DOT Awards Contracts For CPNT Action Plan

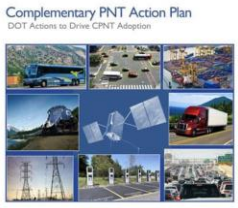
The U.S. Department of Transportation (DOT) awarded nine contracts for its Complementary Positioning, Navigation and Timing (CPNT) Action Plan.

The DOT's CPNT Action Plan was issued in September 2023. The Action Plan aims to promote the use of CPNT services in the nation's transportation systems and other critical infrastructure sectors. It provides a comprehensive roadmap to ensure the safety, security and efficiency of critical infrastructure through the adoption of CPNT technologies.

Also, in February 2024, the DOT, through the Volpe National Transportation Systems Center, issued a solicitation for proposals for the testing, evaluation and performance monitoring of positioning, navigation and timing (PNT) safety systems and critical infrastructure sectors.

Read more in *GPS World* article. https://www.gpsworld.com/dot-awards-contracts-for-cpnt-action-plan/?utm_source=Navigate%21+Weekly+News&utm_medium=Newsletter&utm_campaign=NCMCD240619003&oly_enc_id=1784A2382467C6V

2024-06-21



Advancing Australia's Seafloor Mapping

Australia's scientific infrastructure received a significant boost in 2014 with the arrival and commissioning of the advanced ocean-class research vessel, RV *Investigator*. The 94-metre vessel, which is operated by CSIRO, Australia's national science agency, represented a step change in Australia's capability to conduct marine and atmospheric research across our vast marine estate by providing a flexible platform for multidisciplinary science including atmospheric, biological, geophysical and oceanographic research. Central to the vessel's capability is a highly advanced suite of acoustic systems that enable high resolution seafloor mapping (bathymetry) to full ocean depth anywhere in Australia's Exclusive Economic Zone (EEZ) and beyond.

Ten years on, RV *Investigator* has mapped approximately 3 million square kilometres of seafloor and delivered these datasets to national and international repositories. In addition, the vessel has delivered programs of sub-seafloor mapping for national research efforts and been involved in the discovery of shipwrecks of national significance. These data have furnished our knowledge of the physical seafloor environment of our marine estate, contributing to national strategic objectives including ensuring our regional security and developing sustainable energy and resources.

Read more in *Spatial Source* article. https://www.spatialsource.com.au/advancing-australias-seafloor-mapping/?utm_campaign=SS%20-%20Overall%20Publication%20-%20Master&utm_medium=email&_hsenc=p2ANqtz-9gYvTSmfQ9lXt_aBayF1OzZmW5ZDyL9w5o3kwZib-OYdEQGwM4yqB6LErvYqisbdZblmQO6vIvTr4ntV5y-MkpYugmVw&_hsmi=313199758&utm_content=313199758&utm_source=hs_email

2024-06-21

Galileo Ground Segment Updates

The European Space Agency (ESA) has upgraded the ground segment of the Galileo satellite navigation system, without any disruption to its users. This update enhances the Galileo Control Segment responsible for managing the constellation of orbiting satellites.

The upgrade involved a series of improvements to both the operational control centres and the extensive network of ground stations. These enhancements are designed to boost the robustness and reliability of the Galileo system, which is crucial to critical applications such as navigation, timing services and emergency response.

With Galileo's First Generation close to completion, the ground segment required an upgrade to System Build 2.0 to bring critical enhancements to the system, especially for the roll-out of the Public Regulated Service (PRS), which provides highly accurate and robust encrypted signals for authorised governmental users

Read more in *GPS World* article. https://www.gpsworld.com/galileo-ground-segment-updates/?utm_source=Navigate%21+Weekly+News&utm_medium=Newsletter&utm_campaign=NCMCD240612002&oly_enc_id=1784A2382467C6V

2024-06-17

GPS Jamming Now Impacting Transatlantic Flights

On 19 June a flight from Madrid to Toronto was unable to ascend because a flight at a higher altitude had been affected by GPS jamming.

Read more in *article*…

https://www.msn.com/en-us/news/world/gps-jamming-now-seems-to-be-impacting-transatlantic-flights/ar-BB1oA9kj?ocid=BingNewsSearch

2024-06-20

London Underground Hosts Trials of GPS-alternative

Quantum Compass

Scientists at the Centre for Cold Matter at the Imperial College of London are busy these days transporting some unique items to the London Underground. Among these items is an array of lasers, rubidium atoms, and a vacuum chamber, all components to build and test a quantum compass on the iconic train service.

The Global Navigation Satellite System (GNSS) is a critical tool for the transportation industry today. Whether traveling by road, sea, or air, navigation

systems help determine the exact location of vehicles and compute arrival time to destination, a feature that is critical for maintaining supply chains.
However, the entire navigational system is prone to jamming by adversaries and is vulnerable when the weather is bad. Even if one were to improve the services in urban areas crowded by tall buildings and other constructions, the service would only be available for modes of transportation that are underground or work inside the water.

Researchers at the Centre for Cold Matter at ICL are developing a quantum compass that leverages the behaviour of subatomic matter to pinpoint an object's location accurately, regardless of where it is placed.

Read more in *article*…

https://interestingengineering.com/science/quantim-compass-london-underground

2024-06-17

Department of Transportation Selects 9 Vendors to Provide Complementary PNT Technologies for Field Testing

The Department of Transportation has awarded contracts to nine companies that will provide the Volpe National Transportation Systems Center with commercial complementary positioning, navigation and timing technologies to be subjected to field test trials.

During the tests, the Volpe Center will deploy the CPNT technologies in nominal as well as challenging conditions, evaluate them and use the resulting data in research work for the promotion of CPNT service adoption, according to a solicitation posted on SAM.gov.

CPNTs are envisioned as complementary services to be deployed in the event of disruption of conventional PNT capabilities, like the Global Positioning System, according to the DOT's Complementary PNT Action Plan.

Karen Van Dyke, director for positioning, navigation and timing & spectrum management at the DOT's Office of the Assistant Secretary for Research & Technology, said in an interview with Inside GNSS that the aim of the field trials is to get CPNT "thoroughly tested" so that its limits and vulnerabilities can be "well understood" before the agency can recommend its use.

Read more in *article*…

https://executivegov.com/2024/06/department-of-transportation-selects-9-vendors-to-provide-complementary-pnt-technologies-for-field-testing/

2024-06-20

Green Light for Galileo 2nd Generation Satellite Design

Production of Galileo Second Generation satellites advances as two independent Satellite Critical Design Review boards confirm the satellite designs meet all mission and performance requirements. This milestone is part of the schedule to develop the first 12 satellites of the Galileo Second Generation fleet.

The European Galileo navigation system, known for its precision, is preparing for the Second Generation (G2), which will enhance positioning, navigation, and timing capabilities.

The Second Generation fleet will consist of two different satellite families developed in parallel. Both models underwent assessment by ESA-led Critical Design Review (CDR) boards, where independent experts verified the satellites' design robustness and technical capabilities.

Read more in *Space Daily* article.
https://www.spacedaily.com/reports/Green_Light_for_Galileo_Second_Generation_Satellite_Design_999.html

2024-06-13

Space Force's Resilient GPS Program Draws Skepticism From Lawmakers

A congressional appropriations panel cast some doubt on whether a U.S. Space Force effort to protect its GPS system from signal jamming will be as resilient as the service hopes.

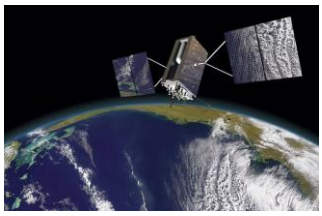
The Space Force said in February it was considering launching a constellation of small navigation satellites to augment the 31 GPS satellites now in orbit. The premise of the effort, dubbed Resilient GPS, would be to provide an additional layer of capability through a fleet of more affordable and smaller spacecraft.

But the House Appropriations defense subcommittee isn't sold on the idea that flying more GPS satellites will inherently boost resiliency, and its proposed fiscal 2025 defense spending bill raises questions about the Space Force's plan.

"While proliferation may provide some advantages, it is not clear how these additional satellites increase the resilience against the primary jamming threat to GPS, compared to alternative concepts for position, navigation, and timing systems being pursued elsewhere in the Department of Defense," lawmakers said in a report accompanying the bill, released June 12.
Read more in *article*…

https://www.c4isrnet.com/battlefield-tech/space/2024/06/12/space-forces-resilient-gps-program-draws-skepticism-from-lawmakers/

2024-06-13



Using LEO Signals of Opportunity for PNT

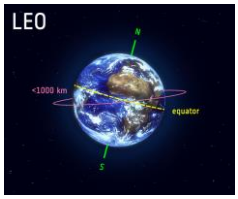
A new paper (June 2024) published in *Navigation*, the Journal of the Institute of Navigation, by Arial Baron, Pini Gurfil and Hector Rotstein of Technion-Israel Institute of Technology, describes a useful approach for navigation based on low Earth orbit (LEO) satellite signals of opportunity (SoOps), using carrier Doppler-shift observables.

The paper, entitled 'Implementation and Accuracy of Doppler Navigation with LEO Satellites', provides analytically derived and simplified formulas for the Jacobian

involved in the numerical computation of the navigation solution, and derives a global navigation satellite system-like dilution-of-precision metric that can be used to assess accuracy.

The use of SoOPs from LEO satellites has recently been proposed as a resilient alternative to GNSS-based navigation, thanks to their desirable characteristics for positioning, navigation, and timing (PNT) applications. LEO satellites are 25–40 times closer to Earth than their GNSS counterparts, which reside in medium Earth orbits (MEOs). This entails important advantages from a user viewpoint, including significantly stronger signals, which grant stronger immunity to jamming, and much shorter orbital periods, which entail the generation of robust Doppler effects that to be measured and used for navigation.

Read more in *Inside GNSS* article. https://insidegnss.com/using-leo-signals-of-opportunity-for-pnt/
2024-06-10



North Korea Spoofing Aircraft and Ships

On the morning of May 30, 2024, Benoit Figuet posted on X that 40 aircraft operating into and out of South Korea had been spoofed over the previous 18 hours.

According to a press release by South Korea's Ministry of Science and Information and Communication Technology (MSIT), by May 31 at 17:00 (KST), 201 airplanes and 731 ships had experienced GPS problems.

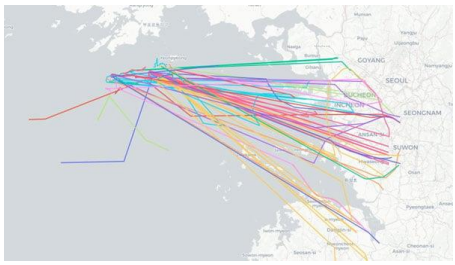
Professor Jiwon Seo at South Korea's Yonsei University reports that the interference has, as of June 3, entered its fifth consecutive day.

Benoit Figuet is the co-founder of SkAI Data Services in Zurich, Switzerland. In collaboration with the Zurich University of Applied Sciences, SkAI created the world's

first public Live GPS Spoofing Tracker website. The site uses ADS-B data to detect and display in near-real time, aircraft being spoofed around the world.

South Korean military authorities have identified North Korea as the source of interference. While the spoofing exhibits many of the same traits as interference in the Black Sea and elsewhere, Figuet has noted some differences. “We even see aircraft impacted at low altitudes,” he said. “We have observed this happening below 5,000 feet and even affecting an aircraft taxiing on the ground at the airport. The source must be at a reasonably high elevation or fairly close by.”

Read more in *GPS World* article. https://www.gpsworld.com/north-korea-spoofing-aircraft-and-ships/
2024-06-03



North Korea Jams GPS Signals Near Sea Border Amid Rising Tensions

North Korea has jammed GPS signals near the inter-Korean maritime border for the second consecutive day, intensifying regional tensions. The move follows the DPRK’s threats of military action if South Korean ships enter its waters in the Yellow Sea, according to South Korea’s Joint Chiefs of Staff (JCS).

The GPS jamming was detected north of the Northern Limit Line (NLL) in the West Sea for about an hour starting at 7:50 a.m. local time on Thursday, May 30. Marine radio broadcasts analysed by NK News confirmed that several ships in the Yellow Sea experienced GPS outages on both Wednesday and Thursday. One vessel near the NLL received an urgent message to turn around immediately due to the GPS issues, though it remains unclear if these ships were under South or North Korean flags.

Experts are uncertain whether North Korea’s actions were intended to provoke a conflict but warn that any accidental crossings of the sea border could be used as a pretext for a military response. Yong-han Park, a research fellow at the Korea

Institute of Defense Analyses (KIDA), suggested the jamming might be designed to create confusion among the South Korean Coast Guard and fishermen, potentially leading them to cross the NLL by accident.

Read more in *article*…
https://theatlasnews.co/latest/2024/05/30/north-korea-jams-gps-signals-near-sea-border-amid-rising-tensions/
2024-05-30

Space Warfare: How the Military Could Be Forced To Give Up GPS and Return To Navigating By the Stars

What would happen if satellite communications were taken down by enemy action during a war?

It's a question governments and militaries around the world are grappling with, and one of the more surprising answers is to train sailors brought up in a digital world to master extremely analog technology such as the use of sextants to navigate by the stars.

Prof Dale Stephens, from the University of Adelaide, is a co-editor of a new reference book for governments and civilians to understand the "rule of law in space in times of peace, heightened tension, and even armed conflict", a global collaboration that took more than five years and posed any number of hypothetical scenarios involving space warfare.

"If you bring down the world's GPS system, that we all rely on, then our digital world becomes sluggish and compromised and doesn't work," Stephens says.

"We go back to an analog world. We don't have the internet. We have analog communications. We use landlines, we watch analog television."

The military relies on space for communications, for position, navigation and timing (PNT) information, meteorology, intelligence, surveillance and reconnaissance.

Australia now recognises space as an operational domain, alongside air, sea, land and cyber, and has established a Defence space command.

Read more in *article*…
https://www.theguardian.com/science/article/2024/jun/01/space-warfare-military-defence-gps-satellites-navigating-by-the-stars
2024-06-01