

IAF BUSINESSES AND INNOVATION SYMPOSIUM (E6)  
Public-Private Partnerships: Traditional and New Space Applications (2)

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THE EVOLUTION OF PNT – HOW COULD PUBLIC-PRIVATE PARTNERSHIPS SUPPORT  
REQUIRED FUTURE SERVICES OF GNSS TECHNOLOGY**Abstract**

Navigation and timing technologies are in the early stages of a revolution. Infrastructure such as the Global Positioning System is of increasing importance from a sovereignty perspective and yet susceptible to jamming, cyberattacks and supply chain instabilities. Currently, Global Navigation Satellite System (GNSS) is government-owned and operated as well as freely available to the public. Growing demand in user markets for increased availability and assurance drives the need to further strengthen existing location-based services to enable new applications such as autonomous vehicles.

To satisfy these requirements, current and planned mega-constellations in Low Earth Orbit are proposed to host payloads or share signals to support navigation and timing services. These provide many advantages over the traditional GNSS constellations in Medium Earth Orbit with improved geometry, faster Doppler effects, greater signal-to-noise ratio and more secure signal bands. However, the question remains of who will fund and develop such services.

Meanwhile, the lunar ecosystem is set to get busy over the coming decade, with an expected tenfold demand increase for communication and positioning services. New infrastructure in an orbit around the Moon is proposed to support a growing user base. At present, though, this market does not exist. Similar to future terrestrial systems, governments will be required to incentivise commercial industry to develop this infrastructure.

This paper will explore how traditional approaches to the development of navigation infrastructure might evolve to support new systems. Diversified public-private models in other domains of space activity have been developed, such as in Earth Observation and Human Exploration, amongst others. New and adapted models will be proposed to fully support the future of navigation and timing.