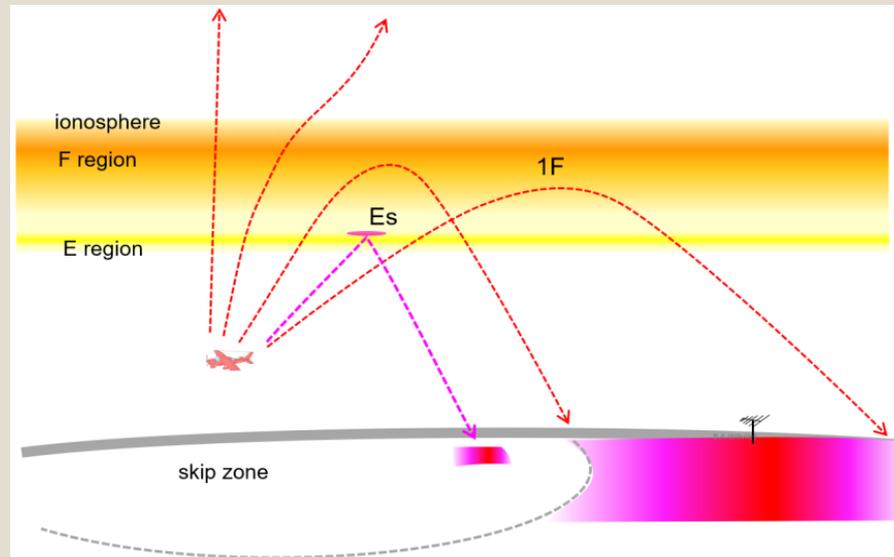


# WRC-23 Agenda Item 1.9

Consideration of regulatory provisions for updating Appendix 27 of the Radio Regulations in support of aeronautical HF modernization

‘Wide Band HF’



NACC/CAR/SAM Preparatory Workshop

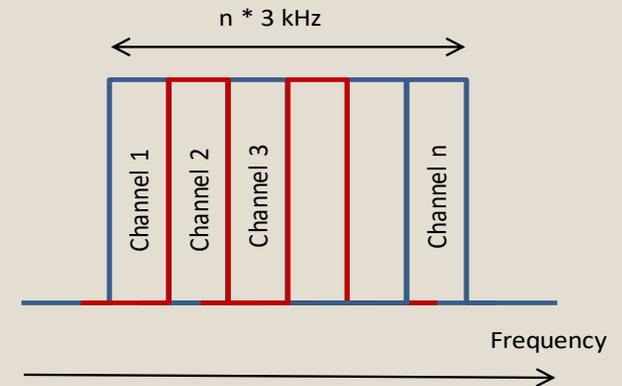
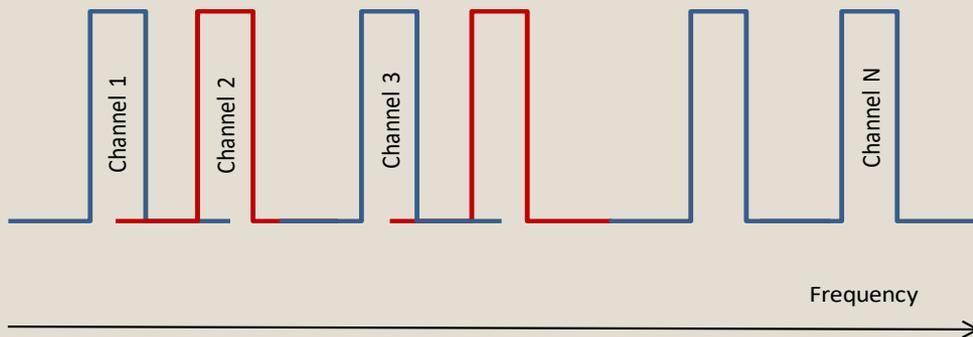
21-22 February 2022

# Current Aeronautical HF Datalink (HFDDL) Usage

- 3 kHz Upper Side Band (USB) channels
  - Operates within the multiple AM(R)S allocations between 2.8 - 22 MHz
  - Channel allotment plan defined in ITU-R RR – Appendix 27
- HFDDL provides CPDLC, ADS-C and AOC data messages for oceanic and remote aircraft
  - Limited to 2.4 kbps data rate
  - RCP 240 performance
  - Often a fall back for L-Band AMS(R)S SATCOM for those aircraft equipped
- Performance defined in ICAO Annex 10 and ITU-R Recommendation M.1458 - [Link](#)

# Wide Band HF Proposal

- Presentation to ICAO on WBHF proposal - [Link](#)
- Use of modern spectrally efficient modulation techniques that can provide approx. 100 kbps
  - Maintaining the current emission limits of the existing HF DL system
  - Allow digital voice over the same data channels
  - Improve upon current RCP-240 performance for delivery of FANS traffic via current HF DL
  - Provide dissimilar but complementary service to current L-Band AMS(R)S SATCOM systems
- Proposals to use multiple 3 kHz channels in both non-contiguous channels with multi-carrier waveforms, and contiguous channels "bonded" into a single channel  $n \times 3\text{kHz}$  wide (up to 16 channels)
  - Automatic Link Establishment which allows the HF radios to find and link on the best available frequency at the current time
- Updated HF radios to reduce SWaP requirements
- More efficient usage of aeronautical HF spectrum



# Key Elements of ITU-R Resolution 429 (WRC-19)

## ITU-R Resolution 429 (WRC-19) - [Link](#)

- Recognizing c) - that the modernization of aeronautical HF communications will not require any changes to Article 5 of the Radio Regulations
- Recognizing e) that any channel aggregation needs to be performed in a manner that protects other primary services operating in band and in adjacent frequency bands
- Noting b) - that the existing regional frequency allotments are detailed in Appendix 27 for aeronautical HF in the AM(R)S
- Noting c) - that Appendix 27 provides international and regional allotments for HF channels within the AM(R)S
- Noting e) that inter-system compatibility between internationally standardized aeronautical equipment is the responsibility of ICAO

# Key Elements of ITU-R Resolution 429 (WRC-19)

## **Resolves**

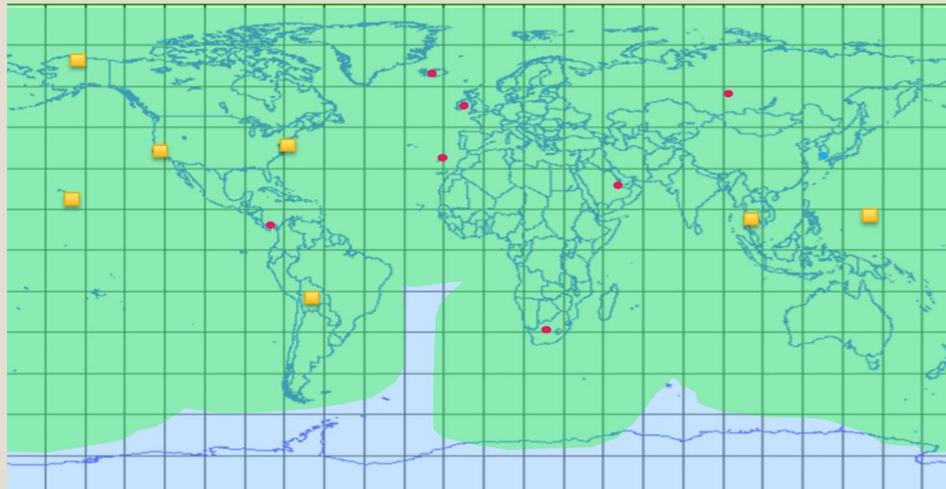
1. to identify any necessary modifications to Appendix 27 for the AM(R)S between 2 850 and 22 000 kHz, noting recognizing c)
2. to identify any necessary transition arrangements for the introduction of new digital aeronautical wideband HF systems and any consequential changes to Appendix 27
3. to recommend how new digital aeronautical wideband HF systems can be introduced while ensuring compliance with safety requirements and with recognizing e)
4. to define the relevant technical characteristics and to conduct any necessary sharing and compatibility studies, taking into account noting e), with incumbent services that are allocated on a primary basis in the same or adjacent frequency bands to avoid harmful interference in accordance with recognizing e)
5. to complete the studies in time for WRC-23

# Draft ICAO Position for 1.9

Full text of ICAO WRC-23 Positions - [Link](#)

**To support ITU-R studies as called for by Resolution 429 (WRC-19).**

**To support, based on agreed studies, the necessary modification of Appendix 27 to the Radio Regulations that will enable the introduction of HF wideband aeronautical communication systems. Those systems shall be operated in accordance with international Standards and Recommended Practices and procedures established in accordance with the Convention on International Civil Aviation.**



*Image from Collins Aerospace Presentation to ICAO FSMP – Jan 2019*

# Current ITU-R Studies

- Work being developed within ITU-R Working Party 5B as the responsible lead group - [Link](#)
- Working Document towards Preliminary Draft New ITU-R Report AERO-WIDEBAND-HF - [Link](#)
  - Overview of current HF DL usage and sites
  - Discussion on channel bonding mechanisms
  - Preliminary system parameters
  - HF propagation mechanisms
  - Possible additional material:
    - Adjacent band studies
    - Regulatory coordination and implementation
- Working Document towards draft CPM Text – [Link](#)
  - No proposals - only a framework currently
- Work Plan for WRC-23 Agenda Item 1.9 – [Link](#)\*