

UNITED STATES OF AMERICA
DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 1.3: *To consider spectrum requirements and possible regulatory actions, including allocations, in order to support the safe operation of unmanned aircraft systems (UAS), based on the results of ITU-R studies, in accordance with Resolution 421 (WRC-07)*

Background Information: Unmanned aircraft systems (UASs) enable the remote piloting of aircraft over short range and significant distances within or out-of-sight of the remote pilot. These flight operations currently take place in segregated airspace, to ensure the safety of the air vehicle and other airspace users.

Some administrations expect deployment of UASs throughout the airspace structure. As UAS deployment increases, it will be impractical for some users to deploy in segregated airspace. Some UASs will need to integrate with the current airspace users in a safe and seamless manner. To accomplish integration into non-segregated airspace, UASs will require high integrity communication links between the unmanned aircraft (UA) and remote control centers capable of relaying the necessary air traffic control (ATC) messages and flight critical aircraft information. The UAS pilot will need sense and avoid functions for situational awareness.

The International Civil Aviation Organization (ICAO) future communications study may be able to identify technologies with some capability to meet the requirements for command and control, including the relaying of ATC communications. The aeronautical mobile (R) service (AM(R)S) and aeronautical mobile-satellite (R) service (AMS(R)S) are the appropriate services to accommodate command and control and ATC radiocommunications. The ITU-R is examining existing aeronautical allocations to satisfy spectrum requirements prior to studying new allocations.

Command & Control

In non-segregated airspace, the remote pilot must reliably monitor the status of the UA, pass control instructions to their UA, and interact with the appropriate air traffic controllers monitoring airspace within which their UA is flying. A line-of-sight link might provide these capabilities for UA flying and maneuvering in a localized area. A combination of a terrestrial radio and satellite network could provide these capabilities to UA flying trans-horizon.

Relay of Air Traffic Control (ATC) Communications

Safe operation of manned or unmanned aircraft depends on ATC communications. Pilots act based on ATC instructions. When the pilot is remote (not in the aircraft) the pilot and ATC must maintain a communication channel to relay information from a radio in the aircraft to the pilot on the ground. Early concepts assume that this function, if digitized, could be part of the command and control links.

Sense and Avoid

The safe flight operation of UA necessitates advanced techniques to detect and track nearby aircraft, terrain, and obstacles to navigation. Unmanned aircraft must avoid these objects in

a manner equivalent to that of a manned aircraft. The remote pilot will need to be aware of the environment within which the aircraft is operating, be able to identify the potential threats to the continued safe operation of the aircraft, and take the appropriate action. The radiodetermination service allocations could potentially accommodate the sense and avoid function. The ITU-R is examining existing aeronautical radionavigation service (ARNS) allocations for suitable bandwidth prior to studying new ARNS allocations. The UAS industry is studying the suitability of various technologies for sense and avoid.

Payload

Resolution **421 (WRC-07) Resolves 1** specifically excludes the allocation of spectrum at WRC-11 for payload applications. However, *invites ITU-R 3* does call for the development of an ITU-R report or recommendation on how to accommodate the radiocommunication requirements for UAS payloads. The purpose of this agenda item is not to seek new spectrum allocations to meet payload requirements.

This agenda item seeks to identify the spectrum requirements necessary to support the safe operation of UASs in current and future airspace structures. Spectrum for UAS for safety and regularity of flight in non-segregated airspace will need AM(R)S, AMS(R)S, or ARNS allocations in order to receive the sufficient status and protection from harmful interference.

The 5 030-5 091 MHz band is an appropriate band to satisfy the terrestrial, line-of-sight, spectrum requirements for the command and control of UASs in non-segregated airspace. Currently, there is minimum usage in this band worldwide. The lack of an existing or planned microwave landing system deployment in the United States ensures availability of appropriate aeronautical spectrum for a terrestrial line-of-sight UAS system in the 5 030-5 091 MHz band.

Proposal:

ARTICLE 5
Frequency allocations
Section IV – Table of Frequency Allocations
 (See No.2.1)

MOD USA/AI 1.3/1

4 800-5 570 MHz

Allocation to services		
Region 1	Region 2	Region 3
5 030-5 091	AERONAUTICAL RADIONAVIGATION <u>AERONAUTICAL MOBILE (R)</u> 5.367 5.444	

Reasons: To provide an AM(R)S allocation to support line-of-sight control links for unmanned aircraft (UA).
