

## Getting Galileo Back to Space

This year's European Space Policy Conference in Brussels saw familiar faces talking about new and unfamiliar things. While Galileo continues to perform well, delivering an ever-widening range of services, the problem of how to get Galileo satellites into space has forced the Union to take unprecedented, forward-thinking and, for some, uncomfortable steps.

Relief or resignation, reprieve or reprobation, flexibility, adaptability or surrender. These and other words spring to mind as the European Union (EU) works out how to represent its arrangement to launch Galileo satellites onboard a very non-European SpaceX launcher.

Thierry Breton, EU Commissioner for Internal Market, started the 2024 edition of the European Space Policy Conference on a familiar note: "We face many crises," he said. Indeed, recent years have seen a veritable multitude of new and unusual crises causing dismay and consternation on all fronts: financial, biodiversity, climate, COVID, climate again, Ukraine, others, and now Palestine. And then a lot can be accomplished in a crisis. In 2020, one prominent EU Commissioner reminded industrial stakeholders that, "in every crisis, there is an opportunity." Crises can make necessary and legitimate the changing of tack, the passing of extraordinary measures and the making of exceptions.

Read more in *Inside GNSS* article. <https://insidegnss.com/getting-galileo-back-to-space/2024-03-25>



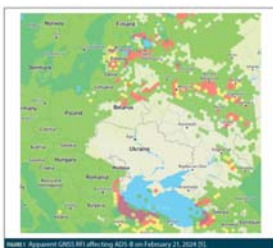
## GNSS Spoofing and Jamming in Eastern Europe

GNSS serves safety-of-life applications in aviation (e.g., precision approach and landing operations), land vehicles and marine users. One threat to these applications is radio frequency interference (RFI). A variety of RFI events affecting GNSS signal bands have been observed over the many years of GNSS usage. RFI leading to unexpected loss of GNSS navigation forces reliance on backup sensors and operational modes. While this is tolerable if sufficiently rare, equipping and planning for these events increases the cost and complexity of safety-critical navigation. Spoofing of GNSS signals also has been observed in the last few years and is more worrying because it could cause GNSS to output hazardously incorrect information and thus pose a direct threat to user safety.

Since the Russian invasion of Ukraine in February 2022, RFI and spoofing that appears to be both intentional and malicious has been observed in Eastern Europe. Most Western observers believe the Russian military is the source of these events, and its purpose is primarily military [2, 4]. However, these events also affect civil users and pose hazards that might not be intended but are no less real. This article examines what we have observed from recent RFI and spoofing in Eastern Europe, how it has affected civil aviation, and lessons for civil user safety and operational efficiency.

Read more in *Inside GNSS* article. <https://insidegnss.com/gnss-spoofing-and-jamming-in-eastern-europe/>

2024-03-26



## **FCC Warns of Security Risks**

The Federal Communications Commission (FCC) is investigating whether the use of Russian and Chinese foreign satellite systems by U.S. mobile phones and other devices poses security threats.

The FCC has concerns that U.S. handheld devices are receiving and processing GNSS signals from satellites controlled by foreign adversaries in violation of commission rules.

The FCC is seeking answers from handset manufacturers Apple, Google, Motorola, Nokia, Samsung and others that collectively cover more than 90% of the U.S. smartphone marketplace.

Read more in *GPS World* article. [https://www.gpsworld.com/fcc-warns-of-security-risks/?utm\\_source=Navigate%21+Weekly+News&utm\\_medium=Newsletter&utm\\_campaign=NCMCD240320003&oly\\_enc\\_id=1784A2382467C6V](https://www.gpsworld.com/fcc-warns-of-security-risks/?utm_source=Navigate%21+Weekly+News&utm_medium=Newsletter&utm_campaign=NCMCD240320003&oly_enc_id=1784A2382467C6V)

2024-03-26



## **Australian Space Agency Funding a National Aerospace-Grade GNSS Receiver**

The Australian Space Agency has initiated a proactive step toward bolstering Australia's capabilities in the aerospace sector through the Moon to Mars Supply Chain Capability Improvement Grants scheme. This move is marked by the funding of an aerospace grade Global Navigation Satellite System (GNSS) receiver, a project set to catalyse advancements in space and aviation technologies across the nation.

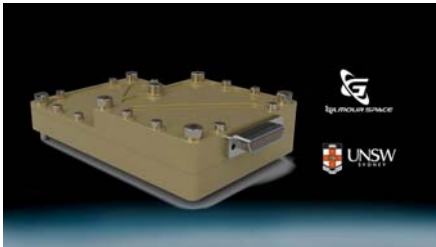
This ambitious project brings together Queensland's Gilmour Space Technologies and the University of New South Wales (UNSW), harnessing their collective

expertise to craft a GNSS receiver using an all-Australian supply chain. The device is targeted for a broad spectrum of applications across civil, commercial, and defence sectors, emphasising the importance of sovereign capabilities in position, navigation, and timing.

Reflecting on the project's significance, Kody Cook, Head of Software, Electrical, GNC & Avionics at Gilmour Space, acknowledged the unpredictable nature of the future and the importance of self-reliance. "With the future becoming less certain, we're thankful that Australia is investing into the sovereign development of exactly these types of fundamental capabilities. If we could use more Australian-made avionics in our launch vehicles and spacecraft, we would," Cook stated, underscoring the strategic importance of this initiative for the nation's aerospace endeavours.

Read more in *Inside GNSS* article. <https://insidegnss.com/australian-space-agency-funding-a-national-aerospace-grade-gnss-receiver/>

2024-03-19



### **GMV Spearheads ESA's Mission to Revolutionise Satellite Navigation with LEO Technology**

In a significant advancement for satellite navigation technology, the European Space Agency (ESA) has selected GMV, a global technology firm, for a pioneering mission. This 78.4 million euro project aims to demonstrate the potential of Low-Earth Orbit (LEO) satellites for enhancing Positioning, Navigation, and Timing (PNT) services. Traditionally, satellite navigation systems have depended on Medium-Earth Orbit (MEO) satellites. The move towards a multi-layered system incorporating LEO satellites promises users enhanced signal strength, reliability, and precision.

This comprehensive contract mandates GMV to lead the mission's entire spectrum, from satellite and payload development to launching services and the establishment of a Ground-Segment-as-a-Service (GSaaS). Furthermore, it encompasses the

creation of a test user receiver, system operations, and the demonstration of LEO-PNT services to end users. A constellation of five satellites will materialise this vision, starting with a 12U Cubesat-based technology demonstrator set to launch within 20 months from the project's inception. The subsequent deployment of four additional satellites by 2027 will complete the constellation.

Read more in *Space Daily* article.

[https://www.spacedaily.com/reports/GMV\\_Spearheads\\_ESAs\\_Mission\\_to\\_Revolutionize\\_Satellite\\_Navigation\\_with\\_LEO\\_Technology\\_999.html](https://www.spacedaily.com/reports/GMV_Spearheads_ESAs_Mission_to_Revolutionize_Satellite_Navigation_with_LEO_Technology_999.html)

2024-03-27



## **NPL to Propel UK's Advancement in Timing**

The National Physical Laboratory (NPL) has marked the inauguration of the first of three innovation nodes designed to enhance the United Kingdom's capabilities in the development of time-critical technologies. The initiative is aimed at sectors such as transport, telecommunications, fintech and quantum with the application of accurate and precise timing.

In a collaborative effort between NPL and host organizations, including the University of Strathclyde, the University of Surrey and Cranfield University, the Innovation Nodes stand as a cornerstone of NPL's National Timing Centre Programme. It represents the UK's nationally distributed time infrastructure and offers secure, reliable, resilient and highly accurate time and frequency data. This infrastructure is crucial for the development of new technologies in time-critical 5G and 6G applications, next-generation automated factories and connected autonomous vehicles.

Read more in *GPS World* article. [https://www.gpsworld.com/npl-to-propel-uks-advancement-in-timing/?utm\\_source=Navigate%21+Weekly+News&utm\\_medium=Newsletter&utm\\_campaign=NCMCD240320003&oly\\_enc\\_id=1784A2382467C6V](https://www.gpsworld.com/npl-to-propel-uks-advancement-in-timing/?utm_source=Navigate%21+Weekly+News&utm_medium=Newsletter&utm_campaign=NCMCD240320003&oly_enc_id=1784A2382467C6V)

2024-03-25



## Genesis and LEO-PNT: Pioneering the Future of Precision Navigation

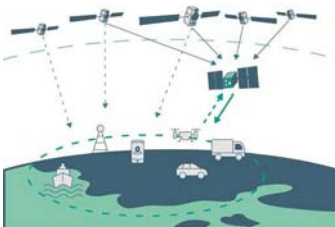
In a significant leap forward for global satellite navigation, the European Space Agency (ESA) has announced the launch of two groundbreaking missions, Genesis and LEO-PNT, under its FutureNAV programme. With a total investment of euro 233 million, these missions are poised to elevate Europe's stature in the satellite navigation arena, catering to the burgeoning demand for more resilient and precise navigation systems worldwide.

Javier Benedicto, ESA Director of Navigation, expressed enthusiasm about the project's potential, stating, "With Genesis and LEO-PNT, we are catering to the rapidly growing needs for enhanced resilience and precision in navigation, thereby cementing Europe's position at the helm of global satellite navigation, a sector that represents the largest downstream space market. Witnessing our industry's competitive edge in bringing these missions to fruition is truly exhilarating."

Read more in *Space Daily* article.

[https://www.spacedaily.com/reports/Genesis\\_and\\_LEO\\_PNT\\_Pioneering\\_the\\_future\\_of\\_precision\\_navigation\\_999.html](https://www.spacedaily.com/reports/Genesis_and_LEO_PNT_Pioneering_the_future_of_precision_navigation_999.html)

2024-03-20



## NT Opens Drone Consultation, Sets Challenge

The Northern Territory Government has released a Drone Industry Strategy that sets out a framework to drive the development of drone technologies to enhance traditional industries, deliver economic benefits and transform service delivery.

The Government says it is “targeting to get Territorians trained and working” in the drone industry, adding that a “mature drone industry has the potential to increase productivity and economic participation across all sectors and presents significant opportunities in regional and remote areas of the Territory”.

The Strategy sets out a plan for:

- Working with industry to sustainably grow the NT drone industry.
- Working with research and educational organisations to develop a skilled workforce required for the NT drone industry.
- Working with all levels of government to establish a regulatory environment that enables drone industry growth.
- Working with the public to increase awareness of and recreational use of drones.

Read more in *Spatial Source* article. [https://www.spatialsource.com.au/nt-opens-drone-consultation-sets-challenge/?utm\\_campaign=SS%20-%20Overall%20Publication%20-%20Master&utm\\_medium=email&hsmi=297966686&hsenc=p2ANqtz-9U8t1Wsk-JdrPywWakyYiQ3xsmsuzVjzuhpmtRMv2usZXK0cOoaiB203\\_8AGu164i5AbprNc4dRJ\\_dh-3DNMRvQrPDQ&utm\\_content=297966686&utm\\_source=hs\\_email](https://www.spatialsource.com.au/nt-opens-drone-consultation-sets-challenge/?utm_campaign=SS%20-%20Overall%20Publication%20-%20Master&utm_medium=email&hsmi=297966686&hsenc=p2ANqtz-9U8t1Wsk-JdrPywWakyYiQ3xsmsuzVjzuhpmtRMv2usZXK0cOoaiB203_8AGu164i5AbprNc4dRJ_dh-3DNMRvQrPDQ&utm_content=297966686&utm_source=hs_email)

2024-03-12



## Ginan Brings Enhancements and Invites Collaboration

Ginan, a home-grown and free to use open-source toolkit that determines precise point positioning with centimetre level accuracy based on global navigation satellite system (GNSS) observations has now released version 3.

“The latest enhancements to Ginan, allow users to use the toolkit to determine precise orbits for low Earth orbit (LEO) satellites,” said Anna Riddell, Director GNSS Analysis.

“The benefits of the version 3 release will see simplified software configuration, improved positioning performance, the ability to estimate LEO orbital trajectories as well as a range of bug fixes and performance improvements.

“This is a great achievement for Geoscience Australia and our collaborators which includes leading Australian universities, Curtin University, the University of Newcastle and RMIT University, as well as industry partners FrontierSI and the Industrial Science Group.

“Through this collaboration, we have already seen the impacts through research opportunities, such as RMIT University’s study on the Ionospheric effects of the 2022 Hunga Tonga Volcano Eruption and the Geoscience Australia, FrontierSI and the Australian Institute of Marine Science’s (AIMS) marine case study demonstrator.

Read more in *article...*

[https://www.ga.gov.au/scientific-topics/positioning-navigation/positioning-australia/positioning-news-and-updates/ginan-brings-enhancements-and-invites-collaboration?utm\\_medium=email&hsmi=298323499&hsenc=p2ANqtz-98yhEHM2g\\_yhIjXoF3eG5hr71rtsVZHNckM3XZd8voufo5w7aBT8omeYj\\_MO1sg9DC4YqfjuX9AKYeVFLfEeUsfx0qiQ&utm\\_content=298323499&utm\\_source=hs\\_email](https://www.ga.gov.au/scientific-topics/positioning-navigation/positioning-australia/positioning-news-and-updates/ginan-brings-enhancements-and-invites-collaboration?utm_medium=email&hsmi=298323499&hsenc=p2ANqtz-98yhEHM2g_yhIjXoF3eG5hr71rtsVZHNckM3XZd8voufo5w7aBT8omeYj_MO1sg9DC4YqfjuX9AKYeVFLfEeUsfx0qiQ&utm_content=298323499&utm_source=hs_email)  
2024-02-07



## Space Force Eyes Smaller, Cheaper GPS Satellites To Augment Constellation

The U.S. Space Force is reviewing ideas from the private sector on how to augment the Global Positioning System constellation with smaller, lower-cost satellites. The Space Force’s procurement arm, the Space Systems Command, last month issued a request for information probing the capabilities of the private sector to design a more affordable GPS spacecraft that is also interoperable with existing GPS infrastructure.



A network of 31 GPS satellites 12,000 miles above Earth broadcast positioning, navigation and timing signals. The military's current GPS spacecraft are built by Lockheed Martin. The company last year delivered the 10th and final of the GPS III model produced under a 2008 contract.

Lockheed Martin is now making a more advanced version of the GPS III, called GPS III F. The Air Force in 2018 awarded Lockheed Martin a contract worth \$7.2 billion for up to 22 GPS III F satellites. Ten have been ordered so far.

Read more in *article...*

<https://spacenews.com/space-force-eyes-smaller-cheaper-gps-satellites-to-augment-constellation/>

2024-03-04



## **Iridium Buys Service That Uses L-Band Satellites For GPS-like Positioning**

L-band satcom provider Iridium has reached a deal to acquire Satelles, a company that provides resilient navigation and timing to supplement GPS.

The vulnerabilities of GPS are well known: the signal strength of the satellite service is low, and can be readily "spoofed" by terrestrial jamming. GPS spoofing has been spotted with some frequency in parts of the Black Sea and near some Chinese ports.

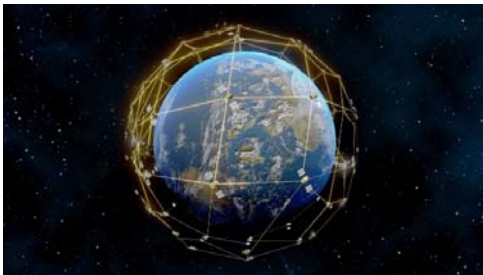
Satelles uses the Iridium satellite network to broadcast its own timing and positioning signals. The signal strength in its STL service is about 1,000 times stronger than GPS, according to Iridium, and it is "highly secure," the firm says.

Satelles' service has been in use since 2016, and its original target market is digital infrastructure installations that require precise timing services - like 5G base stations and commercial data centres. The world has about 10,000 data centres and growing, and they require time synchronisation to operate, Iridium says. For applications like this, the Iridium signal is powerful enough to serve indoor receivers, eliminating outdoor antennas. There is enough potential in this market (and other applications) that Iridium thinks the business line will be worth \$100 million a year by 2030.

Read more in *article*...

<https://maritime-executive.com/article/iridium-buys-service-that-uses-l-band-satellites-for-gps-like-positioning>

2024-03-04



## Detailed Review Of Resilient-PNT Policies Released

FrontierSI has undertaken a review of policy and activities related to positioning, navigation and timing (PNT) services, with the release of a new report and a white paper on the subject.

Australia's PNT ecosystem is almost entirely reliant on services such as the GNSS provided by other countries, leaving it vulnerable to interruptions and loss of access.

With the nation's economy and social fabric now dependent on digital technology and services, and facing increasing cyber threats, such vulnerability cannot be allowed to continue.

"PNT is an essential utility we presently have no control over," said Joshua Critchley-Marrows, FrontierSI Space PNT Lead.

"Australia's access to PNT is intrinsically linked to satellite-delivered services from foreign-owned and operated assets, such as the Global Positioning System from the USA.

“We must invest in our own infrastructure so we can ensure continuous access to this critical service that underpins nearly all aspects of our daily lives.”

Read more in *Spatial Source* article. [https://www.spatialsource.com.au/proposed-australian-resilient-pnt-plan-released/?utm\\_campaign=SS%20-%20Overall%20Publication%20-%20Master&utm\\_medium=email&\\_hsmt=296986371&\\_hsenc=p2ANqtz-8bAv6FhAei2BYfito6fNsejL7Sr9gJek-laMc5BD\\_HyqNDOfzAyijawszK\\_B6fLq\\_zzpphbjtRHq3Lx19iqBvNrG-RXg&utm\\_content=296986371&utm\\_source=hs\\_email](https://www.spatialsource.com.au/proposed-australian-resilient-pnt-plan-released/?utm_campaign=SS%20-%20Overall%20Publication%20-%20Master&utm_medium=email&_hsmt=296986371&_hsenc=p2ANqtz-8bAv6FhAei2BYfito6fNsejL7Sr9gJek-laMc5BD_HyqNDOfzAyijawszK_B6fLq_zzpphbjtRHq3Lx19iqBvNrG-RXg&utm_content=296986371&utm_source=hs_email)

2024-03-01



## First Steps Toward a Fully Operational LEO PNT Payload

The GNSS market has grown rapidly over the last decades. Consequently, the number of users and applications relying on GNSS is larger than ever. However, applications, especially safety-critical applications, suffer from the low signal strength and resulting threat of jamming, as well as the ease of spoofing. This vulnerability led to low Earth orbit (LEO) becoming a potential complement for satellite navigation. Over the past years, agencies and industry all over the world have carried out large efforts to develop solutions for positioning, navigation and timing (PNT) services from LEO. Furthermore, the New Space paradigm with its emerging private space industry and commercialization of services from space has enabled mega-constellations in LEO with hundreds to thousands of satellites, offering potential platforms for PNT services. The realisation of LEO PNT has been discussed extensively in literature, with three general architectures having emerged: Hosted satellite navigation payloads specifically designed for PNT services, fused payloads integrated in existing telecommunication payloads and leveraging arbitrary signals of opportunity from LEO for navigation without the need for a dedicated space segment.

Read more in *Inside GNSS* article. <https://insidegnss.com/first-steps-toward-a-fully-operational-leo-pnt-payload/>

2024-02-06



## **Italian Researchers Developing GNSS Test Facility for Urban Drone Navigation**

The term ‘urban air mobility’ (UAM) refers to a range of new and emerging services provided by aerial drones in urban settings, including people and goods transport, as well as monitoring and control aspects.

Speaking during a recent presentation of results of the first phase of the European Space Agency (ESA)-funded Aurora project, Margherita Lenoci, Project Manager at Telespazio, said, “We want to develop an integrated facility for testing and validating positioning, navigation and timing (PNT) technologies for UAM, and to support research and development of drone navigation capabilities.”

Specific objectives and goals include defining PNT requirements and designing a GNSS-based, supporting architecture for UAM/AAM. “We have developed the concept of a distributed PNT testing structure, that will link physically and geographically separated laboratories and other facilities of Italy’s Distretto Tecnologico Aerospaziale (DTA), Centro Italiano Ricerche Aerospaziali (CIRA) and Telespazio,” Lenoci said.

Read more in *Inside GNSS* article. <https://insidegnss.com/italian-researchers-developing-gnss-test-facility-for-urban-drone-navigation/>

2024-02-26



## Nepal To Require All Mount Everest Climbers To Use Tracking Chip

Ahead of the 2024 Mount Everest season, Nepal has announced a new requirement that all climbers must rent and use tracking chips on their journey.

“Reputed companies were already using them but now it’s been mandatory for all climbers,” Rakesh Gurung, director of Nepal’s department of tourism, told CNN.

“It will cut down search and rescue time in the event of an accident.”

He explains that climbers will pay \$10-15 apiece for the chips, which will be sewn into their jackets. Once the climber returns, the chip will be removed, given back to the government, and saved for the next person.

Tracking chips use the global positioning system (GPS) to share information with satellites.

Gurung added that the chips were manufactured in “a European country” but did not specify where or by which company.

Read more in *article...*

<https://edition.cnn.com/travel/nepal-mount-everest-climbers-tracking-chip/index.html>

2024-02-29



## DOT Issues Follow-Up Solicitation for Complementary PNT Testing and Evaluation

The U.S. Department of Transportation (DOT), through the Volpe National Transportation Systems Center in Cambridge, MA, has issued a new solicitation for proposals for the testing, evaluation, and performance monitoring of Positioning, Navigation, and Timing (PNT)-dependent safety systems and critical infrastructure sectors.

This initiative, part of the DOT's Complementary PNT (CPNT) Action Plan, aims to enhance the resilience of the nation's PNT-dependent systems by encouraging the implementation and adoption of CPNT services.

This Request for Quotation (RFQ) is a multiple-award solicitation that seeks proposals from vendors with operationally ready CPNT services for field testing and evaluation during the Rapid Phase of the CPNT Action Plan. It follows on from the September 2023 quick-turn RFI to seek industry input on CPNT technologies — see additional *Inside GNSS* reporting on likely contenders.

The main objectives detailed in the RFQ include deploying high Technical Readiness Level (TRL)  $\geq 8$  PNT services, evaluating these services under various conditions (including threat scenarios), and sharing results with Sector Risk Management Agencies (SRMAs) to promote CPNT adoption.

Read more in *Inside GNSS* article. <https://insidegnss.com/dot-issues-follow-up-solicitation-for-complementary-pnt-testing-and-evaluation/>

2024-02-14

