

## Written evidence submitted by Northrop Grumman

### I. Northrop Grumman

Northrop Grumman is one of the leading global providers of end-to-end Space capabilities, with a focus on providing agile, affordable, innovative, and reliable solutions to our customer's toughest problems. With over 25,000 employees delivering our Space activities to our US and international customers, Northrop Grumman is trusted to perform on critical programmes including NASA's James Webb Space Telescope, re-supply missions to the International Space Station with our Cygnus Spacecraft and Antares rocket, and the US Air Force's on-orbit Space Situational Awareness system. In addition, we are the world leaders in on-orbit satellite life extension, and assembly & manufacture in Space.

In the UK, Northrop Grumman employs over 900 people across our 11 sites; we deliver key capabilities to government customers, including support to the RAF's Airborne Early Warning aircraft, control systems for the Royal Navy, and mission critical services to the intelligence community. Northrop Grumman is fully committed to the UK, and we are progressing investment plans to significantly increase our presence, including in the increasingly important Space domain.

### II. How should the UK Government seek to further develop its strategic relationships and interoperability with allies?

Space is inherently international and a collaborative approach is required to build military advantage in space. Rapid increases in global space activity present challenges for the UK and allied nations, but also increase opportunities in established and emerging markets. The UK is a particularly competitive base for 'design for export' given its leadership position in the Five-Eyes alliance, as well as its engagement with both NATO and more broadly with the MENA countries.

The Space industrial sector is a truly global enterprise with organisations and companies working across international borders to deliver complex capabilities and services. The UK should seek to build on existing relationships and alliances, for example, the 'Five-Eyes' community, and the NASA Artemis accords, and in addition, seek to establish new international links. Space sector prime contractors that are operating internationally can support the implementation of the, soon to be published, UK National Space Strategy, providing opportunities for UK industrial providers to access global markets, and accelerate innovation through technology transfer agreements and co-development initiatives. Leveraging private sector innovation will help the UK government to develop an agile space enterprise that can continually outpace threats, and offers assured capabilities to allies.

Joint development of new technology with allies, like the United States, positions the UK for interoperability with leading-edge innovations, long-term economic benefit, and ultimately, maintenance of strategic advantage. For example, participation in multi-country programmes like the F-35 and Chinook ensures UK access to workshare and international cooperation.

With Space now classed as a distinct warfighting domain, integration of space operations into joint UK and allied operations will enhance the UK's ability to shape the strategic environment. Therefore, the opportunity to coordinate compatibility with coalition and global standards should be placed at the core of defence procurement processes.

Regarding the United States in particular, it will be important to engage on technology transfer initiatives – for example, the US National Technology and Industrial Base (NTIB) integration framework. As the UK government identifies opportunities for design for export programmes, it must also ensure commitment to the associated need to discuss, and potentially, compromise to follow international technical standards and long-term investment in-line with selected partners. Managed appropriately, collaboration will ensure, rather than limit, the potential for export, with the UK demonstrating its leadership as a Tier-One ‘reference customer’.

**III. Where can the UK most effectively develop and deploy its own sovereign defence capabilities, with particular regard to (i) Space Situational Awareness; (ii) PNT (Position, Navigation, Timing) services, in the context of the UK’s exit from the EU’s Galileo and EGNOS programmes; (iii) Intelligence, Surveillance and Reconnaissance; and (iv) Communications.**

The ability to deter and defend in Space is less a question of sovereignty, and more one of assured capability. The UK needs capability and access to capability, but it may not be cost-effective to develop and deploy such entirely on its own. For maximum military effectiveness, with freedom of action implicit, the UK needs to leverage allied capabilities.

Space Situational Awareness (SSA) is a key capability that is required to operate in the Space domain, and it is a fundamental area where international collaboration is essential. No one country can deploy enough ground and space based sensors to assure a fully comprehensive SSA picture, and therefore working together, as we currently do with international partners, is essential.

Space based Position Navigation and Timing (PNT) capabilities have become essential in the modern world supporting the finance, agricultural, automotive, telecoms and defence sectors, predominantly through the US Global Positioning System (GPS). The exit of the UK from the Galileo and EGNOS programmes allows the UK to re-assess how it delivers a complementary PNT capability that will enhance and provide resilience to existing PNT services. At Northrop Grumman we have been delivering software-defined Positioning, Navigation and Timing (PNT) technology for some time, including the payloads for DARPA’s Blackjack program. This technology offers users an agile new PNT signal from Low Earth Orbit (LEO) – an ideal solution to be delivered via OneWeb’s Gen 2.0 satellite bus.<sup>1</sup>

ISR capabilities looking down on earth from space can provide a huge amount of information, from optical sensors highlighting changes in troop deployments or naval vessel movements; infra-red sensors detecting missile launches or explosions; and radio frequency sensors monitoring movement of aircraft, ships and military formations. Northrop Grumman is a world-leader in space based ISR providing a range of sensor payloads and spacecraft to support civil, commercial, military and intelligence capabilities.

Secure, reliable communications are foundational to UK security and are critical across the defence enterprise. The UK requires secure satellite communications for deployed forces and other government resources, and they also serve a strategic role supporting our deterrent capabilities. Increasingly satellite communications need to be protected and made resistant to attack, in order to provide an additional level of protection against adversaries. Northrop Grumman provides a wide range of secure satellite communication

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<sup>1</sup> Preliminary integrations tests of NG technology have already been successfully completed with OneWeb.

capabilities to our customers, and we are currently contracted by the US Government to develop the next generation of jam resistant protected communications.

Critically, the UK needs to agree with allies where it can most valuably contribute to partnered strategic space capabilities. Shared doctrine and concepts of operation will allow the quickest and most efficient joint development of decisive capability. Many technologies in the Space sector are developing very rapidly, with investment coming from governments and the private sector. These developments are both in the upstream area, for example, small satellites and novel propulsion systems, and the downstream area, for example, multi-source data exploitation and the application of artificial intelligence and machine learning to develop knowledge. The UK should focus on areas of technology that can deliver domestic and export success, and avoid 'over-crowded' or extremely investment intensive, high-risk sub-sectors.

**IV. How vulnerable are our space assets to deliberate attack, both physical and otherwise, and what steps can be taken to improve their resilience (with regard both to defence capabilities and other critical national infrastructure)?**

Vulnerability of space assets, and their associated ground infrastructure, is increasing as barriers to exercising offensive capability in space decrease, at the same time as nations recognise the importance of space. China and Russia represent the most pressing threat to Western security in Space as in other domains, although Iran and North Korea are also growing more sophisticated in this area. Risks to space assets is increased and made more complex by the lack of agreed norms of appropriate and threatening behaviours in Space. It is our view that resilience can be delivered through diversification, such as fielding an increased number of assets, and also through the defence of Space based assets. Defence mechanisms include capabilities that are on-board the primary satellites, and the deployment of dedicated security or 'body-guard' satellites.

**V. How can defence industrial policy ensure that investment and innovation in the private space sector is harnessed to align with the UK's defence requirements?**

Space is an international and long-term enterprise – with capability development supported by planning, investment and in-depth collaboration with commercial industry and allied partners. A clear and succinct statement of objectives enables industry to more effectively anticipate, invest and deliver the future requirements in what is generally a long-lead sector. Defence Industrial Policy should recognise that major Space programmes need to be initiated to fully develop capability, small studies etc. whilst helpful in encouraging broad participation by SMEs, do not enable maturation of technologies. Sustained commitment in Space across the defence portfolio encourages investment in UK-based IP generation, R&D, and resulting industrial workshare and the sustainable skills pipeline HMG requires.

Our role at NG is to find ways to blend US and UK IP to deliver sovereignty and freedom of action for the UK with inwards investment to ensure the delivery of leading capability which is interoperable and exportable. As the UK seeks to procure and develop its Space capability, NG plans to support the UK as it invests to accelerate its defence transformation through both import and indigenous development of Space technologies.

**VI. Have recent machinery of government changes ensured a joined-up and coherent approach to defence space policy both across Whitehall and within the MoD? What further improvements could be made?**

The UK's space industry sector is already a significant international presence, ranging from world leading capabilities in satellite communications and exploration, through to the large number of innovative start-ups and Small to Medium Enterprises (SMEs) that are attracting global interest and investment. The government's commitment to strengthen and grow this sector has the potential to provide thousands of highly skilled jobs, increase the level of UK exports, and further emphasise the UK's position as a global leader.

The recent government changes are welcomed, in particular, the recent efforts to improve co-operation between the Cabinet Office, BEIS and the MoD is evident as the National and Defence space strategies near publication. However, less clarity is evident across other government departments that are dependent on some way on Space capabilities e.g. transportation, agriculture, etc. That said, we look forward to implementation of the national space strategy at pace, with appropriate resourcing and clear guidelines for suppliers. For this to be delivered most efficiently, and maximise the realised benefits, an integrated approach across government is essential. Departmental funding and support needs to be coalesced to avoid dilution and duplication rather than be 'stove-piped'.

**VII. What should be the priorities of the new Space Command, and how will its structures facilitate integration across all military domains and co-operation with commercial space operations?**

Space is an enabler for all-domain activity and as such needs to remain closely coordinated with the activities and requirements of the other commands, contributing to combined operations and persistent presence in any domain. As the Secretary of State stated in his testimony to this Committee on 23 June, the UK will continue to maintain a strategic advantage against the likes of Russia and China as long as our alliances remain strong and as a collective, we continue to invest in defence capability, intelligence, and training.

To this end, the UK should seek to maintain Space as a stable, accessible arena for commercial innovation and freedom of operations for UK military and allies; to counter the hostile use of space; and build capabilities such as space-based ISR to enhance the UK's power projection. To achieve this, Space Command will need to ensure strong ties across the five eyes to ensure the full leveraging of our allies and coalitions, and our contribution to the setting of standards. Space procurement should leverage the cost-effective innovations pioneered by industry and private sector investment, and drive international collaboration to gain agility and have access to the key capabilities necessary to continually outpace the evolving threat.

**13<sup>th</sup> July 2021**