Report of the ARRL HF Bandplanning Committee

Executive Summary

Conflicts have surfaced about interference among CW and digital segments of HF bandplans. The situation was referred to the HF Bandplanning Committee for consideration and recommendations to increase harmony. The group considered a variety of positions on the issues, and developed the recommendations below.

In general, the Committee agrees that the recent, extreme popularity of digital modes is likely to continue or accelerate. FT8 as a mode is the poster child for the rapid and extreme rise in popularity that is possible with the new digital modes. We expect more of this evolution in the future. Along with digital modes, there has been an increase in automatically controlled digital stations (ACDS). We believe this trend will continue as well.

Significant use of modern data modes has been made in emergency communications, and they have been adopted as standards in several states, along with many other countries besides the U.S. in IARU Region 2. Many served agencies have indicated the need to interchange information of a type which is only inefficiently exchanged via CW or SSB modes. Thus, in many ways, the recommendations in this report provide a significant support for the evolution and continued relevance of amateur radio. Our failure to adapt to these needs could consign amateur radio to the technological scrap heap.

The committee has not considered any realignment of allocations for voice modes, except with regard to 80m. The unexpected reassignment of 3600 to 3650 kHz to voice use by the Commission has been instrumental in causing some of the spectrum collisions experienced in the current situation. Our suggestions are consistent with ARRL's petition RM-11759.

Since new spectrum space is not being created, it is inevitable that allocations to one group can only increase by reduction of the allocations of other groups. The committee has tried to minimize this, but we were agreed that growth in digital modes merits some expanded allocation, while existing modes may see slight downwards adjustment in order to accommodate that growth.

Background, History and Approach

The HF Bandplanning Committee was revived in early August 2019 to consider FT4/FT8/existing user conflict. The membership at that time was Ria Jairam N2RJ, Ned Stearns AA7A, and Greg Widin K0GW.

This 3-person group teleconferenced with Joe Taylor K1JT, who was open to suggestions for changing frequencies that appear in WSJT-X. We intend to circle back with him when other relevant frequency assignments are in better focus.

At the end of August, the group's charter was expanded to include RM-11708 (baud-rate to bandwidth), and other current issues, and Kermit Carlson W9XA, Mike Ritz W7VO, and Dale Williams WA8EFK were added to our membership.

Ned Stearns did the difficult and meticulous job of tabulating band allocations for: Regions 1, 2 and 3; JA; YB; VK; ZL; US; and special uses: W1AW, WSPR, JT65, JT9, FT8, FT4. This tabulation is depicted graphically in the Appendix to this report. The group also identified and agreed to several "principles of allocation," which are goals for any allocation. Parts of these principles are discussed in this report, and the entire list appears separately at the end.

While wishing to minimize the number of distinct segments in the bandplan, the group concluded that the following modes/uses need to have distinct assignments:

- CW
- Narrow Data <500Hz
- Wide Data < 2800 Hz
- ACDS

The committee recognizes that there are other incompatibilities among various data modes, even within the Narrow or Wide categories. This will require further agreements on assignments within a given bandplan category. The committee distinguishes between "allocations"—assignments by the applicable governmental administration of frequencies to specific modes or uses—and "bandplan"—consensus agreements among users that certain frequencies will be used for specific purposes that are subsets of a governmental assignment or allocation.

An effective and reliable method of "listen before transmit" (LBT) practice by ACDS stations could alleviate a major source of incompatibility between ACDS and non-ACDS stations. Completely separate assignments will also help alleviate this problem. The committee considered whether LBT should be made a mandatory requirement for ACDS, but has been advised that while this should be a preferred and encouraged practice, it is preferable for users of these modes to develop their own preferred methods of achieving the same level of sharing. The committee wishes, however, to record its strong support for serious work toward developing operational systems for LBT in the amateur service at the earliest possible date. We do suggest, however, that some human-readable identification of a transmitting station (such as Morse ID) be *required* over the air for ACDS stations, as an encouragement of cooperative operating practices, and enforcement if required.

In agreement with the position taken by ARRL in recent FCC filings, the committee sees encryption and open-source as enforcement issues, and therefore outside the scope of the Bandplanning Committee. The committee has explicitly avoided these topics in the context of bandplanning.

Assumptions on which our assignment is based

The assignments detailed in this document are based on the assumption that all 3 petitions by ARRL are enacted:

- RM-11708 Symbol Rate Proceeding
- RM-11759 Petition to realign the 80/75 meter allocations
- RM-11828 Petition for Technician class enhancement

We have also assumed that users can agree to sharing arrangements with in a given allocation—example: NB vs WB sharing within the ACDS allocation.

In addition, assignments as suggested will result in improved harmony of US assignments with the rest of Region 2 and worldwide with Regions 1 and 3.

Specific suggestions of changes for US HF Bandplans

Based on this background, the committee considered specific assignments that could be the basis of formal allocations and subsequent bandplans. The committee is well aware that the nature of ARRL's bandplanning recommendations is a contentious and much-anticipated outcome, but we also believe that careful deliberation is critical to an effective and fair solution. Not only must we consider U.S. usage of these modes, but also the allocations and bandplans of other administrations and the other two IARU regions (hence the tabulation of allocations in the Appendix). It appears impossible to satisfy all these constraints simultaneously. Nevertheless, the committee desires to improve spectrum compatibility around the world, especially since a large amount of the use of data modes is for DX operations, which inherently stress the internationality of frequency assignments. Furthermore, since digital operations look to be the next area of amateur contributions to the radio art, our ability to propose and operate within effective bandplans is likely to affect our ability to contribute to the advancement of technology.

In general, the committee is of the opinion that there is justification for additional space to become available for digital modes, as well as for the operation of digital stations under automatic control. The very changes in spectrum usage that have required our committee's resurgence indicate that digital modes of communication are already increasing in popularity, and the trend is expected to continue or even accelerate. To this end, we have tried to ensure that digital allocations are sufficient for at least a modicum of growth.

With regard to ACDS, after deliberation the group decided that a single allocation without regard to bandwidth would be the best designation. We cannot predict the specific needs of the protocols which will evolve in the digital domain, so we have not attempted to apportion our recommended ACDS assignment to specific bandwidths. We note that this will put responsibility on the digital community to hold an effective dialog on the issue, and to then self-regulate the users of this segment to adhere to the eventual agreement. We also believe that this assignment will encourage "spectrum efficient" modes as they evolve.

The committee also believes that there needs to be flexibility in allocations, and thus considered whether allocations could depend on the time of day (like "daytime only" AM broadcast stations). In addition, we believe that it must be recognized that weekend "expansion" of a segment due to special activities such as DXpeditions or contests is an appropriate use of amateur frequencies and is merely the natural consequence of the need to share frequencies. As all amateurs know, no one has a "right" to a specific frequency, and keeping a particular frequency "clear" for use of a certain group or in case a need might arise is simply untenable in our crowded band conditions. In addition, certain activities may occur at specific times of the day, such as morning or evening traffic nets, and this leaves room for other uses at other times of the day. Modern amateurs must expect to adapt to this kind of fluid assignment of spectrum to incompatible uses, using time-based sharing, rather than only a single assignment. We have not taken the step of proposing specific time-based sharing, but as bandplan/sharing agreements are reached, we hope they consider the advantage of non-simultaneous sharing possibilities.

Our suggested allocations based on these considerations are shown in the Appendix, juxtaposed with the current allocations. Since new bandwidth across the frequency spectrum cannot be created, new solutions will result in some uses receiving reduced emphasis, at the same time that new services feel that they are not being given adequate space to realize their true potential. The Bandplanning Committee definitely understands that the broad scope of change required in this activity will have an impact upon all users of the affected bands. Clearly, compromises will be required and are called for as we attempt to accommodate newer modes and technologies while minimizing impact upon the current user base.

Respectfully submitted,

HF Bandplanning Committee, 2019

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Greg Widin (chair)

Principles of Allocation

1. The classes of modes are: CW, NB data, WB data, NB with ACDS, WB with ACDS. These modes are assumed incompatible and should have non-overlapping allocations.
    a. "Historical" contradiction—CW must be applicable everywhere.
2. ACDS (data type "Y") should only ever overlap with non-ACDS data type Y
3. Maintain the 25 kHz low-end allocation for Extra Class.
4. Maintain NB digital co-allocations with CW as in the current allocations.
5. There should be some exclusively CW allocation which includes other classes besides the Extra Class.
6. If possible, bandwidth occupied by an allocated mode should increase with increasing frequency
    a. For example—CW, NB data, WB data, phone
7. It is desirable to maintain current allocations/uses (FT8/FT4/W1AW bulletins/WSPR, etc.) but this is a distinctly lower priority than appropriate range of frequencies for each "class" of modes.
8. CW identification of ACDS should be considered if technically feasible.

Information sources consulted

The extensive allocation graphs in the Appendix were compiled principally by Ned Stearns. Ned used the sources below.

In order to understand band usage, we accessed several sources which showed the relative use of different frequency regions of each band we were investigating.

Individual committee members are each connected with different parts of the amateur community, and used their connections to discuss some of the allocation ideas the group was considering. In so doing,

we found out that some concepts were likely to be well received, while others were seriously at variance with day-to-day amateur practice.

These are the specific sources used to generate the tables of existing allocations in the Appendix.

Region	*link*
IARU Region 1	http://www.hflink.com/bandplans/region1_bandplan.pdf
IARU Region 2	https://www.iaru-r2.org/documents/explorer/files/Plan%20de%20bandas%20%7C%20Band-plan/R2%20Band%20Plan%202016.pdf
IARU Region 3	http://iaru-r3.org/documents
JA	https://www.jarl.org/English/6_Band_Plan/JapaneseAmateurBandplans20150105.pdf
YB	http://kambing.ui.ac.id/onnopurbo/orari-diklat/pemula/teknik-operasi/operating-procedures/Amateur%20Radio%20Band%20Plans%20in%20Indonesia.htm
VK	http://www.wia.org.au/members/bandplans/data/documents/Australian%20Band%20Plans%20190700.pdf
ZL	http://www.nzart.org.nz/assets/bandplan/2018-bandplan.pdf

The group looked at some data concerning current band occupancy—

40 Meter Nets that are registered in the ARRL On-Line Net Directory (October 2019) Courtesy of Steve Ewald

We also had access to a recent analysis of frequency use during contest conditions for RTTY users--
RTTY Contest Frequency Use Patterns—Presentation by AA7A (September 2018)

Appendix

For each band separately is shown:

- Allocations of IARU Regions 1-3, US FCC, and other International administrations
- Recommended new allocation statements for International HF stations in the Amateur Radio Service

These are shown for each HF band, 160 through 10m, with the exception of 60m which was not considered by the committee.