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ION SCV AS A SPACE SURVEILLANCE AND TRACKING INFRASTRUCTURE

**Abstract**

The D-Orbit InOrbit NOW launch service provides an operational capability to transport customer satellites to space and release them into precise, independent orbital slots. This is achieved using the ION Satellite Carrier Vessel (SCV), an independently controlled satellite that can serve multiple orbital planes with a single launch. ION supports deployment of multiple spacecraft form factors, including 1U to 16U CubeSats and more generic microsattellites.

Once this primary mission has been completed, the ION SCV presents a functional platform with an extended mission lifetime, suitable for a wider range of mission concepts. To date, two SCV missions have been completed. These have included hosted payload and other technology demonstration services. The near-term launch plans for ION spacecraft will continue to expand the presence of functional, operational hardware on orbit. This presents an ideal opportunity to utilise the ION fleet as infrastructure to establish long-term advanced services, the first of which being data collection and provision for space surveillance and tracking (SST).

SST services are enabled by three key features of the ION bus. Firstly, hosted payload missions are well-established for such mission capability. Payloads are integrated as self-contained systems with well-managed and well-defined interfaces to both the spacecraft bus and the ground segment. Secondly, preliminary work has been completed to establish how the ION bus can be used in its standard configuration to support SST services. This is enabled by the use of existing on-board sensors, including cameras for object identification and tracking, and the evaluation of radio receivers for passive radar applications.

Finally, the ION spacecraft also offers capabilities to enhance and complement the payload data processing requirements. These include new approaches to on-board processing, an emergent area of spacecraft systems design and the popularity of which that has been driven by the wider access to terrestrial artificial intelligence and machine learning technologies. Such capabilities are integrated directly into the ION avionics system, providing the capability to supporting ever-increasing levels of on-board processing.

As the fleet of ION SCV spacecraft increases, applications such as SST begin to become feasible for delivery on a consistent and continuous scale, through both repurposing of existing sensors and the flight of different and diverse sensors as hosted payloads. In both cases, these capabilities can be enabled in a sustainable fashion by distribution across the fleet, mitigating the need for the flight of additional or dedicated spacecraft.