

OPTUS

Submission to the Standing
Committee on Industry,
Innovation, Science and
Resources

**Inquiry into Developing
Australia's Space
Industry**

Public Version

January 2021

INTRODUCTION

1. Optus welcomes the opportunity to provide a submission to the House of Representatives Standing Committee on Industry, Innovation, Science and Resources (the “**Committee**”) in response to its inquiry into Developing Australia's Space Industry (the “**Inquiry**”).
2. Optus is the only telecommunications network provider in Australia to own and operate its own fleet of satellites, with the largest fleet of satellites in Australia and New Zealand. Furthermore, Optus is the only operator in Australia to provide 100% network coverage through our terrestrial mobile network and satellite services.
3. Optus Satellite & Space Systems is Australia's first and largest national satellite company and we have more than 35 years' experience in the satellite and space sector. Optus specialises in a range of premium satellite services including the provision of launch support and transfer orbit operations, fleet management and Telemetry, Tracking and Control services.
4. In 2023, Optus will launch its 11th spacecraft and the Asia-Pacific's first OneSat software-defined Ku-band satellite, named Optus 11 which will see Optus shape a new future for satellite technology in our region.
5. Optus Satellite and Space Systems currently have a corporate and enterprise customer base in mobility services. Key sectors include mining, oil and gas, finance, insurance, and agriculture. Optus Satellite and Space Systems also provides services to the Commonwealth and State Governments, including emergency services and key Departments, as well as services to Antarctica.
6. Optus capabilities as a satellite owner and operator are unique in Australia, and this presents a number of future opportunities for further collaboration with Government.
7. The space and satellite sector draws upon some of the finest cutting-edge technology and innovation in the world. There are some further opportunities for Government to consider investment in enhanced capabilities which would benefit not only the space and satellite sector in Australia, but other critical industries via flow-on benefits.
8. It is also important that Australia maintains an Australian-based and operated satellite capacity, particularly with regards to national security capabilities. Optus suggests that national sovereignty in this area should continue to be key priority for the Commonwealth.
9. Optus also recognises the importance of the Australian Space Agency for facilitating greater industry collaboration and lifting the profile of such a critical Australian sector. Optus urges the Government to continue to ensure that administrative and regulatory frameworks are fit-for-purpose and not burdensome on the space and satellite sector.
10. Optus would like to provide feedback on factors which are important to the future of the Australian space sector below. We would welcome the opportunity to further engage with the Committee, should any additional clarity or detail be required.

BACKGROUND: OPTUS SATELLITE & SPACE SYSTEMS

11. Optus is a leading supplier of Australian satellite communication and broadcast services in Australia. We have been a part of the Australian space industry since Optus acquired AUSSAT in 1992, with AUSSAT itself being originally formed in 1981.

12. Optus has successfully launched ten satellites, operated thirteen spacecraft and provided more than 100 industry launch supports. The current Optus satellite fleet consists of five geostationary satellites providing satellite services across Australia and New Zealand and to McMurdo Sound in the Antarctic.
13. Optus has been providing mobile services via satellite since early 2000s; across remote temporary congestion or emergency services occurrences such as bushfires, cyclones and floods and continues to provide connectivity more generally across Australia and New Zealand for commercial business, government and end-users.
14. Optus recently announced the launch of a new, software-defined Very-High Throughput (VHTS) Ku-band geo-stationary spacecraft for launch in 2023: Optus 11. Optus 11 will be deployed at the current Optus D1 orbital location of 160°East and will expand coverage across Australia, New Zealand, Antarctica and parts of the Pacific.
15. Our main satellite operations centre is located in Belrose (NSW) with other operations in Lockridge (WA); Hume (ACT); and Regency Park (SA). From these stations we conduct continuous satellite network monitoring, video, voice and data delivery, support and troubleshooting.

New Optus 11 Spacecraft

16. With the launch of Optus 11, Optus will be the first operator in the Asia Pacific to launch a software-defined Ku-band satellite that can provide both flexible concurrent broadcast and broadband services via a Very High-Throughput Satellite (VHTS) over the region.
17. The satellite will be fully configurable in space, meaning its location, coverage, bandwidth and capacity can be changed in orbit as customer demands evolve. This is distinct from traditional satellites which are limited by on-ground configurations that cannot be altered after launch. Optus 11 will also extend coverage by utilising next-generation technology, including multibeam and wide-beam capacity.
18. This technology will provide capacity, speed and flexibility, and marks a paradigm shift in how satellite communication will be delivered. Optus 11 will have bandwidth capability of up to 170Gbps when in full Very High-Throughput mode, enabling access to more than twice the NBN SkyMuster™ satellites combined.
19. It will provide an enriched end-user experience, delivering greater speeds and more diverse functionality. It will also have the ability to provide tracking spot beam coverage for aircraft and vessels within the satellite's footprint. Service performance will also increase, thus providing improved mobility services for those travelling (land, sea or air) or for emergency services or first responders (for example, during bushfire seasons or other emergency situations).
20. Optus 11's coverage area will reach from Antarctica in the south to the Cocos Islands in the west and cover a large portion of the Pacific.
21. The launch of Optus 11 will take the number of Optus satellites in orbit to six, which will be the largest in the history of both Optus – and Australia.
22. New Optus satellites are also able to carry a satellite-based augmentation system (SBAS) payload. SBAS boosts the accuracy and precision of GPS and other positioning systems across the region, enabling the pinpointing of locations to within 10 centimetres, or 3 centimetres with mobile coverage.

DEVELOPMENT OF TECHNOLOGY AND EQUIPMENT

Satellite-Based Augmentation System (SBAS)

23. Optus sees enormous economic benefits in the creation of an SBAS payload for Australia. We note the advice provided by Geoscience Australia which highlights how SBAS would be a significant benefit to the Aviation industry as well as numerous other sectors.¹
24. Additionally, an investment in an SBAS payload would bring Australia in line with other countries who have already enabled SBAS technology.
25. As an Australian-based operator employing Australians and investing in the development of space opportunities, Optus has the capability to deliver an SBAS payload on one of its satellites.
26. Optus is aiming to launch its next Australian-flown geosynchronous (“GEO”) satellite, Optus 11, in 2023.²
27. Optus may plan and build further spacecraft, which, if approved, may also be able to host Australian-flown SBAS payloads. Optus’ plans reflect our intention to provide Australian jobs in space and to work to be part of the development of Australia’s space industry.

Optus partnership with ANU and the Minderoo Foundation

28. Optus has partnered with the Australian National University (ANU) and the Minderoo Foundation to develop a revolutionary national system that aims to detect bushfires shortly after ignition and aims to shorten the timeframes needed to extinguish them.
29. The partnership has been developed in response to the extreme fire conditions Australia continues to face and will benefit from Optus’ capabilities in managing networks and satellites.
30. In the shorter term, the R&D programme aims to develop and demonstrate a collection of ground and aerial based systems for early fire detection and extinguishing.
31. In the longer term, the partnership aims to develop a state-of-the-art fire detection telescope from geostationary orbit that will enhance the capability of existing Earth observation solutions.
32. Optus is open to further discussions with the Commonwealth on how it could partner with Government to guarantee appropriate funding for a GEO payload of this nature.

Digital Payload Modelling and Management

33. The development of Digital Payload Modelling and Management would allow Optus the ability to model High-Throughput Satellite payloads that can provide the Commonwealth and commercial enterprises payload use cases, plus how to utilise spectrum more efficiently.

¹ <https://www.ga.gov.au/scientific-topics/positioning-navigation/positioning-australia/industry-users/aviation/sbas-and-aviation>

² <https://www.optus.com.au/about/media-centre/media-releases/2020/07/optus-set-to-launch-game-changing-new-satellite-in-2023>

34. In addition, Optus recommends further investment in this technology to allow for improved management of dynamic spot beams and spectrum management within Australia.

Communication System Monitoring

35. Optus suggests that an overarching Satellite and Space Communication System Monitoring service that will improve support to the industry; more specifically assisting the Australian Defence Force and commercial Australian enterprises.
36. This system would allow for monitoring of payload performance to find and fix degradations in orbit. The capability improves the overall communications system effectiveness of a payload and would allow for faster adjustment of uplinks or areas where degradations have occurred, and assist in resolution of any potential interferences.

Automation of Spacecraft Fault Diagnosis

37. Optus believes that there should be greater industry consideration of Automated Intelligence for spacecrafts.
38. In its current state, Australian spacecrafts will raise an alarm should an anomaly present itself. However, once an alarm is raised it is a manual process for operators to assess where the anomaly may be. An example of this occurred last year when there was disruption to NBN's Satellite 1A.³
39. Optus see the value of automation and machine learning to be developed for spacecraft faults. This development would eliminate downtime to find and action anomalies for spacecrafts in orbit and ground segments, as well as provide job opportunities to develop this automation.

INTERNATIONAL COLLABORATION & ENGAGEMENT

European Space Agency

40. Optus has held discussions with the European Space Agency, in collaboration with the Australian Space Agency, and there are potential opportunities which could yield great benefit for Australia.
41. Optical communication technologies are the next revolution in satcoms, bringing unprecedented transmission rates, data security and resilience to meet commercial needs over the next ten years.
42. The European Space Agency is a world leader in optical communications and is working with the Australian Space Agency on various technological developments to advance the space industry in Australia.
43. Optus see the value of international collaboration and optical communications networks. It would be possible for Optus to host an optical payload on one of its satellites.

³ <https://www.itnews.com.au/news/natural-radiation-event-knocks-nbn-sky-muster-satellite-offline-551311>

IMPORTANCE OF SOVEREIGNTY IN SATELLITE MATTERS

44. Optus believes upholding sovereignty in satellite matters is paramount for the Australian Defence Force and for national security.
45. As the only network provider in Australia to own and operate its own fleet of satellites, Optus' capabilities also include the management of orbital slots, and as an organisation we pride ourselves on having some of Australia's best space professionals within our workforce.
46. Optus has a strong history in supporting the Commonwealth and the Australian Defence Force, having launched the C1 satellite for Defence. At the time, this was the largest military and commercial spacecraft ever launched.
47. Since then, Optus has worked with the Department of Defence to reposition and incline the Optus C1 satellite to extend its life and capability to the Australian Defence Force. This incline meant the Commonwealth was able to save a significant number of dollars while providing constant satcom service well beyond the initial contract timeframe.
48. The C1 Satellite Life of Type Extension saw Optus awarded the Australian Defence Force Essington Lewis Award in 2019.
49. Optus has also built the Earth Station and Defence Payload Management Control System for the ADF and we currently provide ongoing satellite concept training and satellite operations training to ADF personnel.
50. Optus would welcome further opportunities which strengthen Australia's domestic strategic capabilities.

MULTI-MISSION GOVSAT OPPORTUNITY

51. Following discussions with various Commonwealth Government agencies, Optus suggests that various Government needs and capabilities would benefit from a multiple payload hosting at GEO orbit.
52. Optus suggests that a single Australian-based and flown Government satellite (GovSat) would be of great benefit to Australia.
53. Each agency has its own requirements, but does not have experience or capabilities in launching, flying and operating spacecraft.
54. We note that some of these requirements are being considered by the Space Agency.
55. Optus has the ability to take the multiple requirements and combine into a single spacecraft which it can procure, manage and operate. Optus has done this since inception as AUSSAT – Australia's first satellite company – and we continue this legacy today for the Australian Defence Force on Optus C1.
56. Optus terms this the Optus Multi Mission Govsat. Such a program requires significant financial support and collaboration. As with any program, Optus is willing to consider appropriate investment in its involvement in such a program.

R&D AND SKILLS

STaR Shots – Inputs

57. Optus would be pleased to deepen its support of the Science, Technology and Research (STaR) Shots, run by the Department of Defence.⁴
58. Launched with the More, together: Defence Science and Technology Strategy 2030, STaR Shots will involve collaboration with science and technology focussed enterprise to focus on critical Defence challenges.
59. As a part of Optus' response to STaR Shots, our proposed involvement could assist in satellite pre-launch, launch and post-launch activities, as well as daily operations. There are further opportunities for Optus to be more involved and we would welcome further discussions on this.

University of Sydney Spacecraft Lecture Series

60. Optus provide yearly lectures to the University of Sydney for their Space Engineering 1 (Space Subsystem Engineering and Ground) degree.
61. Optus provide lectures and materials on telemetry, command and range, data handling, simple payloads, basic link concepts, spacecraft dynamics, ACS hardware, attitude control when manoeuvring, disturbance torques, and more.
62. Acknowledging our partnership with the University of New South Wales as well as the University of Sydney, Optus welcome further opportunities to work with the Commonwealth and other universities to support and assist in the workforce development of future aerospace professionals.

SmartSat CRC Education and Training College

63. The SmartSat CRC Education and Training program aims to identify the skills required for the development of the Australian Space industry.
64. The program will play a critical role in upskilling the next generation of professionals by providing education and training for 73 PhD students as well as building a pipeline for high school, undergraduate and VET students who have an interest in the space sector.
65. Optus has put forward the proposal to allow PhD students to join its Satellite Control Centre located in Belrose for a 3-6 month period to work on special projects.
66. Optus aims to provide PhD students with the opportunity to gain firsthand experience in the workforce, exposure to real-life satellite and space projects and obtain guidance from some of Australia's leading space professionals.

EFFECTIVENESS OF AUSTRALIAN SPACE AGENCY

67. Optus views the Australian Space Agency as a key part of Australia's space sector and we commend their many successes to date.

⁴ <https://www.dst.defence.gov.au/strategy/star-shots>

68. Optus looks forward to working closely with the new Head of the Australian Space Agency, Enrico Palermo, and the entire Agency, on further collaboration and commercialisation opportunities. We hope to increase the flow-on benefits of advanced satellite technology to numerous other industry sectors.
69. Optus recommends that the Australian Space Agency consider a reduction in the required documentation for an Australian Launch Licence, to allow for increased commercialisation of the industry.
70. Furthermore, Optus believes the space sector would benefit from a sovereign insurance policy to mitigate risk and enable more commercial enterprises the ability to innovate satellite and space technology on Australian soil.

OTHER MATTERS

Space Situational Awareness

71. Optus supports preserving and protecting the space environment and we welcome the opportunity to further support the Commonwealth in this endeavour with Space Situational Awareness activities, to monitor for hazards to both in orbit and ground infrastructure.

Review of orbital filings process

72. Optus also suggests that a review and of the current filings process to reposition focus on Australian interests in space activity could drive improvement and efficiency gains for the sector.
73. The Australian filing system is complex compared to some other comparable countries and substantial administration is required by industry to ensure to ensure they meet Australian Government Agency requirements.

CONCLUSION

74. The Australian space and satellite industry has enormous potential for further economic growth, which can greatly benefit other critical Australian sectors through flow-on effects.
75. It is therefore critical for Government to consider the ways that it can encourage innovation and growth through the optimisation of policy and regulatory settings.
76. Optus commends the Government on the interest it has shown on the future of the Australian space sector and would welcome the opportunity to enter into further discussions with the Committee if it would help provide further clarity or detail.

[END OF DOCUMENT]