Mr. Donald Abelson
Chief of the International Bureau
Federal Communications Commission
445 12th Street SW
Washington, D.C. 20554

Dear Mr. Abelson:

The National Telecommunications and Information Administration (NTIA), on behalf of the Executive Branch Agencies, has approved the release of an additional Executive Branch proposal for WRC-07. This proposal considers the federal agency inputs toward the development of the U.S. Proposals for WRC-07.

The enclosed document contains a draft U.S. proposal for agenda item 1.13. This proposal is forwarded for your consideration and review by your WRC-07 Advisory Committee. Jim Vorhies of my staff is the primary contact for NTIA.

Sincerely,

(Original Signed August 5, 2005)
Fredrick R. Wentland
Associate Administrator
Office of Spectrum Management

Enclosure

United States of America

DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE

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 channeling arrangements are in techniques and the spectrum requirements for HF broadcasting;

Background Information: 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 CPM convened following WRC-03 assigned the primary responsibilities for the separate issues to different 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, weather forecasts and for business communications, e.g., by fishing fleets. 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).

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 relocated to 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 broadcasting 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 broadcasters 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 calls 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 services users to establish and maintain reliable essential and emergency communications services. Any consideration by WRC-07 of reallocating 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 2002 kHz for land mobile and 2512 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 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 hard to establish required radio links based on the loss of currently available portions of the spectrum and also due to spectrum crowding from realignment of assignments to account for any spectrum allocated from the fixed and mobile service to the broadcasting service.

The operational databases maintained by the HF Coordinating Committee 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 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 operate within broadcasting allocations and do not operate under Article **4.4**.

There are interference risks associated with Article **4.4** operation. The HF Coordinating Committee 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.

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 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.

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 the 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. Concentration of spectrum in large blocks with large gaps between them cannot be optimal based on HF propagation phenomena. Thus band spacing and availability have become crucial factors which affect all services and have the potential to multiply requests for additional spectrum.

The fixed and mobile services transmit frequencies may change often, spreading the traffic over a wider spectrum. Statistically this may make it appear like there is lower occupancy of the HF spectrum. An adaptive system may find better propagation conditions and establish a link with lower power levels than non-adaptive systems. Given this agility, HF stations or HF circuits kept in a silent mode or on watch must be furnished with the full set of frequencies to meet emergency requirements at any moment in time.

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. Consequently Resolution **544** should be suppressed.

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, radiodetermination 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 6E/223, which originated from 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 (*e.g.*, alpha-numeric).

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 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 in MF/HF bands.

Proposal:

USA/ /1 MOD

RESOLUTION 351 (WRC-~~03~~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 Radiocommunication Conference (Geneva, ~~2003~~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 and narrow-band direct-printing are significantly under-utilized 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 working FEC NBDP,

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

~~g~~i) that the ITU Radiocommunication 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 radiocommunication 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,

noting also

that this conference has modified Appendix **17** to permit~~, on a voluntary basis,~~ the use of various channels or bands identified in the MF and HF bands for ~~initial testing and future~~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, 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,

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 MMS, 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**;

- identify maritime mobile HF spectrum for new systems, particularly in the range 10 to 18 MHz.

- identify additional spectrum resources in the range 9 to 10 MHz in order to facilitate the introduction of new technologies in the mobile maritime service, by overcoming the large gap between the 8 and 12 MHz maritime mobile bands;

– 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, 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 broadcasters that would, in fact, come from bands assigned to these services. In addition, the long term need for additional broadcasting spectrum is unknown.

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 Radiocommunication 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 which currently can only be accomplished through channel bonding;

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.

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