**Subject: IOSM Working Group Response to Ofcom Space Spectrum Strategy & Related ITU WRC-2023 Matters Enabling Spectrum Access For In-Orbit-Service (IOS) Space Systems**

The UKspace In-Orbit Services and Manufacturing (IOSM) Working Group is an industry-led group, comprised of organisations[1] which represent the key stakeholders engaged in developing the UK's leadership position in this burgeoning space sector.

We welcome Ofcom's consultation on its Space Spectrum Strategy published in March 2022. We regret this delayed submission, but we would like to support the comments provided to Ofcom regarding spectrum provisioning for In-Orbit Servicing (IOS) space systems by Global Satellite Operators Association (GSOA) ), ClearSpace Today Ltd, and Astroscale Ltd.

The 'UK In-Orbit Servicing Capability – A Platform for Growth' [2] report issued in May 2021 was commissioned by the UK Space Agency (UKSA). It was co-produced and published by the Satellite Applications Catapult jointly with IOSM and other partner companies. This report highlights the potential for the UK to become a global space leader in IOSM technology, including space sustainability, debris removal, life extension services, space regulations and licencing. These developments create important robotic operations capability that underpins larger, more strategic and longer-term opportunities as the in-orbit economy develops. It is predicted that this market could be worth £1Bn to the UK space sector by 2030, potentially creating value to the UK economy worth tens of billions in the medium to long-term. According to the statistics presented in this report, over the next 8-10 years, the UK space sector can:

- Capture £1 billion of the global in-orbit services and manufacturing market for the UK by 2030;
- Unlock opportunities worth tens of billions to the UK in the future through the expansion of major in-orbit industries and infrastructure in space;
- Enable important political, sustainability and national security imperatives through IOSM.

A wide variety of services are being proposed and offered, including by our UKspace IOSM member companies with support from the European Space Agency and UK Space Agency.

[1] IOSM WG members include industry, government and academia, including Airbus, Alden, UK AEA, Astroscale, BEIS, CGI, ClearSpace, Deimos, D-Orbit, GMV NSL, Lift Me Off, MDA, MTC, Multiply Space, NORSS, Northrop Grumman, OneWeb, Oxford Space Systems, Qinetiq, Rolls Royce, REAH, UK Space Agency, UKRI, Satellite Applications Catapult, Space Forge, Spirent, SSTL, Teledyne, Thales Alenia Space, the Universities of Lincoln, Surrey and The Open University.

[2] See https://sa.catapult.org.uk/wp-content/uploads/2021/05/Catapult-Astroscale-Fairspace-Platform-for-Growth-report-final-27-05-21.pdf

As indicated above, IOS include diverse activities such as the transportation and repair of spacecraft in orbit, the refuelling and life extension of spacecraft, and assisted disposal services, including active debris removal (ADR), recycling, in-space manufacturing and assembly of high value infrastructure. ADR is a key activity to address growing threats from space debris and limit satellite collision risk[3]. Furthermore, independent analysts project an increased demand for IOS, with forecasted cumulative revenues globally of £10 billion by 2031.[4] A significant share of this demand lies in the ADR market in low Earth orbit (LEO).

Ensuring the safety and sustainability of space activities requires the availability of scalable and prompt IOS solutions. Effective pathways to secure access to Telemetry, Tracking and Command (TT&C) frequencies and associated IOS sensor data links are crucial for developing this nascent industry. IOS missions have limited overall spectrum needs but require reliable and resilient communications in critical phases such as proximity operations and capture, during which safe spacecraft operations are crucial.

The frequency licensing process at the national level and the satellite system filing process at the ITU level should consider the peculiarity of IOS, with IOS missions spanning various orbital regimes, having short periods with critical communications and sensor data needs, and servicing different client space objects. These processes should make sure missions that support safe and sustainable operations have assured spectrum access and priority during critical mission phases.

We strongly support the comments of **GSOA:** "*Concerning IOS, in the next 2-4 years, Non-GEO IOS space systems will be launched …to enable space debris removal. GSOA believes an important area to be progressed by Ofcom is enabling early regulatory action at national and ITU level (at WRC-23) to facilitate reliable TT&C frequency access for such non-GEO IOS space systems. GSOA welcomes that Ofcom have submitted initial documents on this topic to the CEPT ECC in mid 2021 and to CEPT CPG PTB later in 2021; further timely pro-active action by Ofcom in this regard would be welcomed."*

We also welcome the recent meeting of **ITU-R WP-4A (May 2022),** which decided to accommodate in its work plan activities to develop approaches for addressing the TT&C spectrum needs of IOS space systems at **ITU WRC-2023 under its agenda item 7**. We would encourage Ofcom to take proactive steps in the relevant ongoing **ITU-R WRC-2023** preparatory processes.

We believe that an assured and efficient pathway to secure access, including by relevant proactive and timely action at ITU WRC-2023, to TT&C frequencies as well as for sensor data link frequencies for IOS missions is an enabler for a reliable, sustainable, and thriving space industry. Ofcom's support to the UK space businesses is indispensable for sustainable use of the space environment.

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[3] See ESA debris in numbers https://www.esa.int/Safety_Security/Space_Debris/Space_debris_by_the_numbers

[4] Euroconsult (2022), Space Logistics Markets, 1st edition. https://digital-platform.euroconsultec.com/product/space-logistics-markets-space-logistics-value-chain/