct printing (NBDP). The use of NDBP is in rapid decline for commercial communications. IMO has noted NBDP is currently used for broadcasting of MSI, ship reporting, and weather forecasts and for safety related business communications. However, all these functions could in principle be provided by alternative HF data communications technology. A PDNR for the new MMS HF data exchange service has been developed based on commercial Orthogonal Frequency Division Modulation (OFDM) (see 8B/135 and 8B/209).

NBDP remains useful for providing distress communications in the Polar regions (sea area A4) when other terrestrial means of communication are no longer reliable because of atmospheric noise, and there is no coverage from geostationary satellite networks providing service to the maritime community. This NBDP functionality will be preserved using the HF distress and safety frequencies listed in Appendix **15**.

Because the studies on this issue are continuing, a revision of Resolution **351** to recognize the current views of the IMO regarding the technology transition, to note the transition that has already taken place, and to direct additional studies regarding the spectrum needed for new technologies is appropriate.

Resolution 544:

resolves to invite ITU-R

"1 to carry out studies on this matter, particularly in respect of the bands identified in *noting* above, taking into account technical, operational, economic and other relevant factors, including the appropriate transitional arrangements, and how the introduction of digital emissions will affect the HF broadcasting requirements and how such reallocations will affect other services using these bands."

further resolves

"to recommend a future competent conference to conclude, where appropriate, on additional spectrum requirements for the broadcasting service, taking into account the interest of all affected services"

Resolution **544 (WRC-03)** resulted from work that was not completed at WRC-03. WRC-03 allocated 50 kHz in Region 2 to the broadcast service as a result of the realignment of portions of the 7 MHz band under WRC-03 agenda item 1.23. Prior to WRC-03, the broadcasting service identified a shortfall in the 4-10 MHz band of 250 kHz of spectrum to alleviate co-channel interference, and 800 kHz of spectrum to alleviate adjacent channel interference. The Resolution also called for a review of the impact of relocating other services from current spectrum allocations if these broadcasting spectrum requirements were accommodated, as well as what transitional arrangements should be made.

WARC-92 (**5.136**) decided to allocate 100 kHz of spectrum to the broadcasting service which will transition from fixed and mobile service allocations in 2007. Any further decrease in available spectrum may affect the ability of fixed and mobile service users to establish and maintain reliable, essential and emergency communications services. Any consideration by WRC-07 to reallocate additional spectrum to the broadcast service should carefully consider the impact on existing and planned fixed and mobile services. Currently, there are 2 102 kHz between 4 and 10 MHz allocated to support the land mobile services and 2 712 kHz allocated to the fixed service. After April 1, 2007, implementation of the results of WARC-92 reduces that amount to 2 002 kHz for land mobile and 2 512 kHz for the fixed service as a result of the reallocation to the broadcast service. After March 29, 2009, in Region 2 an additional 50 kHz is allocated from the fixed and land mobile services to the broadcast service.

Because of their reliability and low cost, fixed and mobile HF services will continue to be required by Administrations. Administrations must be ready to support fluctuations in demand by the fixed and mobile service during emergency communications. The fixed and mobile services are unique in that requirements to use them increase during emergency and disaster situations. Public Protection and Disaster Relief operations depend on the availability of spectrum to support operations.

Displacement of current frequencies from the fixed and mobile service may require considerable expenses for realignment of communication networks and change (replacement) of antennas. In some cases it may be difficult to establish required radio links based on the loss of currently available portions of the spectrum, and due to spectrum crowding from realignment of assignments to account for any spectrum allocated from the fixed and mobile service to the broadcast service.

The operational database(s) maintained by the HF Coordinating Committee (HFCC) illustrate that a broadcast primary allocation of 250 kHz of spectrum would alleviate co-channel interference, and 800 kHz of spectrum would alleviate adjacent channel interference. According to text contained in WP-8A/199, which originated from WP-6E, the HF broadcasters currently address this shortfall by using FS and LMS bands on a non-interference basis under Article **4.4**. According to WP 6E/162, 80-85% of shortwave broadcasting hours in the 4-10 MHz band operates within broadcasting allocations and do not operate under Article **4.4**.

There is interference risks associated with Article **4.4** operation. The HFCC and Administrations need to take these risks into account when assessing cross border interference potential and coordinating usage under Article **4.4**. Some Administrations have reported interference from the broadcast service in the fixed and mobile bands. At least one incident resulted in discontinuation of broadcaster operations. Given this interference risk, Article **4.4** operations do not represent successful broadcaster occupancy of the fixed and mobile bands, nor do they justify reallocation of these portions of the fixed and mobile bands to the broadcasting service.

HF Broadcast providers are currently investing in alternate delivery methods, which may be used to augment or replace programming hours. FM, cable, satellite, and Internet are beginning to provide alternate delivery in developed countries, but are problematic for developing countries due to cost, coverage, and reliability.

Recent public announcements by some broadcasters confirm that there is a decline in the need for HF broadcast spectrum.

Recent natural disasters have demonstrated that the fixed and mobile services are unique in comparison to the broadcast service in that requirements are driven up rapidly during the development of emergency situations. Increased congestion is inevitable during periods of peak usage by the fixed and mobile services.

ITU-R WP 9C has noted that during the 2004-2005 Indian Ocean Tsunami Relief Effort, the emergent need for HF communications drove up spectrum demand rapidly. Because of existing extensive usage of the HF bands in disaster areas, it was not possible to provide all the required channels to meet required emergency communications. Ionospheric (skywave) signal propagation is frequency selective and frequencies usable for communications between any two points change over time throughout the day. This is why several different segments of spectrum within the HF frequency range are allocated to each radio service. This enables the users of the service to have full time access to frequencies that are usable throughout a 24-hour period.

For the fixed and mobile services, propagation concerns make it essential that the frequency channels or sub-bands of an HF pool are evenly spaced in order to adapt to the daily and seasonal changes in the ionosphere. That is why spectrum is allocated to the different services throughout the 4 to 30 MHz range.

The impact to the fixed and mobile services of allocating additional spectrum to the broadcasters would be too severe, since those additional allocations would come from bands assigned to these services. This situation will not change in the foreseeable future.

The examples below show the specific services that would be negatively affected by the proposed re-allocation of spectrum.

On-air monitoring up to 19 September 2005 shows that the following services would be affected:

5 060-5 250 kHz

13 safety-related maritime data channels would be affected and one Link 11 operations. Additional operations with licenses in this band are:

U.S. FBI
NATO Link 11
UK Royal Navy
S African Navy
Malaysian Navy
Russian Navy
French Military
German Navy
Danish Army
Polish Army
US Army
Mexican Army
French Army
Italian Army
US Air Force
US Coast Guard New Orleans (MMS safety service)
Spanish Air Force
Spanish Civil Guard
US NASA
US Navy
China meteorological fax broadcast (safety service)
UK Fisheries surveillance
Canadian Navy
US Federal Emergency Management Agency (Disaster Relief)
UK Royal Navy Coastal Control
UK customs
AFTN net control (aeronautical)
Australian Police
LDOC (Air/Ground) Sweden, France & Australia.
Swiss Diplo Service

The impact on US based services is summarized in Annex 1

5 840-5 900 kHz

11 safety-related maritime data channels would be affected plus on US Air Force operation and one maritime meteorological broadcast. Additional operations with licenses in this band are:
U.S. DEA
Danish Fax Ice Reports
Spanish Air Force
Spanish Civil Guard
Korean Meteorological Reports
Russian navy
Greek Meteo (safety service)
UK Naval coastal control
US Air Force
French Military

The impact on US based services is summarized in Annex 1

Australian Truckers
USAF NASA

Note: Three (3) broadcasts were heard in this area

7 350-7 650 kHz

11 safety-related maritime data channels, 1 NBDP and 1 Nato Stanag standard 4285 data communication.
This band is already used by French, E European, Indian, and one U.S. based religious broadcaster. A total of 13 broadcasters were heard in Oct. 2005, including the BBC using DRM.

Also having assigned frequencies in this band:
Chinese meteo broadcast (safety broadcast)
French Military
Dutch Military
US Army
US Navy
Russian Navy
Portuguese Navy
Argentine Navy
Indian Meteo (safety service)
Japan Meteo (safety service)
USA Federal Emergency Management Agency (Disaster Relief)
LDOC various (air/ground communications)
USAF NASA
USA FAA
USCG Puerto Rico Hurricane Warning (safety service)
German (Hamburg) Meteo

The Impact on US based services is summarized in Annex 1

9 290-9 400 kHz

There are allocations to:

Various Embassies
Indian Navy
LDOC in Bern, Switzerland (air/ground communications)
US Army
USAF NASA
German Meteo (safety service)
French Military
French Air Force
Danish Fax Ice Reports (safety service)

The impact on US based services is summarized n Annex 1

In Oct. 2005 this band was used by broadcasters every 5 KHz throughout the band.
9 352.0 Thales system 3000 ALE auto link bursts using.

9 900-9 940 kHz

2 safety-related maritime data channels

Frequencies are also allocated to:

French Military
USA FAA (aeronautical)
USAF (aeronautical military)
U.S. Army
U.S. NOAA (safety service)
French Navy
Australian Oil Rigs
Japan Meteo Fax (safety service)
USAF NASA
AFTN Meteo Azores (aeronautical safety)

The impact on US based services is summarized in Annex 1

Note: 7 different broadcasts were heard in this band, October 2005.

In view of the severe consequences listed herein, Resolution **544** should be suppressed.

Further support for this proposal will be found in Annex 1

Resolution 729:

resolves

"1 that, in authorizing the operation of frequency adaptive systems in the MF and HF bands, administrations shall:

1.1 make assignments in the bands allocated to the fixed and mobile services;

1.2 not make assignments in the bands:

- allocated exclusively to the maritime or aeronautical mobile (R) services;

- shared on a co-primary basis with the broadcasting service, radio determination service or the amateur services;

- allocated to radio astronomy;

1.3 avoid use which may affect frequency assignments involving safety services made in accordance with Nos. **5.155**, **5.155A** and **5.155B**;

1.4 take into account any footnotes applicable to the proposed bands and the implications regarding compatibility;

2 that frequency adaptive systems shall automatically limit simultaneous use of frequencies to the minimum necessary for communication requirements;

3 that, with a view to avoiding harmful interference, the system should evaluate the channel occupancy prior to and during operation;

4 that frequency adaptive systems shall be notified to the Bureau in accordance with the provisions of Article **11**,"

Resolution **729 (WRC-97)** deals with implementation of adaptive HF systems and was not successfully addressed at either WRC-2000 or WRC-2003. Adaptive HF systems are systems that monitor the propagation environment on pre-established channels and react to use the optimal frequencies available for transmission.

Frequency adaptive systems automatically limit simultaneous use of frequencies to the minimum necessary for communication requirements. According to ITU-R WP 6E/223, which originated in ITU-R WP 9C, this characteristic of adaptive systems does not necessarily reduce the number of frequencies that must be made available to ensure successful link establishment. Consideration must also be given to maintain quality of service for uses that fluctuate in response to situations such as those that arise during Public Protection and Disaster Relief. The number of frequencies in an adaptive frequency pool is directly interrelated to the specific HF propagation characteristics based on time of day, season, sunspot activity, etc. Therefore, efficiency improves as more frequencies are available. A network of stations is assigned a number of frequencies over which to communicate, and each station is assigned a unique address.

Adaptive HF systems have been in use for over 20 years. No special consideration in the ITU Radio Regulations is required to fully implement adaptive HF systems. By their nature these systems already automatically limit simultaneous use of frequencies to the minimum necessary for communication requirements. These systems also automatically avoid harmful interference by evaluating the channel occupancy prior to and during operations.

To fully exploit modern HF technology, the availability of sufficient and coordinated spectrum resources is crucial, and bandwidth beyond the typical 3 kHz-channels must be available. The ITU-R WP 8B proposal (WP 8B/135) takes this into account for the MMS.

The channel bonding approach currently in use is based on the use of several 3 kHz contiguous channels. The advent of HF 64 kbps modems has begun to provide the ability to utilize HF spectrum for Internet, large file transfer, and advanced electronic messaging. Loss of HF spectrum allocated to the fixed and mobile services would constrain the development of advanced technologies such as messaging, file transfer, and the Internet.

The required studies related to adaptive HF technology have been adequately answered. Therefore, Resolution **729** can be suppressed.

However, there is an emergence of high bandwidth requirements in the form of advanced fixed and mobile HF systems, which does require urgent study. Therefore a new resolution is required to examine the issues involved in implementing advanced fixed and mobile HF systems in the MF/HF bands.

Proposal:

USA/ /1 MOD

RESOLUTION 351 (WRC-07)

Review of the frequency and channel arrangements in the MF and HF bands allocated to the maritime mobile service with a view to improving efficiency by considering the use of new digital technology by the maritime mobile service

The World Radio communication Conference (Geneva, 2007),

Reasons: Editorial

considering

a) that the agenda of this Conference included consideration of the use of new digital technology in the maritime mobile service (MMS) in the MF and HF bands;

b) that the introduction of new digital technology in the MMS shall not disrupt the distress and safety communications in the MF and HF bands including those established by the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended;

c) that changes made in Appendix **17** should not prejudice the future use of these frequencies or the capabilities of systems or new applications required for use by the MMS;

d) that the need to use new digital technologies in the MMS is growing rapidly;

e) that the use of new digital technology on HF and MF frequencies allocated to the MMS will make it possible to better respond to the emerging demand for new services;

f) that the HF bands allocated to the MMS for A1A Morse telegraphy are not used for this purpose and narrow-band direct-printing (NBDP) allocations are used by only a small number of low volume residual services at present;

USA/ /2 MOD

g) that the IMO supports replacing general communication narrow-band-direct-printing with new HF data exchange technology capable of delivering MSI

h) that the IMO supports the frequencies of Appendix **15,** concerning NBDP, be retained for the foreseeable future.

i) that the ITU Radio communication Sector is conducting ongoing studies to improve the efficient use of these bands,

noting

a) that different digital technologies have already been developed and are in use in the MF and HF bands in several radio communication services,

b) that new maritime HF data transfer protocols have already been developed to replace general narrow-band-direct-printing communications using Appendix **17** frequencies and mobile frequencies outside Appendix 17

noting also

that this conference has modified Appendix **17** to permit the use of various channels or bands identified in the MF and HF bands for the introduction of new digital technology,

resolves

1 that, in order to provide full worldwide interoperability of equipment on ships, there should be one technology, or more than one interoperable worldwide technology to serve the MMS.

2 that, as soon as the ITU-R studies are completed, a future competent conference should consider necessary changes to Appendix **17** to facilitate the use of new technology by the MMS,

invites ITU-R

to finalize studies currently ongoing:

– to identify future requirements of the MMS;

– to identify the technical characteristics necessary to facilitate use of digital systems in the MF and HF bands allocated to the Mobile Service, taking into account any relevant ITU-R Recommendations;

– to identify the digital system(s) to be used in the MF/HF bands by the MMS;

- to identify any necessary modifications to the frequency table contained within Appendix **17**

- to propose a timetable for the introduction of new digital technologies and any consequential changes to Appendix **17**;

– to recommend how digital technologies can be introduced while ensuring compliance with distress and safety requirements,

instructs the Secretary-General

to bring this Resolution to the attention of the International Maritime Organization, the International Civil Aviation Organization, the International Association of Marine Aids to Navigation and Lighthouse Authorities and the Comité International Radio-Maritime.

Reasons: There are still several studies underway that need to be completed prior to resolving this issue. These studies should be completed prior to the next Conference after WRC-07, where the appropriate changes to the RR can be considered.

USA/ /3 SUP

RESOLUTION 544 (WRC-03)

Identification of additional spectrum for the broadcasting service in the HF bands

Reasons: The impact to the fixed and mobile community is too severe to allocate additional spectrum to the broadcast service that would, in fact, come from bands assigned to these services. In addition, the long term need for additional broadcasting spectrum is unknown. Additional spectrum reallocated to the broadcast service would result in congestion to the fixed and mobile services, including the MMS. Congestion is now present in some fixed and mobile services bands. Recent operations supporting disaster relief demonstrated that fixed and mobile service requirements exceeded the spectrum allocated to these services. Frequencies used by the MMS support general and safety related communications as well as Ship Security Alert Systems communications and Long Range Tracking and Identification. Any degradation of these services would have severe consequences.

USA/ / 4 SUP

RESOLUTION 729 (WRC-97)

Use of frequency adaptive systems in the MF and HF bands

Reasons: The studies under Resolution **729** have been completed. These studies have indicated that no changes to the RR are required to facilitate the introduction of adaptive techniques in the MF/HF bands.

USA/ / 5 ADD

RESOLUTION USA 1 (WRC-07)

Bandwidth Requirements for Advanced Fixed and Mobile HF Technologies in the 3 – 30 MHz Band

The World Radio communication Conference (Geneva, 2007),

considering

a) that there are a limited number of fixed and mobile 3 kHz bandwidth channels, and many channel bandwidths are below 500 Hz, in the planned portions of the 3-30 MHz band;

b) that trials of advanced fixed and mobile HF frequency systems have demonstrated their feasibility and their associated spectrum efficiency;

c) that advanced fixed and mobile HF frequency systems require larger channel bandwidth assignments greater than the 3 KHz assignments that are currently common.

noting

that some advanced fixed and mobile HF frequency adaptive systems utilize bandwidths of up to 12 kHz to support HF electronic messaging, HF Internet, and HF file transfer;

resolves to invite ITU-R

1 to determine the feasibility of changing the Radio Regulations to provide for the use of wider bandwidths to support advanced fixed and mobile HF systems in the 3 – 30 MHz band;

2 to bring the results of these studies to the attention of WRC-10

Reasons: Urgent studies are required to determine the suitability of changing the radio regulations to allow for wider bandwidths to the fixed and mobile services to accommodate advanced HF adaptive systems.

ANNEX 1

IWG-4
Agenda Item 1.13

The case for no additional spectrum for any service

IWG-4 has received inputs from NASB, from the HF Users Group, and a modified proposal by Don Messer. Subsequently, there was an additional modified submission from the HF Users Group and numerous individual submissions calling for "no additional broadcast spectrum". The overwhelming majority of opinion was in favour of "no additional spectrum".

There have been numerous discussions about the detailed wording of the submitted papers. However, such discussions are essentially irrelevant until the very simple, very straightforward question and entire focus of this discussion is settled: "yes" or "no" to additional HF broadcast spectrum. With this focused idea, following are some relevant considerations.

1. The decision has already been made to give the broadcast service additional spectrum in 2007 (100 KHz) and again in 2009 (50 KHz).
2. The broadcast justification for further additional spectrum does not take into account the potential for spectrum saving through the efficient use of digital broadcasting. The broadcast need for spectrum is likely to decline or, at best, is uncertain. This is based on the advent of new technologies such as internet and satellite radio. This is made clear in recent public announcements from major broadcasters.
3. The demand for mobile services and supporting spectrum is growing and forecast to continue growing. There is ample documentation and evidence of this in the submissions from the various emergency services operators..
4. Mobile services already suffer from broadcast interference. New broadcaster allocations would increase congestion. Broadcast services are already operating in the Maritime Mobile Appendix 17 spectrum that is shared with the fixed service.
5. Broadcast services are already transmitting on the Appendix 17 maritime mobile exclusive frequencies between 6200 and 6280 KHz and causing interference to MMS communications.
6. If additional spectrum is transferred from Fixed & Mobile to Broadcasting, there will be a serious deterioration in essential and critical safety services, including maritime security alerting, long range tracking and identification and emergency response services.
7. If no additional spectrum is transferred to broadcasting, there will be no serious impact on essential, critical or safety related services.
8. Co-primary status between broadcasters and fixed and mobile is unworkable due to time needed to arrange for broadcasters to vacate the spectrum when other means of communication are unavailable to first responders or safety of life applications.

Table 1
Issues and comparisons

	HF BROADCAST	**HF FIXED & MOBILE** (Includes Maritime Mobile)
SERVICE	One-way dissemination of useful and important information. Non-critical. High power.	Two-way communications supporting essential operations and critical safety related services. Low power. MMS services are high volume with high frequency occupancy.
SERVICE AREA	Global Land Masses	Global Land & Sea
ALTERNATIVES	Internet, satellite, FM broadcast.	Satellite in some areas.
SERVICE DEMAND	Alternative dissemination technologies such as the internet, satellite and FM broadcast have reduced the demand to the extent that some HF broadcasters have shut down.	New technologies offering improved efficiencies and automation have increased demand. Concerns about security and single points of failure in satellite systems have also increased the attractiveness of and demand for HF systems.
SPECTRUM DEMAND	New, more spectrum efficient technologies such as digital broadcasting and SSB coupled with reduced service demand point towards future reduced spectrum needs. Intelligent, propagation based single frequency selection instead of multiple frequency broadcasts also reduces spectrum needs.	The new technologies require increased bandwidth for increased throughput. This coupled with increased service demand and new service providers entering the market is having a dramatic upward impact of spectrum demand. The attacks of Sept 11 changed how HF is used and dramatically increased the demand.
INTERNATIONAL IMPLICATIONS	Any regulatory changes will have severe international implications.	Any regulatory changes will have severe international implications.

Conclusion:

This scenario does not support the concept of taking spectrum from Fixed and Mobile and giving it to Broadcasting.

POTENTIAL IMPACT ON MOBILE SERVICES

The following frequency ranges were proposed for allocation to the broadcast service. Such an allocation would infringe upon the following service providers.

5 060-5 100 kHz

Globewireless:
6 frequencies would have to shut down.

Other Services:

Sailmail, USAF, FBI, USCG, US NASA, US Navy. FEMA, US Customs, UK Military, Dutch Navy, Russian Military, Nato and Nato Link 11, Canadian Navy, Pacific Loran Net, Malaysian Navy Weather, AFTN (Aeronautical Fixed Telecommunications Network) Net Control, RAF and various Antarctic bases.

5 840-5 900 kHz

Globewireless
8 frequencies would have to shut down.
2 planned frequencies would not be available.

Other Services.

Sailmail, FEMA, FAA, US DEA, USAF, USN/MARS, US NASA, US DOE, USCG, Shipcom, KKL Radio planned frequencies x 2, Swedish Maritime Meteo, Nato, Algerian Diplo. Danish Ice Info, Korean Meteo, Spanish Civil Guard numerous, Canadian AF and Italian Meteo. Antarctic Meteo, Diego Garcia Meteo, Danish Marine Info, China Meteo, Russian Meteo and Ice Reports, various diplo. Services, S African Transport and Ecuador Time Signals.

7 350-7 600 kHz

Globewireless
6 frequencies would have to shut down.

Other Services

US Military x 3, US Navy, FEMA, US NASA, US FAA, USAF, USAF/MARS, USCG, US Bell Tel Net, Nato x2, Albanian Military x 3, Israel AF, Spanish Civil Guard x 4, Venezuelan

Military x 2, German Military, Italian Police, Russian Navy. Tors Cove Marine Radio (Canada), French Military, UK Military, Antarctic Meteo, Diego Garcia Meteo, Danish Marine Info, China Meteo, Russian Meteo and Ice Reports, various diplo. Services, S African Transport, and Ecuador Time Signals.

9 290-9 400 kHz

Globewireless
Could not find a useable frequency.

Other Services

Cruise Email, US Army, US DOE, US Navy, US NASA, Swedish Maritime Meteo, Spanish Thales System, Tashkent Meteo, Russian Meteo, French AF, S African Oil Rigs, Danish Ice Reports, AFTN

9 900-9 940 kHz

Globewireless
Planned 4 channels but could not find any due to extensive broadcast interference.

Other Services

US FAA, USAF, US Army, FAA, US NOAA, US NASA, S African Police Net, UK Naval and Antarctic Bases.

CONCLUSION

Considering that:

1) There is overwhelming opposition to allocating additional Fixed & Mobile spectrum to Broadcasting.
2) It is in the IWG charter to provide to the FCC "proposals for WRC 07"

It is proposed that:

IWG-4 report to the WAC that there is widespread support, with the dissenting view of the broadcasters, for "no new spectrum allocations" and the suppression of 544.