



2019 World Radiocommunication Conference Agenda Item 9.1.4

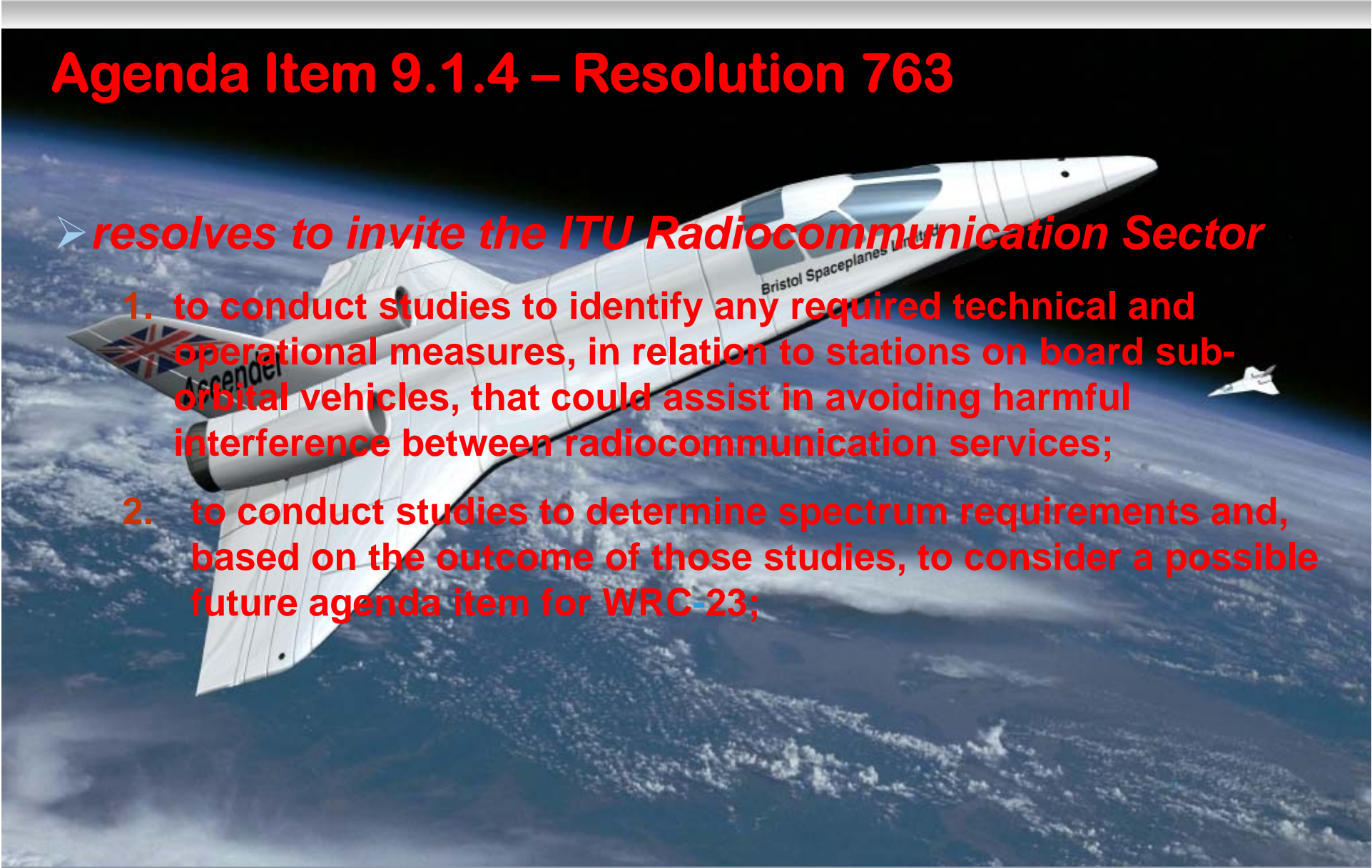
Stations on-Board Sub-Orbital Vehicles (Spaceplanes)

ICAO Regional Preparatory Group meeting
Mexico City, Mexico 6-7 February 2018

John Mettrop
UK CAA



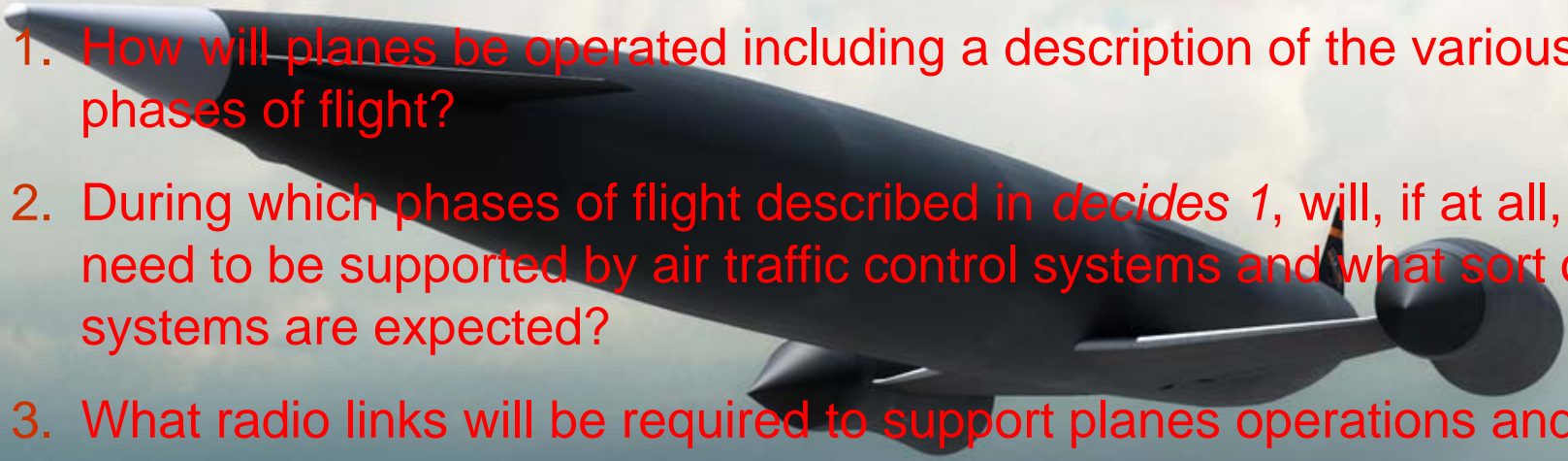
Agenda Item 9.1.4 – Resolution 763

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- A large white spaceplane with two engines is shown in orbit above Earth. The text 'Bristol Spaceplanes Ltd' is visible on the side of the aircraft. A smaller version of the same aircraft is visible in the distance to the right. The background shows the curvature of the Earth and the blackness of space.
- ***resolves to invite the ITU Radiocommunication Sector***
 - 1. to conduct studies to identify any required technical and operational measures, in relation to stations on board sub-orbital vehicles, that could assist in avoiding harmful interference between radiocommunication services;***
 - 2. to conduct studies to determine spectrum requirements and, based on the outcome of those studies, to consider a possible future agenda item for WRC-23;***



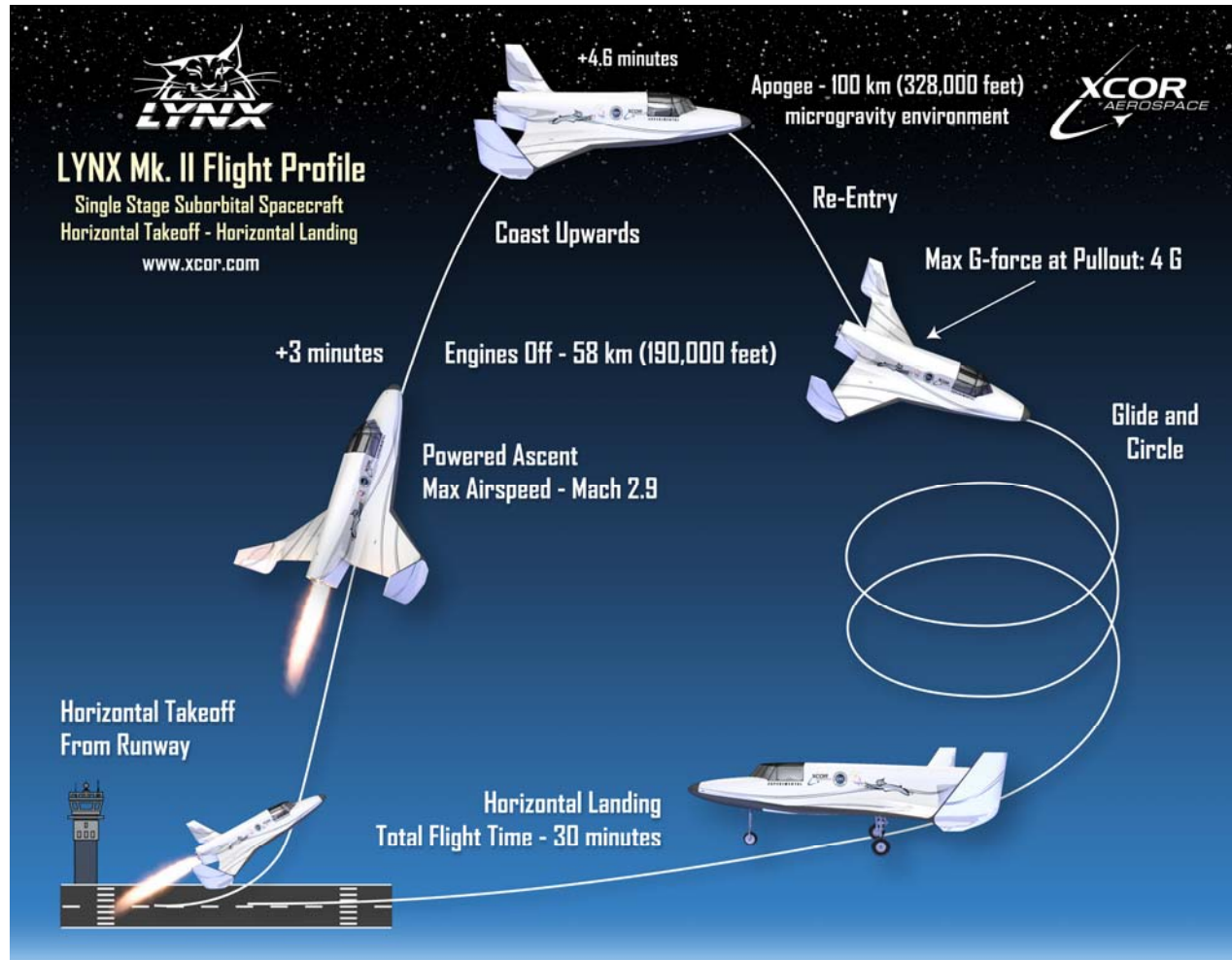
ITU-R Question 259/5

➤ *decides that the following Questions should be studied*

1. How will planes be operated including a description of the various phases of flight?
 2. During which phases of flight described in *decides 1*, will, if at all, need to be supported by air traffic control systems and what sort of systems are expected?
 3. What radio links will be required to support planes operations and under what radiocommunication service definition will they fall?
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- A dark, sleek aircraft, possibly a stealth bomber or a high-speed jet, is shown in flight against a cloudy sky. The aircraft is viewed from a low angle, emphasizing its length and aerodynamic shape. It has a long, narrow fuselage, a high-wing configuration, and a large, rounded nose. The background is a soft, overcast sky with light clouds.



Space Plane Applications



- Space tourism
- Satellite launch
- Hypersonic travel
- Scientific research
- Technology testing
- Remote sensing



Aircraft or Spacecraft?

- **Aircraft:** Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the Earth's surface (ICAO)

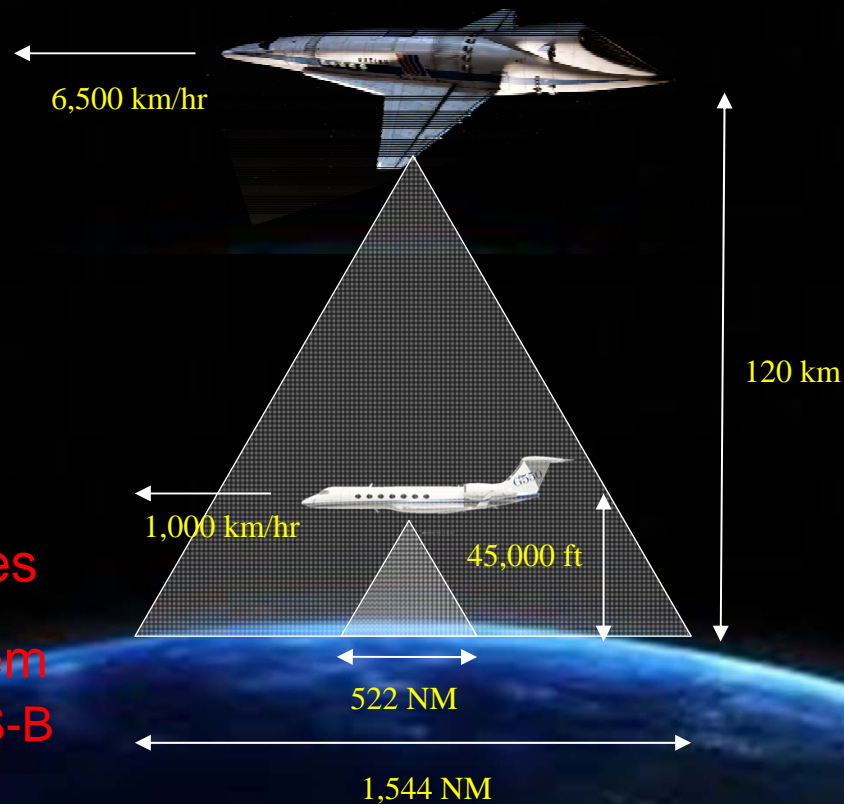


- **spacecraft:** A man-made vehicle which is intended to go beyond the major portion of the Earth's atmosphere. (ITU)



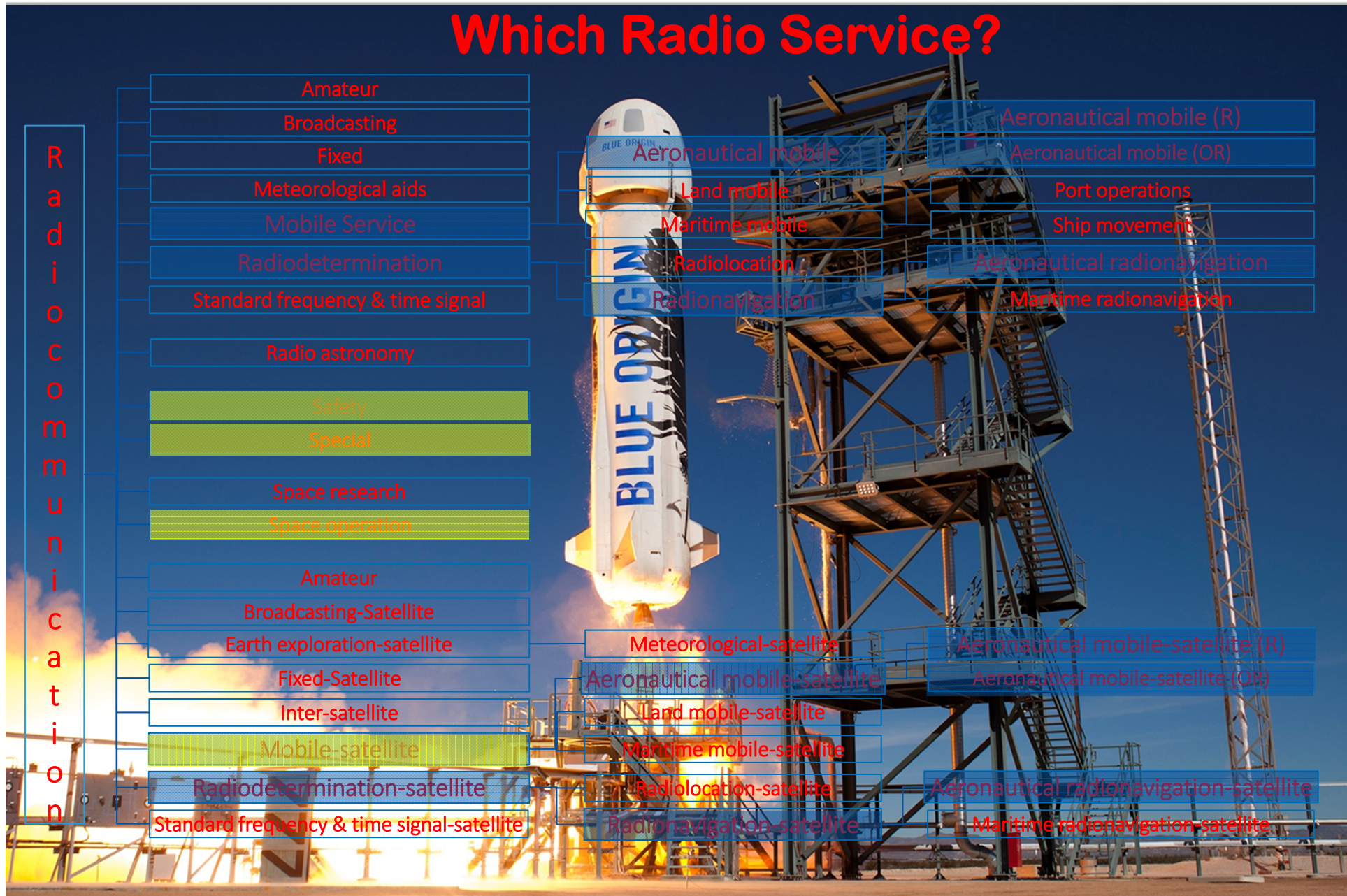
Issues with Respect to Aeronautical Spectrum

- Height
- Radio Horizon
 - Link Budget
 - Time in Sector
- Speed
 - Doppler Shift
- Incompatible with current planning rules
- Aeronautical system Capabilities e.g. ADS-B max
 - height 131,072ft
 - velocity 4096 knots





Which Radio Service?





ITU Studies

- **WDPDN Report ITU-R M.[Suborbital Vehicles]**
(https://www.itu.int/dms_ties/itu-r/md/15/wp5b/c/R15-WP5B-C-0411!N25!MSW-E.docx)
 - Identifies the phases of flight for single & multistage suborbital vehicles
 - Types of applications
 - Spectrum requirement
 - Communication
 - Navigation
 - Surveillance
 - Telemetry
 - Telecommand
 - Identifies radio spectrum issues
- **WD draft CPM text on WRC-19 AI 9.1, issue 4**
(https://www.itu.int/dms_ties/itu-r/md/15/wp5b/c/R15-WP5B-C-0411!N08!MSW-E.docx)





Summary

- How Much Spectrum is Required?
- Which Service?
- Sufficient Spectrum Available?
- Impact on Existing Aeronautical Services
 - Standards
 - Planning rules
 - Sector Size
- Support ICAO/ITU Studies



Questions