ICAO Handbook on Radio Frequency Spectrum Requirements for Civil Aviation

Volume II - Frequency assignment planning criteria for aeronautical radio communication and navigation systems (ICAO Doc 9718, Volume II)

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Robert Witzen
Loftur Jónasson
Mie Utsunomiya
Volume I → Spectrum Management

• ICAO Frequency Spectrum Strategy:
  – High level vision on existing and future spectrum requirements in support of the evolving CNS systems and infrastructure requirements

• ICAO Frequency Policy Statements:
  – Statements of official policy on each and every frequency band used by aeronautical systems for the provision of CNS

• ICAO Position for WRC:
  – ICAO Position on the specific agenda items of the upcoming ITU WRC to ensure that aeronautical requirements and safety concerns are met

Volume II → Frequency Management

• ICAO Frequency Assignment Planning
Vol. I – Overview of spectrum for aviation

Frequency range 100 kHz – 100 MHz

Notes:
- Drawing not to scale
- Not all Regional or sub-Regional allocations are shown
- Band identification (e.g. VHF) and band # per Radio Regulations
- The satellite communication bands used by MTSAT and Inmarsat are not allocated the the Aeronautical Mobile Satellite (R) Service
Vol. II – Frequency assignment planning

- Provides for globally harmonized frequency assignment planning criteria and guidance material to support the application of SARPs in Annex 10, Vol. V
- Developed in conjunction with the revisions to Annex 10, Vol. V
- Developed by the frequency Spectrum Management Panel (FMSP)
- Implementation has been agreed through the relevant Regional eANP
- Support the development of a frequency assignment plan which encompasses Global and Regional COM lists and the Global Air Navigation Plan
Vol. II – Frequency assignment planning
Chapter 1 – General methodology (1)

- General methodology for compatibility analysis
  - General model for compatibility assessment
  - Based on:
    - Protection of desired signal at receiver input
    - Not to exceed maximum permissible distortion of receiver output signal
Determine the desired signal level at receiver input
Determine the undesired signal level at receiver input
Determine the D/U ratio
If $P_D$ and $P_U$ are the same, $D/U$ is $L_D - L_U$
Vol. II – Frequency assignment planning
Radio wave Propagation model

• Propagation model
  – Based on free space propagation  
    (Re. Recommendation ITU-R P.525)

• Propagation model does not accommodate certain phenomena which are difficult to predict such as
  – Changes in the refractive index of the atmosphere
  – Ducting

• ITU has developed propagation curves for aeronautical communication and navigation systems (Recommendation ITU-R P.528)
Compatibility criteria for frequency coordination (1)

- Frequency assignment planning criteria are to be considered as a generic technical measure to support frequency coordination.
- Planning criteria provide for a rather conservative method to assign frequencies without causing harmful interference.
- In most cases, a detailed technical analysis would result in reduced geographical separation being required.
- Consideration of actual operational use
Frequency assignment plans may include frequency assignments which do not meet the planning criteria as agreed by ICAO.

In many of such cases these frequency assignments may be considered operationally compatible.
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Compatibility criteria for frequency coordination (3)

- consideration of the operational use
- absence of interference reports
- consideration of the effect of the terrain.
- as result of a detailed analysis of the technical characteristics of both the desired and undesired stations

• Non-compatible identification in Frequency Finder does not necessarily imply operational incompatibility
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Compatibility criteria for frequency coordination (3)

- A station that is considered “Not Compatible” because it does not meet the ICAO frequency assignment planning criteria is not, by default, also operationally “Not Compatible”.

- Frequency Finder displays geographical areas where interference is predicted to support a more detailed analysis.