

Written evidence submitted by Athena
Defence Select Committee inquiry on Space Defence

Introduction

1. Athena is pleased to offer this submission to the Defence Select Committee on Space Defence. Athena is the UK's new national team in space, formed by Serco, Inmarsat, CGI UK and Lockheed Martin UK, and the four companies are world leaders in providing technology and services across defence, space, communications and information technology to governments, businesses and other organisations.

Executive summary

Athena believes that UK defence space activity needs to be rooted around the following set of core principles which we expand on more in our submission below:

2. **International cooperation:** Close collaboration with international partners is essential for the preservation of the UK's space assets upon which all modern defence capability, national interests and societal functions are reliant. The UK is unable to act independently within the space domain and must therefore work in cooperation with like-minded allies to guarantee access to necessary space-based technologies, decide what it wants to build, own and operate on a sovereign basis while offering that capability to allies in return and invest in the protection and resilience of its own resources. Clarity and scope of programme and initiative participation is required.
3. **Identify niche opportunities:** Alongside close alignment with our allies, the UK should identify and develop niche opportunities to contribute to collective defence, especially in the space domain. Targeted speciality in certain areas, such as space domain awareness, observation and surveillance, enhanced Position, Navigation and Timing capabilities or military satellite communication, is both cost-effective and allows the UK to provide the most value to our international alliances.
4. **The need for a well-designed National Space Strategy:** Delays in the publication of the National Space Strategy has prevented industry from making strategic decisions and investments. Whilst at high levels, research and development spending in space in the UK is fragmented and could be more effective. Guidance and demand signals from the Government and defence sectors would enable industry to channel resources into specific areas of priority.
5. **Building sovereign capability:** The UK has a choice to make in what it needs assured sovereign space capability in. The UK has strong defence space capabilities, not least in military satellite communications, but is at risk of not having the necessary diversity and sovereign capability in its industrial base and

supply chain to deliver resilience and competition. Critical and strategic decisions must therefore be made regarding the role of space in providing defence resilience whilst concurrently supporting boarder defence and industrial priorities.

6. **Skills investment:** The Armed Forces risks missing out on growing the defence space sector due to a developing skills gap. The MOD should therefore explore avenues to encourage greater suitably experienced, qualified and experienced personnel and embedding of space into defence decision making structures. More widely, we need to explore the introduction of space in the national curriculum or the establishment of a National Space Academy and encourage more potential engineers to begin a prosperous career path. Action in this area would not only benefit space but would have a positive spill over into other prosperity sectors such as digital skills and engineering.
7. **Structures and governance:** Despite recent progress in establishing a governmental ecosystem responsible for space, such as the creation of MOD Space Directorate, BEIS Space Directorate and Space Command, more work is needed to define ultimate ownership of particular areas. A clearer defence space responsibility matrix is required. For example, there is a need for greater clarity on both the future role of UKSA and the organisation that oversees the delivery of space programmes. Changes such as a Minister for Space, a Senior Responsible Owner for Space and a 'SAGE' committee for space would bring greater transparency and accountability that will also feed into defence structures.

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

8. Due to the enormity of the operational domain of space, the UK must rely on collective defence to protect and defend our sovereign space assets as we are unable to act independently. Close collaboration in a multi domain integration sense with international partners is essential for the preservation of the UK's space assets upon which all modern defence capability is reliant. The UK must therefore work in cooperation with like-minded allies to develop and access necessary space capabilities.
9. The UK already has an impressive history of contribution to collective defence programmes in which it offers a niche capability. It provides personnel and data to the US Combined Space Operations Center (CSpOC) and also readily supports Op OLYMPIC DEFENDER. In addition, the UK supports US Space Force exercises, such as the Schreiver War Games series. The UK should continue to look for unique roles in international partnerships, which would allow it to develop a leading capability and to support democratic alliances. The UK should also consider expanding its thought leadership role by developing more sophisticated Operational Analysis and Command and Control tools that would allow it to host multinational space wargame exercises. This could be augmented with the use of the UK Launch programme to provide targets.

10. The UK should identify and develop niche capabilities to contribute to collective defence, especially in the space domain. Targeted speciality in certain areas, such as space domain awareness, observation and surveillance, enhanced and differentiated Position, Navigation and Timing capabilities or military satellite communication, is both cost-effective and allows the UK to provide the most value to our international alliances. The UK also needs to explore what role it can play in relation to 'space protection' (active protection of space systems). The US-led Advanced Extremely High Frequency (AEHF) satellite system was co-funded by five allies, including the UK. It provides a potential model for collaboration in other areas, provided industrial participation is considered from the outset.
11. Consideration should be given to building upon the recently announced Space Bridge initiative with Australia by promoting deeper Defence collaboration between UK and Australian industry in programmes such as JP9102 (the Australian military satellite communications programme), as well as exploring roles in the US Space Fence surveillance system, and other opportunities for collaborative space programmes with like-minded space nations, such as Japan and South Korea. In addition, setting up a space forum to be led by senior Defence Principals, as exists for the 5-Eyes community, could be beneficial.

Where can the UK most effectively develop and deploy its own sovereign defence capabilities?

12. There are several technologies and areas of the space domain that are prime opportunities for the UK to develop its own capability, through which it can strengthen national resilience and add value to allies. We recommend focussing on the following areas:
 - a. Communications: The UK's Armed Forces are wholly reliant on satellite communications due to the need to operate anywhere in the world. Satellite communications is a critical enabler of any military deployment, and resilience of this capability is paramount. A strategic approach to this capability would involve a portfolio of different systems, sovereign and commercial, in different orbits, with clear requirements for resilience of those systems.
 - b. Space Domain Awareness (SDA): Defence radars used for ballistic missile detection and early warning, such as the one at RAF Fylingdales, can also provide an important source of data for SDA. Investment in new sensors would develop existing capacity and allow the UK become a leader in SDA capability. The MOD has some planned radar programmes (such as the Ballistic Missile Defence Ground Radar) which will make an important contribution to this task, given their inherent sensitivity, range resolution and discrimination capabilities. It could also explore new forms of ground

sensors, including sensors that use commercial-off-the-shelf (COTS) equipment and analytics tools to track systems in all orbital domains. In addition, further consideration should be given to what SDA capabilities could be introduced on the next generation Skynet constellation.

- c. PNT (Position, Navigation, Timing): The UK's reliance on PNT is absolute, and exit from the EU's Galileo and EGNOS (GPS augmentation) programmes has severely reduced resilience. Development of this critical national infrastructure with a national space-based system through the Space-Based PNT programme (SBPP) should therefore be a priority. As allies are exploring how to improve the resilience of their own Global Navigation Satellite Systems, a UK capability could also support their requirements. As with Space Domain Awareness, it may also be possible to include a timing capability on future UK-owned constellations.
- d. Intelligence, Surveillance and Reconnaissance: The UK currently procures ISR data from commercial sources. However, this data is not necessarily actionable at tactical levels. The UK is largely reliant on US National Technical Means (NTMs) for this purpose. We support the development of a national an ISR constellation.

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)?

13. Space is continually becoming more contested and congested with malicious actors, and the UK's vulnerability is increasing exponentially. In addition, 90% of the space assets we rely on are foreign-owned and operated, and decades of space debris pose collision risks. It is clear that the space-based order is under threat and urgently needs addressing by the UK Government and the International community alike. But risk also brings opportunity, and the UK could promote new norms of behaviour and exert global influence by offering SDA thought leadership and data in support of a new era of space-based resilience in a new look world.
14. Congestion in Space is partly being led by the rapid growth in Space launch from both State actors and, more significantly, commercial operators. The race for faster and more prevalent broadband in conjunction with diminishing costs of small satellites are making launch more desirable and accessible. In addition, major constellations such as the Starlink and OneWeb are launching hundreds of satellites into Low Earth Orbit and, with its recent investment in the latter, the UK now holds greater responsibility for the safe launch and operation of a significant satellite population. Furthermore, over the last three years several nations have

joined or announced their intention to develop a space launch capability, including the UK.

15. Space is becoming contested as potentially hostile states recognise the dependencies of other nations on satellite communications, earth observation intelligence and critical position, navigation and timing. In addition, so-called Grey Zone threats of military actions short of actual warfare are increasingly occurring and there is growing concern over the denial of space services or spoofing of space data via cyber warfare. Furthermore, China demonstrated its first anti-satellite (ASAT) weapon in 2007 when it destroyed an old weather satellite and created thousands of debris objects in the process, and India became the fourth nation to successfully demonstrate its anti-satellite weapon capabilities in 2019. In light of these new threats, the UK and NATO have categorised space as an operational domain alongside air, land, sea and cyberspace.
16. Despite the rise in popularity of and threats associated with space, the last major international legal agreement on regulation in space is the Outer Space Treaty of 1967. There is an acute need for new international rules and regulations for space-based activity, appropriate demonstration of the requisite norms and behaviours in space.
17. The UK should help lead the development of these new international rules and regulations and acceptable norms and behaviours for conduct in space in order to add value to allies and to enable the development of new defence space capabilities and assure future capabilities and markets. It should build on the success of the FCO in this area and establish space equivalents of the International Regulations for Preventing Collisions at Sea and the norms of responsible behaviour in cyberspace, both of which the UK helped to build. These would define the acceptable the rules and behaviours for operators of spacecraft and prevent dangerous actions in space from occurring. In addition, the UK should explore the creation of international Space Traffic Management capability for tracking, analytics, and command and control of space objects, to help mitigate the growing risk associated with space congestion.
18. There is also a need to build-in resilience for space systems and services, in a similar manner to that adopted for cyber security. This includes onboard monitoring and defence systems for satellites, and enhanced physical and cyber resilience of the earth-based ground stations from which they are operated (which are often the most vulnerable elements of any space capability). The UK should also establish a 'Theatre Entry Standard' for all UK systems going into space. Finally, enhanced Space Domain Awareness could help with the attribution of Grey Zone in space threats as long if it was also corroborated with data from other international partners.
19. The UK should continue to participate in international programmes such as the US-led coalition 'Operation Olympic Defender' to monitor potentially hostile

activities. Furthermore, a number of commercial companies, including Serco, Inmarsat and CGI from Athena, are contributing to a Commercial Integration Cell (CIC) at the UK Space Operations Centres to share data and best practice operating procedures on satellite operations between the military and civilian spacecraft operators. Germany and Italy are now seeking to set up similar structures.

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?

20. Whilst there are few UK-owned or headquartered space companies, a large range of leading multinational space companies operate here. However, their development is being severely restricted by continual delays in the publication of the National Space Strategy and progress of national capability programmes. Companies are reluctant to invest and take strategic decisions without guidance from the Government as to the specific areas of priority. They need certainty and clarity to direct R&D and inward investment budget; the National Space Strategy should be published as soon as practicable.
21. This issue is further compounded by one-year spending settlements that make it difficult for companies to commit to long-term plans with such short-term spending arrangements; space programmes are long-term endeavours. A multi-year spending review would help and would also attract inward investment into the UK, in turn diversifying the current somewhat monopolistic UK space manufacturing supply chain.
22. The UK should also review its R&D framework for the development of space technology. It is the prevailing view that the mini-projects approach should be complemented by national endeavour programmes that are potentially riskier but are transformative in capability terms.
23. Finally, the UK has a choice to make in what it needs assured sovereign space capability in. The UK has strong defence space capabilities in certain mission areas, but is at risk of not having the necessary diversity and sovereign capability in its industrial base and supply chain to deliver resilience and wider requirements. Critical and strategic decisions must therefore be made regarding the role of procurement in developing capabilities, improving resilience, and supporting boarder industrial priorities. Currently, it could be argued that the space domain is UK Defence' weak flank, eroding any advantage in the other domains; there needs to be balance in the MOD's spending priorities across all 5 domains.

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?

24. Broadly, we welcome recent progress in establishing a governmental ecosystem responsible for space, such as the creation of the MOD Space Directorate, BEIS Space Directorate and Space Command. However, responsibilities and accountabilities for delivering major and complex space programmes (such as SBPP) remain unclear.
25. Given that space touches on no less than thirteen Government departments, Athena recommends further governance changes to benefit the UK's approach to space. For example, a dedicated Minister for Space rather than space being just part of a larger ministerial portfolio, along with a Senior Responsible Owner for Space, would be beneficial. Delays in defence procurement also demonstrate that a proper programme delivery function for space should be delivered. Finally, more transparency is required around the National Space Council; industry should be provided with read-outs of their discussions, and ideally have a role in providing expert input to the Council perhaps through a 'SAGE for space.

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?

26. We strongly welcome the creation of Space Command and are encouraged by its early activity. The priorities of the new Space Command should firstly be on standing up the command and enacting their 2-year change programme to become a fully functioning and fully resourced Joint Command staffed by suitably qualified and experienced personnel. In parallel, we recommend it undertakes a Capability Audit to understand where its capability gaps lie and use that to inform its future programmes' aspirations and make that available to industry. There are also likely to be debates as to which space assets should fall under its responsibility and there may be a case in time for consideration as to implementing RACI matrix models to ensure clarity across Defence and indeed across wider Government.
27. Athena welcomes the concept of a UK National Space Operations Centre (NSpOC) but MOD and UKSA must provide clarity as to whether the aspiration is for a physical co-location or a virtual "hub-and-spoke" model. Thought also needs to be given to wider aspects, such as where the critical mass of the UK's space expertise already resides, the levelling up agenda and the resilience and redundancy factors if it should all be co-located.

How can the Ministry of Defence ensure that it attracts, develops and retains high calibre space specialists in both policy and operational roles?

28. In a growing space market, suitably qualified and experienced space personnel are in high demand and are very scarce commodities. Consequently, the UK may be unable to manage launch, PNT, milsatcom and ISR programmes simultaneously and may need to prioritise accordingly or review its relationship with industry to avoid competition for talent. Furthermore, to attract more talent into a career in space, the UK should consider a Space Cadre/Trade Group or Branch that provides a clear career path and industry recognised qualifications.
29. As the MOD develops its structures and programmes, a thorough organisational and development review should be undertaken, in collaboration with industry, and consideration given to the role that industry can play in adopting a Whole Force Approach through secondments, Reserve Force models and late entry options.
30. A National Space Academy would usefully create a genuine professional route to certification and training and should combine both military and civilian space personnel. The UK could learn from the approach and reputation of the UK Defence Academy, which trains students from 156 countries around the world and generates revenue. Space is certainly a major attractor for STEM skills more generally and, if the MOD and wider Government gets its approach to the overall STEM pipeline right, it could drive up the number of STEM students for other prosperity sectors such as digital skills, engineering and cyber etc. However, the Space Skills in the UK scene is fragmented and complicated and would benefit from better coherence. This could be coordinated by a Minister for Space.
31. Government also needs to take a 'workforce generation' approach to education by examining what the UK space landscape might look like in 2030 and what we as a nation therefore need to do in schools now to meet those needs. For example, NASA is pushing for Space to be on the national curriculum in the USA and there is a valid debate as to whether the UK should do something similar to attract children into STEM subjects.

About Athena

32. Athena has been formed to seize development opportunities that novel space technologies will offer, driving economic growth for the UK and diversification across the British space sector. The combined capabilities and technologies available to Athena will enhance the country's ability to deliver on the role that space has been afforded in the Integrated Review and the Defence Command Paper as well as the wider National Space Strategy and the UK's 'Prosperity and Security in Space' agenda, which aims to increase the value of space to wider industrial activities to £500 billion, generate an extra £5 billion in UK exports and attract £3 billion of additional inward investment while securing 10% of the global addressable space market for the UK by 2030.
33. Athena will work on several opportunities that leverage space-based technologies, military satellite communications, their ground-based systems and

end-to-end services as they arise, both in the UK and internationally in the export market as part of the Defence and Security Industrial Strategy.

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